ACCEPTABILITY OF HUMAN MILK BANKS AND ASSOCIATED FACTORS AMONG BREASTFEEDING MOTHERS WHO ARE VISITING PUBLIC HEALTH CENTERS FOR CHILD IMMUNIZATION IN HAWASSA CITY, SIDAMA REGION, ETHIOPIA, 2023: A MIXED METHOD.

RESEARCH REPORT

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NOVEMBER, 2023 G.C.

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A THESIS REPORT SUBMITTED TO THE

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DEGREE OF

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Approval sheet

The undersigned agree to accept responsibility for the scientific ethical and technical conduct of the research project and provision of required progress as per terms and conditions of the research office in effect of the time of great is forwarded as the result of this application.

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Abbreviations

BMI;Body Mass Index

BSc;Bachelor of Science

DHM;Donor Human Milk

DHMB;Donor Human Milk Bank

EDHS;Ethiopian Demographic and Health Survey

EMBA;European Milk Bank Association

FGDs;Focus Group Discussions

FMOH;Federal Ministry of Health

HIV;Human Immunodeficiency Syndrome

HM;Human Milk

HMB;Human Milk Banking

HMBANA;Human Milk Banking Association of North America

FGD; Focus Group Discussion

IgA;Immunoglobuline A

LBW;Low Birth Weight

MSc;Masters of Science

NEC:Necrotizing Entero Colitis

NICU;Neonatal Intensive Care Unit

NMR;Neonatal Mortality Rate

PDBM;Pasteurized Donor Breast Milk

SPSS;Statistical Package for the Social Sciences

U5MR;Under 5 Mortality Rate

US:United States

WHO;World Health Organization

Abstract

Background: Human milk banking is the process by which breast milk is collected, screened and pasteurized for the use to infants especially for premature and low birth weight neonates in health facilities or mothers who cannot breastfeed. This study was planned to discover acceptance of donor breast milk banking and its associated factors among breastfeeding mothers in Hawassa city public health centers, Sidama region, Ethiopia.

Objective: To assess acceptance and identify its predictors towards human milk banks among breastfeeding mothers who come for immunization to public health centers in Hawassa city, Sidama region, Ethiopia in 2023.

Methods: A mixed method was conducted between March 21 and 2023 to April 30 and 2023 among breastfeeding mothers who come for immunization to public health centers in Hawassa. Data were collected through Interviews and Focus group discussion (FGD). Multi stage (two stage sampling) sampling was conducted. The data were collected by using kobo toolbox and collected data were downloaded into Microsoft excel and then exported into SPSS version 26 for analysis. n=316.

Results: - With regards to accepting breast milk donation or banking and willingness to use donated milk for feeding infants 32.0% had good perception towards breast milk donation/willingness for donation, while 68.0% had poor perception and 32.0% had good perception towards donated breast milk/willingness to accept but 68.0% had poor perception. But the only difference is by their reasons.

Conclusions and Recommendations: - This study showed that the acceptance of breast milk donation for banking and its use for feeding infants was very low, due to lack of information and misconceptions about the safety of breast milk, along with religious reservations. Therefore, before the initiation of donor milk banking services, a program should be designed to create awareness about donor milk banking among donors and recipients and views of health professionals and policy makers should be collected as they are the immediate stakeholders for the implementation of human milk banking service.

Key words: - Human milk, Human milk bank, acceptance of human milk, donation of human milk, Hawassa, Sidama Region, Ethiopia.

1. Introduction

1.1 Background

Breast milk is collected, filtered, and pasteurized for use in hospitals or by moms who are unable to breastfeed as part of the procedure known as "human milk banking"(HMB)(Arnold, 2006). In 1909, the first human milk bank was established in Vienna, Austria, and soon after in Boston, America. Many milk banks have recently developed across the globe to reduce newborn feeding issues (Haiden and Ziegler, 2016).

Studies shows that human breast milk bank promotion and the collection of donor breast milk are linked so, by offering correct information about breast milk bank, women have an increased chance of successfully getting donor milk when not possibly can breastfeed their infant. Having a human milk bank in a health facility increases awareness about breastfeeding among families and the community (Arslanoglu et al., 2013)]. It is also known that successful breast feeding and possibly getting donor provided breast milk significantly reduces neonatal mortality and morbidity worldwide (Bhutta and Black, 2013), (Black et al., 2013). In addition, the availability of donor breast milk is very significant for infants whose mother cannot breastfeed because of medical problems such as maternal open pulmonary tuberculosis, cancer chemotherapy, HIV and other viral infections so, to fulfil this need, establishing donor breast milk banking is crucial (Arnold, 2006), (Eidelman et al., 2012).

Researches shows that Human milk (HM) is the preferred nutrition for all new born babies but more important for preterm infants and there are specific beneficial effects of breastfeeding in these infants as HM feeding reduces the risk of short term and long-term complications related to prematurity but not all mothers are able to provide their child with enough milk. The main benefits for preterm infants that receive DHM instead of formula are faster gastric emptying, faster attainment of full enteral feedings, improved gut growth and maturation, decreased risk of necrotizing enterocolitis and late onset sepsis, improved neurodevelopmental outcomes, less retinopathy of prematurity and improved visual development (Quigley et al., 2019, Hylander et al., 2001).

According to studies done around the world Austria, Denmark, Germany, Norway, Slovakia, Spain, Sweden, and Switzerland have national guideline for HMB. Differences exist between national guidelines as a result of variations in practices, regulation, and organization of HMBs in each country (Ighogboja et al., 1995).

Studies shows that over 500 human milk banks have been established with most being in Europe and USA with two hundred and six (206) being in Europe, forty-four (44) in Asia, four (4) in Australia and seventy (70) in Africa. Of those in Africa, sixty (60) are in South Africa, six (6)in Cameroon, one (1) planned in Kenya and one (1) in Nigeria ((Haiden and Ziegler, 2016)). There is wide variation of the acceptance of HBM worldwide ranging from 11% in Nigeria to 84% in India. Several factors have been identified to be associated with donating human breast milk. In Ethiopia the acceptance of donor milk banking was 5.8 times more likely among mothers who had heard about donor milk banking previously (AOR 5.8; 95% CI 3.1, 10.72), 4.2 times more likely among mothers who had heard about wet-nurses (AOR 4.2; 95% CI 2.5, 6.99) and 2 times more likely among mothers who had visited a neonatal intensive care unit (AOR 2; 95% CI 1.1, 3.73) (Mekonnen et al., 2013).

Researches shows that commonly reported reasons for donating HBM were "encouragement of a health professional" (61.3%) and "knowing the needs of the babies in the NICU" (25.3%). Most of the donors (49.9%) were introduced during their stay in the hospital to the human milk bank to which they donated, and 25.8% chose the bank recommended by a health professional. Health professionals play an indispensable role in motivating mothers to become human milk donors (Patel et al., 2013). Reasons for not accepting DHM included fear to transmit diseases (28%), fear of transfer of genetic traits (22 %) and religious and cultural taboos (14 %) and In addition were concerns about the safety of donor breast milk and discomfort about using another mother's milk (Rønnestad et al., 2005). Participants believed that education on the importance of breast milk and transparency on the processes involved in sourcing and preparing donor milk would improve the acceptability (Donovan, 2006).

1.2 Statement of Problem

The World Health Organization (WHO, 2018) reported that there are approximately 15 million infants born worldwide every year who are preterm (prior to 37 weeks of gestation), and this number has been rising (Patel et al., 2013). The number of preterm births in China ranks second in the world (approximately 1.2 million) behind India (WHO, 2018). Complications of preterm birth are the leading cause of death among children under five years of age; three-quarters of these deaths could be prevented with current cost-effective interventions and human breast milk is one of these cost-saving interventions (WHO, 2018). Studies have shown that improving breastfeeding behavior and donor breast milk can save 820,000 lives annually, and 87% of this group are infants under six months of age (Victora et al., 2016). In September 2015, the United Nations issued the goal of sustainable development to eliminate preventable neonatal and under-age-five mortality by 2030, and Human breast milk has been regarded as one of the effective interventions (United Nations General Assembly, 2015).

Many studies shows that human milk, widely understood to be beneficial for infants, can be lifesaving for preterm neonates, especially in reducing the risk of necrotizing enterocolitis. Donor human milk (DHM) is an option when mothers are unable to provide milk or have an inadequate supply for their infants. Ensuring acceptance and perception towards establishing a human milk bank for the benefit of premature newborns who are unable to receive their mothers' milk for various reasons is a common initiative. Many studies have shown that donor breast milk has short and long term benefits as compared to preterm formula (Henderson et al., 2001, Quigley and McGuire, 2014, Quigley et al., 2007) and has also been recommended by the World Health Organization (WHO).

However, in some cases, direct breastfeeding cannot be achieved. As a result, the American Academy of Pediatrics (AAP) recommends the introduction of donor human milk (DHM) to infants as a first alternative (Committee on Nutrition, 2017). It has previously been found that donor milk protects premature infants from necrotizing enterocolitis (NEC) (Gibbins et al., 2013; Hair et al., 2016; Kantorowska et al., 2016) and sepsis (Patel et al., 2013), which are two fatal diseases in newborns. Moreover, the supplement of DHM can significantly shorten hospital stays and lower hospitalization costs of low-birth-weight infants (Dritsakou et al., 2016).

Several studies have surveyed people's views on donated breastmilk, mostly among breast feeding mothers in developing and developed countries, and yielded different results. A study in Australia (a developed country) revealed that breastfeeding mothers believed that DBM was superior when compared to formula, and preferred it as the best feeding option for preterm infants (AL-Naqeeb et al., 2000). A study conducted in Zimbabwe (a developing country) reported that most of the healthcare workers had sufficient knowledge regarding breastmilk banks and those participants would accept the DBM to be fed to their own children. The participants were willing to donate and mostly would encourage the mothers to donate and use donated milk from the bank (Meneses et al., 2017). A study conducted in Indonesia indicated low acceptability of DBM among breastfeeding mothers and most mothers due to the fear of transmission of diseases from the donated milk (Ighogboja et al., 1995). In SA (Limpopo, Northwest and Kwazulu Natal provinces), healthcare workers were concerned about the safety of donated milk, particularly regarding HIV transmission and transportation of donated milk from the donor to the bank, which might affect the quality of the milk. These concerns were only reported amongst breastfeeding women receiving healthcare services at Mankweng hospital and clinic (Abhulimhen-Iyoha et al., 2015).

