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BARRIERS AND FACILITATORS TO THE IMPLEMENTATION OF NEONATAL DEATH AUDITS IN MOROCCO: A QUALITATIVE STUDY USING THE CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH FRAMEWORK

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Abstract

Introduction: Aligned with the Sustainable Development Goals (SDG 3.2), Morocco has been working since 2018 to integrate the audit of neonatal deaths and stillbirths in hospitals into the Maternal Death Surveillance, Neonatal Audit, and Response System (MDSNARS), to reduce neonatal mortality to 7 per 1000 live births by 2030. However, the lack of accurate data on neonatal mortality hinders the planning and implementation of targeted strategies. **Objective:** The aim of this study is to identify and explain the multilevel determinants influencing the implementation of neonatal death audits, using the Consolidated Framework for Implementation Research (CFIR) framework, in order to inform system strengthening strategies. **Methods:** A descriptive and exploratory qualitative study was conducted in the Marrakech-Safi region. A total of twenty semi-structured interviews were conducted with stakeholders involved in MDSNARS at the national, regional, and local levels. The data were transcribed, translated into French, and analyzed using thematic content analysis. **Results:** Findings indicate that the implementation of neonatal audits remains partial. The main barriers identified include a shortage of qualified staff, a non-operational neonatal unit, and a negative perception of audits, often associated with a punitive approach. On the other hand, the scientific legitimacy of the audit, the quality of continuing education, and close support from the central level appear to be important motivators for teams in the field. **Conclusion:** Neonatal audit is a key lever for improving neonatal care. To optimize its effectiveness, it is imperative to strengthen motivating factors and remove barriers identified among healthcare providers and within hospitals.

Keywords: Barriers and facilitators; CFIR; Clinical audit; Death surveillance system; Morocco; Neonatal mortality

Introduction

Reducing neonatal mortality is a crucial public health priority, as deaths occurring within the first 28 days of life account for the majority of fatalities among children under one year old. These deaths are also more resistant to recent medical advancements compared to post-neonatal mortality [1]. It is estimated that approximately 2.5 million neonatal deaths and 2.6 million stillbirths occur each year [2]. It is important to note that most of these annual stillbirths and neonatal deaths are preventable [3]. Approximately 99% of these deaths occur in low- and middle-income countries (LMICs), with 57% of newborns dying within the first 3 days of life, two-thirds of whom died within the first 24 hours [4]. In this context, Sustainable Development Goal (SDG) 3.2 focuses on reducing neonatal mortality to 12 per

the area of maternal and neonatal health over the past two decades. The neonatal mortality rate (NMR) fell by approximately 52%, from 27 deaths per 1,000 live births in 2000 to 13.6 per 1000 live births in 2018 [5] . The country remains committed to reducing the neonatal mortality rate to 7 deaths per 1,000 live births by 2030 [5].

In collaboration with various partners, Morocco was among the first African countries to implement the Maternal Mortality Surveillance System (SSDM) in 2009 [6]. Since 2018, perinatal deaths have also been included in this initiative, which extends to the Maternal Death Surveillance System, Neonatal Audit, and Response (MDSNARS). This approach is consistent with the World Health Organization (WHO) recommendation to incorporate perinatal death monitoring into the maternal death surveillance and response system [7].

and stillbirths, emphasizing that it helps optimize the structure, processes, and outcomes related to the health of mothers and newborns. An audit is a process that involves collecting information on the number and causes of all stillbirths and neonatal deaths, as well as near-miss cases where relevant. Its objective is to select specific cases for systematic, critical analysis of the quality of perinatal care provided, in an interdisciplinary, non-punitive setting, with the aim of improving care for all mothers and newborns [11]. Both international scientific literature and WHO recommendations agree that audits are a tool for improvement when they fully follow the "review → response → reassessment" cycle, are conducted in a non-punitive environment, and are based on shared standards of definitions and classifications [12].

Many implementation efforts fail, even with highly detailed execution plans, because contextual factors can be powerful barriers to practical implementation. The CFIR developed by Damschroder et al in 2009 is one of the main frameworks for evaluating these contextual factors [13]. The 39 concepts in the CFIR are arranged into five main domains [14], all of which interact to influence implementation and effectiveness.

1. Intervention characteristics,
2. External setting,
3. The internal setting,
4. the individuals involved,
5. The implementation process (Figure 1).

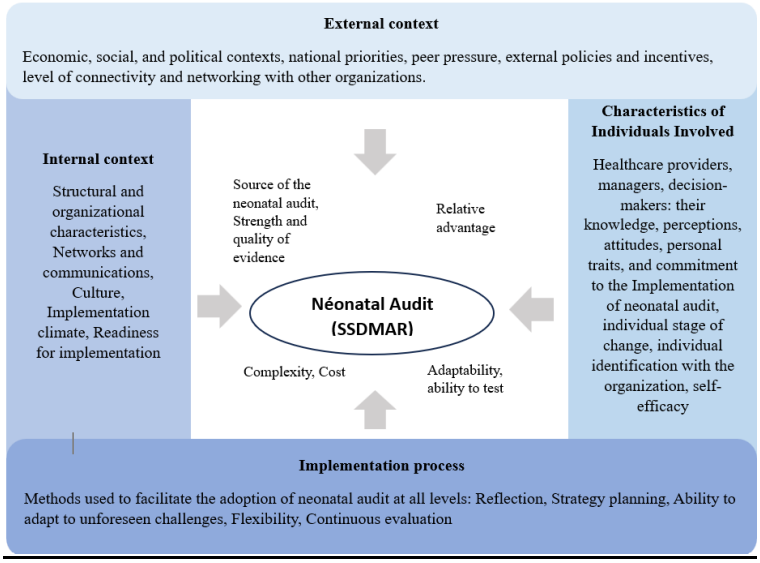

Figure 1: Summary diagram of the domains and constructs of the CFIR developed by Damschroder et al. in 2009 and adapted to our intervention (the audit of neonatal deaths).

