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A scoping review of the relational aspects of networks of care for maternal and newborn health: informing a revised operational framework

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Abstract

Objective We investigated the relational aspects of the "Networks of Care" (NOC) approach to define their role and highlight their importance. These relational aspects distinguish NOCs from other health system-strengthening approaches that aim to enhance the quality of MNH care. NOCs include functional and relational aspects, as defined in the WHO NOC for MNH framework, and offer a promising strategy for enhancing maternal and newborn health (MNH) by strengthening care coordination at an operational level.

Methods We conducted a cross-disciplinary (healthcare, business, military, aviation, education) scoping review of 95 papers and consulted with key stakeholders (21 people) to identify and synthesize insights about relational aspects and the associated barriers and facilitators for implementation. We then used the literature review findings and stakeholder feedback to revise the Networks of Care Operational framework.

Results The revised framework highlights teamwork attributes—trust, respect, shared goals, shared values, and psychological safety, and behaviors - leadership, communication, shared decision-making, situation monitoring, and mutual support. To mitigate barriers and strengthen teamwork facilitators, organizational enablers (role clarity and policies, performance management, and coordination) were identified as crucial for NOCs.

Conclusion The resulting framework centers on relational coordination, including teamwork supported by organizational enablers, in enhancing care coordination between health workers, system administrators, and other users and non-health actors in the NOC. By targeting relational elements in intervention design and evaluation, the revised Operational NOC Framework for MNH may be valuable in strengthening NOC effectiveness and driving quality improvements, leading to improved MNH outcomes and resilient health systems.

Keywords Teamwork, Networks of care, Relational coordination, Maternal health, Framework

1 Introduction

Despite progress made in reducing maternal and newborn mortality rates globally over the past 30 years, the rates have stagnated since 2015 [1]. Access to adequate maternal and newborn health services remains unequal across countries, with sub-Saharan Africa showing the least progress. We are far from achieving the maternal and perinatal SDG goals for 2030, and urgent action is needed [2]. Efficient coordination of healthcare services involves the institutional pillars of the healthcare system, as well as the human factors and relational processes that facilitate the delivery of effective, timely, and high-quality care. Unfortunately, insufficient understanding of how MNH services are coordinated through these relational processes across and within multiple service points along the continuum of care has resulted in missed opportunities to improve services, especially in resource-constrained settings.

The Networks of Care (NOCs) approach for maternal and newborn health has become an increasingly important concept in global health. The World Health Organization (WHO) and its collaborators define NOCs as "collections of public and/or private health facilities and health workers deliberately interconnected to promote multidisciplinary teamwork and collaborative learning to provide comprehensive, equitable, respectful, person-centered care from home/community to primary through to tertiary levels" [3]. NOCs or "purposefully interconnected service delivery touch points" are characterized by coordination across the multiple touchpoints and operational levels of care for mothers and newborns [4]. Beginning in 2019, the World Health Organization and others developed a framework to describe the NOC concept as an alternate systems approach to improve maternal and newborn health and strengthen primary healthcare services in low- and middle-income countries where the global burden of maternal and newborn mortality remains very high [3]. This multi-partner effort involved WHO, the United States Agency for International Development (USAID), the Bill and Melinda Gates Foundation, the Clinton Health Access Initiative, Jhpiego, and others who have experience with integrated maternal and newborn health programs [5].

While the idea of coordination of services is not new, the NOC approach differentiates itself from conventional service delivery models by emphasizing the "relational" aspects of coordination and recognizing their role in addition to the structural components of the healthcare system. These "relational" aspects refer to the often overlooked "soft skills," which are the human factors or interpersonal and social interactions and processes that drive organizational function. Specifically, NOCs for MNH which goes beyond referral systems would encompass the processes by which MNH services are organized and delivered at the community level, linked to health centers and subsequently to hospitals and advanced specialist care. In addition, the organization of these services through coordination meetings, clearly defined protocols, and regular, frequent communication to review, assess and promote adaptive learning for enhanced service delivery. For instance, in a rural district, a pregnant woman identified with high blood pressure during an antenatal visit at a primary health center is rapidly linked through an established NOC. The nurse at the health center immediately consults with a midwife and a physician at the district hospital via a WhatsApp group created for maternal emergencies. A community health worker accompanies the woman to the hospital, where staff are already prepared to receive her because of the prior communication. After treatment, follow-up care is coordinated through regular review meetings between the

hospital, the primary health center, and community health workers. The effectiveness of this process depends not only on the individual actors but also on the deliberate coordination and management of the NOC, including clear protocols, designated focal persons, and routine communication mechanisms that ensure accountability and adaptive learning across all levels. Therefore, NOCs purposefully integrate relational processes with structured oversight to achieve seamless, responsive, and person-centered care for mothers and newborns.

Unfortunately, these relational aspects, generally identified as communication and collaboration, are often assumed to be intact and yet are poorly defined, hindered by ingrained hierarchies, gender, cultural, or other structural barriers. Literature from high-income countries shows that interpersonal, inter-organizational, and intra-organizational relationships are crucial in improving patient care and outcomes [6–8]. Several case studies from low- and middle-income countries (LMICs), including Madagascar, Nepal, Nigeria, the Philippines, and Tanzania, studied the elements of NOCs for Maternal and Neonatal Health. These studies highlighted the role of intentional collaboration and communication in establishing and coordinating functional referral systems, promoting community engagement with healthcare facilities, and strengthening service delivery systems. These relational aspects of NOCs were also critical in adapting to challenging or changing conditions toward improving outcomes [9–13].

The original NOC operational framework is theoretical and may be challenging to apply at the country and subnational levels for health systems looking to adopt the NOC approach [14]. Therefore, there is a need for a more granular understanding of the relational components of the NOC model framework and its application, particularly for low—and middle-income countries [4, 15].

The aim of the review was to synthesize evidence on the relational characteristics, enablers, and barriers that define networks of care across sectors in order to develop a revised operational framework for their application in low- and middle-income countries. The research questions guiding this scoping review were: (1) What are the characteristics of relational aspects of inter and intra-organizational collaboration that apply to networks of care for maternal and newborn health? (2) What are the barriers, enablers, and facilitators of inter and intra-organizational collaboration that apply to networks of care for maternal and newborn health?

