JRSSEM 2025, Vol. 05, No. 04, November
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

Optimizing Collaborative Quality Improvement Strategies to Decrease Neonatal Asphyxia Incidence: A Scoping Review

Andreas Syabrullah*, Herin Mawarti, Masruroh Hasyim
Universitas Pesantren Tinggi Darul 'Ulum, Indonesia
Email: andsyab@gmail.com*

Abstrak. Neonatal asphyxia remains a leading cause of neonatal mortality, particularly in low- and middle-income countries (LMICs). Quality Improvement Collaboratives (QICs) have emerged as a structured approach to bridge the gap between evidence-based interventions and clinical practice in neonatal care. This scoping review aimed to systematically map the characteristics, core components, and reported outcomes of QIC frameworks implemented to reduce the incidence of neonatal asphyxia. The review was conducted following the Arksey and O'Malley framework and PRISMA-ScR guidelines. A systematic search of seven electronic databases (2016–2025) identified seven eligible studies. Data on QIC components, implementation strategies, and outcomes were extracted and synthesized. The findings indicate that QICs, often incorporating Plan-Do-Study-Act cycles, mentorship, and audit-feedback, were implemented across various LMICs. Core components included interprofessional collaboration, protocol standardization, and real-time data monitoring. Enabling factors such as leadership engagement and effective communication enhanced adherence to care protocols, while workforce shortages and inadequate infrastructure posed barriers. The reviewed studies consistently reported improvements in clinical practices and reductions in neonatal asphyxia or related mortality. QICs are effective in improving neonatal outcomes through structured, team-oriented approaches. For long-term sustainability, they must be integrated into broader health system strengthening initiatives, addressing systemic barriers and securing institutional support.

Keywords: Neonatal Asphyxia, Neonatal Resuscitation, Quality Improvement Collaborative

INTRODUCTION

Neonatal asphyxia has been recognized as a significant global health issue and is consistently identified as a leading contributor to neonatal morbidity and mortality, especially in low and middle income countries (LMICs). It has been estimated that nearly 900,000 neonatal deaths occur each year as a result of birth asphyxia, with the greatest impact observed in resource limited settings where timely and skilled perinatal care is not readily accessible (Sawyer, Umoren and Gray, 2016; Foglia et al., 2025). The consequences of neonatal asphyxia are not only marked by fatal outcomes but have also been linked to enduring neurodevelopmental disabilities among surviving infants (Cavicchiolo et al., 2016).

Globally, neonatal mortality trends show a worrying pattern. According to data from the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), despite an overall decline in neonatal mortality rates, the burden of disease remains very high, particularly in Sub-Saharan Africa and South Asia. The Sustainable Development Goals (SDGs) target set by the United Nations for 2030 is to reduce the neonatal mortality rate (NMR) to a maximum of 12 per 1,000 live births across all countries (Lawn, Bhutta, Ezeaka, & Saugstad, 2023; Raina et al., 2023). However, many LMICs still fall far short of this target, with some countries recording NMRs above 30 per 1,000 live births (WHO, 2023).

In Indonesia, specifically, data from the 2018 Basic Health Research (Riskesdas) conducted by the Ministry of Health shows that the neonatal mortality rate in Indonesia reached

15 per 1,000 live births. Neonatal asphyxia is a leading cause of neonatal mortality in Indonesia, accounting for approximately 20-24% of total neonatal deaths, ranking it the third leading cause after infection and prematurity (Ministry of Health of the Republic of Indonesia, 2018). Significant regional disparities are also evident, with several provinces in eastern Indonesia showing significantly higher neonatal mortality rates than Java (Riskesdas, 2018).

Although cost-effective, evidence-based interventions such as neonatal resuscitation and temperature monitoring are available, significant gaps in their clinical implementation persist. Poor neonatal outcomes have been linked to the limited availability of skilled healthcare professionals, inadequate health facility preparedness, inadequate supportive supervision, and a lack of systemic monitoring of care quality (Umunyana et al., 2020; Pietravalle et al., 2022; Mwalweni et al., 2024). Traditional in-house training methods, including single-session neonatal resuscitation programs, have been associated with limited sustainability in both skill retention and long-term behavioral change (Sharrow et al., 2022).

