


Perceptions on donated human milk and human milk banking in Nairobi, Kenya

Elizabeth Wambui Kimani-Murage¹ | Milka Njeri Wanjohi¹  | Eva Watiri Kamande¹ |
 Teresia Njoki Macharia¹ | Elizabeth Mwaniki¹ | Taddese Zerfu¹ | Abdhahah Ziraba² |
 Juliana Waithera Muiruri³ | Betty Samburu⁴ | Allan Govoga⁵ | Laura Wangui Kiige⁶ |
 Thomas Ngwiri⁷ | Waithira Mirie⁸ | Rachel Musoke⁹ | Kimberly Amundson-Mansen³ |
 Kiersten Israel-Ballard³

¹Maternal and Child Well Being Unit, African Population and Health Research Center, Nairobi, Kenya

²Health and Systems for Health Unit, African Population and Health Research Center, Nairobi, Kenya

³Maternal and Child Health and Nutrition Program, PATH, Nairobi, Kenya

⁴Nutrition and Dietetics Unit, Ministry of Health, Nairobi, Kenya

⁵Neonatal, Child and Adolescent Health Unit, Ministry of Health, Nairobi, Kenya

⁶Nutrition Section, UNICEF - Kenya Country Office, Nairobi, Kenya

⁷Clinical Services, Gertrude's Children's Hospital, Nairobi, Kenya

⁸School of Nursing, University of Nairobi, Nairobi, Kenya

⁹Departments of Paediatric, University of Nairobi, Nairobi, Kenya

Correspondence

Milka Njeri Wanjohi, African Population and Health Research Center, P.O. Box, 10787-00100, APHRC Campus, Manga Close, Nairobi, Kenya.
 Email: mwanjohi@aphrc.org

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Abstract

Donor human milk (DHM) is recommended as the best alternative when use of mothers' own milk is not a feasible option. Kenya has not yet established human milk banks (HMBs) for provision of safe DHM, which is free from any physical, chemical, microbiological contaminants or pathogens. This study aimed to establish the perceptions on donating and using DHM, and establishing HMBs in Kenya. Qualitative data were collected through 17 focus group discussions, 29 key informant interviews, and 25 in-depth interviews, with women of childbearing age, community members, health workers, and policy makers. Quantitative interviews were conducted with 868 mothers of children younger than 3 years. Descriptive analysis of quantitative data was performed in STATA software, whereas qualitative interviews were coded using NVIVO and analysed thematically. Majority of them had a positive attitude towards donating breast milk to a HMB (80%) and feeding children on DHM (87%). At a personal level, participants were more willing to donate their milk to HMBs (78%) than using DHM for their own children (59%). The main concerns on donation and use of DHM were personal dislikes, fear of transmission of diseases including HIV, and hygiene concerns. Ensuring safety of DHM was considered important in enhancing acceptability of DHM and successful establishment of the HMBs. When establishing HMBs, Kenya must take into consideration communication strategies to address the main concerns raised regarding the quality and safety of the DHM. The findings will contribute to the development of HMB guidelines in Kenya and other African contexts.

KEYWORDS

breastfeeding, donated human milk, donating, human milk banking, neonate

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1 | INTRODUCTION

Kenya has made substantial progress in child survival over the past decade, with a reduction in under-five mortality from 115 deaths (2003), 74 deaths (2008), to 52 deaths (2014) per 1,000 live births. Over 40% of infant deaths happen within the neonatal period, accounting for an estimated 40,000 annual deaths in the first month of life (KDHS, 2008; KDHS, 2014). The burden of neonatal deaths in the country is high, at 22 out of every 1,000 live birth (KDHS, 2014). Of all the child health indicators, the neonatal mortality rate (NMR) has demonstrated the slowest decline from 33 deaths/1,000 live births in 2003 to 22 deaths/1,000 live births in 2014. The slow progress in reducing neonatal mortality indicates that Kenya runs the risk of not achieving the Every Newborn Action Plan's goal of a neonatal mortality rate below 10 deaths per 1,000 live births by 2035 (Lawn et al., 2014). This signifies the urgent need to focus on effective interventions to save the lives of vulnerable neonates.

Provision of breast milk (BM) is considered as a pillar of child survival and a cost-effective way of preventing the 2.8 million annual infant deaths worldwide (Edmond et al., 2006; Victora et al., 2016). The use of mothers own milk (MOM) through breastfeeding or use of expressed breast milk is the most natural and common way of providing breast milk to babies. However, some babies lack or have insufficient access to their mother's own milk for various reasons such as maternal illness, death, medication, disability, or delayed lactation. In such cases, the World Health Organization (WHO) recommends the use of donor human milk (DHM) as a lifesaving alternative, especially for vulnerable, low birth weight, and preterm neonates (World Health Organization, 2016). Systematic reviews comparing infant formula and DHM reveal that DHM is better tolerated by preterm neonates, more effective in reducing the risks of late-onset sepsis, and significantly reduces the risks of necrotizing enterocolitis in newborns and preterm babies (Boyd, Quigley, & Brocklehurst, 2007; Quigley & McGuire, 2004; Simmer, 2009). In the United States and Brazil, the use of DHM significantly reduced the length of hospital stay for sick infants and saved on the cost of healthcare (Arslanoglu, Moro, & Bellù, 2013; Ganapathy, Hay, & Kim, 2012).

