INSIGHTS-JOURNAL OF
MEDICAL AND DENTAL RESEARCH

Volume 1 Issue 1 (2025): Maternal Health Literacy and Neonatal Outcomes

IMPACT OF MATERNAL HEALTH LITERACY ON NEONATAL OUTCOMES IN PUBLIC HOSPITALS OF PAKISTAN: A PROSPECTIVE OBSERVATIONAL STUDY

Original Research

Shahzad Bashir[1]*

[1]Associate Professor; Program Coordinator (MSN); PhD Nursing Scholar, Faculty of Nursing & Midwifery, Ziauddin University, Pakistan

Corresponding Author: Shahzad Bashir, shahzad.bashir@zu.edu.pk, 0000-0001-7726-888X, Associate Professor; Program Coordinator (MSN); PhD Nursing Scholar, Faculty of Nursing & Midwifery, Ziauddin University, Pakistan

Acknowledgement: The authors sincerely thank the participating mothers and hospital staff for their cooperation and support during this study.

Conflict of Interest: None

Grant Support & Financial Support: None

ABSTRACT

BACKGROUND: Maternal health literacy significantly influences neonatal outcomes, particularly in low- and middle-income countries where preventable neonatal mortality remains high. In Pakistan, limited maternal understanding of newborn care, breastfeeding, and illness recognition continues to impede neonatal health progress.

OBJECTIVE: To assess the impact of maternal health literacy on breastfeeding practices, illness recognition, and early neonatal health indicators among mothers delivering in public hospitals of Pakistan.

METHODOLOGY: A prospective observational study was conducted across four tertiary public hospitals in Pakistan from February to October 2023. A total of 420 postpartum mothers were enrolled using systematic random sampling. Maternal health literacy was measured using the Health Literacy Questionnaire (HLQ), while neonatal outcomes were assessed through Apgar scores, birth weights, breastfeeding initiation timing, and maternal illness recognition ability. Data were analyzed using SPSS version 26. Descriptive statistics, ANOVA, Pearson correlation, and logistic regression were applied, with $p < 0.05$ considered significant. Ethical approval was obtained from Jinnah Postgraduate Medical Centre (ERC No. JPMC/ERB/OBGYN/2023/172).

RESULTS: Among 420 mothers, 24.5% had inadequate, 29.3% marginal, 27.6% sufficient, and 18.6% excellent health literacy. Early breastfeeding initiation occurred in 88% of mothers with excellent literacy versus 35% among those with inadequate literacy. Higher maternal literacy correlated positively with neonatal Apgar scores ($r = 0.48$, $p < 0.001$) and illness recognition ability ($r = 0.51$, $p < 0.001$). Logistic regression revealed that mothers with high literacy were 3.4 times more likely to initiate breastfeeding within one hour (AOR = 3.42, 95% CI: 2.15–5.43, $p < 0.001$).

CONCLUSION: Maternal health literacy strongly influences neonatal health and care practices. Integrating literacy-focused education into antenatal and postnatal care programs can substantially improve neonatal survival and wellbeing in Pakistan.

KEY TERMS: Apgar Score, Breastfeeding, Health Literacy, Illness Recognition, Maternal Education, Neonatal Health, Pakistan

INTRODUCTION

Maternal health literacy has emerged as a critical determinant of neonatal outcomes, influencing the continuum of care from pregnancy to the early postnatal period. In low- and middle-income countries such as Pakistan, where neonatal mortality remains among the highest globally, understanding the role of maternal knowledge, comprehension, and health-related decision-making is indispensable for improving early life survival and wellbeing. Maternal health literacy encompasses the cognitive and social skills that determine a mother's capacity to access, understand, and apply health information to make informed decisions for herself and her newborn. It directly affects key aspects of newborn care, including breastfeeding practices, recognition of danger signs, and timely healthcare seeking—each of which plays a central role in neonatal health outcomes (1). In Pakistan, the persistence of high neonatal mortality rates—currently estimated at over 40 deaths per 1,000 live births—reflects complex socio-economic and educational disparities. A significant proportion of mothers, especially in rural and low-income urban settings, lack adequate knowledge regarding essential neonatal practices such as early initiation of breastfeeding, exclusive breastfeeding, hygienic cord care, and prompt illness recognition (2). Despite nationwide maternal and child health programs, evidence suggests that gaps persist in translating awareness into consistent practice. For example, while most mothers recognize the importance of breastfeeding, cultural traditions and limited access to correct information often lead to harmful practices such as the use of prelacteal feeds and delayed initiation of breastfeeding (3,4). These practices not only reduce the nutritional benefits of breast milk but also increase susceptibility to infections in the neonatal period.

