Check for updates

OPEN ACCESS

DOI: 10.46903/gjms/24.1.2117

ORIGINAL ARTICLE

EFFECT OF NURSES TRAINING IN ESSENTIAL NEWBORN CARE ON REDUCING ASPHYXIA AND NEONATAL MORTALITY: A QUASI EXPERIMENTAL STUDY

Noreena Begum, Madiha Mukhtar, Azeem Kaleem

Departments of Nursing, Lahore School of Nursing, University of Lahore, Pakistan

ABSTRACT

Background: Asphyxia and mortality remain significant concerns in developing countries, emphasizing the need for quality essential newborn care (ENC) at birth. Therefore, this study aimed to evaluate the effect of training nurses in Essential Newborn Care (ENC) on reducing neonatal asphyxia and mortality.

Materials & Methods: A quasi-experimental study design was conducted in the Obstetrics Department of a public teaching hospital in Lahore School of Nursing, The University of Lahore, Punjab, Pakistan. over a period of nine months. A total of 42 nurses were selected through census sampling and received an 8-week ENC training program focused on immediate newborn care and neonatal resuscitation. The prevalence of asphyxia and neonatal mortality among NICU admissions was assessed before and after the training. A validated questionnaire was used to evaluate nurses' knowledge, practices, and neonatal outcomes. Data were analyzed using SPSS version 23.

Results: A review of 698 NICU admissions showed a slight decrease in asphyxia prevalence from 37.0% to 33.7%, with improvement in severity levels. Early neonatal mortality also showed a downward trend from 10.5% to 8.1%, though this change was not statistically significant. Secondary analysis Wilcoxon Signed-Rank test revealed significant improvements in nurses' knowledge and practice scores post-training ($p < 0.001$), with median differences of 10.0 and 12.5, respectively.

Conclusion: The findings suggest that ENC training can contributes to improved neonatal outcomes. However, to achieve a significant reduction in asphyxia and mortality, additional factors influencing patient outcomes must be addressed.

KEYWORDS: Asphyxia; Knowledge; Newborn; Neonatal mortality; Nurses; Practice.

Cite as: Begum N, Mukhtar M, Kaleem A. Effect of nurses training in essential newborn care on reducing asphyxia and neonatal mortality: A quasi experimental study. Gomal J Med Sci 2026 Jan-Mar;24(1):9-14. https://doi.org/1046903/gjms/24.1.2117

INTRODUCTION

Essential Newborn Care (ENC) is crucial for neonatal survival, and trained nurses serve as the frontline defense in preventing birth asphyxia and reducing neonatal mortality. But gaps in knowledge, practice, and care access hinder implementation in low- and middle-income countries. Birth asphyxia and sepsis cause many preventable deaths (1/3 in first 24 hours).[1] Strengthening ENC training and delivery in resource-limited settings is essential to improve newborn outcomes. Pakistan ranks third globally in neonatal deaths, with an estimated 244,000 in 2020.[2] Birth asphyxia, responsible for nearly 24% of neonatal deaths worldwide, accounts for around 900,000 deaths annually.[3,4] Survivors often face long-term neurodevelopmental impairments, imposing substantial burdens on families and healthcare systems.[3,4]

ENC is effective in reducing asphyxia and neonatal mortality, but gaps in nursing practices, limited coverage, and insufficient training hinder its impact. Inadequate evidence-based practices are a key barrier. Targeted interventions can enhance nurses' knowledge and improve newborn resuscitation.[1-3]

Corresponding Author:

Dr. Noreena Begum
Scholar of Master of Science in Nursing
Department of Nursing, Lahore School of Nursing
University of Lahore, Lahore, Pakistan.
E-mail: noreenabegum90@gmail.com

Date Submitted: 03-08-2025
Date Revised: 31-01-2026
Date Accepted: 09-02-2026

ENC includes evidence-based interventions like Helping Babies Breathe, immediate newborn care (drying, delayed cord clamping, skin-to-skin contact, breastfeeding), and thermoregulation. Neonatal hypothermia affects 11% to 95% of newborns, with the highest prevalence in Asia and sub-Saharan Africa.[5-8] If unaddressed, it can lead to serious complications such as asphyxia and sepsis, significantly increasing the risk of neonatal mortality.