Recognizing the benefits of DHM over formula milk when the use of MOM is not feasible, WHO has called for global scale-up of human milk banks (HMBs) (World Health Organization, 2016). A HMB is a rigorous service established to recruit breast milk donors, collect donated milk, pasteurize, screen, store, and distribute safe donor human milk which is free from any physical, chemical, or microbiological contaminants or pathogens to meet infants' specific needs for optimal nutrition and health (PATH, 2013).

Kenya has prioritized breastfeeding as one of the interventions to avert neonatal and infant morbidity and mortality. This is through programs such as the baby friendly hospital initiative (BFHI) that promotes breastfeeding at the hospital level and the baby friendly community initiative (BFCl), which promotes breastfeeding at the community level. These interventions have contributed to the improvement of breastfeeding practices in the country. For instance, exclusive breastfeeding rates increased from 32% in 2008 to 61% in

Key messages

- The study highlights potential acceptability of the idea of donating and using donor human milk for infants with no access to their mother's own milk. However, there were health, cultural, and social concerns, and concerns for the safety of the donor human milk.
- There is need to engage and further foster in communities the importance of breastfeeding and milk donation while addressing the cultural, religious, and health concerns. This can be done through existing structures such as the community health strategy as well as religious and health institutions.
- Ensuring safety of donor human milk (DHM) and assuring communities of the safety of DHM is important in enhancing acceptability of DHM and successful establishment of the human milk banks (HMBs).

2014 (KDHS, 2014). Despite these improvements, the country has not yet implemented the WHO recommended best practice on the use of DHM as the best option for neonates who lack or have insufficient access to their mothers own milk, and infant formula continues to be the feeding option for such neonates.

A comprehensive approach to protect, promote, and support breastfeeding is needed to ensure all infants have access to human milk, through breastfeeding or provision of safe donor human milk if mothers' own milk is not available (Israel-Ballard, 2013). The Kenya government has therefore started the process of establishing HMBs, which will enhance the breastfeeding support for mothers and facilitate the provision of safe DHM to infants who have no access to their own mother's milk. Establishing the acceptability of human milk banking and addressing communities' beliefs and misperceptions through provision of sufficient information and raising awareness on the valuable contribution of DHM, has been reported as a good strategy for strengthening communities' confidence and acceptance of breast milk donation and use of donor human milk (Ekşioğlu, Yeşil, & Turfan, 2015; Gürol, Ozkan, & Celebioğlu, 2014). It is also a key step in the successful establishment of HMBs. However, no data currently exists documenting the perceptions and acceptability of human milk banking in Kenya. This study sought to address this key evidence gap by establishing the acceptability of DHM and documenting the community's perceptions on the issue of donation, use of DHM, and human milk banking. The evidence generated in this study is important in informing the process of establishing HMBs in Kenya, such as the development of HMBs operational guidelines, implementation of HMBs within the health system, and development of appropriate and targeted communications and advocacy strategies on human milk banking (Amundson, Sachdeva, Quynh, Muiruri, & Israel-Ballard, 2017).

2 | METHODOLOGY

2.1 | Study design and setting

This cross-sectional study was conducted between August and December 2016, in Nairobi County, Kenya's capital city, and most populous urban area. The study was conducted at both the health facility and community levels. The health facilities included Mama Lucy Kibaki Hospital, a public county referral hospital; Kenyatta National Hospital, a national referral and teaching hospital; and Gertrude's Children's Hospital, a private paediatric hospital. The two public health facilities mainly serve women from the low and lower-middle income populations from Nairobi and surrounding counties, whereas the private facilities mainly serve those from the middle and higher income groups in Nairobi. At the community level, the study was conducted in Umoja and Kayole areas located in the eastern part of the city and representing the lower and lower-middle income populations, respectively (Kenya National Bureau of Statistics, 2015).

2.2 | Ethical considerations

Ethical approval was sort from the Kenya Medical Research Institute (KEMRI) before the research activities begun. During data collection, written consent and permission to record the qualitative interviews was sort from each study participant after full disclosure of the study procedure. Both qualitative and quantitative data were anonymized to ensure participants' confidentiality. Participants in the qualitative interviews were reimbursed the transport expenses incurred.

2.3 | Data collection

This was a mixed methods study, using both qualitative and quantitative methods of data collection. A mixed methods approach was selected as it allows combination of and draws on the strengths of both qualitative and quantitative methods of data collection. The qualitative survey preceded the quantitative survey and provided an insight and deeper understanding of the community's breastfeeding knowledge and practices, feeding of children without access to their mother's own milk, and their perceptions and attitude on the donation, use of donor human milk, and human milk banking. The quantitative survey subsequently enabled the quantification of the issues identified through the qualitative survey.