According to a study done in Eastern Ethiopia concerning acceptability and awareness of mothers about human breast milk banking (HBMB), 22.3% of mothers had heard about wet nurses but only 10% of mothers had ever heard about HBMB and 5.6% of mothers stated that collecting and storing human breast milk is useful (Mekonnen et al., 2013). With regards to accepting breast milk donation or banking and willingness to use donated milk for feeding infants, only 119 (11%) of the participants were willing to donate breast milk for banking and 165 (15.2%) of mothers were willing to feed donated breast milk to their infant. About 181 (16.7%) of the participants accepted donor human breast milk banking. The finding from FGDS also showed that there were supporting ideas to donate breast milk and use it for infant feeding. According to the participants who were willing to donate breast milk for banking; it was stated that donated milk is good for babies who cannot get their own mothers' breast milk (Mekonnen et al., 2013).

Hence, these conditions like mass death of infants particularly preterm and low birth weight infant due to sepsis, necrotizing enterocolitis, jaundice and so on have prompted us to conduct the study on the predictors of perception towards breast milk banks for feeding infants among mothers who come for immunizations to public health centers in Hawassa city, Sidama region Ethiopia.

For the purposes of the study, predictors of perception towards breast milk banks will be measured by the willingness of mothers to donate breast milk or to use the pasteurized donated breast milk for feeding their infants.

1.3 Significance of the study

Hawassa city health bureau can use the result of this study for establishing a human milk bank. Moreover, the study will be used as initial data for future researchers on acceptability of human milk banking and other related researches.

2. A Literature Review

2.1 Acceptance and willingness to donate and use donor human milk

Studies shows that Preterm birth, maternal illness, maternal death, delay in milk production, insufficient breastmilk supply and abandonment, mean that globally up to 40% of babies in neonatal units lack access to their own mother's breast milk (Brief, 2017, Lee et al., 2013). For these vulnerable infants, the WHO recommends donated breast milk, not formula, as the next best feeding option (santé et al., 2003, Organization, 2011).

Further, WHO recommends that if donor human milk (DHM) is needed, then it should be safely provided through a human milk bank. Human milk banking is the process by which donor breast milk is collected, screened, processed and stored thus providing a source of human breast milk for infants who would otherwise not receive it (Haiden and Ziegler, 2016). In milk banks in high-income settings, pasteurization reduces the risk of infection further. Although pasteurization also reduces the anti-infective properties and nutritional value of the breast milk, many studies have demonstrated both short and long-term benefits of donor breast milk over formula milk in preterm and LBW infants in high-income settings (Quigley et al., 2019, Patel et al., 2013, Edmond and Bahl, 2007, Bertino et al., 2009).

In Brazil, a middle-income country, the introduction of milk banks into their newborn health policy saw neonatal mortality drop by almost three-quarters (Rea, 1990). In resource-limited settings, formula milk is rarely affordable, safe or sustainable, and often either cow's milk or poorly prepared formula milk are used when breast milk is insufficient. Donor Human Milk is therefore likely to have a larger impact on vulnerable infants in these settings. Unfortunately, donor breast milk is currently rarely available in these settings(Black et al., 2013). Studies done in Hararge, eastern Ethiopia, in Addis Ababa Ethiopia and in Nigeria Africa shows that perception and willingness to donate and use donor human milk are low and are negatively affecting the society not to build HMB and provide access to donor human breast milk (Demographic, 2016, Coutsoudis et al., 2011).

2.2 Individual factors

2.2.1 Socio demographic variables

Several studies have suggested that establishment of Milk Bank is associated with an increase in exclusive breastfeeding rate and increased awareness of families and employees about the value of breastfeeding (Chagwena DT, Mugariri F, Sithole B, et al.) and HMB in the Europe ensures that donated human milk is safe and healthy without contamination or pathogenicity. Studies shows that Socio demographic factor like Age, sex, wealth index, religion, education of mother, physical incapacitation, mental incapacitation and associated pathology. For example: - The necessary criteria for donating milk in Iran include being a Muslim; having good moral/ethical values; being in good physical and mental health; having given birth within the last 12 months, being willing to perform the required blood tests with no history of HIV, hepatitis B, hepatitis C, tattoos or organ transplants; and having no history of drug use, addiction or smoking, and no regular use of incompatible medications (European Milk Bank Association: Italy; 2021).

2.2.2 Human Milk Banks related

Researches shows that number of families, breastfeeding, and information about milk bank, benefits of breast milk for infants and intention or acceptability to donate breast milk are factors for health seeking, for example: - Human breast milk is the best source of nutrition for all infants. It is vital for infants' growth, development and health and the World Health Organization (WHO) recommends exclusive breastfeeding for 6 months, with supplemental breastfeeding for 2 years or more (santé et al., 2003) and also height of the child and weight of the child are a concern, for preterm and low birthweight (LBW) infants (below 2500 g), the use of breast milk from milk bank becomes even more important (Hoddinott et al., 2008). In these high-risk infants, evidence from systematic reviews in high-income settings, shows that compared to formula milk, human breast milk reduces the risk of developing sepsis and necrotizing enterocolitis, two life-threatening diseases so HMB is crucial in advance (Quigley et al., 2019, Rønnestad et al., 2005, Boyd et al., 2007, Ganapathy et al., 2012, Cacho et al., 2017, Patel et al., 2013) and It has also been shown to reduce the incidence of retinopathy, neurodevelopmental impairment, childhood obesity and diabetes (Horta et al., 2016).

2.2.3 Awareness about Breastfeeding and Experience about breastfeeding difficulties

Studies shows that in countries where HMB has been successfully established, the key role of the healthcare providers is to ensure the acceptance and use of the Milk Bank as an important resource. Health care providers can encourage mothers to donate milk by providing vital information about the importance and the effects of donated milk on the infants who cannot receive breast milk from their mothers. Given that most mothers relied on health workers for information on donor human milk and breast milk feeding, it is important for health workers to have adequate knowledge on the subject and also level of the institution, availability of HMB, number of professionals, types of professionals, areas of the institution, availability of pharmacy, availability of laboratories, availability of waste disposal, availability of water, availability of ambulances matters (DeMarchis A, Israel-Ballard K, Mansen KA, Engmann C).

Pasteurized donor breast milk (PDBM) is not the same as fresh breast milk as it loses certain bioactive and immunological properties (Donovan, 2006, Patel et al., 2013, Rønnestad et al., 2005). The ingredients of human breast milk include immunoglobulins and other active constituents that can reduce infection, necrotizing enterocolitis, cardiovascular risk and metabolic diseases (Breastfeeding et al., 2012). If a mother's own breast milk is not available, the second choice should be donor breast milk (Schanler et al., 1999). Many studies have shown that donor breast milk has short- and long-term benefits as compared to preterm formula. This has also been recommended by the World Health Organization (WHO) (Quigley et al., 2007).

2.2.4 Health information factors (sources of information)

Based on information from many studies breastfeeding promotion and the collection of donor breast milk are linked. Availability of sources of information, availability of health education and health education delivery mood is very essential, by offering correct information about breastfeeding and human milk bank, women have an increased chance of successfully breastfeeding, donating milk and using the milk from the bank to their infant. Having a human milk bank in a health facility increases awareness about breastfeeding among families and the community (Arslanoglu et al., 2013). It is also known that successful breast feeding from the mother or milk bank significantly reduces neonatal mortality and morbidity worldwide (Bhutta and Black, 2013, Black et al., 2013). In addition, the availability of donor breast milk is very significant for infants whose mother cannot breastfeed because of medical problems such as

maternal open pulmonary tuberculosis, cancer chemotherapy, HIV and other viral infections (Arnold, 2006, Breastfeeding et al., 2012).

2.2.5 Maternal Conditions, ANC and Child factors

As shown by studies parents, problem coping mechanism, each parent relation with the child and siblings are the very limiting factors in infants in spite of donated human milk is the best source of nutrition for all newborn babies and more specifically, a mother's breast milk is the first choice of nutrition for those who are preterm, have low birth weight, are unwell (Breastfeeding et al., 2012) and for those vulnerable infants in the Neonatal Intensive Care Unit (NICU) (Haiden and Ziegler, 2016, Quigley and McGuire, 2014). In Ethiopia, the Neonatal Mortality Rate (NMR) has always been very high with an estimated 63% of infant deaths occurring during the first month of life. According to the Ethiopian Demographic and Health Survey (EDHS) of 2011 report, the Neonatal Mortality Rate accounted for 42% of Under-Five Mortality (U5MR) (Demographic, 2016). In spite of many efforts made for the improvement of maternal and child health care services by the government and other stakeholders, the reduction of NMR has remained insignificant. For the years 1991–1995 NMR was reduced from 46 per 1000 live birth to only 42 for 1996–2000, to 39 for 2001–2005, and to 37 for 2006–2011 (Mekonnen et al., 2013) In Ethiopia, a study conducted in 2007 and 2013 also indicated that prematurity (26.4%), pneumonia (22.6%), neonatal tetanus (9.4%) and sepsis (7.5%) were the leading causes of neonatal mortality (Mekonnen et al., 2013).

