

Mothers' Acceptability of Breast Milk Donation and Banking in Rwanda: A Mixed-Methods Study

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Abstract

Background:

Breastfeeding is critical for neonatal survival, yet many preterm and low-birth-weight infants face barriers to accessing maternal milk. Donor breast milk and banking offer a safe alternative, but it remains a novel concept in Rwanda. Understanding maternal attitudes, cultural beliefs, perceived benefits, and barriers are essential for guiding policy development and implementing culturally responsive programs.

Objectives:

This study explored mothers' acceptability of breast milk donation and banking and identified determinants shaping attitudes toward its potential introduction in Rwandan hospitals.

Methods:

A concurrent mixed-methods design was employed in two district hospitals (Kirehe District Hospital and Ruhengeri Level II Teaching Hospital). Quantitative data were collected from 208 mothers using structured questionnaires, while qualitative insights were obtained from 20 in-depth interviews. Acceptability was measured using a six-item Likert scale, and determinants of acceptability were examined using non-parametric tests. Qualitative data were analyzed thematically and integrated with quantitative findings.

Results:

Overall, mothers demonstrated high acceptability of breast milk donation, with the mean acceptability score of 3.02 (SD = 0.77), with strong recognition of its benefits for neonatal nutrition and survival. Acceptability did not vary significantly across most socio-demographic characteristics but was higher at Kirehe District Hospital compared to Ruhengeri ($p < 0.001$). Despite the generally favorable attitudes toward breast milk donation, awareness of the practice remained limited (11.1%), and concerns related to safety, potential disease transmission, and cultural beliefs. Qualitative findings provided further insights, identifying inadequate knowledge, social stigma, and family influence as major barriers to acceptance. Conversely, confidence in donor screening procedures, the perceived cost savings compared with formula feeding, and altruistic values emerged as important factors promoting acceptance of breast milk donation.

Conclusion :

Donor breast milk is highly acceptable among mothers in Rwanda but were concerned about safety, and cultural perspective. Hospital based interventions, such as peer support programs and strengthened neonatal services, may enhance maternal confidence and uptake.

INTRODUCTION

Breastfeeding remains one of the most effective interventions for improving neonatal and child survival (WHO, 2023d, 2025). It is widely recognized as the foundation of optimal infant health and survival, offering unmatched nutritional, immunological, and developmental benefits during early life (UNICEF, 2025; WHO, 2023e). Yet, globally, less than half of newborns ($\approx 45\%$) receive human milk within the first hour after birth, indicating that many infants -including approximately 13.4 million babies born preterm each year or over 20 million infants born with low birth weight- miss early opportunities for maternal milk exposure due to factors such as maternal or infant illness, death, or separation after birth (*Policybrief-Equitable-Access-Human-Milk.Pdf*, 2017; WHO, 2023a, 2023b). Additionally, evidence shows that preterm infants are less likely than term infants to receive any breast milk in the first days of life (e.g., 71.3% of extremely preterm infants vs. 84.6% of term infants received breast milk in early life). This gap translates into thousands of preterm infants missing critical immune protection in the first days of life, highlighting disparities in access to maternal milk among the most vulnerable newborns (Chiang et al., 2019; *Policybrief-Equitable-Access-Human-Milk.Pdf*, 2017). Mothers of very pre-term infants are also more likely to experience delayed onset of full milk production and practical breastfeeding challenges, which can further limit access to their own milk early postpartum (Xuemei et al., 2024). In such cases, donor breast milk offers an alternative that ensures optimal nutrition, reduces the risk of severe neonatal conditions such as necrotizing enterocolitis (NEC) and infections; thus, contributing to improved survival (Quigley, D Embleton, et al., 2024).

Alongside breastfeeding promotion efforts, donor breast milk and breast milk banking have expanded in recent years and have been associated with increased access to breast milk to hospitalized and preterm infants, as well as reductions in feeding interruptions and morbidity such as necrotizing enterocolitis (NEC) and infections in observational and pre/post studies (Hamidi et al., 2025; Kashyap & Choudhari, 2024). According to the WHO and UNICEF (The ASEAN Secretariat et al., 2022; WHO, 2023c), when a mother's own milk cannot be provided, screened donor breast milk from a breast milk bank is the preferred alternative for vulnerable infants, provided that a safe, and quality assured system is in place. Evidence from systematic reviews and country-level reports further suggests that milk banking, when integrated with lactation support, can increase the proportion of infants receiving breast milk and improve short-term neonatal outcomes, although implementation and safety considerations differ by setting (Chagwena et al., 2020; HMF, 2021; Kashyap & Choudhari, 2024).

Africa bears some of the highest infant mortality rates globally, yet as of 2025, the region has only eight functioning milk banks, restricted to South Africa, Kenya, Nigeria, Angola, Cameroon, Mozambique, Uganda, and Cape Verde (Obeng-Gyasi et al., 2025). Despite progress in promoting early initiation of exclusive breastfeeding, maternal practices remain shaped by social norms, myths, limited awareness, and cultural beliefs (Handayani et al., 2025; Lokossou et al., 2021; Modjadji et al., 2023). These same contextual factors also influence how breast milk donation is perceived. Studies exploring the acceptability of breast milk donation reveal varied attitudes, including willingness to donate or use donor milk among some participants, conditional acceptance based on trust, screening, or infant need, and reluctance by others due to cultural or religious beliefs (Mampane & Wolvaardt, 2024a; Ogundare et al., 2024; Tende et al., 2023). These underscore the importance of context sensitive approaches in promoting donor breast milk and milk banking across the region.

Evidence from rural Rwanda indicates that nearly half (46.5%) of preterm and low-birth-weight infants face feeding difficulties, often accompanied by growth and developmental delays (Kirk et al., 2017). For example, a recent study among preterm infants with feeding challenges found that only 35.4% were receiving mother's own milk at discharge, and very few were exclusively breastfed (Bala et al., 2024). Despite national commitments to improve neonatal outcomes, breast milk banks have not yet been established, and the concept of breast milk donation remains unfamiliar to most mothers in Rwanda. Exploring mothers' beliefs and perceptions toward this practice will provide insight into the sociocultural, logistical, and community-level facilitators and barriers that are critical for the introduction of milk banks in Rwanda. By integrating quantitative and qualitative approaches, this study provides novel insights into the feasibility of introducing donor milk and milk banking in Rwandan hospitals. This study therefore seeks to address this gap by exploring the beliefs and factors influencing the acceptability of breast milk donation among mothers in two Rwandan hospitals, to inform culturally sensitive approaches for the potential of introducing breast milk donation and banking to enhance neonatal nutrition and survival. The findings from this study will guide evidence-based strategies for integrating breast milk donation into neonatal care as a sustainable approach to improving infant health outcomes.

