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Human Milk Banks: A Lifeline for Infant Nutrition and Care

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Donating breast milk originates from the ancient practice of wet nursing, where women breastfed others' infants. The earliest regulations on breastmilk sharing appeared in the Babylonian Code of Hammurabi (circa 1800 BCE), driven by the belief that infants inherited the traits of the wet nurse through milk. In 11th-century Europe, breastfeeding was deemed indecent, so wet nursing became common, especially among royalty and aristocracy. The 19th century saw the decline of wet nursing due to concerns about nurses' health and lifestyle, with medical research by Theodor Escherich in the early 1900s highlighting the unique benefits of breastmilk. Escherich opened the first human milk bank around 1909, followed by the first U.S. milk bank at the Boston Floating Hospital in 1910. Despite advances in neonatal care and formula in the 1960s, the World Health Organization and UNICEF maintained that donor milk is the best alternative to mother's milk. The HIV epidemic later reduced milk banking due to stringent screening increasing costs. Wet nursing dates back thousands of years, practiced across various ancient civilizations including Egyptian, Greek, and Roman societies. Wet nurses were regarded as professionals, often regulated through contracts and societal laws. The practice was especially prevalent among the wealthy, while lower-class women breastfed their own children or relied on wet nurses only when necessary. Over time, wet nursing evolved from necessity to a choice among the upper classes until infant feeding alternatives like bottles and formula emerged in the 19th century. Theodor Escherich's early 20th-century studies demonstrated that neonatal intestinal flora differed significantly if infants were breastfed versus fed by other means, emphasizing the superior nutrition of breastmilk. This led Escherich to establish the first human milk bank in 1909. Soon after, the United States opened its first milk bank at the Boston Floating Hospital. Milk banks provided pasteurized donor milk to neonates unable to be breastfed by their mothers, particularly premature or ill infants. The expansion of infant formula and neonatal medical care in the 1960s led to a decline in milk banking. However, authoritative bodies like WHO and UNICEF have continued to advocate for donor breast milk as the next best alternative to maternal breastfeeding. Later, the HIV epidemic posed significant challenges to milk banks worldwide by necessitating rigorous screening and increasing operational costs, causing many milk banks to close or reduce operations. Nonetheless, donor milk programs persist in many regions to support vulnerable infants.

Introduction

Human milk banks have emerged as a vital public health resource, offering life-saving nutrition and care to infants who cannot receive adequate milk from their own mothers. By collecting, screening, pasteurizing and distributing donor human milk, these banks ensure that vulnerable newborns especially preterm, low-birth-weight and medically fragile infants—receive the optimal nourishment required for survival, growth and immunity. In settings where maternal milk is unavailable, insufficient or contraindicated, donor human milk acts as

the safest and most beneficial alternative, reducing the risk of infections, necrotizing enterocolitis and other complications. As awareness of breastfeeding benefits increases globally, human milk banks are gaining recognition as an essential component of neonatal care systems, bridging critical nutritional gaps and supporting families during challenging circumstances. Through their scientific, ethical and compassionate approach, human milk banks truly serve as a lifeline for infant health and wellbeing.

Breastfeeding provides the optimal nutrition for infants, uniquely suited to human needs with nutrients, antibodies, and enzymes that boost immunity, reduce infections, allergies, and necrotizing enterocolitis (NEC), and support brain development. For low-birth-weight (LBW) and preterm infants, comprising 30-40% of births in India, breast milk significantly lowers sepsis, NEC rates, hospital stays, and long-term morbidities compared to formula. When maternal milk is unavailable, pasteurized donor human milk (PDHM) from milk banks is the recommended next best option, endorsed by WHO/UNICEF since 1980 and the American Academy of Pediatrics. India's first human milk bank opened at Sion Hospital, Mumbai, in 1989, with 125 operational banks today run by government, hospitals, and NGOs following strict screening, pasteurization, and storage protocols. These banks collect milk from healthy donors to feed preterm/sick newborns, termed "liquid gold" for its life-saving benefits amid high preterm birth and malnutrition rates. Cost-effectiveness studies from Western NICUs show PDHM reduces NEC and sepsis, suggesting substantial national savings in India where such evaluations remain limited.

