

Original Research Article

Trend, causes and determinants of perinatal deaths in Ondo state: insights from maternal and perinatal death surveillance and response data 2021-2022

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ABSTRACT

Background: Perinatal mortality remains a major public health challenge in Nigeria and it contributes substantially to under-five mortality. Maternal and perinatal death surveillance and response (MPDSR) systems provide opportunities to identify patterns, causes, and avoidable factors associated with these deaths. This study assessed MPDSR implementation and examined the trends, causes, and determinants of perinatal deaths in Ondo State, Nigeria, between 2021 and 2022.

Methods: A retrospective descriptive study was conducted using triangulated MPDSR data obtained from the electronic MPDSR platform, district health information system (DHIS-2), and health facility records in Ondo State. A four-phase review process involving desk review, stakeholder engagement, data mapping, facility-level record harvesting, and database validation was adopted. Data were extracted using National MPDSR tools and analysed with SPSS version 23 using descriptive statistics.

Results: A total of 365 and 392 perinatal deaths were notified in 2021 and 2022 respectively, of which 68 (18.6%) and 133 (33.9%) were reviewed. Most deaths occurred in health facilities. Home referrals accounted for 28 (41.2%) of reviewed cases in 2021 and 24 (18%) in 2022. Macerated stillbirths constituted a substantial perinatal deaths and while birth asphyxia, prematurity and sepsis were the leading causes of neonatal deaths. Delayed presentation, poor referral systems, socioeconomic barriers, and inadequate intrapartum monitoring were major contributory factors.

Conclusions: Structural and systemic barriers accounted for significant perinatal losses. Therefore, strengthening MPDSR systems, improving intrapartum care, regulating non-skilled birth practices, building the capacity of health workers and expanding equitable maternal and newborn services are essential to reducing preventable perinatal deaths.

Keywords: Perinatal mortality, Neonatal deaths, MPDSR, Birth asphyxia, Prematurity, Nigeria, Ondo State

INTRODUCTION

Globally, substantial progress has been made in reducing under-five mortality over the past two decades; however, neonatal mortality reduction has remained relatively slow, particularly in low- and middle-income countries.^{1,2} An estimated 2.3 million newborns die annually worldwide, with sub-Saharan Africa accounting for a disproportionate share of these deaths.¹ Nigeria contributes significantly to

the global burden of neonatal and perinatal mortality owing to its large population, persistent health system challenges, and inequitable access to quality maternal and newborn healthcare services.³

Approximately seven million babies are born annually in Nigeria, and nearly 240,000 newborns die within the first 28 days of life.^{2,3} A substantial proportion of these deaths occur within the first 24 hours after delivery. Neonatal

deaths contribute nearly one-third of under-five mortality in the country, with prematurity, birth asphyxia, neonatal infections, and complications of labour accounting for the majority of cases.^{4,5} Although modest progress has been recorded in reducing overall child mortality, neonatal mortality remains persistently high.

Perinatal mortality, which includes stillbirths and early neonatal deaths, is a sensitive indicator of the quality of antenatal, intrapartum, and immediate newborn care.⁶ WHO Every Newborn Action Plan emphasizes that the period during labour, birth, and the first week of life accounts for the greatest proportion of preventable maternal and newborn deaths and stillbirths, particularly in low-resource settings.⁷ High perinatal mortality rates are often associated with poor access to skilled birth attendance, delayed referrals, inadequate emergency obstetric and neonatal care, weak health systems, and unfavourable socioeconomic conditions.⁷ In Nigeria, more than half of deliveries occur at home or in facilities lacking adequate capacity for emergency care.⁸

MPDSR has been promoted by WHO as a continuous surveillance and quality improvement strategy aimed at identifying the causes and avoidable factors associated with maternal and perinatal deaths.^{9,10} Approach involves notification, review, analysis, and implementation of corrective actions to prevent future occurrences.

In Ondo State, maternal death reviews began under the Confidential Enquiry into Maternal Deaths in Ondo State (CEMDOS) Law enacted in 2010. The law made maternal death notifications mandatory for all care providers in the State. The CEMDOS, which is essentially a maternal death review system later evolved into the MPDSR framework in 2017, providing an accountability framework beyond maternal deaths to include perinatal deaths as well. Since then, the State has implemented several maternal and newborn health interventions aimed at reducing preventable deaths.