ENC implementation is crucial for reducing neonatal deaths, aligning with SDG 3.. WHO recommends 80% ENC coverage and 90% skilled attendance at deliveries to meet the 12/1,000 target. Need focused, scalable interventions.[1] Training nurses in ENC is crucial to addressing the high burden of asphyxia and neonatal mortality at Lahore School of Nursing, The University of Lahore, Punjab, Pakistan. Hospital. Given the disproportionate contribution of rural regions to neonatal deaths, this study supports progress toward SDG targets by enhancing the quality of facility-based newborn care. this study aimed to evaluate the effect of training nurses in Essential Newborn Care (ENC) on reducing neonatal asphyxia and mortality.

MATERIAL AND METHODS

The study employed a quasi-experimental design, following TREND guidelines. It involved 42 obstetric nurses with no recent ENC training, excluding those on leave, unable to complete training and assigned to the NICU (where most components of early newborn care are not routinely practiced) were excluded from the practice assessment to ensure internal validity. To facilitate nurse participation, groupings were organized according to duty shifts. Additionally, 531 term, normal birth weight neonates without congenital anomalies, admitted to the NICU between February and November 2024, were included to assess asphyxia prevalence and early neonatal mortality (ENM). Neonates were selected based on documented cases of asphyxia, hypoxic-ischemic conditions, and mortality occurring within the first seven days of life.

Data collection used a validated proforma and WHO ENC assessment tool (2022), with two sections: neonatal outcomes and nurses knowledge/practice. To ensure contextual relevance, the tool was further validated for face and content validity by an expert panel, including a pediatrician, a clinical researcher, and a senior nursing professional. Ethical approval was obtained, and non-random census sampling recruited participants. Informed consent was ensured before enrollment. Data collection involved NICU file reviews and non-intrusive observations of nurses in labor and operating rooms. Participants performed ≥2 newborn care procedures. If harmful practices were noted, the observer intervened to ensure neonatal safety. Data were anonymized and digitized for analysis.

Pre-Intervention Phase (Feb–May 2024): Following ethical approval, retrospective data on asphyxia prevalence and neonatal mortality were collected from NICU records. Nurses' knowledge and practices were assessed using self-administered questionnaires and observational checklists. Intervention Phase (June–August 2024): The study implemented an 8-week semi-structured ENC training program, based on WHO guidelines and expert-reviewed. It covered immediate newborn care, Helping Babies Breathe (HBB), and clinical procedures through workshops, lectures, videos, and peer-led learning. An optional revision session was provided to reinforce key concepts and introduce supplementary content beyond the primary scope of the study. Post-Intervention Phase (August–November 2024): One week after the intervention, nurses' knowledge and practice were reassessed. Clinical outcomes—including asphyxia prevalence and early neonatal mortality—were prospectively monitored over the following four months.

To minimize bias, the study included all consenting participants and focused on term, normal birth weight neonates. Anonymity was ensured, validated tools were used, and records from the intervention period (June–July 2024) or with missing data were excluded. The researcher's familiarity with the setting and observations at two time points further reduced bias, strengthening the study's validity and reliability.

The study used SPSS version 23 for statistical analysis. Descriptive statistics summarized the data, while the Wilcoxon Signed-Rank test compared paired ordinal data. Results were considered significant at $p \leq 0.05$ with a 95% confidence interval.

RESULTS

A review of 698 NICU admissions showed a slight decrease in asphyxia prevalence from 37.0% to 33.7%, with improvement in severity levels (Table 1).

he ENC training significantly improved nurses' knowledge and practices. Key findings include: Knowledge of actions within 1st hour: 65% to improved levels, Cord clamping timing: 66.6% to improved levels, Bag-mask ventilation: 35.7% to 76.5%, Skin-to-skin contact: 63% to improved levels, Neonatal resuscitation practices reached 100% compliance in stimulation, calling for help, and stopping ventilation.