By systematically reviewing and understanding relational aspects, we can better define and identify how to apply the NOC approach, measure and act on the relational aspects, and ultimately improve MNH service delivery. This study addresses the existing knowledge gap with NOCs by synthesizing cross-sectoral evidence and proposing a revised operational framework that provides practical guidance for implementing and measuring NOCs, particularly in resource-constrained low and middle income country contexts.

2 Materials and methods

We used a three-part process: (1) a scoping review of both the published and grey literature, utilizing database searches, reviews of relevant program reports, citations shared by experts, and citations in referenced papers, (2) stakeholder consultations, and (3) development and iteration of a revised framework.

2.1 Scoping review

We conducted a scoping literature review of relational aspects and definitions of these aspects in relation to organizational networks. Given the nascent literature on networks of care in global health, we also searched other sectors, including business, psychology, sociology, organizational behavior, military, and aviation, in addition to healthcare. The initial search was conducted between July and September 2023; an updated search was conducted on February 14, 2025. This scoping review was completed in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist, which was assessed and overseen by the research team (OF, DW, AJ). Please see supplementary material S1 - Prisma checklist_filled. We searched for literature exploring the aspects or factors associated with improved performance in intra-organizational and inter-organizational collaborations, partnerships, or networks. We searched for all available literature and did not apply limits to the date or geography. We searched Pubmed, and Scopus. We consulted public health and business experts at the onset and reviewed some preliminary literature referred to us. We used their insights to refine the search strategy and search terms. Following the Joanna Briggs Institute three-step strategy [16], we initially searched for '*Networks of care*' in Pubmed. After reviewing the common words, we identified from the titles and abstracts of search results, we generated a list of keywords to refine the search strategy. Applying these keywords, which included inter-organizational, intra-organizational, collaboration, relational coordination, networks, maternal healthcare, teamwork, facilitators, enablers, and barriers, we conducted a more detailed search in the selected databases. Finally, we reviewed the reference lists and "cited by" articles of the full-text reviewed papers to identify additional papers missing from our search strategy to be included in the study. The search strategy for both databases was: ((("Inter-organizational collaboration" OR "Intra-organizational collaboration" OR teamwork OR "Effective teamwork" OR "Organizational effectiveness" OR "relational coordination")) AND (("health care" OR healthcare OR "maternal health services" OR "Healthcare organizations" OR organizations OR aviation OR military OR business OR industry))) AND (enablers OR barriers OR facilitators).

We excluded systematic reviews and articles not published in English. We used systematic reviews to confirm that we accessed all relevant literature.

2.2 Study selection

After completing the database and grey literature searches, the retrieved records were exported into Excel. Duplicates were first identified and removed using the sorting and conditional formatting functions in Excel. Subsequently, to ensure that all duplicates were removed, the records were reviewed with Zotero, the reference management software. We conducted an initial title screen of the search outputs, followed by abstract and full article screens. In reviewing the abstracts, we excluded articles that had no direct link with the objectives and scope of the literature review, study protocols, and articles that focused on training or education for interdisciplinary collaboration. We also excluded papers that explored relationships between providers and patients. We included all studies published in each database until February 14, 2025. OF led the screening process, while DW and OF met regularly to review articles that did not fit the exclusion criteria to agree on inclusion or exclusion.

2.3 Data extraction

We extracted the data from the retrieved papers into a standardized Excel template. Extracted information included title, authors, doi or website, year of publication, abstract, a summary of the article's contents, and the relational aspects identified. We then synthesized the findings based on commonly occurring themes. We conducted a manual analysis using Excel along three dimensions that would inform the revised framework: (1) definitions of relational aspects in inter/intra-organizational collaborations or networks, (2) facilitators and barriers of relational aspects, and (3) envisioning strategies for improving relational aspects.

2.4 Stakeholder consultations

Before conducting the scoping review, DW and AJ met with colleagues from WHO, USAID, and other MNH experts from partner organizations during the International Maternal Newborn Health Conference in Cape Town in May 2023. Feedback from the stakeholders, a mix of country and global MNH experts, and policymakers indicated that conceptually, the NOC model was clear, but articulating and understanding the relational components and their placement and application in the existing framework was more challenging.

During the summer of 2023, concurrently with the scoping review, our team (DW, AJ, OF) conducted individual virtual discussions with 21 experts specializing in MNH and global health, drawn mainly from the WHO-led NOC steering committee and some country government officials from Ghana, Zambia, and Indonesia whom they recommended. They represented a range of organizations and institutions, including the WHO and the World Bank, academic institutions such as Stanford University, bilateral and donor agencies including USAID and the Gates Foundation, and various Non-Governmental Organizations (NGOs) and country programs like MOMENTUM, Jhpiego, Institute for Healthcare Improvement (IHI), and the Clinton Health Access Initiative (CHAI). 13 of them represented global organizations, and eight were country-based. We also sought input from two business school professors from Stanford University and University of California, Haas Business School.

The primary objective of these discussions was to gather diverse perspectives on applying the NOC framework in the LMIC context. The informal discussions followed a semi-structured discussion guide, with five questions about participants' perspectives on the relational processes that make NOCs function and what would be most useful for in-country health system managers in LMICs looking to implement an NOC model. The team met and reviewed individual notes from these virtual discussions and synthesized the main themes from them. Feedback from stakeholders indicated that conceptually there was a clear understanding of the components that are required for an NOC based on the definition, but operationalizing the relational components was more challenging. This is partly due to the nature of trying to define, train and standardize collaboration, trust, and leadership within a health facility and health system. A well-functioning MNH referral system was the most cited example of a practical application of an NOC – requiring structural and relational aspects – the staff and transport, (structural) as well as the teamwork and communication and collaboration among providers at health centers, and support from community health workers in some cases.

We noted some key differences between how stakeholders who worked at a global level and those who were local implementers at the country level described networks of care. While there was consensus that communication, collaboration, and teamwork were critical, global stakeholders provided perspectives that were more focused on health system strengthening and tended toward an emphasis on how to measure impact and standardize processes for scalability. Stakeholders with a country-level, implementation lens, in contrast, shared and highlighted their experiences and challenges implementing a version of a NOC, and noted the importance of strong leadership and local government buy-in. These comments also helped reinforce the re-visioning of a framework that is actionable and that can be linked to targeted interventions for teams, facilities, and systems. Another common theme from the consultations were comments about issues related to hierarchy and gender that persist in nearly all settings. And while healthcare is inherently hierarchical, stakeholders reinforced the importance of focusing on interdisciplinary teamwork, collaboration, and trust. Multiple stakeholders also mentioned joint decision-making, conflict resolution, and accountability as critical elements for an enabling environment and a successful NOC. The discussions with key stakeholders were consultative and did not involve collecting, recording, analyzing, or reporting specific interviewee data; thus, the work was exempt from human subject (IRB) review.

