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Operational and Systemic Challenges in Human Milk Banking

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Abstract
Human milk banks (HMBs) are necessary for providing donor human milk (DHM) to vulnerable infants, particularly in low- and middle-income countries (LMICs). Nevertheless, human milk banks face significant challenges, including inadequate infrastructure, insufficient healthcare worker training, limited standardized guidelines, financial constraints, and ethical and safety concerns. These barriers suppress the efficient operation and sustainability of human milk banking, particularly in resource-limited settings. This review synthesizes findings from fifteen studies to highlight these challenges and proffer solutions, including investing in infrastructure, developing standardized protocols, increasing funding, and enhancing training programs. Addressing these issues is essential to ensure the readily availability of safe and high-quality donor human milk for vulnerable infants, especially in low- and middle-income countries where the need is greatest.

Keywords: Human Milk Banks, Donor Human Milk, Operational and Systemic Challenges

Introduction

Human milk banks play an important role in providing donor human milk (DHM) to vulnerable babies, especially low-birth-weight neonates and preterm babies when maternal milk is unavailable. The World Health Organization (WHO) recommends the use of DHM as a suitable alternative to a mother's own milk, emphasizing its role in reducing infant death and illness (Obeng et al., 2023; Tende et al., 2023). Despite the proven benefits of donor human milk, the establishment and operation of human milk banks face significant systemic and operational challenges. These challenges include logistic and infrastructural issues, financial constraints, lack of standardized guidelines, inadequate training for healthcare workers, and safety and ethical concerns (Mathias et al., 2023; Obeng et al., 2023). Addressing these barriers is essential for the effectiveness and sustainability of human milk banking, especially in low- and middle-income countries (LMICs) where the need for donor human milk is greatest.

Mathias et al. (2023) and Tende et al. (2023) both found that infrastructure and logistical challenges, such as inadequate storage facilities, transportation problems, and ineffective pasteurization processes, limit the operation of human milk banks. Also, the absence of standardized guidelines and policies for human milk banking creates inconsistencies in milk banking practices, resulting in variability in the quality and safety

of donor milk (Obeng et al., 2023; Mathias et al., 2023). Hoang et al. (2024) further indicate that financial constraints exacerbate the challenges as the costs associated with establishing and maintaining human milk banks are often discouraging, particularly in LMICs. Moreover, the lack of trained lactation consultants and healthcare workers limits the capacity of human milk banks to effectively recruit donors, screen milk, and provide education to mothers (Magowan et al., 2020). Ethical and safety concerns, encompassing the risk of disease transmission and the need for rigorous donor screening, also pose significant challenges to the operation of human milk banks (Tende et al., 2023; Mathias et al., 2023).

This review explores the operational and systemic challenges in human milk banking, focusing on logistical and infrastructure issues, financial constraints, lack of standardized guidelines, healthcare worker training and support, and ethical and safety concerns. By identifying these barriers and proposing potential solutions, this paper seeks to contribute to the development of sustainable and effective human milk banks.

Methods

This review is based on a narrative synthesis of findings from fifteen articles, selected on the basis of relevance to the operational and systemic challenges in human milk banking. The articles were identified through a systematic search of PubMed and Google Scholar. We used keywords such as "human milk banking," "donor human milk," "operational challenges," "systemic barriers," and "infrastructure." The inclusion criteria were studies published between 2019 and 2024 that addressed the key focus areas of infrastructure and logistical challenges, financial constraints, lack of standardized guidelines, healthcare worker training and support, and ethical and safety concerns in human milk banks.

We analyzed and synthesized the selected thematically to identify common challenges and barriers in the operation of human milk banks. Relevant information was extracted in a standardized form, which included information on study design, location, key findings, and recommendations. The final review was structured under five main themes: (1) infrastructure and logistical challenges, (2) lack of standardized guidelines and policies, (3) financial and resource constraints, (4) training and support for healthcare workers, and (5) ethical and safety concerns. The synthesis was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Page et al., 2021).

Infrastructure and Logistical Challenges

One major barrier to the effective operation of human milk banks is infrastructure and logistics. These include inadequate storage facilities, transportation difficulties, and the need for reliable pasteurization processes. In Ghana, the lack of proper storage and transportation systems has been identified as a major barrier to establishing human milk banking (Obeng et al., 2023). Similarly, the absence of cold chain infrastructure in India has limited the ability to collect and distribute donor human milk (DHM) to neonatal intensive care units (NICUs) (Mathias et al., 2023). Likewise, transportation issues, particularly in rural and remote areas, can be prohibitive to human milk bank establishments and access. Magowan et al. (2020) found that in Uganda, mothers reported that the lack of affordable transportation to milk banks discouraged them from donating breast milk. Moreover, the need for effective pasteurization processes to ensure the safety of donor human milk adds another layer of complexity. In Brazil, concerns about the microbiological quality of donated milk due to inadequate handling and storage procedures have been expressed, highlighting the need for stringent protocols (Chaves et al., 2022). These challenges reveal the

importance of investing in robust infrastructure and logistical systems to support the operation of human milk banks.

Lack of Standardised Guidelines and Policies

Another dominant barrier to the establishment and sustainability of human milk banks is the absence of standardized policies and guidelines for human milk banks. This lack of standardization leads to inconsistencies in milk banking practices, which can compromise the quality and safety of donor human milk. In Europe, for instance, there is significant variability in the operation of human milk banks, with some countries lacking clear regulations for donor human milk (Klotz et al., 2022). This variability is credited to the lack of a unified regulatory framework, which hampers the equitable distribution of donor human milk across countries. In LMICs, the situation is even more dire. In Ghana, the absence of national guidelines for human milk banking is documented as the major barrier to their establishment and operation (Obeng et al., 2023). Similarly, in India, there exist no standardized protocols for donor screening, milk processing, and storage (Mathias et al., 2023). Developing standardized policies and guidelines for human milk banking is therefore critical to ensuring the safety and efficacy of donor human milk and to the promotion of its widespread adoption.

