



# STRATEGIES FOR DEPLOYING PEDIATRIC DEATH AUDIT TO IMPROVE QUALITY OF CARE

MOMENTUM Country and Global Leadership



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MOMENTUM works alongside governments, local and international private and civil society organizations, and other stakeholders to accelerate improvements in maternal, newborn, and child health services. Building on existing evidence and experience implementing global health programs and interventions, we help foster new ideas, partnerships, and approaches and strengthen the resiliency of health systems.

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## ABBREVIATIONS

<b>CRVS</b>	Civil registration and vital statistics
<b>IHI</b>	Institute for Healthcare Improvement
<b>LMICs</b>	Low- and middle-income countries
<b>MDSR</b>	Maternal death surveillance and response
<b>MoH</b>	Ministry of Health
<b>MPCDSR</b>	Maternal, perinatal, and child death surveillance and response
<b>MPDR</b>	Maternal and perinatal death review
<b>MPDSR</b>	Maternal and perinatal death surveillance and response
<b>PDA</b>	Pediatric death audit
<b>PDSA</b>	Plan, Do, Study, Act
<b>PiP</b>	Pediatric Improvement Program
<b>PPiP</b>	Perinatal Problem Identification Programme
<b>QA</b>	Quality assurance
<b>QI</b>	Quality improvement
<b>QoC</b>	Quality of care
<b>RMNCAH</b>	Reproductive, maternal, neonatal, child, and adolescent health
<b>SEARO</b>	WHO South-East Asia Region
<b>STAGE</b>	Strategic Technical Advisory Group of Experts
<b>ToC</b>	Theory of Change
<b>UNFPA</b>	United Nations Population Fund
<b>WHO</b>	World Health Organization

## EXECUTIVE SUMMARY

Death audits, including maternal and perinatal death surveillance and response (MPDSR), have been used to improve health care quality and outcomes for decades. Through narrative reviews and key informant discussions with those involved in or providing technical support to death audit programs at the global level and in Nigeria, Kenya, Zambia, South Africa, and Sierra Leone, USAID's MOMENTUM Country and Global Leadership project examined the use of death audits and the challenges being experienced. We used these findings to propose options for pediatric death audit development.

We find that evidence on the effect of death audit programs on patient outcomes, such as reduced mortality, is limited; however, the complex nature of death audits as an intervention makes providing evidence for mortality effects challenging. Death audits have been used with some success as a strategy to promote health care system improvement at national and local levels. However, multiple studies have articulated the challenges encountered in implementing death audits at scale in low- and middle-income countries. Many recommendations have been made to guide effective death audit programming, including comprehensive World Health Organization guidance for introducing MPDSR. These recommendations acknowledge implementation challenges at the macro, meso, and micro levels of health systems. Despite such implementation guidance, multiple challenges remain, including the following:

- Protective legal frameworks are lacking, so fear of blame or even litigation may prevent honest accounts of the events around a death.
- Because programmatic and technical approaches often focus on upward reporting (surveillance) of deaths to regional and national governments, there is typically much less clarity over who/which office is responsible for system responses that address the factors contributing to deaths, with limited resources to support response actions.
- Relationships between use of death audits as a quality/systems improvement approach and wider quality assurance and quality improvement strategies and initiatives may be unclear.
- Workplace pressures (e.g., inadequate staffing) and cultures (e.g., hierarchical structures and poor inter-professional relationships) may not support effective death audit processes; while there are many reports of the harm that “blame cultures” do to audit processes, less attention is paid to the possible benefits to teams of highly effective audit processes.

While many challenges are shared across countries, there are also differences. The health system context is therefore important in identifying challenges and their solutions and what may or may not be possible to achieve in realistic timeframes. For example, we found that many countries are yet to fully operationalize maternal death surveillance and response and in particular are struggling to implement the “P” of MPDSR. This is resulting in somewhat different nascent plans for introducing pediatric death audit (PDA), even to the point of having separate Ministry of Health departments involved across the maternal/neonatal/child and quality improvement landscape. It is also apparent that where audit programs are being developed or implemented, policy and technical or tool development are often most advanced, with less progress in use of audits in day-to-day improvement practice at scale. At local levels, death audit processes remain poorly resourced and do not seem well integrated with other local quality improvement strategies where these exist. Addressing the response component of national MPDSR programs in the countries explored (Nigeria, Kenya, and Zambia) is particularly challenging at national, subnational, and facility/population levels. The failure of response is linked to severely constrained health system resources, challenges in inter-sectoral action that support health, lack of subnational coordination/coordinators, and often unclear or poorly functioning accountability mechanisms.



Given these realities and in keeping with views expressed at the global level, implementing national mortality surveillance as a major part of a PDA program should not be a priority. Instead, efforts to improve national mortality (including cause of death) and morbidity information would be best achieved through strengthening civil registration and vital statistics and health information systems more generally. For feasibility reasons (given the number of pediatric deaths, including neonatal deaths), including community-based audit processes in a PDA program may not be a priority (and, if MPDSR includes community-based enquiry lessons, these may be relevant to pediatric deaths as well). Without surveillance and community-based audit processes, even an apparently more limited approach to developing and implementing a PDA program that includes all facilities (public and potentially private) remains a major undertaking likely to require considerable resources and sustained effort over a long timeframe.

With short- to medium-term timeframes (e.g., two to five years), limited national resources, and constrained resources for technical support, we propose the following as possible strategies to introduce PDA:

- Start with a detailed examination of each country's current MPDSR/PDA landscape, existing health system strengths and challenges, and different stakeholders' interest in PDA and the resources they might commit.
- Based on this landscaping approach, co-develop targeted programmatic goals with local stakeholders to deploy a staged strategy for PDA as part of an overarching approach to improve quality of care (QoC).
- During these co-design meetings, consider different programmatic options together with resources needed/available, time scale, and stakeholders' agreement on their contributions and responsibilities.

To prompt discussion, stakeholders might consider five programmatic options that vary in timeframe and resource intensity. The first and most challenging is development of a national, facility-based PDA program with similarities to MPDSR but focused on implementing PDA processes in all facilities, and systems for reporting specific PDA findings subnationally and nationally so that annual aggregate information is available to guide system monitoring and responses. Subjecting all pediatric deaths to audit and reporting would be a huge undertaking—even auditing and reporting a sample of deaths would be a major undertaking, and it should be noted that this is yet to be achieved in most countries for maternal deaths. If resources, timeframes, and thus ambitions are more limited, then different program models/modules might be developed, possibly in synergistic combinations over time. These options could include:

- Focusing on ensuring that legal protections supporting MPDSR, PDA, and similar strategies are in place as part of promoting a no-blame culture and ensuring honest appraisal of system failings.
- Developing a national report of facility-based maternal, perinatal, and pediatric morbidity and mortality using existing information sources complemented by PDA to identify key system- and facility-level modifiable factors that demand a response (a cross-sectional strategy for using PDA might limit resource requirements). Such an approach could be used on an annual basis, for example, as a means to monitor progress and understand QoC more broadly.
- Developing model districts or facilities with a focus on learning how to build highly functional PDA/QoC processes in a country's specific context. Such learning might then be used to scale up these processes.
- Targeting pre-service health worker training facilities and educational settings so that highly functional PDA/QoC processes are learned at the outset and to promote quality and safety mindsets and skills as part of building a culture of quality care.

As indicated above, co-developing any PDA strategy with country stakeholders is likely to be critical. At the point of developing such contextualized programs, more specific Theory of Change development would likely be useful to accomplish the following:

- Articulate the program plan, causal links between its components and the desired objective/outcome, and how each element will be achieved.
- Surface major assumptions that influence whether the steps on the causal pathway will be achieved and the mechanisms by which change can be realized.
- Provide the basis of a structured monitoring, evaluation, and learning strategy that can result in program adaptation/course correction as needed.

## 1. BACKGROUND

### 1.1 DEATH AUDIT

Medical and clinical audits are systematic approaches to peer review of medical and clinical care processes to identify opportunities for improvement and mechanisms for achieving these improvements.<sup>1</sup> Various forms of such audits have been used for many decades in health systems, often also serving a purpose in medical education. In this document, we distinguish surveillance, death audit (the term we adopt for detailed case-based analysis), and response elements. We define death audits and related processes in Table 1. Throughout this report, we will refer specifically to death/mortality audits.

**TABLE 1. GLOSSARY OF AUDIT TERMS**

Term	Definitions
<b>Death (mortality) audit</b>	“Death audit and review” is a broad term intended to include every different method of reviewing deaths. We define it here as an approach to identify the medical cause of death and modifiable factors that, if avoided, might avert such deaths in the future. Therefore, the death audit can help inform recommendations for modifying care practices. The principle approaches to death audit are community based (verbal and social autopsy), facility based (including significant event analysis), and a combination of the two (such as in confidential enquiry). <sup>2</sup>
<b>Clinical audit</b>	“Clinical audit is a clinically led quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and acting to improve care when standards are not met. The process involves the selection of aspects of the structure, processes, and outcomes of care, which are then systematically evaluated against explicit criteria. If required, improvements should be implemented at an individual, team, or organization level and then the care re-evaluated to confirm improvements.” <sup>3</sup>
<b>Health care audit</b>	“Healthcare audit, in line with the design and practice of Internal Audit, is an independent, objective assurance activity designed to add value and improve an organization’s operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.” <sup>3</sup>



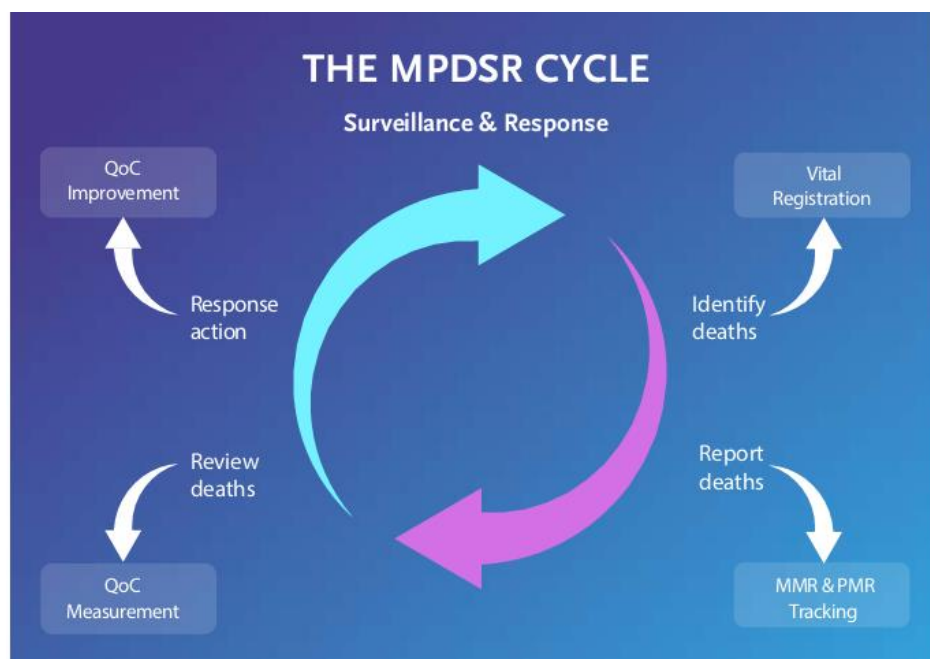
Term	Definitions
<b>Maternal near-miss audit</b>	“These audits of maternal near-miss refer to situations where women experience severe life-threatening obstetric complications during pregnancy, delivery or post-pregnancy which they survive either by chance or because they receive good care at a facility.” <sup>4</sup> This form of audit is distinguished by the selection of cases (near-misses) that are evaluated.
<b>Service evaluation</b>	“Service evaluation seeks to assess how well a service is achieving its intended aims. It is undertaken to benefit the people using a particular healthcare service and is designed and conducted with the sole purpose of defining or judging the current service.” <sup>3</sup>
<b>Incident review</b>	Clinical incident analysis, that emerged from the field of patient safety, “involves a structured analysis and is conducted using best practice methods, to determine what happened, how it happened, why it happened, and whether there are learning points for the clinical service, wider organization, or nationally.” <sup>5</sup> It often focuses on different factors influencing clinical practices such as institutional, organizational, and management factors; work environment factors; task factors; and team, staff, and patient factors.
<b>Quality improvement</b>	<p>“Quality improvement (QI) is the combined and unceasing efforts of everyone—healthcare professionals, patients and their families, researchers, commissioners, providers and educators—to make the changes that will lead to:</p> <ul style="list-style-type: none"> <li>• Better patient outcomes</li> <li>• Better experience of care</li> <li>• Continued development and supporting of staff in delivering quality care.”<sup>3</sup></li> </ul>

## 1.2 THE WORLD HEALTH ORGANIZATION APPROACH TO MATERNAL AND PERINATAL DEATH SURVEILLANCE AND RESPONSE

Maternal and perinatal death surveillance and response (MPDSR) is an audit program comprising two broad processes. First, it is a systematic process of capturing information on number and causes of maternal and perinatal deaths (**surveillance**). Second, it aims to identify health care delivery challenges that contribute to poor outcomes through systematic and critical review of clinical care in a multidisciplinary and no-blame setting (**mortality/death audit**). Combining these approaches is expected to improve care through appropriate **responses** at the whole system and local levels.<sup>6</sup>

The World Health Organization (WHO) first published maternal death surveillance and response (MDSR) technical guidance in 2013<sup>7</sup> and added the perinatal component in 2016.<sup>6</sup> The MPDSR cycle (Figure 1), which includes identifying, reporting, and reviewing deaths and developing, implementing, and monitoring responses, contributes to the identification of local causes of death and other gaps, and the development of improvement actions. MPDSR largely complements other national health information systems, such as civil registration and vital statistics (CRVS), while the focus usually starts at the district and health facility levels and extends to communities.<sup>8</sup>

FIGURE 1. SCHEMATIC OUTLINING THE MPDSR CYCLE AND ITS LINK TO QUALITY CARE



WHO. 2021. Maternal and perinatal death surveillance and response: materials to support implementation.