2.5 Development of a revised operational framework and definitions

Through the scoping review and the feedback from the MNH experts we consulted, we identified the core relational elements and organizational processes to inform a revised NOC operational framework. The revised framework is conceptualized from an applied perspective that implementers, systems, and policy decision-makers can use to guide interventions and approaches to strengthen NOC. We reviewed existing definitions from various sources related to healthcare, and based on expert opinion, we generated definitions that most appropriately describe the relational aspects of the NOC.

3 Results

The article selection process is summarized in Fig. 1. The search yielded 3,722 unique records drawn from online databases and grey literature. We subsequently excluded 3,597 ineligible records through the title and abstract review and fully reviewed 125 records, which included three articles found through reference checks. We then assessed these for eligibility and identified 93 eligible articles, and two program reports included in the scoping review. The final list of included articles is in Supplementary material S2.

3.1 Characteristics of the included articles

Among the reviewed articles, 83% focused on high-income and upper middle-income countries, while only 8% focused on low- and middle-income countries. In 9% of the articles reviewed, no country was specified (eight articles), or they included a mix of countries (two articles). The low-income and lower-middle-income countries represented were Ethiopia, Malawi, Ghana, India, the Philippines, and Zambia. The United States and Canada accounted for 46% of all articles from high-income countries. 89 of the articles were from the healthcare sector. Most of the studies (69%) used qualitative methods, followed by quantitative (11%) and mixed methods (6%). Over the past decade, there has been an increase in the number of articles published in this area. The

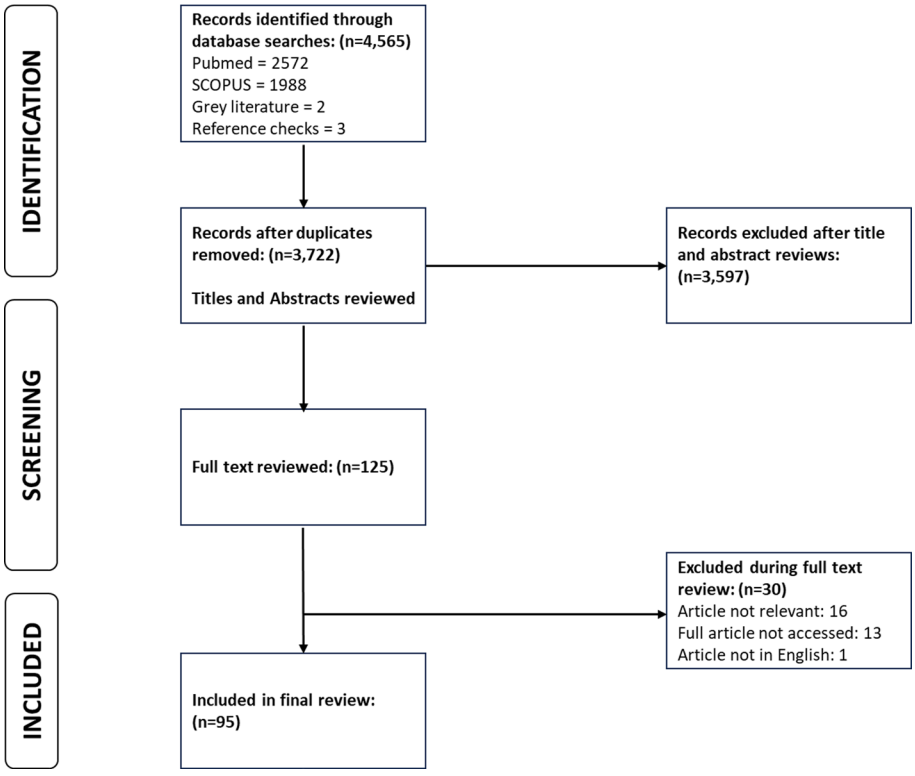

Fig. 1 Article selection and screening

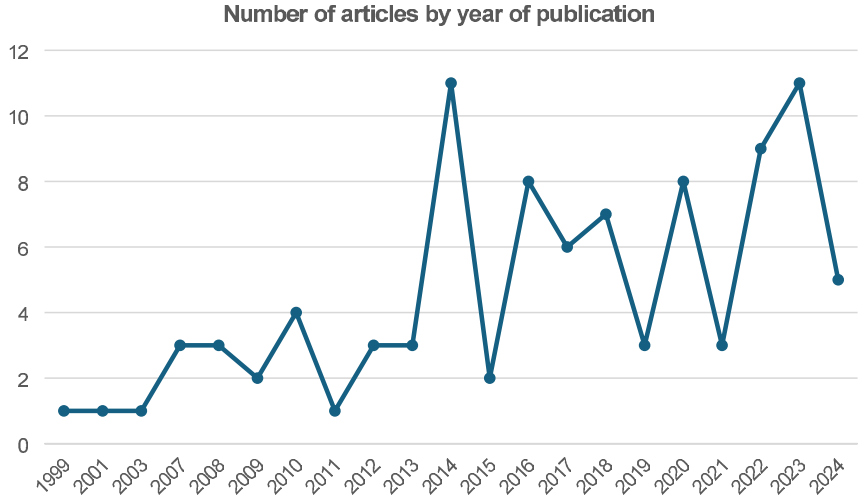

Fig. 2 Number of articles reviewed by year of publication (*N* = 95)

distribution of the articles by year of publication is shown in Figure two, and the number of articles by country is shown in Figs. 2 and 3.

4 Findings of the scoping review

4.1 Relational aspects – attributes and behaviors

Almost all articles referenced trust, mutual respect, shared goals, and shared values as key attributes of relationships or social interactions that make collaboration possible.