METHODS

Study Settings

This study was carried out in the neonatology departments of two district hospitals: Kirehe District Hospital (KDH) and Ruhengeri Level Two Teaching Hospital (RL2TH). Both facilities serve predominantly rural and culturally conservative populations in Rwanda's Eastern and Northern Provinces, respectively. They were purposively selected as they represent typical Rwandan healthcare settings characterized by high neonatal admission rates and diverse maternal backgrounds. At the time of the study, approximately 776 neonates were admitted to KDH, and around 842 to RL2TH over a six-month period (Source: hospital registers).

Study Design

A concurrent qualitative-dominant mixed-methods design was employed, in which both qualitative and quantitative data were collected simultaneously. The qualitative component explored mothers' perspectives on breast milk donation, while the quantitative component assessed the level of acceptability and the determinants influencing its potential adoption. This mixed approach enable both measurement of prevalence and determinants, and a contextual understanding of social and cultural dynamics, enabling triangulation of findings to provide a comprehensive understanding of the factors shaping the feasibility of breast milk donation and banking in Rwandan hospital settings.

Study Population

The study targeted mothers of neonates admitted to the neonatology units of the selected hospitals during the study period.

Inclusion criteria

Mothers whose neonates were admitted to the hospital at the time of the study.

Exclusion criteria

Mothers under the age of 18 years, who were not legally emancipated and for whom guardian or legal representative consent could not be obtained. Non-biological caregivers who stayed with the neonates on behalf of the mothers

Quantitative sampling

Based on the 2024 hospital admission records over a period of six months, an estimated total of 1618 mothers had neonates admitted in both neonatology units (776 neonatal admissions at KDH and 842 at RL2TH). The minimum required sample size was calculated using the OpenEpi sample size calculator for a single proportion, assuming a 95% confidence interval and a 5% margin of error, and a design effect of 1. The national prevalence of exclusive breastfeeding (80.9%) reported in the 2020 Rwanda Demographic Health Survey was used as the hypothesized proportion (p) (OpenEpi, 2025). This yielded a required sample of 208 participant mothers, and they were proportionally allocated between the two hospitals (100 at KDH and 108 at RL2TH). Within each hospital stratum, eligible mothers were consecutively recruited until the required sample size was attained.

Qualitative sampling

The qualitative sample consisted of 20 mothers from both hospitals, selected through a convenience sampling approach. Participants were interviewed until data saturation was reached, the point at which no new information emerged from participant responses. Our findings indicated that near code saturation was reached around the tenth mother interview, but further interviews were conducted to attain an acceptable level of analytical saturation, ensuring adequate depth and variation across participant groups. This aligns with recent studies emphasizing that saturation should be linked to analytical adequacy (Squire et al., 2024). We applied analytic memoing to document when saturation appeared to occur.

Data collection

Data collection procedure

Before launching data collection, a pilot study was conducted to assess the clarity and flow of all the tools, as well as the performance of the data collectors. Findings from the pilot study revealed that, while the tools were generally understandable, data collectors required additional training, particularly on conducting semi-structured interviews. A one-day refresher training was conducted to strengthen their skills. Participants were given the option to choose between English and Kinyarwanda, enabling them to express their experiences and perspectives more comfortably and openly; however, all participants ultimately expressed their views in Kinyarwanda.

Data collection tools

The data collection tools for both the quantitative and qualitative components were developed by adapting and tailoring instruments from similar studies conducted in African settings with economic and sociocultural contexts comparable to Rwanda, including Uganda, Kenya, Ghana, and South Africa (Kanyi, 2024; Kanyi et al., 2025; Namuddu et al., 2023; Tende et al., 2023).

Prior to full scale data collection, a pretest of the instruments was conducted to assess the clarity, sense, flow, and cultural appropriateness of the instruments. The pilot included five quantitative surveys and two qualitative interviews with mothers. Feedback from the pretest indicated that tools were generally understandable; however, minor adjustments were necessary. Revisions included rephrasing certain items for clarity and adjusting probing prompts in the interview guides to enhance depth and consistency.

Quantitative data collection

Quantitative data were obtained through structured questionnaires administered via Google Forms to a purposive sample of 208 mothers whose neonates had been admitted over a six-month period. The survey assessed mothers' awareness, cultural perceptions, and beliefs related to breast milk donation and banking. Key domains included familiarity with breast milk donation, attitudes toward donating or receiving donor milk, and perceived barriers and facilitators. Each survey concluded with a Likert scale measure assessing the overall acceptability of breast milk donations.

Qualitative data collection

The qualitative component involved semi structured in-depth interviews with conveniently selected mothers to gather detailed insights into their views on breast milk donation and its potential implementation in neonatal care. Interviews explored personal experiences with neonatal feeding, cultural and social beliefs, perceived barriers and facilitating factors, and overall views on introducing a breast milk donation program. The interviews were conducted in private hospital locations to ensure confidentiality and comfort. Each interview lasted approximately 20 minutes, with some extending up to 50 minutes to allow for more in-depth exploration when needed.

Key Measures

Dependent Variables

1. Acceptability

Acceptability measured the extent to which participants positively received the concept of breast milk donation and breast milk banking. This was measured using a six-item Likert scale (0–4), Classified into High acceptability: ≥ 2.4 and Low acceptability: < 2.4

Independent Variables

1. Awareness

This variable assessed participants' awareness of breast milk donation and breast milk banking. It captured whether individuals had ever been exposed to the concept which scored 1 or were entirely unfamiliar with it which scored 0, emphasizing the role of informational exposure in shaping attitudes and behaviors.

2. Cultural Beliefs and Attitudes

These variables integrated cultural values, and individual perceptions that influenced participants' interpretations of breast milk donation and banking. It reflected how culturally informed beliefs and personal attitudes affected perceptions of safety, appropriateness, and moral acceptability, ultimately shaping acceptance and decision-making regarding donation.

