

Mapping the Landscape: Malaysian Muslim Women's Insights on Human Milk Banking Through the Islamic Lens

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ABSTRACT

INTRODUCTION: Donated human milk in human milk bank (HMB) is healthier for preterm babies compared to formula milk. In 2022, Halimatussaadiah milk bank was established in Pahang, Malaysia. The objective of this study was to determine the knowledge, attitudes, and behaviours of Malaysian Muslim mothers towards HMB and its Islamic perspectives. **MATERIALS AND METHODS:** From July 2021 to January 2023, a Pahang state multicentred cross-sectional study was carried out at Sultan Ahmad Shah Medical Centre, Hospital Tengku Ampuan Afzan, and Hospital Sultan Haji Ahmad Shah. 793 Muslim Malaysian women who had delivered and breastfed at least one child before, completed validated self-administered Google Form questionnaires, encompassing knowledge, attitude, and behaviour towards HMB. **RESULTS:** The participants, averaging 32.67 years old, were mostly well-educated with an average of 2 children and a monthly household income of approximately MYR 4,500.00. 62.3% recognized HMB as a crucial element for the wellbeing of premature infants. Strong support for Shariah-compliant HMB was evident, with 64.3% advocating for donor-recipient identity disclosure. 34.9% were open to their babies receiving milk from multiple donors, although opinions were divided on accepting milk from non-Muslim women in life-threatening situations, and their willingness to donate breastmilk, both to known and unknown babies. Out of 793 women, only 1.3% had donated their breast milk to HMB. Yet, 45.6% were willing to volunteer and give their milk to a Shariah compliant HMB. **CONCLUSION:** Generally, Malaysian Muslim women in Pahang showed a strong acceptance to the establishment of HMB provided that religious concerns were appropriately addressed.

Keywords

Human milk bank, Malaysia, Muslim, Knowledge, Attitude

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INTRODUCTION

The health benefits of breastfeeding and breastmilk are well-established, offering protection against infections, atopy, and cardiovascular diseases, as well as promoting positive neurodevelopmental outcomes and reducing the risk of various disorders.¹ Research has shown that breastfed newborns, especially preterm infants, experience lower incidences of necrotizing enterocolitis (NEC) and sepsis, along with improved neurodevelopment compared to those fed with formula milk.² Although formula milk attempts to replicate breastmilk, it lacks essential immune components and has been linked to higher risks of obesity, diabetes, and cardiovascular disease later in life. Consequently, donor breastmilk is generally preferred over

formula,³ bringing the practice of human milk donation to increased prominence.

In Muslim communities, the establishment of Shariah-compliant human milk bank (HMB) has gained attention, with studies from Turkey demonstrating strong support from both Muslim mothers and religious scholars.⁴⁻⁶ The concept of Shariah-compliant milk bank is particularly significant as it adheres to Islamic guidelines, which emphasize the importance of milk kinship and religious compliance in breastfeeding and milk donation practices. Despite the introduction of donor human milk for preterm infants in countries like Kuwait and Malaysia,^{7,8}

the attitudes of Malaysian Muslim mothers toward these banks, along with their religious concerns, remain largely unexplored.

In 2020, Sultan Ahmad Shah Medical Centre at the International Islamic University Malaysia (SASMEC@IIUM) established a Shariah compliant HMB, marking a significant step towards addressing the needs of preterm infants while adhering to Islamic principles. Shariah compliant HMB ensures that infants receive milk from the same donor to avoid the formation of unintended milk kinship. Additionally, they facilitate the introduction of the donor's family to the recipient's family, thereby aligning with Islamic teachings and minimizing religious controversies

However, there was a notable lack of research focused on promoting awareness of the benefits of such milk banks within the local community. A cross-sectional study in 2021 conducted in Malaysia, involving 269 Muslim and 91 non-Muslim mothers, revealed that 67.8% of respondents supported the establishment of human milk banks in the country.⁹ Yet, the specific views of Muslim Malaysian mothers regarding the importance, significance, and challenges of Shariah-compliant milk banks have not been adequately studied.

To our knowledge, this was the first large-scale study in Malaysia addressing the concept of Shariah-compliant milk banks among Malaysian Muslim mothers. The study aimed to determine the knowledge, attitudes, and behaviours of Malaysian Muslim mothers towards HMB and its Islamic perspectives.