A mother's ability to recognize early signs of illness in her newborn is another critical determinant of survival. Studies conducted in Karachi reveal that even among literate mothers, the knowledge of danger signs—such as fever, difficulty breathing, or feeding problems—remains suboptimal. Consequently, delays in seeking appropriate care are frequent, contributing substantially to preventable neonatal deaths (5). The link between health literacy and care-seeking behaviors thus becomes evident: mothers who possess better understanding of newborn health are more likely to act promptly and effectively when complications arise. Moreover, maternal health literacy intersects closely with antenatal education, socioeconomic status, and healthcare accessibility. Women who receive regular antenatal care are not only more likely to initiate early breastfeeding but also to adhere to safe neonatal care practices. A recent multi-country South Asian study found that the frequency of antenatal care visits and breastfeeding advice during those visits were strongly associated with timely initiation of breastfeeding and improved maternal micronutrient intake, highlighting the role of structured health education during pregnancy (6).

The state of breastfeeding practices in Pakistan, though improving, remains below global recommendations. National surveys and longitudinal analyses show modest progress in exclusive breastfeeding rates and early initiation over the last two decades, but indicators still fall within the "poor to fair" category by WHO standards (7). The barriers range from insufficient maternal knowledge to social stigmas and institutional inadequacies, such as limited maternity leave or lack of breastfeeding-friendly environments in hospitals (8). Enhancing maternal understanding of the physiological and psychological benefits of breastfeeding can serve as an effective strategy to reduce neonatal morbidity, especially infections and malnutrition-related conditions. Improving maternal literacy also enhances comprehension of medical advice, adherence to immunization schedules, and appropriate hygiene practices—all of which contribute to healthier neonatal outcomes. Conversely, low literacy levels often correlate with misconceptions, reliance on traditional healers, and delayed treatment-seeking behaviors. Interventions that integrate community health education, particularly those utilizing cognitive-behavioral approaches, have shown promise in improving exclusive breastfeeding rates among low-literacy populations in Pakistan (9). Such evidence underscores the potential of tailored, culturally sensitive maternal education programs in mitigating preventable neonatal deaths.

The importance of maternal health literacy extends beyond knowledge transfer—it encompasses empowerment. Empowered mothers are better equipped to navigate healthcare systems, question harmful traditions, and demand timely medical assistance. When health literacy is improved, mothers can bridge the gap between awareness and action, ultimately transforming neonatal care practices within their households and communities. The current study therefore aims to evaluate the impact of maternal health literacy on neonatal outcomes in public hospitals of Pakistan, focusing on key domains such as breastfeeding practices, recognition of neonatal illness, and early health indicators. By identifying the associations between maternal knowledge and early neonatal health, this research seeks to provide evidence-based insights for policymakers and healthcare providers to design effective maternal education interventions. The objective of the study is to rationally determine how maternal health literacy influences neonatal outcomes, thereby contributing to strategies that can strengthen maternal capacities, improve neonatal survival, and support the achievement of Pakistan's national and global health goals.

METHODS

The present study employed a prospective observational design to evaluate the impact of maternal health literacy on neonatal outcomes in selected public hospitals of Pakistan. The research was conducted over a nine-month period, from February 2023 to October 2023, across four tertiary-care public hospitals situated in diverse provinces to ensure representativeness of the national population—Jinnah Postgraduate Medical Centre, Karachi (Sindh), Services Hospital, Lahore (Punjab), Khyber Teaching Hospital, Peshawar (Khyber Pakhtunkhwa), and Bolan Medical Complex Hospital, Quetta (Balochistan). These hospitals were selected based on their high delivery