However, despite these interventions, the burden of perinatal mortality remains high, and comprehensive evidence on the implementation status of MPDSR and the determinants of poor neonatal outcomes in the State remains limited. Furthermore, the COVID-19 pandemic significantly disrupted maternal, newborn, and child health services across Nigeria, including Ondo State.^{11,12} Movement restrictions, fear of infection, diversion of healthcare resources, reduced clinic attendance, and interruptions in referral systems adversely affected access to antenatal care, skilled delivery services, immunization, and newborn care.^{11,13} These disruptions may have contributed to delayed presentation, increased home deliveries, poor intrapartum monitoring, and adverse perinatal outcomes observed during the study period. This study therefore assessed MPDSR implementation in Ondo State and analysed the patterns, trends, causes, and contributory factors associated with perinatal deaths between 2021 and 2022. Findings from this study are expected to guide policy decisions, improve

accountability, and strengthen maternal and newborn health programming in Ondo State and similar settings.

METHODS

Study area

Ondo State is located in Southwestern Nigeria and is one of the six states in the geopolitical zone. The State is bounded by Edo State to the east, Ogun and Osun States to the west, Kogi State to the north, and the Atlantic Ocean to the south. It has an estimated female population of over 2.6 million people and comprises eighteen local government areas (LGAs) distributed across three senatorial districts. Approximately half of the population resides in rural communities where access to quality healthcare services remains limited.

The health system in Ondo State consists of primary, secondary, and tertiary levels of care. Primary healthcare facilities provide basic maternal and child health services, while secondary and tertiary facilities offer more specialized obstetric and neonatal care services including emergency interventions and referral services.

Active MPDSR facilities are distributed across all the 18 LGAs in Ondo State and included primary, secondary, and tertiary healthcare facilities. These facilities included Mother and Child Hospital Akure, now State Specialist Hospital, Akure, University of Medical Sciences Teaching Hospital, Ondo and its Akure complex, Federal Medical Centre Owo, and General Hospitals and selected Comprehensive Health Centres.

Study design

This was a retrospective descriptive study involving secondary analysis of MPDSR data for the years 2021 and 2022. Data triangulation was undertaken using electronic MPDSR database, DHIS-2, and facility-level records.

Study population

The study population comprised all perinatal deaths notified through MPDSR system in Ondo State, Nigeria, between January 1st 2021 and December 31st 2022. Total sample size was being 757. The study included perinatal death records reported from active MPDSR-participating primary, secondary, and tertiary health facilities across 18 LGA of the State.

Inclusion criteria

The study included all perinatal death cases (stillbirths and early neonatal deaths) notified through the MPDSR system in Ondo State between January 2021 and December 2022. Cases documented in at least one of the study data sources (electronic MPDSR database, DHIS-2, or facility MPDSR records). Records from active MPDSR-reporting health facilities within Ondo State. Cases with sufficient

information available for extraction and validation using the national MPDSR data collection tools.

Exclusion criteria

Perinatal deaths occurring outside the study period, duplicate records identified during data validation and consistency checks, records with insufficient or irretrievable information after verification and data cleaning procedures and perinatal deaths not reported through the MPDSR system and therefore unavailable in the reviewed databases were excluded from study.

Data sources and review process

The review process was conducted in 4 interrelated phases.

Phase I: Desk review and data mapping

A comprehensive desk review of policies, guidelines, reports, and relevant documents, including grey literatures related to maternal and perinatal mortality in Ondo State was undertaken. Stakeholder engagement meetings were conducted with the State MPDSR steering and sub-technical committees, facility MPDSR focal persons, representatives of development partners, and consultants. Existing data sources and reporting channels were mapped to determine completeness and consistency.

Phase II: Harvesting of MPDSR data from health facilities

State MPDSR team conducted visits to hub/referral facilities to retrieve completed notification and review forms and ensure harmonization of reporting processes. National MPDSR structured and validated data collection tools were utilized across all facilities. Key informant interviews also conducted among selected stakeholders involved in MPDSR implementation and coordination.