### 1.3 IMPLEMENTING DEATH AUDITS

Employing mortality audits at scale has received particular attention in maternal care and more recently perinatal care.<sup>7,9–13</sup> One African trial demonstrated a 15% reduction in maternal mortality<sup>14</sup> after implementation of a maternal mortality audit intervention strategy, but to date only weak though supportive evidence of impact to improve perinatal health outcomes exists.<sup>12,15</sup> In a reasonably new initiative, WHO is promoting pediatric death audit as a means to improve quality of care (QoC).<sup>16</sup> However, there have been no rigorous studies demonstrating that conducting pediatric death audits can improve health outcomes, such as in-hospital mortality.<sup>17–19</sup> In fact, there is a dearth of work globally on the safety of pediatric care, which is one of the targets of audit processes.<sup>20,21</sup> South Africa has the most experience implementing pediatric death audits in African hospitals at scale.<sup>22–24</sup> However, quantitative effects on patient care, outcomes, or hospital teams themselves have not been clearly demonstrated.<sup>18</sup> Using aggregated data from a large number of pediatric deaths that have been audited has nevertheless had significant impacts on policy and organization of services in South Africa, as it has in some high-income countries.<sup>10,17,18</sup>

In simple terms, auditing deaths may help prevent future mortality by identifying aspects of care that can be changed to improve quality and safety for all patients.<sup>19,23,25,26</sup> However, while the literature informs general recommendations for the conduct of death audit meetings in low- and middle-income countries (LMICs),<sup>5,11,27–29</sup> little effort has been made to understand how death audits may change local attitudes (e.g., feeling able to talk about medical errors outside audit meetings) or local cultures more broadly. For example, whether or not conducting death audits has positive effects on inter-professional communication, team-working, or the development of a no-blame culture has been poorly studied. Death audits are intended to improve aspects of team-working, but whether they do so is likely to be strongly influenced by the implementation approach. In the same way, little is known about how well audit data are collected, analyzed, and used to support supervision and improvement processes conducted by senior managers outside the facility (e.g., how well the surveillance process supports supervision of facilities by district or regional health

offices). Once again, it is likely to be how death audits are implemented and used that determine relationships and ways of working between system levels. Careful implementation with supportive response systems may produce positive effects, whereas poor response processes that produce fear of sanctions may easily produce negative effects.

When establishing death audit systems, often the most attention goes to defining a formal and hierarchical structure for the audit process. These structures may be represented as organizational diagrams in policy documents showing how those at lower levels of the health system are responsible or accountable to those at higher levels, where authority (formal power) sits. Policy documents acknowledge that the diagnostic process—using death audits as a form of problem identification—takes place at the lowest level of health systems in communities or health facilities. Response actions may also be identified at these lower levels. At the same time, diagnostic information—system challenges identified—should travel up through the system to those at the mid and highest levels. This should then prompt responses (actions) to support improvement, including actions that can only be taken at higher system levels. For example, only higher-level actors might have the power to allocate more resources, plan purchases of new equipment, or change policies.

The responsibility of actors at lower levels of the system to those higher up—providing information—is often clear, but the responsibilities of those at higher levels of the system to those at the lower level and how these responsibilities will be enacted are rarely well articulated. In addition, program organograms and the assumptions implicit in policy rarely acknowledge where formal power and responsibility to act lie and how often powerful informal accountability mechanisms are influenced by social structures and professional norms.<sup>30–33</sup> For example, a national audit program may assign responsibility for addressing quality problems to local leaders but give them no resources or authority to act. Conversely, a senior health manager might try and address a problem by directing one type of health care professional to take on a new task traditionally performed by another type of worker, but this sharing of tasks may be rejected in day-to-day practice. In functionally devolved systems, as in Kenya and Nigeria, considering who has formal and informal power may be especially important. Some institutions that have legitimacy (e.g., professional associations) but lie outside formal hierarchies may help create networks supporting the changes needed to improve quality, or conversely may prevent change.<sup>34,35</sup>

**Thinking around death audits also often ignores key local impacts** that may be important to QoC improvements in the long term. For example, interest in death audits as an approach often focuses on identifying the factors contributing to a death and learning what needs to be changed to improve outcomes. However, death audits, when conducted well, improve the capacity of teams and individuals to use reflection as a powerful learning tool. Reflective practices can help (re)set local norms and may trigger commitment to change and greater collective responsibility.<sup>36,37</sup> These positive elements of well-conducted death audits have received much less attention than the negative consequences of poorly conducted death audits, which may cause fear, shame, and guilt that promote withdrawal from or resistance to the audit process.<sup>38,39</sup> If the positive consequences of local mortality audits are realized, then successful death audit programs may have important effects that go beyond the formally defined reporting relationships between frontline teams and mid-level and senior managers depicted in policy documents.<sup>30,32,33,35,40–42</sup> Learning how to achieve positive changes and impact across system levels can create a sense of shared responsibility for QoC and patient outcomes. Often, however, responsibility is diffuse and therefore accountability structures are ineffective (the “problem of many hands”<sup>33</sup>). Ultimately, the approach should foster positive engagement and greater accountability across actors, from communities to frontline workers to national managers, all aligned in their efforts to improve patient outcomes.<sup>33</sup>

## 1.4 DEATH AUDIT AND QUALITY IMPROVEMENT

Delivering high-quality universal health care is the stated aim of most countries, and the means to ensure this are a key policy concern. As suggested earlier, careful conduct of death audits can provide important information for health systems to guide improvement interventions. Comprehensive, high-quality surveillance information with accurately assigned causes of death is important at national and potentially subnational levels for directing policy responses. As the proportion of deaths occurring in health facilities grows, there is potential for duplication of effort across mortality surveillance approaches (e.g., MPDSR) and the more general work of building stronger health information systems. Death audits are also useful for identifying, in detail, modifiable factors (defined as events, actions, or omissions that contribute to a death or substandard care<sup>43</sup>) that can be addressed locally and at higher levels of the health system. Standardized methods exist for identifying modifiable factors across different domains of care and within various parts of the health system (including in the community) and characterizing whether mortality might be avoidable.<sup>5,22,23,44–47</sup> In South Africa, 40–50% of pediatric hospital deaths have at least one modifiable factor associated with a potentially avoidable death.<sup>25,43</sup>

How do death audits fit within the wider spectrum of QI? Some define QI as the systematic use of methods and tools to continuously improve QoC and outcomes for patients. Death audits would therefore clearly seem a tool in the QI armory. However, QI includes a much wider set of tools, such as Lean,<sup>48</sup> Six Sigma,<sup>49</sup> the Institute for Healthcare Improvement (IHI) Model for Improvement,<sup>50</sup> and many others. The IHI Model for Improvement and Plan, Do, Study, Act (PDSA) cycles have been widely used in LMICs with some success. Examples include the Project Fives Alive! intervention in Ghana,<sup>51</sup> which employed training in QI, QI supervisors, and support for hospital QI teams in an effort to reduce facility mortality rates. The Quality Assurance Project used similar principles and approaches to improve QoC across many countries. These QI implementation approaches tend to focus improvement activities on the meso and micro levels of health systems, such as facilities and their teams. They are similar to death audits in that they attempt to diagnose and tackle local problems, but formal QI strategies focus less on deaths and emphasize the use of continuous measurement of selected care processes (such as using run charts) to assess whether quality is improving. These meso- and micro-level QI strategies are somewhat different from **quality assurance** (QA), which employs methods such as accreditation and other inspection methods at the macro level to improve quality. Most recently, WHO developed a comprehensive array of standards and indicators that can be measured to assess the quality of maternal, neonatal, and pediatric care in health facilities.<sup>52</sup> Assessing how facilities perform against these WHO standards might inform macro- or meso-level improvement efforts, and WHO is currently promoting this strategy in some countries.

## 2. OPPORTUNITIES AND OPTIONS FOR DEPLOYING PEDIATRIC DEATH AUDIT AS A STRATEGY TO IMPROVE QUALITY AND OUTCOMES OF CARE

The previous section provided a background on the use of death audits to improve health care quality and outcomes, frequently drawing on the example of MPDSR. We also briefly illustrated how death audits may be situated within the wider set of QI approaches. The purpose of this work was to clarify the current status of MPDSR and, where relevant, PDA implementation, and to identify opportunities for supporting the deployment of PDA as a means to improve QoC.

Three approaches informed our thinking:

- We conducted two literature reviews focused on implementation of MPDSR and PDA using the rapid review methodology,<sup>53</sup> a type of evidence synthesis that accelerates the traditional systematic review process by streamlining or omitting a variety of methods to produce evidence in a resource-efficient manner. The synthesis process is often narrative in nature.
- We carried out exploratory discussions with MOMENTUM Country and Global Leadership team members, Ministry of Health (MoH) personnel, and technical experts in three countries (Nigeria, Kenya, and Zambia), as well as selected additional key informants.
- We developed potential program models/modules that drew on the literature, exploratory discussions, and thinking on change processes. MoHs might consider these options to implement PDA, depending on their priorities and capacities.

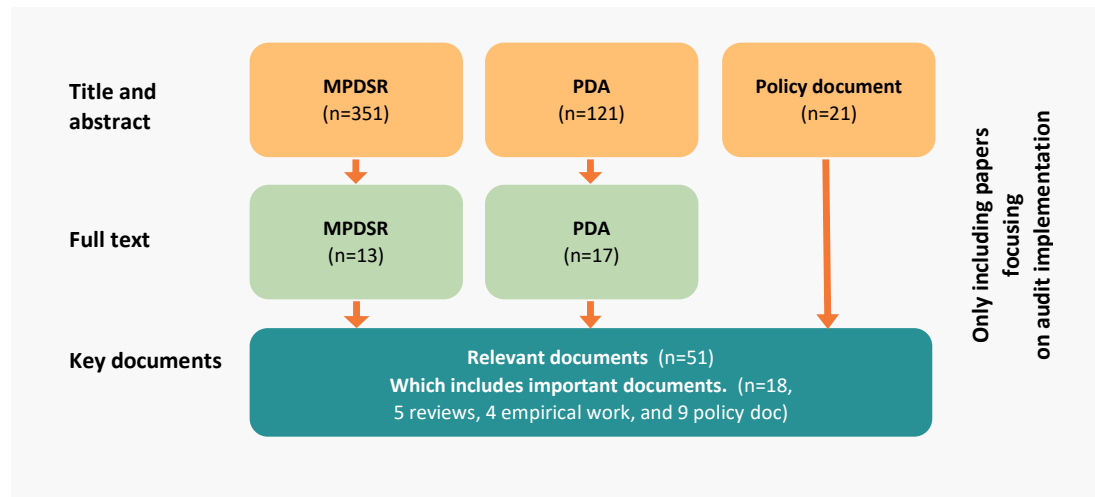
We expand on these approaches in subsequent parts of this report.

### 2.1 LITERATURE AND POLICY DOCUMENT REVIEW

The two rapid reviews focused on the implementation of MPDSR and PDA in LMICs.<sup>53</sup> The MPDSR review started with a review of Cochrane and scoping reviews. We also updated Willcox et al.'s 2023 review<sup>54</sup> and screened papers published on MPDSR in LMICs after 2022. For PDA, we developed our own search and screened papers published on PDA in LMICs after 2010. When screening papers in both MPDSR and PDA reviews, we included papers that described the implementation of death audits.

We also conducted a **policy document review** of global recommendations for MPDSR and PDA. We performed a search on WHO, UNICEF, and United Nations Population Fund (UNFPA) websites in June 2023, focusing on audits and QI guidelines and reports using “audit” and “quality” as search terms. We reviewed these documents to understand the global recommendations for MPDSR and PDA, especially those directly related to MPDSR and PDA implementation. Figure 2 describes the review process, and further detail can be found in Appendices 2 and 3.