A structured, system level approach to overcoming persistent healthcare challenges has been offered through the implementation of Quality Improvement Collaboratives (QIC). Within these frameworks, continuous learning, shared accountability, and collaborative problem solving have been fostered to bridge the gap between evidence and practice. Mentorship, real time feedback mechanisms, data informed decision-making, and the application of iterative Plan-Do-Study-Act (PDSA) cycles have commonly been incorporated to support and sustain improvements in clinical performance (Murki et al., 2018; Russ et al., 2023; Kresnawati et al., 2025).

The effectiveness of Quality Improvement Collaborative (QIC) interventions in reducing neonatal asphyxia and enhancing perinatal outcomes has been demonstrated across various settings. In Indonesia, the application of a QIC model that incorporated on-site clinical mentorship was associated with improved competency among birth attendants and a notable decline in neonatal mortality rates (Kresnawati et al., 2025). Likewise, the implementation of a QIC across health facilities in Rwanda was found to enhance the retention of neonatal resuscitation skills and contribute to a reduction in stillbirth rates (Umunyana et al., 2020). Increased adherence to recommended clinical practices such as delayed cord clamping, early initiation of breastfeeding, and the rational administration of oxygen therapy has also been associated with the implementation of QIC initiatives (Pietravalle et al., 2022; Mwalweni et al., 2024).

The effectiveness of Quality Improvement Collaboratives (QIC) has been attributed to their use of a collaborative learning model, through which multidisciplinary teams from multiple facilities are brought together to exchange insights, identify performance gaps, and implement context adapted strategies. Ownership is fostered, peer benchmarking is encouraged, and the adaptability of interventions across different levels of the health system is strengthened through this approach (Murki et al., 2018; Mostafa et al., 2022; Russ et al., 2023). Considering the complexity of neonatal care and the narrow window for life-saving interventions during birth, the Quality Improvement Collaborative (QIC) framework has been regarded as a scalable and sustainable approach that can be applied globally to address neonatal asphyxia.

In response to this need, a comprehensive synthesis of existing Quality Improvement Collaborative (QIC) frameworks targeting neonatal asphyxia has been deemed essential to

guide both clinical practice and health policy. Therefore, this scoping review was conducted with the aim of systematically mapping the available evidence on QIC interventions intended to reduce the incidence of neonatal asphyxia. The insights generated are expected to inform stakeholders within health systems, including policymakers and practitioners, who seek to adopt effective quality improvement strategies in maternal and newborn care.

MATERIALS AND METHODS

A scoping review methodology was utilized to comprehensively map the existing evidence on Quality Improvement Collaborative (QIC) frameworks aimed at addressing neonatal asphyxia. The methodological approach was guided by a five stage framework, in which the following steps were undertaken: (1) the research question was identified; (2) relevant studies were located; (3) eligible studies were selected for inclusion; (4) data were systematically charted; and (5) the findings were collated, summarized, and reported (Arksey and O'Malley, 2005).

To ensure methodological rigor, the process was additionally aligned with the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta Analyses extension for Scoping Reviews (PRISMA-ScR).

Identifying the Research Question

The central research question guiding this scoping review was framed as follows: "What Quality Improvement Collaborative (QIC) frameworks have been implemented to reduce the incidence of neonatal asphyxia, and what are their key characteristics and outcomes?" This question was designed to encompass the scope and diversity of QIC strategies applied across various health system contexts.

Identifying Relevant Studies

Relevant studies were retrieved through systematic searches performed across several electronic databases, including PubMed, ScienceDirect, ProQuest, Springer, Sage, Clarivate, and Google Scholar. The selection of literature was guided by the Population, Concept, and Context (PCC) framework. Eligibility was restricted to articles published in peer-reviewed journals between 2016 and 2025. The search strategy was tailored to capture studies focusing on neonatal asphyxia and the application of Quality Improvement Collaborative (QIC) frameworks.