Descriptive statistics and Wilcoxon Signed-Rank test analysis revealed significant improvements in both knowledge and practice scores. The median knowledge score increased from 26.50 to 40.00 (+13.5), and the median practice score rose from 15.50 to 28.00 (+12.5).

The majority of participants scored above 90% in knowledge and above 80% in practice assessments. Only 7% of nurses demonstrated inadequate knowledge, and 17% scored inadequately in practice (Figure 1).

Table 1: Background variables of Participants (n= 42)

Variables	Category	Frequency (n)	%age
Gender	Male	04	9
	Female	38	91
Department	Labour room	19	45
	Operation room	7	17
	Postnatal room	8	19
	NICU.	8	19
Highest level of qualification	MSN	00	00
	BSN	5	14
	Diploma RN	37	86
Ever attended Training in (ENC)	Yes	7	17
	No	35	83
Duration of training attended (ENC)	3 - 12 Months - 1-3 Years	2	5
	3- 5 Years - >5 Years	5	12
Demographic information of neonates delivered within the public teaching Hospital KP (February 2024-November 2024)			
Variables	Pre Intervention	Post Intervention	
Total admitted neonates	318(51.2%)	303(48.8%)	
Gestational age (Weeks) >37 Weeks	282(45.4%)	273(44.0%)	
Birth weight (kg) >2.5 k g	274(44.1%)	262(42.2%)	
Congenital Anomaly	271	260	
Descriptive statistics; frequency (n) and percentage (%).			

Table 2: Comparison of knowledge and practice Score

Variables		Minimum	Maximum	Median	SD	25th	50th	75th	MDiff	Z-Valie	P-Value
Knowledge Score	Pre	11	39	26.50	9.50	14	26	33	10	5.518	<0.001
	Post	31	42	39.00	3.00	38	40	42			
Practice Score	Pre	8	32	15.50	6.00	12	15	20	12.5	5.094	<0.001
	Post	19	34	28.00	6.00	25	28	32			
Descriptive and inferential statistic (Wilcoxon Signed-Rank test of two related samples had been applied, p-value <0.05 considered significant)											

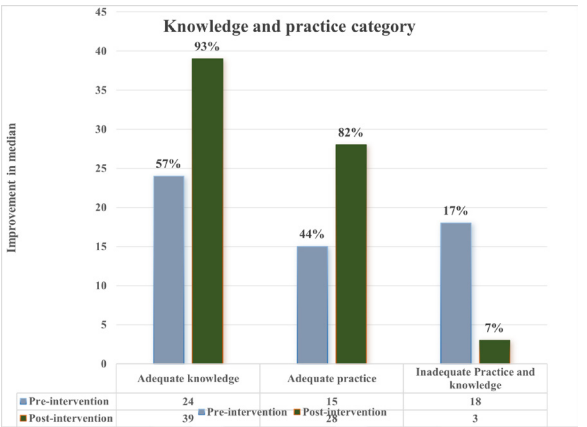

Figure: 1. The Median difference between of knowledge and practice Score before and after essential newborn course training

The standard deviation of scores decreased after the training, indicating a more uniform distribution of scores, and the median increased significantly, indicating a shift in the central tendency of the scores.

The Z-value shows a large effect size, indicating a substantial difference. With $p < 0.001$, both knowledge and practice scores improved significantly post-training. Despite partial gains in some ENC components, the improvements were highly statistically significant (Table 2).

Between Feb-Nov 2024, 2,826 neonates were admitted to NICUs, with 698 (24.65%) from the interventional site: 315 (45%) pre-ENC and 301 (44%) post-ENC. Neonates admitted during June-July (intervention period) were excluded to minimize bias (Figure 2).

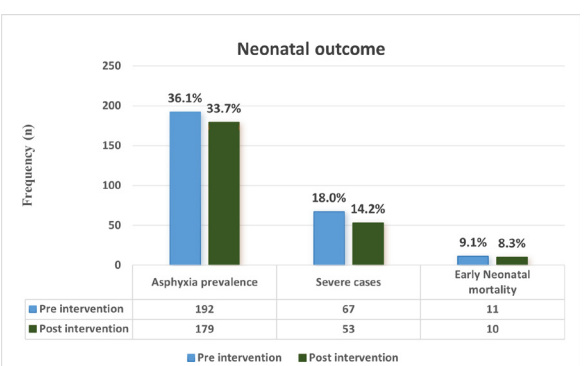

Figure: 2. The difference between asphyxia prevalence and neonatal mortality before and after essential newborn course training (February-May 2024 and August-November 2024).