Despite the revitalization of the MDSNARS in 2018, marked by the official inclusion of the neonatal audit, the effective implementation of clinical audits of neonatal deaths remains inconsistent at the national level. Data on neonatal mortality, including causes, circumstances, and preventable factors of death, remain limited and poorly documented. To date, to our knowledge, no evaluation of the neonatal audit has been conducted in Morocco to examine the challenges associated with its implementation, which hinders the ability to make evidence-based decisions and compromises Morocco's commitments to the SDGs. The objective of this study is to examine the factors hindering or facilitating the implementation of neonatal death audits in Morocco, with a view to improving the quality of maternal and neonatal care and contributing to the reduction of neonatal mortality.

Materials and methods

Our study is descriptive, qualitative, and exploratory in nature. It was conducted between January and July 2025. The study was conducted in the Marrakech-Safi region, which consists of the prefecture of Marrakech and the seven provinces of Al Haouz, Chichaoua, El Kelâa des Sraghna, Essaouira, Rehamna, Safi, and Youssoufia. The choice of the Marrakech-Safi region for analyzing neonatal death audits is relevant and well justified, as the region has ranked first in very early neonatal mortality since 2019, with a total of 1046 deaths reported in that year, according to data from [15]. It is also one of six regions that have established a regional action plan to eliminate preventable deaths among mothers and newborns as part of the 2017-2021 national strategy. The survey was based on sampling using the judicious selection strategy. This approach, which is particularly relevant for qualitative studies, aims to identify and select participants who provide rich and meaningful information directly related to the

phenomenon being studied [16]. Considering this information, the target population of our study consists of key informants involved in the system (MDSNARS) as well as a development partner the United Nations Population Fund (UNFPA). This population is divided into three levels of intervention implementation: national, regional, and local. These actors were selected in accordance with the 2018 ministerial circular governing the organization of the neonatal death audit process.(Table I)

Table I: Selection of stakeholders involved in the study

Level and location		Participant profiles	Number
Central	National Committee of the MDSNARS	Expert, Professor of Obstetrics and Gynecology	1
	National Committee of the MDSNARS	Expert, Pediatrician, Neonatologist	1
	Population Directorate	Manager, National Unit for Monitoring Maternal and Neonatal Mortality / Maternal Health Protection Service, Population Directorate	2
		Manager, Maternal Health Protection Service, Population Directorate	
	Planning and Financial Resources Directorate (DPFR)	Service of Health Studies and Information, Directorate of Planning and Financial Resources (DPFR)	1
	Directorate of informatics and Methods	Studies and Coordination Service at the Directorate of Information Technology and Methods (DITM)	1
	Partner of the Department of Health	UNFPA	1
Regional Directorate of the Ministry of Health and Social Protection, Marrakech-Safi		Public Health Service / Regional Directorate of the Ministry of Health and Social Protection, Marrakech-Safi	1
		Regional Observatory Service at the Regional Directorate of the Ministry of Health and Social Protection, Marrakech-Safi	1
		Focal Point for the MDSNARS at the Regional Directorate of the Ministry of Health and Social Protection	1
Provinces and Prefecture of the Marrakech-Safi, Region		Délégation of d'Alhawz	1
		Délégation of Marrakech	1
		Délégation of SAFI	1
		Délégation of Elkelaa	1
		Délégation of Chichawa	1
		Délégation of Essaouira	1
Hospital Structures in Marrakech		Proximity Hospital, Elmhamid, Marrakech	1
		Mother and Child Department, Proximity Hospital, ELmhamid, Marrakech	1
		Pediatrician, Regional Hospital Center Lmamounia	1
		Pediatrician Proximity Hospital, Charifa, Marrakech	1
Total		**20 interviews conducted**	

Data collection methods and instruments

The interview guide was initially tested and then modified based on participant feedback, which helped to increase the relevance and comprehensibility of the questions asked. These interviews were conducted either face-to-face or remotely, depending on the availability of the participants. Audio recordings of the interviews were made with the participants' consent. The interviews lasted between 30 and 45 minutes.

In total, we conducted twenty in-depth interviews using a semi-structured interview guide, developed on the basis of the five CFIR domains and then adapted to the profile and level of intervention of each participant.

Data analysis

All interviews were transcribed manually, word for word, and translated into French. This phase required repeated careful listening to the audio recordings, followed by multiple proofreadings of the transcripts to ensure accuracy.The thematic analysis, carried out manually in Word, was structured using a deductive approach that enabled us to identify the main codes related to the themes and sub-themes defined in our conceptual framework. Each relevant excerpt was carefully classified according to the CFIR structure, which facilitated the organization and interpretation of the data. This approach helped to identify the drivers, barriers, and contextual dynamics influencing the implementation of neonatal death audits in the Marrakech-Safi region.