3. Perceived Benefits

Perceived benefits captured the advantages of participants associated with breast milk donation, including infant health promotion and support for vulnerable babies. Understanding these perceived benefits helped explain motivational factors that encouraged acceptance and potential participation in milk donation programs.

4. Perceived Barriers

Perceived barriers encompass the challenges or concerns that may limit acceptance or willingness to donate. These included fears about safety, misinformation, cultural restrictions, logistical difficulties, or lack of trust in milk banking systems, highlighting obstacles that interventions must address to optimize uptake.

Data management

Quantitative data management

Data was collected using a survey through Google Forms survey. For analysis, raw dataset was downloaded in excel format and stored on an encrypted password-protected institutional laptop, on which data-cleaning process was done. Once cleaned, the dataset was imported into SPSS for analysis.

Qualitative data management

After the interviews, all audio recordings were uploaded to password protected computers only accessible to the PIs, and the files were immediately deleted from the recorders to prevent unauthorized access. No identifiable information, like participant names, was collected. Instead, unique codes were assigned to maintain confidentiality. Subsequently, audio recordings were transcribed verbatim and then translated into English, with all transcripts saved as digital word documents.

Data analysis

All quantitative analyses were conducted using IBM SPSS Statistics version 26. Descriptive and inferential statistics were performed in alignment with the study objectives and with analytical approaches commonly applied in maternal health and donor-milk acceptability research. Maternal age was grouped into four categories: <20, 20–29, 30–39, and ≥ 40 years. Maternal occupations were re-coded into three analytically meaningful groups, and group differences in acceptability scores were examined using the Kruskal-Wallis H test. Socioeconomic status was assessed using current national standards Ubudehe framework (Categories A–E), as defined by the Government of Rwanda. Awareness of breast-milk donation was coded as Yes/No. Perception variables entered as categorical variables (“Yes”, “No”, “Unsure”). Data were analyzed descriptively using frequencies and percentages to summarize awareness levels, information sources, and perception patterns. Associations between sociodemographic variables and awareness or perception indicators were examined using Pearson’s chi-square tests.

Acceptability of breast-milk donation was evaluated using a six-item Likert scale, scored from 0 (strongly disagree) to 4 (strongly agree), yielding a maximum possible score of 24. Scale reliability was assessed using Cronbach’s α , with values > 0.70 considered acceptable for internal consistency. For summary analyses, continuous mean scores were further dichotomized using a theory-based cutoff of ≥ 2.4 ; the threshold marking entry into the “agree” range. This cutoff, adapted from similar studies in East and Southern Africa (Alkharusi, 2022; Lindner & Lindner, 2024; Sayili et al., 2024), facilitates the calculation of proportion of participants expressing agreement while maintaining interpretive consistency across studies and provides an overview of respondents’ positions, while avoiding sample-dependent cutoffs.

To examine determinants of acceptability; Mann–Whitney U tests were used to compare mean acceptability scores across independent variables with two categories. These included comparisons of acceptability by hospital, pregnancy status, and prior awareness of breast milk donation. Kruskal–Wallis H tests were applied for comparisons involving independent variables with more than two categories, including education level, Ubudehe socioeconomic status, age groups, maternal occupation categories, and source of information. Chi-square tests of independence were used to assess associations between categorical variables, including the relationship between dichotomized acceptability (≥ 2.4 vs < 2.4) and perception indicators, as well as between sociodemographic variables (e.g., education, socioeconomic status) and awareness or perception variables (e.g., safety concerns, perceived risk of disease transmission, beliefs about creating familial ties). Non-parametric tests were chosen because acceptability scores violated normality assumptions on visual inspection and Shapiro–Wilk testing. Statistical significance was determined at $p < 0.05$. No variables exceeded 5% missing data; listwise deletion was applied for inferential analyses.

Qualitative Analysis

Qualitative data were analyzed using manual inductive thematic analysis, following Braun and Clarke’s six phases (S. K. Ahmed et al., 2025). Transcripts were initially read for familiarization, followed by open coding. English transcripts were independently coded by two PIs, who iteratively developed a codebook that was finalized through discussion. Each transcript was then read and coded individually by the PIs, and the coded transcripts were reviewed and agreed upon jointly. Codes were subsequently condensed into categories and final themes.

Saturation assessment combined code saturation (no new codes appearing) and analytical saturation (no further depth added to existing themes). Near code saturation was reached around Interview 8, but interviewing continued until acceptable analytical saturation was achieved across participants. Throughout analysis, analytic memoing was used to document emerging interpretations and track theme development. This strengthened transparency and ensured that the final themes were grounded in participant narratives rather than researcher assumptions.

Integration of Mixed-Methods Findings

Quantitative and qualitative findings were integrated during interpretation to identify converging evidence across methodological strands. Qualitative insights were used to contextualize quantitative patterns, especially regarding beliefs, cultural norms, perceived safety, and trust; the core constructs underlying acceptability.

Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all mothers in either English or Kinyarwanda. For illiterate participants, information was read aloud, and fingerprints were used in place of signatures. Permission was sought before recording interviews, and written notes were taken when participants declined to audio recording. Confidentiality was ensured by collecting data anonymously and storing it securely, with no personal identifiers recorded. Ethical approval for the study was granted by the UGHE Institutional Review Board (Approval No. UGHE-IRB/2025/381), and permission were obtained the Ministry of Health, and the leadership of both hospitals.

RESULTS

Quantitative results

Sociodemographic characteristics

A total of 208 mothers responded to the questionnaires; 100 (48.1%) were from Kirehe District Hospital. The mean age of mothers was 30.1 ± 6.7years, 97 (46.6%) were in the age range 30–39 years old, and had no formal education, 94 (45.2%) (Table 1). Most mothers were self-employed 151 (72.6%), primarily working as farmers, traders, tailors, hairstylists, or maids and about one quarter 47 (22.6%) were unemployed (Table 1).