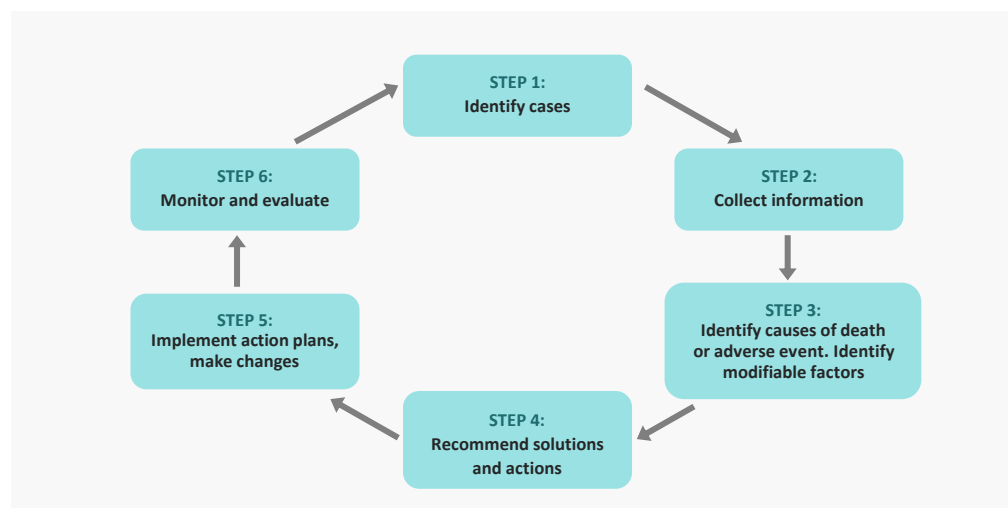
**FIGURE 1. DIAGRAM OF LITERATURE AND POLICY REVIEW PROCESS**



Note: We only included papers that report on the implementation of death audits, and excluded papers that focus primarily on audit outcomes, causes of death, etc. At the title and abstract stage, we excluded papers that are not relevant to MPDSR or PDA; and at the full text stage, we excluded papers that do not focus on the implementation of MPDSR or PDA. We highlighted papers as important if they provide a rich description of implementation process and factors facilitating or impeding implementation. More details on these papers can be found in Appendix 3.

WHO and other partners have published a series of guidelines to support MPDSR, including the 2013 MDSR technical guidance,<sup>7</sup> the 2016 stillbirth and neonatal audit and review guideline,<sup>6</sup> the 2018 facility-based pediatric death audit operational guide,<sup>55</sup> and additional materials on MPDSR in 2021.<sup>8,56</sup> For facility-based PDA, a six-step audit and review cycle is recommended (Figure 3).<sup>55</sup> The careful reflective process required for PDA and the conditions under which it takes place are the same as those for MPDSR, including creating a conducive environment (such as legal protection, confidentiality, and a psychological safe space), and use of results supported by guideline development, training, and supervision.<sup>55</sup> The WHO guideline also listed potential modifiable factors for child deaths. The PDA guideline puts less emphasis on surveillance than the MPDSR guidelines. More broadly, WHO also published a set of reports on QoC, including standards and indicators for QoC in facilities and relevant tools and resources.<sup>57–59</sup>

**FIGURE 2. SIX-STEP FRAMEWORK AUDIT AND REVIEW CYCLE FOR PEDIATRIC DEATH AUDITS ACCORDING TO WHO<sup>55</sup>**



Most of the MPDSR and PDA implementation literature focused on MPDSR. Findings from the four key reviews<sup>2,54,60,61</sup> identified factors influencing the implementation of MPDSR at macro, meso, and micro levels.

A supportive policy and political environment (**macro level**) is important, including tangible inputs such as guidelines, training, information tools, and resources for change. The level of resource input is often deemed inadequate for MPDSR implementation in the literature, especially to achieve high-quality audits, which require human resources (capable and motivated staff) and material resources (funding as well as basic diagnostics). Legal protection for MPDSR is often missing, and its absence often further contributes to health worker fear. According to Wilcox et al.'s 2023 review, South Africa is the only LMIC that has enacted legal protection to prevent MPDSR data from being used in litigation.<sup>54</sup> Also, while high-level political commitment facilitates MPDSR implementation, without a positive organizational no-blame culture, political demand for improvement can paradoxically result in greater health worker fear of mistakes. This can even result in fear of working in labor wards or in facilities refusing to admit high-risk patients.<sup>54</sup>

At the **meso level**, multiple factors affect the success of MPDSR implementation: i) functional multidisciplinary committees and team chaired by a well-respected, straightforward, approachable facilitator, ii) a nurturing team approach free of entrenched professional hierarchies, where junior staff and nurses feel equally empowered, iii) regular scheduled meetings, and iv) true facility ownership.

At the **micro level**, people and their relationships, motivation, and ability to communicate are important as well.<sup>60</sup> When health workers are willing to acknowledge and learn from mistakes and become more vigilant, positive changes, especially at the facility level, are possible. On the contrary, when there is a blame culture exacerbated by political pressure for “good results” and health workers fear punitive actions for mistakes, implementing MPDSR can be destabilizing. The literature also reports different effects of using incentives for MPDSR implementation. Reports include examples of the danger of relying on financial incentives<sup>62</sup> and some positive examples of using performance reviews and continuing professional development opportunities as incentives.<sup>63</sup> Supportive or obstructive organizational and professional cultures thus have effects across the macro, meso, and micro levels. Panel 1 provides two examples of MPDSR implementation from the literature.

### **Panel 1. Examples of mortality audit implementations in Burkina Faso and Malawi from the literature review**

A study by Yameogo et al. of maternal death audits in Burkina Faso suggests that the implementation remains inadequate, with underreporting of cases and absence of community notification, poorly functioning and irregular review committees, data collected not used sufficiently for decision-making, and most recommendations made from the review meetings “remains in the drawers of the district.”<sup>64</sup>

A recent empirical work by Gondwe et al. on stillbirth and neonatal death audits in Malawi highlights a set of inter-connected factors related to training, motivation, power dynamics and autonomy, organization, and data support. It exposes the danger of using financial incentives for audit training and meetings, as health workers only attended external training with per diems, and staff attendance at audit meetings were invitation-only as funds for attendance are limited, and therefore multidisciplinary teams meetings are rare. These factors are informed by facility-level norms and in turn by national-level directives and policies that allow donors to provide monetary incentives. Other barriers for audit implementation include decentralization, lack of decision-making for responses at district and facility levels, data limitation, critical shortage of a data clerk, and demoralization of staff when action plans are not implemented.<sup>62</sup>



While many of these findings reflect work conducted on MPDSR rather than specific work on pediatric and child death audits, Young and Duke conducted a scoping review of literature from LMICs published before 2019.<sup>65</sup> From the seven studies they included, major findings influencing audit implementations across the macro, meso, and micro levels are similar to those outlined above for MPDSR. They highlight the importance of people and resources; the former focuses on having the right representation of staff and recognizing that when staff propose their own solutions, they are more likely to implement them. They also highlight the need for training resources, dedicated time and support, and involvement of clinical leaders and managers. In addition, they acknowledge that one key challenge often is identifying locally feasible solutions that pediatric team leaders have the power and authority to influence.<sup>65</sup>

## **2.2 A SYNTHESIS OF DISCUSSIONS ON MPDSR AND PDA WITH MOMENTUM TEAMS IN NIGERIA, ZAMBIA, AND KENYA AND OTHER KEY STAKEHOLDERS/INFORMANTS**

This synthesis is based on conversations with frontline pediatricians and officials from the central MoHs in each of the case countries who directly engage with QoC and the audit process or who head these units. In addition, we spoke to MOMENTUM Country and Global Leadership country teams, representatives of WHO, the WHO African Regional Office, and nongovernmental organizations such as the Institute for Healthcare Improvement (IHI). Outside of the case study countries, we engaged with key individuals who had successfully established PDA program in other African countries, notably South Africa and Sierra Leone. Overall, we spoke to 22 key informants. We further organized a cross-country learning event with representatives from the three case countries to help us integrate our findings.

### **2.2.1 LEARNINGS FROM MPDSR**

MPDSR is well established at the policy level in the three countries, but still faces challenges in implementation. This subsection uses the three structural levels of the health system (macro, meso, and micro) introduced in the literature review section to explain the implementation of MPDSR and suggest possible lessons for PDA in the study countries. Using this three-level structure, we discuss common themes across countries and then provide more nuanced details for each.

While structures across government levels in terms of committees, meetings, and guidelines exist, shared challenges occur across macro, meso, and micro levels of program implementation.

#### **MACRO LEVEL**

At the macro level, the three study countries have set up committees at all levels of government. In practice, information should flow from committees at lower levels of government toward the center. These committees often appear to have well-defined terms of reference and expectations for meeting schedules.

There are some common challenges across countries. One of these is that funding for MPDSR implementation is heavily donor dependent at the subnational level. This at times leads to differential attainment at subnational or district levels, with more donor support appearing to support better performance, at least as long as the support lasts. The response component of MPDSR has also been challenging across countries and has lagged behind other components. Often the modifiable factors concluded from review meetings are multisectoral in nature and not under the direct control of central or subregional health ministries. For example, poor road conditions impeding hospital visits or emergency transportation, or lack of water supply at health facilities, are beyond health departments' ability to respond.

This leads to the same issues being frequently revisited without any effective response. MPDSR thus appears to function as a surveillance tool rather than a national-level QI tool because of a weak response component.

**Nigeria:** Nigeria has integrated child death audits with MPDSR and now operates an integrated strategy for maternal, perinatal, and child death surveillance and response (MPCDSR). There is an increasing contribution from the Federal MoH toward supporting MPCDSR activity, as evidenced by the presence of a budget line and code for MPCDSR in the health budget. A challenge, however, is the release of funds, and funds have previously been repurposed for other health matters deemed of greater priority, such as control of COVID-19. Nigeria appears the furthest ahead in terms of developing a legal framework for MPCDSR. A bill sent to the country's national assembly is currently awaiting signing into law by the Nigerian president. In addition, an electronic data capture tool for MPDSR is currently being modified to include the child component. There has also been a move to integrate MPCDSR with QoC at the national level with the same coordinating committee managing MPCDSR and QoC.

**Zambia:** There is strong political will in Zambia for MPDSR, which is linked to the government's long-standing interest in reducing maternal mortality as part of the Millennium Development Goals and Sustainable Developmental Goals. Zambia, unlike the other two countries, appears to have a strong community structure for MPDSR. Respondents reported that this is led by community volunteers with well-defined linkages to the community. There are guidelines for MPDSR conduct but no legal framework or bills have been developed. Zambia also has a deficit of personnel at subnational levels. Programmatic roles are split at the national level, for example, with a separate focal lead for maternal health or aspects of child health such as immunization. At the subnational level, a single person is responsible for multiple programs, which compromises efficiency.

**Kenya:** QoC and MPDSR are organizationally separate in Kenya at the national level and there is no legal framework supporting blame-free MPDSR. The MoH appears to manage MPDSR activities and staffing with its own funds, but they are also supported by donors through bilateral and multilateral agreements. The situation in Kenya is made more complex by the important role of devolved government to counties that are responsible for local health systems, including all policy implementation.

## MESO LEVEL

There appear to be variable degrees of incomplete reporting across all countries. There is a disconnect between maternal and perinatal death review, also seen in the global literature. In multiple discussions with stakeholders across Zambia and Kenya, this is manifest as the issue of the “Silent P,” where the maternal component of MPDSR features heavily in reports and feedback with very little about perinatal death reviews. (These sentiments were not shared in Nigeria, which has commenced integration of child death audits into the MPDSR framework as MPCDSR.) The Silent P problem is also seen at the facility level, where meetings have been known to occur after maternal but not perinatal deaths. Institutional focus in terms of resources and time allocation in these settings appears to be unduly skewed toward maternal deaths. Zambia and Kenya are considering breaking away the perinatal component of MPDSR. While Kenya is considering plans to link perinatal audits with PDA, the plans around a possible breakaway of the P component in MPDSR in Zambia are still nascent and evolving.

At the meso level, the local response and reporting vary. This is linked to differential autonomy of facilities and available resources for MPDSR response. Facilities at lower levels of government (for example, primary health care centers), have less autonomy—often to the point of not being able to incur expenditures directly. MPDSR also competes with other budgetary demands at the facility level. Response and reporting successes are thus disproportionately affected by the people responsible, for example, support of facility leadership toward MPDSR or personal drive of local MPDSR leads.

## **MICRO LEVEL**

Common to the three study countries appears to be a limited culture shift within facilities to use MPDSR for QI. In some settings, policymakers feel there is an “attitude problem,” with MPDSR viewed as unimportant and additional work for staff. Although there are a few instances where MPDSR has elicited local change, it appears to be viewed as separate from care provision, with limited integration of MPDSR with wider QoC efforts and not much implementation of QI in any form. Audits are not routinely used for QI due to limited time and capacity and the absence of a culture that views audits as a QI tool. A blame culture also persists in many settings, preventing productive use of death audits.

## **SUMMARY**

Key takeaway messages from MPDSR implementation in the three studied countries relevant to PDA include:

- Finding a way to integrate the micro-level audit work into locally valued clinical practice so PDA can effect change in the form of a local culture shift in QI.
- Fostering a wider professional culture change so that local culture change is more feasible.
- Finding sustainable ways to ensure local ownership of PDA so that all activities are managed and funded by the appropriate level of government, especially the response mechanisms.