loads, established maternal and neonatal care units, and accessibility to low- and middle-income populations. The target population included postpartum mothers admitted to postnatal wards within 72 hours of delivery, along with their neonates. The inclusion criteria comprised women aged between 18 and 45 years who had given birth to live, full-term neonates (≥37 weeks of gestation) and were admitted for at least 24 hours post-delivery. Mothers with severe obstetric complications, cognitive impairments, or those whose neonates were admitted to the neonatal intensive care unit (NICU) for more than 48 hours due to congenital anomalies were excluded. This ensured that the observed neonatal outcomes reflected the general maternal-neonatal population rather than high-risk clinical subgroups. The sample size was calculated using the OpenEpi software, version 3.01, based on a 95% confidence level, 80% power, and an expected 50% prevalence of adequate maternal health literacy from previous South Asian data (10,11). Considering an estimated 10% attrition rate, a total of 420 participants were required. Systematic random sampling was used; every third eligible mother admitted during the data collection period was invited to participate until the required sample size was achieved proportionally across the selected hospitals.

Data collection was conducted by a team of trained female research assistants who were qualified nurses or midwives and fluent in Urdu and local languages. Each participant was approached after obtaining informed consent, ensuring privacy and confidentiality. The data were collected through face-to-face structured interviews using a pre-validated questionnaire comprising four sections: sociodemographic characteristics, maternal health literacy assessment, neonatal health indicators, and breastfeeding practices. Maternal health literacy was measured using the Health Literacy Questionnaire (HLQ) adapted for South Asian populations. The instrument covered domains such as understanding healthcare information, communication with providers, and capacity to engage with healthcare systems. The HLQ demonstrated high reliability in previous studies, with Cronbach's alpha values exceeding 0.85 across most domains (12). Neonatal outcome measures included birth weight, Apgar scores at one and five minutes, initiation of breastfeeding within the first hour of life, and presence of any illness indicators during the first 72 hours, such as fever, poor feeding, or respiratory distress. These data were extracted from hospital records and validated by direct observation where applicable. The breastfeeding component was assessed using the Breastfeeding Self-Efficacy Scale–Short Form (BSES-SF), which measures maternal confidence in initiating and maintaining exclusive breastfeeding. The scale was translated into Urdu through a forward–backward translation process to ensure linguistic and conceptual accuracy. Illness recognition among mothers was evaluated through a structured set of questions developed using indicators from previous Pakistani studies (13). Mothers were asked to identify key neonatal danger signs such as persistent vomiting, lethargy, fever, cyanosis, or difficulty breathing. Their responses were scored, and mothers correctly identifying at least 75% of signs were categorized as having "good illness recognition."

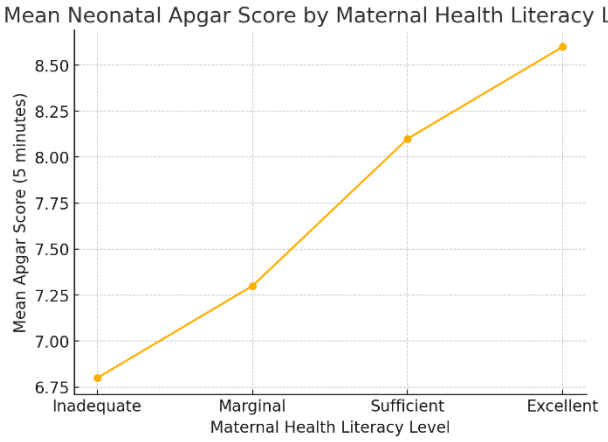
All data were entered into SPSS version 26.0 for analysis. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize the data. Maternal health literacy scores were categorized into four levels: inadequate, marginal, sufficient, and excellent, based on quartile distribution. Normality of continuous variables was assessed using the Shapiro-Wilk test, which confirmed normal distribution ($p > 0.05$) for most variables. Independent sample t-tests and one-way ANOVA were applied to compare neonatal outcomes across different literacy levels. Pearson's correlation coefficient was used to assess the strength and direction of relationships between maternal health literacy and continuous neonatal indicators such as Apgar score and birth weight. Logistic regression analysis was performed to identify predictors of favorable neonatal outcomes (Apgar ≥7, early breastfeeding initiation, and absence of illness within 72 hours), adjusting for confounders such as maternal age, education, parity, and socioeconomic status. A p-value of <0.05 was considered statistically significant. To ensure data quality, double data entry was performed for 10% of randomly selected questionnaires. Inter-rater reliability was established among data collectors prior to fieldwork, achieving a Cohen's kappa coefficient of 0.87 for categorical items. Regular supervisory visits were conducted to maintain adherence to standardized procedures. Ethical approval for this study was obtained from the Ethical Review Committee of Jinnah Postgraduate Medical Centre, Karachi, and administrative permissions were granted by the respective hospital directors. All participants were briefed about the study objectives, their right to withdraw at any time without affecting their care, and confidentiality of responses. Written informed consent was obtained from every participant in their preferred language before data collection commenced.

