

Trends in Neonatal Mortality Rate in Ibn-Atheer Teaching Hospital, Mosul - Northern Iraq (2020-2024)

Mayyadah Y. Mahmmoud ¹, Huda Abass Fadhil ², Muataz A. Alani ³, Ahmad T. Ibraheem ⁴

¹ Specialist in Community Medicine, Ibn Al-Atheer Teaching Hospital, Nineveh Health Directorate, Mosul, Iraq.

² Lecturer, Department of community and family medicine, College of Medicine, University of Nineveh, Mosul, Iraq.

³ Pediatric Surgeon, Ibn Al-Atheer Teaching Hospital, Nineveh Health Directorate, Mosul, Iraq.

⁴ Pediatrician, Ibn Al-Atheer Teaching Hospital, Nineveh Health Directorate, Mosul, Iraq.

* Corresponding author: mayadaa271@gmail.com

ABSTRACT

Article information:

Received 5 September, 2025
 Received in revised form 13 March, 2026
 Accepted 18 March, 2026
 Final Proofreading 4 October, 2026
 Published 6 October, 2026

DOI Online:

<http://doi.org/10.64554/nujms.2026.2.1.2>

Keywords:

Ibn- Atheer teaching hospital, Neonate mortality rate, Bacterial sepsis, Trend.

Background: Neonatal mortality (NM), defined as the death of a live-born infant within the first 28 completed days of life, regardless of gestational age, is considered a key international indicator reflecting the quality and accessibility of a country's health care services.

Objective: This study aims to analyze trends in neonatal mortality and identify the leading causes of death in Ibn Al-Atheer Teaching Hospital during the period 2020–2024.

Method: A retrospective descriptive study was conducted using existing data on neonatal deaths over a five-year period starting from 2020, obtained from the Statistical Department at Ibn Al- Atheer Teaching Hospital. The study included all neonates admitted to the hospital from January 1st to December 31st of each year within the study period.

Result: The trend of neonatal mortality rates at Ibn Al-Atheer Teaching Hospital throughout the study period (2020 – 2024) shows a notable decline, indicating an improvement in neonatal outcomes during this period. The most common cause of neonatal mortality throughout the study period was Bacterial Sepsis, which accounted for the highest proportion of deaths in most of the years observed. Other significant causes included Respiratory distress of the newborn and Causes related to chromosomal and congenital abnormalities.

Conclusion: The neonatal mortality patterns observed in our study have declined over time but face persistent challenges from sepsis, respiratory distress syndrome (RDS), prematurity, and birth complications.

© THIS IS AN OPEN ACCESS ARTICLE UNDER THE CC BY LICENSE.

<http://creativecommons.org/licenses/by/4.0/>

Introduction

The neonatal period, defined as the first 28 days of life, is the most critical and vulnerable time for a child's survival. It is further subdivided into the early neonatal period (the first 7 days of life) and the late neonatal period (from day 8 to 28). In 2021, approximately 2.3 million newborns died globally within the first month of life, with the majority of these deaths occurring during the first week [1][2][3].

Neonatal mortality (NM), defined as the death of a live-born infant within the first 28 completed days of life, regardless of gestational age, is considered a key international indicator reflecting the quality and accessibility of a country's health care services [4]. The neonatal mortality rate (NMR) is calculated as the number of neonatal deaths per 1,000 live births in a given year [5].

With the transition from the Millennium Development Goals to the Sustainable Development Goals (SDGs), SDG 3.2 specifically aims to reduce neonatal mortality to at least 12 deaths per 1,000 live births by the year 2030. Since 1990, global neonatal deaths have declined from around 5 million to approximately 2.3–2.7 million by 2019, demonstrating progress, although significant disparities remain.

In Iraq, decades of wars, internal conflicts, and humanitarian crises have hindered progress in maternal, newborn, and child health (MNCH). The neonatal mortality rate in Iraq dropped from 66 per 1,000 live births in 1975 to 22 per 1,000 in 2020, according to the UN Inter-agency Group for Child Mortality Estimation (IGME, 2023) [6,7,8]. However, Iraq experienced a high number of excess child deaths between 1991 and 1998 [9], with estimates ranging from 400,000 to 500,000 deaths [10]. Subsequent events, including the 2003 Gulf War [11][12][13] and the ISIS occupation from 2014 to 2017, further devastated the health system, especially neonatal and reproductive health services [14].