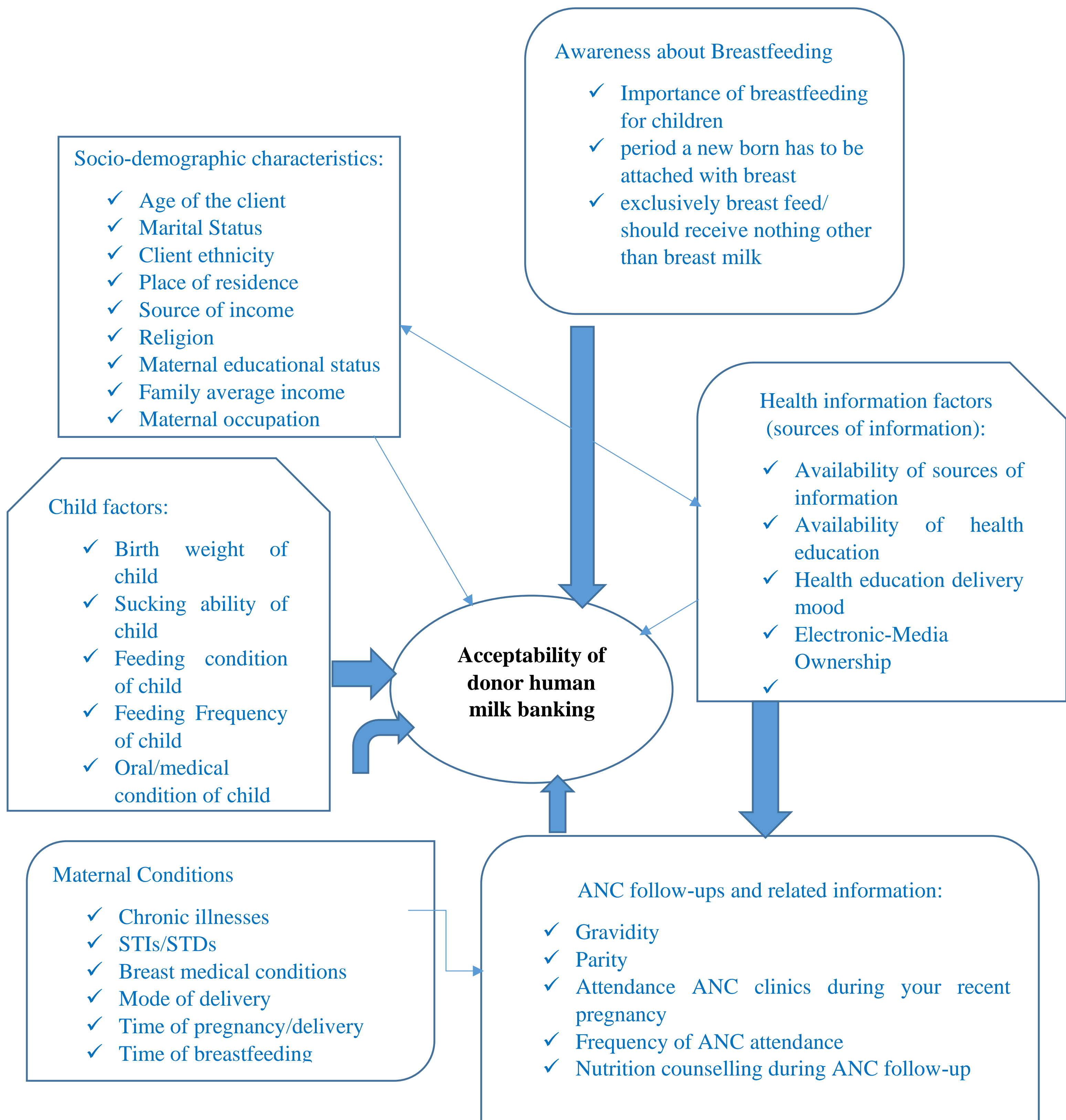


Figure 1 Conceptual Framework from reviewed literature

3. Objectives

3.1 General objective

- ✓ To assess acceptance and identify its predictors towards human milk banks among breastfeeding mothers who come for immunization to public health centers in Hawassa city, Sidama region, Ethiopia in 2023.

3.2 Specific Objective

- To determine level of willingness of breastfeeding mothers to donate human breast milk to milk banks in Hawassa city, Sidama region, Ethiopia in 2023 G.C.
- To determine level of willingness of breastfeeding mothers to accept human breast milk from milk banks in Hawassa city, Sidama region, Ethiopia in 2023 G.C.
- To identify factors associated with acceptance of human breast milk banking in Hawassa city, Sidama region, Ethiopia in 2023 G.C.
- To explore perceived barriers towards human milk banking among breastfeeding mothers who come for immunization to public health centers in Hawassa city, Sidama region, Ethiopia in 2023 G.C.

4. Materials and Methods

4.1Study Setting

The research was conducted at Hawassa city, Sidama, Ethiopia. It is located 273 km south of Addis Ababa and 130 km east of Wolaita Sodo and 75KM north of Dilla. The city administration is divided in to 8 sub cities and 32 kebeles. The city has 83 public and private health institutions. These are 17 health posts, 9 heath centers, 51 private clinics, four private primary hospitals and one general and one comprehensive specialized hospital. Generally, the city contains 28 governmental facility and 55 private facilities.

According to projections of the central statistics authority of Ethiopia, Hawassa's population is estimated to be 436,992 in 2012 E.C. The City's population gender breakdown will be relatively evenly split between male (224,907 /51.4 %/) and female (212,085 /48.6% /). Out of the total number of the Population of the city administration 292,525 people live in urban area, while the remaining 144,467 peoples live in the rural area of the administration.

Hawassa has a young population. Around 65% of the people are under 25 years of age, and only about 5.5% of the population is over 50 years of age. The annual population growth rate 4.02. 4.8% growth rate in urban and 2.8% growth rate in rural areas of the city.

Hawassa has a reproductive age group (15-49 years of age) 25,978. According to the information from Hawassa health bureau there are about 4,564 mothers who are breastfeeding but from immunization logbook I found that only 2908 breast feeding mothers come to the 9 health centers in Hawassa city. (https://web.archive.org/web/20090609000004/http://www.awassacity.gov.et/).

4.2Study design and period

- ✓ A cross sectional study was conducted among breast feeding mothers who come for immunization to public health centers in Hawassa city to assess acceptance and predictors towards human milk bank in 2023 G.C.

AND

- ✓ Analytical phenomenology was conducted among breast feeding mothers who come for immunization to public health centers in Hawassa city to assess acceptance and predictors towards human milk bank in 2023 G.C.

4.3 Population

4.3.1 Source population

All breast-feeding mothers who come for immunization to public health centers in Hawassa city.

4.3.2 Study population

Breastfeeding mothers who come for immunizations to selected public health centers present during data collection period.

4.3.3 Study unit

- ✓ A breastfeeding mother

4.3.4 Eligibility criteria

Inclusion criteria: Breastfeeding mothers who come for immunizations to selected public health centers.

Exclusion criteria: If the mother was unstable or ill, if the child was crying and disturbing the mother, the mother who was not present during data collection period.

4.3.5 Sample size determination and sampling procedure

4.3.5.1 Sample size determination for First objective

Sample size was computed using single population proportion formula based on the following assumptions: true population proportion or estimated taken from the study conducted in eastern Ethiopia prevalence (P) = 0.11 (Gelano et al., 2018a), absolute precision (d) = 0.05, and 95% confidence level. To account for incomplete medical records, a 5% non-response rate will be added. Thus, the final sample size was 158.

Sample Size n=z2 (p q)/d2 $n=1.96^2*(0.11*0.89)/0.05^2$, n=3.84 (0.0979)/0.0025 n=150

By adding 5% non-response rate (8), multiplying with a design effect of 2, the total sample size was 316.

4.3.5.2 Sample size determination for second objectives

Double population proportion formula was used to determine the sample size for the factors associated with acceptance of human milk banking. Sample size was calculated for some of the associated factors obtained from different literatures by using computer-based Epi info 7(2) with the following assumption.

- 95% confidence level and 5% margin error
- Power = 80%

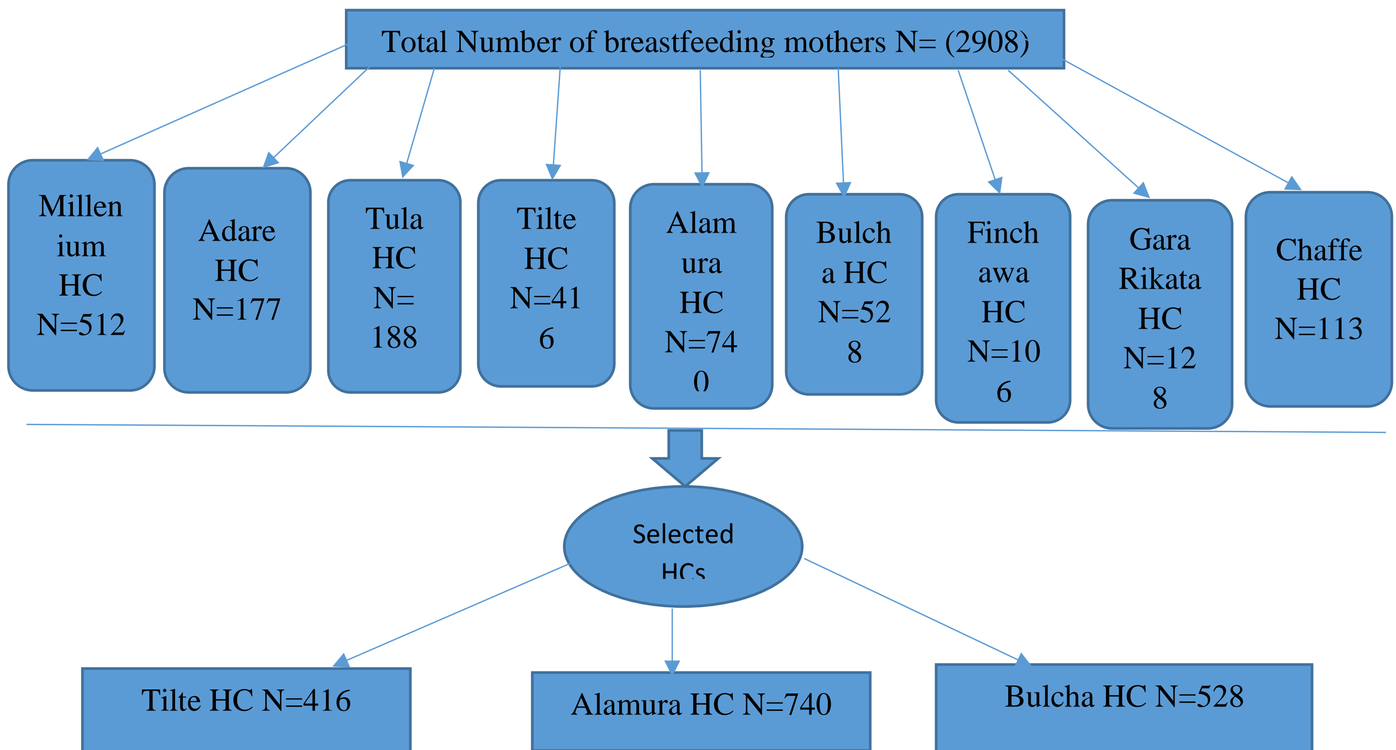
Table 1: Sample size calculation for second objective based on different factors associated with human milk banking in Hawassa city, Sidama region, Ethiopia 2023.

