eISSN: 2229-3213 pISSN: 2229-3205
The Journal of Applied Science and Social Science
Volume 16,Issue 02 February, 2026

UDC: 618.2/3-06:614.2(575.1)

ORGANIZATIONAL DETERMINANTS OF MATERNAL AND PERINATAL MORTALITY IN UZBEKISTAN (2020–2024): A PROCESS-BASED ANALYSIS OF OBSTETRIC CARE

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Abstract:

Background: Maternal and perinatal mortality reflect not only clinical severity but also how obstetric care processes are organized—early recognition of complications, risk-appropriate routing, timeliness of intervention, and availability of escalation mechanisms.

Objective: To analyze maternal and perinatal mortality in Uzbekistan (2020–2024) through an organizational management lens, focusing on facility level at complication onset, transfers, time-to-care intervals, and use of escalation mechanisms.

Methods: An analytical review was conducted using official national statistics (2020–2024) and structured expert review forms for fatal cases. Key organizational indicators included facility level (I–III), transfer patterns, admission-to-intervention time, complication-to-qualified-care time, use of sanitary aviation and multidisciplinary consilium, and expert assessment of preventability.

Results: Maternal mortality showed year-to-year variability without a stable downward trend. In 69.9% of maternal death cases, the fatal event occurred outside Level III facilities. Transfers between facilities were documented in 57.4% of cases. Median admission-to-start-of-care time was 47 minutes (IQR 32–75), and median complication-to-qualified-care time was 4.8 hours (IQR 2.6–7.9). Indications for sanitary aviation were present in 31.5% of cases, while actual use was 14.2%. Expert review suggested that 75.4% of maternal deaths were potentially preventable. Perinatal mortality remained high in absolute numbers, with marked regional heterogeneity in 2024.

Conclusions: A large proportion of adverse outcomes are driven by modifiable organizational factors—routing to an appropriate level of care, timeliness, and system readiness. Strengthening risk stratification, referral criteria, escalation pathways, staffing and simulation training may reduce preventable maternal and perinatal deaths.

Keywords: maternal mortality; perinatal mortality; referral system; delays; organizational factors; quality of care; audit; Uzbekistan

Introduction

Maternal and perinatal mortality are final adverse outcomes that accumulate across pregnancy, childbirth and the early postpartum period. While clinical etiologies (hemorrhage, hypertensive disorders, sepsis) remain important, the probability of death is strongly influenced by organizational performance: detection of danger signs, timely escalation, availability of blood products and intensive care, adherence to transfer criteria, and coordinated multidisciplinary action.

Compared with purely nosological analyses, a process-based organizational assessment focuses on the patient pathway, including facility level at the time of deterioration, transfer count and stage, time to start of definitive care, and consistency of actions with national protocols. This approach aligns with quality improvement frameworks and emphasizes preventable system failures.

Aim

To describe the dynamics and organizational determinants of maternal and perinatal mortality in Uzbekistan during 2020–2024 and to identify key modifiable process gaps.

Materials and Methods

Data sources: (1) official national statistics on maternal and perinatal mortality (2020–2024); (2) regional aggregated summaries; (3) expert review forms for fatal cases.

Organizational indicators: facility level (I–III) at complication onset; transfer occurrence and multiplicity; admission-to-start-of-care time; complication-to-qualified-care time; use of sanitary aviation; performance and impact of multidisciplinary consilium; expert preventability assessment.

