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Original Research Paper

Knowledge and practice of early essential newborn care among health professionals in Indonesia

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Abstract
Indonesia's neonatal mortality rate stands at 12 deaths per 1,000 live births, driven by prematurity, asphyxia, and congenital anomalies. Inconsistent Essential Newborn Care (EENC) implementation fuels preventable first-24-hour deaths. This study aims to assess EENC knowledge and practices among Indonesian health professionals. A cross-sectional survey of 132 experienced providers (>3 years in delivery/perinatology) from hospitals, community health centers, and independent midwifery practices used a validated questionnaire via Google Forms. Descriptive statistics and chi-square tests identified associations (P<0.05). Overall, 66.4% showed poor EENC knowledge. Strengths included breastfeeding cues (99.2% correct attachment; 93.9% rooting), but deficits marked contraindications (34.8% for maternal hemorrhage >1,000 ml; 49.2% post-birth wheezing). Practices excelled in basics (93.2% recognized hypothermia/cord/skin-to-skin/breastfeeding/infection prevention; 90.2% upright positioning) yet faltered in sequencing: only 15.9% prioritized birth time announcement then thorough drying, 50.8% suctioned airways immediately, and 48.5% endorsed supine second-stage positioning. Workplace significantly affected knowledge (χ^2=9.467, P=0.009): hospitals were the worst (79.1% poor), and independent midwifery practices were the best (33.3%). Age, education, experience, and training showed no association. Procedural sequencing and contraindication gaps stem from heavy workloads and patchy training. Skills-focused programs with supervision and supportive settings are essential to boost competency and decrease deaths. Observational studies should capture real behaviors and assess training/policy impacts on newborn outcomes.

Keywords: early essential newborn care; health professionals; Indonesia; knowledge; practice

1. Introduction

Neonatal mortality in Indonesia remains a serious health challenge, with recent estimates showing around 12 deaths per 1,000 live births. Prematurity still accounts for the largest proportion of these deaths (35.5%), followed by asphyxia and birth trauma (21.6%) as well as congenital anomalies (17.1%) (Sampurna et al., 2023; Titaley et al., 2024; WHO, 2023). Many newborns die within the first 24 hours a period that requires health providers to carry out Essential Newborn Care (EENC) properly and consistently (Dol et al., 2023; Jamee et al., 2022; Shukla & Carlo, 2020; Titaley et al., 2024). Strengthening the capacity of birth attendants is therefore repeatedly highlighted as one of the most effective measures to reduce preventable neonatal deaths (Agus et al., 2018; Chou et al., 2019; Goyet et al., 2019). Global evidence further shows that poor-quality care contributes to a considerable share of newborn deaths, even in settings where services are technically available (Ram et al., 2024; WHO, 2020).

Although Indonesia has a large workforce of midwives and nurses, studies show that many providers still struggle to meet competency expectations, particularly in the area of EENC. Outdated techniques continue to be used, often because opportunities for structured, continuous learning are still limited (Baso et al., 2021; Nagamatsu et al., 2017; Vivilaki & Asimaki, 2020). Several providers

also report that their pre-service education did not provide enough hands-on experience, which leaves them unsure when applying evidence-based newborn care in real clinical situations (Adnani et al., 2022; Rintani & Wibowo, 2019). Access to refresher programs or in-service training is also uneven across regions (Suangga & Tuppal, 2017).

The Indonesian government has attempted to address these gaps through various initiatives aimed at improving health professionals' competence. Programs such as continuing professional development and several competency-based training packages supported by the Ministry of Health are designed to ensure that midwives have ongoing opportunities to strengthen their clinical skills (UNFPA, 2025; WHO, 2025). Among the topics offered, EENC is consistently one of the areas most requested by midwives (Nagamatsu et al., 2017).

WHO has emphasized EENC as a critical intervention for preventing complications such as hypothermia, infections, and birth asphyxia. Despite its well-documented benefits, studies continue to report challenges in translating EENC knowledge into daily clinical practice. Even after training, many providers still struggle to implement the procedures consistently (Morseth et al., 2020). This suggests that knowledge gains alone are not enough; both cognitive and practical skills must be monitored and reinforced over time. To support this, WHO developed the Essential Newborn Care Course (ENCC), which is divided into two major components. ENC 1 focuses on immediate newborn care, including resuscitation, while ENC 2 covers ongoing monitoring and care during the first month of life. The training involves hands-on simulations, scenario-based learning, and practical exercises aligned with WHO principles on newborn rights and nurturing care (WHO, 2022).