2.3.1 | Qualitative survey

The qualitative survey was conducted at the community level and at health facilities. This involved a total of 71 qualitative interviews, including 25 in-depth interviews (IDIs), 29 key informant interviews (KIIs), and 17 focus group discussions (FGDs) as detailed in Table 1. These numbers were based on saturation of the ideas sought by the research questions. For each of these interviews, participants were recruited and interviewed continuously until saturation was reached

TABLE 1 Number and location of qualitative interview's participants

Interview type	Participants	Number
Site 1: Kayole and Umoja		
FGD	Mothers	4
	Fathers	4
	CHVs	4
	Grandmothers	4
KIIs	Health workers	5
	Community leaders	9
IDIs	Fathers	4
	Mothers	8
Site 2: Kenyatta National Hospital		
FGD	Mothers	1
IDI	Mothers	2
Site 3: Gertrude's Children's hospital		
IDI	Mothers	11
Site 4: National and county level		
KIIs	Health professionals/ decision and policy makers	15
TOTAL		71

and no more new ideas were emerging, upon which recruitment of new participants was discontinued.

Purposive sampling was used to select the participants for qualitative interviews. This sampling technique was preferred as it allowed a purposive selection of participants who are knowledgeable on breastfeeding and infant feeding practices, either through personal experiences (mothers), professional expertise (health workers), or interacting with mothers and children in the community (community leaders) or at the health facility (health workers).

IDIs were one-on-one interviews conducted with pregnant women and mothers of children less than 3 years, in order to get an in-depth understanding their personal experiences, knowledge, and attitudes on breastfeeding, feeding of children without access to their mother's own milk, their perceptions and attitude on donating and use of donated human milk as well as human milk banking.

FGDs, were conducted in groups of 6–8 participants with diverse demographic composition such as ethnicity, parity, and occupation. The FGDs were conducted with groups of mothers, fathers, grandmothers, and community health volunteers (CHVs). These participants were considered key influencers in infant and young child feeding (IYCF) practices providing a deeper understanding of the selected groups' or their community's views, perception, attitudes, and practices regarding breastfeeding and feeding of children without access to their mother's own milk, donating and use of donated human milk, and human milk banking.

In both IDIs and FGDs, CHVs and community leaders assisted in the identification of eligible participants taking into consideration various characteristics such as ethnic groups, age categories, and parity, to ensure a wider variety of views on this subject.

KIIs were conducted with community leaders including religious leaders, chiefs, village elders, and women group leaders to understand

their views and attitude on donating and use of DHM and establishment of HMBs. KIIs were also conducted with health workers, including nutritionists, nurses, and paediatricians working in the maternity, neonatal, and paediatric departments/wards in the study health facilities; and health professionals or policy/decision makers at the national level. The aim was to understand the current infant and child feeding recommendations in the country, feeding practices and options for children without access to their mother's own milk, their opinion on the use of DHM for vulnerable children and human milk banking.

CHVs and community leaders assisted in the identification of eligible participants at community level, whereas departmental leaders or Health facility in-charges helped to identify the eligible health workers at the health facility to participate in the KIIs.

The interviews at the community level were conducted in community halls that were easily accessible by the participants, whereas interviews with health workers and professionals were conducted at the participant's most convenient places such as their own offices or at the health facility.

Each interview was conducted by a moderator with the assistance of a note taker. The interviews were done using a qualitative guide, mainly in Swahili, the commonly used language in the study area, or English, depending on the participant's preference. The interviews were audiotaped and transcribed verbatim with concurrent translation.

2.3.2 | Quantitative survey (using structured interviews)

Quantitative survey, using structured interviews, aimed at quantifying the knowledge, attitudes, and practices regarding breastfeeding and feeding of children without access to mother's own milk; perceptions and attitudes regarding donation and use of donor human milk and perceptions regarding human milk banking. Data on respondent's socioeconomic and demographic characteristics were also collected.

Quantitative data collection involved interviewer-administered structured interviews with 868 mothers of children aged 3 years and below attending the study health facilities. The sample size calculation was based on parameters from studies in Nigeria (Ighogboja, Olarewaju, Odumodu, & Okuonghae, 1995) and Turkey (Ekşioğlu et al., 2015) that found the prevalence of willingness to donate breast milk to range from 60% (Nigeria) to 69% (Turkey) and willingness to use DHM to range from 29% (Nigeria) to 71% (Turkey). We used the formula for estimating a single population proportion, and taking into account a level of precision of 5% and 95% confidence level. We calculated sample sizes of 369 for each socioeconomic strata (i.e., lower to lower middle and middle to higher SES groups). Adjusting for nonresponse (10%) in the two groups gave a final sample size 406 participants per group, hence, a total of 812 women for both groups.