An almost absent response component appears to have led to a situation where MPDSR meetings are an enforced part of facility routines but are widely felt to be without great value (a sentiment expressed in country discussions). This is particularly true where the same sets of problems are discussed repeatedly without solutions or any response. MPDSR thus becomes “business as usual” rather than an active process for improving quality.

## **2.2.2 LEARNING ON PEDIATRIC DEATH AUDIT ACROSS STUDY COUNTRIES**

The three study countries are considering the use of PDA as a QI tool. There appears to be a difference in how countries might integrate PDA with existing QI plans and with MPDSR. In the following sections, we summarize the macro-level learnings from each study country and outline each country’s broad direction to integrate PDA as a QoC tool. We also summarize learnings from a South African Paediatric Improvement Program (PiP) that has implemented PDA successfully for about 17 years and a child death audit program in Sierra Leone.

### **NIGERIA**

At the macro level, there appears to be a broad move by the Federal MoH to streamline all maternal and child health programs across the reproductive, maternal, neonatal, child, and adolescent health (RMNCAH) continuum. This thinking has also been applied to PDA, which has been integrated with MPDSR to form MPCDSR. This is viewed as a cost-effective strategy to avoid duplication of activities, as MPCDSR includes not only maternal and perinatal deaths, but also under-five deaths. The country’s electronic data capture for MPDSR is also now being modified to also collect child death audit data.

Although integration is progressing nationally, at subnational levels, roughly three of 36 states have made significant progress in integration. One of these states, Lagos, is the economic capital of the country and has comparatively more resources than many other states. At the micro level, pediatric departments in larger facilities often already have monthly mortality review meetings. Such reviews frequently involve departmental doctors, including the teams who managed the patients, and sometimes representatives from the nursing teams. Our discussions reveal this to be more of an academic approach to “monitoring” monthly performance statistics than an attempt to closely examine potentially modifiable factors that might contribute to a pediatric death and to learn from this analysis and improve service delivery. This, in part,

reflects the history of such meetings, often described as mortality and morbidity reviews. However, other reasons for focusing on summary statistics stem from seeing the potential solutions as being health system-related and outside the sphere or control of the department or hospital. So, while there is a form of monitoring, there is no real response element or expectation.

## **KENYA**

Kenya is in the early stages of using PDA as a QI tool. The country recently adopted the WHO guidelines for PDA and will soon commence pre-testing and validation locally. In contrast to Nigeria, Kenya is considering a broad framework where the reporting and conduct of PDA is separate from MPDSR and managed by the neonatal and child health unit. There are also discussions on possibly integrating the perinatal component of MPDSR with PDA under this neonatal and child health unit. At the micro level, similar to Nigeria, pediatric departments in larger facilities have monthly mortality review meetings that again might be considered predominantly a monitoring or educational exercise.

## **ZAMBIA**

PDA is not yet established in Zambia, though it seems to be an area the government is willing to develop as a QI tool. Some nongovernmental programs, such as HIV and tuberculosis programs, are using PDA.

## **SOUTH AFRICAN**

The South African Child Healthcare Problem Identification Programme (Child PiP) has been running for 17 years and is mainly facility based. The broad framework for this program is a bottom-up approach with local facility ownership. At the central level, the Child PiP is overseen by a national committee that sits outside of the MoH, and information is collected and analyzed parallel to the government administrative structure. More information on the South African program is provided in Panel 2.

### **Panel 2. Perinatal and child mortality audits in South Africa**

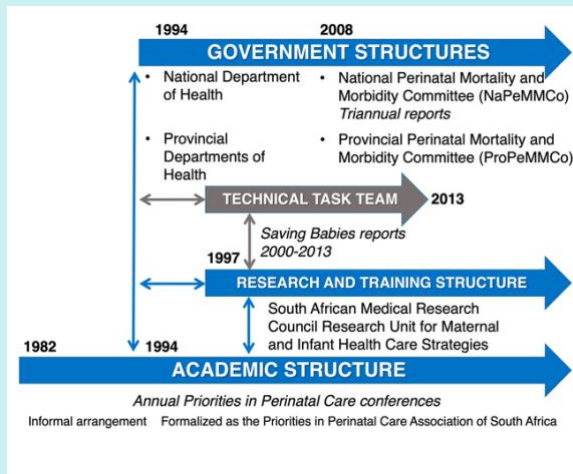
We reviewed the perinatal and child mortality audit programs in South Africa using papers from Kinney et al. that focused on perinatal audit implementation in Western Cape and reflected on the program over 30 years and summarized how to best sustain and institutionalize audit programs.<sup>63,66</sup> We also spoke to three key stakeholders in the child audit program to gain more insights.

The South African Perinatal Problem Identification Programme (PPiP) has been running for nearly three decades (see Figure 3). Although established in the early 1990s, it was not integrated into national policy and guidelines until 2012. It was then excluded from policy in 2021 as the new 2021 Maternal, Perinatal, and Neonatal Health Policy did not specifically mention PPiP in linking surveillance to clinical governance structure. The Child Healthcare Problem Identification Programme (Child PiP) was established based on PPiP in the early 2000s. While mostly facility based, both programs take a bottom-up approach with local facility ownership, and focus on identifying and acting on local problems at the facility level, with national and subnational reporting as the secondary aim.

Kinney et al. reported that at facility level, audits are embedded into everyday work, and with data systems “as part of routine data collection and reporting,”<sup>63</sup> audit meetings should be facilitated by well-respected, approachable, and knowledgeable clinicians. In addition, health workers need an enabling environment with sufficient resources, strong social networks, and motivated and committed

colleagues. They also need to develop common understanding, value, and trust of audits' contributions, and especially believe that "the system works" over time.<sup>63</sup> Our interviews with key stakeholders echoed these findings, highlighting that the biggest impact of Child PiP is at the facility level: ignited by local champions, health workers slowly started to create the culture and structure for QI and changes that improve QoC.

**FIGURE 3. SOUTH AFRICAN PERINATAL PROBLEM IDENTIFICATION PROGRAMME<sup>17</sup>**



At national and subnational levels, it is important to integrate audit into broader policies and guidelines, have multiple reinforcing system structures and actors (government, academics, and research and training institutions) and give them ownership/responsibility, and demonstrate local impacts and positive changes (even if there is no direct impact on mortality).<sup>63</sup> Most of the technical and administrative roles of PPIP and Child PiP are carried out by the Maternal and Infant Health Care Strategies Research Unit at the University of Pretoria, parallel to the government structure. Our interviewed key stakeholders acknowledged that Child PiP would not have been as strong if organized by the MoH, and the MoH "doesn't like it [being a parallel program]."

It should also be emphasized that all of these changes take time and require long-term investment. South Africa started its perinatal audit program nearly 30 years ago and only recently managed to scale up and semi-institutionalize it—and recent declining reporting to the program suggests that backsliding is possible without continuous efforts.<sup>66</sup> The direct impact on mortality is also inconclusive, as the largest study from South Africa investigated perinatal mortality across 163 facilities using PPIP over five years and found wide variation in mortality changes or even increased rates.<sup>15</sup>

### SIERRA LEONE CHILD DEATH PROGRAM

Like the South Africa programs, the child death audit program in Sierra Leone started as a bottom-up program. This was partly due to the relative absence of technical experts at national level. The program benefited from a then U.K. Department for International Development south-to-south initiative that funded and supported pediatricians from Nigeria to work in Sierra Leone for a few years. The program trained these specialists in facilities on audits and was relatively inexpensive. Local ownership by health facilities was emphasized, with little material support from the central MoH. A small roving team of champions affiliated with the MoH led the process and had considerable autonomy to support the program. Audit results primarily fed into local QI mechanisms in facilities, with limited central aggregation and analysis of findings from the various facilities due to a lack of sufficient personnel centrally. Recently, the program was formally taken over by the government and now operates with a more centralized structure under the child health director, who works with the district to appoint a child death coordinator. Following this change, the program has reportedly suffered setbacks and has become expensive, heavily donor-dependent, and less efficient. Facility participation is also reportedly less active and comprehensive than previously. The program's impact has not, however, been formally quantitatively assessed.

## **REFLECTIONS FOR PDA**

The focus countries appear to be at different places with MPDSR, facing different challenges to scale-up and response. The difference in attainment also appears in the use of PDA as a QI tool. While Nigeria is making concrete steps to integrate PDA into the existing MPDSR platform, Kenya is considering pursuing a separate program and Zambia does not yet have an agenda for PDA. A single unified approach guiding national PDA implementation policies is unlikely to work across all contexts. This makes a case for considering a menu of options based on the resources available, time horizon, and current status of MPDSR and QI in a country.

Key learnings from the South African and Sierra Leonean programs, which are reported to show some success at local levels, seem to support a bottom-up approach—starting at the point of patient care and empowering the facility level of the health system. In both cases, death audits were integrated and considered a mechanism for QI, established at the facility level within a structured framework. The data were used to stimulate local change but, in the case of South Africa, also aggregated at higher levels of government. Core transferable learnings from the interaction with the South African program include identifying local QI champions. Also, employing PDA as a complete package and not only a tool would be ideal. In this case, sustaining PDA would require the entire ecosystem, for example, infrastructure, staffing, training, and equipment. Co-production is also crucial to stimulating local ownership.

As the literature review and exploratory discussions indicate, there are many, often consistent, issues relevant to the use of PDA as a QI tool in LMICs generally and in MOMENTUM-supported countries specifically. Recognizing these challenges, we now propose some program options.

### 3. PROGRAMMATIC OPTIONS

Programs are interventions in systems that aim to achieve a set of objectives that produce desired outcomes. Therefore, a first important question is whether the outcomes or objectives desired by the intervention’s proponents (who may be national MoHs or their partners) are well-aligned with, or a priority concern of, those with overall and day-to-day responsibility for the health system. Put simply, are the program goals also key goals of the health system stakeholders? In settings where other health outcomes have higher priority than improved pediatric QoC, and ultimately improved pediatric mortality and morbidity, the support needed to achieve success at all levels of the health system may be inadequate. This is relevant to PDA and QoC more generally as countries may feel there is much unfinished business implementing MPDSR and that other child health interventions remain a higher priority (e.g., nutrition and immunization), especially where progress in these areas has been inadequate. PDA will compete differently for space on the health agenda in different countries and clearly may be more important to some stakeholders than others. Such competition for attention may occur at all levels of the health system, from policy development to implementation in routine settings, such that progress in the policy domain is no guarantee of progress in practice.

As a result, a first step in any program development is to identify institutional and perhaps individual allies who can become “champions.” This may need to go beyond official government MoH structure alone, as improving pediatric QoC, and deploying PDA as part of this effort, requires support and change at the macro, meso, and micro levels as described earlier. A first step in many countries might therefore be a careful evaluation of the landscape of QI initiatives and interest groups in that country. This evaluation may help identify allies among nongovernmental organizations, academic groups, and the private sector, as well as potential opponents.

When considering the scope or focus and the scale or ambition of any program, an advocate for inclusion of PDA as a health system priority must also consider the program’s **time horizon** (and investment) as well as i) the PDA program proponents’ own **position and power** and which stakeholders they might/can align or collaborate with to facilitate success; ii) **resources** and what personnel or material they are prepared to contribute directly, what expectations they have of others, including local stakeholders, and how they understand the resource allocation process to operate at macro, meso, and micro levels; iii) the current health system **context** and whether **opportunities** exist to engage support and to transfer roles to promote sustainability. Such thinking is key when considering the **feasibility** of different approaches or options. As potentially feasible options are identified and linked to objectives (outputs and outcomes), program design can benefit from development of a customized Theory of Change (ToC). A well-developed, program-specific ToC can help:

- Articulate the program plan and anticipated causal links between its components and the desired objective/outcome, with justifications for why each program component is needed and how each will be achieved.
- Surface major assumptions that influence whether the steps on the causal pathway will be achieved.
- Enable the mechanisms by which changes at each step in the ToC are achieved.
- Provide the basis of a structured monitoring, evaluation, and learning strategy that can result in program adaptation/course correction as needed.

The literature review, history of MPDSR, and exploratory discussions with MOMENTUM Country and Global Leadership, country teams, and other key informants (described above) make one overarching fact clear: Launching a national (and subnational) program for pediatric mortality and morbidity surveillance with the aim of improving QoC at scale, combined with use of PDA to identify system problems and guide responses,



even just at the larger facility level, is a huge undertaking. Such a pediatric death surveillance and response program would require a high level of resources and a long time horizon even if building on a successful MPDSR program. While this might be ideal, such an ambitious objective might only be feasible in specific contexts. The three countries studied here (Nigeria, Kenya, and Zambia) do not seem to provide such contexts at present, unless a long-term, very well-resourced strategy is being considered. We summarize this most ambitious scenario in Table 2, highlighting: i) its purpose (national- and local-level responses to improve care and outcomes), ii) the levels of the system involved in the change process and the resources and work needed (considered broadly from mobilizing political capital to securing local financing), and iii) the timescale required (to be thought of more qualitatively than as a specific timeframe).