Financial and Resource Constraints

Financial constraints also remain a major barrier to the establishment and maintenance of human milk banks. The costs associated with setting up and operating milk banks, including the purchase of equipment, maintaining cold chain infrastructure, and hiring trained staff, are often expensive and discouraging. For instance, in Italy, the operational costs of human milk banks have been found to be significantly high, with salaries of medical staff and transportation accounting for the highest expenses (Salvatori et al., 2022). Equally, in China, the sustainability of human milk banks is being argued to depend heavily on government and societal support (Daili et al., 2020). This problem is even more pronounced in LMICs. In Ghana, one major constraint to the establishment of human milk banks is the lack of financial support (Obeng et al., 2023). Similarly, evidence is found in South Africa, where the existence of high costs associated with donor milk screening and processing has limited the effective operations of HMBs (Biggs, 2021). Addressing these financial constraints requires increasing financial investments from governments, international organizations, and other stakeholders.

Training and Support for Healthcare Workers

The lack of trained healthcare workers and lactation consultants is another significant barrier to the effective operation of human milk banks. In many countries, healthcare workers possess little or no knowledge and skills needed to recruit donors, screen milk, and provide education to mothers. In India, the lack of staff training is reported as a major challenge in the operation of human milk banks (Mathias et al., 2023). Equally, in Ghana, scholars report the lack of practical and psychological support from healthcare professionals as a barrier to potential milk donation (Obeng et al., 2023). Training programs for healthcare workers and lactation consultants are essential to address this barrier. In Europe, the European Milk Bank Association (EMBA) has developed evidence-based recommendations for the establishment and operation of human milk banks, which include guidelines for training healthcare workers (Weaver et al., 2019). Similar initiatives are needed in low- and middle-income countries to build the capacity of healthcare workers and promote the widespread adoption of human milk banks.

Ethical and Safety Concerns

Ethical and safety concerns, including the risk of disease transmission and the need for rigorous donor screening, are other significant barriers hindering the effective operation of human milk banks. In many settings, mothers are reluctant to donate milk due to concerns about the safety of the donation process. For example, in Turkey, several mothers have expressed concerns about potential disease transmission as the bane to milk donation (Mizrak Sahin, 2020). Biggs (2021) similarly found that, in South Africa, the lack of trust in the safety of donated milk remained a major barrier to milk donation (Biggs, 2021). Quintessentially, addressing this concern requires the implementation and adherence to rigorous donor screening and milk processing protocols. The EMBA guidelines for donor screening, milk processing, and storage to ensure the safety of donor human milk is a valuable resource for addressing such operational challenges (Weaver et al., 2019). Similar protocols are needed in LMICs to build trust in the safety of donated milk and promote the widespread adoption of human milk banks.

Discussion

The operational and systemic challenges in human milk banking presented in this review highlight the issues surrounding the establishment and sustainability of effective milk banking systems, particularly in low- and middle-income countries. Infrastructure and logistical challenges, such as inadequate storage facilities, transportation difficulties, and the need for reliable pasteurization processes, are significant barriers that prohibit the efficient operation and maintenance of human milk banks. These challenges are exacerbated in resource-limited settings, where the absence of cold chain infrastructure and affordable transportation options limits the ability to collect and distribute donor human milk to those in need (Obeng et al., 2023; Mathias et al., 2023). Where these challenges exist, addressing them would require targeted investments in infrastructure, including the development of cold storage facilities and transportation networks, as well as the implementation and adherence to standardized protocols for milk processing and pasteurization.

The lack of standardized guidelines and policies for human milk banks is another critical barrier that complements the inconsistencies in milk banking practices. In many regions, the absence of clear regulations for donor screening, milk processing, and storage compromises the quality and safety of donor human milk (Klotz et al., 2022; Obeng et al., 2023). The development of standardized guidelines, such as those proposed by the European Milk Bank Association (EMBA), could serve as a model for other regions where the need is high, especially in LMICs (Weaver et al., 2019). In addition, the establishment of national policies to regulate the operation of human milk banks and ensure the safety of donor human milk is crucial for building trust among donors and recipients as well as promoting widespread adoption of human milk banking practices.

Lack of trained healthcare workers and financial constraints further compound the challenges faced by human milk banks. The high costs associated with setting up and operating milk banks, including the purchase of equipment, maintaining cold chain infrastructure, and hiring trained staff, are often prohibitive in resource-limited settings (Salvatori et al., 2022; Daili et al., 2020). Addressing these financial constraints will require increased investment from governments, international organizations, and other stakeholders. Moreover, training programs for lactation consultants and healthcare workers are essential to build the capacity of human milk banks and ensure the effective recruitment of donors, screening of milk, and provision of education to mothers (Mathias et al., 2023; Obeng et al., 2023). By addressing these operational and systemic challenges, stakeholders can work together towards the development of

sustainable and effective human milk banks that provide safe and high-quality donor human milk to vulnerable infants globally, particularly in low- and middle-income countries where the need for human milk banks is greatest.

Conclusion

In summary, the challenges facing human milk banks include inadequate standardized guidelines, poor infrastructure, little or no healthcare worker training, financial constraints, and ethical and safety concerns. Addressing these operational and systemic challenges require a coordinated effort aimed at enhancing protocol and infrastructure development, healthcare worker training, and funding support. The implementation of these solutions is critical especially in LMICs, where the need for human milk banks is greatest and the potential impact on public health is most significant.

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