

Implementing Kangaroo Mother Care in Southeast Asia: Barriers and facilitators identified from a mixed-methods systematic review

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PCMW and MLH conceptualised the project, MLH and JS derived the search strategy, JS conducted the search, JS and MLH completed the PROSPERO registration and devised the analysis plan, JS and MLH completed title and abstract screening, JS completed full text screening, JS completed data extraction and data quality appraisal with conflicts and clarifications overseen by all, PCMW and MLH provided supervision for extraction, analysis and interpretation, JS drafted the first draft of the Manuscript. All authors reviewed and edited the Manuscript.

AI statement:

During the preparation of this manuscript, the authors used Claude (Anthropic) to assist with development of the search strategy, data extraction templates, language editing and manuscript organisation. The authors critically reviewed, revised and validated all content generated using the tool and accept full responsibility for the final manuscript.

Evidence before this study

Kangaroo mother care (KMC) is a WHO-recommended intervention for preterm and low birthweight infants and is associated with substantial reductions in neonatal mortality, sepsis, and other adverse outcomes. Previous reviews have identified barriers to KMC implementation globally and in sub-Saharan Africa, including health system limitations, inadequate healthcare worker training, parental concerns, and infrastructure constraints. However, despite Southeast Asia's large neonatal population, diverse health systems, and substantial burden of neonatal morbidity and mortality, no systematic review has specifically synthesised the factors influencing KMC implementation across the region.

Added value of this study

To our knowledge, this is the first mixed-methods systematic review to synthesise evidence on barriers and facilitators to KMC implementation across Southeast Asia. Drawing on 27 studies from five countries, we identified six interconnected themes influencing implementation: structural and institutional barriers, inadequate physical infrastructure, healthcare worker knowledge-attitude-practice gaps, perceptions of KMC as inferior to biomedical technology, parental fear and uncertainty, and culturally specific implementation challenges. Our findings demonstrate that the principal challenge is not acceptance of KMC itself, but its integration into routine health-system practice.

Implications of all the available evidence

The available evidence suggests that successful KMC scale-up requires more than clinical endorsement alone. Implementation can be strengthened through national policy commitment, facility-level standard operating procedures and monitoring systems, investment in healthcare worker training, family-centred care models, and culturally tailored implementation strategies. Addressing these predominantly modifiable barriers may improve uptake, sustainability, and equity of KMC delivery, supporting efforts to reduce neonatal mortality and infection-related morbidity across Southeast Asia and other diverse healthcare settings.

Abstract (249 words)

Background: Kangaroo mother care (KMC) is an evidence-based intervention to reduce morbidity and mortality in premature and low birthweight infants. Despite its promotion in global guidelines and scale-up commitments, implementation remains inconsistent and inequitable. Understanding the barriers and facilitators to KMC implementation in the populous Southeast Asia region is essential to inform targeted and culturally-responsive strategies to improve its implementation.

Methods: We conducted a mixed-methods systematic review using a convergent segregated design. Five databases and grey literature sources were searched for studies published from January 2016 to March 2026. Eligible studies examined barriers or facilitators to KMC implementation in Southeast Asia. Quality appraisal was conducted using the Mixed Methods Appraisal Tool (MMAT). Quantitative findings were synthesised descriptively, and qualitative findings were analysed using thematic synthesis, with overall findings integrated through a joint display matrix.

Results: Twenty-seven studies from five Southeast Asian countries were included. Six themes influenced implementation: (i) structural and institutional barriers; (ii) inadequate physical

infrastructure; (iii) knowledge-attitude-practice gaps among healthcare workers; (iv) perception of KMC as inferior to biomedical technology; (v) parental anxiety; and (vi) sociocultural factors influencing family participation. Implementation was higher in tertiary urban hospitals than district-level hospitals. Structural barriers – including restricted policy and monitoring systems alongside workforce capacity – were the most frequently reported constraints. Positive healthcare worker attitudes, dedicated KMC spaces, and family-centred approaches facilitated KMC implementation.

Conclusion: KMC implementation in Southeast Asia is constrained by predominantly modifiable structural, health-system, and sociocultural factors. Strengthening national policy commitment, facility-level institutionalisation and culturally tailored integration can improve KMC uptake and sustainability.

Introduction

Neonatal mortality remains a major global health challenge, accounting for 2.3 million deaths each year.¹ Preterm and low-birthweight (LBW) neonates bear a disproportionate burden of mortality and morbidity, particularly due to infections, responsible for 1.3m cases each year.^{2,3} Rising antimicrobial resistance (AMR), alongside increasing hospital births in crowded, under-resourced facilities, compounds this challenge. With multidrug-resistant (MDR) neonatal infections increasing and few new antibiotics licensed to treat neonatal infections, identifying strategies that prevent infection and interrupt MDR pathogen transmission is an urgent global priority.^{4,5}

Kangaroo Mother Care (KMC) is one such strategy, minimising neonatal exposure to crowded ward environments by promoting continuous skin-to-skin contact between a caregiver and a newborn.^{6,7} As a result of the strong evidence for reducing neonatal sepsis and mortality, the World Health Organization (WHO) published guidelines in 2022 recommending immediate initiation of KMC (iKMC) for all preterm neonates, regardless of birthweight, gestational age or clinical stability.⁸

Despite the strong evidence base and regional promotion through WHO's Early Essential Newborn Care Framework (EENC),⁹ implementation across the populous Southeast Asia region, where MDR neonatal infections cause a significant burden of disease,¹⁰ remains inconsistent. The region encompasses diverse health systems, cultures and socioeconomic development levels, alongside a rising burden of neonatal mortality due to infections.¹¹ Identifying and evaluating the barriers and facilitators to KMC implementation across the region is essential for enabling effective KMC scale-up strategies and improving neonatal outcomes.

Methods

We conducted a mixed-methods systematic review using a convergent segregated design, whereby quantitative and qualitative evidence were synthesised and integrated.^{12,13} This approach enabled analysis of both implementation patterns and stakeholder experiences and perceptions relevant to KMC implementation. The protocol was registered on PROSPERO (CRD420261348042) and reported in accordance with the PRISMA guidelines.¹⁴

Scopus, Global Health (CABI via Ovid), Embase, MEDLINE (Ovid) and CINAHL databases were searched for papers published from January 2016 to March 2026. Grey literature was identified via Google Scholar and reference lists of included studies. The search strategy was structured using a Population-Concept-Context framework¹⁵ (Supplementary Table 1a).