DISCUSSION

ENC training boosted knowledge and care practices, but no significant improvement in neonatal deaths or asphyxia rates. Although the pre–post study design limits causal inference, the observed reduction in asphyxia may plausibly be attributed to the ENC training. These findings underscore the need for targeted, competency-based training strategies focusing on high-risk interventions like neonatal resuscitation. Additionally, addressing systemic barriers (e.g., equipment availability, staffing) is crucial to optimizing ENC effectiveness in resource-limited settings.[9-12]

The nursing staff had limited ENC training exposure, with most lacking recent updates. Only six had training 3-5 years ago. This gap in ongoing professional development echoes Ogunlesi et al. (2019). Regular refresher training is crucial. Similarly, ENC training improved knowledge ($p<0.0001$) and skills.[13-16] Minor score differences likely due to their larger scope. Minor differences in mean scores between the two studies may be attributed to the larger scale and broader scope of their research.

Moreover, this study found a modest reduction in asphyxia prevalence, consistent with the findings of literature.[17] However, high rates persisted post-intervention. This may be attributed to inadequate practice in key areas of neonatal ventilation among nurses or to confounding variables such as secular trends, the distribution of asphyxia severity in the study setting, and the duration of labor, all of which can influence asphyxia outcomes. Additionally, the introduction of Essential Newborn Care (ENC) interventions was associated with a reduction in sepsis risk. However, neonatal mortality slightly increased from 1.6% to 2.5%, potentially due to external factors or a low number of pre-intervention cases. The persistent challenge of accurately diagnosing sepsis further underscores the need for improved and reliable diagnostic tools in low- and middle-income countries.[18]

In comparison with previous studies, our findings are consistent with existing literature.[17] Several recent studies have demonstrated the effectiveness of training programs in enhancing healthcare providers' knowledge and practice.[8,16,17] However, contrast the findings of the study, reported that persistently low knowledge and practice scores despite training. This discrepancy may be attributed to differences in study settings, target populations, and the structure or delivery of training programs. Such contrasting findings underscore the influence of contextual factors on the effectiveness of capacity-building interventions.[19]

ENC implementation didn't reduce asphyxia admissions, contrasting some reviews, possibly due to component selection or low baseline rates.[21] Neonatal mortality findings align with similar programs (e.g., "Helping Babies Breathe"). This suggests refining ENC focus and components may be needed.[22]

ENC training boosts nurses' skills in key newborn care steps (drying, positioning, airway management, stimulation, BMV). Similar improvements seen in

sub-Saharan Africa and Pakistan with structured training, enhancing adherence to protocols.[23]

Consistent with global guidelines like HBB and WHO ENC, initiating interventions within the first minute is critical. Timely interventions (drying, stimulation, BMV) within the first minute are critical for newborn outcomes. Delays in BMV (>30 seconds) increase risk of death/admission by16%.[24] ENC training is effective in reducing neonatal mortality and asphyxia, supported by reviews 5.6% to 52.38%.[25-28] This study provides valuable baseline data in a low-resource setting, highlighting cost-effectiveness and reliability through data triangulation.[29,30]

This study suggests ENC training positively impacted asphyxia prevalence despite infrastructure challenges. To boost neonatal outcomes, improvements in critical care areas and action research approaches are needed. Refining ENC programs is key, especially in resource-limited settings.

Acknowledgement: The authors thank the hospital management, research assistant, pediatrician, and all participants for their support and cooperation throughout the study.