India faces a major burden of vulnerable newborns due to its large birth cohort, high rates of prematurity and low birthweight, and significant neonatal mortality. Of the 27 million babies born annually, nearly 30% are low birthweight and 40% of these are preterm. Prematurity accounts for 35% of neonatal deaths and infections for another 33%. Although India has made notable progress in maternal and child health, the reduction in neonatal mortality has been slower, falling from 37 to 25 per 1,000 live births over a decade. To achieve the Sustainable Development Goal of reducing neonatal mortality to 12 per 1,000 live births, stronger interventions focused on newborns are essential.

Nearly 75% of premature infants can be saved through cost-effective interventions such as kangaroo mother care, neonatal resuscitation, infection management, and breastfeeding. Breastfeeding alone has the potential to prevent 0.16 million child deaths annually, yet early initiation and exclusive breastfeeding rates remain low in India. This highlights the urgent need to make human milk accessible to all hospitalized newborns, especially preterm and low-birthweight infants. A human milk bank can be effective only when integrated with broader breastfeeding promotion efforts, kangaroo mother care, and strong lactation support systems.

The Mother Baby Friendly Initiative Plus (MBFI+) model developed by PATH offers a comprehensive framework where human milk banks not only collect, process, and store donor milk but also serve as centers for breastfeeding and kangaroo mother care support. By engaging families and communities, these milk banks promote breastfeeding, encourage milk donation, and create supportive environments for lactating mothers. India has adapted this model to suit its public health structure, recognizing that integrated systems and shared best practices can significantly improve neonatal outcomes.

India-specific studies on human milk banks reveal gaps in standardization, staffing, and infrastructure. Only a quarter of facilities use laminar airflow for pooling, though most use stainless steel containers—a uniquely Indian practice that supports faster heating and cooling cycles. Staffing shortages, especially in dedicated lactation counselors, remain a challenge. High demand has led to short storage durations and the establishment of satellite collection centers in some regions. Donor milk collection is largely facility-based, with limited home collection and no longitudinal donors. Although many milk banks were initially started by NGOs, government support has increased, especially in states like Rajasthan and Tamil Nadu. Awareness among mothers and families remains low, emphasizing the need for

education and community engagement to strengthen milk donation and breastfeeding practices.

Key Benefits for Vulnerable Infants

- Reduces NEC, late-onset sepsis, chronic lung disease, retinopathy of prematurity, and neurodevelopmental delays in very low birth weight infants.
- Promotes better body composition with lower fat mass and higher lean mass versus formula, despite slower initial weight gain.
- Enhances cognitive outcomes, potentially raising IQ by 5 points and cutting special education needs.

India's tradition of human milk donation traces to wet nursing, exemplified in mythology by Yashoda nursing Lord Krishna, and was widespread among 18th-century nobility who avoided breastfeeding to preserve beauty. The practice declined due to fears of transmitting infections like syphilis, evolving later into regulated human milk banks. Asia's first milk bank opened in 1989 at Sion Hospital, Mumbai, by Dr. Armida Fernandez, becoming sustainable through donor mothers' return visits; it remained the sole bank until 2005, with only 22 added by 2015, reaching about 50 today far short for 27 million annual births versus the UK's 16 banks for 770,000 births. Expansion has accelerated recently, doubling milk banks in the past two years, but remains concentrated in western India due to the Sion model. Key barriers include poor obstetrician-pediatrician collaboration, scarce lactation counselors, limited awareness, and gaps in leadership for best practices. Despite these, evolving support is driving growth in other regions to address preterm and low-birth-weight infant needs.

Key Statistics and Needs

- Current Coverage: ~50 operational milk banks, inadequate for national demand amid high preterm births.
- Historical Pace: 1 bank (1989–2005), 22 more (2005–2015), rapid recent increase.
- Comparative Gap: India (27M births/year, 50 banks) vs. UK (770K births/year, 16 banks).

More banks in NICUs are urgently needed, supported by government and civil society.