Table 2 presents four program models (or perhaps modules), labeled A, B, C, and D. These might be considered high-level components of a broad and longer-term PDA implementation strategy that are conceptually and programmatically distinct while being complementary. They could therefore each be run independently as programs of varying intensity and with specific objectives or outputs. For each model, we point to its main purpose, the system levels most involved, the resource intensity, and the timescale. More refined, country-specific program models (of type A, B, C, D, or other variants) might be developed for an agreed time horizon. These country-specific programs would depend on the degree to which countries prioritize PDA, their resources, and the capacity of technical partners such as MOMENTUM to support them. At the outset, it would be important to carefully explore such capacity and the country context, including its current level of maturity in implementing MPDSR and PDA, and the likely challenges and opportunities. One possibility is that technical partners, including MOMENTUM, engage with country-level stakeholders to foster selection of the program model(s) thought to be most feasible and most valuable within the timeframe and with the resources that can be committed.

It should be noted that having a supportive legal framework is an important foundation to the effective use of any death audit program. A key purpose of such a legal framework is to protect health workers from use of information arising during an audit in future litigation. This protection encourages health workers to provide honest accounts of events and recognizes that it is system failures, not individual failings, that are the typical causes of adverse events. From the literature review and country-level discussions, this essential condition seems rarely to have been achieved. It has clearly been beneficial in South Africa, and in Nigeria draft legislation is available, but in other settings little progress has been made to secure this legal precondition. One option for technical partners such as MOMENTUM is to focus on support of this key step (Model A, Table 2) by aligning PDA with MPDSR in one approach and developing a comprehensive legal framework for death audits (and potentially other critical incident investigations). A further option is to only proceed with additional PDA implementation strategies once this has been achieved.

**TABLE 2. PROGRAMMATIC OPTIONS FOR PDA INTRODUCTION/IMPLEMENTATION AS A MEANS TO IMPROVE QUALITY OF CARE**

	<b>Desired objective/output (outcome)</b>	<b>Purpose</b>	<b>Target system level</b>	<b>Resources/capital and work needed</b>	<b>Timescale</b> (short: 1–3 years; medium: 3–5 years; and long: 5+ years)
	National reports (with district/regional stratification) on mortality and morbidity with facility-based PDA/QoC implementation at scale	Address facility care challenges at scale through national action and local solutions	National District Facility	<b>Very high</b> Multiple skillsets and stakeholders	<b>Long</b>
<b>A</b>	Legal protections supporting MPDSR and PDA and all similar strategies	Enabling platform (high-level culture change)	National	<b>Small to moderate</b> Technical + Political	<b>Short</b> , if politics are favorable
<b>B</b>	National sample report of facility-based maternal, perinatal and pediatric morbidity and mortality audits	Advocacy to inform/improve policy and strategy Resource allocation for sustainability	National District Facility Health management information system	<b>Moderate</b> Technical +++ Political	<b>Short:</b> basic/partial report <b>Medium:</b> comprehensive report and action
<b>C</b>	Highly functional audit/QoC demonstration districts	Show (test) benefits Learn what is needed, what works (or does not), and how to integrate PDA into context	District(s)	<b>Small to moderate</b> Technical support Local resources Learning	<b>Medium</b> , to establish a model, learn, and inform replication
<b>D</b>	Health workers: Quality and safety mindset and skills	Transformative: advance professional skills and norms	National Institutional	<b>Small to moderate</b> Institutional Educational Learning	<b>Medium</b> , if targeted

## 3.1 USING FORMAL THEORY OF CHANGE STRATEGIES TO GUIDE PROGRAMS

Whole-system changes are needed to implement PDA at macro, meso, and micro levels. As Table 2 indicates, a complete program actually comprises multiple subprograms (of type A, B, C, D, etc.). It might be possible to lay out a program logic model for the complete strategy that focuses on all needed steps or activities—the architecture of a comprehensive plan. Such logic models may not, however, help identify how to deliver a successful program or guide learning during implementation. These broad logic models are commonly activity focused, with measures of success based on activity delivery-oriented key performance indicators. However, we suggest that constructing a unified, fully developed, intuitive ToC, comprising all assumptions, indicators, and mechanisms, that is useful for a complete national PDA program integrated with other QoC strategies and MPDSR is likely not feasible.<sup>67,68</sup>

In fact, a key issue in developing a fully specified ToC is defining the **boundary** of the system one is attempting to simplify for the purpose of program specification. A ToC encompassing all of the activities, causal links, and inter-relationships of a whole-system model for PDA stretches the boundary too far. By proposing program model components, one can set more sensible boundaries and could develop a more useful and component-specific ToC. Developing a fully specified ToC for particular program models/modules would be best done with country-level stakeholders and could be linked with initial prioritization discussions. When entering these discussions, national authorities, MOMENTUM, and other partners will need a clear idea of what they are prepared to commit, in terms of resources and personnel, and over what timescale so that the ToC is grounded in these realities.

## 3.2 PROVISIONAL RECOMMENDATIONS FOR DEPLOYING PDA PROGRAMS

Here, we offer provisional thoughts on ways forward to develop PDA programs, acknowledging as above that any plans must be based on country-level decisions. The recommendations focus on PDA programs, but, where relevant, we indicate how synergies with MPDSR may be leveraged to promote efficiency and integration with existing MoH programming. The use of PDA to conduct childhood (and neonatal) mortality surveillance, including careful cause of death assignment, is not proposed. The number of pediatric deaths will far exceed that of maternal deaths and efforts to improve neonatal and pediatric mortality data are likely better spent strengthening CRVS and routine health information systems. If PDA programs do not include surveillance, then their focus becomes “system diagnosis” of the factors contributing to pediatric deaths and the responses needed to avert them.

In presenting options, we first describe the problem that the program model/module may tackle and then how the program addresses the problem.

- **To contribute to addressing the problem of a persistent blame culture and only a superficial audit process:** Develop a legal framework that supports full and honest examination of deaths, and ensure that any legal framework already in place to support MPDSR also encompasses the full pediatric age group (0–19 years). PDA (and QoC more widely) would benefit from such efficiency and could contribute to a broader sense within the health system that a no-blame strategy is being pursued. For example, such legal protection might encourage institutionalization of a supportive code of conduct for PDA in the public and private sectors and educational institutions.
- **To address the problem of inadequate understanding of mortality, morbidity, and the QoC factors contributing to poor pediatric outcomes at national and subnational levels:** Develop a comprehensive national (and subnational) mortality, morbidity, and QoC report for the 0–19 years age group to energize, advocate, and inform programming. The number of neonatal, child, and adolescent deaths will be far higher than the number of maternal deaths, so a national surveillance system based on auditing all

neonatal and pediatric deaths to contribute to a national monitoring framework is likely impractical and inefficient. A more efficient and potentially more sustainable strategy, with possible wider benefits for the health information system, is to focus on creating a national maternal/perinatal, neonatal, child, and adolescent mortality and morbidity report. This might employ national health information system data (typically from facilities) on mortality and morbidity and CRVS data, complemented by MPDSR surveillance data and any available PDA data. In early years, this national report might:

- Highlight data gaps and concerns over data quality that are themselves worthy of a national response. This should prompt efforts to continuously improve maternal, neonatal, child, and adolescent mortality and morbidity information to improve the value of future national monitoring.
  - Be complemented by available MPDSR and PDA data on modifiable factors, showing the extent to which these strategies have been implemented, and use these findings, albeit limited, to highlight QoC challenges. Even if nationally comprehensive data are not available, death audits could provide valuable information that helps to identify system failings.
  - Be enhanced by conducting PDA data exercises in multiple, representative locations in the form of a time-limited, cross-sectional approach to using PDA. A restricted and intermittent PDA strategy (e.g., annual exercises) could initially be embedded in long-term local QoC efforts and might make effective use of limited health worker time. The learning gained even from a modest number of well-conducted audits is likely to yield important information of relevance at national and local scales.
  - Combining multiple approaches could help create an early form of a national “State of the Nation’s Women’s and Children’s Health” report. This report could also include relevant data from Service Provision Assessments (SPA) and Service Availability and Readiness Assessment (SARA) and other community and QoC surveys. It might be progressively improved if conducted each year, with articulating the coverage and quality of available data a key focus and attention drawn to how to improve this. Such a report could be linked to national-level advocacy and agreed commitments to action. Progress against action plans could be evaluated on a yearly basis to assess effectiveness of system responses as part of efforts to improve the response element. Such a strategy is consistent with recommendations made by the WHO Strategic Technical Advisory Group of Experts (STAGE) for Maternal, Neonatal, Child and Adolescent Health.<sup>69</sup>
- **To address the challenge of implementing PDA as a means to improve QoC at scale over the longer term:** Develop the system architecture for effective uptake and use of PDA as part of wider quality and safety of care initiatives. Discussions with national-level stakeholders were helpful in articulating both the challenges and solutions that may be needed. These can be considered in a number of dimensions:
    - **Defining the focus.** Respondents and experts often felt that PDA might focus specifically on facility-based care and its quality. While wider socioeconomic factors, access to health care, and cultural issues are critical to child survival, it may not be feasible for PDA to encompass wider “social autopsy” activities linked to each case. To gain such wider insights, options exist to highlight key relevant issues learned from social/community investigations linked to MPDSR or to conduct intermittent exercises to address these issues specifically as part of local health system evaluations and reporting (potentially feeding into local community engagement and governance efforts and the national report identified above).
    - **Developing management and accountability structures.** In some countries, it is not always clear if there are specific positions or roles in local and national government focused on child health or the quality of pediatric care. Often these concerns are part of a much larger portfolio of responsibilities held by a limited number of individuals who may oversee all RMNCAH activities. Sometimes oversight

of QoC is housed in a separate department or unit of the MoH. It was observed that the needs of children and the quality of their care might often be “crowded out” in such situations. One option is therefore to create more specific, dedicated structures that support neonatal and child/pediatric health. These might include focal persons at the local government level who link with facilities, as well as those at higher levels of government, and who can support data aggregation, reporting, local advocacy, supervision, and management to foster accountability. Such arrangements would clearly need to be contextually appropriate and supported by well-defined role specifications, lines of reporting, and ideally linkages with peers and engaged stakeholders, which could create a peer learning community. True response options must be linked to such structures. Thus, those in positions to make changes recommended as a result of PDA must have the ability and authority to act. It is important to map out which level of the health system and which offices hold responsibility for which responses/actions. At facility and local government levels, leaders/managers need to have the decision space to allow this and at least some ability to mobilize resources with support from and accountability to higher levels of government.

- **Developing an appropriate organizational culture that supports PDA.** In many settings, hierarchical, fear, and blame cultures are the norm and are exacerbated by poor inter-professional and community–health system relationships. Fears may be compounded by increasing concerns over litigation even in low-income countries. Identifying and addressing the causes of adverse outcomes, which may comprise errors, slips, lapses, and more, will require honest accounts of events. This is not possible unless there is trust in the process and participants operate in a psychological “safe space.” Changing working cultures is neither quick nor easy; it requires changing how health workers are trained, socialized into their professions, and subsequently experience long-term working environments. Multiple options to change cultures are available, and where resources are sufficient, multiple intervention strategies should be selected (in addition to the supportive legal framework discussed earlier). These include:
  - Making changes to pre-service education to introduce the concepts and practice of quality and safety of care and ensuring that no-blame death audits, including improved inter-professional work, are actively demonstrated. Educational institutions should act as role models for ideal, facility-based PDA.
  - Changing routine facility working environments through role modeling, facilitation, supportive supervision, and wider supportive management and leadership practices.

It may not be possible to undertake such initiatives at national scale in the short term. Options may therefore be to start with more targeted interventions in specific locations/institutions. However, too many programs have only ever reached the pilot intervention stage and embarking on targeted programs should be part of a clear long-term commitment to scaling up and learning lessons on how to do this as programs progress.

## 4. OVERALL SUMMARY

PDA as a tool to improve QoC delivers QoC benefits at the local level, can help change organizational culture, and has been linked to influence on policy in South Africa. The equivalent to a PDA program in South Africa achieved results at scale in terms of improving care processes and culture at the facility level over a period of almost two decades. It built on an equivalent to MPDSR that has been operating in South Africa for three decades. Both South African programs (PPiP and Child PiP) have benefited from institutional champions (university teams) and strong professional support. Many other African settings are yet to have fully operationalized MDSR, are struggling to implement the “P” of MPDSR, and have nascent or nonexistent plans for PDA. Where audit programs are in development, policy and technical or tool development are often more advanced, with much less progress in the use of audits in day-to-day improvement practice. Existing audit systems typically operate without the benefit of legal protection and may not be well integrated with wider QI strategies. Efforts to introduce PDA should be based on a careful examination of each country’s landscape and strengths and should likely begin with targeted programmatic goals co-developed with local stakeholders as part of a long-term, staged strategy focused on QoC that includes PDA. As specific strategy or PDA goals are prioritized, any program to be developed would benefit from formulating a ToC. This can guide the implementation and evaluation of specific program models/modules for which resources are mobilized over the short to medium term. Progress with specific program models/modules can then support more long-term and larger scale efforts to improve quality of health care employing PDA, MPDSR, and other strategies as part of a learning system agenda.

