

Mortality & Morbidity Profile: What the Demography Tells About Neonatal Death

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Abstract:

Background: The burden of neonatal mortality is still high with India contributing to one fifth of under-five mortality burden and a quarter of neonatal deaths globally. In terms of absolute numbers, this translates into 1.1 million under 5 deaths, of which 630,000 happen during the first four weeks of life.

Objectives: To determine the morbidity and mortality pattern of admitted babies in the Sick Newborn Care Unit (SNCU) of a tertiary teaching institute of Kolkata, West Bengal.

Materials and Methods: This is a cross sectional, observational, descriptive - analytical study profiling the causes of mortality between babies born within (inborn) and outside our hospital facilities (outborn) based on information on place of birth, age on admission, diagnosis on admission, duration of hospital stay, and outcome of newborns admitted into the sick newborn care unit (SNCU) over a period of 1 year.

Results: A total of 4593 newborns were admitted during the period under review. Out of these 4176 were discharged successfully & 342 neonates died with a mortality rate of 7.5%. Out of these unfortunate 342 newborn deaths, 204 (59.45%) were male, 131 (38.3%) were female & 7 patients belonged to disorders of sexual development (DSD). The sex specific mortality were extremely high in the DSD group (53.84%), & that of male being higher than female newborns. (odd's ratio = 1.55, $p < 0.05$). Sepsis (33%) & Perinatal Asphyxia (31.5%) as major cause of mortality in neonates along with a significant rise in Major Congenital anomalies (9.9%). Low Birth weight, higher duration of hospital stay, male sex & DSD, prematurity, Sepsis & perinatal asphyxia all were associated with increased mortality.

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I. Introduction

Demographic profiling of health care has always been an indispensable tool in the very inception of addressing a problem. Especially when it comes to neonatology, it gives one of the most basic foundations to identify deeper research question arising from a huge magnitude of crude data.

Though India accounts for highest burden of under-5 deaths, it has shown faster decline in under-5 mortality reduction compared with the global fall. Worldwide, the under-5 mortality rate reduced by 49 per cent from 90 per 1000 live births in 1990 to 46 per 1000 live births in 2013, while India achieved a reduction of 59 per cent in under-5 mortality from 126 in 1990 to 52 in 2012. In India, both perinatal and neonatal care have been improved remarkably over the last few decades, bringing down the neonatal mortality rates substantially from 37 in 2005 to 25 in 2015. In West Bengal similarly, neonatal mortality has reduced substantially and stands at 18 per 1000 live births (SRS 2015). Establishment of Sick Newborn Care Units (SNCUs) at all District and Sub divisional Hospitals in addition to Medical College and Hospitals has contributed to reduction of neonatal mortality to a large extent.⁽¹⁾

Our current study, while profiling the morbidity & mortality pattern in Neonatal period in a Tertiary Medical College & Hospital in Kolkata, tries to dive deep into the bigger picture pointing to the areas needing further research.

II. Materials & Methods

The study was carried out in the sick newborn care unit at RG Kar MCH, Kolkata, over a period of 1 year from January 2018 to December 2018. Data in relation to admission profile, antenatal risk factors, neonatal complications, treatment profile and outcome was collected with the help of case sheets of newborns obtained from Medical Records dept. (MRD) and SNCU online monitoring software. Study design was cross sectional, observational, descriptive - analytical in nature. We organized & analyzed data in Microsoft Excel 2010 using standard statistical techniques.

III. Results

A total of 4593 newborns were admitted during the period under review. Out of these 4176 were discharged successfully & 342 neonates died with a mortality rate of 7.5%. Out of these unfortunate 342 newborn deaths, 204 (59.45%) were male, 131 (38.3%) were female & 7 patients belonged to disorders of sexual development (DSD). The sex specific mortality were extremely high in the DSD group (53.84%), & that of male being higher than female newborns. (odd's ratio = 1.55, $p < 0.05$)

Gender Distribution:

Gender	Expired	Discharged	Sex Specific Mortality ratio %	Proportional mortality ratio %
DSD	7	6	53.84	2.05
Female	131	1965	6.25	38.30
Male	204	2205	8.47	59.65
Grand Total	342	4176	7.57	100

Table 1: Above table depicts gender specific distribution of mortality & discharge profile.