Systematic random sampling was used to recruit eligible participants at the antenatal (pregnant mothers) and postnatal (well and sick baby clinics) departments. Every 5th mother in Kenyatta National Hospital and Mama Lucy Kibaki and every 3rd mother attending Gertrude's Children's hospital was recruited to participate in the quantitative interviews. Eligible participants who declined to be

interviewed or were unavailable would be replaced by the next eligible mother. The interviews were conducted in either English or Swahili, depending on the participant's preferred language.

Qualitative and quantitative data collection were conducted by a team of field interviewers who were trained by the researchers on the purpose and objectives of the study, qualitative and quantitative data collection techniques, the data collection tools, and guides and research ethics. The field interviewers were also involved in the pretesting and refining of the data collection tools and interview guides.

2.4 | Data analysis

Quantitative data were analysed in STATA software and involved descriptive analysis with one-way and two-way frequency tables showing the distributions of the variables of interest generated. The analysis was also stratified using demographic, socioeconomic factors to determine differences in the distribution of the variables across the different participant's characteristics.

Qualitative data was translated, transcribed verbatim, and saved in Word files. The researchers familiarized themselves with the data by listening to audio tapes and reading the transcripts, from which they developed themes based on the narratives from the respondents and the research questions. The transcribed Word files were then imported into NVIVO 10 software (QSR International Pty Ltd), for coding. Coding and interpretation was done by two members of the research team to ensure objectivity and to check for consistency in application of the coding process. Final checks for understanding and consistency of the application of the codes were undertaken with a third member of the research team (Hancock, 2002). Analysis was done thematically.

3 | RESULTS

A total of 868 mothers with children younger than 3 years were interviewed using the structured interviews. Of these, 223 and 282 were recruited from Gertrude's Children's Hospital Muthaiga and Lavington clinics, respectively, whereas 191 were from the Kenyatta National Hospital and 172 from Mama Lucy Hospital.

3.1 | Participant's characteristics (quantitative data)

The mean (\pm SD) age of respondents was 30 (\pm 5) years, a larger majority (71%) being between 25 and 39 years. Close to half of the participants were from the Kikuyu (48%) ethnic group; and almost all (97%) were Christians. Majority of the participants had a college/university level of education (68%), whereas a quarter (25%) were not employed. Table 2 presents details of selected socioeconomic and demographic characteristics of study participants.

3.2 | Current practices of donating and use of donated breast milk in the community

Qualitative explorations revealed that the practice of women donating their milk directly to other mothers or children, also known as informal

TABLE 2 Participants socioeconomic and demographic characteristics (quantitative interviews)

Socio-economic and demographic characteristics		Percent
Educational level	None	0.2
	Incomplete primary	1.8
	Completed primary	8.3
	Incomplete secondary	4.6
	Completed secondary	17.5
	Tertiary	67.5
Occupation	Self-employed	28.0
	Employed-casual	2.9
	Employed-formal	40.2
	Unemployed	25.7
	Student	2.5
	Others	0.4
	Personal income	Lower (30,000 and less)
Middle (31,000–100,000)		20.7
Higher (>100,000)		14.6
No willing to disclose		15.3
Household income	Lower (30,000 and less)	19.4
	Middle (31,000–100,000)	19.2
	Higher (>100,000)	27.5
	Not willing to disclose	33.9
Religion	Christian Catholic	30.9
	Christian Protestant	65.0
	Muslim	2.7
	Others	1.5
	Total	100
Age groups (in years)	<20	2.09
	20–24	11.0
	25–29	30.5
	30–34	31.6
	35–39	19.8
	40–44	3.9
	>49	1.1
Ethnicity	Kikuyu/Meru/Embu	47.9
	Luhya	12.3
	Luo	13.4
	Kamba	9.7
	Other	17.6
	Married/cohabiting	86.9
	Single	13.1
Marital status	Others	0.4

milk sharing, exists in the community. It is however not a common practice as only 1% had donated their own breast milk directly to another mother or child in the past 1 year, whereas only 13% of the mothers reported to have seen or heard about it in their communities.

Health care workers further indicated that in the past, the donation of breast milk directly from one mother to another (informal milk sharing) was practiced in some health facilities, in which case, mothers would share their surplus milk to feed other newborns whose mothers had inadequate milk, were very sick to breastfeed, or had died. This was done informally and the milk was not pasteurized or treated in any way. This practice, however, was reported to have ceased mainly due to the fear of HIV transmission.

The time I came, I heard that it (informal milk sharing) used to be done; there was a container where mothers would come, they express the milk and its poured there. The one who does not have milk would be given KII, Health Worker.

3.3 | Views on human milk banking

When asked if they have heard of an HMB (where mothers donate their milk then it is pasteurized for safety and fed to newborns who do not have access to their own mothers milk), about a quarter (23%) of those interviewed for the quantitative survey had heard of human milk banking, mainly from the internet (55%), friends (23%), and the television (19%). The proportion of participants who had heard about human milk banks increased with increasing level of education as 32% of mothers of post-secondary education have heard about HMBs compared with 8% of those with primary level of education. Similarly, more mothers in the higher income level (50%) and those in formal employment (37%) have heard about human milk banks compared with those in lower income category (11%) and those who were unemployed (10%).