The most representative themes, sub-themes, codes, and verbatim quotes are presented in the table (Annex1) and are then explained in an analysis grid indicating the frequencies of the codes, their meanings, and the identified determinants (Annex2).

Ethical considerations

The study was conducted in accordance with the ethical principles governing public health research. Approval was obtained from the Ethics Committee of the Faculty of Medicine and Pharmacy of Rabat (N° 101/25), and the necessary administrative authorizations were obtained. The anonymity and confidentiality of participants were strictly respected, and their free and informed consent was obtained prior to the interviews and for the audio recordings.

Results

The results first present the socio-professional characteristics of the participants and the current status of neonatal audit implementation in the Marrakech-Safi region. The determinants identified through thematic analysis are then reported across the five main themes and their associated constructs, in line with the CFIR framework

Socio-professional characteristics of participants.

The sample for this qualitative study includes 20 participants from different levels of the MDSNARS system (central, regional, provincial, and hospital), representing strategic, technical, and operational functions, as well as the program's main technical and financial partner. This diversity ensures a comprehensive and integrated approach to the implementation of neonatal death audits .(Table II)

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Table II: Socio-professional overview of study participants (N= 20)

Variable		N (%)
Gender	Men	10 (50%)
	women	10 (50%)
Professional status	Pediatrician	3 (15%)
	midwife	2 (10%)
	Gynecologist	1 (5%)
	Specialist in public health	6 (30%)
	Nursing manager	4 (20%)
	General practitioner	1 (5%)
	Computer engineer	2 (10%)
	Doctor of Biology and Health	1 (5%)
Years of professional experience	Average 22,7	
	Minimum 10	
	Maximum 42	
Years of experience in the MDSNARS	Median 8	
	Minimum 1	
	Maximum 17	

Factors influencing the implementation of neonatal death audits

Characteristics of the neonatal audit

13 of 20 participants reported that the implementation of neonatal death audits was initiated based on recommendations from international organizations, particularly WHO and UNFPA. These recommendations guided the adoption of the audit system at the national level and reinforced its legitimacy in the health system. As one participant noted:

«…The maternal and neonatal death surveillance system is an initiative of the WHO in collaboration with UNFPA at the international level… » Resource person.

13/20 participants highlighted strong international evidence on neonatal mortality as supporting the implementation of neonatal death audits. Eight participants also referred to national data, particularly two Moroccan studies: a multicenter study conducted in four university hospitals in 2009 and a study at Rabat University Hospital. These data were seen as reinforcing the adoption of audit practices.

All participants described neonatal death audits as a tool for improving quality of care. Eight participants also reported that audits contribute to human resource development by enhancing skills and improving working conditions.

«…For teams, neonatal audits improve working conditions, strengthen skills, motivate healthcare professionals, allow communication of key internal challenges, and enhance the value of teams and the hospital's image… » Member of the Regional Confidential Audit Committee (RCAC) 10.

17/20 participants highlighted the high adaptability of neonatal audits, describing them as flexible tools that can be adapted to local contexts.

« …The neonatal audit process is valid in any context. All that is needed is a committee with some level of organization and regular meetings. It is very simple… » Member of RCAC 10.

14/20 Participants reported that the implementation of neonatal audits was preceded by pilot projects aimed at familiarizing local actors with the tool. These pilots helped facilitate the initial

implementation before wider regional or national rollout. The aspect of complexity reflects various constraints perceived by healthcare providers as hindering effective audit implementation.

More than half of the participants (11/20) reported that limited human, material, and logistical resources restrict audit implementation. Specific constraints included staff shortages, limited time, inadequate technical equipment, and lack of suitable infrastructure, such as the absence of a neonatal unit. In addition, participants noted a lack of commitment and motivation among healthcare professionals as another barrier. This is illustrated by the following testimony:

« ... To be honest, the main problem lies with the users. For them to adopt the solution, they need motivation, either through legislation or through incentives… » Central Manager 3.

All participants reported a negative perception of neonatal audits, often linked to a culture of fear. As one RCAC member explained:

« ... The problem so far has been this negative perception of neonatal auditing; until now, healthcare providers have believed that auditing is a punishment... they are afraid of this feeling of responsibility for neonatal deaths... everyone tries to shift the blame onto others. They do not fully understand the philosophy behind auditing… » Member of RCAC 10.

Another significant obstacle, reported by 11 participants, is the lack of enforceability of audit recommendations. Participants explained that failing to implement recommendations effectively can demotivate healthcare professionals, leading them to see their efforts as futile.

«…Complexity…Sometimes we issue recommendations, but they remain on paper… They are not applied in the field, and this demotivates healthcare staff … » central Manager 2.

Finally, governance issues within the Regional Hospital Center (RHC) were reported by 10/20 participants. One central manager described the situation as follows:

« …The RHC suffers from a serious lack of governance. Since the COVID-19 pandemic, maternity and pediatric services have been spread across three hospitals: the RHC and two local hospitals. As a result, human and material resources are also dispersed, and the RHC, which is supposed to function as a level 2 hospital, is not fulfilling its role properly… » Member of RCAC 13.