REFERENCES

1. UNICEF WWBUN. Levels and trends child mortality - report 2023: estimates developed by the United Nations Inter-agency Group for Child Mortality Estimation. Washington; 2023 Mar.
2. Berhe YZ, Kebedom AG, Gebregziabher L, Assefa NE, Berhe LZ, Mohammednur SA, et al. Risk factors of birth asphyxia among neonates born in public hospitals of Tigray, Northern Ethiopia. Pediatr Health Med Ther. 2020;11:13–20. https://doi.org/10.2147/PHMT.S232633
3. Okyere FED. Incidence and associated factors of birth asphyxia in neonates admitted at St. Patrick's Hospital, a district hospital in Ghana. OAlib. 2024;11(10):1–12. https://doi.org/10.4236/oalib.1111713
4. World Health Organization. Regional Office for the Western Pacific. Action plan for healthy newborn infants in the Western Pacific Region (2014–2020). Geneva: World Health Organization; 2014. 39 p.
5. Yosef T, Getachew D, Weldekidan F. Health professionals' knowledge and practice of essential newborn care at public health facilities in Bench-Sheko Zone, southwest Ethiopia. Heliyon. 2021 Nov;7(11):e08369. https://doi.org/10.1016/j.heliyon.2021.e08369
6. Beletew B, Mengesha A, Wudu M, Abate M. Prevalence of neonatal hypothermia and its associated factors in East Africa: a systematic review and meta-analysis. BMC Pediatr. 2020 Dec 3;20(1):148. https://doi.org/10.1186/s12887-020-02046-1
7. Phoya F, Langton J, Dube Q, Iroh Tam PY. Association of neonatal hypothermia with morbidity and mortality in a tertiary hospital in Malawi. J Trop Pediatr. 2020 Oct 1;66(5):470–8. https://doi.org/10.1093/tropej/fmaa003
8. Latif S, Perveen K, Sarwar H, Khan S. The effect of educational program on nurses knowledge regarding physical assessment of cardiovascular system in tertiary hospital Lahore, Pakistan. Pak J Med Health Sci. 2022 Feb 26;16(2):252–4.
9. Eze CN, Elusoji CI, Okafor CN, Emeh AN, Obi IA, Odira CCH, et al. Impact of essential newborn care education on knowledge and practice of newborn care among nurses in rural primary health centres in Ebonyi state of Nigeria. Int J Community Med Public Health. 2023 Sep 30;10(10):3556–6. Available from: https://www.ijcmph.com/index.php/ijcmph/article/view/11643
10. Shikuku DN, Milimo B, Ayebare E, Gisore P, Nalwadda G. Practice and outcomes of neonatal resuscitation for newborns with birth asphyxia at Kakamega County General Hospital, Kenya: a direct observation study. BMC Pediatr. 2018 Dec 15;18(1):167. https://doi.org/10.1186/s12887-018-1155-3
11. American Academy of Pediatrics. Helping babies breathe: the golden minute. Learner workbook. Washington: American Academy of Pediatrics; 2010.
12. Nvonako H, Ojee E, Masika M, Brunelle A, Wamalwa D, Wasunna A. Effect of in-hospital training in newborn resuscitation on the competence of health-care workers in resuscitating newborn infants at birth at Mboppi Baptist Hospital, Douala, Cameroon. Pan Afr Med J. 2022;42. https://doi.org/10.11604/pamj.2022.42.236.32619
13. American Academy of Pediatrics. Helping babies breathe: the golden minute. Learner workbook. Washington: American Academy of Pediatrics; 2010.
14. Centers for Disease Control and Prevention. Data collection methods for program evaluation: observation. Eval Brief. 2008;16(16):1–2.
15. Polit DF, Beck CT. Nursing research: principles and methods. Philadelphia (PA): Lippincott Williams & Wilkins; 2004.
16. Bhandankar M. Impact of training health care workers in resuscitation on asphyxia related deaths. Acad J Pediatr Neonatol. 2022;11(4). https://doi.org/10.19080/AJPN.2022.11.555815
17. Amsalu R, Morris CN, Hynes M, Had HJ, Seriki JA, Meehan K, et al. Effectiveness of clinical training on improving essential newborn care practices in Bossaso, Somalia: a pre and post-intervention study. BMC Pediatr. 2020;20(1):215. https://doi.org/10.1186/s12887-020-02135-1
18. Milton R, Gillespie D, Dyer C, Taiyari K, Carvalho MJ, Thomson K, et al. Neonatal sepsis and mortality in low-income and middle-income countries from a facility-based birth cohort: an international multisite prospective observational study. Lancet Glob Health. 2022;10(5):e661–72. https://doi.org/10.1016/S2214-109X(22)00043-2
19. Ogunlesi TA, Ayeni VA, Ogunfowora OB, Jagun EO. The current pattern of facility-based perina-