MATERIALS AND METHODS

From July 2021 to January 2023, a Pahang state level multicentred cross-sectional study was carried out at the Sultan Ahmad Shah Medical Centre (SASMEC @ IIUM, Kuantan), Hospital Tengku Ampuan Afzan (HTAA, Kuantan), and Hospital Sultan Haji Ahmad Shah (HOSHAS, Temerloh). All Muslim Malaysian women over the age of 18 who provided consent and could communicate in Malay or English were recruited using simple random sampling from the outpatient clinic,

Department of Obstetrics and Gynaecology of the respective hospitals. One of the aims of including pregnant women in this research was to reduce the waiting time of breastmilk donors screening. Participants who were primigravid or nulliparous were excluded from the study, as this study was a part of a larger primary investigation assessing the knowledge, attitudes, and behaviours of Malaysian Muslim mothers regarding breastfeeding, wet-nursing, milk kinship and HMB in Pahang, Malaysia. Individuals without prior breastfeeding experience were not included in the sample.

A single proportion formula was employed to estimate the sample size.¹⁰ With a power of 80%, an expected proportion of 45% mothers with good acceptance of Shariah compliant HMB responding positively,¹¹ and a population size of 2400 in SASMEC@ IIUM, HTAA, and HOSHAS, the study sample size is 850 after accounting for a 20% attrition rate.

Sociodemographic data such as age, parity, education level, and total monthly household income were collected. Parity was defined as the number of pregnancies that reached 20+0 weeks of gestation or beyond, independent of the number of foetuses or outcomes (ACOG, 2014). Education was divided into primary, secondary, and higher levels (ISCED, 2011). Shariah compliant HMB was the milk bank which operated in accordance with Shariah rulings.

Study instrument

A self-administered questionnaire was used to measure knowledge, attitudes, and behaviours of participants towards human milk bank (HMB) and the Islamic perspective. The self-administered closed-ended questionnaire was developed by “adapt-and-adopt” method from literature review through the studies conducted in Turkey and Malaysia to assess knowledge, attitudes, and behaviours of Muslim women and religious scholars on human milk banking.^{4-6,11} Generally, the questionnaire comprised three domains: i) knowledge, ii) attitudes, and iii) behaviours towards human milk banking.

There were 10 items in knowledge, and attitudes domains respectively, and 6 items in behaviours domain. The items in knowledge domain consisted of closed ended multiple choice questions including correct answers, distractors or incorrect answers and the option “I do not know” to reduce the chances of guessing. The items in attitude contained five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree). The content was validated by obstetrician, neonatologist, family medicine specialist, specialist nurse, and nutritionist. Face validity was conducted by pre-testing in a similar study population demographic in SASMEC@IIUM. Cronbach’s Alpha of 0.823 was obtained, indicating good internal consistency and reliability for the questionnaire

Data analysis

Statistical analysis was performed using IBM SPSS version 21. Descriptive statistics of frequency (%) and mean (standard deviation) were used to describe sociodemographic factors and variables related to knowledge, attitude, and behaviours.

RESULTS

A total of 850 participants responded to a web-based self-administered questionnaires. However, 793 responses were included in data analysis after excluding missing data, which corresponded to 93% completion rate of the questionnaires. Table 1 provides the summary of the sociodemographic characteristics of the participants.

Table 1 Sociodemographic characteristics of study participants

Sociodemographic characteristics	Mean ± SD
Age (Year)	32.67 ± 4.67
Number of children	2.15 ± 1.21
Income (Ringgit)	4548.25 ± 5877.56
Education	
Primary	14 (1.8)*
Secondary	276 (34.8)*
Higher	503 (63.4)*

*Frequency N (%)

Table 2 illustrates the knowledge of Malaysian Muslim mothers in HMB, where 62.3% of participants understood the primary purpose of HMB is to provide safe breast milk to premature infants. Support for Shariah compliant HMB was high, with 64.3% agreeing that donors and recipients should know each other’s identities to avoid unintended

milk kinship. About 69.1% believed HMB were established to preserve life, while 48.4% were aware of disease transmission risks. Social media played a significant role in informing 50.2% of participants. Most (50.7%) favoured dual oversight by religious and medical authorities, showing positive perceptions of Shariah compliant HMB.