Table 1
Mothers' demographics

Variable	Categories	n = 208 (%)
Hospital	KDH	100 (48.1%)
	RL2TH	108 (51.9%)
Age (Years)	Less than 20	13 (6.3%)
	20–29	82 (39.4%)
	30–39	97 (46.6%)
	40 and above	16 (7.7%)
Education level	No formal education	28 (13.5%)
	Primary education	94 (45.2%)
	Secondary education	68 (32.7%)
	Tertiary education	18 (8.7%)
Occupation	Unemployed	47 (22.6%)
	Self employed	151 (72.6%)
	Formal employed	10 (4.8%)
Economic status	Category D	21 (10.1%)
	Category C	93 (44.7%)
	Category B	94 (45.2%)
Pregnancy status	First pregnancy	61 (29.3%)
	Not the first pregnancy	147 (70.7%)

Awareness and perspectives regarding breast milk donation

Most mothers 185 (88.9%) had never heard of breast milk donation, while only 23 (11.1%) reported prior awareness. Among those who had heard about it, healthcare providers were the most common source of information. Regarding the awareness of breast milk banks, only 5 (2.4%) mothers reported that they knew what a breast milk bank was. Perception-wise, 131 (63.0%) believed that sharing breast milk with others could create familial ties or relationships. Perceptions of the risk of disease transmission through breast milk donation were mixed: 85 (40.8%) believed there was a risk (Table 2).

Table 2
Mothers' Awareness, perception regarding breast milk donation and banking

Variable	Categories	n = 208 (%)
Have heard of breast milk donation	No	185 (88.9%)
	Yes	23 (11.1%)
Where the respondent learnt about breast milk donation.	Healthcare provider	13 (6.3%)
	Family or friends	6 (2.9%)
	Media	4 (1.9%)
Knowledge of what a breast milk bank is	No	203 (97.6%)
	Yes	5 (2.4%)
Perception of whether sharing breast milk with others could create familial ties or relationships	Yes	131 (63%)
	No	27 (13%)
	Unsure	50 (24%)

Perceived benefits, barriers, and facilitators of breastmilk donation program

In terms of perceived value, 100 (48.4%) of mothers rated breast milk donation and banking as “important,” while 84 (40.4%) considered it “very important.” When asked about the perceived benefits, the most frequently cited benefit was improved infant nutrition, 200 (96.2%).

Regarding perceived barriers, most mothers reported lack of awareness about milk donation, 193 (93.3%) as a key challenge. With respect to facilitators and support needs, most mothers identified education and awareness programs, 189 (91.3%), and support from healthcare providers, 175 (84.5%), as key enablers of milk donation. Additionally, 110 (53.1%) emphasized the importance of establishing milk banks in hospitals to increase participation and ensure safety (Table 3).

Table 3
Mothers' perceived benefits, barriers, facilitators

Item	Categories	n = 208 (%)
Rating the importance of having a milk bank in their hospital	Very important	84 (40.4%)
	Important	100 (48.4%)
	Neutral	10 (4.8%)
	Not important	7 (3.4%)
	Not sure	7 (3.4%)
Benefits	Improved Infant nutrition	200 (96.2%)
	Reduces the risk of infections	150 (72.1%)
	Reduces neonatal Mortality	177 (85.1%)
	Others	5 (2.4%)
Barriers	Lack of awareness about milk donation	194 (93.3%)
	Cultural beliefs and stigma	170 (81.7%)
	Concerns about milk safety	167 (80.3%)
	Lack of hospital infrastructure	111 (53.4%)
	Fear of affecting my milk supply	108 (51.9%)
Facilitators	Better education and awareness programs	189 (91.3%)
	Support from healthcare providers	175 (84.5%)
	Creation of milk banks in the hospital	110 (53.1%)

Acceptability to donate or receive breast milk

Overall, most participants expressed positive attitudes toward practice. The proportion of mothers who agreed or strongly agreed with each statement ranged from 55.7% for “My family supports the idea of me donating breastmilk” to 95.6% for “I believe breastmilk donation can help save the lives of babies who need and don’t have breastmilk.” Few mothers reported disagreement, with the highest proportion of disagreement observed for “I see myself accepting for my baby to use donated breastmilk” (18.0%). (Fig. 1).

The overall acceptability of the breast milk donation program was high: 176 (84.6%) scored in the “agree” category. The mean acceptability score was 3.02 (SD = 0.77). However, only 161 (77.4%) were willing to accept donated milk for their babies. Using Kruskal–Wallis (H) and Mann–Whitney (U) tests and comparing median acceptability scores among mothers across demographic characteristics showed a significant difference by hospital ($p < 0.001$). Significant differences in acceptability scores were also observed by educational level ($p = 0.012$) and economic status (Ubudehe category) ($p = 0.015$). (Table 4).

Table 4
Acceptability across mothers' socio-economic characteristics

Variable	Subcategory	n	Acceptability score	p-value
Hospital	Kirehe L2TH	100	96.0%	< 0.001
	Ruhengeri L2TH	108	80.0%	
Educational level	No formal education	28	64.3%	0.012
	Primary	94	87.0%	
	Secondary	68	77.9%	
	Tertiary	18	100%	
Economic status	Category 1	21	71.4%	0.015
	Category 2	93	86.0%	
	Category 3	94	86.2%	
Mothers' age group	< 20	13	84.6%	0.649
	20–29	82	86.6%	
	30–39	97	82.5%	
	≥ 40	16	87.5%	
Occupation	Unemployed	47	80.9%	0.328
	Self-employment	152	84.9%	
	Formally employed	9	100%	
First pregnancy	No	147	85.7%	0.327
	Yes	61	85.0%	
Prior Awareness	No	185	83.2%	0.970
	Yes	23	95.7%	
Source of information	Never heard of it	185	83.2%	0.124
	Healthcare provider	13	100%	
	Family/ Friends	6	83.3%	
	Media	4	100%	

Factors Associated with Acceptability of Breast Milk Donation

Seven factors were found to be associated with breast milk donation acceptability level: 1) belief that breast milk donation reduces the risk of infections ($p = 0.035$); 2) perception that breast milk donation reduces neonatal mortality ($p = 0.011$); 3) fear of affecting one's milk supply ($p < 0.001$); 4) Lack of hospital infrastructure to support milk banking ($p < 0.001$); 5) creation of a milk bank in the hospital ($p < 0.001$), 6) the possibility that sharing breast milk could create familial ties ($p < 0.001$) and 7) perceived risk of disease transmission through donated milk ($p < 0.001$) (Table 5).

