HARAMAYA UNIVERSITY

POSTGRADUATE DIRECTORATE

ACCEPTABILITY OF DONOR BREAST MILK BANKING AND ITS ASSOCIATED FACTORS AMONG HEALTHCARE PROFESSIONALS IN PUBLIC HOSPITALS IN HARARI REGIONAL STATE AND DIRE DAWA CITY ADMINISTRATION, EASTERN ETHIOPIA: MIXED METHOD STUDY

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A thesis to be submitted to the School of Nursing of Postgraduate Studies, Haramaya University in Partial Fulfillment of the Requirements for A Master's Degree in Pediatrics and Child Health Nursing

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APPROVAL SHEET

HARAMAYA UNIVERSITY

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I hereby certify that I have read and evaluated this thesis entitled, "Acceptability of Donor Breast Milk Banking and its Associated Factors among Healthcare Professionals in Public Hospitals in Harari Regional State and Dire Dawa City Administration, Eastern Ethiopia: Mixed Method Study" prepared under my guidance by Ahmed Abadir Abafogi. I recommend that it be submitted as fulfilling the thesis requirement.

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LIST OF ABBREVIATIONS AND ACRONYMS

AOR	Adjusted Odds Ratio
CI	Confidence Interval
DBMB	Donor Breast Milk Bank/Banking
LMICs	Low and Middle-Income Countries
NICU	Neonatal Intensive Care Unit
OR	Odds Ratio
TFA	Theoretical Framework of Acceptability
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

ABSTRACT

Background: A donor breast milk bank is recommended for preterm, low birth weight, and other infants who cannot feed their mother's milk. It is an intervention that contributes to the reduction of neonatal and infant morbidity and mortality. Healthcare professionals play a key role in ensuring the establishment and success of this intervention. However, there is a significant lack of evidence regarding its acceptability among healthcare professionals in eastern Ethiopia.

Objective: To assess the acceptability of donor breast milk banking and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, from August 15-September 13, 2024.

Methods: A mixed-method study (quantitative, cross-sectional, and qualitative) design was employed. For the quantitative study, a total of 347 healthcare professionals working in maternal and child health units were enrolled using a simple random sampling technique. Quantitative data was collected using a structured, self-administered questionnaire, entered into Epi-data version 4.6, and analyzed using STATA version 17. Binary logistic regression models were fitted to identify factors associated with the acceptability of donor breast milk banking. Qualitative data was collected by in-depth interviews and analyzed using thematic analysis.

Results: The proportion of acceptability of donor breast milk banking was 38.62% (95% CI: 33.47, 43.96%). Factors such as having a master's degree, and medical doctor, adequate knowledge, a good attitude and having children were significantly associated with breast milk banks' acceptability. Qualitative insights revealed facilitators such as training and educational activities, understanding of breast milk benefits, and trust in healthcare systems' safety protocol, while barriers were; lack of awareness, cultural and religious concerns, and resource constraints.

Conclusion: The acceptability of breast milk banks among healthcare professionals was moderate, and influenced by factors such as level of education, knowledge status, attitudes, and having children. Facilitators were; understanding of the benefits of breast milk, confidence in the safety protocols, as well as training and educational initiatives; while, lack of awareness, cultural and religious concerns, and resource constraints were barriers. Targeted educational programs, awareness campaigns, infrastructural improvements, and further studies are recommended to enhance the acceptability of breast milk banks.

Keywords: Acceptability, Donor breast milk bank, Healthcare professionals, Eastern Ethiopia

1. INTRODUCTION

1.1 Background

Proper nutrition during the first 1000 days of life, is crucial for the long-term health and development of infants and children (Perrin et al., 2022). Breast milk supplies all the necessary energy and nutrients for a baby's early months, continuing to meet a significant portion of their nutritional needs through the first and second years of life (WHO, 2024). World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) recommend that children should start breastfeeding within the first hour of birth and exclusively breastfeed for the first 6 months of life (WHO, 2024). However, there are challenges to achieving global targets for promoting early, exclusive, and sustained breastfeeding, leading to a significant number of infants missing out on the numerous advantages of this life-saving source of nourishment for a healthy beginning in life (PATH, 2017).

According to the WHO and UNICEF guidelines for the Baby Friendly Hospital Initiative, infants who cannot be breastfed by their mothers, especially low birth weight, preterm babies, and other vulnerable infants should be given donor breast milk (WHO, 2023a). The American Academy of Pediatrics, European Society for Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition, and other national and global policy groups also recommend the use of donor breast milk as the preferred feeding option when a mother's milk is insufficient, unavailable, or not recommended (WHO, 2023a).

Donor breast milk is essential in reducing neonatal morbidity and mortality, particularly for premature and low birth weight infants with higher nutritional requirements, and metabolic and gastrointestinal challenges (Zerfu, 2024). Various studies have indicated that donor breast milk can decrease serious conditions such as necrotizing enterocolitis, bronchopulmonary dysplasia, late-onset sepsis, and retinopathy of prematurity, lower the likelihood of infections, improve feeding tolerance, shorten stays in neonatal intensive care units (NICU) (Lewis, 2024, Tran et al., 2020, Victora et al., 2016, Wilunda et al., 2024). It also decreases the incidence of severe intraventricular haemorrhage and reduces cardiovascular risk factors during adolescence (Allana et al., 2022, Arslanoglu et al., 2013). Besides benefiting the baby, it also provides advantages to the mother by reducing the risk of breast and ovarian cancers, lactation amenorrhoea, and aiding in weight loss after childbirth (Victora et al., 2016).

Donor breast milk banks (DBMBs) are nonprofit health institutions established to collect, process, store, and distribute donated human breast milk to support breastfeeding in premature and other vulnerable infants (Jayanandan et al., 2024). The donor population is healthy lactating mothers with healthy babies, who are voluntarily willing to give their extra breast milk to other babies without compromising the nutritional needs of their babies. It includes mothers attending well-baby clinics, those with babies in NICUs, those who have lost their babies, lactating hospital staff, and motivated community members (Bharadva, 2014; Haiden, 2016).

After undergoing a thorough screening process and receiving proper counselling, including obtaining written consent, medical history, physical examination, and laboratory tests, the donated breast milk is collected by trained staff using hygienic methods. The milk is then pasteurized to remove harmful bacteria, tested for safety and nutritional value, frozen, and stored until required. It is primarily distributed to premature and critically ill infants in hospitals and NICUs, sometimes reaching families through medical prescriptions. These milk banks adhere to strict guidelines set by organizations like the Human Milk Banking Association of North America (HMBANA) to ensure safety and quality standards (Bharadva, 2014; Haiden, 2016).

The tradition of milk banking has been around for over 100 years, predating blood banking. The first DBMB was established in Vienna in 1909, followed by one in Boston in 1919. Currently, 233 active DBMBs in Europe, 44 in Asia, 5 in Australia, 10 in Africa, 26 in the United States and Canada, 258 in South America, and 45 in Central America, including Caribbean islands (Jayanandan et al., 2024). Low and middle-income countries (LMICs) have proven they can effectively operate DBMBs. Brazil leads with 219 banks, while countries like South Africa, Uganda, and Kenya in Africa have also set up DBMB despite dealing with epidemic diseases (Iloh et al., 2018, McCloskey and Karandikar, 2018, Pimenteira Thomaz et al., 2008).

1.2 Statement of Problem

Globally, in 2020, over 13.4 million babies were born prematurely, mostly in southern Asia and sub-Saharan Africa (WHO, 2023b). Additionally, 15% to 20% of global births are estimated to be low birth weight, with over 20 million occurring births annually (Desta et al., 2019), and 13% of these occur in sub-Saharan Africa (Marete et al., 2020). In Ethiopia, the prevalence of preterm

birth and low birth weight was found to be 10.48% (Muchie et al., 2020) and 14.1% respectively (Katiso et al., 2020).

Formula-fed babies face a higher risk of death from illnesses like diarrhoea and lung infections, are more prone to ear infections and Sudden Infant Death Syndrome (SIDS), have an increased likelihood of developing cancers and obesity, and are at a higher risk of diabetes and heart disease later in life when compared to breastfed infants (Llamas, 2024, Oklahoma, 2024). Using infant formula instead of breast milk also increases the chances of gastrointestinal diseases, infectious diseases, altered development, and maternal breast cancer (Munblit et al., 2020). It also increases the incidence of necrotizing enterocolitis, parenteral nutrition duration, and full enteral feeding time (Li et al., 2022).

Global health organizations such as the WHO, UNICEF, Centers for Disease Control and Prevention (CDC), and national health ministries are actively working to reduce neonatal mortality rates through various interventions. Their strategies include establishing Neonatal Intensive Care Units (NICUs) equipped with advanced medical technology and trained healthcare professionals, implementing evidence-based interventions like promoting antenatal care, encouraging breastfeeding, and improving maternal and child health services. One of their recommendations to further reduce neonatal mortality rates is the implementation of DBMBs (Ministry of Health, 2015; UNICEF, 2020; WHO, 2024).

However, studies conducted on the acceptability of DBMB among healthcare professionals across the globe led to varied findings (Adawiah et al., 2022, Chagwena et al., 2020, Lam et al., 2012, Ramachandran et al., 2024, Safeena Beevi et al., 2021). In particular, studies have shown that the acceptability of DBMBs, among healthcare professionals in LMICs was considerably lower compared to high-income countries (Adawiah et al., 2022, Chagwena et al., 2020, Lam et al., 2012, Ramachandran et al., 2024, Safeena Beevi et al., 2021). In Australia, professionals in the healthcare field considered donor breast milk superior to formula and favoured it as the top choice for feeding preterm babies (Lam et al., 2012). Conversely, a study in Indonesia showed that healthcare workers had low acceptability of DBMB (Murray et al., 2016). In Zimbabwe, only 31% of healthcare workers accepted the DBMB (Chagwena et al., 2020). In Ethiopia, there is a lack of data on the acceptability of DBMB among health professionals. However, a study on

the knowledge of health professionals regarding DBM revealed that around 53.7% were unaware of donor breast milk (Alemu et al., 2016).

Several studies in LMICs explored that, the acceptability of DBMB was associated with the level of knowledge and attitude towards DBMBs, the clinical experience, profession, and religion (Adawiah et al., 2022, Chagwena et al., 2020, Ramachandran et al., 2024, Safeena Beevi et al., 2021). The key barriers identified include a lack of knowledge among healthcare workers, logistical challenges of creating a milk laboratory, the safety of the donated breast milk, uncertainty about the screening process, fear of disease transfer, and safety during the processing of pasteurized DBMB, limited finances and facilities, fear of HIV infection, religious and cultural beliefs (Chagwena et al., 2020, Doshmangir et al., 2019, Kimani-Murage et al., 2019, Mahlatjie et al., 2022, Mathias et al., 2023, Tende et al., 2023).