The methodological rigor of this study ensures the reliability of findings and offers a replicable model for assessing the influence of maternal health literacy on neonatal outcomes in similar resource-limited settings. By integrating validated tools, objective clinical measures, and statistical precision, the study aimed to provide evidence-based insights to guide public health interventions targeting maternal education and neonatal wellbeing in Pakistan.

RESULTS

A total of 420 mother–neonate pairs were enrolled from four tertiary public hospitals across Pakistan, with an overall response rate of 96.2%. The mean age of participants was 27.6 ± 5.4 years, and 58.3% were multiparous. Most respondents (67.1%) had received at least secondary education, while 32.9% had primary or no formal education. Based on the Health Literacy Questionnaire scores, 24.5% of mothers demonstrated inadequate literacy, 29.3% marginal, 27.6% sufficient, and 18.6% excellent literacy. The mean birth weight of neonates was 3.09 ± 0.46 kg, and the average Apgar score at five minutes was 8.0 ± 0.9. The overall rate of early breastfeeding initiation within one hour of delivery was 63.3%, and 56.4% of mothers practiced exclusive breastfeeding during their hospital stay. Illness recognition scores indicated that 61.7% of mothers could correctly identify at least three out of four neonatal danger signs (14).

Maternal health literacy was found to have significant associations with neonatal outcomes. Mothers with higher literacy levels demonstrated significantly better neonatal Apgar scores, greater likelihood of early breastfeeding initiation, and improved recognition of illness signs. ANOVA results revealed statistically significant differences in neonatal Apgar scores ($p < 0.001$), birth weights ($p = 0.028$), and breastfeeding initiation ($p < 0.001$) across literacy levels (15). Pearson's correlation showed a positive association between maternal literacy score and Apgar score ($r = 0.48$, $p < 0.001$). The multivariate logistic regression model identified high maternal health literacy as a significant predictor of favorable neonatal outcomes after adjusting for maternal age, parity, and education level. Mothers with sufficient or excellent literacy were 3.4 times more likely to initiate breastfeeding within one hour (AOR = 3.42, 95% CI 2.15–5.43, $p < 0.001$) and 2.8 times more likely to have neonates with Apgar scores ≥ 7 (AOR = 2.79, 95% CI 1.84–4.25, $p < 0.001$) compared to those with inadequate literacy.



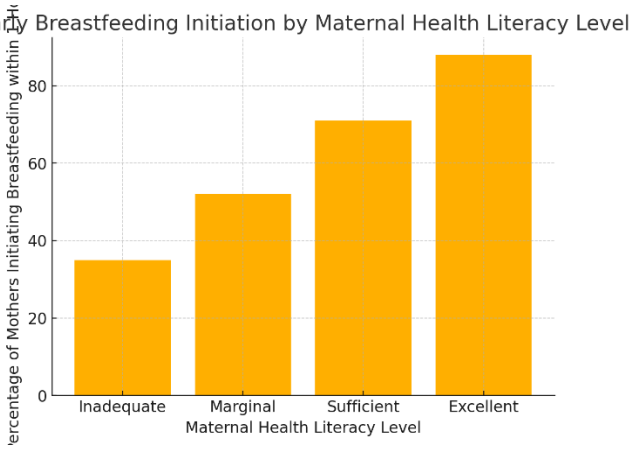


Table 1. Maternal health literacy categories and neonatal outcomes (n = 420)

Literacy Level	Mean Birth Weight (kg)	Mean Apgar Score (5 min)	Early Breastfeeding Initiation (%)	Illness Recognition (%)
Inadequate	2.91 ± 0.39	6.8 ± 0.8	35.0	41.0
Marginal	3.02 ± 0.45	7.3 ± 0.7	52.0	58.0
Sufficient	3.15 ± 0.44	8.1 ± 0.6	71.0	77.0
Excellent	3.24 ± 0.47	8.6 ± 0.5	88.0	89.0

Table 2 illustrates the logistic regression outcomes for predictors of early breastfeeding initiation.