Phase III: Updating and validation of the State MPDSR database

Data extracted from facility records and national MPDSR tools were entered into the State MPDSR database template developed by the Ministry of health. Data validation was undertaken through double data entry, consistency checks, and random facility verification visits.

Phase IV: Data analysis

Data were exported into statistical package for social sciences (SPSS) version 23 for analysis. Descriptive statistics including frequencies, percentages, tables, and charts were generated to summarize trends, causes, and contributory factors associated with perinatal deaths.

Ethical considerations

Ethical approval for the study was obtained from the Ondo State Health Research Ethics Committee. All participants involved in stakeholder interviews provided written

informed consent prior to participation. Confidentiality and anonymity of facility and patient-level data were maintained throughout the study.

RESULTS

Sociodemographic characteristics of study subjects

Mean age of mothers of decedent babies was 30 years. Table 1 and 2 show the analysis of perinatal deaths recorded between 2021 and 2022, which revealed that the majority of mothers of the decedent babies 107 (54%) occurred among mothers aged 25-34 years. Most, 189 (94%) mothers were married and had attained at least secondary education. Nearly half, 144 (49.7%) of all perinatal deaths occurred among infants with normal birth weight, although low birth weight, 83 (28.6%) remained a significant contributor. Term births 111 (50%) accounted for half, of the deaths, while preterm births 105 (47.5%) constituted almost an equal proportion, underscoring the substantial burden of prematurity. Antenatal care attendance was common; however, a considerable proportion of deaths occurred among referred 123 (34.6%) and unbooked 100 (28.2%) mothers, highlighting persistent gaps in the continuum and quality of maternal and newborn care.

Trends in perinatal death notifications and reviews

A total of 365 perinatal death notifications were received in 2021, of which only 68 (18.6%) cases were reviewed. In 2022, 392 notifications were recorded, with 133 (33.9%) reviewed (Figure 1). Although the proportion of reviewed cases improved between both years, substantial gaps remained in MPDSR implementation and review coverage.

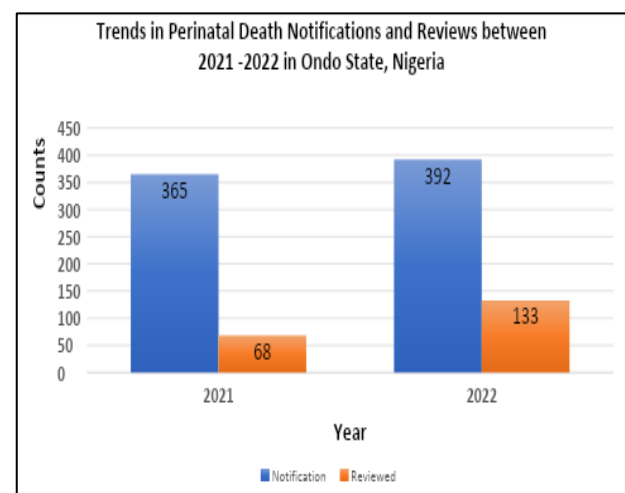


Figure 1: Trends in perinatal death notifications and reviews between 2021-2022 in Ondo State, Nigeria.

Table 3 shows that most perinatal deaths that occurred in the years 2021 and 2022 were inter-facility referrals, 125 (62.2%) probably reflecting the referral of complicated obstetric and neonatal cases to higher-level centres.

Nevertheless, a significant proportion of the perinatal deaths in 2021 and 2022, 28 (41.2%) and 24 (18.0%) respectively of the reviewed cases were admitted directly from home and from TBA.

More perinatal deaths occurred after home deliveries and with TBAs in 2022 40 (30.1%) than in 2021, 17 (25%) of deaths. In the health facilities, use of partograph for monitoring labour was suboptimal. Only 69 (34.3%) of the women with decedents babies that underwent labour were documented to have been monitored using partographs. Table 3 further show that majority of perinatal mortalities for 2 years occurred with women who had SVD, 107 (53.2%) and C-section, 70 (34.8%) as mode of deliveries.