Experiences from Vietnam indicated that EENC training is generally appreciated and can yield initial improvements, but maintaining high-quality practice remains a challenge (Tran et al., 2021). More practical, skills-focused sessions have been recommended to help strengthen retention and mastery (Morseth et al., 2020). Despite the recognized importance of EENC, research examining the knowledge and clinical readiness of Indonesian health workers remains limited. Such evidence is essential for improving training strategies and, ultimately, reducing neonatal mortality. This study aimed to assess the knowledge and clinical practices regarding Early Essential Newborn Care (EENC) among Indonesian health professionals, especially those involved in immediate newborn care.

2. Research Methods

This study applied a quantitative descriptive cross-sectional approach, focusing on midwives and nurses as the primary study population. Respondents were selected using purposive sampling based on predetermined inclusion criteria. Individuals were eligible if they were employed in maternity or perinatology units and had more than three years of clinical experience. Letters requesting cooperation were sent to health facilities that met these requirements, and ward supervisors assisted in identifying staff who fulfilled the criteria and were willing to participate. Using this process, 132 midwives and nurses were successfully recruited and completed the study.

Two instruments were used to collect data: (1) a self-administered questionnaire that documented demographic characteristics such as gender, age, length of experience, primary responsibilities, involvement in continuing education, and motivation to participate in future training; and (2) a set of items assessing respondents' knowledge and practices related to skin-to-skin contact. The knowledge and practice section consisted of 17 dichotomous items scored as "1" for *Yes* and "0" for *No*, producing total scores ranging from 0 to 17. Items 1–10 focused on practices related to EENC, while items 11–17 measured knowledge of EENC concepts. Reliability testing demonstrated good internal consistency, with a Cronbach's alpha value of 0.75. Respondents who achieved a minimum of 70%

correct responses were classified as having adequate knowledge, while those scoring below this benchmark were considered to have inadequate knowledge.

The study procedures were carried out in several steps: 1) The researcher developed and adapted the questionnaire on skin-to-skin contact based on WHO guidance; 2) public and private hospitals, community health centers, and independent midwifery practices were selected, and formal research proposals were submitted to these institutions; 3) After receiving ethical approval, the researcher coordinated with each facility to finalize the research arrangements; 4) Permissions were obtained, and the data collection process was authorized; and 5) Questionnaires were distributed online, with responses automatically recorded in a Google Form database. All data were screened for completeness, duplicate entries were removed, and only respondents meeting the inclusion criteria were retained for analysis. Data were analyzed using: (1) descriptive statistics, including mean, median, quartiles, and percentages to summarize non-parametric variables; (2) bivariate analyses to examine associations between the independent and dependent variables, with statistical significance set at $P < 0.05$; and (3) standardized statistical procedures for the overall analysis framework.

The Faculty of Health Sciences at State Islamic University granted ethical clearance for this study with the reference number Un.01/F.10/KP.01.1/KE.SP/08.10.080/2022. The research objective was communicated to all respondents, along with the right to withdraw, and the precautions implemented to protect their privacy and confidentiality. The guidelines outlined in the Helsinki Declaration were rigorously followed throughout this research (Zhang et al., 2024). Before participating, each participant signed a consent form indicating voluntary participation involvement.

3. Results and Discussion

3.1.Result

Data for this study were collected through an online questionnaire created in Google Forms and shared with nurses and midwives working in a range of health services, including private and public hospitals, community health centers, and independent midwifery practices. A total of 132 respondents, aged 20–61 years, completed the survey and met the study's inclusion requirements. Univariate analysis was used to summarize the main characteristics of the respondents, such as age, level of education, employment duration, workplace setting, and any relevant training attended within the past three years, including ENC or other maternal newborn care programs.