Study Selection for inclusion

Table 1. Articles that met the inclusion criteria

No	Database	Keywords Used	Articles Retrieved	Access Date
1	PubMed	(Quality Improvement OR QI OR Quality Improvement Collaborative OR QIC) AND (neonatal asphyxia OR asphyxia OR neonatal mortality)	17	July 25, 2025
2	ScienceDirect	(Quality Improvement OR Quality Improvement Collaborative) AND (neonatal asphyxia)	127	July 25, 2025
3	ProQuest	(Quality Improvement OR Quality Improvement	256	July 25,

No	Database	Keywords Used	Articles Retrieved	Access Date
		Collaborative) AND Clinical Mentorship AND (neonatal asphyxia OR Neonatal Outcome OR Neonatal Resucitation)		2025
4	Springer	(Quality Improvement OR Quality Improvement interventions OR Quality Improvement Collaborative) AND Clinical Mentorship AND (neonatal asphyxia OR neonatal mortality)	77	July 26, 2025
5	Sage	(Quality Improvement OR Quality Improvement Collaborative OR Improvement collaborative) AND (neonatal asphyxia OR asphyxia OR neonatal resuscitation OR neonatal outcomes OR neonatal mortality)	82	July 26, 2025
6	Clarivate	(Quality Improvement OR Quality Improvement Collaborative OR Improvement collaborative) AND (neonatal asphyxia OR asphyxia OR neonatal resuscitation OR neonatal outcomes OR neonatal mortality)	37	July 26, 2025
7	Google Scholar	(Quality Improvement OR Quality Improvement Collaborative OR Improvement collaborative) AND Clinical Mentorship AND (neonatal asphyxia OR asphyxia OR neonatal resuscitation OR neonatal outcomes OR neonatal mortality)	647	July 26, 2025

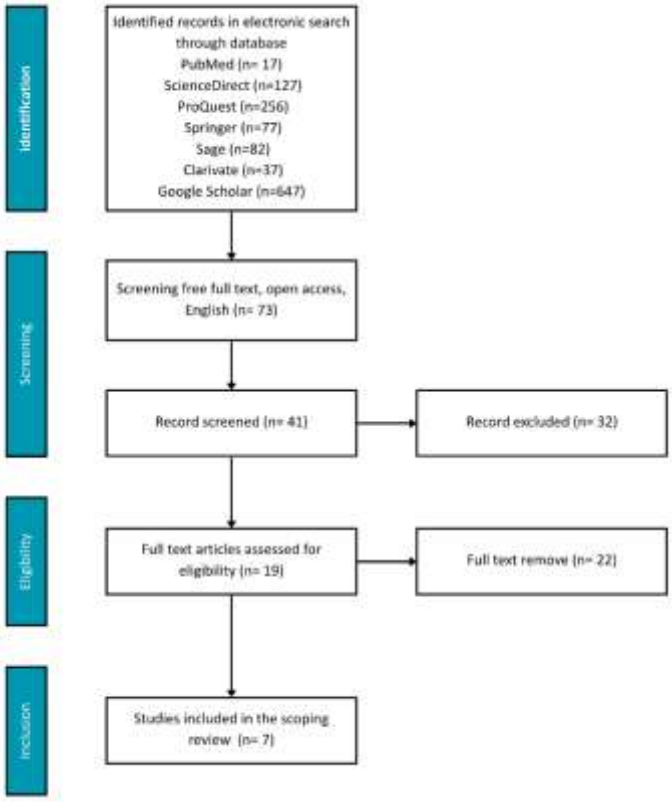

Figure 1. PRISMA Flowchart

The process of study selection, as illustrated in Figure 1, was conducted through a multi stage screening procedure that involved reviewing titles and abstracts, followed by full-text

evaluations to assess eligibility according to predefined inclusion and exclusion criteria. A total of seven studies were ultimately included in this review. Studies were considered eligible if they: (1) addressed Quality Improvement Collaborative (QIC) frameworks or interventions aimed at reducing neonatal asphyxia, (2) were peer-reviewed and published in English, and (3) provided full-text availability. Exclusion criteria were applied to studies that: (1) focused exclusively on individual or non-collaborative interventions, (2) constituted reviews, editorials, or opinion articles, or (3) did not report outcomes related to neonatal asphyxia.

Charting the Data

To ensure consistency and rigor, data were extracted using a standardized charting form that was developed to capture essential study elements. Two independent reviewers carried out the extraction of key information, including author, publication year, study design, Quality Improvement Collaborative (QIC) components, and outcome measures such as neonatal mortality and resuscitation rates. Discrepancies between reviewers were resolved through deliberation and consensus.