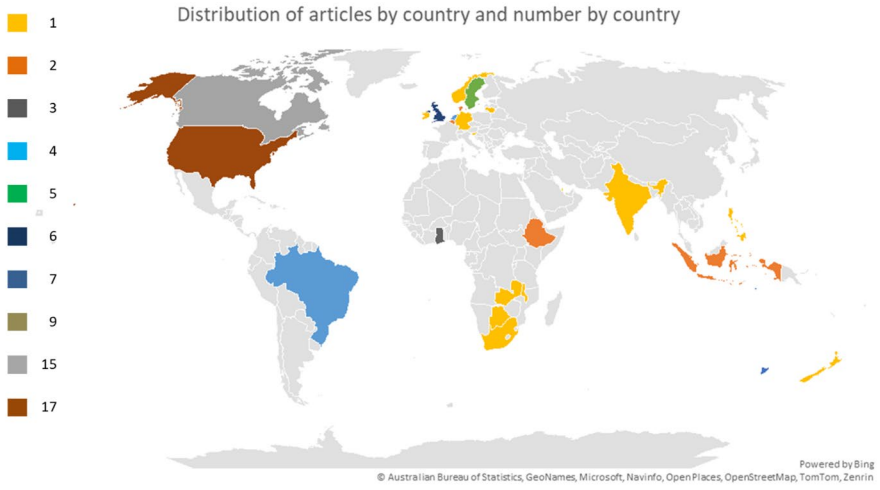

Fig. 3 Number of articles reviewed by country

Trust-building was often cited as a foundational relational element for ensuring effective coordination of collaboratives. Studies emphasized key characteristics of trust, including that partners and stakeholders have a shared knowledge of each other's roles and expertise and how they contribute jointly to achieving the shared goals of the collaboration [17–20]. Linked to trust, some articles highlighted the roles of conflict and conflict management and other key dynamics related to power and hierarchy in influencing the development of trust between collaborating parties [21–25]. While critical in forming and maintaining networks, trust is dynamic and non-linear. In addition to trust, almost all the articles identified the role of mutual respect among collaborators in fostering collaboration and reducing conflicts, leading to greater trust and better communication and teamwork [26].

Most articles reviewed strongly emphasized shared values and a common goal as key components of collaborative engagements that improve coordination. Several studies identified the value of aligning toward a shared vision, such as patient-centered care. Patient-centered goals are useful in creating a value proposition for all stakeholders in the network and reduce interpersonal, interprofessional, inter-organizational, and intra-organizational tensions that may arise from differences in priorities [19, 27–30]. Some articles highlighted how a shared mental model, or having a shared goal and vision, enhances trust building, reduces conflict within the collaboration, and, in turn, drives team effectiveness and satisfaction [31, 32]. Having a shared mental model focusing on quality healthcare services and patient health outcomes can improve coordination and overall team effectiveness [33].

Another key attribute frequently identified from the review is psychological safety. This builds on interpersonal trust being developed within a team and fosters teamwork in the coordination of care. Articles linked the facilitatory role of leadership to the development of psychological safety, which creates the enabling environment for conflict resolution, deepening of trust, clarity of roles, and feeling supported to take risks and try new things without fear of failure or blame [25, 33–36].

A majority of the studies identified behaviors, such as leadership and communication as essential for enhancing coordination and teamwork both within the same units or organizations, or between organizations [37–43]. A leader who fosters collaboration,

coordination, and shared decision-making was consistently identified as important to effective teamwork [12, 44]. Leaders committing to a collaborative environment and culture was highlighted as important for care quality and coordination [22, 27, 34, 45–47]. A leadership structure that supports shared goals, values, and vision, fosters teamwork, and has mechanisms for managing conflicts and enhancing psychological safety will promote successful collaboration [23, 36, 47, 48]. Some of the articles also highlighted the role of leadership, especially institutional leadership, in driving joint planning and coordination across teams and groups of stakeholders in building relationships [17, 46].

Most of the articles highlighted effective communication as a key behavior of both inter- and intra-organizational collaboration. Communication between stakeholders and partners should be frequent, open, and consistent, fostering joint problem-solving, planning, and relationship-building [17, 24, 35, 38, 49–51]. Several articles also identified the importance of creating avenues for communication, including regularly scheduled meetings, huddles, or debriefs to facilitate teamwork and cooperation, as these platforms enable the identification and timely resolution of problems, thereby reinforcing and promoting the shared commitment to defined outcomes [20, 24, 30, 33, 52–55].

4.1.1 Barriers and facilitators of relational elements

Many articles identified barriers and facilitators that influence the relational elements necessary for optimal collaboration and coordination. These barriers and facilitators are broad and diverse, ranging from interpersonal relationships and conflicts to a poor understanding of overly complex goals to systemic or structural barriers that hinder collaboration. These are presented in Table 1.

The nine articles from low-income and lower-middle-income countries were more likely to identify systemic barriers to collaborative relationships and care coordination. The "Networks of Practice" approach implemented in Ghana highlighted key systemic and structural issues, such as weak health system governance, lack of political will, and poor healthcare financing, which may impact the development and sustainability of the relational elements. Although not extensively identified, power dynamics and hierarchies (especially between physicians and other professionals) [22, 55, 58, 69, 72], and less highlighted, gender [76], were additional barriers identified.

4.1.2 Strategies to promote teamwork

Some of the studies assessed or described strategies that have been implemented to enhance teamwork and coordination. The majority of these strategies were organizational strategies. Several organizational strategies were recurrent across studies and can be grouped into three main categories: (1) Role clarity and standardized processes, (2) Performance management systems, and (3) Coordination processes.

Role clarity and standardized policies Some of the studies described formalized processes for information sharing, planning, and problem-solving around a shared goal. Some studies identified the need to establish clear frameworks to ensure stakeholders are aligned on the shared goal, purpose, and expected outcomes for the collaboration [12, 19, 25, 32, 41, 44, 65, 77–79]. These studies also identified the need to define roles and responsibilities. This includes clear job descriptions and the adoption of standardized