In Ethiopia, the concept of DBMB is relatively new, with no operational DBMB currently available. A preliminary feasibility study indicated that 75% of surveyed health professionals believe that establishing a breast milk bank is feasible (Alemu et al., 2016). Despite these positive findings, there is a significant lack of research and practical implementation in this area, highlighting a gap in efforts to promote maternal and child health through DBMB in Ethiopia.

The neonatal mortality rate remains high in LMICs like Ethiopia, and the absence of facilities such as DBMB is notable. Healthcare professionals play a crucial role in the establishment and success of DBMBs. Studies indicate that well-informed healthcare professionals, who have a positive attitude and accept DBMBs are effective in encouraging and supporting mothers to donate breast milk (Radzyminski and Callister, 2015). However, there are very few studies on the acceptability of DBMBs and associated factors among healthcare professionals in Africa (Chagwena et al., 2020, Tende et al., 2023). There is also a significant lack of evidence regarding the acceptability of this service among healthcare professionals in the Harari regional state and Dire Dawa City Administration.

Assessing healthcare professionals' acceptability of DBMB is crucial for the successful establishment and implementation of DBMB. Therefore, this study aims to assess the acceptability of DBMB and its associated factors among healthcare professionals in public hospitals in the Harari regional state and Dire Dawa City Administration, Eastern Ethiopia.

1.3 Significance of the Study

The primary beneficiaries of this study are Hiwot Fana Comprehensive Specialized Hospital, Jugol General Hospital, Dil-Chora Referral Hospital, Sabian General Hospital, Harari Region Health Bureau, and Dire Dawa City Administration Health Bureau. The hospitals will benefit from this study by gaining insights into healthcare professionals' acceptance of DBMB, which will guide effective program implementation, targeted training, and resource allocation. This will enhance neonatal care, and improve collaboration with health bureaus. The health bureaus will receive evidence-based data to develop guidelines and policies for DBMB, leading to standardized practices in neonatal nutrition across the hospitals they govern. Additional beneficiaries include healthcare professionals, other hospitals, institutions in Harari Regional State and Dire Dawa City Administration, and policymakers who will gain insights to support maternal and child health initiatives. Furthermore, the study will lay the foundation for future researchers by encouraging further research and innovation in neonatal nutrition and care.

1.4. Objective

1.4.1 General objective

To assess the acceptability of donor breast milk banking and associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia from August 15-September 13, 2024.

1.4.1 Specific objectives

To determine the proportion of the acceptability of donor breast milk banking among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia.

To identify factors associated with the acceptability of donor breast milk banking among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia.

To explore facilitators and barriers to the acceptability of donor breast milk banking among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia.

2. LITERATUR REVIEW

Comprehensive searches were conducted in various databases like Google, Google Scholar, PubMed, Research Gate, and institutional repositories to gather related literature on the acceptability of DBMBs and associated factors among healthcare workers. The search terms included combinations of keywords like; Donor breast milk bank, Health professionals, acceptability, perceptions, attitudes, implementation, challenges, benefits, and utilization. For Google Scholar and PubMed, relevant search terms were: Donor breast milk bank acceptability, Acceptance of human milk banking by medical staff, Healthcare professional's attitudes towards donor breast milk banks, Factors influencing acceptability of donor breast milk banks, Health professionals' perceptions of donor breast milk banks, Breast milk donation in healthcare settings, donor milk bank utilization among healthcare providers, challenges of implementing donor breast milk banks in hospitals, benefits of donor breast milk banks for neonatal care, and professional views on donor milk banking. Additionally, reference (bibliographies) lists of the identified studies were reviewed to find more relevant research.

2.1 Magnitude of Acceptability of Donor Breast Milk Banks

According to the study on the Correlation between Knowledge and Attitude to the Behavior of Health Workers Regarding Acceptance of Human Milk Bank in General Hospital Dr Soetomo Surabaya, Indonesia in 2020; most (69%) health workers had poor acceptability of the DBMBs, the remaining 31% had good acceptability (Adawiah et al., 2022). Another study on the Assessment of Knowledge regarding the Human Milk Bank among the Nursing Officers in Jipmer Puducherry, India, 2021, revealed that 94.29% of them accepted breast milk donation (Safeena Beevi et al., 2021).

A cross-sectional mixed-method survey conducted in urban Zimbabwe between October 2017 and October 2018 on the acceptability of DBMB among health workers found that health workers generally find the concept of DBMB to be acceptable. Around 31% of participants said they would be open to using donor breast milk for their children, while 56% mentioned they would encourage their clients to donate breast milk (Chagwena et al., 2020).

A qualitative study conducted at the Greater Accra Regional Hospital in Ghana in 2022 on the acceptability of DBMB among health workers revealed that health workers generally supported the concept of DBMB. Participants indicated they would be open to using and contributing to a DBMB if proper safety measures were in place. They also mentioned a willingness to recommend donor milk to their clients when needed (Tende et al., 2023). In another Qualitative Study on Rural Nurses' Views on Breast milk banking in Limpopo Province, South Africa, it was observed that nearly all nurses were open to donating their breast milk to the bank. Although the nurses showed strong support for donating breast milk, there was some hesitancy around actually using the donated breast milk and the use of donated breast milk seemed to be not entirely acceptable (Mahlatjie et al., 2022).

2.2 Factors Associated with the Acceptability of Donor Breast Milk Banks

From a study on motivators and barriers to the acceptability of a Human Milk Bank among Malaysians in 2024, general knowledge of breastfeeding was associated with the acceptability of the establishment of a Human Milk Bank (p-value: 0.032, AOR: 1.715, 95% CI: 1.047–2.808), while being a Muslim was negatively associated with acceptance of its establishment (p-value: 0.001, AOR: 0.113, 95% CI: 0.050–0.253) (Ramachandran et al., 2024). According to the study on the Correlation between Knowledge and Attitude to the Behavior of Health Workers Regarding Acceptance of Human Milk Bank in General Hospital Dr. Soetomo Surabaya, Indonesia in 2020, There was an association between the level of knowledge (p-value: 0.003) and attitude (p-value: 0.008) with the behavior of health workers towards the acceptance of Human Milk Bank (Adawiah et al., 2022).

A cross-sectional survey conducted in urban Zimbabwe on the acceptability of DBMBs among health workers found that the acceptability of DBMB was associated with a good knowledge of DBMBs (OR 1.52 CI 1.34; 1.78. p = 0.002) and working experience in a setting where a DBMB was present (AOR 1.36 CI 1.16; 2.82. p = 0.015) while, factors such as Religion (p = 0.624) and awareness of DBMB (p = 0.52) did not influence health workers' acceptability of DBMB (Chagwena et al., 2020).

2.3 Facilitators and Barriers to the Acceptability of Donor Breast Milk Banks

According to the Scoping Review conducted in 2023 on Facilitators and Barriers for the Donation and Acceptance of Human Milk Bank, the major barriers identified were; lack of practical and psychological support, lack of information, storing and transportation issues, lack of knowledge among healthcare workers, and logistical challenges of creating a milk laboratory (Mathias et al., 2023). A Systematic Review of Facilitators and Barriers Influencing Donations to Human Milk Bank found that having surplus milk, a desire to help other babies, and altruism are key facilitators for donors, while religious and cultural beliefs present significant barriers (Doshmangir et al., 2019).

According to a Qualitative Study on Rural Nurses' Views on Breast milk banking in Limpopo Province, South Africa in 2022; receiving donated breast milk for their children seemed to be a challenge due to the safety of the donated breast milk, uncertainty about the screening process, and cultural issues (Mahlatjie et al., 2022). Another qualitative study Exploring the barriers and facilitators to the acceptability of DBMBs in eastern Uganda in 2020, found that factors influencing the acceptability of DBMBs included an understanding of the superiority of human milk over formula and caregivers' trust in knowledgeable and safe healthcare providers (Magowan et al., 2020)

According to a cross-sectional survey conducted in urban Zimbabwe on the acceptability of DBMB among health workers, limited finances and facilities and fear of HIV infection were potential barriers (Chagwena et al., 2020). In another study on the Perceptions of donated human milk and human milk banking in Nairobi, Kenya in 2019, the main concerns on donation and use of donated human milk were personal dislikes, fear of transmission of diseases including HIV, and hygiene concerns (Kimani-Murage et al., 2019).

2.4 Conceptual Framework

The outcome variable is the acceptability of DBMB by healthcare professionals, and the independent variables are socio-demographic characteristics, knowledge, and attitude of the participants towards DBMBs for quantitative study. Additionally, facilitators and barriers are explored through qualitative study to provide deeper insights into factors affecting acceptability of DBMB. These qualitative variables are represented with a broken line to indicate their indirect influence on acceptability.