Collating, Summarizing, and Reporting the Results

The extracted data were synthesized by categorizing findings into thematic domains that reflected the scope and variation of QIC implementations targeting neonatal asphyxia. These domains encompassed the structural elements and core components of QIC frameworks, outcome indicators such as reductions in neonatal mortality or asphyxia rates, and contextual factors that facilitated or hindered implementation.

The findings were presented through descriptive reporting, and comparative insights were derived across the included studies to underscore recurring strategies, innovative modifications, and contextual differences. This analytical process enabled a comprehensive depiction of how QICs were implemented across various health systems, the outcomes they produced, and the critical factors influencing their effectiveness or limitations.

The findings were synthesized narratively and organized into summary tables to enhance clarity for policymakers, practitioners, and researchers aiming to implement or adapt QIC strategies within maternal and neonatal health care settings. This approach was intended to highlight patterns, strengths, and contextual variations among QIC frameworks, and to illustrate their diversity and effectiveness across different implementation environments.

RESULTS AND DISCUSSION

The findings were synthesized narratively and organized into summary tables to enhance clarity for policymakers, practitioners, and researchers aiming to implement or adapt QIC strategies within maternal and neonatal health care settings. This approach was intended to highlight patterns, strengths, and contextual variations among QIC frameworks, and to illustrate their diversity and effectiveness across different implementation environments (Umunyana et al., 2020).

The implementation of Quality Improvement Collaboratives (QIC) was characterized by variations in structure and scope across different countries. In several settings, emphasis was placed on facility-based coaching and the use of data feedback mechanisms to enhance compliance with neonatal resuscitation protocols (Pietravalle et al., 2022; Kresnawati et al.,

2025). In other cases, emphasis was placed on fostering multidisciplinary collaboration and implementing standardized care processes across hospital networks (Murki et al., 2018), In several instances, periodic training, supervisory support, and action-oriented learning cycles were utilized at the district level (Mwalweni et al., 2024).

In addition, a variety of enabling and limiting factors influencing the implementation of QICs were identified through the review. Successful adoption was facilitated by strong leadership commitment, the availability of essential equipment, and access to updated clinical guidelines. Conversely, barriers were presented by workforce shortages, logistical challenges, and inadequate systems for monitoring progress (Pietravalle et al., 2022; Mwalweni et al., 2024). The understanding of these contextual factors is considered essential for the successful replication or scale up of QIC models in comparable settings

Table 2. Synthesis of Research Result

No	Article Title	Study Design	Population Sample	QIC Intervention Components	Outcome Indicators
1	Ten Steps to Improve Outcomes of In Facility Neonatal Resuscitation (Foglia *et al.*, 2025)	Expert based descriptive	Healthcare providers involved in neonatal care and resuscitation in low and middle income countries (LMICs)	10 key interventions: 1. Implement effective education systems 2. Ensure team and equipment readiness 3. Identify high risk pregnancies and prevent perinatal risks 4. Respond to every birth 5. Perform guideline based resuscitation 6. Deliver guideline based post resuscitation care 7. Collect data throughout resuscitation care 8. Improve quality of resuscitation 9. Support parent and family well being 10. Cultivate a culture of excellence	1. Improved neonatal resuscitation readiness and performance 2. Reduction in neonatal asphyxia and mortality (based on secondary data from prior QI programs)
2	Impact of a Quality Improvement Bundle on Neonatal	Retrospectiv e comparative study	All neonates admitted to the Special Care Unit (SCU) at Tosamaganga	Comprehensive quality improvement bundle including: 1. Infrastructu re development:	1. Primary: Neonatal mortality before discharge, categorized by birth weight using