Table 1 – Barriers and facilitators to relational aspects in networks of care

Barrier	Description
Unresolved conflicts	Conflict in interdisciplinary healthcare teams, often inevitable, can democratize relationships and spark creativity. It provides an opportunity for diverse voices to be heard, promoting shared power in decision making and collective autonomy [21, 54, 56, 57, 58]. It can weaken interpersonal relationships and lead to erosion of trustA Team meetings were emphasized as crucial for addressing conflicts
Lack of a mutual understanding of the purpose of the collaboration	Without a common and clearly defined shared purpose (shared goals), there is lack of cohesion threatening shared ownership for the desired results of the collaboration [44, 59]
Overly complex goals and targets	At an organizational level, setting complex goals and targets that are unachievable could dampen motivation among stakeholders
Systemic barriers	Includes staffing shortages or high turnover which contribute to staff overload and inadequate time to participate in activities that promote coordination; lack of institutional leadership support, insufficient funding, and lack of relevant supporting infrastructure e.g. communications are also important [22, 38, 60, 61, 62, 63, 64]
Hierarchy	The pre-existing hierarchy in relationships between different professions in healthcare was strongly identified as a major barrier to collaboration and coordination [32, 65, 66]
Facilitator	Description
Interpersonal relationships and social ties	Social ties and interpersonal relationships play an important role in collaboration. A lack of familiarity and pre-existing personal relationships affects the development of trust and respect in the collaboration between clinical and community-based social service organizations [67]
Boundary spanning roles	The role of "boundary spanners" or staff who work across different boundaries (organizational, professional, geographical) was highlighted. These boundary spanners were noted as necessary for maintaining commitments towards the shared goals for the collaborative efforts across the different groups in the network [21, 22, 27, 68, 69, 70]
Geographic or physical proximity	Co-location of stakeholders or team members can foster or accelerate the process of developing team shared mental models and commitments to defined shared values and goals for the collaboration [42, 67, 70, 71, 72, 73] Co-location of team members also contributes to frequent, timely and accurate communication and promotes joint problem solving and shared decision making [20, 22, 51, 57, 61, 71, 72, 74, 75]

tools, protocols, checklists, and standard operating procedures (SOPs), which can help reduce variation in service delivery and improve coordination between stakeholders.

Performance management Studies described the need for a management framework that defines the mechanisms for collaboration and expectations for all stakeholders, accountability, and measures to assess whether the collaborative effort is yielding the desired results. Several studies identified decision-making and accountabilitymechanisms as key factors that contribute to the success of collaborative efforts [12, 20, 27, 28, 77, 80]. These processes include conducting audits [71], performance measurement of the collaborative and mutual performance monitoring [80–84].

Some studies identified the importance of applying organizational performance tools such as Lean management or Plan-Do-Study-Act (PDSA) to conduct gap analyses and identify solutions to improve care coordination [75]. Lean management, a business organizational framework which aims to improve performance by eliminating waste and improving process efficiency, has been found to positively impact improving teamwork, communication, and coordination among health workers [85, 86]. Kerrissey et al. expanded on the need for instituting processes for measuring performance, addressing conflict, correcting mistakes in a timely fashion, and standardizing how these performance audits are done [67].

Other strategies identified include setting measurable targets, measuring them, and rewarding performance [81], as well as focusing on the performance of teams instead of individuals [82]. Mechanisms to maintain team stability, by minimizing staff turnover and attrition, which helps to strengthen social ties and interpersonal relationships, were cited as crucial to enhancing the performance of collaborative engagements. This applies to intra-organizational and inter-organizational teams that comprise the NOC.

Coordination Almost all the studies highlighted three main strategies to enhance coordination. These include: (1) Creating opportunities for physical connections and co-location. These could be through meetings, huddles, and other engagements [32, 41, 51, 57, 60, 67, 87, 88], ; (2) Providing information and communication technologies to enhance communication and frequency of communication [32, 89–91], ; and (3) Identifying and assigning a coordination agent. The individual ensures that processes in place are working and identifies issues that may emerge or need addressing [51, 79, 92].
Strategies identified for strengthening teamwork at the relational level include team training, leadership training, and formalized communication tools and training. Some studies identified the role of intentionally strengthening leadership capacity to foster teamwork and build trust and transparency [32, 67]. This includes building leadership capacity in teamwork, collaboration, shared decision-making, and network oversight. Studies found that leadership involvement in identifying problems and shared decision-making to identify and implement solutions can strengthen collaborative relationships in healthcare service delivery [20, 80].

Most articles often highlighted the need to train staff in both task expertise and teamwork. According to the research conducted by Wise et al., the effectiveness of a team is not solely dependent on the individuals' skills and competence to carry out their designated task but also on their ability to coordinate with each other [40, 73, 81, 82]. The Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) training is one patient safety training program designed to strengthen teamwork. TeamSTEPPS aims to enhance communication and teamwork in healthcare settings by providing healthcare professionals with the necessary tools and strategies to work collaboratively toward a common goal [93, 94].

4.2 Revised operational framework and definitions

In the review, we came across popular frameworks that have been used to assess integration, collaboration, and coordination including the network theory [95], and the competing values frameworks [96]. However, the Relational Coordination (RC) theory [75, 97] stood out among the theories we identified and appears to be the most suitable basis for the relational elements of NOCs for LMICs.

Effective communication and coordination are crucial for achieving desired outcomes in highly interdependent and time-sensitive work, according to the RC theory developed by Joy Hoffer Gittell in the mid-1990s based on an in-depth field study of airline flight departures (Fig. 4) [75]. It expanded on previous work done on coordination. The relational coordination theory proposes that "relationships with shared goals, shared knowledge, and mutual respect are critical to support frequent, timely, accurate, problem-solving communication, and vice versa, enabling stakeholders to effectively coordinate their work across boundaries" [75]. Shared goals, mutual respect and enhanced

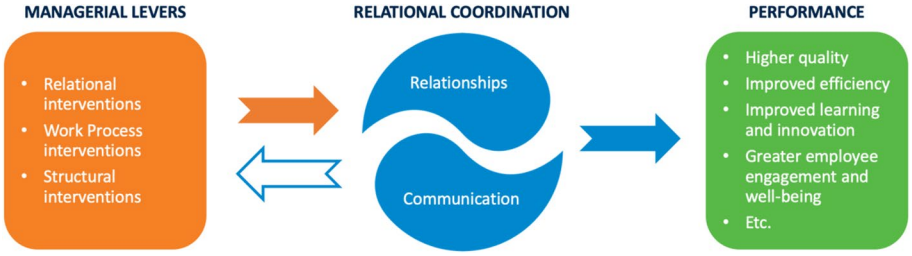

Fig. 4 Interventions to strengthen Relational Coordination [102]