Variables	Acceptance of human milk banking		References
	Yes	No	
Use of health care services	21.6%	46.8%	Bogale and Tefera 2020
Antenatal visits during pregnancy (ANC)	37.3%	62.7%	Gizaw, 2019
EPI use	40.9%	59.1%	(Eskezia , et al.,2018a)

- *The largest sample was found to be **316** from the first objective.*

4.3.6 Sampling Technique

Multi stage (two stage sampling) was conducted in this study. In the first stage public health centers was selected using simple random sampling technique. In the second stage lactating mothers was selected using systematic random sampling technique. The total number of lactating women was determined from immunization log book. We selected women every K value where K= N/n. N= total number of lactating women who come for immunizations in the study period. n= sample size. So, from 9 public health centers found in Hawassa city 3 was selected by lottery method i.e. Millennium HC, Adare HC, Tula HC, Tilte HC, Alamura HC, Bulcha HC, Finchawa HC, Gara Rikata HC, Chaffe HC. From immunization log book in Health Centers the total number of breastfeeding mothers are 2908 i.e. Millenium HC had 512, Adare HC had 177, Tula HC had 188, Tilte HC had 416, Alamura HC had 740, Bulcha HC had 528, Finchawa HC had 106, Gara Rikata HC had 128, Chaffe HC had 113. SO, K= 2908/316=9.202 which was 9. By simple random sampling Tilte HC, Alamura HC and Bulcha HC was selected.



K= N/n=2908/316=9.202=9

Sample size for qualitative data

A total of four Focus Group Discussions (FGDs) each group consist of 6 study participants was conducted. Sample size was determined by saturation of information and another special group was organized other than the group on the quantitative study.

4.3.7 Study variables

Dependent Variable

The dependent variable in this study was willingness to donate and accept of donor human milk banking

Explanatory variables

The explanatory variables in this study consisted of socio-demographic characteristics: Age of the client, Marital Status, Client ethnicity, Source of income, Religion, Maternal educational status, Family average income, maternal occupation. Furthermore, Health information factors (sources of information), ANC follow-ups and related information, Child factor, Maternal Conditions.

4.3.8 Operational definition

Human breast milk banking /HBMB: - Refers to a service which collects, screens, processes, and dispenses donor breast milk to hospitals or recipients.

Acceptance of breast milk donation: - Refers to a mother's willingness to donate breast milk for banking.

Acceptance of use of donor milk: - Refers to a mother's willingness to use/accept pasteurized donated breast milk.

Acceptance of donor milk banking: - *A mother was considered to accept donor breast milk banking if she had willingness to donate breast milk for banking and/or she had willingness to use/ accept donor breast milk and if answered both the questions for donating and accepting as a yes.*

Awareness of mothers about donor milk banking: - A mother was considered to be aware about donor breast milk banking if she had ever heard about donor milk banking.

Human milk donation: - Refers to the act of the breastfeeding mother to give breast milk for human milk banking.

Wet-nurse: - Refers to a mother who breast feeds for another's baby.

4.3.9. Data quality control measure

A structured and pre-tested questionnaire, as well as an observational checklist, were used to collect data to assure data quality. Two days of training was given to all data collectors, and supervisors following with training manual developed beforehand. The collected information was frequently checked at the field by the supervisors. The overall supervision was made by the principal investigator. A questionnaire was checked for completeness every night at the time of data collection. Feedbacks on previous day activities were given to both supervisors and data collectors. {Gelano, 2018 #176} {Meneses, 2017 #177}

4.3.10. Data analysis

Data were collected and entered using Kobo toolbox statistical software and then exported into SPSS version 26.0 for analysis. For most variables in the study, descriptive statistics were generated utilizing statistical measures such as percentages, means, and standard deviations. The goodness of fit was tested by Hosmer-Lemeshow statistic tests and omnibus test. The model was considered a good fit since it is found to be insignificant for Hosmer-Lemeshow statistic (p=0.129) and significant for Omnibus tests (p=0.000). The bivariate analysis was used primarily to check which variables were associated with the dependent variable individually. All variables with $P \leq 0.25$ in the bivariate analysis were included in the final model of **multivariable** analysis in order to control all possible confounders. In addition, variables which were significant in previous studies and from context point of view was included in the final model even if the above criteria are not meet. The multi co-linearity test was carried out to see the correlation between independent variables using VIF and tolerance tests, no variables were observed with VIF of >5 or tolerance test <0.1. Finally, the variables which had significant association was identified based on AOR, with 95% CI. Later, in this study, P-value < 0.05 was considered as a cutoff point to declare a result as statistically significant.

4.3.10 Data processing and analysis

4.3.10.1 Data preparation

The collected data by kobo toolbox was entered and checked for consistency and completeness using SPSS version 26.

4.3.10.2 Descriptive analysis and log regression

Inconsistent values were double checked against the filled questionnaire and corrected as necessary. Descriptive statistics were summarized using percentage and median, and presented using tables and figures. Finally, the presence of association between dependent and independent variables was checked using chi-square test statistics. Variables which show association from chi-square test statistics was taken for further analysis using binary logistic regression model. Variables which showed significant association with p value less than 0.25 will be a candidate variable for multi variable logistic regression analysis. Multivariate analysis was used to control possible confounders and their 95% CI was used to measure the association. P-value < 0.05 was taken as level of significance used to decide the significance of statistical tests. Finally, the results were presented in texts, tables and graphs. The multivariable models were checked for evidence of lack of goodness of fit as suggested by Hosmer and Lemeshow.

4.3.10.3 Qualitative data analysis

Thematic analysis is used by systematic approach to identifying, analyzing and interpreting patterns, themes and meanings. First familiarization which was began by transcription or recordings of FGD. Secondly, coded, the theme had been developed and then reviewed and refined the themes and then finally interpreted and reported.

4.4. Ethical approval and permission to chart review

Ethical approval and clearance (Ref. No: DUB/291/15) were obtained from institutional review board from Hawassa University college of Medicine & Health Sciences. Permission letter was obtained from concerned bodies of Hawassa city government health institutions to review charts. Names and unique card numbers of patients was not included in the checklist. Moreover, data collectors and the supervisor were health professionals who have work experience in the EPI to maintain confidentiality of clients. Information retrieved was used only for the study purpose. This study was conducted according to the protocol and ethical principles of the Declaration of Helsinki by the World Medical Association and also to the principles that govern medical research

involving human subjects specified by the Council for International Organizations of Medical Sciences.

5. Result

Quantitative

Socio-demographic characteristics

All study participants give full response making a response rate of 100%. Of the 316 breastfeeding mothers who were surveyed at the three selected public health centers, the mean age was 27.82 years with SD± 4.836. Nearly all, 97.8% were married.

Table 2- Socio-demographic characteristics of breastfeeding mothers who come for immunization to selected public health centers in Hawassa city, Sidama region, Ethiopia in 2023. (n=316)

Variables	Category	Frequency	Percent (%)
Age of the client(years)	15-19	6	1.9
	20-24	74	23.4
	25-49	236	74.7
Marital Status	Married	309	97.8
	Single Mom	7	2.2
Client ethnicity	Sidama	167	52.8
	Wolayita	43	13.6
	Oromo	30	9.5
	Amhara	49	15.5
	Tigray	20	6.3
	Others	7	2.2
Source of income	Father	34	10.8
	Mother	7	2.2
	Both	275	87.0
Religion	Orthodox	104	32.9
	Muslim	15	17.4
	Protestant	95	30.1
	Catholic	38	12.0
	Other (Jobha witnesses, Adventists and Hawariats)	24	7.6

Maternal educational status	Not attended Formal education	85	26.9
	Elementary (1-8)	19	6.0
	High school (9-12)	31	9.8
	Certificate (TTI and/or less than diploma)	20	6.3
	Diploma	39	12.3
	Degree or above	122	38.6
Family average income (ETB)	<10,000	197	62.3
	10,001-20,000	96	30.4
	20,001-30,000	19	6.0
	30,001-40,000	4	1.3
Maternal occupation	Managers	12	3.8
	Professionals	51	16.1
	Technicians and associate professionals	20	6.3
	Clerical support workers	10	3.1
	Service and sales workers	113	35.8
	Skilled agricultural, forestry and fishery workers	30	9.5
	Craft and related trades workers	42	13.3
	Plant and machine operators and assemblers	25	7.9
	Elementary occupations	11	3.5
	Armed force occupations	2	0.6

Sources of health information

The sources of information were almost the same i.e., peers, TV, radio, school and community and less were known about newspaper. Health education coverage was 98.4%, and health education delivery mood was majorly drama and social media, majority of the participants had electronic media coverage and majority of them (98.6%) had attended breast feeding related nutrition counseling or education in person or through media.