Table 2 Knowledge of Malaysian Muslim mothers in human milk bank

	Frequency (n)	Percentage
1. Human milk bank is primarily needed to		
A. provide safe breastmilk to the ill premature babies	494	62.3
B. feed the healthy babies of healthy mothers	115	14.5
C. earn extra money by milk donation	10	1.3
D. I don’t know	174	21.9
2. The milk in human milk bank is pasteurised.		
A. Yes	417	52.6
B. No	80	10.1
C. I don’t know	256	37.3
3. In Shariah compliant milk bank, a single recipient (baby) is fed by milk collected		
A. Yes	357	45.0
B. No	92	11.6
C. I don’t know	344	43.4
4. In Shariah compliant milk bank, the institution has the responsibility of informing both donors and recipients of each other’s identities to prevent marriage of milk		
A. Yes	510	64.3
B. No	39	4.9
C. I don’t know	244	30.8
5. Shariah compliant human milk bank is established to preserve life.		
A. Yes	548	69.1
B. No	25	3.2
C. I don’t know	220	27.7
6. If you have ever heard about milk bank, from where did you hear about it?		
A. Friends	64	11.8
B. Social media	273	50.2
C. Other sources	207	38
7. Infectious diseases can be transmitted from donors to recipient.		
A. Yes	384	48.4
B. No	130	16.4
C. I don’t know	279	35.2
8. Standard operating procedures of Shariah compliant human milk banks aim for protecting lineage.		
A. Yes	488	61.5
B. No	37	4.7
C. I don’t know	268	33.8
9. Who should monitor the Shariah compliant milk bank?		
A. Religious authorities	60	7.6
B. Hospital administrators	103	13.0
C. Both	402	50.7
D. I don’t know	228	28.8
10. Milk bank in Islam is allowed for		
A. <i>Darurijab</i> (necessity)	390	49.2
B. <i>Hajrijab</i> (complement)	56	7.1
C. <i>Taksinjyab</i> (refinement)	53	6.7
D. I don’t know	294	37.1

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C. earn extra money by milk donation	10	1.3
D. I don't know	174	21.9
2. The milk in human milk bank is pasteurised.		
A. Yes	417	52.6
B. No	80	10.1
C. I don't know	256	37.3
3. In Shariah compliant milk bank, a single recipient (baby) is fed by milk collected from a woman only.		
A. Yes	357	45.0
B. No	92	11.6
C. I don't know	344	43.4
4. In Shariah compliant milk bank, the institution has the responsibility of informing both donors and recipients of each other's identities to prevent marriage of milk brothers and sisters.		
A. Yes	510	64.3
B. No	39	4.9
C. I don't know	244	30.8
5. Shariah compliant human milk bank is established to preserve life.		
A. Yes	548	69.1
B. No	25	3.2
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6. If you have ever heard about milk bank, from where did you hear about it?		
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A. <i>Daruriyyah</i> (necessity)	390	49.2
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D. I don't know	294	37.1

In Table 3 which illustrates the attitude of Malaysian Muslim mothers towards HMB, 34.9% expressed their approval for their babies to receive milk from various donors, indicating an openness to utilizing multiple sources of breastmilk if necessary. Opinions among participants varied on the acceptability of using milk from non-Muslim women in life-saving situations, with 27.6% in agreement and 42.6% in disagreement or strong disagreement. A considerable number of mothers expressed their willingness to donate breastmilk, both to babies they know personally (57%) and to babies they do

not know (31.4%). The majority (73.6%) held the view that pasteurization in HMB would not diminish the quality of breastmilk, reflecting confidence in the safety measures employed during milk processing. There was a consensus (40.9%) that all nursing mothers should be informed about, and encouraged to contribute to the milk bank, indicating a positive attitude toward promoting milk donation. 86.9% respondents believed that donors and recipients should be acquainted to prevent the marriage of milk siblings, highlighting a preference for transparency and potential social connections in the donation process.