No	Article Title	Study Design	Population Sample	QIC Intervention Components	Outcome Indicators
	Mortality in a District Hospital in Tanzania (Pietravalle *et al.*, 2022)		Hospital during the study period. A total of 5742 neonates: 1. 2952 neonates admitted in the pre-intervention period 2. 2790 neonates admitted in the post-intervention period	Establishment of a neonatal ward with intensive care, sub intensive care, and KMC units 2. Provision of equipment: Oxygen concentrators, phototherapy units, infusion pumps, aspirators 3. Updated protocols and procedures: For managing antenatal steroids, umbilical catheterization, IV fluids, etc. 4. Human resources: Dedicated neonatal nursing team, on site general physician 5. Training: In neonatal resuscitation, sepsis management, premature infant care, and more	the B.A.B.I.E.S. Matrix 2. Secondary: Cause-specific mortality (asphyxia, infection, prematurity)
3	Evaluation of criterion based audit in improving quality of neonatal birth asphyxia care at Balaka district hospital in Malawi (Mwalweni *et al.*, 2024)	Retrospective review	110 cases notes	1. Development of locally agreed standards for neonatal asphyxia care. 2. Initial audit of practice. 3. Feedback and training to staff. 4. Re-audit to assess improvement. 5. Continuous review and adjustments in clinical practice.	1. Improved adherence to standard management protocols (e.g., resuscitation steps, documentatio). 2. Reduction in gaps in clinical care (e.g., thermoregulation, early breastfeeding). 3. Increased percentage of neonates receiving correct interventions within recommended timeframes.

No	Article Title	Study Design	Population Sample	QIC Intervention Components	Outcome Indicators
4	A practice improvement package at scale to improve management of birth asphyxia in Rwanda: a before after mixed methods evaluation (Umunyana *et al.*, 2020)	Mixed methods before after design	220 health workers	1. Clinical mentoring through a structured mentorship program 2. Use of a Continuous Quality Improvement (CQI) model 3. On site visits and coaching 4. Data collection, review, and feedback sessions 5. Use of HBB (Helping Babies Breathe) protocols 6. Strengthening facility based newborn care training and resuscitation skills.	1. Improved identification and management of non-breathing newborns 2. Increased use of bag mask ventilation 3. Reduced neonatal mortality among newborns with birth asphyxia 4. Improved provider competency and performance in neonatal resuscitation.
5	Reduced neonatal mortality in a regional hospital in Mozambique linked to a Quality Improvement intervention (Cavicchiolo *et al.*, 2016)	Retrospective pre post implementation study (before after design)	4.276 neonates (2.118 pre intervention in 2013 and 2.158 post intervention in 2014)	The intervention included three main areas: 1. Infrastructure : room renovation, sanitation, mosquito nets. 2. Equipment : CPAP, pulse oximeters, UVB phototherapy, glucometer, CRP testing, infusion pumps. 3. Clinical Protocols & Training : neonatal resuscitation courses, video demonstration, on the job training, supervision of midwives.	1. Neonatal mortality rate dropped from 26% to 18%. 2. Mortality due to asphyxia decreased from 34% to 19%, prematurity from 43% to 33%, and sepsis from 39% to 28%. 3. Increased NICU admissions for asphyxia, prematurity, and sepsis
6	Quality improvement on reducing neonatal mortality through	Retrospective observational study (quasi experimental before after	All neonates treated during three periods: pre-intervention (2011–2013), intervention	1. Direct intensive regular clinical mentorship. 2. Scholarship program for pediatrician training.	1. Neonatal mortality rate. 2. Mortality due to asphyxia.

No	Article Title	Study Design	Population Sample	QIC Intervention Components	Outcome Indicators
	intensive Clinical Mentorship Intervention: a case study in Biak Regional Hospital, Papua Indonesia (Kresnawati *et al.*, 2025)	comparison)	(2014–2016), and post-intervention (2017–2020).	3. On site mentoring by experts in neonatal care including resuscitation, stabilization, and transport.	3. Early mortality (within 24 hours). 4. Survival rates for neonates with birth weight <1500g and 1500–2500g. 5. Referral death rate.
7	REFINE (Rapid Feedback for quality Improvement in Neonatal rEsuscitation): an observational study of neonatal resuscitation training and practice in a tertiary hospital in Nepal (Gurung *et al.*, 2020)	Pre and post intervention observational study	All eligible health workers in labor room	1. Workshop with hospital leadership 2. One day training on Helping Babies Breathe (HBB 2.0) 3. Technology orientation: NeoNatalie Live, NeoBeat HR meter, bag-mask with PEEP 4. Plan-Do-Study-Act (PDSA) cycles with performance dashboards	1. Primary: Intrapartum stillbirth or newborn death <24h. 2. Secondary: Time to apply NeoBeat, time to spontaneous breath, bag-mask use, Apgar scores, heart rate monitoring.