Pattern and causes of perinatal deaths

Macerated stillbirths constituted a substantial proportion of the deaths reviewed during the study period. Birth asphyxia and prematurity were identified as the leading causes of perinatal mortality in both years. Other

contributing causes included neonatal sepsis, prolonged obstructed labour, and complications associated with delayed referrals (Figure 2).

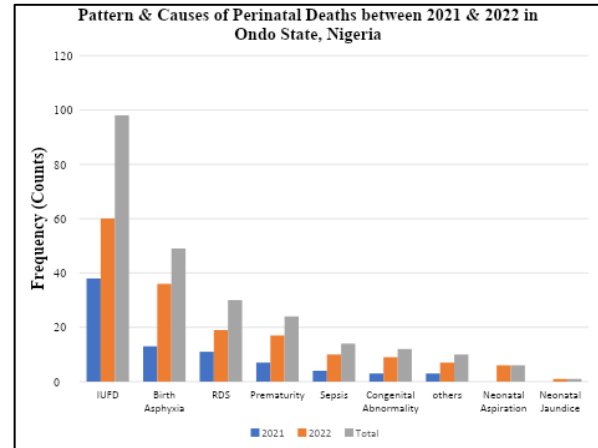


Figure 2: Patterns and causes of perinatal mortality in Ondo, (2021-2022).

Table 1: Sociodemographic characteristics of mothers of decedent babies in 2021 & 2022.

Variables	Category	2021		2022		Total	
		N (n=68)	%	N (n=133)	%	N (n=201)	%
Maternal age (years)	15-24	13	19	22	16.54	35	17.41
	25-34	41	60	66	49.62	107	53.23
	35-44	14	21	41	30.83	55	27.36
	45-54	0	0	1	0.75	1	0.50
	Unrecorded		0	3	2.26	3	1.49
Maternal marital status	Single	4	6	5	3.76	9	4.48
	Married	63	93	126	94.74	189	94.03
	Separated	1	1	1	0.75	2	1.00
	Unrecorded		0	1	0.75	1	0.50
Maternal educational status	No formal education	1	1	5	3.76	6	2.99
	Primary	10	15	24	18.05	34	16.92
	Secondary	32	47	43	32.33	75	37.31
	Tertiary	19	28	40	30.08	59	29.35
	Unrecorded	6	9	21	15.79	27	13.43

Table 2: Sociodemographic characteristics of decedent babies in 2021 & 2022 (notification data).

Variables	Category	2021		2022		Total	
		N (n=365)	%	N (n=392)	%	N (n=757)	%
Baby birth weight	Extreme low birth weight	9	2.47	6	1.53	15	1.98
	Very low birth weight	19	5.21	19	4.85	38	5.02
	Low birth weight	31	8.49	52	13.27	83	10.96
	Normal weight	64	17.53	80	20.41	144	19.02
	Macrosomia	3	0.82	7	1.79	10	1.32
	Unrecorded	239	65.48	228	58.16	467	61.69
Gestational age at birth	Preterm	49	13.42	56	14.29	105	13.87
	Term	56	15.34	55	14.03	111	14.66
	Postterm	5	1.37	5	1.28	10	1.32
	Unrecorded	255	69.86	276	70.41	531	70.15
Maternal ANC status	Booked	45	12.33	87	22.19	132	17.44
	Unbooked	54	14.79	46	11.73	100	13.21
	Referred-in	55	15.07	68	17.35	123	16.25
	Unrecorded	211	57.81	191	48.72	402	53.10

Table 3: Obstetric care and delivery-related variables.

Variables	Categories	2021		2022		Total	
		n=68	%	n=133	%	n=201	%
Deaths by place of referral	Home	28	41.2	24	18	52	25.9
	Another health facility	39	57.4	86	64.7	125	62.2
	Not recorded	1	1.4	23	17.3	24	11.9
Place of delivery and death	Home/TBA	17	25	40	30.1	57	28.4
	Health facility	51	75	93	69.9	144	71.6
Mode of delivery	SVD	39	57.4	68	51.1	107	53.2
	Breech	5	7.4	6	4.5	11	5.5
	Forceps	1	1.5	2	1.5	3	1.5
	Caesarean section	21	30.9	49	36.8	70	34.8
	Vacuum	-	-	1	0.8	1	0.5
	Laparotomy	-	-	5	3.8	5	2.5
	Not recorded	2	2.9	2	1.5	4	2
Partograph used in labour	No	29	42.6	59	44.4	88	43.8
	Yes	29	42.6	40	30.1	69	34.3
	Not recorded	10	14.7	34	25.6	44	21.9

Table 4: Contributory factors associated with perinatal deaths by phase of delays.