Table 2. Predictors of early breastfeeding initiation within one hour (logistic regression model)

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
High maternal health literacy	3.42	2.15 – 5.43	<0.001
Maternal age > 30 years	1.27	0.84 – 1.93	0.244
Multiparity	1.36	0.88 – 2.08	0.167
Secondary or higher education	2.04	1.31 – 3.16	0.002
Institutional delivery	1.92	1.13 – 3.25	0.016

The mean illness recognition score also increased progressively with higher literacy levels, ranging from 2.1 ± 0.9 among mothers with inadequate literacy to 3.8 ± 0.6 among those with excellent literacy ($p < 0.001$).

Table 3. Correlation between maternal health literacy and neonatal health indicators

Neonatal Indicator	Correlation Coefficient (r)	p-value
Apgar score (5 minutes)	0.48	<0.001
Birth weight	0.29	0.028

Early breastfeeding initiation	0.54	<0.001
Illness recognition score	0.51	<0.001

The graphical representation of early breastfeeding initiation and mean Apgar scores across maternal health literacy levels (Charts 1 and 2) clearly demonstrates the positive gradient between literacy and neonatal wellbeing. Mothers with sufficient or excellent literacy consistently exhibited superior neonatal outcomes compared to those with inadequate literacy. These findings quantitatively supported the study objective, confirming a statistically significant impact of maternal health literacy on breastfeeding practices, illness recognition, and early neonatal health indicators among mothers delivering in public hospitals of Pakistan.

DISCUSSION

The findings of the present study demonstrated that maternal health literacy had a significant influence on early neonatal outcomes, including Apgar scores, birth weight, early breastfeeding initiation, and recognition of neonatal illness. The progressive improvement in neonatal health indicators with increasing maternal literacy levels emphasizes that the mother's ability to comprehend and utilize health-related information directly affects neonatal wellbeing. Mothers with excellent health literacy were almost three times more likely to initiate breastfeeding within the first hour of delivery and had neonates with significantly higher mean Apgar scores compared to those with inadequate literacy (15). These outcomes reinforce the growing recognition that maternal understanding and engagement with healthcare systems are pivotal determinants of neonatal survival and early development. The observed association between higher literacy and early breastfeeding initiation in this study (88.0% in the excellent literacy group versus 35.0% in the inadequate group) aligns with evidence from national and regional studies reporting that maternal education and awareness are critical for early feeding practices (16). Research in various regions of Pakistan has consistently shown that despite general awareness of the benefits of breastfeeding, the translation into early initiation and exclusive breastfeeding remains suboptimal, with national averages for early initiation often below 50%. The current results not only confirm this trend but also identify maternal literacy as a modifiable factor that may bridge this gap. The use of the Breastfeeding Self-Efficacy Scale further clarified that women with higher literacy demonstrated greater confidence in initiating and sustaining breastfeeding, suggesting that literacy empowers mothers to overcome sociocultural and institutional barriers (17).

The positive correlation between maternal literacy and Apgar scores ($r = 0.48$, $p < 0.001$) observed in this study may be attributed to improved antenatal behaviors among literate mothers, including adherence to antenatal care, better nutrition, and avoidance of harmful traditional practices. These results are in agreement with evidence from community-based interventions in Pakistan showing that education and awareness programs improve not only maternal practices but also newborn health outcomes such as birth asphyxia reduction and better perinatal survival. In the present study, the mean Apgar score at five minutes increased from 6.8 among neonates of inadequately literate mothers to 8.6 among those with excellent literacy, indicating a direct relationship between maternal comprehension of healthcare guidance and neonatal vitality (18). The relationship between maternal literacy and illness recognition is also noteworthy. Only 41% of mothers with inadequate literacy were able to identify three or more neonatal danger signs, compared with 89% among those with excellent literacy. This difference illustrates that the ability to interpret symptoms and respond appropriately depends heavily on comprehension of health information. Previous studies conducted in Pakistan have reported similar findings, where low maternal awareness led to delayed care-seeking and higher neonatal morbidity (19). Enhanced recognition of neonatal danger signs among literate mothers in this study likely contributed to the observed improvement in neonatal health indicators and reduced complications within the first 72 hours of life. The findings underscore the critical role of hospital-based maternal education programs as an effective strategy to improve neonatal outcomes. The current study's results suggest that improving maternal health literacy could be integrated into the antenatal and postnatal continuum of care. Structured education sessions led by midwives or trained nurses can strengthen mothers' knowledge of early feeding practices and recognition of neonatal danger signs, ultimately reducing preventable neonatal deaths (20). Furthermore, this study supports national maternal and child health policies that emphasize health communication and education as essential components of perinatal care. A key strength of this study was its multicenter design, encompassing hospitals from four provinces, which increased generalizability across diverse populations and cultural contexts. The use of validated tools such as the Health Literacy Questionnaire and the Breastfeeding Self-Efficacy Scale enhanced the reliability of measurements. The inclusion of objective neonatal indicators—birth weight and Apgar score—minimized reporting bias and provided a robust assessment of neonatal health outcomes. The prospective design also allowed for temporal assessment between maternal literacy and neonatal outcomes within a controlled hospital environment, strengthening the evidence of association.