Donor human milk consists of excess breast milk voluntarily donated by healthy lactating mothers (without payment) for preterm/low-birth-weight infants when mother's own milk (MOM) is unavailable, acting as a formula alternative and bridge to exclusive human milk

feeding via lactation support. Human milk banks (HMBs) recruit/screen donors, collect/process (pasteurize)/store/distribute milk per clinical priority, ideally boosting community breastfeeding; they prioritize NICU high-risk newborns like those <1,500g birthweight.

Breastfeeding provides unmatched nutrition, immunity, and growth benefits—praised in Sushruta Samhita as superior to "water of seven seas"—reducing sepsis, necrotizing enterocolitis (NEC), NICU stays, and costs versus formula; WHO/AAP/ESPGHAN endorse pasteurized donor human milk (PDHM) next after MOM. UK data projects £30M+ first-year NHS savings, 10,594 quality-adjusted life-years gained, and 238 fewer deaths for 2013 preterms; globally, it averts 820K under-5 deaths yearly, aiding SDGs.

India's ~90-125 HMBs (from Sion's 1989 start) serve amid 27M births/20-40% LBW rate but face slow growth due to awareness gaps, costs, formula promotion, and staff shortages; expansions in Kerala (Ernakulam), Delhi (Lady Hardinge), AIIMS sites, Tamil Nadu/Maharashtra/Rajasthan tie to NHM's IMR reduction (25/1,000). Guidelines recommend NICU/postnatal ward locations, trained staff, and rural scaling for safe, stigma-free donations.

Human milk bank recipients are primarily preterm (<37 weeks), low birth-weight (<2500g), sick NICU newborns (e.g., sepsis, respiratory distress, post-surgery), orphans/abandoned infants, those of non-lactating mothers (postpartum issues, multiples, adoption), or mothers with infections like HIV/TB where breastfeeding risks transmission. Donor human milk (PDHM) acts as lifesaving "gold standard" post-mother's own milk (MOM), reducing necrotizing enterocolitis (NEC), infections, feeding intolerance, parenteral nutrition duration, and hospital stays versus formula—especially vital for VLBW infants enabling trophic gut priming.

Donors must be healthy, lactating women passing rigorous screening: HIV/hepatitis/syphilis (VDRL) negative, chest X-ray/Tine test clear, no medications/herbs/smoking/alcohol excess, with informed consent; milk undergoes pasteurization, microbiology testing, and cold-chain storage for traceability. Priority goes to high-risk cases like short gut syndrome or omphalocele; surplus PDHM supports multiples, temporary interruptions, or adoptive feeding.

Optimal HMB infrastructure requires a 250 sq ft partitioned room near/in NICU/postnatal wards for donor access/supervision, with private expression areas (music/TV/crèche/videos on KMC/breastfeeding), technician workspace, record storage, and counseling—boosting exclusive breastfeeding rates in VLBW babies. NGOs/spiritual groups can host for community/abandoned infants; integrate lactation support for sustainability.

Equipment, Containers & Quality Control in Human Milk Banks

Item	Details (Simple & Easy)
Breastmilk Pumps	Hospital-grade electric pumps preferred; comfortable & efficient; expensive; can hurt nipples if suction high.
Manual Pumps	Low-cost; simulate baby's compressive action; reusable; cost around ₹2000.
Avoid Bicycle Horn Pumps	Not hygienic; difficult to clean.
Sterilization	All pump parts must be disinfected/sterilized properly.

Container Type	Usefulness	Issues/Comments
Polythene Milk Storage Bags	Not recommended	Fragile, contamination risk, loss of lipids/vitamins.
Hard Plastic Containers (polycarbonate, propylene, pyrex)	Used in foreign milk banks	May reduce some bioactive components; can crack; single-use recommended due to BPA.
Stainless Steel Containers	Highly recommended (India)	Durable, easy to clean/autoclave, no major nutrient loss.

Glass Containers	Acceptable	Must check for chipping; reusable after proper sterilization.
General Rules	Label all containers; don't fill fully (milk expands when frozen).	