We included quantitative, qualitative, and mixed-methods studies examining barriers or facilitators to KMC implementation in countries in Southeast Asia (defined by the Association of Southeast Asian Nations classification: Indonesia, Vietnam, the Philippines, Thailand, Myanmar, Cambodia, Lao PDR, Malaysia, Singapore, Brunei and Timor-Leste).¹⁶ Studies involving newborns, caregivers or HCPs were eligible. We excluded review articles and case series or studies involving <10 participants. Detailed inclusion and exclusion criteria are provided in Supplementary Table 2.

Records were exported to EndNote¹⁷ for deduplication before screening in Rayyan (by MH and JS).¹⁸ Disagreements were resolved by discussion and consensus. Reasons for exclusion are reported in the PRISMA¹⁴ flow diagram (Figure 1). Data were extracted using a standardised extraction tool in Excel (Supplementary Table 3).

Study quality was assessed using the Mixed Methods Appraisal Tool (MMAT, v2018),^{13,19} with quality appraisal conducted by the lead reviewer. Consistent with mixed-methods review guidance, studies were not excluded based on quality assessment alone.²⁰ Qualitative and quantitative evidence were synthesised separately before integration, with descriptive statistics and synthesis using Thomas and Harden methodology.¹⁹

Integration used a convergent approach, with quantitative and qualitative results compared across areas of convergence, expansion, and discordance. Integrated findings were subsequently interpreted to address the review objective.

Results

We identified 502 studies, of which 27 met the inclusion criteria following screening (Figure 1, Table 1). There were 14 quantitative,²¹⁻³⁴ eight qualitative,³⁵⁻⁴² and five were mixed-methods studies.⁴³⁻⁴⁷ Eleven studies were rated as high quality,^{24,25,30-33,37,38,41,42,45} while the remaining 16 were rated moderate.^{21-23,26-29,34-36,39,40,43,44,46,47} Studies were conducted across five countries, with the majority conducted in Indonesia (n=15), with smaller numbers from Vietnam, Malaysia, Thailand and the Philippines. KMC implementation varied across countries and facility levels, as summarised in Supplementary Table 5.

The results of the quantitative analysis are summarised in Table 1 and 2. Table 3 presents a joint display matrix identifying the convergence of qualitative themes and quantitative frequencies. Qualitative analysis revealed six themes: (i) structural and institutional barriers; (ii) inadequate physical infrastructure; (iii) a knowledge-attitude-practice gap among HCPs; (iv) the perception of KMC as inferior to biomedical technology; (v) parental fear and uncertainty; and (vi) culturally distinct implementation challenges.

1. Structural and institutional barriers

Structural and institutional barriers at multiple levels (national, facility and clinical workforce) were the most consistently reported constraints to KMC Implementation, evident across all countries.^{21,25,26,28-30,34,36-38,42-47} National policy endorsement alone was insufficient to enable KMC implementation in the absence of standard operating procedures (SOPs), operational guidance and monitoring at the facility level, and lack of integration of KMC into routine service delivery.^{24-26,29,34,37,38,41-44,46,47} Without managerial visibility or performance frameworks, healthcare workers (HCWs) perceived KMC as neither essential nor a priority.⁴²

In Indonesia, less than one percent (21/2083) of hospitals reported KMC implementation,³⁰ while in Vietnam KMC implementation rates varied markedly across facility levels - with central hospitals achieving 83%, compared to 35% at district hospitals.²⁴ A national programme in the Philippines saw KMC implementation increase by 40% (from 3-43%) between 2013 and 2019.⁴⁴

The absence of SOPs, performance indicators and monitoring of KMC limited HCW's willingness to practice it. One nurse confirmed the absence of formal guidance, stating "*I'm not sure if there's a guideline or a written policy for this... Is there an SOP for it?*"^{42(pp6,8)} In a tertiary Indonesian hospital, all nursing staff held positive attitudes toward KMC, yet 74% had never received training to support its implementation.²⁵

Facility-level hierarchies further constrained KMC uptake, with doctors holding primary responsibility for initiation across Vietnamese and Malaysian settings, leaving nurses unable to act independently and junior doctors hesitant to proceed without senior direction.^{24,48} Inadequate human resources and understaffing were also reported as barriers to educating mothers, in almost half of the studies (12/27).^{26,28,30,31,34,36,37,40,42-45} One junior doctor stated that *“when KMC is ordered, we look up the necessary information given by our seniors and provide a short explanation to the parents. We don't see it as our responsibility to go into much detail – we're just following the order, so we'll inform the mothers and move on, because we have lots of other work to do.”*^{48(p5)} However, even where staffing was adequate, inadequate training remained a further barrier to effective KMC implementation.^{36,48}

2. Inadequate physical infrastructure

Infrastructure-related barriers (absence of dedicated KMC spaces, limited privacy, accommodation difficulties for carers, restrictions on visiting hours and separation of postnatal care areas) reported in over half of the studies (14/27),^{24-26,29,31,33,36,37,40-44,46} whilst almost one quarter (6/27) identified a dedicated KMC space as a facilitator to effective KMC.

In Vietnam, fewer than half (45%) of the included hospitals had a dedicated KMC room or written KMC protocol,²⁴ while in Indonesia, dedicated KMC facilities were absent from study hospitals, despite universally positive attitudes towards implementation.²⁵ Across four Indonesian hospitals, 71% of parents identified the absence of a curtain or privacy screen as a barrier to KMC practice;^{23-25,29,33,36,41-43,46} however, a privacy screen or curtain did not satisfy mothers as an adequate alternative to a dedicated room, with the fear of being interrupted persisting.^{41,46} One mother's privacy concerns are articulated in the quote, *“The place is so open. Men could just be behind the screen. Sometimes when the ward is crowded, the screens can accidentally be pushed, opening up a gap for everyone to see me doing KMC.”*^{41(p6)}

One-third of the included studies (9/27^{23,26,28,29,33,34,38,40,43}) reported distance, visiting hours, or accommodation as a barrier to KMC implementation. However, in Malaysia the presence of a KMC room adjacent to the NICU and accommodation facilities for mothers was identified as a facilitator for continuous KMC.^{23,30,41}

3. Gap between knowledge, attitude and practice

Whilst positive attitudes to KMC were reported more frequently than negative attitudes, formal training varied substantially between settings, resulting in knowledge gaps and misconceptions among HCWs, which were reported as a barrier in 15 of the 27 studies (56%), across all five countries.^{21,25,26,28-31,33,34,37,38,41-43,45}

At one Indonesian tertiary hospital, all nursing staff reported a positive attitude towards KMC, yet only one-quarter had received KMC training.²⁵ Similar findings were observed in the Philippines, with less than half (41%) of nurses having received formal training.²⁶ However, KMC implementation rose from 40% to 94% in facilities included in a study in the Philippines after a training program was implemented over three months.³⁴