Reproductive Characteristics

Of the participants asked about ANC follow-ups and related information Gravidity mean 2.78 ± SD 1.200, Parity mean 2.78 ± SD 1.187, 98.7% attended ANC clinics during recent pregnancy, 53.8 attended ANC four times for recent pregnancy and 94.0% counseled about nutrition during ANC of most recent pregnancy. Mode of delivery SVD 43.4%, Episiotomy 38.3% and CS 18.4%, 89.9% were term, 6.6% were preterm and 3.5% were post term,

Table 3: Reproductive Characteristics of breastfeeding mothers who come for immunization to selected public health centers in Hawassa city, Sidama region, Ethiopia in 2023. (N= 2908).

Variables	Category	Frequency	Percent (%)
Gravidity	1	46	14.6
	2-5	262	82.9
	>5	8	2.5
Parity	1	43	13.6
	2-5	266	84.2
	>5	7	2.2
Attended ANC clinics during recent pregnancy	Yes	312	98.7
	No	4	1.3
Times attended ANC for recent pregnancy	Once	3	0.9
	Twice	11	3.5
	Three Times	68	21.5
	Four Times	170	53.8

	Five Times	38	12.0
	More	22	7.0
Counseled about nutrition during ANC of most recent pregnancy	Yes	297	94.0
	No	19	6.0
Chronic illnesses	Cancer	2	0.6
	Diabetes	34	10.8
	Hypertension	36	11.4
	Others	60	19.0
STIs/STDs	HIV/AIDS	5	1.6
	Gonorrhea	4	1.3
	Syphilis	28	8.9
	Others	4	1.3
Breast medical conditions	Breast wound	16	5.1
	Breast cancer	3	0.9
	Mastectomy	2	0.6
	Breast tumor	6	1.8
	Burning sensations	37	11.7
Mode of delivery	SVD	137	43.4
	Episiotomy	121	38.3
	CS	58	18.4
Time of pregnancy/delivery	Term	284	89.9
	Preterm	21	6.6
	Post term	11	3.5
Time of breastfeeding	Busy	159	50.3
	Free	38	12.0
	Unknown	119	37.7
Production of milk	Yes	237	75.0
	No	79	25.0

Child Factors

Birth weight mean 3195 g ± SD 464.5g and 75.0% were between 2501g & 2500g. Most of the children have good sucking ability and good feeding condition.

Table 4: Child Factors of breastfeeding mothers who come for immunization to selected public health centers in Hawassa city, Sidama region, Ethiopia in 2023. (n=316).

Variable	Category	Frequency	Percent (%)
Birth weight of child(gram)	1001-1500	1	0.3
	1501-2500	18	5.7
	2501-3500	237	75.0
	3501-4200	55	17.4
	>4200	5	1.6
Sucking ability of child	No	39	12.3
	Yes	277	87.7
Feeding Frequency of child	Twice	16	5.1
	Four times	55	17.4
	Six times	131	41.5
	Others	114	36.1

Human milk banks acceptance /willingness to donate and/or willingness to accept

With regards to accepting breast milk donation or banking and willingness to use donated milk for feeding infants 32.0% were willing to donate while 68.0% were not willing to donate. The reasons were: 9.2% said contamination, 9.2% infection, 8.9% taboo, 1.9% unknown and 1.3% replied unsafe 66.5% remained unanswered or/had no reason and 32.0% were willing to accept donated milk while 68.0% were not willing to accept donated milk. The reasons 8.2% said contamination, 9.2% infection, 8.9% taboo, 1.9% unknown, 3.8% replied not fresh and 1.6% replied unsafe 66.5% remained unanswered or/had no reason.

Table 5: Human milk banks related data /willingness to donate and/or willingness to breastfeeding mothers who come for immunization to selected public health centers in Hawassa city, Sidama region, Ethiopia in 2023. (n=316).

Variables	Category	Frequency	Percent (%)
Conditions that oblige women not to breast feed or newborns not to get breast milk	Yes	265	83.9
	No	51	16.1
Heard that human body fluids or organs can be donated to others	Yes	276	87.3
	No	40	12.7
Can be donated	Blood	276	87.3
	Eye	150	47.5
	Kidney	126	39.9
	Breast milk	73	23.1
	Others	103	32.6
Attitude towards donation or/ Practice of donation	Yes	175	55.4
	No	141	44.6
Attitude towards accepted/donated human body fluid or organ	Yes	151	47.8
	No	165	52.2
Heard about HMBs	Yes	73	23.1
	No	243	76.9
Would you donate your breast milk to human milk bank?	Yes	101	32.0
	No	215	68.0
Would you accept donated breast milk from bank	Yes	101	32.0
	No	215	68.0

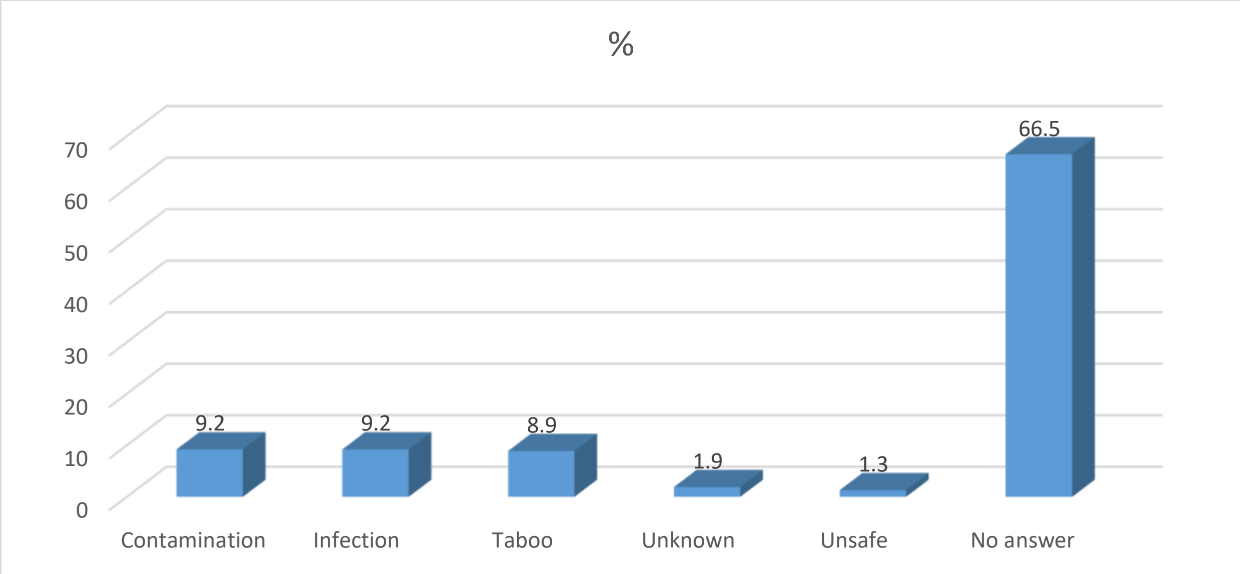


Fig2: Reason for poor willingness to donate

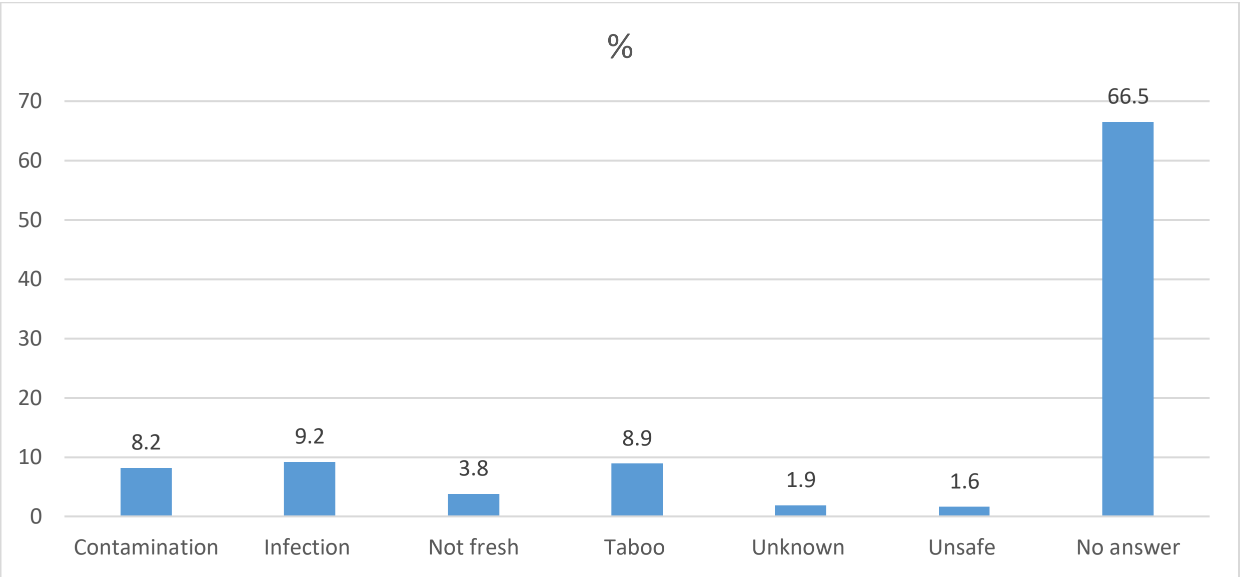


Fig3: Reason for poor willingness to accept

Acceptance of human milk banking and associated factors

In this study, the factors associated with the acceptance of breast milk banking were also assessed. In bivariate logistic regression variable with P- value of 25% were considered for multivariable logistic regression and statistical significance was take at P value of less than 5% at confidence level of 95%.