Implementation of QIC Frameworks Across LMICs

Structured and systematic Quality Improvement Collaborative (QIC) frameworks have been extensively implemented across low- and middle-income countries (LMICs) to address neonatal asphyxia. In the reviewed studies, QICs were commonly embedded within existing health system infrastructures, enabling their adaptation and operationalization in alignment with local contextual needs (Murki et al., 2018; Umunyana et al., 2020; Kresnawati et al., 2025). Team based problem solving, iterative learning processes, and accountability structures were frequently emphasized within these frameworks. Likewise, Quality Improvement Collaborative (QIC) models reported in the supporting literature have been used to highlight the importance of system-wide coordination, active stakeholder participation, and the incorporation of real-time feedback to enhance perinatal care outcomes (Mostafa et al., 2022; Russ et al., 2023).

Strategies Utilized in QIC Implementation

Plan-Do-Study-Act (PDSA) cycles, on-site mentorship, and collaborative learning sessions were commonly incorporated into Quality Improvement Collaborative (QIC) strategies. Within the reviewed studies, real-time coaching and mentorship were applied in settings such as Indonesia, Rwanda, and Malawi, where they were utilized to strengthen

adherence to neonatal resuscitation protocols and to lower the incidence of birth asphyxia (Umunyana et al., 2020; Mwalweni et al., 2024; Kresnawati et al., 2025). This approach was reinforced by supporting studies, in which mentorship was found to enhance skill retention and facilitate cultural transformation when routinely integrated into facility practices (Ghosh et al., 2019; Luo et al., 2022). Incremental improvements and adaptive learning within clinical teams were facilitated through the application of PDSA cycles, as demonstrated in the reviewed studies (Pietravalle et al., 2022; Russ et al., 2023; Mehndiratta et al., 2025)

Core Components of QIC Interventions

The core components of QIC interventions were found to vary across studies; however, they commonly encompassed clinical audit mechanisms, standardized clinical guidelines, on-site capacity development, and collaboration among multidisciplinary teams. In several studies, data dashboards and performance tracking tools were employed to identify service delivery gaps and foster accountability across different units (Murki et al., 2018; Pietravalle et al., 2022). Peer exchange and collaborative learning were facilitated through structured workshops, which were designed to promote shared ownership and collective responsibility for change (Peterson and Ranganna, 2023). It has been supported in the literature that the success of QIC components is influenced by the alignment of clinical guidelines with local practices and by the implementation of continuous feedback loops that inform decision making processes (Burgess-Shannon et al., 2024).

Outcomes Achieved Through QIC Models

Significant improvements in neonatal care delivery were reported through outcome indicators identified in the reviewed studies. Metrics such as improved adherence to neonatal resuscitation protocols, reduced rates of fresh stillbirths, and decreased early neonatal mortality were observed (Umunyana et al., 2020). These findings have been aligned with evidence from broader QIC implementations, in which improvements in clinical performance and reductions in neonatal mortality have been achieved through sustained intervention efforts (Balasundaram et al., 2025). In addition, the importance of triangulating quantitative metrics with qualitative perspectives from health workers has been emphasized in outcome evaluations, in order to elucidate the mechanisms underlying behavior change (Issen et al., 2018).

Enabling Factors Supporting QIC Success

The effectiveness of Quality Improvement Collaboratives (QIC) has frequently been attributed to enabling conditions, including strong leadership engagement, functional data systems, and well structured learning platforms. Evidence from studies conducted in Indonesia and Ethiopia underscored the critical role of institutional commitment and cross-disciplinary coordination in facilitating successful implementation (Kresnawati et al., 2025). The influence of organizational culture and communication practices on the effectiveness of Quality Improvement Collaboratives (QIC) has also been highlighted in the supporting literature. Improvements in care quality were more consistently achieved when motivated teams were empowered through structured mentorship and collaborative environments that enabled them to address systemic challenges (Huang et al., 2021).

Limiting Factors Hindering QIC Implementation

In contrast, several persistent challenges were identified, including shortages in human resources, insufficient infrastructure, and disruptions in supply chains. In Malawi and Uganda, for instance, the full implementation of Quality Improvement Collaborative (QIC) interventions was hindered by logistical limitations reported at facility level (Mwalweni et al., 2024). It was further emphasized in additional studies that gains from QIC efforts could be undermined by high staff turnover and the absence of protected time for quality improvement activities, unless these issues were addressed through appropriate policy or managerial support. To overcome these barriers, systemic reforms were considered necessary to ensure alignment of workforce allocation, capacity building, and resource management with established quality improvement priorities (Luo et al., 2022).