Table 5
Factors associated with mothers' acceptance of breast milk donation and banking

Variable	Category	Subcategory	Acceptability n (%)	P-value
Benefits	Improve infant nutrition	No	6 (75%)	0.442
		Yes	170 (85%)	
	Reduce the risk of infections	No	54 (93.1%)	0.035
		Yes	122 (81.3%)	
	Reduce neonatal mortality	No	30 (100%)	0.011
		Yes	145 (81.9%)	
	Reduce the cost	No	172 (84.7%)	0.772
		Yes	4 (80%)	
Barriers	Lack of knowledge	No	10 (71.4%)	0.157
		Yes	166 (85.6%)	
	Cultural beliefs and stigma	No	34 (89.5)	0.359
		Yes	142 (83.5)	
	Concerns about milk safety	No	37 (90.2)	0.265
		Yes	139 (83.2)	
	Lack of hospital infrastructure for milk banking	No	93 (95.9)	< 0.001
		Yes	83 (74.8)	
	Fear of affecting my milk supply	No	94 (94)	< 0.001
		Yes	82 (75.9)	
Facilitators	Better education and awareness programs	No	16 (84.2)	0.959
		Yes	160 (84.7)	
	Support from healthcare providers	No	30 (90.9)	0.275
		Yes	146 (83.4)	
	Creation of milk banks in hospitals	No	93 (94.9)	< 0.001
		Yes	83 (75.5)	
Sharing breast milk with others would create familial ties or relationships		No	13 (48.1)	< 0.001
		Yes	123 (93.9)	
Risk of disease transmission through breast milk donation		No	71 (94.7)	< 0.001
		Yes	61 (71.8)	

Qualitative results

A total of 20 mothers of neonates from the neonatal units; 10 from KDH and 10 from RL2TH; participated in the qualitative interviews. A convenience sampling approach was used to recruit mothers who were available and willing to share their experiences, regardless of their age, parity, ubudehe category, education level, or occupation. Interviews explored their experiences with neonatal feeding, cultural and social beliefs, perceptions of safety, and views on the potential introduction of a breast milk donation program.

Theme 1: Mothers' awareness of breast milk donation is limited, with partial understanding shaped by analogies and lived experiences

Consistent with quantitative findings, most mothers demonstrated limited awareness of breast milk donation, stating that they had never heard about breastmilk donation. Several described it to be like traditional wet nursing, where women breastfed each other's children within families or neighborhoods. A few also compared it to blood donation, saying that both involve giving something from the body to help others in need.

We see it nowhere. Except that some of us see it on social media, but the mothers residing in rural areas cannot see it anywhere. ~M2-08

...The same way that in the past they used to tell us that when your mother died, you could go to breastfeed from another neighboring mother, and it would be ok... my grandmother breastfed a girl from region whose mother had died. ~M2-07

I would consider it a similar way when the baby does not have enough blood; they give them additional blood. The same way they give them donated blood... it would be the same to breastmilk, donated to the ones that are not being able to directly obtain breastmilk from the mother. ~M2-02

Among those with some knowledge, many explained that breast milk donation helps feed babies whose mothers are deceased, ill, or unable to produce enough milk. Others associated with its purpose with caring for premature infants or those unable to breastfeed immediately after birth. A few also mentioned that breast milk is more nutritious than other feeding alternatives. Some mothers expressed curiosity but said they lacked information about how breast milk is collected, stored, or used in hospitals.

There are mothers that do not have breastmilk, or the mothers have passed away. If such babies got the donated breastmilk, it would be good for their nutrition and growth, thus beneficial to us all. ~ M2-03

We learnt that breastmilk is the first thing that has all the nutrients that the baby needs, and that nothing could replace it. So, if the breastmilk is available, it is understandable that it is better to give the baby breastmilk than giving formula. ~ M2-08

Theme 2: Cultural beliefs and misconceptions influence mothers' views on breast milk donation and its safety.

Qualitative findings provided deeper insight into the cultural factors shaping mothers' perceptions of breast milk donation. Many mothers spoke of deep respect for their husbands' opinions, noting that some men might not approve of their child being fed another woman's milk. Participants also mentioned fears of stigma or social isolation in communities unfamiliar with the practice, with some suggesting that community members might judge or misunderstand mothers who donate or receive breast milk. Others believed that cultural practices could evolve through continued education for both parents and community members, increasing awareness and openness toward the practice.

Yes, culture-wise... there are times when husbands do not understand the way you are going to feed his baby another woman's breastmilk. And here, we highly respect our husbands...~M2-07

In the village, they can isolate you/ stigmatize you... because you donated BM, because of how people understand things differently... yet you are just helping ~ M1-05

...If the donating woman is from another family, it would really be difficult. But it would require educating us all, including the husband, to make us understand that it would be safe. ~M2-07

Concerns and misconceptions were also commonly raised. Some mothers expressed fears that donated milk could carry diseases or contamination if not properly tested, while others worried that switching mothers or feeding from multiple women could harm the baby. Limited understanding of milk screening and storage processes led to reduced trust in the safety of donated milk.

Concern is that the donor might have an unknown disease; I think I would be concerned if there is no thorough research/ testing this BM, on the side of healthcare workers and preparations. ~~ M1-08

...currently I can't breastfeed. And maybe in the future I will be healed and I can breastfeed, but my baby has already been fed by someone else. That would mean that my own breastmilk would hurt the baby since s/he would have been fed another mother's breastmilk. ~M2-01

...since nowadays there exist a lot of conditions like AIDs... you understand it would be bad to donate the breastmilk from a person with AIDs. ~M2-07

Theme 3: Mothers associated breast milk donation with improved infant health outcomes, maternal emotional reassurance, and financial strain relief.

Mothers strongly endorsed the benefits of breast milk donation, describing it as highly advantageous for infants and mothers alike. For infants, participants emphasized that donated breast milk supports healthy growth, strengthens immunity, helps babies reach developmental milestones, and reduces the risk of infections, undernutrition, and neonatal death. Many mothers also described breast milk as "what the baby is meant to have," viewing it as superior to formula or other substitutes. Several also highlighted that donation can reduce financial strain for families who cannot afford formulas and prevent reliance on unsafe alternatives such as cow milk, offering both practical and emotional reassurance.