Globally, the leading causes of neonatal death include prematurity and low birth weight, birth asphyxia, congenital anomalies, infections such as sepsis, and birth trauma. Many of these conditions are preventable or treatable with relatively low-cost and effective interventions. Various factors contribute to neonatal mortality, including maternal infections, poor antenatal care, malnutrition, socioeconomic conditions, obstructed labor, repeated cesarean sections, and cultural practices. These factors are closely associated with preterm birth and low birth weight, both of which are strongly linked to increased neonatal morbidity and mortality [15].

According to the World Health Organization (WHO), nearly 2.5 million newborns die each year, with approximately 47% of all under-five deaths occurring in the neonatal period—three quarters of which take place in the first week of life. The burden of neonatal mortality is highest in low- and middle-income countries, particularly in regions affected by poverty, conflict, and health system disruptions, such as during the COVID-19 pandemic. In Iraq, neonatal mortality accounted for 27% of under-five mortality in 1990 and declined to 17% by 2017. Reducing neonatal mortality is essential for lowering both infant and under-five mortality rates [16][17][18].

Methods

A retrospective descriptive study was conducted using existing data on neonatal deaths over a five year period (2020-2024), from January 1st to December 31st of each year within the study period. The data obtained from the Statistical Department at Ibn Al-Atheer Teaching Hospital, Mosul, Iraq, which serves as a major pediatric hospital in Mosul and serves as a training site for medical students, provides essential clinical and neonatal care services, including a neonatal intensive care unit (NICU), and also receives the most complicated and high-risk deliveries referred from surrounding primary health facilities.

Collection of Samples: The data were extracted from hospital registration records and included the following variables: age at death, sex, and causes of death. Only live-born neonates admitted to the neonatal care unit within the first 28 days of life were included. Stillbirths and cases with incomplete medical records were excluded. Institutional and ethical approvals were obtained from Nineveh Health Directorate, Iraq, in March, 2025, prior to data collection.

Statistical Analysis: Data analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 26. A line graph was generated to illustrate the neonatal mortality rate for each year. Frequencies and percentages were calculated for neonatal sex distribution, early vs. late neonatal deaths, as well as the death rates for each category. The number and percentage of deaths for all study years were also reported.

No formal statistical testing or confidence intervals in the initial analysis, because the study was primarily descriptive and based on hospital records. The results are intended to summarize trends in hospital-based neonatal mortality not the infer causal relationships.

However, this study was hospital-based data rather than population-level data, because the total number of live births in Mosul was not fully accessible during the study period. Therefore, mortality was calculated as the percentage of neonatal deaths among hospital admissions, which accurately reflects the burden within the hospital rather than the overall neonatal mortality rate (NMR) per 1,000 live births used in national or global statistics and the findings represent hospital-based mortality rates, not population-based NMR.

According to International Statistical Classification of Diseases and Related Health Problems (ICD-10-TM), the included causes of neonatal mortality are arranged as follows:

P21: Perinatal asphyxia

P22: Respiratory distress of the newborn

P23: Congenital pneumonia

P29: Cardiovascular disorders originating in the perinatal period

P36: Bacterial sepsis

Q00–Q99: Causes related to chromosomal and congenital abnormalities.

Other causes: P05 to P20, and P23

Ethical approvals: Nineveh Health Directorate and the University of Nineveh, Mosul, Iraq.