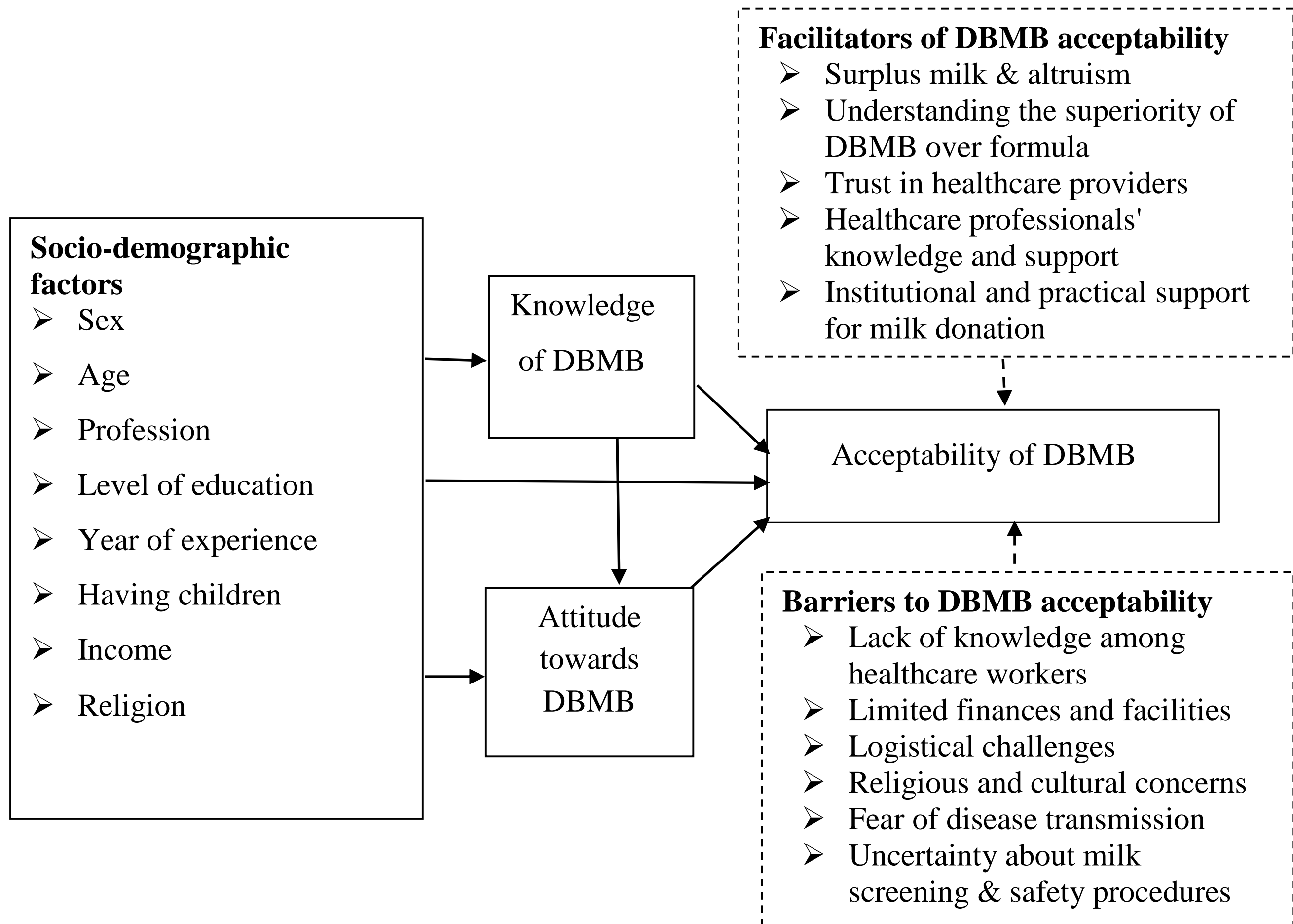

Figure 1: Conceptual framework for the study on acceptability of DBMB and associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia. Constructed by the investigator from reading of different literatures (Doshmangir et al., 2019; Kimani-Murage et al., 2019; Chagwena et al., 2020; Magowan et al., 2020; Safeena Beevi et al., 2021; Mahlatjie et al., 2022; Adawiah et al., 2022; Mathias et al., 2023; Ramachandran et al., 2024).

3. METHODS AND MATERIALS

3.1 Study Area and Period

This study was conducted from August 15 to September 13, 2024, in four public hospitals within the Harari Regional State and Dire-Dawa City Administration, Eastern Ethiopia. The hospitals included Hiwot Fana Comprehensive Specialized Hospital (HFCSH) and Jugol General Hospital from Harari Regional State, as well as Dil-Chora Referral Hospital and Sabian General Hospital from Dire-Dawa City Administration.

Hiwot Fana Comprehensive Specialized Hospital is a public hospital established in 1941 in Harari Regional State approximately 526 km from Addis Ababa, the capital of Ethiopia. According to the HFCSH HMIS report of 2024, the hospital employs 825 healthcare professionals, 254 of whom work in maternal and child health units. The hospital reported an estimated 5,500 childbirths in the 2016 Ethiopian calendar (EC) and is equipped with a level III NICU to provide advanced neonatal care. Jugol General Hospital is another public hospital in Harari Regional State, established in 1902. As per the hospital report of 2016 EC, it serves over 58,000 patients annually, employing 297 healthcare professionals in 2024, of which 66 work in maternal and child health units. The hospital is projected to manage 2,163 deliveries in 2016 EC and has a level II NICU.

Dil-Chora Referral Hospital is a referral-level public hospital in Dire-Dawa City Administration, located 527 km from Addis Ababa. It was established in 1952, with 570 healthcare professionals, with 107 of them working in maternal and child health units in 2024. According to the hospital HMIS report of 2024, the hospital was expected to handle 4,074 births in 2016 EC and has a level II NICU for neonatal care. Sabian General Hospital, also in Dire-Dawa City Administration, employs 237 healthcare professionals, of whom 68 are in maternal and child health units. The hospital was expected to manage 2,957 deliveries in 2016 EC and has a level II NICU equipped for neonatal care hospital according to the hospital HMIS report of 2024.

3.2 Study Design

A convergent mixed-methods approach was employed, combining a cross-sectional quantitative study and a qualitative method.

3.3 Population

3.3.1 Source population

The source population comprised healthcare professionals working in maternal and child health units of public hospitals in Harari Regional State and Dire Dawa City Administration in 2024.

3.3.2 Study population

The study population included healthcare professionals working in maternal and child health units of public hospitals in Harari Regional State and Dire Dawa City Administration who met the inclusion criteria.

3.4 Inclusive Criteria and Exclusive Criteria

3.4.1 Inclusive criteria

All healthcare professionals in these hospitals' maternal and child health units were included in the study.

3.4.2 Exclusive criteria

Healthcare professionals who were on leave, and with less than one year of work experience were excluded from the study.

3.5 Sample Size Determination

3.5.1 Quantitative Study

The sample size for the quantitative study was calculated using the single population proportion formula for the first objective, based on a prevalence of 31% for health workers' acceptance of DBMB, reported in a Zimbabwean study (Chagwena et al., 2020) with a margin of error of 5%, a 95% confidence interval (CI) and 10% non-response rate.

(n= sample size, p= prevalence, d= margin of error).

$$n = \frac{(Z^{\alpha}/2)^2 \, p \, (1-p)}{d^2}$$

$$n = \frac{(1.96)^2 \times (0.31) \times (0.69)}{(0.05)^2} = \frac{(0.82)}{(0.0025)} = 328 \qquad n = 328$$

Adding a 10% non-response rate, the total sample size for the first objective became

33 + 328= **361**

3.5.2 Determining Sample Size for Associated Factors

To identify factors associated with the acceptability of DBMB (second objective), Fleiss's formula with continuity correction was used to compare two independent proportions. The calculations were based on significant associations reported in the literature, assuming a 95% confidence level, 80% power, and a 1:1 ratio of exposed to unexposed groups. The sample size was calculated using StatCalc in Epi Info. The exposure with the maximum required sample size was selected to ensure sufficient power for the analysis (Table 1).

Table 1: Sample size determination for the second specific objective using different factors associated with the acceptability of DBMB among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024.

Variables	Proportion of exposed	Proportion of non-exposed	Confidence level	Power	Total sample size	Reference
Level of knowledge	25%	75%	95%	80%	44	(Adawiah et al., 2022)
Level of attitude	48%	21%	95%	80%	119	(Adawiah et al., 2022)

Final Sample Size

The calculated sample sizes for the second specific objective (associated factors) were smaller than the sample size required for the first specific objective (361 participants). Therefore, the larger sample size determined for the first specific objective was taken as the final sample size for the quantitative study. The final quantitative sample size was 361.

3.5.3 Qualitative Study

For the qualitative study, the sample size was determined based on the principle of data saturation. Data saturation is reached when further interviews or discussions do not yield any new information or insights relevant to the study's objective. Based on this principle and guidance from similar studies, seven healthcare professionals were interviewed for their perspectives on the acceptability of DBMBs, and further interviews were stopped once no new ideas were emerging.

3.6 Sampling Technique and Procedures

3.6.1 Quantitative study

A total of 1,929 healthcare professionals were employed in these four hospitals (825 in Hiwotfana Comprehensive Specialized Hospital, 570 in Dil-Chora Referral Hospital, 297 in Jugol General Hospital, and 237 in Sabian General Hospital). Among these 495 (254 in Hiwotfana Comprehensive Specialized Hospital, 107 in Dil-Chora Referral Hospital, 66 in Jugol General Hospital, and 68 in Sabian General Hospital) healthcare professionals were engaged in maternal and child health units in 2024. The calculated sample size was proportionally allocated to the number of healthcare professionals working in maternal and child health units of each hospital (Fig. 2). A sampling frame was developed by listing all healthcare professionals in the maternal and child health units of each hospital. Study participants were selected using a simple random sampling technique based on the allocated sample size.

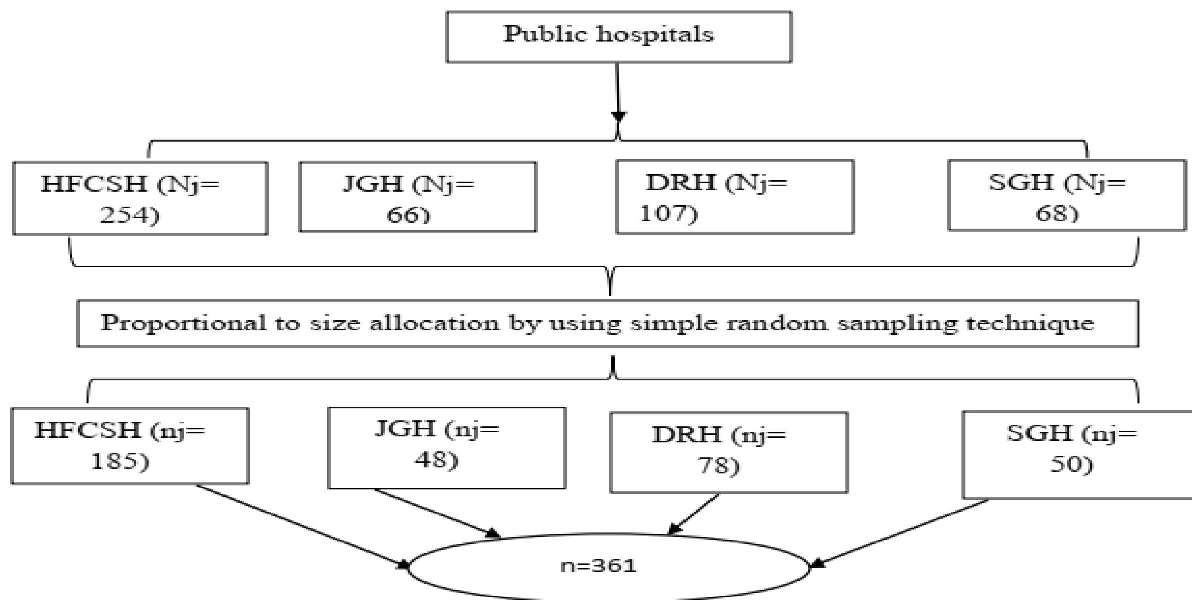

Figure 2: Schematic presentation of the sampling method for the study on the acceptability of DBMB and associated factors among healthcare professionals working in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024. Key: HFCSH- Hiwot Fana Comprehensive Specialized Hospital; DRH- Dil-Chora Referral Hospital; JGH- Jugol General Hospital; SGH- Sabian General Hospital; Nj- number of healthcare professionals working in maternal and child health units of the hospital; nj- number of sampled healthcare professionals working in maternal and child health units of the hospital; n- total sample size.