Qualitative studies indicated that a lack of training influenced HCW's confidence in its implementation, with concerns cited for infant safety and a lack of confidence handling LBW infants.³⁷ Frustration due to inadequate support for KMC implementation undermined their motivation to support KMC.^{48(p9)}

Positive HCW attitudes and witnessing KMC outcomes were identified as facilitators, with one nurse noting KMC *“relieves the work, reduces the burden,”* enabling mothers to be an additional pair of eyes,^{37(p435)} while others cited earlier discharge as a motivating outcome.⁴⁸ A “reinforcement loop” was evident, in which visible improvements in maternal and infant health strengthened HCW’s commitment to the practice.^{44(p6)}

4. KMC competes with biomedical technology

Incubator dependency and the perception of KMC as an inferior technology were reported in more than half of the included studies (15/27), across all five countries.^{23,25,26,28-30,32,33,36,37,40-42,44,46} Convergence of qualitative and quantitative evidence highlights the importance of this barrier.

Quantitative evidence from an Indonesian hospital-based study revealed that only one-quarter of parents knew KMC would not cause hypothermia, and only 10% knew KMC was appropriate for a medically stable neonate.³³ In another study, 40% of labour ward nurses did not support KMC for neonates <1800g.²⁵

Qualitative findings contextualised these data, revealing strongly held beliefs that biotechnological intervention (such as the use of incubators) is the gold standard for neonatal care, and KMC is only appropriate when technology is unavailable.^{30,37,40,41,44,48} This pattern held across both HCWs and parents/carers.^{25,33,34,36,37,40-43,46,47} HCWs across Indonesia, Malaysia and the Philippines described incubator care as the default, with KMC only safe once an infant was *‘well’*^{25,30,37,40,42} – and these beliefs were ingrained to such a degree that clinical evidence supporting KMC as conventional care did not influence implementation.^{30,37,42} Paediatricians stated infants *“in incubators could not be treated with KMC”* until certain clinical thresholds were met,^{37(p436)} and they *“only think of KMC when the neonate is more stable.”*^{48(p6)}

This theme was further observed in the managerial and policy context, with qualitative findings demonstrating that policymakers viewed KMC as a practice to be used in low-income countries only, as a next-best alternative to incubator care.⁴⁴

5. Parental fear and lack of preparation

Parental fear and anxiety around infant safety were reported in 14 of 27 included studies (52%),^{26,28-33,35,38,39,41,43,44,46} with neonatal fragility, the need for medical equipment, and uncertainty regarding KMC procedures alongside the fear of causing harm frequently identified barriers. Peer support, structured education and antenatal preparation were found to be meaningful interventions supporting KMC uptake.

Up to 88% of parents in an Indonesian hospital reported discomfort providing KMC when their infant was undergoing phototherapy, receiving oxygen, or had an intravenous (IV) cannula *in situ*, and only 62% felt comfortable to do KMC in the first week after delivery.³³ This was echoed in Malaysia, where one-third of mothers lacked the confidence to perform KMC consistently,²⁹ yet with structured education, stress scores around the intervention reduced significantly (mean 3.74 vs. 2.96, $p < 0.001$) and perceived barriers decreased.²⁹

Qualitative studies found a lack of antenatal education and KMC preparation precipitated fear and uncertainty around the practice.^{26,28-33,35,38,39,41,43,44,46} Parents across Malaysia and Thailand described being asked to perform KMC without knowing what to wear, what to do or what to expect.^{38,41} One

mother noted that she *“felt so stressed about it that [she] went home straight away and did not come back for three days.”*^{41(p4)} A missed opportunity identified across the included literature was the absence of antenatal preparation.^{33,41} One mother reflected, *“what a pity, I should have been told about this before coming to this ward.”*^{41(p5)}

However, fear transformed into confidence, warmth and a sense of maternal agency when KMC is adequately supported.^{38,41,46} One mother stated KMC enabled her to *“finally [feel] like a mother,”* while another described how *“our hearts beat in synchrony”* during KMC.^{41(pp5-6)} Peer support was more effective than nurse-delivered education for promoting maternal confidence and increasing KMC frequency and duration,²⁸ while structured maternal education programmes significantly reduced perceived barriers and stress at three months compared with controls.²⁹

6. Cultural factors shaping KMC uptake

Cultural influences on KMC implementation (including confinement traditions, modesty and exposure concerns) were reported across all five countries.^{27,29,30,32,33,36,39-42} Gender expectations limiting parental care were evident in a further subset of studies.^{32,33,39-42}

Qualitative evidence^{33,38,39,41,42} highlighted dimensions of cultural factors that were underexplored in quantitative studies. KMC practice requires mothers to expose their chest for skin-to-skin contact, and this is a direct conflict to Islamic norms around modesty and coverage in public or semi-public places,⁴⁹ posing a significant barrier among Muslim mothers.^{29,41} One HWC noted, *“the most predominant obstacle...in terms of maternal factors is the reluctance and discomfort of the mother in exposing her breasts.”*^{29(p355)} Temporary screens were perceived as insufficient protection, in case *“there are men or even ladies - if they were not of the Islamic faith - on the other side of the screen.”*⁴¹

In Malaysia, Chinese postpartum confinement traditions also present a unique cultural conflict to KMC.^{41,42,48} The practice of confinement is a *“deeply rooted cultural belief prioritising rest during the postpartum period as essential for recovery.”*^{48(p9)} Cultural factors also resulted in male HCW discomfort in assisting mothers with KMC, with one male doctor noting he felt *“awkward”* when the mother was exposed.^{48(p5)} In Thailand, a challenge is posed by *kreng-jai*: deference to authority, which, in the context of KMC, manifests as parents feeling unable to ask nurses or doctors questions, request assistance, or assert their desire to spend more time with their infant.³⁸ One mother noted she *“felt hesitant (kreng-jai) and afraid to ask [the nurses], and thought if they were available, they would come to [her].”*^{38(p228)} In rural Papua, patriarchal norms restrict maternal autonomy: *“it’s taboo because the mother is breastfeeding, the father can’t be near.”*^{39(p583)}

Across multiple countries, a shared cultural norm positioned KMC as a maternal rather than family-centred practice, with fathers excluded from participation due to hospital regulations, cultural expectations, or physical ward constraints.^{32,33,39-42} Some Indonesian hospitals had regulations explicitly preventing fathers from entering the NICU, with one participant noting that *“fathers are only allowed to see their infant through a mirror and have no chance to touch and hold the infant.”*^{33(p533)} However, one included study noted that cultural competence and integration of traditional practices are a key facilitator.³⁹

Discussion

This review evaluated and synthesised evidence to identify the barriers and facilitators to KMC implementation across Southeast Asia, where this low-cost, evidence-based strategy to improve neonatal health outcomes has significant potential to reduce the rising burden of mortality from multidrug-resistant infections across the region.^{10,50} Six key analytical themes were identified, many of which are modifiable with the appropriate focus and investment implemented to support KMC.