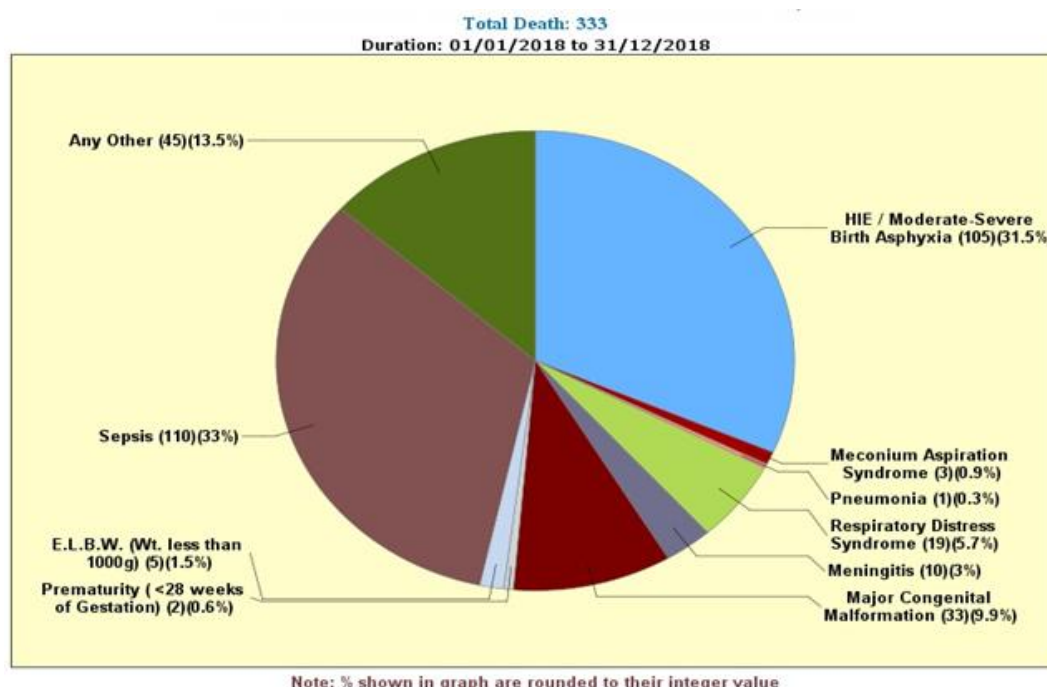


Figure 1: The above diagram shows Sepsis & Perinatal Asphyxia as major cause of mortality in neonates along with a significant rise in Major Congenital anomalies emphasizing the need for pre natal diagnostics & perinatal monitoring can help addressing these issues

Etiology	Death	Admission	Case Fatality Rate
HIE / Moderate-Severe Birth Asphyxia	105	625	16.8
Meningitis	10	19	52.63
Sepsis	110	321	34.26

Table 2 Above table showing disease specific mortality rates for 3 major contributors to the cause of death. Table shows sepsis remains equally fatal with a case fatality of 34.26%, despite the improvement in antibiotic policy implying further need for research in this regard.