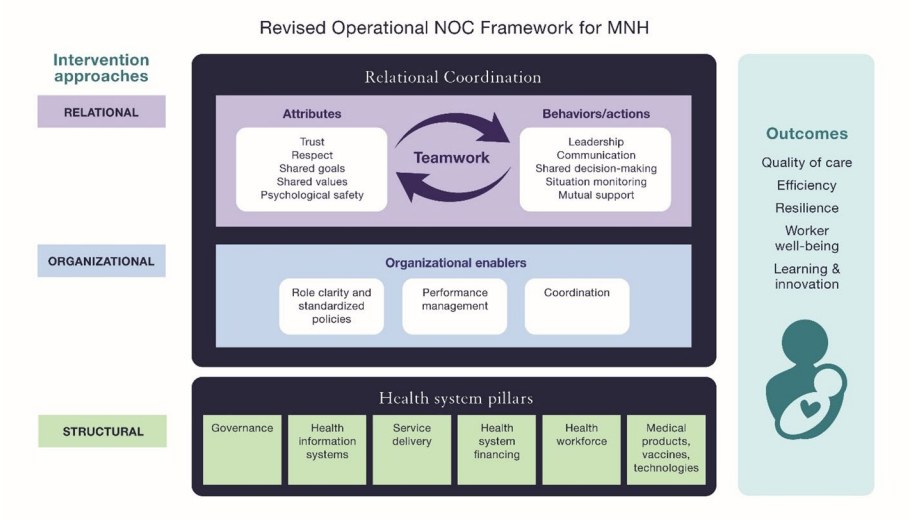

Fig. 5 Revised Operational NOC Framework for MNH

communication were found to be foundational among effective Networks of Care in the 2020 scoping review and case studies [4], hence the Relational Coordination Theory is in agreement with previous literature about NOC.

When RC is applied to healthcare, studies suggest it can lead to improvements in the quality of care, increased provider job satisfaction, patient-reported care continuity, and adaptive learning [6, 98–101].

Including the synthesis of the literature review and the feedback from the MNH experts at the global and country levels, we adapted the relational coordination theory to develop a revised Operational NOC Framework for MNH (Fig. 5). This revised framework takes an applied perspective, aiming to serve as a guide that implementers, systems, and policy decision-makers can use to establish and strengthen NOCs. The revised framework, building on the original framework, has two main aspects for a functional NOC model – (1) Structure – made up of the WHO health systems building blocks) and (2) Relational Coordination, subdivided into teamwork and organizational enablers.

4.2.1 The revised operational NOC framework for MNH

Synthesizing the concepts of teamwork, organizational enablers, and the health system pillars that make NOCs operational and functional, we developed a revised Operational Framework for NOCs emphasizing the relational aspects and how they layer on the structural aspects. Figure 5 illustrates the revised framework we developed. In this

framework, Relational Coordination for NOC includes teamwork and organizational enablers within dynamic and iterative processes that encourage adaptive learning and lead to improved performance or outcomes.

After developing the revised framework with some iterations based on stakeholder feedback, we felt it was necessary to modify the NOC definition to reflect better the dynamic processes and mechanisms by which an effective NOC can drive improved outcomes. This includes acknowledging the role of formal and informal relationships and interdisciplinary teams and is proposed as follows:

> *Networks of Care for maternal and newborn health exist along a spectrum, ranging from informal to formal collaborations within and between public and private health facilities. These networks bring together interdisciplinary teams and rely on structural, organizational, and relational processes, and adaptive learning, to deliver high-quality, equitable, respectful, and person-centered care from the household level through primary to tertiary care.*

Based on feedback and suggestions from the stakeholder consultations, we developed an illustrative practical application for this NOC framework (Table 2) that focuses on both intra- and inter-organizational interventions. Importantly, it identifies both the Who, What and How that are key to implementation. This requires bringing together the appropriate actors to be able to assess their service delivery models in the context of NOCs from structural, relational, and organizational aspects of making the networks function.

The table highlights how NOCs operate through distinct but complementary processes at both intra-organizational and inter-organizational levels. Within facilities, managers and clinical teams strengthen collaboration by fostering clear roles, structured routines, and performance management practices that enhance teamwork and accountability. These relational processes ensure that frontline staff have shared goals and communication mechanisms to deliver timely, respectful, and person-centered care. At the inter-organizational level, coordination extends beyond a single facility to encompass district and state managers, technical working groups, and multiple service delivery points. Here, the emphasis shifts toward harmonizing policies, conducting joint data reviews, and convening cross-facility coordination platforms that promote alignment and adaptive learning. Together, these practices reveal that NOCs are not merely referral linkages, but relational systems deliberately managed to embed trust, respect, and shared decision-making across all levels of care. For LMICs, operationalizing these dynamics is critical to bridging gaps in service delivery and achieving continuity of maternal and newborn care.

4.3 Defining the teamwork attributes and behaviors

Our review and consequent operational framework depict teamwork as a dynamic state in which attributes and behaviors are mutually reinforcing. We reviewed existing definitions of the identified attributes and behaviors that comprise teamwork and, through expert opinion and review, we generated definitions that most appropriately describe teamwork in the context of NOC (Table 3).

For each of the three organizational enablers, we identified core strategies synthesized from the literature review as listed in Fig. 6.

Table 2 Illustrative practical application of the revised framework for NOC implementation in an LMIC setting

	Intra-organizational (e.g. within a health center)	**Inter-organizational (e.g. district level)**
WHO	Facility Manager Head of Department Clinical Team Outreach coordinator	District Manager State Health Director/Coordinator National Program Coordinator Supply Chain Management Director or Referrals Coordinator
WHAT	Collaboration, teamwork, and communication among colleagues within the facility to coordinate maternal and newborn health care.	Collaboration, teamwork, and communication across different facilities and system levels to ensure continuity and coordination of maternal and newborn health care.