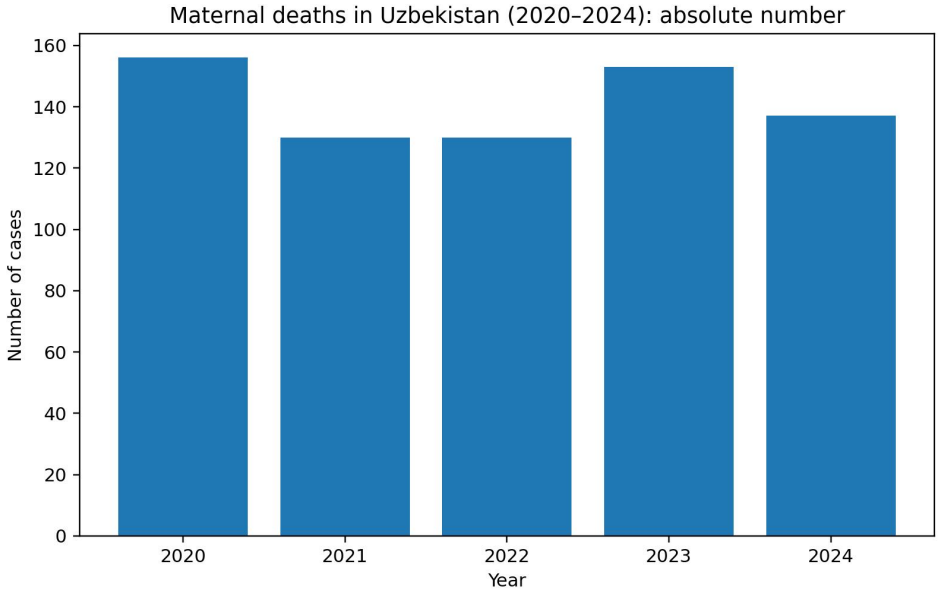
Analysis: Descriptive analysis of annual dynamics, distributions, and regional heterogeneity. Process indicators were interpreted as potential targets for system redesign and quality improvement.

Table 1. Maternal mortality dynamics in Uzbekistan (2020–2024)

Year	Maternal deaths (n)	Indicator
2020	156	18.5
2021	130	14.4
2022	130	13.9
2023	153	15.9
2024	137	14.79

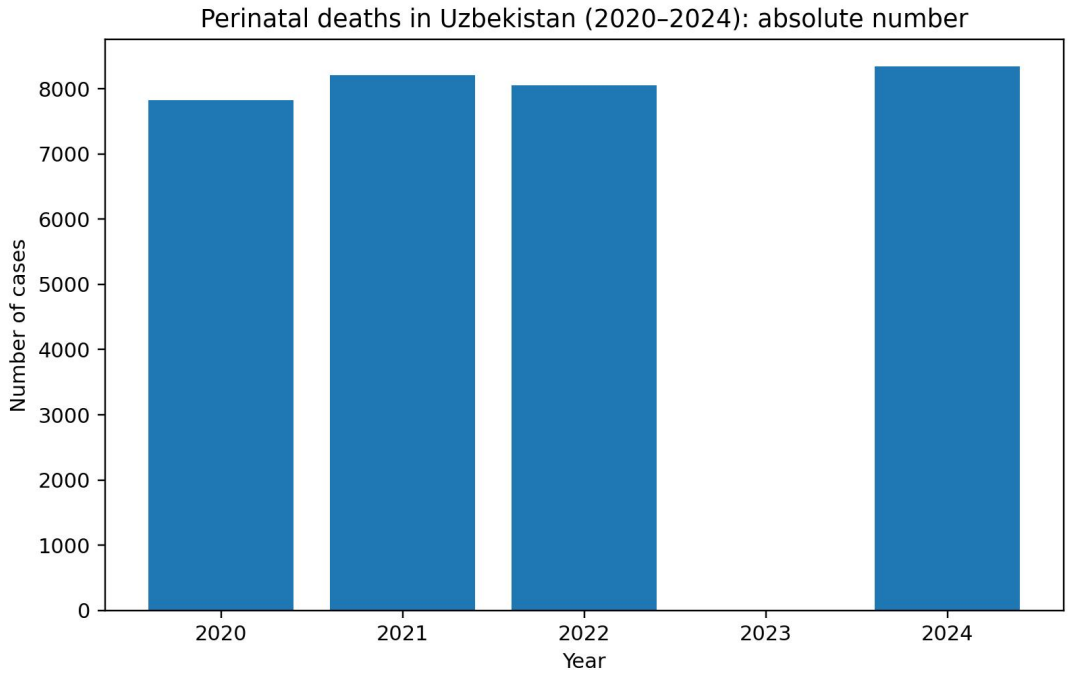
Results

Maternal mortality dynamics. Over 2020–2024, national statistics recorded 706 maternal deaths. Annual values fluctuated, indicating non-uniform implementation of management decisions across regions and facilities (Figures 1).