Area	Key Points (Simple)
Donor Screening	Check lifestyle, medical history, STIs, smoking, drug use; blood tests done.
Milk Expression & Storage	Handwashing, clean pump parts; refrigerate immediately at 4°C; freeze at −20°C within 24 hrs.
Pasteurization	Holder method: 62.5°C for 30 min; cool quickly; temperature monitored.
Bacteriological Testing	Pre-pasteurization limits vary; post-pasteurization: no bacterial growth allowed.
Equipment & Facility Management	Maintain freezers/pasteurizers; calibrate every 6 months; staff training essential; follow HACCP; maintain logs.
Record Keeping & Accreditation	Pasteurization logs, donor traceability; regular inspections by milk bank authorities.

Locations of Human Milk Banks in India

Human milk banks are increasing in number across India. Some key locations include:

- **Maharashtra** – The first human milk bank in Asia, "Sneha," was started in 1989 at Lokmanya Tilak Municipal General Hospital, Mumbai. Many more have been established since, including at Pune and Nagpur.
- **Rajasthan** – Jaipur has "Jeevan Dhara," one of the largest human milk banks in North India.
- **Tamil Nadu** – Chennai has several milk banks, including at Egmore Children's Hospital.
- **Kerala** – Thiruvananthapuram and Kochi hospitals run human milk banks.
- **Karnataka** – Bengaluru has multiple banks, such as at Vani Vilas Hospital.
- **Delhi** – Lady Hardinge Medical College and other hospitals host milk banks.
- **Telangana** – Hyderabad has a human milk bank at Niloufer Hospital.
- **West Bengal** – Kolkata has a facility at SSKM Hospital.
- **Other states** like Gujarat, Madhya Pradesh, Uttar Pradesh, and Odisha are also establishing milk banks in medical colleges and government hospitals.

As of 2025, India has **over 100 human milk banks**, coordinated by government hospitals, medical colleges, and NGOs, making it one of the largest networks in the world.

State / UT	Hospital / Institution
Tamil Nadu	Coimbatore Medical College Hospital (CLMC)
	Coimbatore district headquarters hospital, Pollachi
	Institute of Child Health & Hospital for Children (ICH), Egmore, Chennai
	Other govt medical colleges / district headquarters hospitals under expansion in TN (e.g. Udagamandalam, Tiruppur, Erode, Namakkal, etc.)
Delhi (NCR)	Lady Hardinge Medical College (LHMC), New Delhi – "Vatsalya-Maatri Amrit Kosh"
	AIIMS, New Delhi – "Payodhi" Human Milk Bank
Maharashtra	Sion Hospital, Mumbai (Lokmanya Tilak Municipal General Hospital)
	Deenanath Mangeshkar Hospital, Pune
	DY Patil Medical College, Pimpri, Pune
	Sassoon General Hospital, Pune
Gujarat	Surat (Medical College Hospital) – CLMC

	Vadodara – SSG Hospital
	Valsad – medical college hospital
	Gandhinagar – milk bank / CLMC
Kerala	Ernakulam General Hospital – "Nectar of Life" Human Milk Bank
	Jubilee Medical Mission Hospital, Thrissur
Telangana	Niloufer Hospital, Hyderabad – "Dhaatri Mother's Milk Bank"
	Fernandez Hospital, Hyderabad – Donor Milk Bank
Rajasthan	Mahatma Gandhi Medical College & Hospital, Jaipur – "Amrit Milk Bank"
	Various district hospitals under Rajasthan's "Anchal" scheme: Bharatpur, Alwar, Chittorgarh, Beawar, Banswara, Bhilwara, Bundi, Tonk, Baran, Churu
Assam	Satribari Christian Hospital, Guwahati – Breast Milk Bank

Collection of Breastmilk

After donor counselling, consent, health screening and laboratory tests, eligible mothers are sent to the designated milk collection area of the Human Milk Bank. Milk is collected by trained staff using hygienic precautions, and the donor may choose manual expression or breast pump expression. Home collection is generally avoided in India due to higher risk of contamination. Washing the breast with clean water is sufficient, and foremilk does not need to be discarded. Drip milk collected using milk shells is not suitable for banking because it has a lower fat content. Simultaneous expression is more efficient than sequential expression. Milk must be collected in a sterile, properly labelled container and transported to the milk bank under cold storage conditions.