Results

Table 1. Neonatal Deaths at Ibn Al-Atheer Teaching Hospital (2020–2024):

Year	Total Neonatal Admissions	Neonatal Deaths (No.)	Mortality Rate (%)
2020	1,126	84	7.5%
2021	1,554	82	5.3%
2022	2,200	59	2.7%
2023	3,108	121	3.9%
2024	3,265	117	3.6%
Total	11,253	463	4.1%

Table 2. Distribution of Neonatal Deaths by Sex and Age at Death (2020–2024)

Year	Total Deaths	Early Neonatal Deaths (%)	Late Neonatal Deaths (%)	Male Deaths (%)	Female Deaths (%)
2020	84	69.0%	31.0%	57.1%	42.9%
2021	82	51.2%	48.8%	54.9%	45.1%
2022	59	52.5%	47.5%	52.5%	47.5%
2023	121	57.9%	42.1%	52.9%	47.1%
2024	117	53.0%	47.0%	51.3%	48.7%
Total	463	56.8%	43.2%	53.6%	46.4%

Table 3. Distribution of Causes of Neonatal Deaths (2020–2024) [%]

Year	P36 (bacterial Sepsis)	P22 (Respiratory Distress)	Q00–Q99 (Congenital abnormalities)	P21 (Asphyxia)	P23 (Pneumonia)	P29 (Cardio)	Others
2020	51.2%	22.6%	11.9%	1.2%	6.0%	3.6%	3.6%
2021	45.1%	19.5%	13.4%	7.3%	4.9%	1.2%	8.5%
2022	45.8%	23.7%	5.1%	3.4%	10.2%	0.7%	10.2%
2023	40.3%	9.3%	12.4%	2.5%	5.0%	—	3.3%
2024	49.6%	26.5%	13.7%	1.7%	6.0%	0.9%	1.7%

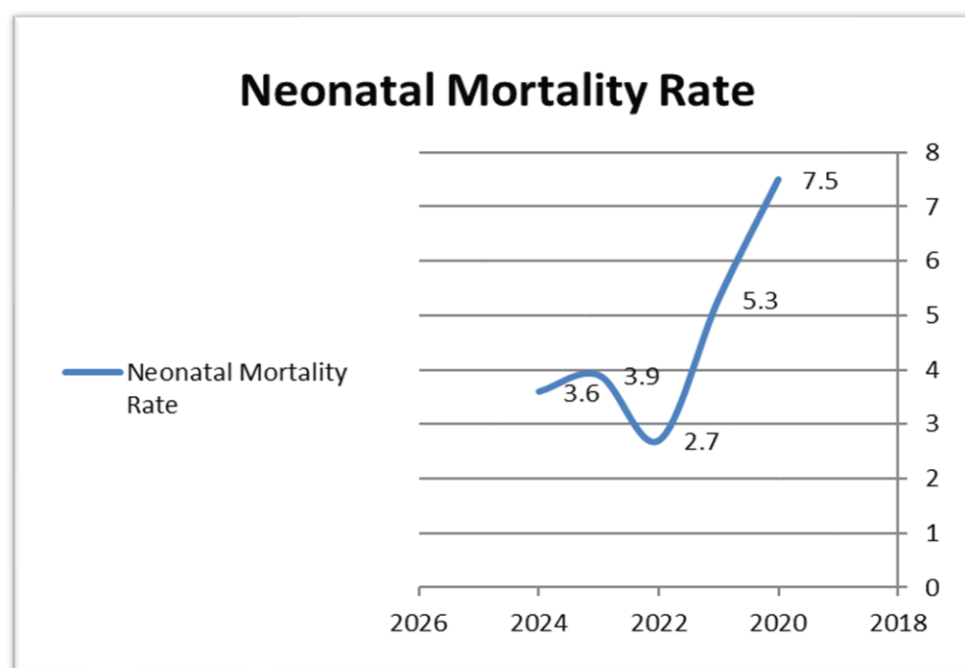


Figure1 trend of neonatal mortality rates from 2020 to 2024

Discussion

Throughout the study period (2020–2024), the admitted neonates to Ibn Al-Atheer Teaching Hospital were 11,253 neonates. The number of deaths among them were 463, resulting in an overall mortality rate of 4.1%, as detailed in Table 1. One of the components of Sustainable Development Goal 3 is reducing neonatal mortality; achieving this goal requires a comprehensive understanding of the levels and trends in neonatal mortality.