Table 3 Attitude of Malaysian Muslim mothers towards human milk bank

	Frequency (n)	Percentage (%)
1. If my baby is premature and my milk is insufficient for my baby, I am willing to feed my baby with milk donated by women whom I know personally.		
A. Strongly agree	96	12.1
B. Agree	342	43.1
C. Neutral	162	20.4
D. Disagree	173	21.8
E. Strongly disagree	20	2.5
2. If my baby is premature and my milk is insufficient for my baby, I am willing to feed my baby with milk donated by women whom I do not know personally.		
A. Strongly agree	24	3.0
B. Agree	152	19.2
C. Neutral	198	25.0
D. Disagree	328	41.4
E. Strongly disagree	91	11.5
3. I think all donor mothers should have infection screening before donation process.		
A. Strongly agree	386	48.7
B. Agree	335	42.2
C. Neutral	44	5.5
D. Disagree	19	2.4
E. Strongly disagree	9	1.1
4. I will consent for my baby to receive donated milk from different donors.		
A. Strongly agree	33	4.2
B. Agree	85	10.7
C. Neutral	194	24.5
D. Disagree	358	45.1
E. Strongly disagree	123	15.5
5. I think it is acceptable to feed the baby by the milk of non-Muslim women in lifesaving circumstances.		
A. Strongly agree	33	4.2
B. Agree	189	23.8
C. Neutral	233	29.4
D. Disagree	260	32.8
E. Strongly disagree	78	9.8
6. If my breastmilk is in excess, I would like to give my breastmilk to other babies whom I know.		
A. Strongly agree	88	11.1
B. Agree	364	45.9
C. Neutral	207	26.1
D. Disagree	117	14.8
E. Strongly disagree	17	2.1
7. If my breastmilk is in excess, I would like to give my breastmilk to other babies whom I do not know.		
A. Strongly agree	50	6.3
B. Agree	199	25.1
C. Neutral	248	31.3
D. Disagree	243	30.6
E. Strongly disagree	53	6.7

In Table 4 which illustrates the behaviours of Malaysian Muslim mothers towards HMB, out of 793 women, only 1.3% had donated their breast milk to HMB. Yet, 45.6% are willing to volunteer and give their milk to a Shariah-compliant milk bank, indicating they have a positive attitude toward contributing to places that follow specific religious principles. 98.6% of respondents were not interested in getting money for giving their milk to HMB. This showed their enthusiasm to help without expecting payment. Many participants (35.2%) were ready to collect and send their breast milk to HMB by themselves, which shows they were dedicated and wanted to be personally involved. Nevertheless, some participants (30.4%) wanted help sending their breast milk to HMB, suggesting that it might be difficult for them to contribute without assistance. Most respondents (70.7%) thought deciding to donate breast milk should be a joint decision with their spouse, while 22.7% believed it should be their decision alone.

Table 4 Behaviours of Malaysian Muslim mothers towards human milk bank

	Frequency (n)	Percentage (%)
1. Have you ever donated your breastmilk to milk bank to feed those babies who need human milk for nutrition?		
A. Yes	10	1.3
B. No	783	98.7
2. Do you wish to get payment if you donate your milk to the milk bank?		
A. Yes	11	1.4
B. No	782	98.6
3. Are you willing to collect your breastmilk and send yourself to the milk bank?		
A. Yes	279	35.2
B. No	514	64.8
4. Do you need someone to send your expressed breastmilk to the milk bank?		
A. Yes	241	30.4
B. No	552	69.6
5. Who should decide to donate your breastmilk?		
A. Myself	180	22.7
B. Husband	52	6.6
C. Both	561	70.7
6. Would you like to volunteer to donate milk to Shariah compliant milk bank?		
A. Yes	362	45.6
B. No	431	54.4

DISCUSSION

The dynamic nature of human milk and its health benefits

Human milk, the biological norm for infant nutrition, contains diverse bioactive compounds that promotes numerous health benefits. From colostrum to late lactation, its composition varies, offering protection against infection and inflammation, while its dynamic nature supports infant development.¹² Additionally, the study involving 207 premature infants demonstrated that

an exclusively human milk diet led to significantly lower rates of necrotizing enterocolitis (NEC) and reduced need for surgical intervention compared to a bovine milk-based fortifier.¹⁰ As the practice of feeding infants with expressed human milk grows, it provides a potential fail-safe for mothers to share their unique bacterial imprint with their infants, regardless of the delivery method or timing.¹³