In the qualitative interviews, community members perceived the establishment of HMBs as a feasible and cheap lifesaving intervention that would allow the access of breast milk to children without access to their mother's own milk, especially orphans.

We would have reduced child mortality rates especially for children who have been left at infancy by the mothers because they would have gotten proper food they would have missed at infancy since their parents are dead and that is an advantage. KII, Religious Leader.

A few respondents, however, were opposed to the idea of establishing HMBs in Kenya. As depicted in the excerpt below, the main concern being the transmission of HIV and other diseases that can be transmitted through the breast milk:

We are not ready for human milk banking in Kenya. Yes as of now and I do not think we will be for a long time because we have a generalized AIDS epidemic. I as a health professional will not give human milk from a milk bank to a baby with certainty that there is no HIV virus there, so I will not do it. KII, Health Professional

Further discussions with policy makers and health professionals revealed that there were discussions by government officials on the potential establishment of HMBs in Kenya several years ago but the plan never materialized due to other competing needs.

Quite a number of people had floated the idea within our research sub-committee and many people were quite receptive, they were willing to have a go at it like 'why do not we try this for Kenya and see whether it can work, can we do it? And I think most of the discussions were just around the table. I did not feel like many of them had a negative perception. I would see that they were very open to the idea and willing to embrace/try it. That

should have been around 2006/7 or thereabout. We did not go very far, other than just the discussion, as a country or as members of that sub-committee. We did not take it any further than that ..."

KII, Health Professional.

3.4 | Donation of breast milk to human milk banks

A majority (91%) of the participants in the quantitative survey were positive towards the general idea of mothers donating breast milk to a human milk bank.

On a personal level, the majority of the quantitative participants (79%) indicated that they would donate their own milk to an HMB. Willingness to donate was higher among mothers with a college level (81%) compared with those with less than primary level of education (56%), and higher among Christians (78%) compared with Muslims (56%).

For those opposed to the idea of donating their own milk to an HMB, the three main reasons were personal dislike (44%), followed by the perception of inadequate milk for donation (39%), and fear of risk of disease transmission (18%; Table 3).

About the three quarters (77%) of the mothers indicated that they are not particular on who should receive their milk. However, the remaining mothers who were particular on the recipients of their breast milk preferred children who are in need of breast milk (65%), orphans (60%), or children of relatives (22%). Qualitative explorations supported these opinions as portrayed in the following quote:

Okay, if it is a matter of life and death, it's about saving the kid, of course, I will not sit and watch a baby who needs the milk, she is like almost dying, in such a scenario, of course, I'll have a human heart, I'll donate.

IDI, Mother.

TABLE 3 Reasons against donation of breast milk to human milk banks^a

Reason against the use of donor human milk from human milk bank	Percent
Personal dislike	44.3
Not enough milk to donate	38.9
Risk of disease transmission	18.4
Risk HIV transmission	11.4
Hygiene concerns	8.1
Negative influence on bonding between child and mother	8.1
Cultural or religious unacceptable practice	5.9
May encourage irresponsibility	4.3
Do not want to express	3.8
Donated breast milk loses its strength	3.2
Fear of transfer of genetic and personal traits	2.7
Fear of familial diseases	2.2
Others	8.1

^aQuantitative interviews, multiple selection question.

Four in five mothers (80%) would not donate their milk to children of irresponsible mothers. This was also supported by qualitative interviews as one of the mother said:

I would not mind but again it depends with the situation, there are things that are beyond our control, in such a case I would not mind (donating) ... but in a case where the mother can be available, the mother is available somewhere, the mother is not sick, I do not support the idea

IDI, mother.

3.5 | Feeding children on donated human milk from HMBs

Almost all (87%) of the mothers were positive on the general idea of children being fed on donated milk from HMB, which was also substantiated during qualitative interview. A mother in an FGD said:

We usually give them cow milk and 'Nan' (infant formula), and I do not even know what 'Nan' is made of. If I hear that it (donated milk) is truly from a human being, it is a mother's milk, I will be happy. I know that is a mother's milk. I know for sure that what I am giving him/her is a mother's milk, which is natural and not those other ones with chemicals.

FGD, Mothers.

However, of those few (13%) mothers who had a differing attitude about the use of DHM, fear of disease transmission, personal dislike, hygienic issues, and perceived negative effect on child–mother bonding were some of their major concerns as presented in Table 4.

TABLE 4 Reasons against feeding children on DHM from HMBs^a

Reasons against the use of donor human milk from HMB	Percent
Risk of disease transmission	55.1
Personal dislike	49.5
Fear of poor hygiene of donor	17.4
Negative influence on bonding between child and biological mother	16.5
Diseases may be transmitted to the child	12.8
Donated breast milk loses its strength	11.9
May encourage irresponsibility	10.1
Cultural or religious unacceptable practice	9.2
Fear of transfer of familial diseases	8.3
Fear of transfer of genetic and personal traits	4.6
Others	3.7

Abbreviation: DHM, donor human milk; HMB, human milk bank.