A numerous challenge has been occurred in Iraq over decades, including conflicts, wars, and economic sanctions, all of which have caused broad disruptions across various sectors, including the healthcare system.

The study period highlights a series of significant challenges, beginning from ISIS in 2014 and post ISIS conflict in 2017, which led to the widespread destruction of health infrastructure, loss of medical equipment, pharmaceutical supplies, and critical health data systems. In addition approximately half of the population was displaced during this time, further straining the healthcare system.

In 2021, Ibn Al-Atheer Hospital was designated for reconstruction. During this process, the hospital was relocated temporarily to an alternative site with considerably smaller capacity. But despite limited resources, the hospital continued to admit pediatric patients up to 14 years of age (declared in the hospital's annual admission figures).

Following the hospital's rehabilitation, Ibn-Atheer teaching hospital returned to its original site in 2022, and it resumed its role as a central pediatric facility for the governorate; consequently, the number of admissions increased for different pediatric conditions. Table 2 shows the distribution of neonatal deaths by age (categorized as early or late neonatal deaths) and by sex over the study period. From 463 neonatal deaths, 56.8% occurred during the early neonatal period, and 43.2% occurred during the late neonatal period. Regarding sex, 53.6% of deaths were among males, and 46.4% were among females.

Early vs. late neonatal death causes: Historical estimates (2000–2013) indicate early neonatal deaths are predominantly due to preterm complications and birth asphyxia, while infections—like sepsis—cause nearly half of deaths in the late neonatal period [19]. This aligns with your observed split (56.8% early and 43.2% late neonatal deaths).

The information on gender difference in stillbirths and mortality in different periods of infancy is important for developing strategies and identifying measures directed at reducing sex-specific mortality, our data showed more male than female deaths (53.6% vs. 46.4%). Male infants in general are ultimately at an increased risk for gastrointestinal and respiratory infections, mostly due to high testosterone levels that suppress the immune system [20], but several recent studies have shown higher neonatal and infant mortality in females compared to males in South Asia [21]

As shown in Table 3, the most common cause of neonatal mortality among all years under study, was Bacterial Sepsis, followed by other significant causes included respiratory distress of the newborn and chromosomal and congenital abnormalities.

The study concludes the top ten causes of death among under 5 children were (Disease of Respiratory System, Certain Conditions originating in the perinatal period, Disease of circulatory System, Congenital Malformation, Deformation and Chromosomal Abnormalities, Certain infectious and parasitic disease, Endocrine, Nutritional, Metabolic Disease, Disease of Nervous System, Malignant Neoplasm and Disease of Digestive System) with death indicators (under 5 mortality rate U5MR, crude death rate CDR and perinatal mortality PM) showed decreasing trend toward 2023. Our hospital's early decline mirrors broader global patterns, but in the subsequent years, could reflect the worldwide challenges in maintaining continuous improvements [22].

Our data highlight bacterial sepsis (P36) as the most frequent cause of death across 2020–2024, followed by respiratory distress (P22) and congenital anomalies (Q00–Q99). Sepsis burden: A global multicenter study encompassing over 3,200 neonates from 11 countries reported nearly 20% mortality among culture-positive sepsis cases, compounded by antibiotic resistance challenges [23].

Neonatal infection trends: Broader data show neonatal infections are increasing in incidence but decreasing in mortality, especially in regions with higher health coverage—highlighting gaps in infectious disease prevention and treatment in lower-resource areas [24] [25].

Respiratory distress syndrome (RDS): a U.S. cohort study found that among late preterm neonates (34–36 weeks of gestation), RDS was associated with a 3-fold higher risk of neonatal death. Furthermore, antenatal corticosteroid administration reduces mortality risk substantially [26] [27].

A Biometry study concludes the top ten causes and trends of under-five mortality in Nineveh (Disease of Respiratory System, Certain Conditions originating in the perinatal period, Disease of circulatory System, Congenital Malformation, Deformation and

Chromosomal Abnormalities, Certain infectious and parasitic disease, Endocrine, Nutritional, Metabolic Disease, Disease of Nervous System, Malignant Neoplasm and Disease of Digestive System), showed decreasing trend of all toward 2023 [28].