3.6.2 Qualitative study

Purposive sampling was employed to select participants for the qualitative study. This method was chosen to ensure the inclusion of experienced healthcare professionals, particularly those who are current or former ward heads, and who possess extensive knowledge of neonatal and infant care. Participants were selected from the same hospitals where the healthcare professionals in the quantitative study were employed. They came from various professional backgrounds, including nurses, midwives, and doctors, and held a range of educational qualifications, such as BSc, MSc, residency, and medical speciality, ensuring a wide range of perspectives. The selection criteria focused on individuals with direct roles in neonatal and infant health and their ability to provide relevant insights into the acceptability of DBMBs.

3.7 Data Collection Method

3.7.1 Data Collection Instruments

Quantitative Data:

Quantitative data were collected using a structured, self-administered questionnaire adapted from previous studies (Chagwena et al., 2020, Demisse et al., 2022, Mwende, 2023, Namuddu et al., 2023, Shanigaram et al., 2022, Singh et al., 2024). The questionnaire had four parts: Part One: Socio-demographic characteristics (e.g., sex, age, marital status, profession, years of experience, level of education, children, income, and religion). Part Two: Eleven questions assessing knowledge of DBMBs. Part Three: Thirteen attitude-related questions with a 4-point Likert scale (strongly disagree, disagree, agree, and strongly agree). Part Four: Seven questions assessing the acceptability of DBMBs based on the Theoretical Framework of Acceptability (TFA) by (Sekhon et al., 2017).

Quantitative Data:

For qualitative data, a semi-structured interview guide which was adapted from previous research and modified according to local context was used for in-depth interviews, based on the Theoretical Framework of Acceptability (TFA), to explore acceptability, facilitators, and barriers to DBMBs (Chagwena, 2020; Mwende, 2023; Namuddu, 2023; Tende, 2023).

3.7.2 Data collectors & supervisors

Quantitative Data: Collected by two BSc nurses and one midwife, supervised by an MPH holder public health officer.

Qualitative Data: Conducted by the principal investigator.

3.7.3 Procedure of Data Collection

The data collection period spanned from August 15 to September 13, 2024, with quantitative and qualitative data collected simultaneously. The supervisor was oriented on his roles, including managing data collectors and reviewing the collected data for quality assurance. Quantitative data collection involved distributing structured questionnaires to healthcare professionals in maternal and child health units. The qualitative data were collected through in-depth interviews with seven senior healthcare professionals from different hospitals. A semi-structured interview guide, based on the Theoretical Framework of Acceptability (TFA), was used to explore acceptability, facilitators, and barriers to DBMBs. All interviews were conducted face-to-face in private settings to ensure confidentiality and lasted 10 to 20 minutes. With the participants' consent, the interviews were audio-recorded and later transcribed verbatim. Probing questions were used to gain deeper insights and clarify responses where necessary.

3.8 Variables

3.8.1 Dependent Variable

Acceptability of donor breast milk banking

3.8.2 Independent Variables

Socio-demographic characteristics of healthcare professionals (sex, age, marital status, profession, year of experience, level of education, having children, income, religion)

Knowledge of healthcare professionals on donor breast milk banking

The attitude of healthcare professionals toward donor breast milk banking

Facilitators and barriers to the acceptability of donor breast milk banking

3.9 Operational Definitions

Acceptability of the donor breast milk banking: was measured using the TFA recommended by Sekhon et al., 2017. TFA was selected because it can assess the acceptability of healthcare interventions of service providers or recipients before delivery. The study utilized a questionnaire containing one question for each of the seven TFA constructs to measure acceptability.
The key constructs of the TFA are 1) affective attitude: how an individual feels about the intervention before taking part, 2) burden: The perceived amount of effort required to participate in the intervention, 3) ethicality: The extent to which the intervention has a good fit with an individual's value system, 4) intervention coherence: participant's understanding of how an intervention works, 5) opportunity costs: The extent to which benefits, profits, or values must be given up to engage in the intervention, 6) perceived effectiveness: The extent to which the intervention is perceived to be likely to achieve its purpose, and 7) self-efficacy: participant's confidence that they can perform the intervention (Namuddu et al., 2023, Sekhon et al., 2017). A total score representing the seven constructs reflected respondents' overall acceptability. The results were categorized as "accepted DBMB" if respondents accepted at least five of seven TFA components (Adawiah et al., 2022; Mwende, 2023).

Knowledge: The knowledge possessed by respondents about DBMB. Measurement results were considered "adequate knowledge" if they answered at least eight out of eleven questions correctly and "inadequate knowledge" if they answered less than eight (Adawiah et al., 2022; Ashebir et al., 2022).

Attitude: The respondent's attitude to DBMB was based on a 13-item scale. Measuring results were "good" if they answered at least eleven out of thirteen questions correctly and "poor" if they answered less than eleven (Adawiah et al., 2022).

3.10 Data Quality Control

3.10.1 Quantitative Data

For quantitative data collection, a structured, self-administered questionnaire was developed. The questionnaire was pre-tested on 5% of the total sample size at Haramaya General Hospital, one of the public hospitals in East Ethiopia, Oromia Regional State, East Hararghe Zone. Errors

identified during the pre-test were rectified to create the final version. The training was provided to data collectors and the supervisor before data collection began to ensure data quality. The data collection process was conducted by two trained BSc nurses and one midwife, supervised by an MPH holder public health officer to ensure quality and completeness. At the end of each data collection day, the principal investigator, data collectors, and the supervisor reviewed the collected data for accuracy and completeness.

3.10.2 Qualitative Data

To ensure data quality, the interview guide was pretested with two healthcare professionals to check for clarity and appropriateness. Member checking was conducted by summarizing key points at the end of each interview to confirm accuracy. Transcriptions were reviewed multiple times to ensure accuracy before analysis. Peer debriefing was also performed with senior researchers to validate the coding process and thematic analysis. Additionally, triangulation was applied by comparing qualitative findings with quantitative results to enhance credibility.

3.11. Data Processing and Analysis

3.11.1 Quantitative Data

Data collected from the survey were checked for completeness, coded, and entered into Epi Data version 4.6, and then exported to STATA version 17 for analysis. After data cleaning, descriptive statistics were computed to describe socio-demographic characteristics, proportions of acceptability, knowledge, and attitude. Reverse-coded questions were adjusted before computing scores.

Acceptability of the DBMBs was measured by using the Theoretical Framework of Acceptability (TFA). One question per seven TFA constructs was used. Two negatively stated statements were reversely coded. Each question has a three-option scale of “yes”, “no”, and “unsure”. The “yes” option was given 1 point, and the “no” option and “unsure” options have zero points. But for negatively stated statements, the “no” option was given 1 score, and the “yes” and “unsure” options have zero points. 'Unsure' responses were categorized as 'no' for positively stated statements and with 'yes' for negatively stated statements to minimize bias and enhance clarity in analysis. This classification assumes that uncertainty (unsure) indicates a lack of definite

agreement for positive statements while suggesting a possible inclination toward agreement for negative statements, consistent with similar studies on healthcare interventions (Kimani-Murage et al., 2019; Mahlatjie et al., 2022). Respondents' answers were categorized as "accepted" or "not accepted" for each TFA component. To calculate total acceptability, respondents who accepted at least five out of the seven components were classified as having accepted the concept overall.

The knowledge questionnaire has a three-option scale of “yes”, “no”, and “and I do not know” for each question. The 'I don't know' responses were categorized along with 'no' responses for straightforward questions, as both indicate a lack of adequate knowledge. For reversed correct answers, 'I don't know' responses were grouped with 'yes' responses since they suggest uncertainty or a lack of correct understanding, aligning with the logic of misclassification as inadequate knowledge. This approach ensures consistency in data analysis and has been utilized in previous studies evaluating knowledge levels in health-related research, enhancing interpretability and maintaining methodological rigor (Adawiah et al., 2022; Alemu et al., 2016). Based on this, for straightforward questions, the “yes” option was given 1 point, and the “no” option and “I do not know” options have zero points. For those questions with reversed correct answers, the “no” option was given 1 score, and the “yes” option and “I do not know” options have zero points. Each participant was given a score based on the number of correct answers they gave. The total score of the knowledge assessment ranged from 0 to 11, and those respondents who scored eight out of eleven were categorized as adequate knowledge and inadequate knowledge if the score was less than eight for knowledge measuring questions.

Similarly, the respondent’s attitude was measured based on a 13-item scale upon a 4-point Likert scale ranging from strongly disagree (1 point), disagree (2 points), agree (3 points), and strongly agree (4 points). The measurement scale did not include a neutral option, limiting responses to "agree," "strongly agree," "disagree," and "strongly disagree." This approach was intentional and aimed at avoiding ambiguity and encouraging participants to take a clear stance, which enhances the clarity and interpretability of the findings. Excluding a neutral option is a common practice in similar studies that assess attitudes, particularly in health-related research, as it helps reduce the risk of central tendency bias and more accurately captures participants' true opinions on the subject (Adawiah et al., 2022; Chagwena et al., 2020). A dichotomous response scale was applied

as, affirmative responses (agree and strongly agree) were merged to become the correct answer, and the negative responses (disagree and strongly disagree) were merged into an incorrect answer. For those negatively stated statements, affirmative responses were considered incorrect answers, while negative responses were taken as correct answers. Finally, the level of attitude was categorized as good if they scored at least eleven out of thirteen and poor if less than eleven for attitude measuring items.

3.11.2 Assumptions checking

In this binary logistic regression analysis, several assumptions were evaluated to ensure validity and reliability. The dependent variable, acceptability was binary (accepted/not accepted), and observations were independent. Linearity between continuous predictors and the logit of the dependent variable was tested using the Box-Tidwell test, confirming that age and income met the assumption, while work experience did not and was transformed. Multicollinearity was checked using the Variance Inflation Factor (VIF), revealing collinearity among age, knowledge, work experience, and income. Based on theoretical importance, knowledge was retained while work experience and income were excluded. Additionally, educational status and profession showed collinearity, leading to the retention of educational status due to its stronger explanatory power. Having children also correlated with marital status, and was retained based on its conceptual relevance.

The sample size met the requirements for logistic regression, ensuring a sufficient number of events per independent variable to avoid overfitting, and data was checked for perfect separation to confirm that all categories of independent variables contributed to the model. Finally, only theoretically relevant and statistically justifiable variables were included in the final model. To ensure that statistical assumptions were met and to improve the interpretability of the analysis, several variables were recategorized. Educational status was reorganized by combining diplomas with Bachelor's degree holders and grouping general practitioners, residents, and specialists under the category "Medical Doctors and above." Religion was condensed by merging Protestants, Atheists, and Wakefata into the category "Protestants and others." These modifications were made to facilitate meaningful analysis and to ensure reliable results.