^aQuantitative interviews, multiple selection question.

At a personal level, 59% of the mothers stated that they would allow their own children to be fed on donated milk from human milk banks mainly on the circumstances when they were not available to breastfeed (64%), were sick (59%), did not have enough milk for the baby (29%), or were on medication that restricted breastfeeding (10%).

A slightly larger percentage (64%) of mothers from the lower income group compared with those in the higher income group (58%) would allow the use of DHM on their babies. Those of Islamic faith had the lower proportion (39%) of mothers who would allow their children to be fed on donor human milk compared with Christians (60%).

Regarding the concerns on allowing own child to be fed on DHM, a mother indicated that,

I would not like my baby to be given milk from another mother because breastfeeding is actually what makes the baby bond with the mother, so if the baby is not breastfed then that means even psychologically the baby will have a problem in future.

DI mother.

Whereas a father highlighted that,

It (use of DHM) is not bad as long as I am told it is not bad - as long as the woman who is giving out that (milk) is not sick or is not transmitting anything bad to the child, any kind of disease to the child.

IDI, Father.

Discussions with Islamic religious leaders further revealed that children who have been breastfed or received breast milk from the same mothers are not allowed to intermarry.

Yes, a child who is being breastfed by another mother is not supposed to have a relationship with the other baby being breastfed by the same mother in terms of marriage.

KII, Religious leader

3.6 | Preferred donors and recipients of the DHM from HMBs

Two third (63%) of the participants would prefer any healthy mothers to donate; whereas the rest 36% were specific to having healthy mothers, free from diseases such as HIV as potential donors. Some (38%) of the respondents also felt that any willing mother should be allowed to donate their milk to human milk banks.

Additional opinions were also explored from qualitative interviews regarding eligible candidates to donate breast milk. As such, healthy mothers who are currently breastfeeding and with excess breast milk, as well as those who lost children at birth were the most preferred potential donors.

Let us say my wife has delivered a child but dies, now instead of going to be injected the injection to prevent

the milk production, I can tell her 'since there are children who need that milk and you are just okay, express it until the time it will be over' because now that child needs it and you do not have the child to breastfeed and the milk is flowing ... instead of being given that injection you just go and donate

IDI, Father.

Conversely, Participants indicated that very old women, sick mothers, particularly those known to have HIV, and mothers engaging in risky behaviours like smoking should not be allowed to donate any milk to the HMB.

For DHM recipients, study participants rated orphans (88%), babies whose biological mothers are very sick (66%), and unavailable to breastfeed (34%) as most preferred recipients of DHM from HMBs.

Additionally, participants in the qualitative discussions highlighted that DHM could also be used for mothers who do not have enough milk and those who are on medication.

The babies who don't have another source. There are those who completely don't have anything to depend on like the orphans maybe she was born today and the mother died ... or the lame ... or those whose mothers are ill, like you can say the mother has breast cancer ... they should be given first priority.

FGD, Fathers, Nairobi

Some health professionals also recommended that the use of donated milk should not take priority over breastfeeding and, if available, mothers should be encouraged and supported to breastfeed their children.

3.7 | Compensation of donors

The qualitative participants felt that no compensation should be involved in the donation and use of donated human milk. They were concerned that compensation would not be sustainable and would introduce ethical issues of mothers selling their milk at the expense of breastfeeding their own children optimally.

If it is used for commercial purposes, now that is a turn off ... because the donors do not sell their milk, it should not be sold.

IDI, Mother.

Some of the participants however felt that mothers who volunteer to donate their milk should be appreciated preferably with non-monetary items such as free medical services or information materials on nutrition and health. For this, they recommended that guidelines and standard fixed rates are developed on compensation of the donors and if a fee is charged on the recipients, it should be affordable especially for the poor families, and preferably cheaper than formula or cow milk, which are the most common breast milk substitutes in the community.

You know, what will make people to also be motivated because Kenyans love money if you say 'I'll give money,'

you will see them being motivated. So also, if they will be given something small, it can give mothers morale

KII, Health Worker

"They can be appreciated. Like if you go to talk to the others, you can give them something small just to say thank you so that they can help feed their babies. Even if you can do some shopping or whatever you want to give them, it can also be money ... you can even give them soap, or buy things for them nets and then you go and give them."

KII, CHV.

3.8 | Safety of donor human milk and human milk banking

Most mothers felt that testing milk for contamination (60%) and sterilizing the equipment for processing/storing the milk (60%) should be done to ensure that donated human milk is safe for babies, as summarized in Table 5.

"First, I think they need to screen the mothers who are going to donate. Then if they reach the standards and its safe, then they teach them on expressing and hygiene and then now they need to take care of storage as well"

KII, Health Worker.