Motivations for milk donation in non-Muslim communities

In the context of milk donation in non-Muslim communities, a French study of 214 mothers found that 75% were motivated to donate milk to help others, 25% to support premature neonatal care, and 30% due to ample supply.¹⁴ Similarly, a 2018 survey of 489 Chinese nursing women showed 76.7% were willing to donate despite limited understanding.¹⁵ Another cross-sectional study in 2019 with 1078 mothers in Wuhan, China, found 75.3% supporting HMB establishment, 81.3% favouring donating breast milk, and 38.3% supporting accepting donor milk.¹⁶ Meanwhile, a KwaZulu-Natal study reported that 52.7% of 148 participants were likely to donate breast milk, influenced by well-informed staff, sufficient milk production, and support from family, friends, or partners.¹⁷

Challenges and reservations regarding milk donation

Nonetheless, perception of milk donation is not without challenges. In a study involving 100 postnatal mothers in an Indian tertiary care centre, positive perceptions of HMB were evident, with 89% recognizing the life-saving potential of human milk donation and 95% acknowledging its nutritional completeness for infant development.¹⁸ However, reservations were present, as 19 participants preferred donating milk only to family and friends, contrary to the disagreement of 81% of respondents. Additionally, 28 women expressed concerns about the adequacy of their milk for their own infants if donated to others, indicating apprehensions regarding resource allocation. In a study in Punjab, India, with 200 parous women, 66.5% had a neutral attitude towards HMB, with an overall mean attitude score of 28.8 ± 5.87 , suggesting a largely neutral view due to the newness of the

concept.¹⁹ A study in Michigan, United States, involving 73 mothers found that the majority (89%, n=59) preferred formula to donor human milk (11%, n=7) for their infants.²⁰ In cases where donor human milk was the sole option, participants preferred acquiring it from a relative or friend (60%, n=40) over a milk bank (40%, n=26).²⁰

Cultural and religious concerns about anonymous milk donation in Muslim communities

The Western-style milk bank model, which utilizes pooled donor milk while keeping the identities of donors and recipients anonymous, raises concerns within Muslim communities. In Islamic law, marriage between individuals who share a milk relationship—either with a milk mother or milk siblings—is prohibited, creating religious and cultural objections to anonymous milk donation. Consequently, such milk banks have faced resistance in these communities.

Diverse attitudes toward HMB in Muslim countries

There is a mixed reaction towards the establishment of HMB in Muslim countries. In a survey of 401 religious officers from Turkey,⁵ 63.3% supported the use of donor human milk when the mother's milk was unavailable. Regarding religious sensitivity, 71.3% preferred a restricted arrangement limiting recipients from pooled donations. Only 1.7% supported Western-style milk banks in Turkey. This reflects the majority's preference for restricted pooling due to cultural and religious concerns. Over the years, there has been a notable shift in the perception of Turkish women regarding human milk banks and milk donation. In 2009, a study with 350 married women showed that 64.0% were willing to donate their milk, while 36.3% considered it a religious issue.⁴ However, in 2014, a study involving 240 Turkish women indicated a change in perspective. Only 22.9% supported the establishment of milk banks, and among them, 19.1% expressed a willingness to donate. The primary concern for 76.8% was potential marriages between milk siblings.⁶ In a more recent survey in 2022 with 271 Turkish women, the willingness to donate breast milk increased to 57.9%. However, the readiness to use donor milk for their newborns was lower at 27.7%, with concerns including religious issues, fear of infectious disease transmission,

and distrust of strangers. Positive attitudes were associated with the perceived importance of breastfeeding and religious beliefs.²¹ In a 2021 survey at North Syrian hospitals with 536 participants, 47.2% favoured establishing a milk bank, with 81.3% willing to use it if they were unable to breastfeed. Religious reasons were cited by 49.4% opposing milk banks.²² Meanwhile, a Bangladesh study found 108 of 121 mothers willing to donate to a HMB, with 71.9% open to obtaining milk from an HMB if needed. Yet, 28% would not accept milk from an HMB, and 8.3% found HMBs incompatible with Islamic beliefs. Most (99.2%) lacked awareness of HMB practices in Bangladesh.²³ Both studies highlighted diverse attitudes and factors influencing perceptions of milk banks in different cultural contexts.^{22,23}