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## APPENDIX 1. WHO, UNICEF AND UNFPA AUDITS AND QUALITY IMPROVEMENT GUIDELINES AND REPORTS REVIEWED

Authors	Year	Title
WHO et al.	2013	<a href="#">Maternal death surveillance and response technical guidance</a>
UNICEF and Myanmar Ministry of Health	2015	<a href="#">Technical Guideline for Child Death Surveillance and Response</a>
WHO EURO	2015	<a href="#">Hospital care for children: quality assessment and improvement tool</a>
WHO South-East Asia Region (SEARO)	2015	<a href="#">Improving the quality of care for reproductive, maternal, neonatal, child and adolescent health in South-east Asia region</a>
WHO	2016	<a href="#">The WHO application of ICD-10 to deaths during the perinatal period: ICD-PM</a>
WHO	2016	<a href="#">Time to respond: a report on the global implementation of Maternal Death Surveillance and Response</a>
WHO	2016	<a href="#">Making Every Baby Count: audit and review of stillbirths and neonatal deaths</a>
WHO	2016	<a href="#">Standards for improving quality of maternal and newborn care in health facilities</a>
WHO, UNICEF, UNFPA	2018	<a href="#">Quality, Equity, Dignity: The network to improve quality of care for maternal, newborn and child health. Strategic Objectives</a>
WHO	2018	<a href="#">Improving the quality of paediatric care: Operational guide for facility-based audit and review of paediatric mortality</a>
WHO	2018	<a href="#">Standards for improving the quality of care for children and young adolescents in health facilities</a>
WHO	2018	<a href="#">Improving the quality of health services: tools and resources</a>
WHO	2018	<a href="#">Integrating stakeholder and community engagement in quality of care initiatives for maternal, newborn and child health</a>
UNICEF and Myanmar Ministry of Health and Sports	2018	<a href="#">Review/Assessment of Implementation of Child Death Surveillance and Response in Myanmar</a>
WHO SEARO	2020	<a href="#">Implementation experience of the WHO SEARO model of point-of-care quality improvement</a>
WHO, UNICEF	2021	<a href="#">Maternal and Perinatal Death Surveillance and Response: Materials to Support Implementation</a>
WHO	2021	<a href="#">Implementation of maternal and perinatal death surveillance and response as part of quality of care efforts for maternal and newborn health: Considerations for synergy and alignment</a>
WHO	2022	<a href="#">Improving the quality of care for maternal, newborn and child health Implementation guide for national, district and facility levels</a>
WHO	2022	<a href="#">WHO recommendations on maternal and newborn care for a positive postnatal experience</a>
WHO	2022	<a href="#">Introducing the WHO Quality Toolkit: supplemental overview</a>
WHO SEARO	2022	<a href="#">Setting up and managing a quality improvement programme at the district level</a>

## APPENDIX 2. SEARCH STRATEGY FOR MPDSR AND PDA RAPID REVIEWS

### MPDSR

Database(s): Embase 1974 to present, Medline (Ovid MEDLINE® Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) 1946 to present Search Strategy:

#	Searches	Results
1	(child mortality/ or fetal mortality/ or infant mortality/ or maternal mortality/ or perinatal mortality/) and (clinical audit/ or medical audit/)	1068
2	(Pregnant Women/ or exp Child/) and ("cause of death"/ or Mortality/) and (clinical audit/ or medical audit/)	564
3	(Pregnancy Complications/mo or Stillbirth/ or Sudden Infant Death/) and (clinical audit/ or medical audit/)	92
4	((maternal or mother* or maternity or child* or infan* or p?ediatric* or fetal or foetal or perinatal or pregnan* or childbirth or birth or labo?r) adj3 (mortality or death?)).ti,ab. and (clinical audit/ or medical audit/)	1396
5	(stillbirth? or sudden infant death? or sids or cot death? or crib death?).ti,ab. and (clinical audit/ or medical audit/)	308
6	(child mortality/ or fetal mortality/ or infant mortality/ or maternal mortality/ or perinatal mortality/) and (review* or audit* or meeting? or enquir* or inquir*).ti,ab.	18233
7	(Pregnant Women/ or exp Child/) and ("cause of death"/ or Mortality/) and (review* or audit* or meeting? or enquir* or inquir*).ti,ab.	23043
8	(Pregnancy Complications/mo or Stillbirth/ or Sudden Infant Death/) and (review* or audit* or meeting? or enquir* or inquir*).ti,ab.	1582
9	((death? or mortality) adj3 (review* or audit* or meeting? or enquir* or inquir*)) and (maternal or mother* or maternity or child* or infan* or p?ediatric* or fetal or foetal or perinatal or pregnan* or childbirth or birth or labo?r).ti,ab.	6605
10	((stillbirth? or sudden infant death? or sids or cot death? or crib death?) adj5 (review* or audit* or meeting? or enquir* or inquir*).ti,ab.	1158
11	((confidential enquir* or confidential inquir*) and ((maternal or mother* or maternity or child* or infan* or p?ediatric* or fetal or foetal or perinatal or pregnan* or childbirth or birth or labo?r) adj3 (mortality or death?))).ti,ab.	1043
12	((confidential enquir* or confidential inquir*) and (stillbirth? or sudden infant death? or sids or cot death? or crib death?)).ti,ab.	168
13	(cemach or cmace or cemd or cmde).ti,ab.	429
14	(saving mothers lives or making pregnancy safer or making childbirth safer).ti,ab.	116
15	((verbal autops* or social autops*) adj5 (maternal or mother* or maternity or child* or infan* or p?ediatric* or fetal or foetal or perinatal or pregnan* or childbirth or birth or labo?r)).ti,ab.	342
16	((near miss* or significant event* or critical event* or critical incident?) and (maternal or mother* or maternity or child* or infan* or p?ediatric* or fetal or foetal or perinatal or pregnan* or childbirth or birth or labo?r) and (review* or audit* or meeting? or enquir* or inquir*).ti,ab.	1459
17	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16	47024
18	exp Animals/ not humans/	16822430
19	17 not 18	35585
20	(review or meta analysis or news or comment or editorial).pt. or cochrane database of systematic reviews.jn. or comment on.cm. or (systematic review or literature review).ti.	9065759
21	19 not 20	25185
22	randomized controlled trial.pt.	595046
23	controlled clinical trial.pt.	95340
24	randomized.ab.	1509124

#	Searches	Results
25	placebo.ab.	597046
26	drug therapy.fs.	6983004
27	randomly.ab.	963422
28	trial.ab.	1633537
29	groups.ab.	6119750
30	22 or 23 or 24 or 25 or 26 or 27 or 28 or 29	14238259
31	21 and 30	5866
32	multicenter study.pt.	334986
33	pragmatic clinical trial.pt.	2230
34	(randomis* or randomiz*).ti,ab.	1989160
35	(trial or multicenter or multi center or multicentre or multi centre).ti.	850842
36	((intervention? or effect? or impact? or controlled or control group? or (before adj5 after) or (pre adj5 post) or ((pretest or pre test) and (posttest or post test)) or quasiexperiment* or quasi experiment* or evaluat* or time series or time point? or repeated measur*).ti,ab.	27167810
37	32 or 33 or 34 or 35 or 36	27699666
38	37 not 30	19462537
39	21 and 38	8166
40	exp "Costs and Cost Analysis"/	666784
41	economics/ or exp economics, hospital/ or exp economics, medical/	1233108
42	"Value of Life"/	159739
43	quality adjusted life years/	51243
44	Decision Trees/	33006
45	economic evaluation*.ti,ab.	36445
46	(Cost* adj2 (Effective* or analysis* or Utility* or Benefit* or Minimi*).ti,ab.	501885
47	pharmacoeconomic*.ti,ab.	13204
48	economic*.ti.	131588
49	("Value of life" or "quality adjusted life year*" or qaly* or qald* or qale* or "disability adjusted life year*" or daly).ti,ab.	65588
50	(sf6 or short form 6 or shortform6 or euroqol or euro quality of life or eq5d).ti,ab.	27592
51	(hye or health* year equivalent*).ti,ab.	226
52	(health utilit* or disutilit*).ti,ab.	8928
53	"willingness to pay".ti,ab.	21399
54	standard gamble.ti,ab.	2087
55	(time trade off or time tradeoff or tto).ti,ab.	5787
56	(vas or visual analog*).ti,ab.	257620
57	((economic adj2 model*) or markov or monte carlo method).ti,ab.	83400
58	(decision* adj (tree* or model* or analysis)).ti,ab.	53724
59	(resource* adj (use* or utilisation)).ti,ab.	36888
60	((healthcare or health care or direct service or hospital or drug*) adj cost*).ti,ab.	121325
61	40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60	2410029
62	61 not (30 or 37)	1092363
63	21 and 62	468



#	Searches	Results
64	31 or 39 or 63	14500
65	(afghanistan or albania or algeria or american samoa or angola or "antigua and barbuda" or antigua or barbuda or argentina or armenia or armenian or aruba or azerbaijan or bahrain or bangladesh or barbados or republic of belarus or belarus or byelarus or belorussia or byelorussian or belize or british honduras or benin or dahomey or bhutan or bolivia or "bosnia and herzegovina" or bosnia or herzegovina or botswana or bechuanaland or brazil or brasil or bulgaria or burkina faso or burkina fasso or upper volta or burundi or urundi or cabo verde or cape verde or cambodia or kampuchea or khmer republic or cameroon or cameron or cameroun or central african republic or ubangi shari or chad or chile or china or colombia or comoros or comoro islands or iles comores or mayotte or democratic republic of the congo or democratic republic congo or congo or zaire or costa rica or "cote d'ivoire" or "cote d'ivoire" or cote divoire or cote d ivoire or ivory coast or croatia or cuba or cyprus or czech republic or czechoslovakia or djibouti or french somaliland or dominica or dominican republic or ecuador or egypt or united arab republic or el salvador or equatorial guinea or spanish guinea or eritrea or estonia or eswatini or swaziland or ethiopia or fiji or gabon or gabonese republic or gambia or "georgia (republic)" or georgian or ghana or gold coast or gibraltar or greece or grenada or guam or guatemala or guinea or guinea bissau or guyana or british guiana or haiti or hispaniola or honduras or hungary or india or indonesia or timor or iran or iraq or isle of man or jamaica or jordan or kazakhstan or kazakh or kenya or "democratic people's republic of korea" or republic of korea or north korea or south korea or korea or kosovo or kyrgyzstan or kirghizia or kirgizstan or kyrgyz republic or kirghiz or laos or lao pdr or "lao people's democratic republic" or latvia or lebanon or lebanese republic or lesotho or basutoland or liberia or libya or libyan arab jamahiriya or lithuania or macau or macao or "macedonia (republic)" or macedonia or madagascar or malagasy republic or malawi or nyasaland or malaysia or malay federation or malaya federation or maldives or indian ocean islands or indian ocean or mali or malta or micronesia or federated states of micronesia or kiribati or marshall islands or nauru or northern mariana islands or palau or tuvalu or mauritania or mauritius or mexico or moldova or moldovian or mongolia or montenegro or morocco or ifni or mozambique or portuguese east africa or myanmar or burma or namibia or nepal or netherlands antilles or nicaragua or niger or nigeria or oman or muscat or pakistan or panama or papua new guinea or new guinea or paraguay or peru or philippines or philippines or philippines or philippines or poland or "polish people's republic" or portugal or portuguese republic or puerto rico or romania or russia or russian federation or ussr or soviet union or union of soviet socialist republics or rwanda or ruanda or samoa or pacific islands or polynesia or samoan islands or navigator island or navigator islands or "sao tome and principe" or saudi arabia or senegal or serbia or seychelles or sierra leone or slovakia or slovak republic or slovenia or melanesia or solomon island or solomon islands or norfolk island or norfolk islands or somalia or south africa or south sudan or sri lanka or ceylon or "saint kitts and nevis" or "st. kitts and nevis" or saint lucia or "st. lucia" or "saint vincent and the grenadines" or saint vincent or "st. vincent" or grenadines or sudan or suriname or surinam or dutch guiana or netherlands guiana or syria or syrian arab republic or tajikistan or tadjikistan or tadjikistan or tadjhik or tanzania or tanganyika or thailand or siam or timor leste or east timor or togo or togolese republic or tonga or "trinidad and tobago" or trinidad or tobago or tunisia or turkey or "turkey (republic)" or turkmenistan or turkmen or uganda or ukraine or uruguay or uzbekistan or uzbek or vanuatu or new hebrides or venezuela or vietnam or viet nam or middle east or west bank or gaza or palestine or yemen or yugoslavia or zambia or zimbabwe or northern rhodesia or global south or africa south of the sahara or sub-saharan africa or subsaharan africa or africa, central or central africa or africa, northern or north africa or northern africa or magreb or maghrib or sahara or africa, southern or southern africa or africa, eastern or east africa or eastern africa or africa, western or west africa or western africa or west indies or indian ocean islands or caribbean or central america or latin america or "south and central america" or south america or asia, central or central asia or asia, northern or north asia or northern asia or asia, southeastern or southeastern asia or south eastern asia or southeast asia or south east asia or asia, western or western asia or europe, eastern or east europe or eastern europe or developing country or developing countries or developing nation? 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66	64 and 65	4137
67	limit 66 to yr="2022 -Current"	413
68	remove duplicates from 67	351