Acceptance of breastfeeding mothers were 2.2 times more likely among sources of income from both (AOR 0.632; CI 95% 0.01, 0.83) compared to sources of income from Father (AOR 0.53; CI 95% 0.007, 0.83). ANC follow-ups and related information acceptance of breastfeeding mothers were 5 times more likely among gravidity 1 (AOR 0.015; CI 95% 0.001, 0.71) compared to gravidity 2-5 (AOR 0.075; CI 95% 0.03, 0.78).

Table 6: Bivariate and multivariable logistic regression to identify factors associated with acceptance of donor milk banking among breastfeeding mothers who come for immunization to selected public health centers in Hawassa city, Sidama region, Ethiopia in 2023. (n=316).

Variable	Outcome Variable		COR (95% CI)	AOR (95% CI)
	Acceptance of HBMB			
	No	Yes		
Source of income				
Both	177	87	0.69(0.15,0.96) *	0.63(0.01,0.83) *
Father	30	7	0.18(0.03,0.23) **	0.53(0.007,0.83) **
Mother	8	7	1	1
ANC follow-ups and related information				
Gravidity				
1	37	9	0.24(0.05,0.56) *	0.015(0.001,0.714) *
2-5	160	86	0.51(0.12,0.97) **	0.075(0.03,0.78) **
>5	18	6	1	1
Parity				
1	35	8	0.17(0.03,0.92)	0.88(0.10,2.67)
2-5	170	86	0.38(0.08,0.72)	0.05(0.04,0.75)
>5	10	7	1	1
Counseled about nutrition during ANC of your most recent pregnancy				
Yes	18	1	0.11(0.01,0.83)	0.02(0.003,0.12)
No	197	100	1	1
Ever practiced wet nursing				
Yes	211	41	0.013(0.004,0.04)	0.004(0.001,0.034)

No	4	60	1	1
Ever heard about HMBs				
Yes	211	32	0.01(0.003,0.03)	0.07(0.01,0.44)
No	4	69	1	1

Qualitative

PERCEIVED BARRIERS TO ACCEPTANCE OF HMB

To support with qualitative findings, I have explored perceived barriers to acceptance of HMB

For this purpose, I have used A total of four Focus Group Discussions (FGDs) each group consist of 6 study participants was conducted. Most of the participants on the FGD were from urban, age category of 25-29 married Sidama ethnic group, their family's average income was <10,000 ETB and majority of them were Service and sales workers.

Table 2: Summary of findings on barriers to acceptance of HMB

Participants descriptions	**Sub-themes**	**Themes**
No information about HMB No health education Not heard about HMB Not understanding HMB	About Human milk bank	Information gap
Is dirt Disgusting Not appropriate	Fear of contamination	Disease transmission
Fear of HIV infection Fear of different illnesses	Infection	
Disease transmission from one to another I fear AIDS disease	Disease transmission	

Fear of cancer Not fresh	Safety of donated breast milk	
I am Muslim Not welcome in our religion	Religion	Culture
It is shame Very shy Taboo	Taboo	

INFORMATION GAP

Most of the participants on the FGD had health and nutrition awareness creation broadcasts through mobile, radio or television and so, most of them are electronic media owners but did not hear about milk banking.

Most of the participants in the FGDs stated that they did not know about human breast milk banking or donor breast milk banking.

A 28-year-old mother said that, "I have heard about donated human milk for infants feeding from other countries, such kinds of practices are especially present in orphanages but in our country, there are no such kinds of practice."

DISEASE TRANSMISSION

The finding from FGDs also showed that reasons for being unwilling to use donor breast milk for feeding infants were also due to fear of contamination, infection, disease transmission and safety of donated breast milk.

A 24-year-old mother stated that, "I fear the transmission of different diseases from the use of donated human breast milk for infant feeding. Especially diseases such as HIV can be transmitted to baby through donated breast milk."

On this issue a 26-year-old mother explained, "It is not good to feed someone else's breast milk to my baby because there are some diseases such as cancer that can be transmitted to baby through breast milk."

CULTURE

The other concern which was mentioned by the participants was the issue of milk sharing and religion and taboo. Some of the participants from FGDs were concerned that human breast milk sharing is prohibited.

Another mother stated that, "It is not acceptable to use someone else's breast milk for infant feeding because it is not good and the milk may expire is not fresh. I do not like to donate my breast milk for other infants, because I do not think that my breast milk is good for other babies and Taboo." (21-year-old mother).

A 23-year-old Muslim mother stated, "I will not give donated breast milk to my baby; rather I prefer to use other feeds such as cow milk or formula milk than donated milk. It is not right to feed someone else's breast milk to infants even if the baby cannot get his mother's own breast milk, rather it is better to feed formula or cow milk by bottle. In the Muslim religion we do not support feeding someone else's breast milk to our infants. Because it is prohibited."

A 34-year-old breastfeeding mother stated that, "I do not understand about human breast milk banking. In the past I have heard information about wet nurses but this is only possible if we have a blood relation with the baby's family. For example, my sister can feed my baby if I cannot feed my baby otherwise it is not possible."

6. Discussion

The current study sought to determine the willingness of mothers to donate their breast milk for breast milk banking and their acceptance of its use. The survey showed that among total study participants 316 only 101(32%) were willing to donate/accept breast milk for banking but, majority 215(68%) were not willing to donate/accept breast milk for banking. This percentage is greater than the study report from Eastern Ethiopia, which showed that 119 (11%) of the study subjects accepted breast milk donation (Gelano et al., 2018b).

In this study, 32% of the mothers agreed to use donated breast milk for infant feeding, and this is comparable with a report from Eastern Ethiopia (Gelano et al., 2018b). Like similar studies in Eastern Ethiopia, Nigeria and South Africa, the primary reasons for their unwillingness to donate breast milk for banking or to use it for feeding infants were safety, contamination, infection and fear of disease transmission (Coutsoudis et al., 2011, Abhulimhen-Iyoha et al., 2015).

FGDs also showed that the majority of participants stated they have had received no information about human milk banking or donor breast milk feeding for infants.

Some of the participants in the FGDs mentioned that different diseases can be transmitted to infants through donor breast milk. Particularly, diseases such as cancer and HIV can be transmitted. From this we understand that before the initiation of donor breast milk banking service, create awareness about the safety of donor breast milk among the donors and recipients.

Findings from FGDs showed that the religious issue was one of the reasons for the unwillingness to donate breast milk for banking and to accept its use. The study participants mentioned that it was not right to feed another mother's breast milk for infants feeding rather it is better to feed formula or cow milk by bottle as an alternative. Some of the women also mentioned that the use of another mother's breast milk for the infants feeding can only be possible if recipient's baby has a blood relationship with the donor. This information may be related to the religious belief that the person who donates breast milk for a baby is considered as maternally related to the baby. Therefore, the infant would be considered as the donor's child and marriage between the recipient's and donor's offspring is forbidden, as was mentioned in a paper on the introduction of donor milk banking in a Muslim country (Gelano et al., 2018b).

Although the majority of the participants did not support the idea of breast milk donation for banking and were not willing to use it for infant feeding, some women appreciated the advantages for mothers who could not breastfeed and the benefits for babies. The breast milk provides the best nutrition for infants especially during their first six months of life. The World Health Organization (WHO) strongly recommends that for infants who cannot receive their own mother's breast milk, the preferred option should be donor breast milk (Schanler et al., 1999).

The study showed that there are factors that can be used to increase willingness to use human breast milk banking. It was found that awareness about donor breast milk banking and wet-nurses

were significantly associated with acceptance of donor milk banking. It may be that as mothers receive information related to human breast milk banking and use of someone else's breast milk for infant feeding, their acceptance of donor breast milk increases. The study conducted by Meneses et al. in Brazil in 2013 also showed that information about breast milk expression was significantly associated with human milk donation for primary health care (Adjusted Prevalence Ratio 3.6; 95% CI 1.48, 8.97) (Meneses et al., 2017).

Other factors which showed significant association with the acceptance of donor breast milk banking were the mothers' antenatal care visits and maternal counseling about breastfeeding. This finding contradicts a study conducted in Brazil which showed a 90% reduction of breast milk donation among the participants who fellow ANC (Meneses et al., 2017). This might be related to maternal exposure to actual breast milk donation because in the case of the previous study those mothers might face negative effects of preterm birth that limit their milk donation tendency, whereas in the current study mothers were not exposed to actual milk donation rather they were only asked about their future willingness to donate.

7. Strength and limitation

7.1 Strength

The strength of the study was, it adapted standard questionnaires from reviewing previously done studies and other materials related to the topic like International Labour Organization (ILO) Human milk bank statistics and different relevant sources with required modification based on outcome variables and observation. This would help as to compare willingness to donate and willingness to accept of human milk banking against national and international point of view. In addition, the sample size was large and representative.

7.2 Limitation

The limitations of this study were it might not show the illness or the health concerns of breastfeeding mothers and that the views of health professionals and policy makers were not collected, as they were the immediate stakeholders for the implementation of human milk banking services.

8. Conclusions and Recommendations

8.1 Conclusions

In conclusion, this study showed that the acceptance of breast milk donation for banking and its use for feeding infants was very low, due to lack of information and misconceptions about the safety of breast milk, along with religious reservations.

8.2. Recommendation

To health policy makers

- Before the initiation of donor milk banking services, a program should be designed to create awareness about donor milk banking among donors and recipients and views of health professionals and policy makers should be collected as they are the immediate stakeholders for the implementation of human milk banking service.

To Hawassa health bureau

- Budgets should be considered for further research in the city on human milk banking.

To HUCMHS

- Thematic researches should be given emphasis on human milk banking and related research topics.

To other researchers

- Do further study on different health related topics on human milk banking.

9. References

ABHULIMHEN-IYOHA, B., OKONKWO, I., IDEH, R. & OKOLO, A. 2015. Mothers' perception of the use of banked human milk for feeding of the infants. *Nigerian Journal of Paediatrics,* 42, 223-227.

AL-NAQEEB, N. A., AZAB, A., ELIWA, M. S. & MOHAMMED, B. Y. 2000. The introduction of breast milk donation in a Muslim country. *Journal of Human Lactation,* 16, 346-350.