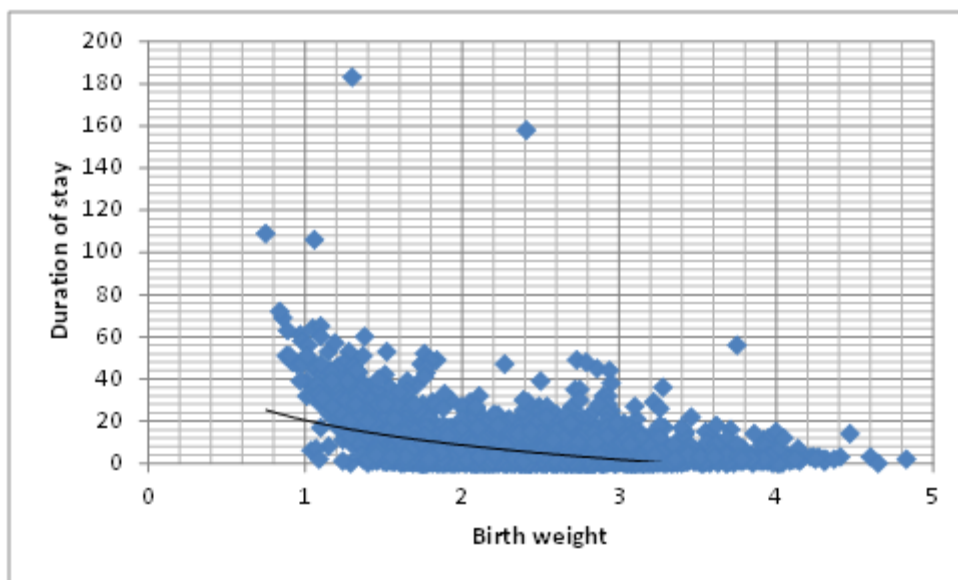


Figure 3: We observed a strong negative correlation between birth weight & duration of stay in SNCU. (correlation coefficient = -0.41)

Column	Discharged	Expired
Mean birth weight	2.43	1.69
2SE	0.02	0.08

Table 4: Tabular representation of mean birth weight comparison between 2 groups of patients viz. discharged & expired newborns.

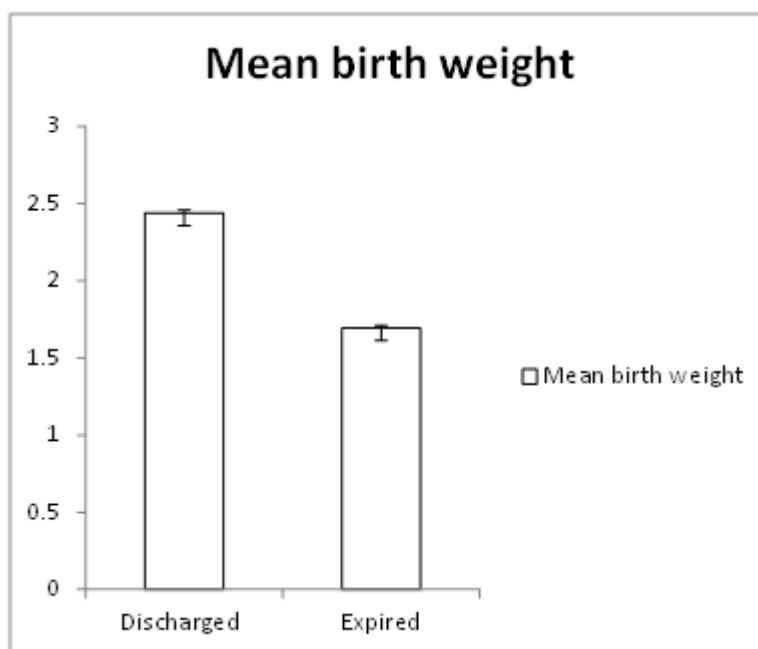


Figure 4: Error bars with standard errors of means implying a significant difference between 2 groups in terms of mean birth weight ($p \ll 0.05$)

Column	Discharged	Expired
Mean Duration of stay	5.92	8.46
2SE	0.29	1.38

Table 5: Tabular representation of mean duration of stay.

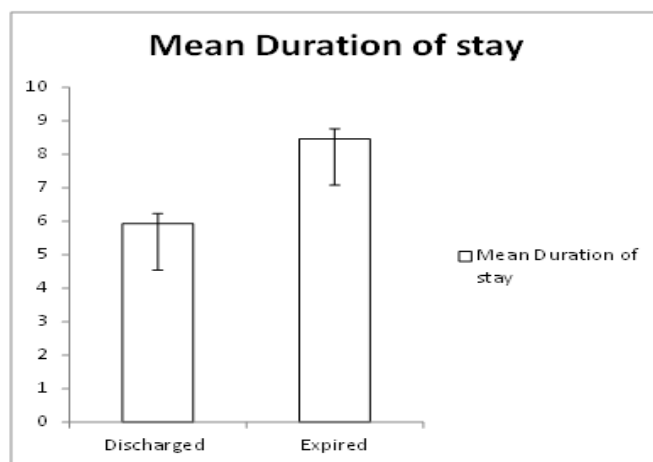


Figure 5: Error bars with standard errors of mean showing a significantly higher mean duration of stay in newborns who died than those who were discharged successfully.