3.11.3 Model Fitness

After evaluating the assumptions, model fitness was assessed for the binary logistic regression model using several statistical measures. The Hosmer-Lemeshow goodness-of-fit test produced a p-value of 0.25, indicating no significant difference between the observed and predicted outcomes, thereby confirming that the model fits the data well. The model's explanatory power, measured by pseudo R^2, was 0.22, which suggests that 22% of the variance in acceptability can be explained by the predictors included in the analysis. The model's classification performance was demonstrated by an overall accuracy of 74.9%, indicating its ability to correctly classify healthcare professionals into those who accepted and those who did not accept DBMBs. Additionally, the Area Under the Receiver Operating Characteristic Curve (AUC) was 80.5%, reflecting excellent discriminatory power in differentiating between these two groups. These findings collectively demonstrate that the model is fit and suitable for analyzing the factors influencing the acceptability of DBMBs.

3.11.4 Statistical Analysis

After checking the assumptions and confirming model fitness, binary logistic regression analysis was employed to test for an association between healthcare professionals' socio-demographic characteristics, knowledge, and attitude with their acceptability of DBMBs. Crude Odds Ratios (COR) and their 95% CI, were calculated. Variables with $p\text{-value} < 0.25$ in the bivariable analysis were included in multivariable logistic regression to identify explanatory variables that were associated with the acceptability of the DBMBs. Adjusted Odds Ratios (AOR) were computed with 95% CI and a p-value of less than 0.05 was considered to identify a significant association.

3.11.5 Qualitative Data

Qualitative data were analyzed by thematic analysis using ATLAS. ti7 software program. The analysis was drawn on a TFA of healthcare interventions. All interviews were recorded, and transcribed, and a cross-case analysis was used to identify themes from the combined responses of all participants. The following steps were employed. 1) Reading and re-reading the responses to become familiar with the text and begin developing codes. 2) Coding the data to identify themes and sub-themes. 3) Displaying details of categories and themes. 4) Reducing the data to essential points, and 5) Developing an overall interpretation based on this process. Themes and

sub-themes were derived inductively from transcripts and used to explore barriers and facilitators to DBMB acceptability. Data triangulation was achieved by corroborating qualitative findings with quantitative data.

3.12 Ethical Considerations

The research proposal was approved by the Institutional Health Research Ethics Review Committee (IHRERC) at Haramaya University's College of Health and Medical Sciences and ethical clearance was obtained from IHRERC on August 13, 2024, with reference number 207/2024. Informed, voluntary, written, and signed consent was obtained from hospital heads and participants. Respondents were informed about the study’s purpose, and participation was entirely voluntary. Any involvement in the study was after their complete consent was obtained. They were also informed that all data obtained from them would be kept confidential by using codes instead of any personal identifiers and is meant only for the study.

3.13 Information Dissemination

After completion of this study, the findings will be submitted to Haramaya University, College of Health and Medical Sciences, Hiwot Fana Comprehensive Specialized Hospital, Dil-Chora Referral Hospital, Jugol General Hospital, Sabian General Hospital, and other concerned bodies. The findings will published in scientifically reputable journals. It will also be presented at annual scientific meetings, conferences, and seminars.

4. RESULTS

4. 1 Socio-demographic Characteristics of Participants

4. 1. 1 Quantitative Study

A total of 347 participants were included in the quantitative study with a response rate of 96.1%. The 3.9% non-response rate was participants not returning the questionnaire or providing incomplete responses. These were excluded to maintain the completeness and reliability of the dataset. Out of 347 participants, 182 were from HFCSH, and 177 were male. Their ages ranged from 20 to 50 years, with a median age of 30 and interquartile range of 28 to 34 years. Among the participants, 181 were married, and 156 had children. Nurses comprised the largest professional group, totalling 153 participants, while 209 held a Bachelor's degree (BSc). Work experience ranged from 1 to 30 years, with a median of 5 and interquartile range between 2 to 9 years. Regarding their religion 155 participants identified as Orthodox Christians. Monthly incomes ranged from 3,600 to 50,000 ETB, with a median income of 9000 ETB and an interquartile range between 7000ETB to 11000ETB. Further details regarding these socio-demographic characteristics are presented in Table 2.

Table 2: Socio-demographic characteristics of Healthcare professionals who participated in a quantitative study in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024. (n=347)

Variables	Category	Frequency	Per cent
Sex	Male	177	51.01
	Female	170	48.99
Age in years	20-29	151	43.52
	30-39	170	48.99
	40 and above	26	7.49
Workplace	HFCSH	182	52.45
	DRH	72	20.75
	JGH	48	13.83
	SGH	45	12.97
Marital status	Single	162	46.69
	Married/cohabiting	181	52.16
	Separated	2	0.58
	Divorced	2	0.58

Profession	Nursing	153	44.09
	Midwifery	94	27.09
	Public health	12	3.46
	Medical Doctor	88	25.36
Level of education	Diploma	23	6.63
	BSc	209	60.23
	MSc/MPH	27	7.78
	General Practitioner	52	14.99
	Gynecologist	9	2.59
	Pediatrician	8	2.31
	Pediatric residents	10	2.88
	OBGYN residents	9	2.59
Work experience in years	up to 5	193	55.62
	6-10	98	28.24
	11 and above	56	16.14
Having children	Yes	156	44.96
	No	191	55.04
Religion	Muslim	136	39.19
	Orthodox	155	44.67
	Protestant	53	15.27
	Others	3	0.86
Monthly income	up to-7000ETB	90	25.94
	7001-9000ETB	91	26.22
	9000-11000ETB	85	24.50
	Above 11000ETB	81	23.34

Religion: *Others (Atheist and Wakefata)*

Workplace: *HFCSH- Hiwot Fana Comprehensive Specialized Hospital; DRH- Dil-Chora Referral Hospital; JGH- Jugol General Hospital; SGH- Sabian General Hospital*

Level of education: *OBGYN- Obstetrics and Gynecology*

Monthly income*: ETB: Ethiopian birr*

4. 1. 2 Qualitative Study

A total of seven health professionals have participated in the qualitative study. They were from four different hospitals and came from various professional backgrounds, including nurses, midwives, and medical doctors. Their educational qualifications ranged from BSc to medical specialty and their work experience ranged from 10 to 25 years. In terms of religion, four identified as Muslim, and others are Orthodox Christian (Table 3).

Table 3: Socio-demographic characteristics of healthcare professionals who participated in a qualitative study in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024. (n=7)

Variables	Category	Frequency
Profession	Nurses	3
	Midwives	2
	Medical doctors	2
Educational status	BSc	3
	MSc	2
	Resident	1
	Specialist	1
Workplace	HFCSH	3
	DRH	2
	JGH	1
	SGH	1

Workplace: HFCSH- Hiwot Fana Comprehensive Specialized Hospital; DRH- Dil-Chora Referral Hospital; JGH- Jugol General Hospital; SGH- Sabian General Hospital;

4.2 Knowledge of Donor Breast Milk Banks

Among the 347 participants, 164 (47.26%) reported having heard about DBMBs, of which 100 heard about it via the Internet. Overall, 12.1% (95% CI: 8.86%–16.01%) of the participants were found to have adequate knowledge about DBMBs. Details of the responses to knowledge assessment questions are presented in Table 5 below.

Table 4: Knowledge of DBMBs among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

Variables	Category	Frequency	Per cent
Ever heard about donor breast milk banks (n=347)	Yes	164	47.26
	No	183	52.74
Source(s) of information concerning donor breast milk banks. (n=164)	Formal education	34	20.73
	Internet	100	60.98
	Media	41	25.00
	Family and friends	32	19.51
	Senior physicians	2	10
Donated breast milk can be utilized when mothers are unable to breastfeed due to various reasons. (n=164)	Yes	138	84.15
	No	14	8.54
	I don’t know	12	7.32

Donated breast milk is more beneficial than formula for premature infants. (n =164)	Yes	129	78.66
	No	19	11.59
	I don't know	16	9.76
Donor breast milk contains more nutrients than formula feed (n=164)	Yes	124	75.61
	No	17	10.37
	I don't know	23	14.02
Donor breast milk provides immunological benefits. (n=164)	Yes	124	75.61
	No	16	9.76
	I don't know	24	14.63
A medical examination is needed for breast milk donors. (n=164)	Yes	124	75.61
	No	21	12.80
	I don't know	19	11.59
Donor breast milk increases the risk of allergy in recipient infants. (n=164)	Yes	76	46.34
	No	52	31.71
	I don't know	36	21.95
Donor breast milk transmits infections to the recipient's infant. (n=164)	Yes	83	50.61
	No	46	28.05
	I don't know	35	21.34
Can you describe the process of collecting, storing, and distributing breast milk in a breast milk bank? (n=164)	Yes	54	32.93
	No	80	48.78
	I don't know	30	18.29
Are there any regulations or guidelines governing the operation of breast milk banks in our country? (n=164)	Yes	21	12.80
	No	46	28.05
	I don't know	97	59.15
Are breast milk banks available in our country? (n=164)	Yes	20	12.20
	No	48	29.27
	I don't know	96	58.54

4. 3 Attitudes towards Donor Breast Milk Banks

Participants expressed varied attitudes toward DBMBs. Specifically, when it came to the idea that "a mother's breast milk only benefits her child," 161 individuals (46.4%) strongly disagreed. A significant number, 200 (57.64%), agreed that donor breast milk is a better option than infant formula if a mother's breast milk is insufficient. A total of 155 (44.67%) believed establishing and sustaining a DBMB in the country is feasible, while 207 (59.65%) expressed interest in supporting initiatives to establish a DBMB. Overall, the proportion of respondents with a good attitude towards DBMBs was 31.12% (95% CI: 26.29%–36.29%). Details of these findings are presented in Table 6 below.