ARNOLD, L. D. 2006. Global health policies that support the use of banked donor human milk: a human rights issue. *International Breastfeeding Journal,* 1, 26.

ARSLANOGLU, S., MORO, G. E., BELLÙ, R., TUROLI, D., DE NISI, G., TONETTO, P. & BERTINO, E. 2013. Presence of human milk bank is associated with elevated rate of exclusive breastfeeding in VLBW infants. *Journal of perinatal medicine,* 41, 129-131.

BERTINO, E., GIULIANI, F., OCCHI, L., COSCIA, A., TONETTO, P., MARCHINO, F. & FABRIS, C. 2009. Benefits of donor human milk for preterm infants: current evidence. *Early human development,* 85, S9-S10.

BHUTTA, Z. A. & BLACK, R. E. 2013. Global maternal, newborn, and child health—so near and yet so far. *New England Journal of Medicine,* 369, 2226-2235.

BLACK, R. E., VICTORA, C. G., WALKER, S. P., BHUTTA, Z. A., CHRISTIAN, P., DE ONIS, M., EZZATI, M., GRANTHAM-MCGREGOR, S., KATZ, J. & MARTORELL, R. 2013. Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet,* 382, 427-451.

BOYD, C. A., QUIGLEY, M. A. & BROCKLEHURST, P. 2007. Donor breast milk versus infant formula for preterm infants: systematic review and meta-analysis. *Archives of Disease in Childhood-Fetal and Neonatal Edition,* 92, F169-F175.

BREASTFEEDING, S. O., EIDELMAN, A. I., SCHANLER, R. J., JOHNSTON, M., LANDERS, S., NOBLE, L., SZUCS, K. & VIEHMANN, L. 2012. Breastfeeding and the use of human milk. *Pediatrics,* 129, e827-e841.

BRIEF, P. P. 2017. Ensuring equitable access to human milk for all infants: A comprehensive approach to essential newborn care. *Global Breastfeeding Collective; PATH: Seattle, WA, USA*.

CACHO, N. T., PARKER, L. A. & NEU, J. 2017. Necrotizing enterocolitis and human milk feeding: a systematic review. *Clinics in Perinatology,* 44, 49-67.

COUTSOUDIS, I., PETRITES, A. & COUTSOUDIS, A. 2011. Acceptability of donated breast milk in a resource limited South African setting. *International breastfeeding journal,* 6, 1-10.

DEMOGRAPHIC, E. 2016. Health Survey Central Statistical Agency and ICF International. *Addis Ababa, Calverton*.

DONOVAN, S. M. 2006. Role of human milk components in gastrointestinal development: current knowledge and future needs. *The Journal of pediatrics,* 149, S49-S61.

EDMOND, K. & BAHL, R. 2007. *Optimal feeding of the low birth weight infant. Technical review*, World Health Organization.

EIDELMAN, A. I., SCHANLER, R. J., JOHNSTON, M., LANDERS, S., NOBLE, L., SZUCS, K. & VIEHMANN, L. 2012. Breastfeeding and the use of human milk. *Pediatrics,* 129, e827-e841.

GANAPATHY, V., HAY, J. W. & KIM, J. H. 2012. Costs of necrotizing enterocolitis and cost-effectiveness of exclusively human milk-based products in feeding extremely premature infants. *Breastfeeding medicine,* 7, 29-37.

GELANO, T. F., BACHA, Y. D., ASSEFA, N., MOTUMMA, A., ROBA, A. A., AYELE, Y. & TSIGE, F. 2018a. Acceptability of donor breast milk banking, its use for feeding infants, and associated factors among mothers in eastern Ethiopia. *International breastfeeding journal,* 13, 1-10.

GELANO, T. F., BACHA, Y. D., ASSEFA, N., MOTUMMA, A., ROBA, A. A., AYELE, Y. & TSIGE, F. 2018b. Acceptability of donor breast milk banking, its use for feeding infants, and associated factors among mothers in eastern Ethiopia. *International Breastfeeding Journal,* 13, 23.

HAIDEN, N. & ZIEGLER, E. E. 2016. Human milk banking. *Annals of Nutrition and Metabolism,* 69, 7-15.

HENDERSON, G., ANTHONY, M. Y., MCGUIRE, W. & QUIGLEY, M. 2001. Formula milk versus term human milk for feeding preterm or low birth weight infants. *Cochrane Database of Systematic Reviews*.

HODDINOTT, P., TAPPIN, D. & WRIGHT, C. 2008. Breast feeding. *Bmj,* 336, 881-887.

HORTA, B., VICTORA, C. & CESAR, G. 2016. Long-term effects of breastfeeding: a systematic review. Geneva, Switzerland: World Health Organization; 2013. *This meta-analysis is the latest and most complete to date of observational studies on this topic, including,* 71.

HYLANDER, M. A., STROBINO, D. M., PEZZULLO, J. C. & DHANIREDDY, R. 2001. Association of human milk feedings with a reduction in retinopathy of prematurity among very low birthweight infants. *Journal of perinatology,* 21, 356-362.

IGHOGBOJA, I., OLAREWAJU, R., ODUMODU, C. & OKUONGHAE, H. 1995. Mothers' attitudes towards donated breastmilk in Jos, Nigeria. *Journal of Human Lactation,* 11, 93-96.

LEE, A. C., KATZ, J., BLENCOWE, H., COUSENS, S., KOZUKI, N., VOGEL, J. P., ADAIR, L., BAQUI, A. H., BHUTTA, Z. A. & CAULFIELD, L. E. 2013. National and regional estimates of term and preterm babies born small for gestational age in 138 low-income and middle-income countries in 2010. *The lancet global health,* 1, e26-e36.

MEKONNEN, Y., TENSOU, B., TELAKE, D. S., DEGEFIE, T. & BEKELE, A. 2013. Neonatal mortality in Ethiopia: trends and determinants. *BMC public health,* 13, 1-14.

MENESES, T. M. X. D., OLIVEIRA, M. I. C. D. & BOCCOLINI, C. S. 2017. Prevalence and factors associated with breast milk donation in banks that receive human milk in primary health care units☆,☆☆. *Jornal de pediatria,* 93, 382-388.

ORGANIZATION, W. H. 2011. *Guidelines on optimal feeding of low birth-weight infants in low- and middle-income countries*, World Health Organization.

PATEL, A. L., JOHNSON, T. J., ENGSTROM, J. L., FOGG, L. F., JEGIER, B. J., BIGGER, H. R. & MEIER, P. P. 2013. Impact of early human milk on sepsis and health-care costs in very low birth weight infants. *Journal of Perinatology,* 33, 514-519.

QUIGLEY, M., EMBLETON, N. D. & MCGUIRE, W. 2019. Formula versus donor breast milk for feeding preterm or low birth weight infants. *Cochrane Database of systematic reviews*.

QUIGLEY, M., HENDERSON, G., ANTHONY, M. & MCGUIDRE, W. 2007. Formula milk versus donor breast milk for feeding preterm or low birth weight infants (Review). The Cochrane Collaboration. *The Cochrane Library,* 4.

QUIGLEY, M. & MCGUIRE, W. 2014. Formula versus donor breast milk for feeding preterm or low birth weight infants. Quigley M, editor. *Cochrane Database Syst Rev. Chichester, UK: John Wiley & Sons, Ltd,* 4.

REA, M. F. 1990. The Brazilian national breastfeeding program: a success story. *International Journal of Gynecology & Obstetrics,* 31, 79-82.

RØNNESTAD, A., ABRAHAMSEN, T. G., MEDBØ, S., REIGSTAD, H., LOSSIUS, K., KAARESEN, P. I., EGELAND, T., ENGELUND, I. E., IRGENS, L. M. & MARKESTAD, T. 2005. Late-onset septicemia in a Norwegian national cohort of extremely premature infants receiving very early full human milk feeding. *Pediatrics,* 115, e269-e276.

SANTÉ, O. M. D. L., ORGANIZATION, W. H., STAFF, W. H. O. & UNICEF. 2003. *Global strategy for infant and young child feeding*, World Health Organization.

SCHANLER, R. J., SHULMAN, R. J. & LAU, C. 1999. Feeding strategies for premature infants: beneficial outcomes of feeding fortified human milk versus preterm formula. *Pediatrics,* 103, 1150-1157.

10. Appendix

Study Information sheet

Principal investigator: Anteneh Benti Negewo

Title of the research: Acceptability of human milk banks and associated factors among breastfeeding mothers who are visiting public health centers for child immunization in Hawassa city, Sidama region, Ethiopia, 2023: a mixed method.

Greetings! My name is _________________. I am here on behalf of ………… department of Nursing, college of medicine and health science at Hawassa University. He is conducting research for the partial fulfilment of MSc degree in Pediatrics and Child Health Nursing on the title mentioned above. We will interview and fill the checklist the woman who come for immunizations in 2023. Before you decide whether or not to allow the cards for observation, I would like to explain to you the objective of the study, any risks, benefits, procedure and what is expected from you.

The Objective of the study: "To assess acceptance and identify its predictors towards human milk banks among breastfeeding mothers who come for immunization to public health centers in Hawassa city, Sidama region, Ethiopia in 2023."

Procedure: The data will be collected using checklist by data collectors and FGD.

The Benefit of the study: Though there is no direct benefit from this research project, the finding of this study will used to implement intervention and reveal out gap regarding donor human milk bank and associated factors.

The Risk of the study: Any personal information registered will be not be transferred to other bodies and kept confidential.

Confidentiality: All information you give me will be strictly confidential and will be kept safe and secure. The name of the client should not appear anywhere on the checklist to ensure anonymity. Your role in the success of the research is important and I appreciate your contribution to the research.