Phases	Factors	2021		2022	
		N (n=68)	%	N (n=133)	%
Primary phase	Failure to recognize danger signs	37	54.4	42	32
	Use of traditional medicine	4	5.9	3	2.3
	No antenatal	16	23.5	25	19
	Late booking of ANC or infrequent visit	15	22.1	27	20
	Delay in decision making or getting permission	28	41.2	31	23
	Preference for care at home or by TBA	10	14.7	13	9.8
	Unsafe Traditional/cultural practice	6	8.8	5	3.8
	Refusal of treatment- non-compliance to advise	6	8.8	8	6
	Inappropriate response to rupture of membranes	13	19.1	7	5.3
	Inappropriate response to poor fetal movements	13	19.1	13	9.8
Secondary phase	Transport problem from home to health facility	1	1.5	8	6
	Transport problem between health facilities	2	2.9	2	1.5
	Financial constraints	9	13.2	5	3.8
Tertiary phase	Lack of qualified and skilled staff	7	10.3	1	0.8
	Delay in deciding to refer/consult senior staff	19	27.9	12	9
	Inadequate newborn resuscitation & monitoring	16	23.5	2	1.5
	Multiple referrals without stabilization	3	4.4	3	2.3

Contributory factors associated with perinatal deaths

Table 4 show major contributory factors to perinatal deaths identified by the different phases of delay, and arranged in order of importance for both years, included: failure to recognize danger signs, delay in decision making or getting permission to seek care, no antenatal/late ANC booking, and preference for care at home or with TBA for phase one delay.

Financial constraints were the most important factor for phase two delays. For the third phase delays, delay in deciding to refer/consult senior professionals, and Inadequate newborn resuscitation and monitoring were the most significant.

DISCUSSION

This study highlights the persistent burden of perinatal mortality in Ondo State and demonstrates important gaps in MPDSR implementation and quality of maternal and

newborn care services. Although there was improvement in the proportion of reviewed perinatal deaths between 2021 and 2022, overall review coverage remained suboptimal.

The predominance of perinatal deaths occurring in higher-level health facilities is consistent with findings from other Nigerian and sub-Saharan African studies where complicated obstetric and neonatal cases are frequently referred to.^{14,15} This pattern likely reflects persistent weaknesses in primary and secondary healthcare systems, poor referral coordination, inadequate emergency obstetric and newborn care capacity at lower levels of care, and delays in accessing definitive treatment.

The substantial proportion of admissions from home and non-facility deliveries underscores the continued reliance on traditional birth attendants and unskilled delivery practices. This situation may have been exacerbated by the indirect effects of the COVID-19 pandemic, during which many women experienced reduced access to healthcare

facilities because of lockdown measures, transportation difficulties, fear of contracting infection in hospitals, and economic hardship.^{11,13} Similar disruptions in maternal and newborn healthcare utilization were reported across many low- and middle-income countries during the pandemic period. Home deliveries are associated with increased risks of birth asphyxia, neonatal infections, delayed recognition of complications, and poor emergency response.

Poor use of partograph observed in study is worrisome, because partograph monitoring remains a critical component of quality intrapartum care.¹⁶ Inadequate labour monitoring may contribute to prolonged labour, obstructed labour, fetal distress, and birth asphyxia. Similar studies in Nigeria and other low-resource settings have identified poor adherence to partograph use among healthcare workers due to inadequate training, staffing shortages and weak supervision.¹⁷

Birth asphyxia, prematurity and neonatal sepsis emerged as the leading causes of perinatal mortality in this study, in consistence with findings from NDHS 2023 and global evidence demonstrating that complications of prematurity, intrapartum-related events, and neonatal infections account for over 80% of preventable neonatal deaths in low- and middle-income countries.^{16,18} These conditions are largely preventable through improved antenatal care, timely identification of high-risk pregnancies, quality intrapartum monitoring, availability of skilled birth attendants, and strengthened neonatal care services.