## PDA

Database(s): Embase 1974 to present, Medline (Ovid MEDLINE® Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) 1946 to present Search Strategy:

#	Searches	Results
1	(p?ediatric* adj3 (mortality or death?)).ti,ab. and (clinical audit/ or medical audit/)	82
2	((death? or mortality) adj3 (review* or audit* or meeting? or enquir* or inquir*)) and p?ediatric*).ti,ab.	1118
3	((confidential enquir* or confidential inquir*) and (p?ediatric* adj3 (mortality or death?))).ti,ab.	7
4	((verbal autops* or social autops*) adj5 p?ediatric*).ti,ab.	7
5	((near miss* or significant event* or critical event* or critical incident?) and p?ediatric* and (review* or audit* or meeting? or enquir* or inquir*)).ti,ab.	407
6	1 or 2 or 3 or 4 or 5	1595
7	(afghanistan or albania or algeria or american samoa or angola or "antigua and barbuda" or antigua or barbuda or argentina or armenia or armenian or aruba or azerbaijan or bahrain or bangladesh or barbados or republic of belarus or belarus or belorussia or byelorussian or belize or british honduras or benin or dahomey or bhutan or bolivia or "bosnia and herzegovina" or bosnia or herzegovina or botswana or bechuanaland or brazil or brasil or bulgaria or burkina faso or burkina fasso or upper volta or burundi or urundi or cabo verde or cape verde or cambodia or kampuchea or khmer republic or cameroon or cameron or cameroun or central african republic or ubangi shari or chad or chile or china or colombia or comoros or comoro islands or iles comores or mayotte or democratic republic of the congo or democratic republic congo or congo or zaire or costa rica or "cote d'ivoire" or "cote d'ivoire" or cote divoire or cote d ivoire or ivory coast or croatia or cuba or cyprus or czech republic or czechoslovakia or djibouti or french somaliland or dominica or dominican republic or ecuador or egypt or united arab republic or el salvador or equatorial guinea or spanish guinea or eritrea or estonia or eswatini or swaziland or ethiopia or fiji or gabon or gabonese republic or gambia or "georgia (republic)" or georgian or ghana or gold coast or gibraltar or greece or grenada or guam or guatemala or guinea or guinea bissau or guyana or british guiana or haiti or hispaniola or honduras or hungary or india or indonesia or timor or iran or iraq or isle of man or jamaica or jordan or kazakhstan or kazakh or kenya or "democratic people's republic of korea" or republic of korea or north korea or south korea or korea or kosovo or kyrgyzstan or kirghizia or kirgizstan or kyrgyz republic or kirghiz or laos or lao pdr or "lao people's democratic republic" or latvia or lebanon or lebanese republic or lesotho or basutoland or liberia or libya or libyan arab jamahiriya or lithuania or macau or macao or "macedonia (republic)" or macedonia or madagascar or malagasy republic or malawi or nyasaland or malaysia or malay federation or malaya federation or maldives or maldives or indian ocean islands or indian ocean or mali or malta or micronesia or federated states of micronesia or kiribati or marshall islands or nauru or northern mariana islands or palau or tuvalu or mauritania or mauritius or mexico or moldova or moldovian or mongolia or montenegro or morocco or ifni or mozambique or portuguese east africa or myanmar or burma or namibia or nepal or netherlands antilles or nicaragua or niger or nigeria or oman or muscat or pakistan or panama or papua new guinea or new guinea or paraguay or peru or philippines or philippines or philippines or philippines or poland or "polish people's republic" or portugal or portuguese republic or puerto rico or romania or russia or russian federation or ussr or soviet union or union of soviet socialist republics or rwanda or ruanda or samoa or pacific islands or polynesia or samoan islands or navigator island or navigator islands or "sao tome and principe" or saudi arabia or senegal or serbia or seychelles or sierra leone or slovakia or slovak republic or slovenia or melanesia or solomon island or solomon islands or norfolk island or norfolk islands or somalia or south africa or south sudan or sri lanka or ceylon or "saint kitts and nevis" or "st. kitts and nevis" or saint lucia or "st. lucia" or "saint vincent and the grenadines" or saint vincent or "st. vincent" or grenadines or sudan or suriname or surinam or dutch guiana or netherlands guiana or syria or syrian arab republic or tajikistan or tadjikistan or tadjikistan or tadjhik or tanzania or tanganyika or thailand or siam or timor leste or east timor or togo or togolese republic or tonga or "trinidad and tobago" or trinidad or tobago or tunisia or turkey or "turkey (republic)" or turkmenistan or turkmen or uganda or ukraine or uruguay or uzbekistan or uzbek or vanuatu or new hebrides or venezuela or vietnam or viet nam or middle east or west bank or gaza or palestine or yemen or yugoslavia or zambia or zimbabwe or northern rhodesia or global south or africa south of the sahara or sub-saharan africa or subsaharan africa or africa, central or central africa or africa, northern or north africa or northern africa or magreb or maghrib or sahara or africa, southern or southern africa or africa, eastern or east africa or eastern africa or africa, western or west africa or western africa or west indies or indian ocean islands or caribbean or central america or latin america or "south and central america" or south america or asia, central or central asia or asia, northern or north asia or northern asia or asia, southeastern or southeastern asia or south eastern asia or southeast asia or south east asia or asia, western or western asia or europe, eastern or east europe or eastern europe or developing country or developing countries or developing nation? or developing population? or developing world or less developed countr* or less developed nation? or less developed population? or less developed world or lesser developed countr* or lesser developed nation? or lesser developed population? or lesser developed world or	5099196

	under developed countr* or under developed nation? or under developed population? or under developed world or underdeveloped countr* or underdeveloped nation? or underdeveloped population? or underdeveloped world or middle income countr* or middle income nation? or middle income population? or low income countr* or low income nation? or low income population? or lower income countr* or lower income nation? or lower income population? or underserved countr* or underserved nation? or underserved population? or underserved world or under served countr* or under served nation? or under served population? or under served world or deprived countr* or deprived nation? or deprived population? or deprived world or poor countr* or poor nation? or poor population? or poor world or poorer countr* or poorer nation? or poorer population? or poorer world or developing economy* or less developed economy* or lesser developed economy* or under developed economy* or underdeveloped economy* or middle income economy* or low income economy* or lower income economy* or low gdp or low gnp or low gross domestic or low gross national or lower gdp or lower gnp or lower gross domestic or lower gross national or lmic or lmics or third world or lami countr* or transitional countr* or emerging economies or emerging nation?).ti,ab,sh.	
<b>8</b>	6 and 7	222
<b>9</b>	limit 8 to yr="2010 -Current"	176
<b>10</b>	remove duplicates from 9	121

## APPENDIX 3. RELEVANT LITERATURE ON MPDSR AND PDA FROM THE RAPID REVIEWS

Note: In the second column of the following table, the importance of papers were rated in terms of the richness of their description of implementation process and factors facilitating or impeding implementation, where “low” provides limited description, “moderate” provides some description, and “high” provides the richest levels description.

Reference	Importance level	MPDSR or PDA	Country and setting	Key takeaway
<b>Compaoré R, Millogo T, Ouedraogo AM, Tougri H, Ouedraogo L, Tall F, Kouanda S. Maternal and neonatal death surveillance and response in Liberia: an assessment of the implementation process in five counties. International Journal of Gynecology &amp; Obstetrics. 2022;158:46-53.</b>	Moderate	MPDSR	Liberia, subnational	<ul style="list-style-type: none"> <li>Implementation poor, even where structures (review committee) are in place, they are not functional due to lack of guideline and SOPs</li> <li>No response activity or monitoring of the response was found at subnational level</li> </ul>
<b>Congo B, Méda CZ, Millogo T, Sanon/Ouédraogo D, Ouédraogo CM, Kouanda S. Evaluation of the quality of maternal death review cycles in Burkina Faso. International Journal of Gynecology &amp; Obstetrics. 2022;158:21-8.</b>	Moderate	MPDSR	Burkina Faso, subnational	<ul style="list-style-type: none"> <li>Poor quality of data collection (not having all the necessary information required for analysis)</li> <li>Identification of solutions not always accurate nor defining of who implements</li> <li>“We are not yet at the stage where recommendations are regularly followed up”</li> </ul>
<b>Endris AA, Tilahun T. Health system readiness to manage maternal death data and avail evidence for decision-making through the Maternal Death Surveillance System in Ethiopia, 2020. BMC Health Services Research. 2023;23(1):1-2.</b>	Moderate	MPDSR	Ethiopia, national	<ul style="list-style-type: none"> <li>Half of the death review committees are not functional</li> <li>Most health centers and hospitals do not have optimal readiness to investigate and review maternal deaths (e.g., no definition, mechanisms for receiving community reports)</li> <li>Lack of finance (e.g., for purchasing and maintaining functional computers to surveillance and analysis)</li> </ul>
<b>Fitzgerald E, Mlotha-Mitole R, Ciccone EJ, Tilly AE, Montijo JM, Lang HJ, Eckerle M. A pediatric death audit in a large referral hospital in Malawi. BMC Pediatrics. 2018;18:1-7.</b>	Low	PDA	Malawi, single facility	<ul style="list-style-type: none"> <li>Retrospective record review. Cause of death was extrapolated based on recorded information, but was often difficult to definitively diagnose given limited diagnostic tools.</li> </ul>

Reference	Importance level	MPDSR or PDA	Country and setting	Key takeaway
<b>Forae GD, Uchendu OJ, Igbe AP. An audit of paediatric mortality patterns in a Nigerian teaching hospital. Nigerian medical journal: journal of the Nigeria Medical Association. 2014;55(2):130.</b>	Low	PDA	Nigeria, single facility	<ul style="list-style-type: none"> <li>• Retrospective record review</li> <li>• No other useful information on the process</li> </ul>
<b>Gondwe MJ, Joshua E, Kaliati H, Aminu M, Allen S, Desmond N. Factors impacting—stillbirth and neonatal death audit in Malawi: a qualitative study. BMC health services research. 2022;22(1):1-4.</b>	High	Neonatal	Malawi, national	<ul style="list-style-type: none"> <li>• Training inadequate and staff did not value in-house training due to no monetary incentives</li> <li>• Staff attendance at audit meetings relies on monetary incentives, which is part of facility norms and informed by national-level directives</li> <li>• Unable to implement activities in hospitals with resource shortage</li> <li>• Facility lack autonomy and decision-making power</li> <li>• Difficult to get multidisciplinary audit teams, restricted by monetary budget (closed invitation) and reporting back to donors</li> </ul>
<b>Kinney MV, Walugembe DR, Wanduru P, Waiswa P, George A. Maternal and perinatal death surveillance and response in low- and middle-income countries: a scoping review of implementation factors. Health Policy and Planning. 2021;36(6):955-73.</b>	High	MPDSR	Scoping review	<ul style="list-style-type: none"> <li>• Most studies focus on (inadequate) tangible input</li> <li>• Societal and health system factors showed that people and their relationship, motivation, implementation climate, and ability to communicate are important (e.g., top-down without facility ownership; silencing of junior staff due to professional hierarchy; importance of subnational structures), yet experience and relationship are inadequately explored</li> <li>• MPDSR contributed to accountability and a culture of learning and improvement but few studied the complex interplay and change dynamics</li> <li>• Death audits could be disruptive in context where staff are not used to self-evaluation and critical review</li> </ul>

Reference	Importance level	MPDSR or PDA	Country and setting	Key takeaway
<b>Kinney M, Bergh AM, Rhoda N, Pattinson R, George A. Exploring the sustainability of perinatal audit in four district hospitals in the Western Cape, South Africa: a multiple case study approach. BMJ Global Health. 2022;7(6):e009242.</b>	High	MPDSR	South Africa, subnational	<ul style="list-style-type: none"> <li>• Use of Normalisation Process Theory (NPT)</li> <li>• Capability: embedded into everyday work (and with data systems sometimes)</li> <li>• Contribution: common understanding, value, and trust (navigate professional hierarchies and lead to changes)</li> <li>• Potential: tangible incentives (performance reviews and continuing professional development)</li> <li>• Capacity: Sufficient resource, strong social network, low staff turnover</li> <li>• Important role of facilitation of review meetings: straightforward, approachable, well-respected clinician, knowledgeable about protocols, humble, academic</li> </ul>
<b>Kinney MV, George AS, Rhoda NR, Pattinson RC, Bergh AM. From Pre-Implementation to Institutionalization: Lessons From Sustaining a Perinatal Audit Program in South Africa. Global Health: Science and Practice. 2023;11(2).</b>	High	MPDSR	South Africa – subnational	<ul style="list-style-type: none"> <li>• Integrating perinatal audit into broader policy and guideline</li> <li>• Multiple structures, continuity of actors supporting institutionalization (academic, research and training [giving official ownership of the process], government)</li> <li>• Demonstration of impact and local adaptation (however no direct impact on mortality) and challenges at subnational level</li> <li>• Institutionalization is a process not destination (started 30 years ago)</li> <li>• Facilities are required to do a minimum number of review meetings each year (10), and perinatal-focused meetings are counted toward this requirement.</li> </ul>
<b>Mahajan V, Kaur A, Sharma A, Azad C, Guglani V. Modifiable factors for prevention of childhood mortality. Indian Pediatrics. 2014;51:45-7.</b>	Low	PDA	India – single facility	<ul style="list-style-type: none"> <li>• Retrospective review, fortnightly audit meetings attended by three pediatricians, resident doctors, and nursing staff</li> <li>• No other useful information on the process</li> </ul>