Table 5: Attitudes towards DBMBs among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024 (n=347)

Statements	Category	Frequency	Per cent
The breast milk of a mother is only beneficial to her child.	Strongly Disagree	161	46.40
	Disagree	94	27.09
	Agree	59	17.00
	Strongly Agree	33	9.51
If the mother's breast milk is not enough, donor breast milk is a greater option for the baby than infant formula.	Strongly Disagree	22	6.34
	Disagree	61	17.58
	Agree	200	57.64
	Strongly Agree	64	18.44
Donating breast milk is good for a mother's health.	Strongly Disagree	27	7.78
	Disagree	59	17.00
	Agree	200	57.64
	Strongly Agree	61	17.58
Donating human breast milk is critical to the management of inconsistencies in breastfeeding.	Strongly Disagree	15	4.32
	Disagree	68	19.60
	Agree	201	57.93
	Strongly Agree	63	18.16
Donor breast milk decreases the bonding between mothers and babies.	Strongly Disagree	57	16.43
	Disagree	101	29.11
	Agree	128	36.89
	Strongly Agree	61	17.58
All nursing mothers must be informed about and encouraged to donate milk to milk banks.	Strongly Disagree	18	5.19
	Disagree	60	17.29
	Agree	199	57.35
	Strongly Agree	70	20.17
In case of excess production of breast milk Donating breast milk is good.	Strongly Disagree	22	6.34
	Disagree	54	15.56
	Agree	212	61.10
	Strongly Agree	59	17.00
If it is found to be necessary, I will be voluntary to donate/ recommend my spouse to donate breast milk.	Strongly Disagree	28	8.07
	Disagree	98	28.24
	Agree	169	48.70
	Strongly Agree	52	14.99
If it is found to be necessary, I will use /recommend my spouse to use donated breast milk	Strongly Disagree	29	8.36
	Disagree	89	25.65
	Agree	186	53.60
	Strongly Agree	43	12.39
I believe that if I give my breast milk to other babies/recommend my spouse to give	Strongly Disagree	30	8.65
	Disagree	115	33.14
	Agree	161	46.40

breast milk, then it may not be sufficient for my baby.	Strongly Agree	41	11.82
Establishing a breast milk bank in our country is important for infant health.	Strongly Disagree	19	5.48
	Disagree	38	10.95
	Agree	218	62.82
	Strongly Agree	72	20.75
I believe that establishing and sustaining a breast milk bank in our country is feasible	Strongly Disagree	45	12.97
	Disagree	109	31.41
	Agree	155	44.67
	Strongly Agree	38	10.95
I am interested in supporting initiatives related to the establishment of a breast milk bank.	Strongly Disagree	16	4.61
	Disagree	38	10.95
	Agree	207	59.65
	Strongly Agree	86	24.78

4.2 Acceptability of Donor Breast Milk Banks

The overall results from seven components of the quantitative study showed that 38.62% (95% CI: 33.47–43.96%) of participants accepted the concept of DBMBs. Affective attitude findings showed that most participants (74.64%) recognized donor breast milk as the best alternative when a mother's milk was unavailable. However, concerns about the burden of implementing DBMBs were evident, as only 46.26% believed that establishing a DBMB would not be an extra burden. Regarding ethical acceptability, 60.23% agreeing that DBMBs align with healthcare ethics. Additionally, 62.82% of participants believed DBMBs fit well within existing healthcare practices. Resource allocation emerged as a major challenge, as 72.60% opposed dedicating resources to DBMBs. Despite this, 54.47% accepted that the benefits of DBMBs outweigh potential risks, emphasizing perceived effectiveness. However, self-efficacy was low, with only 23.63% of healthcare professionals feeling adequately prepared to contribute to DBMB initiatives. Details of participants' responses to each TFA for the quantitative study are presented in Table 4 below.

Table 6: Quantitative results on the acceptability of DBMBs among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024 (n=347)

Variables	Category	Frequency	Per cent
Affective attitude (perception of breast milk as the best alternative)	Yes	259	74.64
	No	34	9.80
	Unsure	54	15.56
Perceived burden on healthcare professionals	Yes	122	35.16
	No	164	46.26
	Unsure	61	17.58
Ethicality (ethical compatibility with healthcare practices)	Yes	209	60.23
	No	49	14.12
	Unsure	89	25.65
Intervention coherence (alignment with healthcare practices)	Yes	218	62.82
	No	40	11.53
	Unsure	89	25.65
Perceived opportunity costs	Yes	148	42.65
	No	102	29.39
	Unsure	97	27.95
Perceived effectiveness	Yes	189	54.47
	No	68	19.60
	Unsure	90	25.94
Self- Efficacy (Perceived competence)	Yes	82	23.63
	No	208	59.94
	Unsure	57	16.43

Qualitative findings also supported quantitative results, providing deeper insights into the perspectives of healthcare professionals regarding DBMBs. Participants expressed positive attitudes towards DBMBs, recognizing their importance in addressing infant feeding challenges. However, concerns were raised regarding the burden, with mixed opinions on whether DBMBs would increase workloads or alleviate formula-feeding responsibilities. While many participants acknowledged the ethical alignment of DBMBs with healthcare values, others highlighted community and religious concerns. The concept was generally understood (intervention coherence), with healthcare professionals emphasizing its potential to reduce neonatal mortality, although resource constraints and opportunity costs were notable concerns. Perceived effectiveness was supported by evidence of DBMBs improving infant health outcomes, yet

doubts remained due to limited local experience. Lastly, self-efficacy emerged as a challenge, with low confidence in implementing DBMBs due to limited awareness and training; however, participants acknowledged that structured education and awareness could improve readiness. The following table presents these findings, categorized into themes and sub-themes, with supporting participant quotes.

Table 7: Qualitative findings on the acceptability of DBMBs among healthcare professionals in public hospitals in Harari Regional State and Dire Dawa City Administration, Eastern Ethiopia, 2024

TFA constructs	Themes	Sub-Themes	Supporting Quotes
Affective attitude (perceptions toward DBMBs)	Positive perceptions toward DBMBs	Recognition of benefits for high-risk infants	*"These services offer significant benefits for mothers who are unable to feed their babies due to factors like HIV/AIDS."* ***…Nurse.***
		DBMBs as a solution to infant feeding challenges	*"I fully support this, as it addresses several issues."* ***…..Pediatrician.***
	Neutral or uncertain perceptions	Mixed feelings about DBMBs	*"I feel neutral, about 50/50%. It may benefit those who cannot feed their babies."* ……***Nurse.***
Perceived burden (workload and feasibility of DBMBs)	DBMBs could reduce the workload	Easier than managing formula feeding	*"Offering breast milk could reduce the workload in terms of formula feeding."* ……***Nurse.***
	DBMBs require additional resources	Increased workload and special resources needed	*"Establishing a DBMB would demand commitment and additional resources."* ……***Nurse.***
Ethicality (alignment of DBMBs with ethical standards)	Ethical alignment with healthcare practices	DBMBs as an ethical healthcare initiative	*"Offering donor breast milk as an option for infant feeding aligns with ethical standards. I do not anticipate any ethical issues."* …..***Pediatrician.***
	Ethical concerns related to cultural and religious beliefs	Need to address community concerns	*"The doubts can be challenging, but we can help the community to understand."………**Pediatric resident.***
		Ethical considerations from a midwifery perspective	*"From a midwifery perspective, our role is to care for both mothers and babies. I believe ethical issues should not be a concern for us."…………**Midwife.***

Intervention coherence (understanding of DBMBs' purpose)	Perceived alignment with healthcare goals	DBMBs could improve infant survival	*"Although not practiced in our area, DBMBs could reduce costs, lower infant mortality rates, and ease the burdens on hospitals."…………**Pediatrician.***
		Essential for preterm and high-risk infants	*"Premature infants often cannot suck effectively, and mothers with complications struggle to feed them. DBMBs could provide crucial support for these infants."….**Midwife.***
Opportunity cost (resource allocation for DBMBs)	Concerns over financial and infrastructure investment	Lack of public awareness may hinder success	*"A lack of societal awareness may hinder availability until it is adequately established." ………**Pediatrician.***
		Infrastructure and equipment requirements	*"Storage facilities might be required. If it's affordable and manageable by institutions, it could be a beneficial project." …….**Midwife.***
	Practicality and feasibility considerations	DBMBs require standards and resources	*"Standards, refrigeration, and materials for milk expression are needed, but the demand isn't excessive."……..**Nurse.***
Perceived effectiveness (DBMBs' potential to improve health outcomes)	DBMBs can reduce infant mortality and improve health	DBMBs prevent infant mortality	*"Breast milk banks can significantly reduce mortality rates and costs, especially for families in orphanages." …….**Pediatrician***
		Breast milk is superior to formula	*"Breast milk provides protective properties against infections and essential nutrients; there is no comparison to formula."…. **NICU nurse.***
	DBMBs can improve breastfeeding practices	DBMBs help mothers facing breastfeeding challenges	*"DBMBs are undeniably beneficial for infant health and can help to reduce infant mortality rates when mothers face challenges with breastfeeding." – Pediatric resident*
Self-efficacy (confidence in supporting DBMBs)	Confidence in supporting DBMBs	Some professionals feel ready to advocate for DBMBs	*"I am fully confident and eager to encourage others to support this initiative."…**NICU nurse.***
	Challenges in readiness due to lack of experience	Concerns over limited experience in society and the healthcare system	*"I am fully confident, despite the inexperience within our society and healthcare system." **Pediatrician***
		Cultural and religious beliefs affect confidence	*"Cultural and religious beliefs could hinder my immediate support, but raising awareness can facilitate acceptance."……..**Nurse.***

4.6 Factors Associated with the Acceptability of Donor Breast Milk Banks

Variables with a p-value of less than 0.25 during a bivariable logistic regression and those that met the necessary assumptions like sex, level of education, having children, knowledge status, and attitude were included in the final multivariable analysis. The results of the final analysis revealed that level of education, having children, knowledge status and attitude were significantly associated with the acceptability of DBMBs.

Participants who have children were 4.38 times (AOR: 4.38; 95% CI: 2.54-7.53; p = 0.000) more likely to accept DBMBs compared to participants who do not have children.

MSc/MPH holder participants were 12.84 times (AOR: 12.84; 95% CI: 4.19–39.29; p = 0.000) more likely to accept DBMBs compared to those with a diploma and BSc holders.

Similarly medical doctors and above (general practitioners, residents, and specialists) were 2.7 times (AOR: 2.7; 95% CI: 1.44–5.03; p = 0.002) more likely to accept DBMBs compared to those with a diploma and BSc holders.

A health professional who possessed adequate knowledge of DBMBs was 2.25 times (AOR: 2.25; 95% CI: 1.03–4.93; p = 0.041) more likely to accept DBMBs compared to those with inadequate knowledge.

Moreover, professionals with a good attitude towards DBMBs were 3.11 times (AOR: 3.11; 95% CI: 1.80–5.38; p = 0.000) more likely to accept DBMBs compared to those with a poor attitude (Table 7).