Three participants emphasized the importance of technical and financial support from international partners and some regions in implementing neonatal screening. This support was reported to partially compensate for the shortfall in centralized funding.

External factors influencing the adoption of neonatal auditing

Half of the participants (10/20) highlighted the key role of international agencies, including WHO, UNFPA, and UNICEF, in improving maternal and neonatal health, supporting the introduction of neonatal audits, and providing normative, technical, and logistical assistance. Participants also mentioned occasional support from the National Initiative for Human Development (NIHD) and expertise contributed by university hospitals (UH).

Benchmarking was seen as a driver of improvement by a majority of participants (11/20), who considered intraregional comparisons constructive. However, one participant noted a limitation related to sensitivity to interregional rankings, as illustrated in the following excerpt:

« ... I created it, but I sometimes found it a bit sensitive. So, I make the comparison without mentioning the names of the regions. However, within regions, the exercise works very well ...» Central Manager 1.

Regarding national policies and external incentives, 12 of 20 participants viewed political commitment as an accelerating factor, particularly since neonatal mortality is used to monitor national progress and will serve as an indicator for country disbursements for 2024–2028. Six participants reported a decline in most health programs following recent health system reforms, while three participants highlighted the growing influence of the private sector and universal health coverage, which increases pressure on care quality and the monitoring of maternal and neonatal deaths.

Internal characteristics of the organization conducting the neonatal audit

Analysis of the structural and organizational features related to neonatal auditing revealed divergent perspectives among participants. Six participants viewed its adoption as dependent on adequate infrastructure, available equipment, and organized internal processes. In contrast, the majority (11 of 20) emphasized the importance of human and organizational factors, particularly team dynamics, collective motivation, and leadership, noting that the mere availability of material resources does not ensure the success of the approach. This is illustrated in the following excerpt:

« ...It's not enough to have new walls, you need a well-organized system… » Member of RCAC 4

In terms of network and communication, 17 of 20 participants reported satisfaction with communication with the central office, which was described as smooth, fast, and efficient. However, thirteen participants highlighted constraints in local communication, particularly between the healthcare facility network service (SRES) and hospitals, as

well as limited information sharing. This was often due to the absence of MDSNARS focal points in hospitals, including university hospitals (UH). Participants described this as a coordination weakness that hinders effective implementation of neonatal audits.

« … Indeed, there is genuine commitment at the national and regional levels... However, the real obstacle lies at a more local level...» Member of RCAC 5.

Regarding preparations for implementation, 19/20 participants highlighted a strong national effort in continuing education on neonatal auditing, covering nearly 90% of the country's regions. At the same time, 17 participants identified several obstacles, including instability in human resources, characterized by high staff turnover, which compromises the sustainability of training outcomes. Other challenges included scheduling constraints, limited team availability, and a lack of interest in cascade training among some local managers, sometimes due to insufficient financial incentives.

Neonatal health is widely recognized as a priority. 14/20 participants reported strong political and health sector support. They emphasized the seriousness of neonatal mortality, which is recognized as a public health emergency.

« …Maternal and neonatal health has always been, and remains, a priority at both the regional and national levels. It is unacceptable, in this day, to continue losing young mothers and newborns during childbirth… » Member of RCAC 4.

Characteristics of individuals involved in the audit of neonatal deaths

Training alone was reported as insufficient to achieve autonomy. 19/20 participants emphasized that local support is crucial during the first few meetings. This coaching was described as essential for building confidence and enabling teams to fully engage in the audit process. As one RCAC member noted:

« …We must support them during the first few meetings until they are able to conduct neonatal audits independently… » Member of RCAC 3.

Nearly half of the participants (9/20) noted that current training programs do not cover interpersonal and relational skills. However, communication, leadership, and the ability to unite a team were reported as key factors influencing commitment and the successful implementation of neonatal audits. As one central manager noted:

« … I think this is very important. These are areas that are not sufficiently addressed in basic training and continuing education in general… » Central Manager 6.

Neonatal audit implementation process

16/20 participants reported active involvement of regional teams in planning neonatal audits since the launch of the 2017–2021 national strategy to reduce maternal and neonatal mortality, through advocacy activities or exchanges with the central level.

Formal commitment was highlighted by eight participants, reflected particularly in the preparation of a new circular aimed at revising the existing system and the development of a practical guide for MDSNARS incorporating maternal and neonatal death audits. In addition, very active informal engagement through close communication and follow-up was reported by 17/20 participants. The following excerpt illustrates this

« … From time to time, we receive calls to revitalize and reactivate this approach, and we truly feel that the central service is highly committed to it… » Member of RCAC 10.

13/20 participants emphasized the need for regular field monitoring to maintain the engagement of professionals in neonatal auditing and to prevent any decline in team effort. 6 participants reported gaps in monitoring and evaluation, including limited access to mortality data and insufficient accountability for inactive structures. One manager highlighted ongoing regional efforts to guide audits, develop recommendations, and produce regional reports on maternal and neonatal audits.

« …We are currently in a phase of regional empowerment with the system overhaul … We are present in nearly eight university hospitals and do not need to exercise central control over them, except in regions lacking certain profiles and expertise… » Central Manager 1.