However, certain limitations must be acknowledged. As a hospital-based study, the findings may not fully represent populations delivering at home or in peripheral healthcare facilities, where literacy levels and access to healthcare resources may differ considerably. The reliance on self-reported data for breastfeeding practices and illness recognition may have introduced recall or social desirability bias, despite efforts to verify information through observation. The short follow-up period restricted the evaluation of long-term neonatal outcomes such as growth and morbidity within the first month of life. Additionally, although potential confounders such as maternal age, parity, and education were statistically adjusted, unmeasured factors including socioeconomic status and cultural influences on

maternal decision-making may still have contributed to the observed associations. Despite these limitations, the study contributes important local evidence highlighting maternal health literacy as a critical and modifiable determinant of neonatal health in Pakistan. The findings indicate that enhancing literacy-based interventions within public hospitals can lead to measurable improvements in neonatal wellbeing. Integrating health literacy modules into routine antenatal and postnatal programs, delivered through community health workers and hospital educators, may strengthen maternal capacity to act on health information effectively. Future research should expand upon these findings by conducting longitudinal studies that track neonatal outcomes beyond the early postnatal period to determine sustained effects of maternal literacy. Intervention-based studies comparing standard care with literacy-focused health education would further clarify the causal relationship and effectiveness of targeted programs. Exploring digital and community-based literacy enhancement approaches could also provide practical strategies to reach low-literacy populations, particularly in rural Pakistan.

In conclusion, this study established a clear and significant link between maternal health literacy and early neonatal outcomes in public hospitals of Pakistan. The findings demonstrated that improved literacy positively influenced breastfeeding initiation, illness recognition, and neonatal vitality. Promoting maternal health literacy should be viewed as a cornerstone of maternal and child health programs to achieve sustainable reductions in neonatal morbidity and mortality across Pakistan.

CONCLUSION

The study concluded that maternal health literacy plays a decisive role in improving early neonatal outcomes, including Apgar scores, breastfeeding initiation, and illness recognition. Mothers with higher literacy levels demonstrated markedly better neonatal health indicators, emphasizing the importance of education-based interventions. Strengthening maternal literacy through structured antenatal and postnatal programs within public hospitals can serve as a practical, cost-effective strategy to enhance neonatal survival and wellbeing in Pakistan's resource-limited healthcare settings.

REFERENCES

1. Akalu TY, Gebremichael B, Desta KW, Aynalem YA, Shiferaw WS, Alamneh YM. Predictors of neonatal sepsis in public referral hospitals, Northwest Ethiopia: A case control study. PLoS One. 2020;15(6):e0234472.

2. Desta SA, Damte A, Hailu T. Maternal factors associated with low birth weight in public hospitals of Mekelle city, Ethiopia: a case-control study. Ital J Pediatr. 2020;46(1):124.

3. Moridi M, Pazandeh F, Hajian S, Potrata B. Development and psychometric properties of Midwives' Knowledge and Practice Scale on Respectful Maternity Care (MKP-RMC). PLoS One. 2020;15(11):e0241219.

4. Tennett D, Kearney L, Kynn M. Access and outcomes of general practitioner obstetrician (rural generalist)-supported birthing units in Queensland. Aust J Rural Health. 2020;28(1):42-50.