3.9 | Preferred location of human milk banks

Health facilities were preferred by most of the participants for the reason that equipment and human capacity would be readily available and it would be easy to screen donors. The maternal and child health department, paediatric wards, and new-born units were thought to be the most suitable locations for human milk banks at the health facility, for ease of access, especially by recipients. Other

TABLE 5 Suggested ways to ensure the safety of the donor human milk^a

Ways to ensure the safety of donor human milk	Percent
Sterilizing/pasteurizing the milk	27.9
Sterilizing the equipment used for processing/storing the milk	60
Ensuring personal hygiene for people handling the milk	27.1
Ensuring personal hygiene for the mother donating the milk	19.2
Screening the mothers donating the milk for HIV	23.3
Screening the mothers donating the milk for other diseases	26.6
Screening for risky behaviour (drugs, prostitution)	10.5
Testing the milk for contamination/microorganisms	60.3
Regulation/quality control by the government	9.6
Others	10.1

^aQuantitative interviews, multiple selection question.

recommendations included having the milk banks near orphanages hosting abandoned children who are potential beneficiaries of donated human milk or establishing them as standalone facilities, just like blood banks.

Some participants recommended that the establishment of the HMBs should be done systematically, beginning with a referral hospital where equipment and human capacity are readily available and have higher numbers of potential beneficiaries (vulnerable children; and in urban settings which are more populous), and then cascaded down to counties and community level, for ease of access by potential donors and recipients.

What I mean is that when we decentralize, it means we are going to decentralize the scale, we are going to decentralize the management. Why I think so is that when we decentralize, you actually bring the services and the benefits of HMBs closer to the people.

KII, Health Professional.

3.10 | Perceived facilitators in the establishment of HMBs

The involvement and leadership by the Ministry of Health and the recognized need in both community and health facility levels were seen as the main enablers to the establishment of HMBs. Other perceived enablers include the fact that informal milk sharing and wet nursing have previously been practiced in some parts of the country informally, and that the culture of saving lives is highly regarded in Kenya.

3.11 | Anticipated challenges in establishing HMBs

Being a new idea, some participants felt that there would be resistance and reluctance in the uptake and poor acceptability of human milk bank, mainly at the community level and among some health workers due to health (mainly HIV transmission), cultural, or personal concerns.

Establishment of human milk banks would require a lot of resources, including financial, human capacity, equipment/technology, and space. Some of the participants felt that there would be a challenge in obtaining these resources for the sustainable establishment of banks, given the already constrained budgets and staff resources in most public health facilities. Lack of political commitment or support due to other competing interest was also seen as potential challenges that could hinder resource allocation for establishment of human milk banks at the government, regional/county, and health facility levels. Other potential challenges mentioned included the perception that human milk banks could replace natural breastfeeding.

4 | DISCUSSION

This study sought to establish knowledge, perceptions, and practices regarding donating and use of donated human milk and human milk banking. Findings generally demonstrated positive attitudes towards

donation and use of DHM, despite the idea being new to most of the respondents. Health workers suggested that the use of DHM would be an affordable solution compared with the high cost of infant formula which is currently used in situations where mother's own milk is not available. They also felt that DHM would reduce morbidity especially from the negative effects associated with delayed breastfeeding and allergies to infant formula. Evidence from several studies highlights that DHM reduces the rate of infections and feeding intolerances among vulnerable neonates and reduces their duration of hospitalization (6, 7, 8).

The positive attitudes regarding donation and use of DHM were not without concerns. Although most mothers were willing to donate their breast milk to feed vulnerable children, there was some reluctance among some participants in allowing their own children to be fed on DHM from other women for the fear of transmission of HIV and other diseases, hygiene, cultural and social concerns, and general personal dislike of the idea. This concern around safety of DHM concurs with findings from South Africa where concerns regarding the safety of the DHM in the context of HIV/AIDs was identified as a key barrier in the acceptability of DHM (Coutsoudis, Petrites, & Coutsooudis, 2011). Like in our study, in Australia, majority of the mothers indicated that they would use donor human milk on their babies if they were assured that it was safe and appropriate (Mackenzie, Javanparast, & Newman, 2013).

The concern that children sharing mother's milk are regarded as milk siblings in the Islam religion, could explain the lower proportion of Muslim mothers who would allow the use of donor human milk compared with Christians. These concerns echo findings highlighted in Turkey (Ekşioğlu et al., 2015; Gürol, Özkan, & Çelebioğlu, 2014). In a study conducted by Khalil et al, in a Muslim setting, religious leaders indicated that they would only approve the use of DHM if it came from a single known donor or pooled from at most three donors (Khalil, Buffin, Sanlaville, & Picaud, 2016). This underpins the key role that religion and culture play in the acceptability of the use of DHM and human milk banking and hence the need for a multi-stakeholder approach, involving health professionals and community, religious other leaders in HMB communication, and advocacy strategies. Further, addressing communities' concerns, beliefs, and misperceptions regarding DHM and HMBs through provision of sufficient information and raising awareness, has been reported as a strategy for strengthening communities' confidence and acceptance of breast milk donation (Coutsoudis et al., 2011; Ekşioğlu et al., 2015; Gürol, Ozkan, et al., 2014). It is also documented that health professionals play an important role in motivating mothers to become donors and use DHM (Pimenteira Thomaz et al., 2008).