Table 2 (continued)

	Intra-organizational (e.g. within a health center)	Inter-organizational (e.g. district level)
HOW	Relational	
	1) Coach and mentor other staff on team goals, shared vision, and teamwork; resolve conflicts 2) Recognize and reward high performing teams or staff/members in the facility or community outreach team 3) Conduct regular debriefs after clinical procedures or activities e.g. immunization outreach campaign 4) Encourage learning, and innovation by focusing on what is working and what can be improved 5) Develop and reinforce importance of team goals, values and norms	1) Train facility managers on leadership skills and teamwork and provide ongoing coaching support to facility managers 2) Recognize and reward high performing facilities or districts, and develop support plans for lower performing facilities/districts 3) Co-develop shared goals, values and expected results for the district/region/state 4) Regularly hold review meetings to problem-solve, make joint decisions, and update program targets and expected results based on progress 5) Employ participatory and inclusive leadership style to foster a psychologically safe space for learning, innovation and growth
	Organizational	
	Role Clarity and Standardized processes	
	1) Develop Job descriptions and clearly define individual roles 2) Develop policies, protocols and SOPs for key processes in the facility e.g. inventory management practices, conflict resolution policy	1) Develop key policies for the district/region/state e.g. referral policy, respectful maternity care policy, HR policy 2) Develop a vision, and short-term objectives and key results for the district, and regularly update and share with all facilities 3) Set clinical standards and adapt or develop applicable guidelines and process SOPs e.g. stock requisition and resupply 4) Assign key roles with clear descriptions for essential functions e.g. roles for MNH coordinator for the district
	Performance Management	
	1) Conduct regular data reviews and track progress towards facility and district key results 2) Conduct debriefs after key activities e.g. debrief after managing an obstetric emergency to identify what went well and what could be improved 3) Set learning goals for each staff and create opportunities for continuing professional development e.g. through stuctures online courses, in-facility simulation exercises e.t.c	1) Conduct regular data review meetings 2) Recognize high performing facilities or districts and facilitate cross-learning across facilities and districts 3) Conduct teamwork assessments, identify bottlenecks and take steps to course correct
	Coordination	
	1) Hold standing facility review meetings to discuss key issues and for workplanning 2) Set up WhatsApp group for staff communication and timely notification or escalation of issues 3) Proper documentation on EHR (where these exist) for seamless patient management by all team members	1) Establish and regularly convene Technical Working Groups for MNH reviews and guidelines updates 2) Identify and establish appropriate communication platforms e.g. WhatsApp groups, Email listservs 3) Hold regular district/regional/state level meetings or retreats for joint review and decisions about the state of affairs (Financial, Staffing, External threats, Strategy e.t.c) for the district/region/state to improve effectiveness and outcomes

5 Discussion

This scoping review examined the relational aspects that define high-performing Networks of Care (NOCs) to develop a revised framework for implementing the NOC model for maternal and newborn health (MNH) in LMICs. Our cross-disciplinary approach highlights the importance of relational processes in driving organizational and

Table 3 Definitions of teamwork attributes and behaviors

	Definition
Attributes	
Trust	The predictive understanding of another's behavior. Shared willingness of team members to be vulnerable to the actions of other members. Required for psychological safety.
Respect	The belief that all persons have unconditional intrinsic value as human beings (dignity) and team members and act in light of that belief.
Shared values	Beliefs that are jointly held among members of a team which guide individual and interdependent team behavior and guide decision making.
Shared goals	Objectives or outcomes that are collectively determined, agreed upon by a group and which each individual in the group works towards achieving
Psychological safety	The willingness of team members to take interpersonal risks, for example by admitting an error, asking a question, or seeking help.
Behaviors	
Leadership	The practice of influencing team members through effective communication to foster psychological safety to achieve a shared purpose under conditions of uncertainty.
Communication	The exchange of information between two or more team members in the prescribed manner and using proper terminology. Often the purpose of communication is to clarify or acknowledge the receipt of information.
Mutual support	Team members (1) assisting one another; (2) providing and receiving feedback; and (3) exerting assertive and advocacy behaviors when patient safety is threatened. The essence of teamwork.
Situation monitoring	Knowing what is happening in the changing environment and using new knowledge to adapt to the situation and to support team members.
Shared decision making	A process that draws on the combined knowledge of all team members to make smarter, more effective decisions.

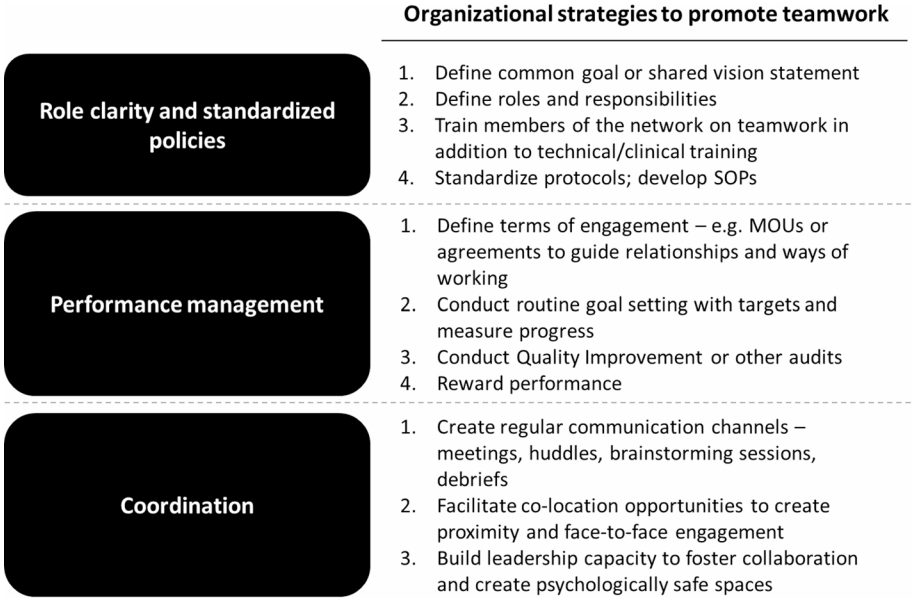

Fig. 6 Organizational Enablers to improve teamwork in NOCs for MNH

team performance. Analyzing 95 relevant papers, we found that the Relational Coordination theory best describes the relational aspects of NOCs, emphasizing teamwork and organizational enablers for intra- and inter-organizational networks. NOCs involve clinical and administrative teams at multiple levels, reinforcing the necessity of coordination beyond direct clinical healthcare providers.

Several systematic reviews have identified key characteristics of effective coordination, cooperation, and collaboration across settings [74, 81, 103–106]. Our study builds on these, expanding the focus to LMICs to define relational aspects applicable to NOCs and their integration into an operational framework for MNH.