...the doctors tell us that breastmilk is better, since it protects the baby from frequent diseases, favors fast weight gain, thus quickening the time we get to go back home. ~ M2-07

Breastmilk is essential, helps babies grow well, protects them from frequently contracting infections, and as we are thought and we see for ourselves, breastmilk is essential. ~M2-09

Yes, as doctors explained to us that there is nothing that could replace breastmilk; the formula is because there is no other option. It is just so that the baby does not die of hunger. Breastmilk has nutrients. We learnt that breastmilk is the first thing that has all the nutrients that the baby needs, and that nothing could replace it. So, if the breastmilk is available, it is understandable that it is better to give the baby breastmilk than giving formula. ~ M2-08

If I wouldn't have to buy it, I think I would be ok. Because they are currently asking me to pay 20k for the formula, I can't find that. ~M2-09

Theme 4: Mothers identify limited awareness, trust, and healthcare support as key challenges, while also recognizing them as essential for successful implementation of breast milk donation programs.

Complementing the quantitative findings, mothers highlighted several practical challenges that hinder engagement with breast milk donation. Many described limited awareness and understanding of the practice, uncertainty about screening and safety procedures, and concerns about how donated milk would be safely handled within hospitals.

The primary challenge is little understanding regarding that. If they were trained and understood the reasoning for all that, the community would understand. ~ M2-04

... but ensuring the safety would be worrisome. If there was a way to ensure that the donated breastmilk is safe, I think sharing and donating breastmilk would be ok. ~M2-04

I wouldn't trust that it would have been prepared. ~ M2-01

Some mothers also expressed concerns about logistical and operational challenges, as well as ethical issues related to consent. They questioned the feasibility and sustainability of milk banks in our settings, citing costs, equipment maintenance, and the ability to ensure a continuous milk supply.

...But on agreement with the baby's parent, then I would consider giving the breastmilk. ~M2-08

I wonder how the breastmilk could get to us. I live very far away. Thinking of coming here every day to get the breast milk, of bringing the milk I could be donating, that would be very difficult. ~M2-09

Despite these barriers, mothers suggested practical approaches to enable the successful introduction of breast milk donation in Rwanda. They recommended that health professionals lead education sessions within communities, involving men, elders, and local leaders to counter stigma and cultural misconceptions. They also suggested that hospitals demonstrate milk safety through visible screening, testing, and quality-control measures.

It requires creating awareness. Regarding safety, those in charge have to ensure the breastmilk is safe, since we all have different diseases. ~M2-04

If you keep educating us about it, so that we really understand, even our husbands and families, local leaders, so that everyone understands that it is something that is ok. ~M2-07

Mothers emphasized that collaboration and adherence to hospital-level guidelines would build public confidence in the program. They also highlighted the need for nutritional and logistical support for donor mothers to encourage participation.

There are times mothers can't afford things that make them have more BM. Therefore, mothers can be helped by getting those things like porridge, or other things that helps to increase the BM ~ M1-09

Theme 5: Mothers' Acceptability of Breast Milk Donation and Receipt Is Shaped by Safety Perceptions, Social Support, and Altruism

Subtheme 5a: Conditional willingness to receive donor milk

Mothers generally expressed openness to receiving donor milk, but only under specific circumstances such as cases of insufficient supply, maternal illness, or life-threatening situations for their baby. Acceptance was strongly tied to assurances of safety (screening, hospital supervision, hygienic handling) and family approval, particularly from husbands.

Maybe if it saved my baby, then I would agree. But it would be difficult for me to understand. ~M2-01

After breastmilk has been checked against all the possible contracted diseases. ~M2-07

Me giving my baby donated milk, it would really be difficult... the father would also have to decide. ~M2-08

If you keep educating us about it, so that we really understand, even our husbands and families, local leaders, so that everyone understands that it is something that is ok. ~M2-07

A minority of mothers rejected donor milk altogether, preferring alternatives like infant formula or cow milk due to discomfort with using another woman's milk.

I wouldn't agree (to give my baby donated breastmilk) ... Since me I don't have enough, I would keep giving my baby the infant formula, until I get enough breastmilk... I would find other ways to find my own breastmilk, but I cannot feed my baby another person's breastmilk. ~ M2-01

I would find cowmilk or any other type of milk. ~ M2-01

But I think that instead of another mother giving me their breast milk, it would be better to use the formula provided by the hospital. ~ M2-02

Subtheme 5b: Altruistic motivations to donate, tempered by practical and social concerns

Most mothers indicated readiness to donate breast milk, motivated by compassion and solidarity, especially when they had surplus milk or believed donation could save another baby's life.

Yes, I would (donate breastmilk), the same way if I don't have enough, someone else can give me theirs. ... There is no problem, a person can donate happily, since babies are ours all. ~ M2-03

However, willingness was conditional on confidence in their own health and family support. Some mothers highlighted practical needs such as nutritional supplements or compensation, while others expressed reluctance due to stigma or uncertainty about how donated milk would be used.

Yes, if I trusted myself that I don't have any other disease, I would donate the breastmilk. But then I would worry, wondering if it would still be ok for another baby. ~M2-02

...If it was the only way to save that baby, and the mother agrees, I could give the breastmilk. ~M2-08

There are times mothers can't afford things that make them have more BM... therefore mother can be helped by getting those things like porridge, or other things that helps to increase the BM ~ M1-09

DISCUSSION

Mothers in this study demonstrated high acceptability of donor milk, reflecting recognition of its potential to improve neonatal outcomes. Quantitative findings showed broad agreement that donor milk is beneficial and safe when screening and handling procedures are explained, with few significant differences across socio-demographic groups. However, gaps remained, including low awareness, fears of disease transmission, and cultural discomfort. Qualitative data added depth, highlighting misconceptions, social influences, and community perceptions, but also strong motivations such as trust in biomedical processes, financial relief compared to formula, and altruistic values. Overall, concerns centered more on safety and system readiness than on intrinsic opposition. (M. A. M. Ahmed et al., 2024; Ogundare et al., 2024).

Together, these findings show that donor milk is broadly acceptable in Rwanda when safety, awareness, and institutional capacity are addressed. This alignment across data sources is illustrated in Fig. 2, which highlights how both strands converge around similar facilitators and barriers.

Despite the high acceptability observed, awareness of breast milk donation and banking among mothers was very limited, with nearly 89% of mothers reporting that they had never heard of the concept. This low level of awareness mirrors findings from similar studies in Kenya, Uganda, Nigeria, and Ghana, where donor milk programs are still emerging (Kimani-Murage et al., 2019; Tende et al., 2023). Our qualitative data revealed that many mothers equated breast milk donations with traditional wet nursing, suggesting that pre-existing cultural analogies could be leveraged in awareness campaigns.