A retrospective study done in governmental hospitals of Babylon governorate, The neonatal deaths rate was 42.9 for each 1000 live birth in 2020 and 38 for each 1000 live birth in 2021 among all admitted neonates. And the neonatal mortality rate NMR was very high among neonates with respiratory distress syndrome (RDS) (48% in 2020 and 55.2% in 2021) [29].

Figure 1 illustrates the trend of neonatal mortality rates at Ibn Al-Atheer Teaching Hospital throughout the study period (2020 – 2024). The graph shows a notable decline in the neonatal mortality rate from 7.5% in 2020 to 2.7% in 2022, followed by a mild rise to 3.9% in 2023 and 3.6% in 2024, reflecting an improvement in neonatal outcomes during this period. This indicates the improvements in admission rates and improvement in neonatal care and clinical practices resources, Taking in consideration, the hospital is pediatric specialty and referral center.

Global trends: WHO reports neonatal deaths have declined by 44% since 2000, yet the pace of reduction has slowed, particularly in lower-resource settings. In 2022, nearly half of under-5 deaths occurred during the neonatal period, with prematurity, asphyxia, infections, and congenital anomalies remaining top causes [30] Comparison to sustainable development goals (SDGs): According to the Gates Foundation, progress toward SDG targets for neonatal mortality has plateaued, particularly in regions with lingering gaps in prenatal care, infection control, and perinatal intervention packages [31].

A Cluster Survey done in Iraq, for the last two decades from 2006, 2011, and 2018 on national and subnational rates and trends for neonatal and under-five child mortality, showed, however, wars, conflicts, and invasions, demonstrated significant resilience and is poised to reach SDG-3.1 goals in upcoming years. Despite, significant inequity persists by regions, governorates, and socioeconomic variables. Dealing with these inequalities is vital to accelerate progress in lowering child mortality in Iraq [32].

Our data affirm the critical importance of improving neonatal infection control, perinatal care, and early intervention strategies, such as breastfeeding support, and timely treatment of respiratory distress. For future directions, enhancing sepsis identification and management, optimizing preterm neonatal care (including surfactant and respiratory support), and implementing quality improvement interventions—such as simulation training or continuous data-driven care—may help sustain and further reduce neonatal mortality in our setting.

Acknowledgment

We acknowledge the administration of Ibn Al-Atheer Teaching Hospital for their support in facilitating our research.

Conflicted interest

All authors declare no conflicts of interest related to this work, except for the limitations regarding statistical inference.

References

1. Dimitrova A, Dimitrova A, Mengel M, Gasparrini A, Lotze-Campen H, Gabrysch S. Temperature-related neonatal deaths attributable to climate change in 29 low-and middleincome countries. *Nature communications*. 2024 Jun 29;15(1):5504. [https://doi: 10.1038/s41467-024-49890-x](https://doi.org/10.1038/s41467-024-49890-x).
2. Gunawardane DA. Sri Lankan Newborns; Improving Survival and Well-Being. *Sri Lanka Journal of Medicine*. 2024 Apr 5;33(1). [https://doi: 10.4038/sljm.v33i1.497](https://doi.org/10.4038/sljm.v33i1.497).