Impact on Neonatal Asphyxia Reduction

Notably, a reduction in the incidence of neonatal asphyxia was reported to some extent in all included studies, either through direct clinical outcomes or indirectly via proxy indicators such as enhanced resuscitation practices. These observed improvements illustrate the practicality of implementing QIC frameworks across diverse health care contexts, particularly when local adaptation and institutional commitment are prioritized (Murki et al., 2018; Kresnawati et al., 2025). It has also been emphasized in supporting literature that QIC contribute not only to improved clinical outcomes but also to the reinforcement of health system resilience through the cultivation of collaborative and data-informed organizational cultures (Russ et al., 2023).

Broader Implications and Future Directions

In conclusion, Quality Improvement Collaboratives (QIC) have been demonstrated to serve as effective frameworks for enhancing neonatal outcomes by leveraging structured learning, peer collaboration, and real-time monitoring of performance. Nevertheless, their long-term viability is contingent upon the establishment of supportive systems, sufficient infrastructure investment, and sustained leadership involvement. For enduring impact, especially in low and middle income countries (LMICs) where neonatal asphyxia remains a leading cause of mortality, the integration of QICs into overarching health system strategies is considered essential.

CONCLUSIONS

This scoping review has confirmed that Quality Improvement Collaboratives (QIC) are effective in addressing neonatal asphyxia by employing structured, team-oriented, and data informed methodologies. Clinical practices such as neonatal resuscitation, early essential newborn care, and adherence to established protocols were consistently enhanced across diverse implementation contexts. The effectiveness of QIC frameworks was supported by the integration of Plan-Do-Study-Act (PDSA) cycles, structured mentorship, collaborative learning sessions, and continuous data feedback mechanisms. Key enabling factors included active leadership involvement, interdisciplinary coordination, and overall system preparedness. Conversely, implementation was hindered by persistent challenges such as human resource

shortages, inadequate infrastructure, and logistical inefficiencies. Nevertheless, all reviewed interventions demonstrated measurable reductions in the incidence of neonatal asphyxia or related outcomes, thereby underscoring the potential of QICs to improve newborn survival in low and middle income countries. Future implementations of Quality Improvement Collaboratives (QIC) should be embedded within routine health system structures to promote sustainability. It is recommended that policymakers prioritize investments in workforce capacity development, ongoing mentorship, and robust data systems. The integration of QIC principles into national maternal and newborn care guidelines may facilitate their institutionalization across health systems. Furthermore, additional research is warranted to assess the long term impact and cost-effectiveness of QIC, especially in settings with limited resources. Strengthening health systems through scalable and collaborative quality improvement frameworks is regarded as essential to accelerating progress in the reduction of preventable neonatal mortality.

REFERENCES

Balasundaram, M., et al. (2025). *Improving commitment to family-centered care in the NICU: A multicenter collaborative quality improvement project*. **Journal of Perinatology** [Preprint]. https://doi.org/10.1038/s41372-025-02232-1

Burgess-Shannon, J., et al. (2024). Achieving optimal cord management: A multidisciplinary quality improvement initiative. *BMJ Open Quality, 13*(2), e002662. https://doi.org/10.1136/bmjoq-2023-002662

Cavicchiolo, M. E., et al. (2016). Reduced neonatal mortality in a regional hospital in Mozambique linked to a quality improvement intervention. *BMC Pregnancy and Childbirth, 16*(1), 366. https://doi.org/10.1186/s12884-016-1170-y

Foglia, E. E., et al. (2025). Ten steps to improve outcomes of in-facility neonatal resuscitation. *Resuscitation*, 110746. https://doi.org/10.1016/j.resuscitation.2025.110746

Ghosh, R., et al. (2019). Diagnosis and management of postpartum hemorrhage and intrapartum asphyxia in a quality improvement initiative using nurse-mentoring and simulation in Bihar, India. *PLOS ONE, 14*(7), e0216654. https://doi.org/10.1371/journal.pone.0216654

Gurung, R., et al. (2020). REFINE (Rapid Feedback for quality Improvement in Neonatal rEsuscitation): An observational study of neonatal resuscitation training and practice in a tertiary hospital in Nepal. *BMC Pregnancy and Childbirth, 20*(1), 756. https://doi.org/10.1186/s12884-020-03456-z