Discussion

The discussion highlights that implementing neonatal death audits is a complex process. It depends on the interaction between the characteristics of the intervention, the organization of services, and the way implementation is carried out. Using the CFIR framework helped interpret the findings in light of national and international evidence, and better explain the factors that influence adoption and sustainability

Status report on the implementation of neonatal audits in the Marrakech-Safi region

Our study shows that, although clinical audits of in-hospital neonatal deaths were officially launched in Morocco in 2018, their implementation in the Marrakech-Safi region remains incomplete and at an early stage. This slow progress appears to be due to persistent structural and organizational barriers, including shortages of qualified staff and weaknesses in hospital management and

governance, particularly at the Regional Hospital Center, which affect system coordination. These findings align with international literature, which emphasizes that successful initiation and wide implementation of neonatal death audits require a systemic approach, strong leadership, ongoing technical support, and mobilization of resources at all levels of the health system [11].

External pressures and system responses

Linking neonatal audits to WHO and UNFPA recommendations strengthens their legitimacy and facilitates their integration into national policies, creating a favorable environment for adoption. In addition, inter- and intra-regional comparisons can encourage action by showing how regions perform relative to standards and highlighting performance gaps. However, our results indicate that these external pressures do not always lead to improvement. Without adapting comparisons to local resources and structural constraints, benchmarking can create anxiety and a sense of unfairness, especially in under-resourced areas, and may promote responses aimed at justification rather than learning. Literature shows that benchmarking is increasingly used in health care and is associated with improvements in both processes and outcomes. Nevertheless, contextualization and appropriate support remain essential to maximize benefits and reduce unintended effects, particularly in resource-limited settings [17].

Political support appears to be a key determinant for the successful implementation of the audit system. Integrating indicators such as neonatal mortality into funding mechanisms creates a systemic incentive, but it does not guarantee sustained political engagement at the local level. This finding aligns with a Moroccan study, which attributes the marked reduction in maternal and neonatal mortality to the prioritization of health on the national agenda, while emphasizing that the sustainability of progress depends on renewed political commitment and strong systemic incentives. Without these, measures risk remaining theoretical and may not translate into concrete actions on the ground [5]. Thus, external signals, whether norms, incentive mechanisms, or benchmarking, mainly act as triggers and must be supported internally through effective capacity and monitoring routines to achieve measurable changes.

The role of leadership and trust climate in audit ownership

Our results point to a common theme: audits are often perceived as hierarchical control tools, or even as punitive measures, rather than as instruments for continuous improvement. This negative perception limits transparency, hinders open discussion of cases, and reduces active participation, which undermines the development of realistic and shared recommendations. Identified obstacles, including a climate of fear, uneven motivation, and poor implementation of recommendations, suggest that when the environment is experienced as punitive, audits risk becoming administrative and defensive exercises rather than spaces for collective learning. Conversely, experiences reported in other contexts suggest that audits are better accepted when teams are able to translate findings into concrete actions within a climate of trust and transparency [18] . This requires structured leadership and governance: beyond simple formal support, it involves securing a safe space for discussion, clarifying the purpose of the audit, establishing clear rules and defined responsibilities, and explicitly valuing learning. Under these conditions, a system initially perceived as restrictive can become a useful routine, promoting stable changes in perceptions and sustained engagement.

Constraints in the implementation of neonatal audits

Even when audits are recognized for their relative benefits as tools for coordination, continuous improvement, and professional development, these benefits depend on daily feasibility. Our results show that heavy workloads, insufficient qualified staff, unreliable data, and fragmented information systems hinder the regularity of audits and the quality of their outputs. These findings are consistent with the literature: several reviews and qualitative studies conducted in sub-Saharan Africa and other resource-limited countries identify major barriers, including staff shortages, high workloads, lack of cascade training, poor data quality, fragmented information systems, weak leadership, and, importantly, the persistence of a blame culture that demotivates teams and limits active participation [18,19] .

The daily feasibility of audits also depends on internal organizational conditions. The availability of appropriate infrastructure and a functional work environment supports adoption, but it remains insufficient without a coherent, structured internal organization aligned with program objectives, as highlighted in the literature for effective integration of health innovations [20]. Our results also emphasize the critical role of vertical communication: when information flows smoothly between central, regional, and local levels, engagement increases and teams receive continuous support to address challenges. Conversely, coordination gaps, particularly with the university hospital, fragment support and slow feedback, weakening implementation. Literature confirms that both horizontal and vertical coordination are key conditions for the successful dissemination of innovations in decentralized systems, especially for complex interventions [21].

In this context, the adaptability of audits is both an asset and a constraint: it allows for local adjustments but exposes the system to heterogeneous implementation when minimum resources are lacking, which threatens its sustainability, especially in a decentralized system. The results also indicate that training, although appreciated, has limited impact when it is occasional, technically focused, and not followed by ongoing support. Literature shows that effective programs rely on continuous support, such as supervision, coaching, and skills reassessment, rather than on isolated sessions whose effect fades quickly [22] . This limitation is worsened by high staff turnover, which leads to gradual loss of skills. Moreover, teams report that training programs pay insufficient attention to essential transversal skills, including communication, leadership, conflict management, and teamwork, which are necessary to manage complex interventions and strengthen collective dynamics [23] .