Reference	Importance level	MPDSR or PDA	Country and setting	Key takeaway
<b>Manu A, Billah SM, Williams J, Kilima S, Yeji F, Matin Z, Hussein A, Gohar F, Wobil P, Baffoe P, Karim F. Institutionalising maternal and newborn quality-of-care standards in Bangladesh, Ghana and Tanzania: a quasi-experimental study. BMJ Global Health. 2022;7(9):e009471.</b>	Low	QI including MPDSR	Cross-country	<ul style="list-style-type: none"> <li>• Piloting EMEN-QI indicators and tracking changes on mortality</li> </ul>
<b>Nassif M, Bissen T, Alotaibi YK, Alnowaiser N, Alzahrani A, Wang M. Collaborative improvement project to decrease maternal mortality rate across five hospitals in Saudi Arabia. BMJ Open Quality. 2022;11(4):e002024.</b>	Low	QI	Saudi Arabia – selected facilities	<ul style="list-style-type: none"> <li>• Lack of safety culture – focusing on addressing underreporting</li> <li>• IHI collaborative model for achieving breakthrough improvement</li> </ul>
<b>Ouédraogo OM, Ouédraogo CM, Kouanda S. Discontinuation of the maternal death surveillance and response system in the post-conflict context of the Central African Republic. International Journal of Gynecology &amp; Obstetrics. 2022;158:74-5.</b>	Low	MPDSR	Central African Republic – national	<ul style="list-style-type: none"> <li>• Conflict’s impact</li> <li>• No other useful information on the process</li> </ul>
<b>Sandakabatu M, Nasi T, Titiulu C, Duke T. Evaluating the process and outcomes of child death review in the Solomon Islands. Archives of disease in childhood. 2018;103(7):685-90.</b>	Moderate	PDA	Solomon Islands – single facility	<ul style="list-style-type: none"> <li>• Adapting WHO guideline. Once-a-week audit after morning handover, all staff encouraged to attend (lower attendance of nurses). Cases reported to MoH</li> <li>• Thirty-three child death review meetings were conducted over 6 months, reviewing 66 neonatal and child deaths</li> <li>• Uncertainty of action plan until a specified QI team</li> </ul>
<b>Tsai C, Walters CB, Sampson J, Kateh F, Chang MP. Pediatric mortality in a rural tertiary care center in Liberia. Children. 2017;4(2):8.</b>	Low	PDA	Liberia – single facility	<ul style="list-style-type: none"> <li>• Retrospective review of medical record</li> <li>• No other useful information on the process</li> </ul>
<b>Willcox ML, Kumbakumba E, Diallo D, Mubangizi V, Kirabira P, Nakaggwa F, Mutahunga B, Diakité C, Dembélé E, Traoré M, Daou P. Circumstances of child deaths in Mali and Uganda: a community-based confidential enquiry. The Lancet Global Health. 2018;6(6):e691-702.</b>	Moderate	PDA	Mali and Uganda – community	<ul style="list-style-type: none"> <li>• Uncertainty of cause of death due to incomplete data</li> <li>• Cost of investigation during research is £180 per death, it would be cheaper to investigate and review a sample of deaths</li> <li>• Verbal autopsies are unlikely to identify unexpected avoidable factors</li> </ul>



Reference	Importance level	MPDSR or PDA	Country and setting	Key takeaway
<b>Willcox ML, Price J, Scott S, Nicholson BD, Stuart B, Roberts NW, Allott H, Mubangizi V, Dumont A, Harnden A. Death audits and reviews for reducing maternal, perinatal and child mortality. Cochrane Database of Systematic Reviews. 2020(3).</b>	Low	MPDSR + PDA	Cochrane review	<ul style="list-style-type: none"> <li>• Two random control trials included</li> <li>• In a study from West African hospitals, where death rates among women and babies were high, reviewing deaths probably led to fewer deaths among pregnant women, new mothers, and newborn babies. In French hospitals, where death rates among babies were low, it may have made little or no difference to death rates among newborn babies .</li> </ul>
<b>Willcox ML, Okello IA, Maidwell-Smith A, Tura AK, van den Akker T, Knight M. Maternal and perinatal death surveillance and response: a systematic review of qualitative studies. Bulletin of the World Health Organization. 2023;101(1):62.</b>	High	MPDSR	Systematic review	<ul style="list-style-type: none"> <li>• Action cycle: In the context of absence of legal protection and more commonly audit charter, through implementation of changes (mostly at facility level), learning from mistakes, and being more vigilant, leads to implementation of positive changes</li> <li>• Vicious cycle: in a blame culture (fused by high-level political commitment and fear), insufficient resources, and poor leadership, through fear of blame, inadequate preparation, inaccurate or incomplete information, inadequate review and recommendation, nonimplementation of recommendation (as they were unachievable), lack of sustainability, leads to lack of any changes, or harmful outcomes (afraid to work in labor ward, refusal of high-risk patients)</li> <li>• Although several respondents recommended legal protection at the national level to prevent data from MPDSR from being used in litigation, only South Africa had enacted this protection which “has been ratified by relevant judicial bodies.”</li> </ul>
<b>Yameogo WM, Nadine Ghilat Paré/Belem W, Millogo T, Kouanda S, Ouédraogo CM. Assessment of the maternal death surveillance and response implementation process in Burkina Faso. International Journal of Gynecology &amp; Obstetrics. 2022;158:15-20.</b>	Moderate	MPDSR	Burkina Faso – subnational	<ul style="list-style-type: none"> <li>• Underreporting and absent community notification</li> <li>• Review committees not always functional, some officers lack understand; newborn deaths have not been reviewed</li> <li>• Data not used sufficiently for decision-making</li> <li>• Most of the response recommendations are not implemented, also no monitoring mechanisms of the recommendations</li> </ul>

Reference	Importance level	MPDSR or PDA	Country and setting	Key takeaway
Young A, Duke T. The process of implementing child mortality reviews in low-and middle-income countries: a narrative systematic review. <i>Tropical Medicine &amp; International Health</i> . 2020;25(7):764-73.	High	PDA	Scoping review	<ul style="list-style-type: none"> <li>• Difficulty in identifying feasible solutions</li> <li>• People and resources are key barriers and facilitators, same people proposing solution and implementing them</li> </ul>
Lusambili A, Jepkosgei J, Nzinga J, English M. What do we know about maternal and perinatal mortality and morbidity audits in sub-Saharan Africa? A scoping literature review. <i>International Journal of Human Rights in Healthcare</i> . 2019;12(3):192-207.	High	MPDSR	Scoping review	<ul style="list-style-type: none"> <li>• Not all countries in sub-Saharan Africa conduct maternal and perinatal mortality and morbidity audits (MPMMAs). Countries where MPMMAs are conducted have not instituted standard practice, MPMMAs are not done on a national scale, and there is no clear best practice for MPMMAs.</li> <li>• MPMMAs are not held regularly; there is a lack of understanding of audit importance and lack of commitment among health workers, alongside limited organizational support and supervision.</li> </ul>

## APPENDIX 4. CROSS-COUNTRY LEARNING WORKSHOP SUMMARY

### MORTALITY AUDIT AND QUALITY CARE: TOWARDS AN INTEGRATED APPROACH? CROSS-COUNTRY LEARNING WORKSHOP

**SEPTEMBER 13, 2023**

10:00 to 11:30 (Washington DC)

Participants included MOMENTUM Country and Global Leadership child health team, consultant team, and country interviewees from Kenya, Nigeria, Sierra Leone, and Zambia.

#### OPENING

1. Self-introductions
2. Introduction to MOMENTUM Country and Global Leadership and pediatric death audit (PDA)
3. Presentation from consultants on learning from country interviews and proposed options for countries

#### DISCUSSION

##### Legal framework

- Does a legal framework for deaths audits both (1) require it, and (2) protect health workers from repercussions? But in the latter case, at some point or at some level, doesn't action require accountability?
- Legal protection is for individual health workers who would not be blamed and penalized. If people feel that they will be blamed, they would not disclose information at the audit meetings. This shifts the accountability to a system level.
- Kenya had had no previous experiences with litigation, more on the maternal side.
- Similarly, no legal issues to date in Zambia.
- In Nigeria, even before the information related to analysis come out, already having a lot of issues related to quality of care; not sure why law has not been assented; continued advocacy.
- Legal framework important in Nigeria, not so important years ago but important now. People have more access to information, so legal backing had to be strong to protect frontline workers.

##### Community component of PDA

- Do our country colleagues agree with the global perspective that the community piece is less relevant for PDA than for maternal death surveillance and response (MDSR)?
- World Health Organization (WHO) felt it adds another layer to the complexity, not that it is unimportant
- Long debate in Nigeria on how to define “community,” and difference with primary level of care. Also related to how informal care sector could be managed and community stakeholders could be involved in reporting and other activities. Patent and Proprietary Medicine Vendors and their roles in community. Community is an important piece of maternal and perinatal death surveillance and response (MPDSR).

## Transferrable lessons from MPDSR to PDA

- Surveillance for PDA is not a key priority from WHO perspective because it should be captured by national surveillance programs.
- Based on Kenyan context and decentralization, challenges are that audits are seen as an extra activity and lack of resources for action from the county level. County MPDSR meetings every month; however, no accountability from the county level. Reporting is mostly on the maternal side from the health facilities. Recommend providing an official report from the county level to improve accountability. Currently national level only important for policy whereas county level is relevant for changes.
- In Nigeria the Federal MoH conducted a lot of meetings at subnational levels, at the end of meetings there was a virtual meeting with local actors. One key feedback is audits are ongoing but they are hard to be brought together, and addressing issues related to reporting platforms, some only operate at tertiary levels. Need for an aligned platform at different levels. Sometimes resources are there but staff are unfamiliar with accessing the resources.
- From the practitioner's perspective in Nigeria, the previous audit platform does not include audit for all children. Maternal Perinatal Database for Quality, Equity and Dignity (MPD-4-QED), and later pediatric audits added on. Comparing with MPDSR, technical advancement (paper-based form to laptop based); less challenge with logistics (subscription provided and people can do at their convenience); mindset and added work. The data from the audit must be gathered for responses, and people should be able to learn from the audits.
- Facilitation approach for audits is appropriate in Kenya, since health workers already have negative experiences with audits; the facilitation by external stakeholders is slowly changing health workers' attitude after a couple of audits.
- In the context of Zambia, there have been national-level separate programs and staff (EPI, immunization, etc.); going down to provincial levels the structure is different, might be one person looking at maternal and child health as a whole. Things won't be done as required because of staff shortage as they would be likely biased toward maternal death audits.
- Zambia also has clearly defined national-level roles; need to lobby for similar structure at the subnational levels. The provincial focal point currently likely a midwifery staff so biased toward maternal and newborn.
- Given what was said about Zambia, technical assistance alone would not be enough, but needs to be combined with human resources expansion.
- How manpower distribution within a country impacts programming is a key consideration. Not only by senior doctors but also most of these doctors are in urban tertiary settings, very unusual in secondary rural settings.
- For Sierra Leone, we would be interested learning more about Nigeria's experience with the MPD-4-QED to roll out digital that would support collation of data at all levels. And to develop a facility policy and agreement.

### Technical support needs and partners

- Need to appoint a local technical lead at the district level to overview audits conducted at the facility level. The collation of data at the district level is missing.
- Professional associations and academics; would make more progress if state governments buy in to the policy, requires more advocacy and engagement with commissioners of health at states and federal MoH.
- A key need relates to coordination and use of information, and ensuring accountability, requiring some more people.
- In Zambia, the key support we need is the development of official tools for PDA; the technical aspects. Many guidelines and standards supported to be drafted and launched including pediatric and adolescent quality of care standards. Could easily form consensus technical working group, recommendations to permanent secretary to write a circular to request all children who die be reviewed. With instruction from higher level, have seen good response for maternal death surveillance, which has been done every week. People operate business as usual, people review and come up with solutions.
- In Kenya, focus should be on supporting the county level who operate very separately, facilitators at individual counties.

### Options

- Does the modular approach make sense?
- In the Kenya context, having the policy from national level helps or else some counties would not act. As a strategy, bottom-up approach from a facility level works better because of differences at facility level.

### Summary

- Enabling policies and understanding how to use tools; changing mindset not only through training; interested in understanding legal aspects; capacity to coordinate meetings, reporting, and accountability. Discussion around (1) legal; (2) coordination; (3) technical assistance.
- It sounds like both the top-down work of having the right tools and policies in place, as well as the bottom-up work of ensuring the right resources are available at district and facility levels are BOTH necessary for action but insufficient on their own.



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