While many attributes and behaviors of teamwork are well-known, some aspects emerged as particularly important. First, psychological safety as an attribute may be linked to NOC resilience and adaptive learning. This is supported by existing literature identifying psychological safety as important for improving organizational performance [107], and organizational learning [108], which is crucial for NOCs' adaptive learning feature. Team psychological safety is a function of interpersonal trust and mutual respect, creating a climate that enables people to speak up and question without fear of judgement [108]. Second, trust is built by achieving results, so setting realistic short-term goals rather than overambitious targets is vital. LMICs often align with long-term global targets, but short-term success is also critical for NOCs. For LMICs to adopt NOCs, strong and realistic performance management systems are essential. Collaborative leadership with shared decision-making is also necessary to ensure effective service coordination and build trust and transparency.

Organizational enablers are crucial for effective NOCs. A dedicated coordinator plays a key role in ensuring network success, particularly in LMICs, where human resources are limited, and professional, cultural, and gender boundaries influence coordination. Health systems adopting the NOC approach should consider dedicated coordination roles that strengthen these relational aspects. For example, having a facility champion who is responsible for coordinating maternal and perinatal death reviews in the facility, who is also trained in how to mentor other colleagues on these reviews, could help foster improved communication around skills, competencies and confidence in the management of obstetric complications among health workers in the facility. This champion will also be responsible for collating and reporting data for the facility, managing referrals from the facility to other specialized centers, and oversee the consistent availability of drugs and equipment that other health workers may need for carrying out their day to day activities. raining strengthens relational aspects by improving collaborative leadership, teamwork, and communication. Mentorship by teamwork specialists fosters professional competencies alongside relational skills. Additionally, a well-functioning health system which includes sufficient infrastructure, appropriate staffing ratios, and adequate funding [74], is essential. Staff stability or retention is a key factor, as frequent attrition and redistribution hinder inter-personal relationship building, trust, and effective teamwork.

A useful example of these relational aspects in action is the Clinical Information Network (CIN) in Kenya, a system-oriented digital intervention to improve services for children in Kenyan district hospitals [109]. The CIN is a platform that connected 22 district hospitals that also served as referral centers for communities by regularly collecting reported data on paediatric cases and building a learning system for clinicians and nurses to improve the quality of care using data. Through an iterative consultative process, complemented with observational assessments and expert opinion, the resulting CIN had several of the organizational enablers we synthesized from this review. We can identify these components if we apply our framework to describe the CIN intervention package. The CIN intervention strengthened teamwork through shared goals and

capacity building, integrating mentorship on both clinical and teamwork skills. Psychological safety was fostered through audits without sanctions and performance reviews. Organizational enablers included real-time data monitoring, feedback mechanisms, and the appointment of a network coordinator to facilitate collaboration through meetings and reviews; [109]. Addressing broader health system challenges, such as resource availability and workforce stability, was also integral. After four years of implementation, findings highlighted that improving care outcomes required structured interventions and developing "soft skills" among system stakeholders [110].

Processes in maternal and newborn health are complex, and mistakes can be fatal [111, 112]. Delivering high-quality, patient-centered services requires reliable collaboration and coordination within and across boundaries [106]. Relationships are essential for integrated, coordinated care, and informal networks—built over time through necessity—often play a significant role [41, 50, 58, 90]. However, fostering more intentional coordination approaches can enhance NOC performance and reliability.

Our findings suggest that Relational Coordination is highly relevant for NOCs in LMICs, with the potential to improve healthcare service delivery when applied effectively across management and administrative teams. A structured framework with clear definitions, measurement approaches, and intervention strategies can help accelerate the adoption of NOCs. Evidence indicates that strong relational coordination is linked to improved job satisfaction, lower burnout, higher motivation, and continuous learning, ultimately enhancing workforce retention—a major challenge in LMIC healthcare settings [99, 113]. While some existing tools measure teamwork and coordination, they are primarily used in high-income countries and within single organizational units underscoring the need for LMIC-specific measurement tools [78, 114, 115].

5.1 Study strengths and limitations

Our study used a cross-disciplinary approach to developing a revised NOC Operational framework that emphasizes Relational Coordination. However, we did not explore the formation of relational aspects, social processes, or the theory of change in achieving improved performance, despite their recognized importance [27, 106, 116]. Additionally, power dynamics and gender influences on relational coordination were not analyzed, highlighting an area for further investigation in the relational aspects of NOCs in LMICs.

Given the importance of training as a critical organizational enabler for promoting better collaboration and teamwork, the exclusion of articles that studied teamwork training methods may have limited the extent to which we can understand the role of training in NOC models. Finally, our search was limited to primarily published and grey literature available online, acknowledging the possibility of relevant LMIC studies or case studies that were not publicly accessible and that we may have missed. The limited representation of LMIC-specific studies may have skewed findings toward high-income contexts, reinforcing the need for additional research to refine the NOC framework for LMICs.

6 Conclusion

This study developed a revised operational framework for NOC focusing on Relational Coordination with insights integrated from both healthcare and non-healthcare fields. Overall, this review advances the understanding of relational aspects in NOCs for MNH

and provides a revised framework to guide implementation in LMICs. By fostering relational coordination, strengthening organizational enablers, and addressing systemic challenges, NOCs can enhance healthcare service delivery and improve maternal and newborn health outcomes. Additional research is needed to develop tools for measuring and evaluating relational coordination in the LMIC context. Power dynamics and gender roles remain significant challenges that are under-explored and less studied in healthcare systems in LMICs, which warrant further inquiry.

Acknowledgements
The authors would like to thank the stakeholders who were consulted during the literature review and who informed the revised operational framework.

Author contributions
OF led the scoping review, with feedback on the synthesis and analysis from DW and SB. DW, AJ, and OF conducted the stakeholder consultations with input from KK, AM, RC, AEC, DM, and MV. OF drafted the manuscript with support from DW, SB, and NP. All the authors reviewed the manuscript and provided feedback.

Funding -
This study was supported by funds from the United States Agency for International Development (USAID) Health Evaluation and Applied Research Development (HEARD) Project. USAID's Health Evaluation and Applied Research Development Project (HEARD) was funded by United States Agency for International Development (USAID) under cooperative agreement AID-OAA-A-17-00002. The project team includes prime recipient University Research Co., LLC (URC) and subrecipient organizations.

Data availability
The authors confirm that the data supporting the findings of this study are available within the article [and/or] its supplementary materials. For more data about the study, please contact dilys.walker@ucsf.edu.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
All authors reviewed and gave their consent for publication of the manuscript.

Competing interests
The authors declare no competing interests.

Received: 30 April 2025 / Accepted: 18 November 2025
Published online: 27 November 2025

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