From initial ownership to sustainability: the "audit → action → follow-up" loop

Early involvement of regional actors and local stakeholders in planning appears to be a key driver of ownership of the neonatal audit system. It strengthens engagement by increasing the perceived relevance of the system, bringing decision-making closer to the field, and promoting accountability. This finding is consistent with experiences reported in Malawi, where insufficient local involvement and excessive centralization of decisions limit ownership and the effectiveness of audits [24]. The pilot experience in Marrakech-Safi also supported engagement and the gradual adjustment of the system. Similar experiences suggest that a pilot phase can facilitate ownership before scaling up [18]. However, our results indicate that initial ownership is not enough: without local support, functional access to data, and structured accountability mechanisms, audits struggle to produce observable changes, which undermines engagement.

This fragility can be explained by a disruption of the "analyze → decide → act → measure" loop: in the absence of visible gains, audits lose their learning purpose. Process evaluations should therefore document not only what is implemented but also the factors of success or failure, in order to adjust actions in real time [25] .

Finally, the lack of autonomy due to the absence of local supervision limits self-efficacy, which can be strengthened through mentoring and close support [22]. As engagement develops in stages, strategies adapted to the teams' level of commitment may be necessary to maintain participation and prevent disengagement [26].

Strengths and limitations of the study

This study is the first in Morocco to qualitatively explore factors influencing the implementation of neonatal death audits. The involvement of health professionals from different levels of care, combined with the CFIR framework, helped build a broad and nuanced understanding of the context.

However, several limitations should be acknowledged. The study was conducted in a single region. The University Hospital of Marrakech; the main regional referral and teaching center, and a key actor in governance, could not be included. Two provincial leaders also declined participation. Finally, hierarchical relationships and institutional roles may have encouraged socially desirable responses, with possible institutional discourse in some accounts.

Conclusion

In the Marrakech–Safi region, the implementation of neonatal death audits remains partial and fragile in many facilities, while revealing significant potential for improvement in professional practices. Beyond the obstacles identified, this study highlights key drivers, showing that the success of the audit depends primarily on the internal dynamics of the teams and on trust in a non-punitive process, where mistakes are seen as opportunities for learning and continuous improvement. These results call for coordinated reinforcement of the system at various levels of the healthcare system.

At the national level, by promoting and motivating human resources within the Territorial Health Groups (THG), integrating the MDSNARS system into the basic training of healthcare professionals, and providing local support to ensure the quality of clinical audits and the regularity of neonatal death notifications on the new dedicated platform, which was recently launched.

At the regional level, by strengthening the functioning of the RCAC for the neonatal component, and by urgently creating a neonatology department within the RHC to relieve congestion at the UH and designate MDSNARS focal points at each level of the region to facilitate internal communication around the system.

At the local level, through the mobilization of resources, ongoing support, and the effective implementation of audit recommendations. Taken together, these levers can transform neonatal death audits into a truly sustainable tool for improving the quality and safety of care for newborns.

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Annex 1

Table III: Results of the Thematic Analysis of Interview Content

Theme	Sub-themes	Codes	Verbatims
Characteristics of the Neonatal Audit	*Intervention source*	*International Guidelines*	*« ... The maternal and neonatal death surveillance system is an initiative of the WHO in collaboration with UNFPA at the international level ... » Resource person*
	Evidence Strength and justification	*Existence of an International Literature Review*	*« ... The literature provides substantial evidence on how the implementation of a neonatal death audit system can enhance care quality and drive improvements ... » Central Manager 6*
		Existence of National Studies and Data on Neonatal Mortality	*« ... There were studies and surveys conducted in our country at the time Morocco decided to implement or introduce clinical audits… » Central Manager 1*
	Relative Advantage	*Tool for Improving the Quality of Neonatal Care*	*« ... Without the neonatal audit, we cannot improve many aspects… It is a process of improvement and correction of everything that can influence neonatal health ... » Member of RCAC 10*
		Skills Development and Recognition of Human Resources	*« ... For the teams as well, the neonatal audit helps improve working conditions, strengthen skills, and motivate staff. It provides an opportunity to communicate the main internal obstacles, enhances team recognition, and also boosts the hospital's image ... » Member of RCAC 10*
	Adaptability	*Flexible Tool*	*« ... It is very flexible and adaptable… It is easy. It involves sampling cases; the neonatal audit is not conducted for all deaths. It really should become a routine practice, like a standard service—it should be a reflex for healthcare personnel ... » Member of RCAC 1*
	Trialability	*onducting a Pilot Exercise of the Neonatal Audit*	*« ... The central service asked us to carry out a sort of exercise. All provinces prepared an example report for a single neonatal audit case, just as an introduction to the neonatal audit… Shortly after, the audit was expanded to the hospitals in the provinces.... » Member of RCAC 10*
	Complexity	*Lack of Necessary Human and Logistical Resources*	*« ... I simply do not have the necessary human and logistical resources to establish a proper neonatal unit ... » Member of RCAC 12*
		Challenges in Governance at the Regional Hospital Center	*« ...The Regional Hospital Center (RHC) is facing a major governance deficit. Since the COVID-19 pandemic, maternity and pediatric services have been distributed among three hospitals—the RHC and two local hospitals—resulting in the dispersion of both human and material resources. Consequently, the RHC, which is expected to fulfill its level-2 role, is not adequately performing its functions ... » Member of RCAC 13*
		Adverse Perceptions of the Audit and a Culture of Fear	*« ...The problem up to now is this negative perception of the neonatal audit; healthcare professionals still believe that the audit means punishment. They fear the sense of responsibility for deaths, and everyone tries to shift the blame onto others... ». Member of RCAC 10*
		Insufficient Commitment and Motivation of Healthcare Professionals	*« ... We must be honest; the main problem lies with the end-user. For them to adopt the solution, they need to be motivated…either through laws or incentives ... » Central Manager 3*
		Lack of Enforceability of Recommendations from the Audit	*« ...The complexity… Sometimes, neonatal audits are conducted, and recommendations are issued. These recommendations remain… on paper… They are not implemented in the field, and this creates demotivation among healthcare personnel... » Central Manager 2*
	Cost	*Funding from International Organizations and Selected Regions*	*« ... We approached the UN agencies so that the regions could receive training… Some regions were able to mobilize their own funds to have the trainings delivered to them. ... » Central Manager 1*
Outer Setting – factors external to the organization	*Cosmopolitanism*	*Initial Assistance Provided by WHO, International Organizations, the NIHD, and Relevant Thematic Associations*	*« ...The WHO remains the main reference, with its norms and standards. UNFPA is interested, and UNICEF is also involved because it concerns the newborn. There are also associations that focus on training providers and improving their skills, as well as the NIHD, which consistently supports maternal and neonatal health ... » Resource person*
		Sharing of Expertise by the University Hospital (UH)	*« ... We also receive support from the university hospitals (UH) whenever we request expertise ... » Central Manager 1*
	Peer Pressure	*Interregional Comparison is Sensitive, but Intra-regional Comparison is Effective*	*« ...I created it, but I sometimes noticed a certain sensitivity. People did not appreciate it, because they felt as if they were taking part in a competition. So now I make the comparison without mentioning the names of the regions. However, at the intra-regional level, the exercise works very well ... » Central Manager 1*
	External Policy & Incentives	*The Role of Political Engagement in Steering Programs*	*« ...We have seen that political involvement helps move many programs forward… But when there is a pause, no decision-making, no ownership of the file, there is not only delay, there are also consequences. ... » Central Manager 5*