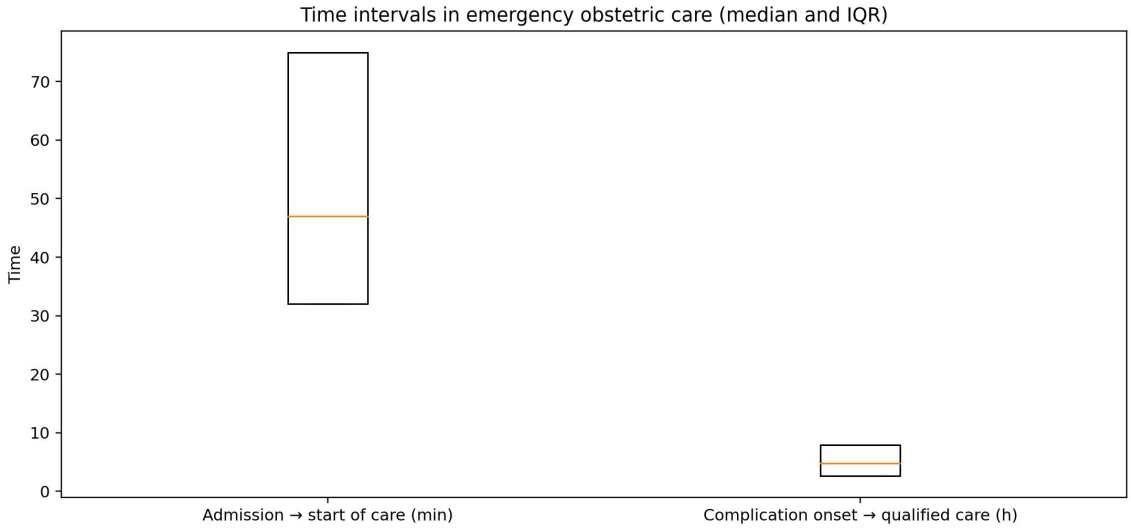


Facility level and transfers. In 69.9% of maternal death cases, deterioration and/or death occurred outside Level III facilities despite the need for specialized care. Transfers between facilities were documented in 57.4% of cases (Figures 3-4). Delayed and multi-stage transfers