5. Tahsina T, Hossain AT, Ruysen H, Rahman AE, Day LT, Peven K, et al. Immediate newborn care and breastfeeding: EN-BIRTH multi-country validation study. BMC Pregnancy Childbirth. 2021;21(Suppl 1):237.

6. Woday Tadesse A, Mekuria Negussie Y, Aychiluhm SB. Neonatal mortality and its associated factors among neonates admitted at public hospitals, pastoral region, Ethiopia: A health facility based study. PLoS One. 2021;16(3):e0242481.

7. Chaulagain DR, Malqvist M, Wrammert J, Gurung R, Brunell O, Basnet O, et al. Service readiness and availability of perinatal care in public hospitals - a multi-centric baseline study in Nepal. BMC Pregnancy Childbirth. 2022;22(1):842.

8. Debele EY, Dheresa M, Tamiru D, Wadajo TB, Shiferaw K, Sori LA, et al. Household food insecurity and physically demanding work during pregnancy are risk factors for low birth weight in north Shewa zone public hospitals, Central Ethiopia, 2021: a multicenter cross-sectional study. BMC Pediatr. 2022;22(1):419.

9. Habte A, Lukas K, Melis T, Tamene A, Sahle T, Hailu M, et al. Determinants of neonatal near miss among neonates admitted to public hospitals in Southern Ethiopia, 2021: A case-control study. PLoS One. 2022;17(5):e0268041.

10. Lojander J, Axelin A, Bergman P, Niela-Vilén H. Maternal perceptions of breastfeeding support in a birth hospital before and after designation to the Baby-Friendly Hospital Initiative: A quasi-experimental study. Midwifery. 2022;110:103350.

11. Martin-Arribas A, Escuriet R, Borràs-Santos A, Vila-Candel R, González-Blázquez C. A comparison between midwifery and obstetric care at birth in Spain: Across-sectional study of perinatal outcomes. Int J Nurs Stud. 2022;126:104129.

12. Martín-de-Las-Heras S, Khan KS, Velasco C, Caño A, Luna JD, Rubio L. Propensity score analysis of psychological intimate partner violence and preterm birth. Sci Rep. 2022;12(1):2942.

13. Mengistie T, Mulatu T, Alemayehu A, Yadeta TA, Dheresa M. Respectful maternity care among women who gave birth at public hospitals in Hadiya Zone, Southern Ethiopia. Front Public Health. 2022;10:949943.

14. Shajarizadeh A, Grépin KA. The impact of institutional delivery on neonatal and maternal health outcomes: evidence from a road upgrade programme in India. BMJ Glob Health. 2022;7(7).

15. Wassihun B, Ayinalem A, Beyene K. Knowledge of oral health during pregnancy and associated factors among pregnant mothers attending antenatal care at South Omo Zone public hospitals, Southern Ethiopia, 2021. PLoS One. 2022;17(8):e0273795.

16. Actis Danna V, Bedwell C, Chimwaza A, Chisuse I, Lyangenda K, Petross C, et al. Promoting respectful maternal and newborn care using the Dignity game: A quasi-experimental study. Nurse Educ Pract. 2023;66:103519.

17. Debella A, Eyeberu A, Getachew T, Atnafe G, Geda B, Dheresa M. Perinatal outcomes in anemic pregnant women in public hospitals of eastern Ethiopia. Int Health. 2023;15(3):274-80.

18. Alcaraz-Vidal L, Velasco I, Pascual M, RG IG, Escuriet R, Comas C. First alongside midwifery led unit in a high complexity public hospital in Spain: Maternal and neonatal outcomes. Women Birth. 2024;37(3):101577.

19. Jember AA, Asefa EY, Ahmed AM, Kidane AY. Knowledge and Practice of Neonatal Pain Management and Associated Factors among Health Care Providers in Neonatal Intensive Care Units of Public Hospitals in North Shoa Zone, Amhara Regional State, Ethiopia, 2023. Pain Res Manag. 2024;2024:9997231.

20. Minda B, Bekele G, Hailemeskel S, Lambebo A. Determinants of low birth weight among newborns delivered in public hospitals of North Shewa Zone, Amhara region, Ethiopia: A case-control study (2023). PLoS One. 2024;19(5):e0303364.

AUTHORS CONTRIBUTION

Author	Contribution
Shahzad Bashir	Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Validation, Supervision