Processing and Microbiological Screening

Collected raw milk is refrigerated until the donor's serology reports are confirmed negative. Fresh milk should not be mixed directly with frozen milk unless it is chilled first, to avoid thawing and nutrient breakdown. For preterm or sick babies, milk from each pumping session should be stored separately. Milk from multiple donors may be pooled before pasteurization for ease of processing. Holder pasteurization (62.5°C for 30 minutes) is the standard method used. Microbiological testing should ideally be done before and after pasteurization, although pre-pasteurization screening can lead to some milk wastage. A bacterial count of $\geq 10^5$ CFU/mL in raw milk indicates poor quality. Thresholds for Enterobacteriaceae and *S. aureus* are 10^4 CFU/mL. After pasteurization, no bacterial growth is acceptable, and any contaminated batch must be discarded.

Storage and Disbursal of Donor Milk

Pasteurized milk awaiting culture results is stored in a dedicated freezer and should not be distributed until the culture report is negative. Milk should remain in the same container used during pasteurization to avoid contamination. Culture-negative milk is stored at −20°C with proper labelling and can be preserved for 3–6 months. Disbursal of pasteurized donor human milk (PDHM) is done only with a physician's requisition and parental consent, preferably following a first-in-first-out policy. Transport must maintain cold conditions. For use, frozen milk should be thawed in warm water (not exceeding 37°C) without the container cap touching the water. Microwaving is not allowed as it reduces IgA and can cause burns. Thawed milk should not be refrozen and should be gently mixed and used within 3 hours to prevent contamination.

Need for human milk banks

- Human milk banks support mothers who cannot breastfeed, especially those with premature or sick babies.
- Many infants develop diarrhoea and infections when fed formula milk or cow's milk instead of breast milk.

- Breastfeeding within the first hour of birth provides essential nutrients and immunity to fight infections.
- Exclusive breastfeeding for six months greatly improves survival chances of premature and newborn babies.
- Cities across India, including Bengaluru, are setting up human milk banks to ensure infants get donor breast milk when needed.
- India has one of the highest under-five mortality rates, largely due to prematurity and low birth weight.
- WHO recommends donor human milk as the best alternative when a mother's own milk is unavailable.
- Human milk contains immune and non-immune factors that protect against infections and support gut development.
- Milk banks help reduce neonatal deaths, especially in hospitals with NICUs where demand is high.
- Donor milk is crucial for high-risk infants and babies whose mothers face lactation issues or whose bodies cannot tolerate formula milk.
- Many Indian cities are establishing milk banks, and the government is working toward a national milk bank network.
- Donors must undergo screening for infections like HIV, HTLV, syphilis, hepatitis B and C, and must disclose drug use or past transfusions.
- Donors who do not meet health criteria are not allowed to donate milk for safety reasons.
- Pasteurization and cold storage ensure donated milk is safe and can be stored for up to six months.
- Strict adherence to guidelines prevents contamination and unethical practices like adulteration.
- Awareness and encouragement of milk donation are essential to save infants who lack access to breast milk.
- More government and medical community initiatives are needed to promote breastfeeding and provide counselling services to mothers.

Conclusion

Human milk banks play a crucial role in protecting the health and survival of newborns, especially premature and low-birth-weight babies who depend on safe donor milk for proper growth and immunity. There is a strong need to expand human milk banks across the country so that every district has access to this lifesaving service. By increasing the number of milk banks, more infants can receive the nutrition they deserve when their mothers' milk is unavailable. At the same time, widespread awareness is essential. Families, communities, and healthcare workers must know the importance of breastfeeding and milk donation so that more mothers come forward to contribute. With proper implementation, government support, and community awareness, human milk banks can become a powerful tool to reduce infant mortality and ensure healthier futures for all children. There is a critical need to establish milk banks in all districts to ensure equitable availability of safe, pasteurized donor milk for vulnerable newborns. Increasing awareness among mothers, families, and healthcare providers about the importance of milk donation and the processes involved is equally necessary to maintain an adequate and reliable supply. Strengthening policies, promoting community participation, and integrating human milk banks into routine hospital care can significantly enhance neonatal survival rates. Overall, human milk banks represent a scientifically validated, ethically sound, and socially important intervention that must be expanded to support infant nutrition and care on a wider scale.

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