3. World Health Organization, the global health observatory 2022, Explore a world of health data. Neonatal mortality rate (0 to 27 days) per 1000 live births) (SDG 3.2.2) <https://www.who.int/data/gho>.
4. Odejimi A, Quinley J, Eluwa GI, Kunnuji M, Wammanda RD, Weiss W, James F, Bello M, Ogunlewe A, King R, Franca-Koh AC. Causes of deaths in neonates and children aged 1-59 months in Nigeria: verbal autopsy findings of 2019 Verbal and Social Autopsy study. BMC Public Health. 2022 Jun 6;22(1):1130. [https://doi: 10.1186/s12889-022-13507-z](https://doi.org/10.1186/s12889-022-13507-z).
5. Park K. Park text book of preventive and social medicine. 23rd Ed. Banarsidas Bhanot publishers. India, 2015.
6. UNICEF U. UN inter-agency group for child mortality estimation. Levels and trends in child mortality. 2015 Sep 9.
7. Ogbuaji O, Yamey G. How many child deaths can be averted in Nigeria? Assessing statelevel prospects of achieving 2030 sustainable development goals for neonatal and under-five mortality. Gates Open Research. 2019 May 9;3:1460. [https://doi: 10.12688/gatesopenres.12928.1](https://doi.org/10.12688/gatesopenres.12928.1).
8. Rosa-Mangeret F, Benski AC, Golaz A, Zala PZ, Kyokan M, Wagner N, Muhe LM, Pfister RE. 2.5 million annual deaths—are neonates in low-and middle-income countries too small to be seen? A bottom-up overview on neonatal morbi-mortality. Tropical medicine and infectious disease. 2022 Apr 21;7(5):64. Page 11 of 13 - AI Writing Submission Submission ID trn:oid::1:3481280164 [https://doi: 10.3390/tropicalmed7050064](https://doi.org/10.3390/tropicalmed7050064).
9. Hossain SM, Chou VB, Ibrahim S, Alhilfi R, Lami F, Sarnak D, Khanam R, Al-Dahir S, Burnham GM, Baqui AH, Ahmed S. Child Mortality and Maternal, Neonatal and Child Health in Iraq in the Last Two Decades: Trends and a Way Toward the SDG Targets for Child Survival. [https://doi: 10.2139/ssrn.3797585](https://doi.org/10.2139/ssrn.3797585).
10. Ali M, Blacker J, Jones G. Annual mortality rates and excess deaths of children under five in Iraq, 1991-98. Population studies. 2003 Jan 1;57(2):217-26. [https://doi: 10.1080/0032472032000097119](https://doi.org/10.1080/0032472032000097119).
11. Cetorelli V. The impact of the Iraq War on neonatal polio immunisation coverage: a quasiexperimental study. J Epidemiol Community Health. 2015 Mar 1;69(3):226-31. [https://doi: 10.1136/jech-2013-203174](https://doi.org/10.1136/jech-2013-203174).
12. Mortality before and after the 2003 invasion of Iraq: cluster sample survey, Roberts, Les et al. The Lancet, Volume 364, Issue 9448, 1857 - 1864 [https://doi: 10.1016/S0140-6736\(04\)17441-2](https://doi.org/10.1016/S0140-6736(04)17441-2).
13. Burnham G, Lafta R, Doocy S, Roberts L. Mortality after the 2003 invasion of Iraq: a crosssectional cluster sample survey. Lancet 2006; 368(9545): 1421-8. [https://doi: 10.1016/S0140-6736\(06\)69491-9](https://doi.org/10.1016/S0140-6736(06)69491-9).
14. Ibrahim S, Al-Dahir S, Al Mulla T, Lami F, Hossain SM, Baqui A, Burnham G. Resilience of health systems in conflict affected governorates of Iraq, 2014-2018. Conflict and Health. 2021 Dec;15:1-9. [https://doi: 10.1186/s13031-021-00412-2](https://doi.org/10.1186/s13031-021-00412-2).
15. Abdulrasol ZA, Obaid AF, Kadim MA, Shlash AM. Mortality rate among Iraqi neonates in neonatal intensive care units: Retrospective study. Journal of Neonatal Nursing. 2024 Apr 1;30(2):148-51. [https://doi: 10.1016/j.jnn.2023.07.018](https://doi.org/10.1016/j.jnn.2023.07.018).
16. Nayyef, Nadia Kadhim; Al-Bairmani, Jawad Kadhim; Al-Hillali, Ayser Mohammed. Perinatal and Neonatal Mortality, Risk Factors, and Causes in Babylon Teaching Hospital for Maternity and Children During 2018. Medical Journal of Babylon 17(1):p 58-63, Jan- Mar 2020. | [https://doi: 10.4103/MJBL.MJBL_93_19](https://doi.org/10.4103/MJBL.MJBL_93_19).
17. Abd AM. Assist. Lec. Ali Fadhil Obaid (Doctoral dissertation, University of Babylon).