Gestational age at birth	TOTAL	<28 Wks	28 Wks to<32 Wks	32 Wks to<34 Wks	34 Wks to<37 Wks	37 Wks to<42 Wks	>=42 Wks
Admission	4593	152	326	428	1279	2352	56
Mortality	333	65	80	35	74	77	2
Specific Mortality Ratio	7.25	42.76	24.54	8.18	5.78	3.27	3.57

Table 6: Table shows Gestational age specific mortality

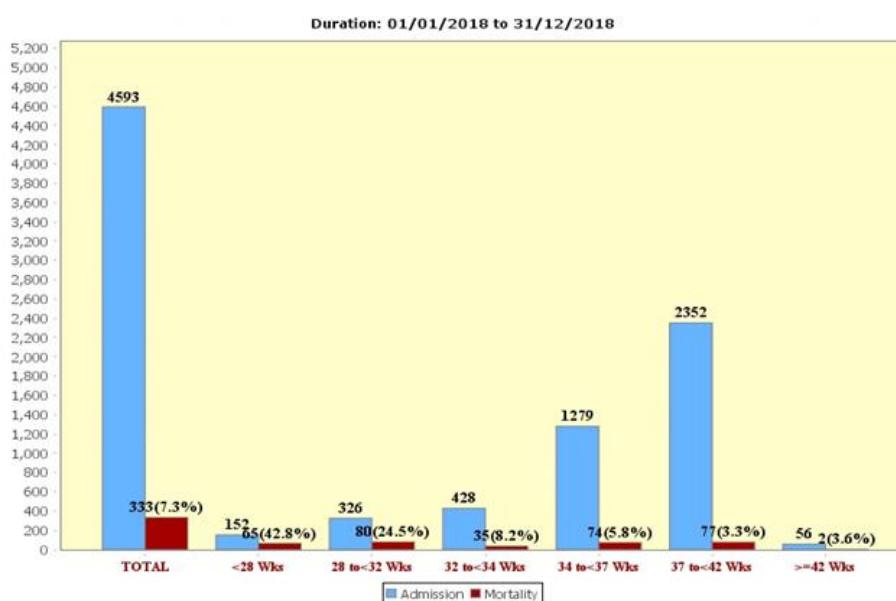


Figure 6: Mortality comparison by gestational age. Lowest mortality rate was observed in term babies & highest being in <28 weeks group.

	TOTAL	< 1 day	1-3 Days	4-7 Days	> 7 Days
Admission	4456	281	2433	786	956
Mortality	333	72	106	55	100

Table 7: Proportional mortality ratio were highest in day 1 & lowest between 1-3 days of life