Theme	Sub-themes	Codes	Verbatims
		The Private Sector is a Strategic Partner in the Region	*« … The private sector is becoming a major partner, and we need to remain competitive … » Central Manager 1*
characteristics of the involved individuals Inner Setting - characteristics of the organization	*Structural characteristics*	*The Role of Infrastructure in Facilitating Audit Implementation*	*« … They say that before adopting the system, we must first have a structure that respects human dignity… "Give us the necessary resources, the proper structure, and the required conditions, and then we are ready.… » Member of RCAC 7*
		The Influence of Team Dynamics on Audit Implementation	*« …Even though we have renovated hospitals, they are poorly organized and almost functionally ruined… Having new walls is not enough; a well-organized system is required … » Member of RCAC 4*
	Networks & Communication	*Communication from the Central Service is Highly Efficient*	*« … We do not have any problems with the central service; the message is conveyed very quickly… They are present, receptive, and there is no issue with communication at their level… » Member of RCAC 9*
		Limitations of Local Communication	*« … There is genuine engagement at the regional and national level, however, the main obstacle lies at the local level. … » Member of RCAC 5*
	Culture	*Culture of Blame as a Barrier to Audit Implementation*	*« … There is still this perception among healthcare professionals that auditing a death is already a form of incrimination … » Member of RCAC 9*
		Change-Resistance Culture	*« … This clearly demonstrates strong reluctance on their part. They are still hesitant, and there is a real blockage … ». Member of RCAC 13*
	Implementation climate	*This Matter Represents a National Priority*	*« … Maternal and neonatal health has always been, and remains, a priority at both regional and national levels. It is unacceptable nowadays to continue losing young mothers and newborns during childbirth, a natural physiological process. Society no longer accepts these preventable deaths. … ». Member of RCAC 4*
	Readiness for Implementation	*Training and Support for Health Professionals at the National Level*	*« …We have already rolled out the neonatal audit training in 2024. It is therefore widespread about 90% coverage, with only one region remaining. … » Central Manager 2.*
		Non-Adherence of Certain Professional Categories to the Neonatal Audit	*« … We have more difficulty with obstetricians than with midwives, pediatricians, and neonatologists… In the obstetrician's mind, they are not yet fully involved in neonatal health. … » Central Manager 6*
	Self-efficacy	*Requirement for Guidance to Promote Autonomy*	*« … People need on-site support… We must guide them through the first meetings until they are able to conduct the neonatal audit independently … » Member of RCAC 3*
	Individual State of Change	*Evolution of Professionals' Engagement with the Neonatal Audit*	*« … When professionals are trained and understand that the audit is a self-assessment mechanism… they become much more invested and committed. … » Member of RCAC 7*
	Other Personal Attributes	*Insufficient Training on the Human Aspects of Health Professionals*	*« … I think this is something very important… these are areas that are generally not sufficiently addressed in basic training … » Central Manager 6*
Processes of implementation	*Planning*	*Involvement of Regions in the Planning of the Neonatal Audit*	*« … We have been involved in the neonatal audit process since the strategy 2017-2021… » Member of RCAC 1*
	Engaging	*Official Commitment toward the Neonatal Audit*	*« … A new circular is being drafted to review the entire structure, including the regional and provincial committees. There is also a guide that will soon cover both mothers and newborns, called the MDSNARS Guide.… » Central Manager 1*
		Informal Engagement	*« … From time to time, we receive calls to reinvigorate and reactivate this approach, and we truly feel that the central service is highly committed in this regard … » Member of RCAC 10*
	Monitoring and Evaluation	*Enhancing Regional Autonomy in Neonatal Audit Management*	*« …As you know, we are in a phase of regional empowerment with the restructuring. We are practically operating in 8 UH, and we do not need to exercise central oversight, except for regions that lack certain profiles and expertise … » Central Manager 1*
		Insufficient Monitoring Mechanism for the Neonatal Audit	*« …I would like to ask the central service, what do you do for the facilities that do not conduct audits? That's the question. It's fine either way…if you have the information, that's fine; if not, that's also fine… » Central Manager 6*