Although HCWs and parents recognised the benefits of KMC, implementation is constrained by weak integration within health systems, inadequate infrastructure, workforce limitations, and cultural influences. Taken together, these findings suggest that the principal challenge facing KMC scale-up in Southeast Asia is not acceptance of the intervention itself, but its integration into routine practice across diverse health systems and their sociocultural contexts.

Structural and institutional barriers were the most consistently reported constraint, operating at multiple levels of the health system - from national policy frameworks to HCW and parent support. Notably, many of the facilitators identified reflected the converse of these barriers, indicating that targeted investment to promote national commitment, facility-level structural support, and tailored training for both HCWs and parents may meaningfully improve KMC uptake⁵¹ (Figure 2).

The persistence of beliefs positioning KMC as secondary to technology-based neonatal care creates significant challenges for implementation. Across multiple countries, HCW, parents and policymakers frequently described incubator care as the preferred management strategy and viewed KMC as appropriate only after clinical stabilisation. Successful implementation would require a change in deeply-seated belief and the reframing of KMC as the gold-standard model of care. This is despite strong evidence advocating immediate and continuous KMC for preterm infants, regardless of clinical stability,⁵² stating KMC should begin immediately after birth, even before clinical stabilisation.⁵² Our findings aligned with other reviews in low- and middle-income countries,⁵³ highlighting a gap between current evidence and clinical practice that requires targeted education to successfully implement the 2022 WHO guidelines.⁸

Notably, HCW reported positive attitudes towards KMC, yet implementation was suboptimal, emphasising the important distinction between acceptance of an intervention and its routine adoption in practice. Inadequate formal training in KMC among HCWs was reported as a challenge to implementation, consistent with previously cited global barriers.^{49,54} “Normalisation Process Theory” provides a useful theoretical lens for interpreting these findings.⁵⁴ The theory proposes that complex interventions become normalised in practice only when they are collectively understood, enacted and evaluated by those responsible for implementation.⁵⁴ Where KMC lacks institutional visibility, performance monitoring, and senior endorsement, the practice will remain inefficiently implemented in routine care.⁵⁵

Inadequate physical infrastructure, including lack of dedicated KMC spaces, privacy and parental accommodation, was another important determinant of KMC implementation across the region; aligning with findings from sub-Saharan Africa.⁵⁶ A physical environment to support KMC is therefore a prerequisite for sustained KMC practice – yet this can be as simple as enabling adult beds for carers within the NICU, as has been successfully implemented in many hospitals in Vietnam.^{31,55}

This review also highlighted the need for family-centred care to enable uptake of KMC. Parental fear, lack of confidence and anxiety regarding causing harm were identified as barriers to KMC, findings reflected in the global literature;⁵⁷ while family support and caregiver education are powerful enablers of KMC uptake.⁵⁵ Our finding that many parents first encountered KMC only after admission to neonatal care suggests integrating KMC education into routine antenatal care may improve parental readiness, reduce anxiety and facilitate earlier initiation of KMC when preterm birth occurs.

A distinctive contribution of this review's findings is the importance of considering the diverse cultural factors influencing KMC implementation across Southeast Asia, which necessitates locally tailored programs to support KMC. Postpartum confinement practices, Islamic modesty traditions and patriarchal family structures influenced KMC acceptance across the studies included in our review, indicating that a uniform regional KMC promotion strategy cannot address the distinct religious, cultural and gender-based views both within and between countries across the region, and globally. The implication of these findings is that cultural competence and locally-tailored approaches are prerequisites for effective KMC uptake globally. Programs must move beyond generic health promotion strategies to instead engage directly with the cultural norms and gender beliefs of the communities they serve.^{55,57,58}

Several limitations of this review should be noted. Firstly, there is insufficient representation of the countries across the region, with Indonesia accounting for the majority of the included studies and several Southeast Asian countries (Myanmar, Singapore, Timor-Leste, and Brunei) entirely unrepresented, limiting the generalisability of findings across the broader region. Secondly, the heterogeneity of study designs, settings, and outcome measures across included studies precluded direct comparison of implementation rates and prevented formal meta-analysis, with quantitative synthesis limited to frequency analysis and descriptive tabulation. Furthermore, most included studies were conducted in tertiary or secondary hospital settings, meaning findings may not reflect the implementation context of community or rural facilities, where KMC barriers and facilitators may differ.

Nevertheless, the findings of this review carry several important lessons for KMC policy and practice in Southeast Asia and globally. The region needs to develop and disseminate clear standard operating procedures, integrate KMC into performance monitoring frameworks, and ensure formal inclusion of KMC training in HCW and antenatal care programmes. The diversity of cultural practices identified in this review also underscores the need for carefully designed, culturally tailored implementation strategies for KMC, co-designed with community consultation.

Future research should prioritise implementation studies examining effective strategies for implementing KMC into routine neonatal care to reduce the burden of neonatal mortality. As countries seek to accelerate progress in reducing the burden of neonatal sepsis and improve coverage of essential newborn care, strengthening the integration of KMC into health systems should be a priority in policy and practice. Effective implementation will require regional and national commitment, alongside facility-level operational guidance and monitoring systems to evaluate uptake, under an umbrella of culturally responsive, family-centred models of care.

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Figures & Tables

Box 1: Key Findings

- KMC implementation across Southeast Asia is inconsistent, despite the evidence revealing its role in improving neonatal morbidity and mortality.
- Structural and institutional barriers are the most consistently reported impediment to implementation.
- Healthcare workers hold positive attitudes toward KMC, yet have substantial gaps in KMC training and implementation support, indicating a persistent knowledge–attitude–practice gap.
- KMC is commonly, yet incorrectly, perceived as inferior to biomedical technologies (such as incubator care) for neonatal healthcare, contributing to delayed initiation and reduced uptake.
- Parental fear, anxiety, and lack of education regarding the benefits of KMC are major modifiable barriers identified in the literature. Antenatal and postnatal education programs can improve carer confidence in implementing KMC.
- Cultural factors influencing KMC uptake differ substantially across countries within the region, and even within communities. Postpartum confinement practices, patriarchal decision-making structures, and deference to healthcare authority currently limits KMC uptake.
- Effective KMC implementation to improve neonatal outcomes requires multilevel engagement, combining national policy commitment, facility-level support, culturally tailored education for healthcare workers and parents, and the promotion of family-centred models of care.