Cultural beliefs strongly shaped participants' comfort with willingness to donate or receive breast milk. Many mothers indicated that husbands' or elders' approval and opinions would influence their decisions, consistent with patriarchal norms and community influence observed in Uganda and Ghana (Barbi et al., 2020; Magowan et al., 2020). Concerns about disease transmission, contamination, and the belief that sharing milk might create familial ties also reduced comfort with the practice. These fears echo prior research showing that misconceptions around infection transmission, particularly related to HIV, remains a major barrier in African contexts (Kimani-Murage et al., 2019). Importantly, mothers emphasized that these beliefs stem primarily from lack of knowledge rather than outright rejection of milk donation, underscoring the need of culturally sensitive education.

Participants also strongly agreed that donor milk improves infant nutrition, protects newborns from infections, and thus lower the risks for neonatal death. These perceptions are in line with global evidence regarding donor milk's protective effects against necrotizing enterocolitis and other morbidities, especially for preterm and low-birth-weight infants (Quigley, Embleton, et al., 2024). Additionally, mothers described emotional and financial relief as secondary benefits, including reduced stress related to feeding difficulties and the high cost of formula. These broader psychosocial and economic dimensions align with global findings that donor milk contributes to maternal well-being and house stability especially in low resource settings (Brown et al., 2024; *CONBF-Global-Brief-ENG-2023-10-31.Pdf*). Respondents also viewed breast milk donation as an opportunity to support vulnerable preterm infants or neonates who lost their mothers, reinforcing the humanitarian values embedded in milk sharing practices.

Barriers identified in this study; low awareness, cultural stigma, safety concerns, and limited infrastructure; aligned with evidence from other sub-Saharan African contexts (M. A. M. Ahmed et al., 2024; Ogundare et al., 2024). Mothers' mistrust regarding how donated milk would be handled highlights the need for transparent safety protocols, public communication, and visible systems for screening and pasteurization. Nevertheless, mothers suggested that raising awareness and establishing accessible professional health support could substantially enhance acceptability. This mirrors lessons from Brazil's successful milk bank network, where strong policy backing and systematic training contributed to successful implementation (Leila Doshmangir et al., 2019; Mathias et al., 2023; Morosini, 2024; Subramanian, 2023).

Quantitative analysis revealed that education level and socioeconomic status were significantly associated with mothers' acceptability of breast milk donation, suggesting that health literacy influences perceived safety and trust in milk donation. This finding aligns with previous studies demonstrating that exposure to health information enhances acceptance and trust in milk donation (Bi et al., 2015). Additionally, beliefs about safety, infection risks, milk handling, and cultural acceptability strongly predicted willingness to donate or receive donor milk.

Although 88% of mothers were willing to donate breast milk and 77% were willing to receive donor milk for their infants, acceptance was conditional, often dependent on safety assurance, clear need, and family approval. Similar conditional acceptance has been reported in Uganda and Nigeria, where willingness increased when education and safety information were provided (M. A. M. Ahmed et al., 2024; Ogundare et al., 2024).

Hospital context also appeared to influence acceptability. Mothers at Kirehe District Hospital reported significantly higher willingness compared to those at Ruhengeri Level II Teaching Hospital ($p < 0.001$). The higher acceptability observed at Kirehe District Hospital may be partly attributable to the presence of the *Expert Mother* program, a structured peer-support initiative that engages experienced mothers to provide breastfeeding education, Kangaroo Mother Care guidance, and psychosocial support to families (Partners In Health, 2019). In addition, Partners In Health (Inshuti Mu Buzima) in collaboration with the hospital, has strengthened neonatal and maternal services at KDH, including nutritional support and provision of infant formula for medically vulnerable infants (PIH, 2019). These interventions likely enhance maternal confidence in hospital-based feeding practices and may contribute to greater openness toward donor milk.

Taken together with the broader trends observed in this study, these findings suggest that establishing a breast milk bank in Rwanda, and similar settings, requires coordinated efforts to raise awareness among mothers, engage communities in culturally sensitive ways, ensure clear communication on safety and screening, and strengthen health facility capacity to support the service. The alignment of mothers' motivations and concerns highlights a strong foundation for developing both national and facility-level systems that can support the use of donor breast milk for improving neonatal care.

Strength and limitations of the study

A key strength of this work is its methodological approach: because this is a novel area of research in the country, a mixed-methods design was necessary to capture quantitative trends as well as the qualitative reasons behind them, insights that would not have been possible using only a single quantitative or qualitative approach. While this study provides important insights into the acceptability and determinants of breast milk donation and banking among mothers, several limitations should be noted. First, the study was conducted in only two district hospitals, which may limit generalizability. Future research should extend to urban and private hospitals to capture a broader range of perspectives. Second, awareness of breast milk donation was extremely low among mothers, which may have influenced how participants interpreted survey items. Although standardized explanations were provided, further studies could incorporate pre-survey educational sessions to reduce misinterpretation. Third, quantitative data relied on self-reported measures, which may have been affected by social desirability bias. Fourth, the qualitative component used convenience sampling. Finally, the cross-sectional design and absence of existing milk banks limit understanding of how acceptability might evolve over time.

CONCLUSION AND RECOMMENDATIONS

This study shows that mothers expressed high acceptability of the concept, strong recognition of the clinical benefits, and willingness to engage in donation programs. Cultural beliefs, perceived safety, and understanding of the health benefits all play a significant role in shaping attitudes toward donor breast milk. Key determinants of acceptability included perceived benefits for infant survival, positive attitudes toward milk sharing, belief in the feasibility of establishing milk banks, and willingness to participate. However, concerns such as cultural norms, fear of disease transmission, lack of knowledge, and inadequate hospital infrastructure remain important barriers. Building on these findings, we suggest the following recommendations to support the establishment of donor breast milk services in Rwanda. Awareness and education on breast milk donation should be strengthened through structured community and hospital-based programs, including integration into routine antenatal and postnatal care. National policies and regulatory frameworks should be developed to guide donor eligibility, quality assurance, and monitoring. Furthermore, community engagement is essential to address cultural concerns and build trust in practice. Given the high acceptability demonstrated, a pilot breast milk bank could then be considered as a next step, supported by future research on implementation, cost-effectiveness, long-term acceptability, and broader community perspectives.