Annex 2

Table IV: Deductive Analysis Grid / Meaning of the Code and Its Determinants

Analytical category	Points of convergence	Points of divergence	Evaluation analysis of the convergent points	Evaluation analysis of the divergent points
Characteristics of the Neonatal Audit				
Intervention source (+)	International Guidelines (+) (32 times)		(+)	
Evidence Strength and justification (+)	Existence of an International Literature Review (+) (25 times)		(+)	
	Existence of National Studies and Data on Neonatal Mortality (+) (17 times)		(+)	
Relative Advantage (+)	Tool for Improving the Quality of Neonatal Care (+) (67 times)		(+)	
	Skills Development and Recognition of Human Resources (+) (15 times)		(+)	
Adaptability (+)	Flexible Tool (+) 65 times)		(+)	
Trialability (+)	Conducting a Pilot Exercise of the Neonatal Audit (+) (37 times)		(+)	
Complexity (−)	Lack of Necessary Human and Logistical Resources (−) (63 times)	The neonatal audit tools are too long (−) (1 time)	(+)	(+)
	Governance problem at the Regional Hospital Center (−) (52 times)		(+)	
	Adverse Perceptions of the Audit and a Culture of Fear (−) (90 times)		(+)	
	Insufficient Commitment and Motivation of Healthcare Professionals (−) (54 times)		(+)	
	Lack of Enforceability of Recommendations from the Audit (−) (27 times)		(+)	
Cost (+)	Funding from International Organizations and Selected Regions (+) (11 times)		(+)	
External Determinants Influencing the Adoption of the Neonatal Audit				
Cosmopolitanism (+)	Initial Assistance Provided by WHO, International Organizations, the NIHD, and Relevant Thematic Associations (+) (33 times)		(+)	
	Sharing of Expertise by the University Hospital (UH) (+) (11 times)		(+)	
Peer Pressure (+)	Presence of positive competitiveness (+) (34 times)	Limitations of experience sharing and benchmarking (−) (1 time)	(+)	(−)
	Interregional Comparison is Sensitive, but Intra-regional Comparison is Effective (+) (3 times)		(+)	
External Policy & Incentives (+)	The Role of Political Engagement in Steering Programs (+) (29 times)		(+)	
	The Private Sector is a Strategic Partner in the Region (+) (13 times)		(+)	
Characteristics of the Organization Adopting the Neonatal Audit				
Structural and organizational characteristics (+)	The Role of Infrastructure in Facilitating Audit Implementation (+) (27 times)		(+)	
	The Influence of Team Dynamics on Audit Implementation (+) (39 times)		(+)	
Réseaux et communications (+)	Communication from the Central Service is Highly Efficient (+) (52 times)		(+)	
	Limitations of Local Communication (−) (76 times)		(−)	
Culture (+)	Culture of Blame as a Barrier to Audit Implementation (−) (84 times)		(−)	
	Change-Resistance Culture (−) (23 times)		(−)	
Implementation climate (+)	This Matter Represents a National Priority (+) (51 times)		(+)	
Readiness for Implementation (+)	Training and Support for Health Professionals at the National Level (+) (90 times)		(+)	
	Non-Adherence of Certain Professional Categories to the Neonatal Audit (−) (57 times)		(−)	
Characteristics of Individuals Involved in Neonatal Death Audits				
Self-efficacy (+)	Requirement for Guidance to Promote Autonomy (−) (29 times)		(−)	
Individual State of Change (+)	Evolution of Professionals' Engagement with the Neonatal Audit (+) (26 times)		(+)	
Other Personal Attributes (+)	Insufficient Training on the Human Aspects of Health Professionals (−) (23 times)		(−)	
Process of Implementing the Neonatal Audit				
Planning (+)	Official Commitment toward the Neonatal Audit (+) (21 times)		(+)	
Engaging (+)	formal Engagement toward the Neonatal Audit (+) (24 times)		(+)	
	Engagement informel des responsables en matière d'AN (+) (70 times)		(+)	
Monitoring and Evaluating (+)	Enhancing Regional Autonomy in Neonatal Audit Management (+) (7 times)		(+)	
	Insufficient Monitoring Mechanism for the Neonatal Audit (−) (27 times)		(−)	