Quantitative

I. Socio-demographic characteristics

Q#	Question	Response	Skip
101	Age of the client?	___________ (years)	
102	Marital Status	1. Married 2. Single Mom 3. Widowed 4. Divorced	
103	Client ethnicity	1. Sidama 2.Wolayita 3. Oromo 4. Amhara 5. Tigray 6. Others	
104	Place of residence	1. Rural 2. Urban	
105	Source of income	1. Father 2. Mother 3. Both	
106	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Other	

107	Maternal educational status	1. Not educated 2. Elementary complete(1-8) 3. High school complete(9-12) 4. Certificate 5. Diploma 6. Degree 7. Masters 8. MD/PHD/Specialty	
108	What is your family average income	______________________ ETB	
109	Maternal occupation (based on ILO)	________________________________	

Part II: - Health information factors (sources of information)

Q. #	Questions	Answers	Skip
201	Availability of sources of information	1. Yes 2. No	
202	What is your source of information	1. Peers 2. Television 3. Radio 4. News paper 5. School 6. Community 7. Other medias	

203	Availability of health education	1. Yes 2. No	
204	Health education delivery mood	1. Drama 2. Role play 3. Social Media 4. Lecture 5. Seminars 6. Others	
205	Electronic Media Ownership	1. Mobile phone ownership 2. Radio-household-level ownership 3. Television-Household-level ownership	
206	Ever heard about Health and Nutrition Awareness creation broadcasts through mobile, radio or television	1. Yes 2. No	
207	Have you ever attended Breast feeding related nutrition counseling or education in person or through media	1. Yes 2. No	

Part-III: ANC follow-ups and related information

Q. #	Questions	Answers	Skip
301	Gravidity	________________	
302	Parity	________________	

303	Have you attended ANC clinics during your recent pregnancy	1. Yes 2. No	
304	How many times you attended ANC for your recent pregnancy	1. Once 2. Twice 3. Three Times 4. Four Times 5. Five Times 6. More	
305	Were you counseled about nutrition during ANC of your most recent pregnancy	1. Yes 2. No	-

Part IV- Child Factors

Q. #	Questions	Answers	Skip
401	Birth weight of child	________kg	
402	Sucking ability of child	1. Good 2. Fair 3. Poor	
403	Feeding condition of child	1. Good 2. Fair 3. Poor	
404	Feeding Frequency of child	1. Twice 2. Four Times 3. Six Times 4. Others	

405	Oral medical condition of child	1. Oral thrush 2. Tonsillitis 3. Gingivitis 4. others	
406	Medical condition of child	1. GIT disturbance 2. Respiratory problem 3. Cardiac problem 4. Others _______	

Part V- Maternal Conditions

Q. #	Questions	Answers	Skip
501	Chronic illnesses	1. Cancer 2. Diabetes 3. Hypertension 4. Others	
502	STIs/STDs	1. HIV/AIDS 2. Gonorrhea 3. Syphilis 4. Others ___________	
503	Breast medical conditions	1. Breast wound 2. Breast cancer 3. Mastectomy 4. Breast tumor 5. Others _________	
504	Mode of delivery	1. SVD 2. Episiotomy 3. CS	
505	Time of pregnancy/delivery	1. Term 2. Preterm	

		3. Post term	
506	Time of breastfeeding	1. Busy 2. Free 3. Unknown	
507	Production of milk	1. Good 2. Fair 3. Poor	

Part-VI: Awareness about Breastfeeding

Q. #	Questions	Answers	Skip
601	Importance of breastfeeding for children	1. Perfect nutrition 2. Protection 3. Brain power 4. Ready and portable 5. Size does not matter 6. Good for mothers too 7. Builds a special bond 8. Advantages continue as baby grows	
602	After birth, with in what period a new born has to be attached with breast	1. 30-50 minutes 2. 1- 2 hours 3. 2-4 hours 4. I don`t know	
603	How long a child has to be exclusively breast fee/ should receive nothing other than breast milk	1. 6 months 2. 1 year 3. 2 years 4. I don`t know	

Part-VII: Experience about breastfeeding difficulties

Q. #	Questions	Answers	Skip
701	Do you know common breast-feeding difficulties	1. Yes 2. No	
702	If yes, what are they?	1. Sore nipples 2. Low milk supply 3. Cluster feeding and growth spurts 4. Engorgement 5. Plugged duct 6. Fungal infection 7. Nursing strike 8. Breast and nipple size and shape	
703	Ever experienced breast feeding difficulties	1. Yes 2. No	
704	If yes, which one?	1. Sore nipples 2. Low milk supply 3. Cluster feeding and growth spurts 4. Engorgement 5. Plugged duct 6. Fungal infection 7. Nursing strike 8. Breast and nipple size and shape	
705	Have you ever encountered a mother practicing breast milk	1. Yes 2. No	

	expression or breast pumping		
706	Have you ever practiced breast milk expression or breast	1. Yes 2. No	
707	Have you ever encountered a woman practicing wet nursing	1. Yes 2. No	
708	Have you ever practiced wet nursing	1. Yes 2. No	
709	Is wet nursing safe	1. Yes 2. No	
710	If not safe, what are the disadvantages of wet nursing	________________________	

Part-VIII: Human Milk Banks related questions

Q. #	Questions	Answers	Skip
801	Are there conditions that oblige women not to breast feed or newborns not to get breast milk?	1. Yes 2. No	
802	Have you ever heard that human body fluids or organs can be donated to others	1. Yes 2. No	

803	If yes, what can be donated?	1. Blood 2. Eye 3. Kidney 4. Breast milk 5. Others	
804	Attitude towards donation of Practice of donation	1. Good 2. Fair 3. Poor	
805	Attitude towards accepted donated human body fluid or organ	1. Good 2. Fair 3. Poor	
806	Have you ever heard about HMBs	1. Yes 2. No	
807	Perception towards breast milk donation/willingness for donation	1. Good 2. Fair 3. Poor	
808	If poor perception why?	__________________	
809	Perception towards donated breast milk/willingness to accept	1. Good 2. Fair 3. Poor	
810	If poor perception why?	_________________	

Qualitative

SEMI –STRUCTURED FOCUS GROUP DISCUSSION GUIDE

Introduction: Today we are going to be talking about requesting or receiving breast milk bank (BMB). Now I would like to ask you some questions. Let me assure you that your answers are completely confidential and will not be told to anyone. If we should come to any question that you don't want to answer, just let me know and we will go to the next question.

Instrument A: Demographic Data

Code of participant___________________

1. Age in years ____________________
2. Current marital status_________
3. Highest level of education that you have completed _______________
4. Your religion or denomination______________________
5. Your occupation/employment status ______________________
6. Average Monthly family income______________________
7. Parity ______________________
8. Gravidity ______________________
9. Prenatal care (Yes/No)
10. Mode of delivery of current child ____________________
11. Family type (Nuclear/ extended)

PART B: REQUESTING OR RECEIVING BREAST MILK BANK (BMB)

1. Tell me if you have ever heard of breast milk banking. [Probe if it includes the following]
   - ✓ Source of information: Media/ family/ friends/ in schools/ Internet source etc.

2. Tell me if you have ever experienced utilizing breast milk bank in case of a condition hindering breast feeding your baby.
    - ✓ In your opinion, what are the possible reason(s) for requesting breast milk bank? (Why someone shouldn't request donor milk?)
3. Share with me your views regarding donating healthy and safe breast milk if there were a milk bank in your area.
    - ✓ Tell me your intention or motivation in donating breast milk if there were a milk bank in your area.

 [Probe and see if it includes the following]

- ✓ Anything that would prevent her from donating breast milk

(Consent of partner, risk of STI/HIV, Religion issues etc.)

- ✓ Would milk banking create a problem in terms of religion? Please tell me your views.

4. Would you recommend opening of a breast milk bank in our country? Why?
    - In your opinion, what are the challenges/difficulties to donate a breast milk bank?

 [Probe and see if it includes the following]

- ✓ Lack of knowledge of donors/recipient/ HCW, distance from BMB, family support (consent of partner), support from BMB staff etc.)
- ✓ Would you agree to have your blood screened if requested before donating breast milk?

5. Do you have any more things to tell us?

Thank you very much for taking part in this study.

Name of interviewer(s) & Signature: ________________________________

Date and place of interview: ____

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HAWASSA UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
Institutional Review Board

Ref. No: IRB/291/13
Date: 25/04/2023

Name of Researcher(s): **Anteneh Benti, Alemneh Kabrta (Ass't Prof.); Yacob Abraham (MSc)**

Topic of Proposal: ***Acceptance of human milk banks and associated factors among breastfeeding mothers who came for immunization to public health centers in Hawassa city, Sidama Region, Ethiopia in 2023: A mixed cross-sectional study***

Dear researcher(s),
The Institutional Review Board (IRB) at the College of Medicine and Health Sciences of Hawassa University has reviewed the aforementioned research protocol with special emphasis on the following points:

1. Are all principles considered?
   - 1.1. Respect for persons: Yes ☑ No ☐
   - 1.2. Beneficence: Yes ☑ No ☐
   - 1.3. Justice: Yes ☑ No ☐
2. Are the objectives of the study ethically achievable? Yes ☑ No ☐
3. Are the proposed research methods ethically sound? Yes ☑ No ☐

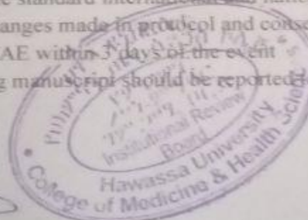
Based on the aforementioned ethical assessment, the IRB has:

- **A.** Approved the proposal for implementation ☑ Approval period **-25 April 2023** to **24 April 2024**
- B. Conditionally Approved ☐ Element Approved: **Protocol Version No. 1**
- **C.** Not Approved ☐ Follow up report expected in 6 **months**

Obligation of the PI:

1. Should comply with the standard international and national scientific and ethical guidelines
2. All amendment and changes made in protocol and consent form needs IRB approval
3. The PI should report SAE within 3 days of the event
4. End of study, including manuscript should be reported to the IRB

Yours faithfully,



Dr. Embialle Mengistie (Ph.D. Associate Prof.)
Chairperson, Institutional Review Board

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