Figure 1 PRISMA Diagram

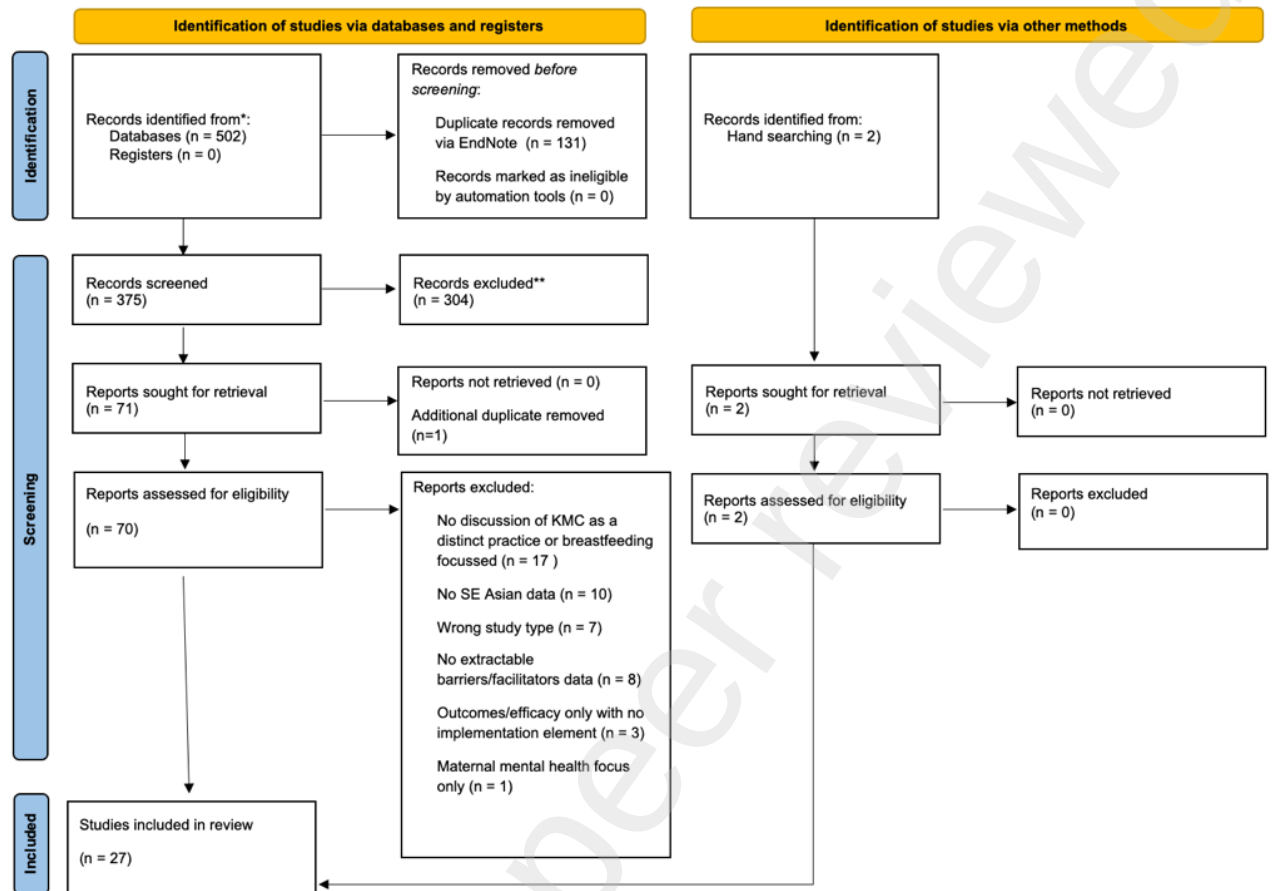


Figure 2 A multilevel framework of barriers and facilitators to KMC implementation in Southeast Asia. Barriers operate simultaneously across five reinforcing levels, from national policy to cultural context. Dashed arrows indicate bidirectional reinforcement between levels. Facilitators identified across the included literature are shown as counterbalancing factors on the right.