18. Medeiros P, Bailey C, Andrews C, Liley H, Pollock D, Gordon A, Flenady V. Effectiveness of neonatal “near miss” audits in reducing perinatal morbidity and mortality: a systematic review protocol. JBI evidence synthesis. 2022 Mar 1;20(3):847-53 <https://doi: 10.11124/JBIES-21-00069>.
19. Oza S, Lawn JE, Hogan DR, Mathers C, Cousens S. Cause-of-death estimates for the early and late neonatal periods for 194 countries from 2000-2013. arXiv preprint arXiv:1411.4021. 2014 Nov 14.
20. Klein SL. Hormones and the mating system affect sex and species differences in immune function among vertebrates. Behav Processes. 2000;51:149–66.
21. Chowdhury R, Taneja S, Mazumder S, Bhandari N, Strand TA. Gender differences in infant survival: a secondary data analysis in rural North India. BMJ Open. 2017;7:e014179.
22. Greenwell F. MDG 4-5: Reduce child mortality and improve maternal health.
23. Green C, Walker AS, Sharland M, et al. Global burden of neonatal sepsis: A multicenter observational study. UCL News [Internet]. 2023 Jun [cited 2025 Aug 18]. Available from: <https://www.ucl.ac.uk/news/2023/jun/global-study-highlights-deaths-newborn-babiessepsis>.
24. Semahegn A, Gebreslassie A, Tadesse Y, et al. Trends in neonatal mortality and associated factors in low-income countries: A systematic review. BMC Public Health. 2022;22(1):1223. Available from: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-12765-1>
25. Ou Z, Yu D, Liang Y, He H, He W, Li Y, Zhang M, Gao Y, Wu F, Chen Q. Global trends in incidence and death of neonatal disorders and their specific causes in 204 countries/territories during 1990–2019. BMC Public Health. 2022 Feb 19;22(1):360. <https://doi: 10.1186/s12889-022-12765-1>.
26. Stock SJ, Thomson AJ, Papworth S. Antenatal corticosteroids to reduce neonatal morbidity and mortality. Green-top Guideline No. 74. BJOG: An International Journal of Obstetrics & Gynaecology. 2022 Jul 1;129(8). <https://doi:10.1111/1471-0528.17027>.
27. Berger DS, Garg B, Penfield CA, Caughey AB. Respiratory distress syndrome is associated with increased morbidity and mortality in late preterm births. American Journal of Obstetrics & Gynecology MFM. 2024 Jun 1;6(6):101374. <https://doi: 10.1016/j.ajogmf.2024.101374>.
28. Al-Fathy MY, Ameen HF, Al-Fathi MY, Alsabea WM, Al-Rawee RY, Hussein AA, Mustafa IM, Mustafa IJ, Abul-Rahman AK. Top ten causes of mortality among children under five in Nineveh 2018-2023: a time series analysis.
29. Abdulrasol ZA, Obaid AF, Kadim MA, Shlash AM. Mortality rate among Iraqi neonates in neonatal intensive care units: Retrospective study. Journal of Neonatal Nursing. 2024 Apr 1;30(2):148-51. <https://doi: 10.1016/j.jnn.2023.07.018>.
30. World Health Organization. Newborn Mortality [Internet]. WHO; 2022 [cited 2025 Aug 18]. Available from: <https://www.who.int/news-room/fact-sheets/detail/newborn-mortality>.
31. Gates Foundation. 2023 Goalkeepers Report: Progress on Maternal and Neonatal Health [Internet]. 2023 [cited 2025 Aug 18]. Available from: <https://time.com/6312835/maternalmortality- gates-foundation-2023-report>.
32. Hossain SM, Chou VB, Ibrahim S, Alhilfi R, Lami F, Sarnak D, Khanam R, Al-Dahir S, Burnham GM, Baqui AH, Ahmed S. Child Mortality and Maternal, Neonatal and Child Health in Iraq in the Last Two Decades: Trends and a Way Toward the SDG Targets for Child Survival.