To ensure safety and quality of the DHM, the use of internationally recognized practices for hazard management such as the Hazard Analysis and Critical Control Point (HACCP), to guide the development of standard operating procedures and good manufacturing practice for the screening of donors and processing of DHM is recommended (De Nisi et al., 2015; Hartmann, Pang, Keil, Hartmann, & Simmer, 2007; Practice, 2010). PATH's global implementation framework for strengthening HMB outlines core requirements and

quality principles that should be universal in all HMBs (PATH, 2013). In addition, PATH has HACCP workshop and tools developed based on technical input from existing milk banks networks and from previous work conducted in South Africa and these tools have since been trialled in Vietnam and adopted by the Indian government (PATH, 2016). These would be useful in training and ensuring safety of HMBs in countries like Kenya wishing to establish human milk banking.

This study revealed that informal milk sharing is done in some communities, although it is not a common practice. History of human milk banking indicates that establishment of HMBs was actually preceded by practices such as wet nursing and informal milk sharing (Haiden & Ziegler, 2017). That donation of breast milk is happening in some communities although informally, and hence not a totally new idea, could strengthen the HMB advocacy messages. Laying emphasis on the fact that HMBs (unlike informal milk sharing and wet nursing) ensure that donated breast milk goes through a rigorous process of screening, pasteurization, and hygienic handling and storage, which makes DHM from HMB safe for infants who do not have access to their own mothers milk.

The desire to save the life of a child in need emerged as among the main reasons why mothers would consider donating their breast milk to HMBs. Majority of the respondents preferred no compensation for the donors. Similarly, evidence from other countries reveals that the motivation for mothers to donate their breast milk was mainly altruistic rather than compensation (Azema & Callahan, 2015). In Australia, mothers cited their reasons for donating milk as having been separated with their children, excess breast milk when own baby is unavailable to breastfeed, and desire to maintain lactation (Gribble, 2014). In our study, healthy women who are currently breastfeeding and have excess breast milk were among the most preferred donors. In France, donors were mainly mothers of childbearing age with strong family support (Azema & Callahan, 2015). Kenya has made great strides in promoting breastfeeding practices and, although there is still room for improvement, this positive trend forms a good basis for promotion and introduction of donation and use of DHM, when the use of mother's own milk is not feasible. HMBs rely on DHM, therefore, a robust breastfeeding culture, hinging on support from a mother's family and community, is necessary.

5 | CONCLUSION

This study highlights potential acceptability of the idea of donating and using donor human milk for infants with no access to their mother's own milk. However, there is need to engage and further foster in communities the importance of breastfeeding and milk donation while addressing the cultural, religious, and health concerns and building awareness of the value of human milk. To achieve this, intensive education and awareness campaigns among the community members and health workers is imperative to ensure their buy-in and to address the concerns on the use of DHM and human milk banking as highlighted in the study findings. To ensure effective

communication and education, existing structures such as the community health strategy, religious institutions, and trained health professionals can be used as avenues and agents of community education and awareness creation.

To further facilitate the actualization of HMBs in Kenya, it will be imperative to have national guiding documents on the collection, processing, and use of donor human milk. For this to be successful, a multidisciplinary team would be required to move the agenda of establishing human milk banking in Kenya. In addition, there is a need to draw on experiences from other countries where HMBs have been established. Leadership and prioritization by the government is also important to ensure budgetary allocations for the establishment of the human milk banking in Kenya. Clarification among global policy leaders regarding the ethical use of DHM is also needed to guide decision making around compensation, consent, and commercialization of DHM in Kenya.

5.1 | Limitations

This study was conducted in an urban setting and did not fully represent perceptions among rural residents. Additionally, the quantitative data collection was only carried out among women in health facility settings. This might create a bias in the estimates as those who may not be able to access health facility services are likely to be systematically different in many important ways, including knowledge, attitudes, and practices. However, to widen the scope of views, we conducted qualitative studies at the community level in urban areas. These results are therefore mainly generalizable to residents in urban areas. The fact that the target population has not yet been exposed to human milk banking may also have introduced some bias on their perceptions. However, this study sets a good foundation for pilot-testing of human milk banking in Kenya, particularly in urban settings. More studies on the topic in future will address the gaps identified.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

EKM, designed the study, guided the data collection, analysis, drafted the manuscript, reviewed and approved the manuscript for submission, MW participated in the data collection, analysis, drafted the manuscript, reviewed and approved the manuscript for submission, EK, TM, EM, participated the data collection, reviewed and approved the manuscript

for submission AZ, JM, BS, AG, LK, TN, RM, KM, KI-B designed the study, reviewed and approved the manuscript for submission.

ORCID

Milka Njeri Wanjohi  <https://orcid.org/0000-0003-4289-4762>

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