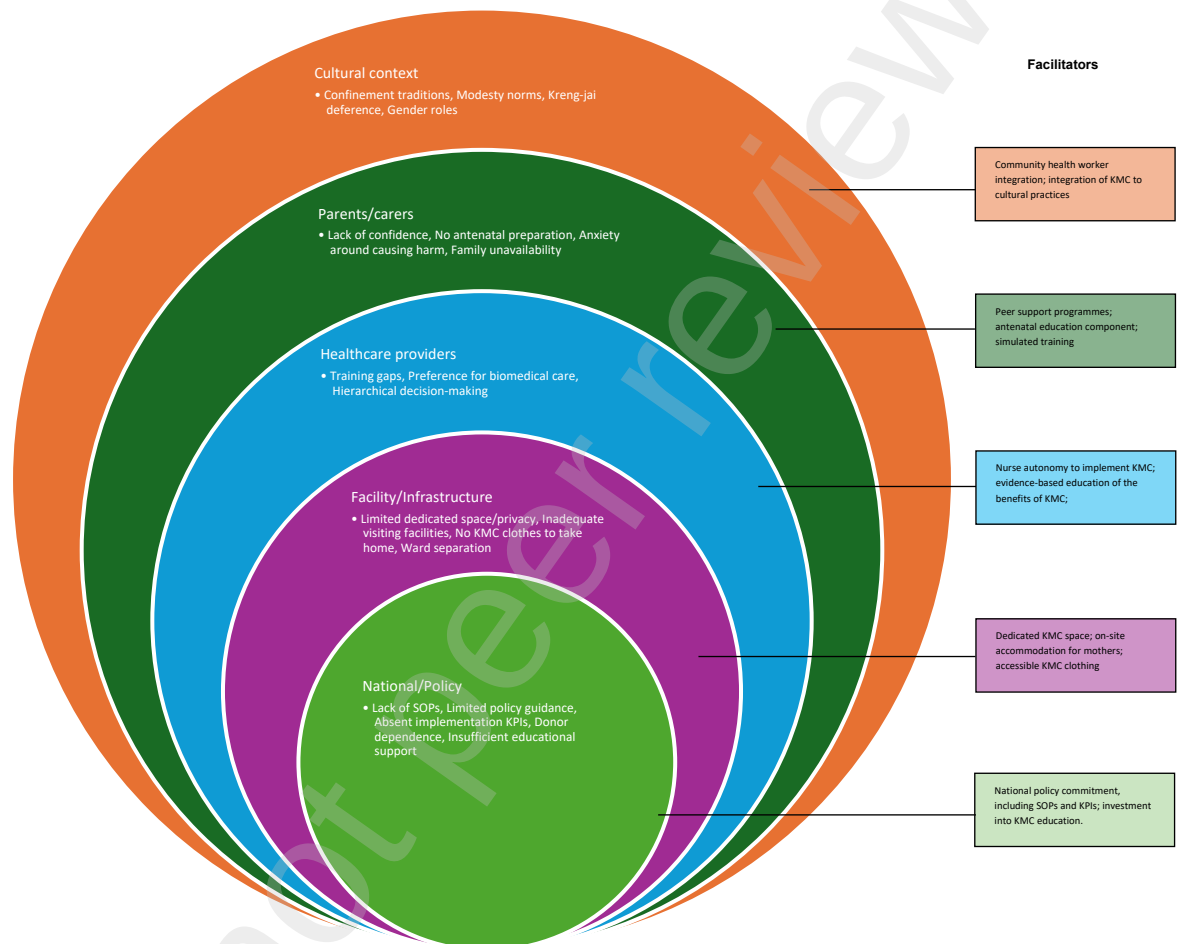


Figure 3 Geographic distribution of included studies and KMC implementation levels across Southeast Asia.

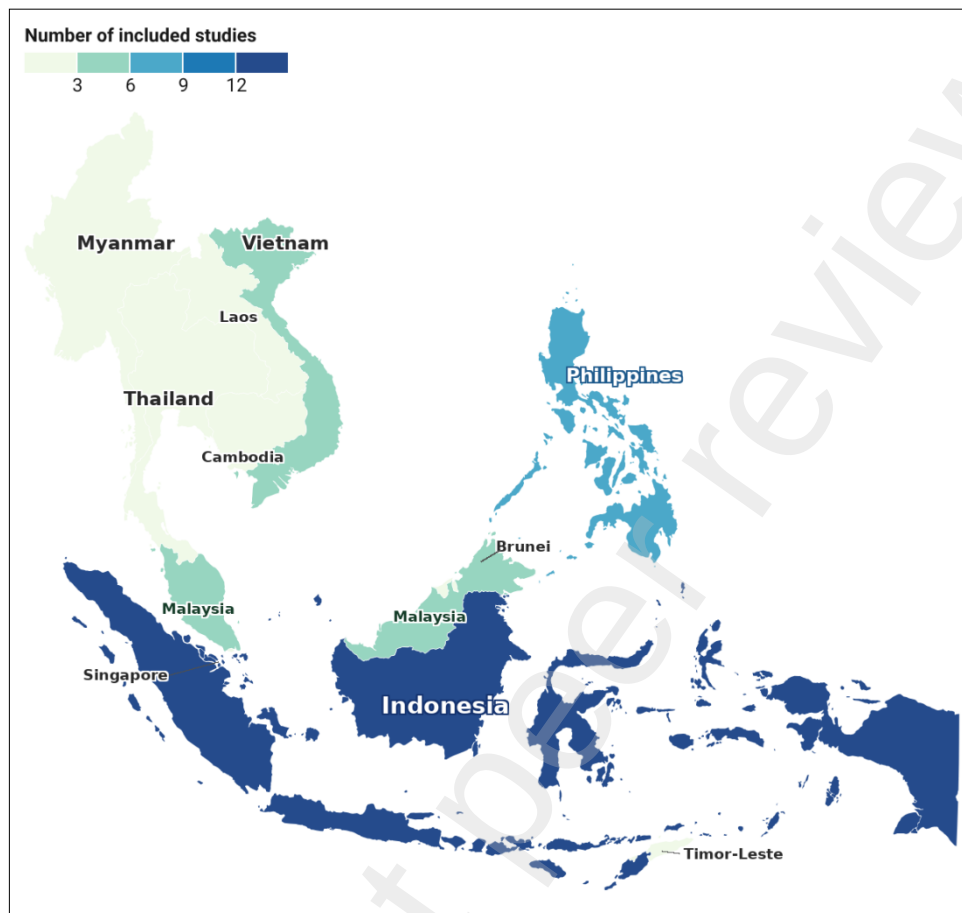


Table 1 Reported KMC implementation rates across included studies

Study, year (setting)	Implementation indicator	Metric type	KMC / SSC duration
Cambodia & Lao PDR			
Kitamura et al. (2022) Tertiary hospitals; 2018–19	Immediate SSC: 94% (Cambodia) vs 100% (Lao PDR) Uninterrupted SSC at 60 min: 26% vs 97% Uninterrupted SSC at 90 min: 23% vs 85%	SSC compliance	Mean SSC: 34 min (Cambodia) vs 87 min (Lao PDR)
Indonesia			
Bergh et al. (2016) National (mixed); 2013	No national figure (decentralised system) 3 centres of excellence; 73 training courses reached 2,190 staff across 17 cities	Training coverage	Not reported
Adisasmita et al. (2021) Tertiary; Koja DH, N. Jakarta; 2019	All perinatal nurses had KMC experience 9/36 (25%) labour/postnatal staff had assisted with KMC No dedicated KMC rooms, beds, or SOPs	Facility readiness & staff exposure	Not measured
Utami & Huang (2019) Secondary; 4 hospitals, Central Java; 2015–16	Provincial KMC rate: 21.7% 11 reporting regions at 0% 71.2% of HCPs had performed KMC	Provincial KMC rate	Not reported
Suza et al. (2020) Secondary; Medan; year NR	21/30 (70%) of hospitalised mothers performed KMC	Maternal KMC uptake	Not reported
Kurniawati et al. (2019) — RCT Secondary; 4 hospitals, greater Jakarta; 2018	Frequency: 1.1 vs 0.9 sessions/day (peer support vs control; p=0.01)	KMC frequency (pre/post)	114.4 vs 100.9 min/session (p=0.03)
Hadi et al. (2022) — Intervention Secondary + community; Central Jakarta; 2019–20	LBW care practice score at 6 wks: 1.95 vs 1.50 (p=0.031)	Composite LBW practice score	Limited to mornings/evenings (urban heat)
Utami et al. (2023) Secondary; 4 hospitals, Central Java; 2015	Provincial KMC rate: 21.7% 11 regions at 0% 9.2% of parents had previous KMC experience	Provincial KMC rate	Comfort declines sharply with phototherapy (88% uncomfortable), O ₂ (81%), IV (78%)