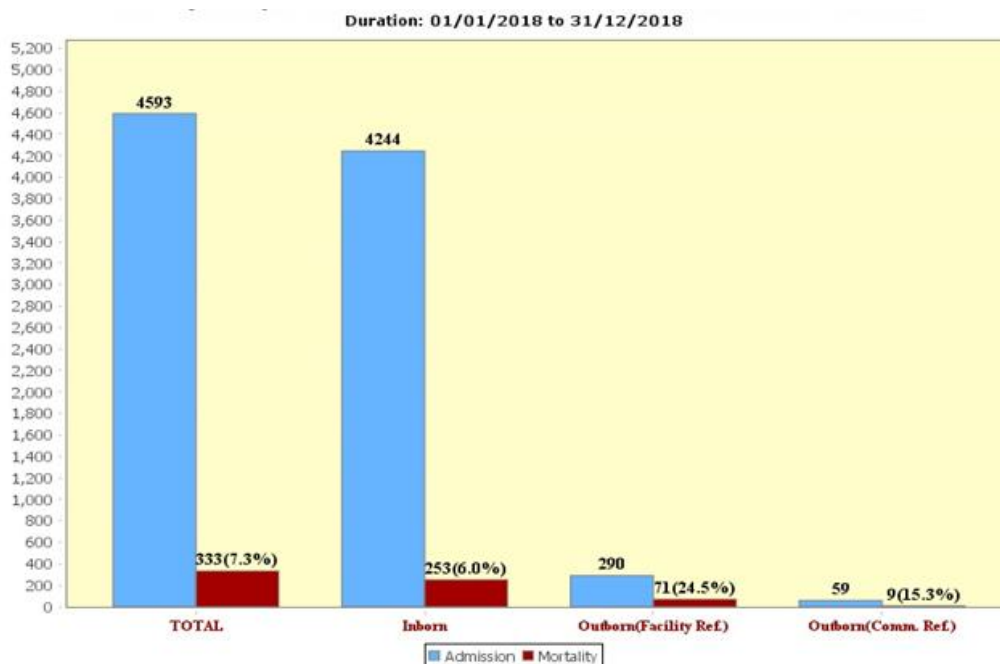


Figure 6: Mortality comparison (Inborn vs Out born) shows a higher rate of death among outborn babies (24.5%) vs inborn babies (6%)

IV. Discussion

A total of 4593 newborns were admitted during the period under review. Out of these 4176 were discharged successfully & 342 neonates died with a mortality rate of 7.5%. Out of these unfortunate 342 newborn deaths, 204 (59.45%) were male, 131 (38.3%) were female & 7 patients belonged to disorders of sexual development (DSD). The death rate is pretty low compared to previous study by Dey S et al⁽¹⁾ with inborn death rate being 6%. In spite of this low death rate we still faced with persistent high mortality of Sepsis & Perinatal asphyxia with improved care for pre term & low birth weight babies. This corresponds well to the mortality statistics published by WHO.⁽²⁾ Dr. A L Shane et al reported The clinical manifestations range from subclinical infection to severe manifestations of focal or systemic disease. The source of the pathogen might be attributed to an in-utero infection, acquisition from maternal flora, or postnatal acquisition from the hospital or community. The timing of exposure, inoculum size, immune status of the infant, and virulence of the causative agent influence the clinical expression of neonatal sepsis. Immunological immaturity of the neonate might result in an impaired response to infectious agents.⁽³⁾ This emphasizes need for further research to improve current understandings regarding these contributors to neonatal death.

Low Birth weight, higher duration of hospital stay, male sex & DSD, prematurity, Sepsis & perinatal asphyxia all were associated with increased mortality. High Out born death rate may be attributed to lack of organization neonatal transport. Poor rural transport facilities for pregnant women constitute a major encumbrance to accessing antenatal services and emergency obstetric care in India and internationally.^(4,5,6) The mortality profile corroborated well with previous other studies by Okechukwu AA et al. in terms of etiology⁽⁷⁾ & prematurity as leading cause of death⁽⁸⁾.

Fortunately, newborn health has now come to the attention of policymakers and UNICEF is joining their efforts to address these preventable deaths. The Indian government has introduced two landmark programmes, the National Rural Health Mission (NRHM) and the Reproductive, Maternal, Newborn, Child and Adolescent Strategy (RMNCH+A Strategy). The NRHM has provided an unprecedented focus and resources for newborn health, while the RMNCH+A strategy marks a significant shift in approach, basing services on a continuum-of-care model and on strengthening health systems.

The government has also now developed the India Newborn Action Plan (INAP) in response to the global Every Newborn Action Plan (ENAP) launched at the World Health Assembly in June 2014. INAP, in which UNICEF is a key partner, aims to significantly reduce preventable newborn deaths and stillbirths and to bring down the Neonatal Mortality Rate and Still Born Rate to “single digits” by 2030.⁽⁹⁾

V. Conclusion

In addition to correlating well to the established factors for neonatal mortality like prematurity, sepsis, perinatal asphyxia, low birth weight, out born delivery, what this study adds new is the need to tackle old killers like sepsis & perinatal in a novel way, beyond antibiotics & IVIg for sepsis & the need to create a protocol to initiate therapeutic hypothermia in babies with perinatal asphyxia. Having said all these the recommendations will be incomplete & may be in vain if maternal factors both pre & intranatal, are not addressed properly, as it's always difficult to halt a pathology further down the process.

Authors' contributions:

Das PS : study conceptualization, data collection, analysis and manuscript writing, Gayen S: Study conceptualization, manuscript writing & editing, Das GC: study conceptualization, data analysis. All authors approved final version of manuscript.

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Ethical Considerations:The study per se did not include any additional intervention and no individual was harmed by this study. Also, standard scientific techniques & protocols were followed & necessary permissions obtained regarding data handling.

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