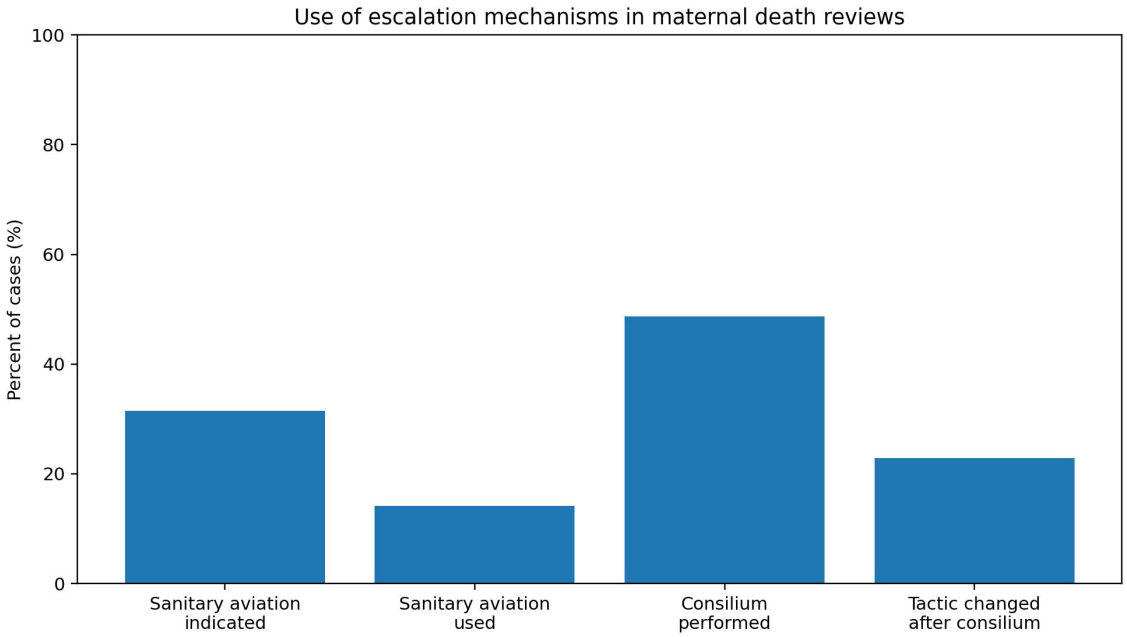
were associated with loss of therapeutic time.



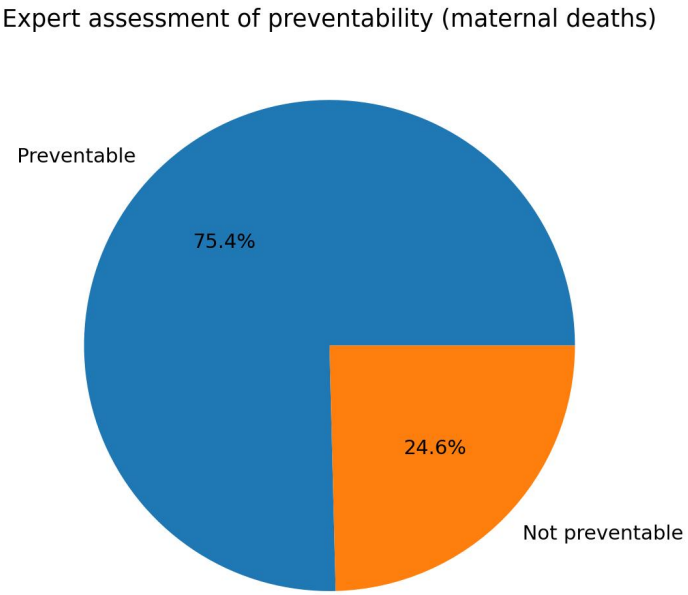
Timeliness. Median admission-to-start-of-care time was 47 minutes (IQR 32–75). Median complication-to-qualified-care time was 4.8 hours (IQR 2.6–7.9). In 62.3% of reviews, time-to-qualified-care exceeded predefined thresholds (Figure 3).



Escalation mechanisms. Indications for sanitary aviation were present in 31.5% of cases, while actual use was 14.2%. Consilium was performed in 48.7% of cases, but a documented change in management tactics after consilium was noted in 22.9% (Figure 3).



Preventability. Expert assessment classified 75.4% of maternal deaths as potentially preventable, underscoring the predominance of modifiable organizational determinants (Figure 4).



Perinatal mortality. During 2020–2024, 40,603 perinatal deaths were registered. Despite a temporary decline in 2022–2023, the rate increased in 2024. More than 60% of losses occurred antenatally or intranatally—before specialized neonatal intensive care could be provided—highlighting the decisive role of antenatal follow-up and intrapartum management (Table 2; Figures 4–5). Regional heterogeneity in 2024 was pronounced, with the gap between minimum and maximum values exceeding 1.9-fold

Discussion

The results suggest that the dominant drivers of maternal and perinatal mortality are frequently organizational rather than purely clinical. The high share of fatal events occurring outside Level

III facilities and the substantial proportion of transfers reflect delayed or inadequate routing decisions. This is consistent with the "three delays" framework, where delays in reaching and receiving appropriate care amplify clinical risk.