Mustikawati et al. (2022) Community post-discharge; N. Jakarta; 2020	100% of LBW mothers continued KMC at home	Home KMC continuation	Mean 2.92 h/day (SD 0.90); well below WHO ≥8 h
Malaysia			
Samsudin et al. (2023) — Intervention Tertiary NICU; UMMC; 2017–18	>50% of preterm infants received only 15–30 min KMC irregularly at baseline No standardised KMC protocol; practice based on instinct	KC duration & protocol availability	Control: 15–30 min, irregular; intervention duration improved (specifics NR)
Philippines			
Bergh et al. (2016) National (mixed); 2013	8/13 trained hospitals showed KMC practice (2013) Expanded from 13 to 51 facilities (2013–15)	Facilities with KMC practice	Not reported
Castillo et al. (2016) — Intervention Mixed; Visayas; 2014 (post- Haiyan)	3 months post-training: 94% of 51 facilities providing KMC (p<0.05) National SSC: 9.6% (2008) → 64% (2013) → 84% primary-level (2014)	Facilities providing KMC + national SSC trajectory	SSC: 84% of facilities at 3 months
Almazan et al. (2019) Secondary/tertiary; 6 sites, E. Philippines; 2017–18	47.1% of nurses assisted mothers in KMC (highest item) 9.4% assisted fathers (lowest item)	Nurse-reported practice items	Not reported (item-based)
Villanueva-Uy et al. (2021) Tertiary; Philippine General Hospital NICU; 2014–17	KMC enrolment of eligible LBW infants: 57% (2014) → 75% (2015) → 87% (2017)	Enrolment of eligible infants	0.5–6 h/day (vs recommended ≥18 h)
Calibo et al. (2021) National; all 17 regions; 2013–19	Hospitals implementing KMC: 3% (2013) → 14% (2015) → 43% (2019) 53% of LBW babies received KMC (2019); only 20% continuous	Facilities implementing KMC + infant coverage	SSC <1 min: 1.1% (2008) → 66% (2019); SSC 60 min: 0% → 39%
Vietnam			
Morseth et al. (2020) Provincial/district; Da Nang & Quang Nam; 2015–17	Vaginal births with any early SSC: 83% (2015) → 96% (2017) Caesarean births: 35% (2015) → 55% (2017)	Any early SSC (longitudinal)	Duration NR; monitored as SSC at fixed time points
Tran et al. (2018) Tertiary; Da Nang HWC; 2016	≥90% of singleton vaginal births had SSC (median 99%)	Births with SSC (cross- sectional)	Not reported

Cavallin et al. (2022) National; 138 public hospitals; 2020	Caesarean SSC: median 95% National KMC implementation: 49% (95% CI 40–57) Central 83%; provincial 65%; district 35% Not routinely performing KMC: 37% (54% district)	Hospitals routinely implementing KMC	SSC 18–24 h/day: 9% of hospitals; <6 h/day: 42%
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Table 2 Frequency of reported barriers and facilitators across included studies

Theme Type	Theme	n Studies (%)
Barriers	Lack of institutionalisation	16 (59)
	Knowledge gaps and misconceptions among HCPs	15 (56)
	Incubator dependency/KMC perceived as inferior technology	15 (56)
	Inadequate physical environment and infrastructure	14 (52)
	Parental fear and anxiety about infant safety	14 (52)
	Staff shortage and competing clinical workload	12 (44)
	Maternal mental and physical condition	12 (44)
	Inadequate parent education and involvement in KMC	10 (37)
	Cultural norms, confinement traditions, modesty and exposure concerns	10 (37)
	Distance, visiting hours or accommodation barriers	9 (33)
	Family unavailability and limited support	7 (26)
	Post-discharge follow-up and referral gap	6 (22)
	Insufficient financing and donor dependence	4 (15)
Facilitators	HCP training and coaching	13 (48)
	Positive HCP attitudes and witnessing outcomes	11 (41)
	Parental and family education	11 (41)
	Hospital management and champion support	9 (33)
	Family support and involvement	8 (30)

Clear evidence-based protocols and SOPs	7 (25.9)
Government and insurance policy buy-in	6 (22.2)
Dedicated KMC space and infrastructure	6 (22.2)
Maternal confidence and self-efficacy	6 (22.2)
Peer support among parents	4 (14.8)
Primary health care integration and home visits	4 (14.8)
Discharge planning and post-discharge follow-up	3 (11.1)
Community demand generation	2 (7.4)
Cultural competence and integration of traditional practices	1 (3.7)

Table 3 Joint Display matrix: Integration of qualitative and quantitative findings

Analytical Theme	Qualitative findings	Quantitative findings	Integration	
	<i>Illustrative quote in italics</i>	<i>% of 27 included studies shown in theme row</i>	Type	Finding
1. Structural and institutional barriers	<i>Studies reporting: 59% (16/27) lack of institutionalisation; 44% (12/27) staffing/workload; 15% (4/27) financing</i>			
	- Absence of SOPs/KPIs made KMC optional and invisible to management - Hierarchical approval prevented junior staff from initiating KMC independently - Donor dependence produced inconsistent regional uptake - KMC champions were the primary implementation driver in absence of formal systems <i>"Unlike breastfeeding, this does not sound like it's something vital that has to be done."</i> (Doctor, Foong et al., 2025)	- Vietnam: 83% central vs 35% district hospital implementation (Cavallin et al., 2022) - Only 21/2,083 Indonesian hospitals implementing KMC (Utami & Huang, 2019) - Philippines: 3% → 43% hospital coverage following national programme (Calibo et al., 2021)	CONFIRMING	Qualitative evidence of cascading institutional failures is confirmed by quantitative data showing markedly lower implementation at district level and without formal policy frameworks. Convergence across all five SE Asian countries confirms structural barriers as the primary systemic challenge.
2. Physical infrastructure	<i>Studies reporting: 52% (14/27) inadequate environment/infrastructure; 33% (9/27) distance, visiting hours, accommodation</i>			