The rise of Shariah compliant HMB in Malaysia

To address these concerns while preserving the health benefits of human milk, countries like Kuwait and Malaysia^{7,8} had introduced the ideology of Shariah compliant milk banks. A case series in Kuwait highlighted the benefits of donated human milk for six premature infants born at 26-28 weeks, weighing 705-1000 grams.⁷ Initial total parenteral nutrition provided essential nutrients for 11-21 days, and subsequent breastfeeding supplemented with donated milk between 19-41 days. The infants were discharged with weights between 1810-1940 grams, indicating positive growth. Following that, a human milk donation initiative has been launched at the Duchess of Kent Hospital in Sandakan, Sabah, Malaysia, as an Islamic-based alternative to traditional human milk banks. The trial, which ran from January 2009- December 2010, included 48 infants who received donor breast milk. Of these, 42 were in the special care nursery and six were on the paediatric ward. Majority of donors (88%) and recipients (77%) identified as Muslim. Furthermore, 60% of the newborns who received donated human milk were preterm. Tragically, two newborns died as a result of prematurity complications.⁸ The Shariah compliant HMB in Malaysia was established at Sultan Ahmad Shah Medical Centre (SASMEC@IIUM), Kuantan in 2022, named Halimatussaadia Mother's Milk Centre (HMMC). Its development began in 2019, receiving approval in 2020, with its first donor in 2021. It was Malaysia's first

Shariah compliant HMB, created to meet Islamic guidelines regarding milk kinship.

Support for Shariah compliant HMB among Malaysian Muslim women

In our study, Malaysian Muslim women strongly supported Shariah-compliant HMB, with 64.3% favouring identity disclosure to prevent unintended familial relationships. Additionally, 48.4% acknowledged the potential for infectious disease transmission from donors. Participants advocated dual oversight, with 50.7% supporting monitoring by religious authorities and hospital administrators. Regarding permissibility in Islam, 49.2% considered it allowed for necessity (*Daruriyyah*). Among Muslim Malaysian women in Pahang state of Malaysia, a notable portion expressed willingness to donate breast milk to known (57%) and unknown (31.4%) babies. A consensus (40.9%) favoured informing and encouraging all nursing mothers to contribute to the milk bank, reflecting a positive attitude toward milk donation. While only 1.3% had donated milk to HMB, 45.6% were willing to volunteer at a Shariah-compliant milk bank without expecting payment (98.6%).

Awareness and perceptions of pasteurization in HMB

Pasteurized donor milk is now routinely administered to high-risk infants, and most mothers in the United States extract and freeze their milk at some time during lactation for future infant feedings. However, heat treatment degrades many milk proteins, and freeze-thaw cycles may result in reduced bioactivity.¹² While pasteurization alters various components in donor milk, clinical studies showed that many beneficial characteristics remain following this treatment, making pasteurized donor milk a viable option when a mother's own milk is unavailable.²⁴ In our study, over half (52.6%) were aware of milk pasteurization in HMB, indicating understanding of safety measures in processing. The majority (73.6%) believed pasteurization would not diminish milk quality.

Decision-making and perspectives on milk donation in Malaysia

In our research, a significant number (35.2%) were ready to collect and send milk independently, while 30.4%

preferred assistance from HMB. Regarding decision-making, 70.7% believed donating should be a joint decision with their spouse, and 22.7% felt it should be an individual decision. Opinions on accepting milk from non-Muslim women varied, with 27.6% in agreement and 42.6% in disagreement.

Strength and limitation of the study

The study strength lies in its use of a validated questionnaire to assess breastfeeding knowledge, attitudes, and behaviours among pregnant Muslim women. Random selection and a larger study population enhanced generalizability and statistical robustness. It uniquely explored Malaysian Muslim mothers' views on HMB, highlighting religious and personal concerns. However, limitations included the absence of construct validation and failure to assess willingness to establish milk kinship through donation. Despite those, the study made a significant contribution, encouraging further research into HMB in Malaysia.

CONCLUSION

The study emphasized the robust approval of Malaysian Muslim mothers for the creation of a Shariah-compliant HMB to safeguard the lives of premature infants. Nonetheless, there was a strong sentiment among women that the matter of milk kinship needs proper attention and promotion of HMB by Muslim religious scholars and healthcare professionals.

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CONFLICT OF INTEREST

None declared.

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