tal and neonatal mortality in Sagamu, Nigeria. Afr Health Sci. 1970;19(4):3045–54. https://doi.org/10.4314/ahs.v19i4.31

20. Agudelo-Pérez S, Cifuentes-Serrano A, Ávila-Celis P, Oliveros H. Effect of the Helping Babies Breathe program on newborn outcomes: systematic review and meta-analysis. Medicina (B Aires). 2022;58(11):1567. https://doi.org/10.3390/medicina58111567
21. Tran HT, Mannava P, Murray JCS, Nguyen PTT, Tuyen LTM, Hoang Anh T, et al. Early essential newborn care is associated with reduced adverse neonatal outcomes in a tertiary hospital in Da Nang, Viet Nam: a pre-post intervention study. EClinicalMedicine. 2018;6:51–8. https://doi.org/10.1016/j.eclinm.2018.12.001
22. Dol J, Campbell-Yeo M, Murphy GT, Aston M, McMillan D, Richardson B. The impact of the Helping Babies Survive program on neonatal outcomes and health provider skills: a systematic review. JBI Database System Rev Implement Rep. 2018;16(3):701–37. https://doi.org/10.11124/JBISRIR-2017-003486
23. Nasim S, Kousar S, Latif W. Practices and outcomes of neonatal resuscitation for newborns with birth asphyxia in tertiary care hospitals in Lahore, Pakistan. Pak J Inten Care Med. 2025. https://doi.org/10.54112/pjicm.v5i01.49
24. Shukla VV, Carlo WA, Niermeyer S, Guinsburg R. Neonatal resuscitation from a global perspective. Semin Perinatol. 2022;46(6):151630. https://doi.org/10.1016/j.semperi.2022.151630
25. Panthee K, Sharma K, Kalakheti B, Thapa K. Clinical profile and outcome of asphyxiated newborn in a medical college teaching hospital. J Lumbini Med Coll. 2016;4(1):1. https://doi.org/10.22502/jlmc.v4i1.97
26. Simiyu IN, Mchaile DN, Katsongeri K, Philemon RN, Msuya SE. Prevalence, severity and early outcomes of hypoxic ischemic encephalopathy among newborns at a tertiary hospital, in northern Tanzania. BMC Pediatr. 2017;17(1):131. https://doi.org/10.1186/s12887-017-0886-9
27. Uleanya ND, Aniwada EC, Ekwochi U, Uleanya ND. Short term outcome and predictors of survival among birth asphyxiated babies at a tertiary academic hospital in Enugu, South East, Nigeria. Afr Health Sci. 2019;19(1):1554. https://doi.org/10.4314/ahs.v19i1.31
28. Woday A, Muluneh A, St Denis C. Birth asphyxia and its associated factors among newborns in public hospital, northeast Amhara, Ethiopia. PLoS One. 2019;14(12):e0226891. https://doi.org/10.1371/journal.pone.0226891
29. Huang C, Hu L, He J, Luo B. Effects of early essential newborn care versus routine birth care on physiological variables and sleep state among newborn infants: a quasi-experimental design. BMC Pediatr. 2022;22(1):127. https://doi.org/10.1186/s12887-022-03146-3
30. Briggs DC, Eneh AU, Alikor EAD. Basic neonatal resuscitation: retention of knowledge and skills of primary health care workers in Port Harcourt, Rivers State, southern Nigeria. Pan Afr Med J. 2021;38. https://doi.org/10.11604/pamj.2021.38.248.27791

CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	NB, MM
Acquisition, Analysis or Interpretation of Data:	NB, MM, AK
Manuscript Writing & Approval:	NB, MM, AK

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.