Huang, H., et al. (2021). Collaborative improvement in Scottish GP clusters after the Quality and Outcomes Framework: A qualitative study. *The British Journal of General Practice, 71*(710), e719–e727. https://doi.org/10.3399/BJGP.2020.1101

Issen, L., et al. (2018). Criteria for evaluating programme theory diagrams in quality improvement initiatives: A structured method for appraisal. *International Journal for Quality in Health Care, 30*(7), 508–513. https://doi.org/10.1093/intqhc/mzy063

Kresnawati, W., et al. (2025). Quality improvement on reducing neonatal mortality through intensive clinical mentorship intervention: A case study in Biak Regional Hospital, Papua-Indonesia. *BMJ Open Quality, 14*(1). https://doi.org/10.1136/bmjoq-2024-002862

Lawn, J. E., Bhutta, Z. A., Ezeaka, C., & Saugstad, O. D. (2023). Ending preventable neonatal

deaths: Multicountry evidence to inform accelerated progress to the Sustainable Development Goal by 2030. *Neonatology*. https://doi.org/10.1159/000530496

Luo, L., et al. (2022). Application of obstetric nursing-sensitive quality indicators in continuous quality improvement. *American Journal of Translational Research, 14*(1), 643–655. https://www.ncbi.nlm.nih.gov/pubmed/35173882

Mehndiratta, A., et al. (2025). Quality improvement collaborative to increase access to caesarean sections: Lessons from Bihar, India. *BMJ Quality & Safety, 34*(6), 404–412. https://doi.org/10.1136/bmjqs-2024-017454

Mostafa, F. A., et al. (2022). Reducing central-line–associated bloodstream infections (CLABSI): An improvement project in a specialized tertiary hospital. *Global Journal on Quality and Safety in Healthcare, 5*(4), 84–92. https://doi.org/10.36401/JQSH-22-4

Murki, S., et al. (2018). Quality improvement collaborative for preterm infants in healthcare facilities. *Indian Pediatrics, 55*(9), 818–823. https://www.ncbi.nlm.nih.gov/pubmed/30345992

Mwalweni, C., et al. (2024). Evaluation of criterion-based audit in improving quality of neonatal birth asphyxia care at Balaka District Hospital in Malawi. *Maternal Health, Neonatology and Perinatology, 10*(1), 21. https://doi.org/10.1186/s40748-024-00191-7

Peterson, J., & Ranganna, R. (2023). Embracing change: A quality improvement project to introduce deferred cord clamping. *Hospital Pediatrics, 13*(3), 265–273. https://doi.org/10.1542/hpeds.2022-006681

Pietravalle, A., et al. (2022). Impact of quality improvement bundle on neonatal mortality in a district hospital in Tanzania. *Children, 9*(7). https://doi.org/10.3390/children9071060

Raina, N., Khanna, R. K., Gupta, S., Jayathilaka, C. A., Mehta, R., & Behera, S. (2023). Progress in achieving SDG targets for mortality reduction among mothers, newborns, and children in the WHO South-East Asia Region. *The Lancet Regional Health – Southeast Asia*. https://doi.org/10.1016/j.lansea.2023.100307

Russ, S. J., et al. (2023). An introduction to quality improvement. *Journal of Clinical Urology*. https://doi.org/10.1177/20514158221075405

Sawyer, T., Umoren, R. A., & Gray, M. M. (2016). Neonatal resuscitation: Advances in training and practice. *Advances in Medical Education and Practice, 8*, 11–19. https://doi.org/10.2147/AMEP.S109099

Sharrow, D., et al. (2022). Global, regional, and national trends in under-5 mortality between 1990 and 2019 with scenario-based projections until 2030: A systematic analysis by the UN Inter-agency Group for Child Mortality Estimation. *The Lancet Global Health, 10*(2), e195–e206. https://doi.org/10.1016/S2214-109X(21)00515-5

Umunyana, J., et al. (2020). A practice improvement package at scale to improve management of birth asphyxia in Rwanda: A before-after mixed methods evaluation. *BMC Pregnancy and Childbirth, 20*(1), 583. https://doi.org/10.1186/s12884-020-03181-7