The high proportion of macerated stillbirths suggests delays in identifying fetal compromise and possible failures in antenatal and intrapartum surveillance. Macerated stillbirths often indicate fetal death occurring before labour or prolonged delay before delivery.¹⁹

Socioeconomic factors were major contributors to poor neonatal outcomes in this review. The economic consequences of the COVID-19 pandemic likely worsened these vulnerabilities by increasing household poverty, reducing health-seeking behaviour, and limiting the ability of families to afford transportation and healthcare services. Health facilities also experienced workforce shortages, service disruptions, and reallocation of resources toward pandemic response activities, potentially compromising the quality and continuity of maternal and newborn care services. Financial constraints, transportation barriers, poor health literacy, and inadequate access to emergency obstetric care remain major determinants of maternal and newborn mortality in Nigeria. Strengthening health insurance coverage and improving equitable access to maternal healthcare services may therefore play a critical role in reducing preventable deaths.²⁰

The findings of this study reinforce the importance of strengthening MPDSR systems not only as surveillance tools but also as quality improvement mechanisms capable of driving policy reforms and accountability in maternal and newborn health.

Strengths and limitations

This study utilized triangulated data from multiple sources including DHIS-2, electronic MPDSR platforms, and facility-level records, thereby improving data completeness and reliability. The study also provides valuable sub-national evidence on perinatal mortality patterns and MPDSR implementation in Southwestern Nigeria.

However, the study has several limitations. First, incomplete documentation and under-reporting from some facilities may have affected the accuracy of estimates. Second, community-level perinatal deaths were likely under-reported due to weak community surveillance systems. Third, the retrospective nature of the study limited the ability to establish causal relationships between identified risk factors and outcomes.

CONCLUSION

Perinatal mortality remains a major public health challenge in Ondo State despite ongoing maternal and newborn health interventions. Although improvements were observed in the review of notified deaths between 2021 and 2022, gaps in reporting, review coverage, and quality of care remain significant.

Birth asphyxia and prematurity were the major causes of death while delayed referrals, poor intrapartum monitoring, and socioeconomic barriers were major contributors to poor neonatal outcomes. The persistence of home deliveries and patronage of traditional birth attendants further highlights inequities in access to skilled maternal healthcare services.

Strengthening MPDSR implementation, improving quality intrapartum and newborn care, expanding health insurance coverage, strengthening referral systems, and enhancing community engagement are critical to reducing preventable perinatal deaths in Ondo State and similar low-resource settings. There is also a need to build resilient maternal and child health systems capable of sustaining essential healthcare services during public health emergencies such as the COVID-19 pandemic.

Recommendations

Based on the findings of this study, the following recommendations are proposed: Community-based MPDSR systems should be strengthened to improve identification and reporting of perinatal deaths occurring outside health facilities. Capacity building of healthcare workers on essential newborn care, neonatal resuscitation, intrapartum monitoring, and MPDSR processes should be sustained. Government should strengthen referral systems, emergency transportation services, and communication between different levels of healthcare. Use of partograph/labour care guide during labour should be institutionalized through regular training, supervision, and clinical audits. Expansion of the Ondo State health insurance scheme

should be accelerated to improve financial access to maternal and newborn health services, especially among underserved populations. Activities of traditional birth attendants should be properly regulated, and community sensitization on the importance of skilled birth attendance should be intensified. Investments in hospital infrastructure, neonatal equipment, and human resources should be prioritized to improve quality of maternal and newborn care.