Table 8: Factors associated with acceptability of DBMBs among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024 (n=347)

Variables	Category	Status of acceptability		Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
		Accepted	**Not-accepted**				
Sex	Male	77	100	1		1	
	Female	57	113	0.65 (0.42, 1.01)	0.057	0.78 (0.46, 1.33)	0.370
Having children	No	46	145	1		1	-
	Yes	88	68	4.07 (2.57, 6.45)	0.000	**4.38 (2.54, 7.53)**	**0.000**
Level of education	Diploma/BSc	67	165	1		1	-
	MSc/MPH	22	5	10.8 (3.93, 29.80)	0.000	**12.84 (4.19, 39.29)**	**0.000**
	Medical Doctor and above	45	43	2.57 (1.55, 4.27)	0.000	**2.7 (1.44, 5.03)**	**0.002**
Knowledge status	Inadequate	107	198	1		1	-
	Adequate	27	15	3.33 (1.69, 6.53)	0.000	**2.25 (1.03, 4.93)**	**0.041**
Level of attitude	Poor	67	172	1		1	-
	Good	67	41	4.19 (2.59, 6.78)	0.000	**3.11 (1.80, 5.38)**	**0.000**

4.7 Facilitators and Barriers to the Acceptability of Donor Breast Milk Banks

The qualitative findings of this study identified several facilitators and barriers that could influence the acceptability of DBMBs among healthcare professionals. Facilitators included healthcare professionals' scientific understanding of breast milk benefits, trust in healthcare systems’ safety protocols, training, and educational initiatives. On the other hand, barriers were related to lack of awareness, religious and community concerns and resource constraints. The following table presents the key themes that emerged from the qualitative analysis along with participant’s quotes.

Table 9: Facilitators and Barriers to the DBMBs among healthcare professionals in public hospitals in Harari Regional State and Dire Dawa City Administration, Eastern Ethiopia, 2024

Category	Themes	Supporting quotes
Facilitators	Scientific understanding of breast milk benefits	*"We (healthcare professionals) can understand the pathophysiology or effect of donating. As I donate, the production of milk also increases, so knowing about the mechanism of milk production can be one factor for accepting this concept."* ***....Nurse***
	Trust in healthcare systems' safety protocols	*"If this service operates within a healthcare facility, issues such as hygiene can be addressed and foster acceptance." ....* ***Midwife***
	Training, and educational initiatives	*"By providing training and increasing awareness on the DBMBs, healthcare professionals will be more likely to accept it" .....* ***Pediatrician***
		"Since the DBMB concept is new, training and awareness for all stakeholders is crucial." …… ***Pediatric resident.***
Barriers	Lack of awareness among health professionals	*"A lack of awareness among healthcare professionals as a significant barrier to the acceptability of DBMBs.".....* ***Pediatrician***
	Community concerns and religious beliefs	*"Community concerns and religious factors may influence the acceptability of DBMBs among healthcare professionals.".....* ***Pediatrician***
		"In Ethiopia, religion and culture can be major hurdles. In our context (Muslims) there is a belief that feeding breast milk together may lead to familial bonding between the two babies....Nurse
	Resource constraints	*"Insufficient infrastructure and resources can obstruct the implementation of DBMBs" ....*Pediatric resident.

5. DISCUSSION

This study assessed the acceptability of DBMBs, identified factors associated with DBMBs, and explored facilitators and barriers to the acceptability of DBMBs among healthcare professionals. The quantitative findings indicated that 38.62% (95% CI: 33.47–43.96%) of respondents accepted the concept of DBMBs. Factors such as adequate knowledge, good attitudes, holding a master's degree, medical doctor, and having children were significantly associated with the acceptability of DBMBs.

The present finding in the proportion of acceptability of DBMBs is slightly higher than a study conducted in Zimbabwe (31%), and Indonesia 31% of health workers accepted the concept of DBMBs (Chagwena et al., 2020; Adawiah et al., 2022). The variations may be attributed to differences in study populations. The Zimbabwean study involved both clinical and non-clinical healthcare workers, while the Indonesian study involved healthcare professionals in pediatric wards only. However, the overall acceptability across these studies was low since all three countries are low-middle-income nations lacking established DBMBs, facing comparable cultural and systemic challenges affecting breastfeeding practices. This shared context indicates that enhancing education, tailored to local cultural contexts, might improve the acceptability of DBMBs in these regions. In contrast, the acceptability in this study is significantly lower than the 94.29% reported among nursing officers in India (Safeena Beevi et al., 2021). This difference may be attributed to India's more advanced healthcare infrastructure and well-established awareness campaigns regarding DBMBs, which enhance familiarity and trust in their use. India has made considerable progress in setting up DBMBs, supported by national guidelines, training curricula, and public awareness initiatives (Tyebally Fang, 2021; Mantri, 2022).

This study revealed areas where qualitative findings supported, enriched, and added considerations to the quantitative findings on DBMBs, while occasionally presenting contradictions. The qualitative insights of this study provided a richer context, showing that many participants recognized the significant benefits of DBMBs in reducing neonatal mortality, especially for premature infants and mothers who have difficulties with breastfeeding. One paediatrician noted, "*DBMBs could significantly reduce mortality rates and hospital burdens.*" The finding is consistent with a study conducted in Ghana, where healthcare workers accepted

the idea of DBMBs and indicated a willingness to recommend donor milk, provided that adequate safety protocols were established (Tende et al., 2023). Quantitative data reflected concerns about the potential burden DBMBs might place on healthcare professionals, but qualitative insights showed that many participants believed DBMBs could reduce workloads, as one nurse noted, "*Offering breast milk could lessen the workload in terms of formula feeding*." This finding aligns with studies in Ghana (Tende et al., 2023), which reported that healthcare providers recognized the efficiency of DBMBs in reducing time spent on alternative feeding methods.

Both qualitative and quantitative supported the ethical acceptability of DBMBs; however, qualitative findings highlighted cultural and religious concerns, consistent with studies in Uganda and South Africa (Magowan et al., 2020; Mahlatjie et al., 2022), which found that cultural beliefs and familial bonding traditions often challenged the acceptance of DBMBs. Resource concerns raised quantitatively were supported qualitatively, with additional considerations of long-term benefits, as one midwife reflected, "*If it's affordable and manageable by institutions, it could be a beneficial project*," aligning with findings from Indonesia (Adawiah et al., 2022). Regarding perceived readiness, confidence gaps highlighted in quantitative results were enriched by qualitative insights. Qualitative findings added a more positive dimension, showing enthusiasm from experienced professionals, with one nurse stating, "*I am fully confident and eager to encourage others to support this initiative*." showing that experienced professionals expressed greater readiness.

The findings of this study revealed that healthcare professionals with adequate knowledge of DBMBs are 2.25 times more likely to accept DBMBs than those with inadequate knowledge. This aligns with findings from Malaysia (Ramachandran et al., 2024), Indonesia (Adawiah et al., 2022), and Zimbabwe (Chagwena et al., 2020), which all show a strong association between knowledge and acceptability of DBMBs. These results highlight the importance of targeted educational interventions to improve knowledge and support for DBMBs among healthcare professionals. Considering that Ethiopia currently has no operational DBMBs and the prior study suggests limited awareness (Alemu et al., 2016), enhancing healthcare professionals' knowledge through structured training and educational programs could significantly enhance the acceptance of DBMB. In multivariable analysis, participants with a good attitude toward DBMBs were more

likely to accept the concept, consistent with findings from Adawiah et al., (2022) in Indonesia, where the attitude was associated with the acceptance of DBMBs. Attitudes can significantly influence individuals' recognition of DBMB benefits (Adawiah et al., 2022), pointing to the need for targeted interventions to foster favourable attitudes among healthcare professionals.

Educational status also has a strong association with acceptability, with those holding an MSc/MPH and medical doctors are significantly more likely to accept DBMBs than diploma and BSc holders, supporting the notion that knowledge enhances acceptance. Studies such as Chagwena et al., 2020 and Ramachandran et al., 2024 affirm that better knowledge about DBMBs correlates with higher acceptability, emphasizing the need to improve awareness among healthcare professionals, particularly those with lower educational backgrounds (Chagwena et al., 2020; Ramachandran et al., 2024). In this study, having children was significantly associated with the acceptability of DBMBs. Participants with children were over four times more likely to accept DBMBs than those without children. This suggests that parental experience influences perceptions of the importance of breast milk, awareness of breastfeeding challenges, and openness to donor breast milk for infants, which is supported by studies in India (Safeena Beevi et al., 2021) and in Malaysia (Ramachandran et al., 2024).

Facilitators of acceptability of DBMBs included an understanding of the nutritional and immunological benefits of breast milk and breast milk donation, confidence in the safety protocols of the healthcare system, training, and educational initiatives. This is consistent with findings from South Africa, where nurses expressed a willingness to donate milk to assist vulnerable infants (Mahlatjie et al., 2022). Additionally, the importance of training and education was underscored, with participants advocating for campaigns designed to address knowledge gaps and cultural misconceptions. This aligns with a scoping review by (Mathias et al. (2023), which highlighted the necessity of training to enhance health professionals' understanding and acceptance of DBMBs.

Barriers to the acceptability of DBMBs were related to a lack of awareness, and cultural, religious, and logistical issues. Participants expressed worries about disease transmission, safety in screening, and storage methods, which align with findings in Kenya and Zimbabwe where hygiene fears and concerns about HIV transmission limited acceptance (Kimani-Murage et al.,

2019; Chagwena et al., 2020). Cultural resistance to sharing breast milk and religious objections were significant barriers, as seen in South Africa, where traditional beliefs complicated the acceptability of DBMBs (Mahlatjie et al., 2022). Logistical challenges, such as inadequate infrastructure, personnel shortages, and financial constraints, were also major factors, reflecting a systematic review that identified these as global barriers to implementing DBMBs (Doshmangir et al., 2019).

This study has important implications for healthcare professionals, healthcare systems, and community health outcomes. By identifying gaps in knowledge, attitudes, and acceptability among healthcare professionals, the findings highlight the need for targeted educational and training programs that enhance understanding and acceptance of DBMBs. Empowered healthcare professionals can become key advocates, effectively educating communities about the benefits of DBMBs, reducing misconceptions, and promoting donor participation. Addressing the barriers requires a comprehensive strategy that incorporates culturally sensitive education, improved infrastructure, and community involvement to foster trust and promote acceptance. Additionally, the study provides vital evidence for local policymakers to establish culturally sensitive frameworks for establishing and implementing DBMBs, ensuring that both healthcare professionals and communities can benefit from this life-saving intervention.

5.1 Strengths and limitations of the study

This study is the first of its kind in Ethiopia to assess the acceptability of DBMBs and explore facilitators and barriers to acceptability. It provides invaluable baseline data on the acceptability of DBMBs, addressing a critical gap in the local literature. The mixed-methods approach enhances the study by integrating quantitative data with qualitative insights, which allows for a comprehensive understanding of healthcare professionals' acceptability. The use of multi-centre studies provides comprehensive viewpoints concerning the acceptability of DBMBs.

However, the study has some limitations. First, the reliance on self-administered questionnaires may have introduced response and social desirability bias. Second, the study focused on healthcare professionals in public hospitals which may not fully represent the professionals in private and rural healthcare settings. Despite these limitations, the study provides foundational evidence that can inform future research, advocacy, and policy development regarding DBMBs in Ethiopia.