Time intervals (admission-to-intervention and complication-to-qualified-care) provide direct, measurable indicators of system responsiveness. The underutilization of sanitary aviation despite indications, and limited impact of consilium on management tactics, may indicate gaps in governance, logistics, role clarity, and resource availability.

Perinatal mortality patterns further emphasize that prevention must target antenatal risk identification, timely hospitalization of high-risk pregnancies, and delivery at an appropriate facility level. Regions with higher perinatal mortality are typically characterized by limited access to Level III services, higher shares of deliveries in Level I–II facilities, delayed hospitalization of high-risk women, and shortages of neonatologists and critical care staff.

A strengthened clinical audit system should move beyond attribution of causes toward root-cause analysis and monitoring of corrective actions, supported by standard indicators and feedback loops for Level I–II facilities.

Recommendations for system improvement

1) Standardize risk stratification and routing from late gestation, with clear referral criteria and early planned delivery site selection.
2) Implement time-based quality indicators (time to intervention; time to qualified care) with routine monitoring and accountability.
3) Strengthen transfer logistics, including defined triggers for urgent transfer, pre-arranged transport, and expanded use of sanitary aviation/telemedicine where indicated.
4) Expand simulation training and team drills for critical obstetric events in Level I–II facilities.
5) Redesign maternal and perinatal death audits to include preventability criteria, structured root-cause analysis, and tracking of corrective actions.
6) Address staffing gaps in remote regions (anesthesiology, intensive care, neonatology) through targeted incentives, rotation models, and continuous education.

Conclusion

In Uzbekistan (2020–2024), maternal and perinatal mortality demonstrated persistent variability and remained strongly influenced by modifiable organizational determinants. Improving routing to an appropriate level of care, reducing delays, and strengthening escalation mechanisms and audit feedback are key priorities for reducing preventable deaths.

References:

1. World Health Organization. Strategies toward Ending Preventable Maternal Mortality (EPMM). Geneva: WHO; 2015.
2. World Health Organization. Standards for improving quality of maternal and newborn care in health facilities. Geneva: WHO; 2016.
3. World Health Organization. Maternal and Perinatal Death Surveillance and Response: Materials to Support Implementation. Geneva: WHO; 2021.
4. World Health Organization. The WHO near-miss approach for maternal health. Geneva: WHO; 2011.
5. World Health Organization. ICD-MM: The WHO application of ICD-10 to deaths during pregnancy, childbirth and the puerperium. Geneva: WHO; 2012.
6. Thaddeus S, Maine D. Too far to walk: maternal mortality in context. Social Science & Medicine. 1994;38(8):1091–1110.

7. Donabedian A. The quality of care: how can it be assessed? JAMA. 1988;260(12):1743–1748.
8. Kruk ME, et al. High-quality health systems in the SDG era: time for a revolution. Lancet Global Health. 2018;6(11):e1196–e1252.
9. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: WHO; 2016.
10. World Health Organization. WHO recommendations: intrapartum care for a positive childbirth experience. Geneva: WHO; 2018.
11. UNICEF, WHO, World Bank Group, UN DESA/Population Division. Levels and Trends in Child Mortality (for perinatal/neonatal context). 2023.
12. Goldenberg RL, McClure EM, Saleem S. Improving pregnancy outcomes in low- and middle-income countries. Reprod Health. 2018;15(Suppl 1):88.
13. Pattinson R, Kerber K, Buchmann E, Friberg IK. Stillbirths: how can health systems deliver for mothers and babies? Lancet. 2011;377(9777):1610–1623.
14. World Health Organization. Global report on health emergency and disaster risk management (systems readiness concepts). Geneva: WHO; 2019.