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REFERENCES

1. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME). Levels and Trends in Child Mortality: Report 2023. New York: United Nations Children's Fund; 2023. Available at: <https://childmortality.org/wp-content/uploads/2023/09/UNIGME-2023-Child-Mortality-Report.pdf>. Accessed on 29 July 2026.
2. World Health Organization. Newborns: improving survival and well-being. Geneva: WHO; 2023. Available at: <https://www.who.int/news-room/fact-sheets/detail/newborns-reducing-mortality>. Accessed on 29 July 2026.
3. Ameh CA, Oladapo OT, Papageorgiou AT. A call to action to address the maternal health crisis in Nigeria. BJOG. 2024;131(Suppl 3):3-4.
4. Federal Ministry of Health Nigeria. National Guidelines for Maternal and Perinatal Death Surveillance and Response. Abuja, Nigeria: Federal Ministry of Health; 2022. Available at: <https://nationalqoc.fmohconnect.gov.ng/resources/?utm>. Accessed on 29 July 2026.
5. Lawn JE, Blencowe H, Oza S, You D, Lee AC, Waiswa P, et al. Every newborn: progress, priorities, and potential beyond survival. Lancet. 2014;384(9938):189-205.
6. World Health Organization. Every Newborn: An Action Plan to End Preventable Deaths. Geneva: World Health Organization; 2014. Available at: <https://www.who.int/publications/i/item/9789241507448>. Accessed on 29 July 2026.
7. Graham WJ, Varghese B. Quality, quality, quality: gaps in the continuum of care. Lancet. 2012;379(9811):e5-6.
8. Federal Ministry of Health and Social Welfare of Nigeria, National Population Commission (NPC) [Nigeria], ICF. Nigeria Demographic and Health Survey 2023–24: Key Indicators Report. Abuja, Nigeria, and Rockville, Maryland, USA: Federal Ministry of Health and Social Welfare, National Population Commission, and ICF; 2024. Available at: <https://www.dhsprogram.com/pubs/pdf/PR157/PR157.pdf>. Accessed on 29 July 2026.
9. World Health Organization. Maternal and Perinatal Death Surveillance and Response: Materials to Support Implementation. Geneva: World Health Organization; 2021. Available at: <https://www.who.int/publications/i/item/9789240036666>. Accessed on 29 July 2026.
10. Dickson KE, Simen-Kapeu A, Kinney MV, Huicho L, Vesel L, Lackritz E, et al. Every newborn: health systems bottlenecks and strategies to accelerate scaleup in countries. Lancet. 2014;384(9941):438-54.
11. Robertson T, Carter ED, Chou VB, Stegmuller AR, Jackson BD, Tam Y, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries. Lancet Glob Health. 2020;8(7):e901-8.
12. Kumar M, Puri M, Yadav R, Biswas R, Singh M, Chaudhary V, et al. Impact of COVID-19 pandemic on maternal and child health services in India and globally: a systematic review. Trop Med Int Health. 2022;27(11):1022-34.
13. Chmielewska B, Barratt I, Townsend R, Kalafat E, van der Meulen J, Gurol-Urganci I, et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. Lancet Glob Health. 2021;9(6):e759-72.
14. Fawole AO, Shah A, Tongo O, Dara K, El-Ladan AM, Umezulike AC, et al. Determinants of perinatal mortality in Nigeria. Int J Gynaecol Obstet. 2011;114(1):37-42.
15. Kinney MV, Kerber KJ, Black RE, Cohen B, Nkrumah F, Coovadia H, et al. Sub-Saharan Africa's mothers, newborns, and children: where and why do they die? PLoS Med. 2010;7(6):e1000294.
16. World Health Organization. WHO recommendations: intrapartum care for a positive childbirth experience. Geneva: World Health Organization; 2018. Available at: <https://www.who.int/publications/i/item/9789241550215>. Accessed on 29 July 2026.
17. Opiah MM, Ofi AB, Essien EJ, Monjok E. Knowledge and utilization of the partograph among midwives in the Niger Delta Region of Nigeria. Afr J Reprod Health. 2012;16(1):125-32.
18. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? Lancet. 2014;384(9940):347-70.
19. Lawn JE, Blencowe H, Pattinson R, Cousens S, Kumar R, Ibiebele I, et al. Stillbirths: where? when? why? how to make the data count? Lancet. 2011;377(9775):1448-63.
20. PATH. Accelerating progress towards maternal, neonatal, and child health. Seattle (WA): PATH; 2025. Available at: <https://www.path.org/our-impact/media-center/accelerating-progress-towards-maternal-neonatal-and-child-mortality/>. Accessed on 29 July 2026.

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