6. CONCLUSION

In conclusion, four in 10 health professionals accepted the concept of DBMBs, indicating moderate acceptability. Several factors were significantly associated with acceptability, including higher education, and a medical doctor, possessing adequate knowledge, having a good attitude, and having children. The high levels of inadequate knowledge and poor attitudes among health professionals highlight the urgent need for awareness campaigns and training to enhance understanding and acceptance of DBMBs. Facilitators identified in the study included an understanding of the benefits of breast milk and breast milk donation, confidence in the safety protocols of the healthcare system, as well as training and educational initiatives. In contrast, barriers to acceptance included a lack of awareness, cultural and religious concerns, and resource constraints.

7. RECOMMENDATIONS

The study findings emphasize the crucial need to integrate DBMBs into educational systems and to establish the necessary infrastructure for DBMBs, to enhance the survival rates of preterm infants. Based on these findings, several key recommendations are proposed to guide healthcare professionals, hospital administrators, policymakers, and future researchers in addressing the gaps in knowledge, attitudes, and acceptability of DBMBs in Ethiopia.

For healthcare professionals

Enhance knowledge: Engage in specialized training and educational programs focused on DBMBs to improve understanding and readiness for future implementation.

Advocate for DBMBs: Use their position to promote the concept of DBMBs in discussions with hospital administrators and policymakers.

For hospitals and health institutions

Prepare for future DBMB integration: Develop protocols and guidelines in preparation for DBMB implementation as part of neonatal care services.

Invest in training: Establish internal training initiatives for staff to build a foundation for future DBMB operations.

Assess infrastructure needs: Evaluate existing resources and identify gaps that need to be addressed to facilitate the potential introduction of DBMBs.

For health bureaus & policymakers

Develop strategic guidelines: Develop national or regional policies and guidelines for implementing DBMBs based on healthcare professionals' acceptability and needs.

Resource allocation: Plan for financial and infrastructural investments that would support the establishment of DBMBs.

Engage community leaders: Collaborate with community and religious leaders to address concerns and promote awareness about the advantages of DBMBs.

For future researchers

Further exploration: Conduct longitudinal and ethnographic studies to explore community perceptions and organizational factors that influence the acceptance of DBMBs.

Evaluate interventions: Assess the impact of training and awareness initiatives on the acceptability of DBMBs once pilot projects are established.

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9. ANNEXES

9.1 Data Collection Instruments/Questionnaires

Date………/………../2024 Form number....................

Hospital…………………………………

Section A: socio-demographic information

Table 6: Questionnaire about socio-demographic information for the study on the acceptability of donor breast milk banking and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

SN	Questions	Response Categories	Skip if any
1	Sex	1. Male 2. Female	
2	Age in year	__________ years	
3	Marital status	1. Single	
		2. Married/cohabiting	
		3. Separated	
		4. Divorced	
		5. Widowed	
4	Profession	1. Medical Doctor	
		2. Midwifery	
		3. Public health	
		4. Nursing	
		5. Others (specify)	
5	Level of education	1. Diploma	
		2. BSc	
		3. MSc/MPH	
		4. General Practitioner	
		5. Sub-specialist in ….	
		6. Gynaecologists	
		7. Paediatrician	
		8. Pediatric residents	
		9. OBGYN residents	
6	Work experience	____________ years	
7	Do you have children?	1. Yes	
		2. No	
8	Religion	1. Muslim	
		2. Orthodox	
		3. Protestant	
		4. Other: ____________________ specify	
9	What is your monthly household income?	______________ ETB	

Section B: Knowledge of donor breast milk banking

Table 7: Questionnaire about knowledge of donor breast milk banking for the study on the acceptability of donor breast milk banking and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

SN	Questions	Response Categories	Skip if any
1	Have you ever heard about donor breast milk banks?	1. Yes	If you say No skip to section C
		2. No	
2	What is your source(s) of information concerning donor breast milk banks?	1. Formal education	
		2. Internet	
		3. Media	
		4. Family and friends	
		5. Other:_____________specify	
3	Can donated breast milk be utilized when mothers are unable to breastfeed due to various reasons?	1. Yes	
		2. No	
		3. I don't know	
4	Is donated breast milk more beneficial than formula for premature infants?	1. Yes	
		2. No	
		3. I don't know	
5	Does donor breast milk contain more nutrients than formula feed?	1. Yes	
		2. No	
		3. I don't know	
6	Does donor breast milk provide immunological benefits?	1. Yes	
		2. No	
		3. I don't know	
7	Is a medical examination needed for breast milk donors?	1. Yes	
		2. No	
		3. I don't know	
8	Does donor breast milk increase the risk of allergy in recipient infants?	1. Yes	
		2. No	
		3. I don't know	
9	Can donor breast milk transmit infections to the recipient's infant?	1. Yes	
		2. No	
		3. I don't know	
10	Can you describe the process of collecting, storing, and distributing breast milk in a breast milk bank?	1. Yes	
		2. No	
		3. I don't know	
11	Are there any regulations or guidelines governing the operation of breast milk banks in our country?	1. Yes	
		2. No	
		3. I don't know	
12	Are breast milk banks available in our country?	1. Yes	
		2. No	
		3. I don't know	

Section C: Attitude towards donor breast milk banks

Table 8: Questionnaire about attitude towards donor breast milk banking for the study on the acceptability of donor breast milk banking and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

SN	Statement	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
1	The breast milk of a mother is only beneficial to her child.				
2	If the mother's breast milk is not enough, donor breast milk is a greater option for the baby than infant formula.				
3	Donating breast milk is good for a mother's health.				
4	Donating human breast milk is critical to the management of inconsistencies in breastfeeding.				
5	Donor breast milk decreases the bonding between mothers and babies.				
6	All nursing mothers must be informed about and encouraged to donate milk to milk banks.				
7	In case of excess production of breast milk donating breast milk is good.				
8	If it is found to be necessary, I will be voluntary to donate/ recommend my spouse to donate breast milk.				
9	If it is found to be necessary, I will use donated breast milk.				
10	I believe that if I give my breast milk to other babies/recommend my spouse to give breast milk, then it may not be sufficient for my baby.				
11	Establishing a breast milk bank in our country is important for infant health.				
12	I believe that establishing and sustaining a breast milk bank in our country is feasible.				
13	I am interested in supporting initiatives related to the establishment of a breast milk bank.				

Section D: Acceptability of donor breast milk banks

Table 9: Questionnaire about acceptability of donor breast milk banking for the study on the acceptability of donor breast milk banking and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

SN	Questions	Response Categories	Skip if any
1	Do you think that breast milk donated from a milk bank is the best alternative for infants when the biological mother's milk is unavailable?	1. Yes 2. No 3. Unsure	
2	Do you believe that establishing a breast milk bank would impose a considerable burden on healthcare professionals?	1. Yes 2. No 3. Unsure	
3	Do you believe it is ethically acceptable to establish and operate a breast milk bank (it doesn't conflict with your values and beliefs)?	1. Yes 2. No 3. Unsure	
4	Do you believe a breast milk bank aligns with current healthcare practices and goals?	1. Yes 2. No 3. Unsure	
5	Are there any potential drawbacks or sacrifices linked to allocating resources to a breast milk bank?	1. Yes 2. No 3. Unsure	
6	Do you believe the advantages/ benefits of a breast milk bank outweigh/surpass the potential risks or challenges?	1. Yes 2. No 3. Unsure	
7	Do you feel confident/equipped with the relevant skills and knowledge to contribute effectively to a breast milk bank initiative?	1. Yes 2. No 3. Unsure	

9.2 Data Collection Instruments/Interview Guide

A. Socio-demographic information

1. Sex:
2. Age:
3. Profession:
4. Educational level:
5. Years of experience:

B. Interview Guide

Table 10: Interview guide on TFA constructs for the study on the acceptability of DBMB and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

SN	TFA constructs	Interview guiding questions
1	Affective Attitude	How do you feel about the idea of a DBMB if it is introduced into our healthcare system? **Probes** a. What are your thoughts or feelings on the idea of using DBMB in clinical settings? b. Do you feel comfortable with the idea of using DBMB in clinical settings? Why or why not? c. What positive or negative feelings come to your mind regarding DBMB?
2	Burden	From your viewpoint, what challenges or obstacles do you anticipate in establishing and managing a DBMB in our healthcare setting? **Probes** a. Do you believe DBMB will increase your workload? If so, how? b. What logistical or administrative issues do you anticipate when implementing DBMB? c. How can the hospital address these potential challenges?
3	Ethicality	In your opinion, how is providing DBMB as an option for infant nutrition consistent or aligned with ethical standards in healthcare? **Probes** a. What ethical issues or concerns come to your mind when you think about establishing and functioning a DBMB? b. How do you think ethical challenges related to DBMB be managed?
4	Intervention Coherence	How well do you understand the goals and objectives of a DBMB concerning infant nutrition and healthcare? **Probes** 1. How would you explain the role of DBMB in enhancing maternal and child health? 2. What potential benefits do you see for premature or low-birth-weight infants through DBMB?
5	Opportunity Cost	What potential opportunity costs do you believe in associated with establishing a DBMB? **Probes**

		1. Do you think DBMB would require significant financial, time, or human resources? 2. How might setting up DBMB affect resource distribution in other healthcare services? 3. Do you believe the benefits of DBMB outweigh its costs? Why or why not?
6	Perceived Effectiveness	In your view, how effective do you think a DBMB would be in improving infant health outcomes and encouraging breastfeeding? **Probes** 1. Have you seen or heard of successful DBMB implementations in other settings? 2. What evidence or personal experiences influence your views on DBMB's effectiveness? 3. What factors could influence the success of DBMB in our healthcare context?
7	Self-Efficacy	How confident do you feel in your ability to support the initiation and implementation of a breast milk bank? **Probes** 1. What skills or knowledge do you think are essential for advocating for DBMB? 2. Do you feel equipped to promote DBMB among colleagues and patients? Why or why not? 3. What challenges might affect your confidence in supporting DBMB? How can they be addressed?

Table 11: Interview guide on facilitators and barriers to the acceptability DBMB for the study on the acceptability of DBMB and its associated factors among healthcare professionals in public hospitals in Harari regional state and Dire Dawa City Administration, Eastern Ethiopia, 2024

Facilitators and barriers	Interview guiding questions
Facilitators	1. In your opinion, what facilitators can contribute to healthcare professionals' acceptability of a DBMB? **Probes** I. What do you believe would be the key factors influencing healthcare professionals' readiness to accept DBMB? II. How do you think training and education can enhance the acceptability of DBMB?
Barriers	2. What barriers or challenges do you anticipate for the acceptability of a DBMB among healthcare professionals? **Probes** I. Are there any cultural, religious, or social factors that could influence the acceptance of DBMB among healthcare professionals? II. Do you think healthcare professionals have concerns about the safety or ethical aspects of DBMB? III. Are there logistical or financial challenges that could limit the acceptance of DBMB? IV. How do you think these barriers could be addressed to improve DBMB acceptance?