Abbreviations

- **BM**
Breast Milk
- **BMD**
Breast Milk Donation
- **BMB**
Breast Milk Bank / Breast Milk Banking
- **CF**
Complementary Feeding
- **CI**
Confidence Interval
- **DBM**
Donor Breast Milk
- **EBF**
Exclusive Breastfeeding
- **HCP(s)**
Healthcare Provider(s)
- **HMF**
Human Milk Foundation
- **IRB**
Institutional Review Board
- **KDH**

Kirehe District Hospital

• **LBW**

Low Birth Weight

• **MOH**

Ministry of Health

• **NEC**

Necrotizing Enterocolitis

• **NICU**

Neonatal Intensive Care Unit

• **PIH**

Partners In Health / Inshuti Mu Buzima

• **PIs**

Principal Investigators

• **RL2TH**

Ruhengeri Level II Teaching Hospital

• **SPSS**

Statistical Package for Social Sciences

• **UGHE**

University of Global Health Equity

• **UNICEF**

United Nations Children's Fund

• **WHO**

World Health Organization

Declarations

Ethics Approval and Consent to Participate

Ethical approval was obtained from the University of Global Health Equity (UGHE) Institutional Review Board (IRB). Administrative permission to conduct the study was granted by the Rwanda Ministry of Health and the participating hospitals. Written informed consent was obtained from all participants before data collection. Participation was voluntary, and participants were informed of their right to withdraw at any time without consequences. Consent forms were provided in English and Kinyarwanda. For participants who were unable to read or write, the consent form was read aloud, and consent was documented using a thumbprint. Permission to audio-record interviews was obtained from participants; otherwise, responses were documented in writing.

Consent for publication : Not applicable

Availability of data and materials: Not applicable

Competing interests: The authors declare that they have no competing interests

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Authors' contributions :

- PI and MID conceived the study, developed the research proposal, obtained ethical approval, supervised data collection, analyzed and interpreted the data, and drafted the manuscript.
- PK, AN, OI, and RW supervised the study, contributed to the development and review of the research proposal, assisted with data analysis and interpretation, and critically revised the manuscript.

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Figures

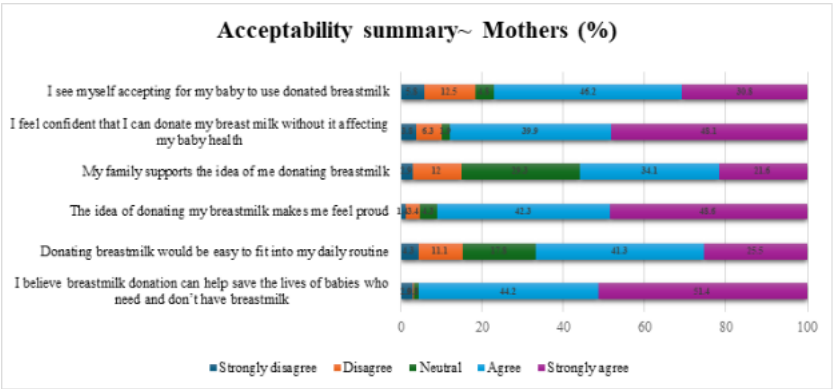


Figure 1

Summarizes the acceptability of breast-milk donation among mothers across six items

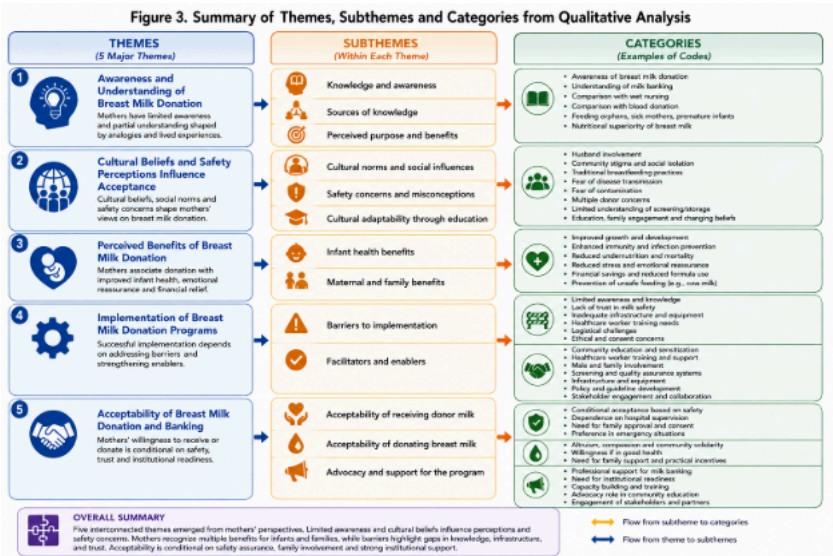


Figure 2

Summarizes the themes, subthemes, categories, and codes that emerged from the analysis.

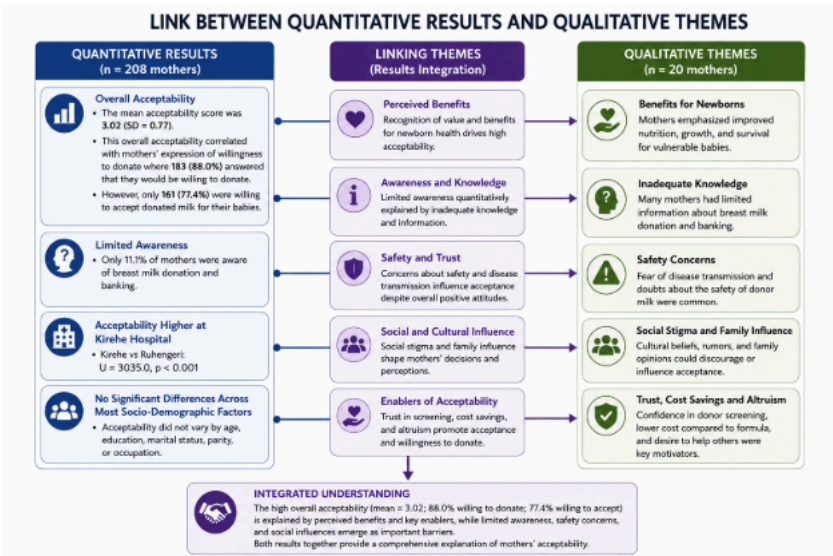


Figure 3

Link between quantitative and qualitative themes