Analytical Theme	Qualitative findings	Quantitative findings	Integration	
	<i>Illustrative quote in italics</i>	<i>% of 27 included studies shown in theme row</i>	Type	Finding
	- Absence of dedicated KMC rooms caused overcrowding and reduced HCP motivation - Portable screens inadequate for privacy; fear of exposure persisted - Visiting hour restrictions prevented sustained KMC even in motivated mothers - KMC clothes not permitted home — practical barrier to continuation <i>"The place is so open. Men could just be behind the screen." (Mother 1143, Foong et al., 2023)</i>	- Dedicated KMC room available in only 45% of Vietnamese hospitals (Cavallin et al., 2022) - Written KMC protocol in only 48% of Vietnamese hospitals (Cavallin et al., 2022) - Mean KMC duration only 15–30 min irregularly before intervention (Samsudin et al., 2023)	CONFIRMING	Qualitative accounts of mothers performing KMC behind inadequate screens and restricted by visiting hours are confirmed by quantitative data showing fewer than half of facilities have dedicated KMC spaces or written protocols.
3. HCP knowledge–attitude–practice gap	<i>Studies reporting: 56% (15/27) knowledge gaps; 41% (11/27) positive attitudes/witnessing outcomes as facilitator</i>			
	- HCPs acknowledged KMC benefits but workload and structural barriers prevented practice - Emotional burnout among KMC advocates documented where structural support absent - Perception predicted practice more strongly than knowledge <i>"We don't see it as our responsibility to go into much detail." (Doctor, Foong et al., 2025)</i>	100% positive attitude among nursing staff yet 73.8% never trained (Adisasmita et al., 2021) - KMC practice correlated with perception not knowledge (Utami & Huang, 2019) 60% of HCPs in rural East Java: KMC not running optimally (Rahmatika et al., 2022) - Good attitudes but poor practice confirmed across Philippine nurses (Almazan et al., 2019)	CONFIRMING + EXPANDING	Universally positive attitudes alongside persistently poor implementation rates (quantitative) is expanded by qualitative evidence that the mechanism is structural rather than motivational. Where KMC lacks formal accountability, even motivated HCPs disengage over time.
4. KMC vs. biomedical technology	<i>Studies reporting: 56% (15/27) incubator dependency/KMC perceived as inferior</i>			
	HCPs positioned incubator care as default even when evidence supported concurrent KMC	Only 25.6% of Indonesian parents knew KMC would not cause hypothermia (Utami et al., 2023)	CONFIRMING	Convergence of HCP hesitancy (qualitative) with widespread parental and HCP misconceptions (quantitative) confirms this barrier operates at the level of institutional culture. The finding

Analytical Theme	Qualitative findings	Quantitative findings	Integration	
	<i>Illustrative quote in italics</i>	<i>% of 27 included studies shown in theme row</i>	Type	Finding
	- Parents independently replicated the belief that incubators signal severity and superiority - KMC framed in policy as a resource-poor substitute rather than first-line intervention <i>"Because he was in the incubator, he must be critical. So, I shouldn't disturb him." (Mother 1042, Foong et al., 2023)</i>	- Only 10.5% knew KMC is appropriate for medically stable premature babies (Utami et al., 2023) 40% of labour ward nurses not in favour of KMC for infants 1,000–1,800g (Adisasmita et al., 2021)		that both groups independently replicate the technology preference suggests a culturally embedded belief system.
5. Parental fear and preparation	<i>Studies reporting: 52% (14/27) parental fear/anxiety; maternal confidence as facilitator reported across multiple studies</i>			
	- Parents described being called to perform KMC without preparation, not knowing what to wear - Emotional transformation from fear to confidence documented after supported KMC - Peer support more effective than nurse-delivered education for maternal confidence - Parents identified antenatal preparation gap as a missed opportunity <i>"Our hearts beat in synchrony." (Mother 1444) / "I should have been told about this before." (Mother 1042, Foong et al., 2023)</i>	- Knowledge, perception, and barriers explained 72.1% of KMC practice variance (Utami et al., 2023) - MKC-EP significantly reduced perceived barriers and maternal stress at 3 months (Samsudin et al., 2023) - Peer support: 1.1 vs 0.9 sessions/day; 114 vs 101 min/day vs nurse education (Kurniawati et al., 2019) 97.7% of parents agreed KMC should be explained on first day of admission (Utami et al., 2023)	CONFIRMING + EXPANDING	Fear-to-confidence transformation (qualitative) is confirmed and quantified — knowledge and perception explain 72.1% of practice variance. Together these indicate early preparation and peer support are the highest-yield interventions. Quantitative data expand the narrative by showing modality of support matters as much as its presence.
6. Cultural context	<i>Studies reporting: 37% (10/27) cultural norms across all five SE Asian countries; gender norms/paternal exclusion across multiple studies</i>			
	- Thailand: Kreng-jai deference to authority - Malaysia/Indonesia: Islamic modesty norms - Malaysia: Chinese postpartum confinement practices	Breast exposure discomfort: influential barrier for 70.9% of Indonesian parents (Utami et al., 2023)	EXPANDING	Quantitative data confirms cultural barriers present across all five SE Asian countries, but qualitative data reveals fundamentally different mechanisms in each context. Aggregate frequency counts cannot capture country-specific cultural pathways — locally tailored responses are required.

Analytical Theme	Qualitative findings	Quantitative findings	Integration	
	<i>Illustrative quote in italics</i>	<i>% of 27 included studies shown in theme row</i>	Type	Finding
	- Indonesia: Patriarchal norms; father NICU exclusion by hospital regulation - Cultural deference + clinical hierarchy created double silencing effect <i>"I felt hesitant (Kreng-jai) and afraid to ask them." (Mother, Sarapat et al., 2017)</i>	- Breast exposure predominant barrier among Malay Muslim mothers (Samsudin et al., 2023) - Father exclusion: influential barrier for 64% of Indonesian parents (Utami et al., 2023) - Only one father practising KMC across both Malaysian study sites (Foong et al., 2023)		
7. Facility-to-home transition	<i>Studies reporting: 22% (6/27) post-discharge gap — frequency underestimates severity</i>			
	- Mothers described abrupt, poorly supported discharge - KMC clothes could not be taken home — removed equipment mothers had practised with - CHWs identified as most accessible and trusted post-discharge resource - Difference between hospital and home conditions reduced maternal confidence <i>"Nothing at all, we were just told to bring clothes to take the baby home." (Participant 2, Situmorang et al., 2025)</i>	- Mean home KMC: 2.92 h/day (SD 0.90) (Mustikawati et al., 2022) 76% of Vietnamese hospitals rated post-discharge follow-up as most difficult (Cavallin et al., 2022) - Nearly half of Filipino mothers received no additional KMC info after hospital orientation (Villanueva-Uy et al., 2021) - Structured home visits significantly improved practice scores at 2 and 6 weeks (Hadi et al., 2022)	CONFIRMING	Qualitative accounts of inadequate preparation, equipment gaps, and absent community support are confirmed and quantified. The relatively low 22% study frequency belies the severity — where measured, the facility-to-home transition consistently represents the point at which KMC implementation collapses.

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