Table 1. Respondent Characteristics

Variable		(N=132)		Standard Deviation
		N	%	
Age	Average: 39.77 years old			
	Min-Max: 20-61			
	20-35	57	43.2	
	35-45	33	25.0	
	46-55	33	25.0	0.98
	56-65	9	6.8	
Educational background	Diploma 1	16	12.1	
	Nursing Academy	71	53.8	
	Master of Nursing/Midwifery	44	33.1	0.661
	Master of Nursing	1	0.8	
Experienced training within 3 years	Yes	99	75.0	0.435
	Not	33	25.0	
Length of work	Less than 3 years	9	6.8	
	3-10 years	58	43.9	0.619
	More than 10 years	65	49.2	

Variable		(N=132) N	%	Standard Deviation
Workplace	Public Health Center	77	58.3	
	Hospital	43	32.6	0.66
	Midwives Practicing	12	9.1	
EENC Training	Yes	58	43.9	
	Not	74	56.1	0.498
Healthcare boosters hope to increase their knowledge	Training	29	22.0	
	Workshops/seminars	28	21.2	0.819
	Continuing education	75	56.8	
Health professionals' knowledge	Poor	85	64.4	
	Good	47	35.6	

The respondents' average age was 39.77 years old (SD 0.98, range 20-61), with 43.2% aged 20-35 years. In terms of education, 53.8% (n = 71) had completed a Nursing Academy program, only 0.8% (n = 1) had earned a master's degree with a focus in nursing. Regarding professional skill development, 75% (n = 99) had attended various training events within the previous three years. About half of the respondents (49.2%, n = 65) reported having worked professionally for more than ten years. Most respondents worked at Community Health Centers (58.3%, n = 77). More than half of the respondents (56.1%, n = 74) had never attended any EENC training sessions. Regarding preferred methods of continuing education, 56.8% (n = 75) were interested in further schooling (**See Table 1**).

Table 2. Respondent Characteristics and Their Relationship to Knowledge Level

Variable	Knowledge Level n (%) Poor	Good	X2 (df)	P- value
Age (years)				
20-35	36 (63.2)	21 (36.8)	.670 (3)	0.88
35-45	20 (60.6)	13 (39.4)		
46-55	23 (69.7)	10 (30.3)		
56-65	6 (66.7)	3 (33.3)		
Educational background				
Diploma 1	13 (81.3)	3 (18.8)	3.999 (3)	0.262
Nursing Academy	45 (63.4)	26 (36.6)		
Bachelor of nursing/midwifery	27 (61.4)	17 (38.6)		
Master of nursing	0 (0)	1 (100)		
Experienced training within 3 years				
Yes	62 (62.6)	37 (37.4)	.540 (1)	0.303
Not	23 (69.7)	10 (30.3)		
Length of work				
Less than 3 years	6 (66.7)	3 (33.3)	2.021 (2)	0.364
3-10 years	41 (70.7)	17 (29.3)		
More than 10 years	38 (58.5)	27 (41.5)		
Workplace				
Public Health Centre	47 (61)	30 (39)	9.467 (2)	0.009
Hospital	34 (79.1)	9 (20.9)		
Midwives Practicing	4 (33.3)	8 (66.7)		
EENC Training				
Yes	35 (60.3)	23 (39.7)	.740 (1)	0.249
Not	50 (67.60)	24 (32.4)		
Midwives and Nurses hope to improve				

Variable	Knowledge Level n (%) Poor	Good	X2 (df)	P- value
their knowledge				
Training	20 (69.0)	9 (31.0)		
Workshops/seminars	14 (50)	14 (50)	3.220 (2)	0.2
Continuing education	51 (68)	24 (32)		

Across all demographic categories, the majority of respondents have poor knowledge of Early Essential Newborn Care (EENC), generally around 60–80% in each subgroup. Good knowledge appears in only about one-third of respondents in most categories, showing a broad knowledge gap among providers. Age groups (20–35, 35–45, 46–55, 56–65) show similar proportions of poor and good knowledge, with no statistically significant association (χ^2=0.670; p=0.88). Educational background, recent training within 3 years, length of work, EENC training, and preferred way to improve knowledge (training, workshops/seminars, continuing education) also do not differ significantly in knowledge level (all p>0.05). Workplace is significantly related to knowledge (χ^2=9.467; p=0.009). Hospital staff have the highest proportion of poor knowledge (79.1%), Public Health Centre staff are somewhat better (61% poor), and in independent midwifery practices show the best profile, with only 33.3% poor and 66.7% good knowledge **(See Table 2).**

Analysis of EENC knowledge and practice revealed that midwives and nurses answered more than 70% of item correctly on 10 out of 17 questions, suggesting a good grasp of many important topics. However, considerable gaps remained in several aspects of newborn care. Table 3, indicates that health professionals generally demonstrate strong knowledge of breastfeeding cues and practices, with the vast majority correctly recognizing that breastfeeding cues signal the baby's readiness to feed (85.6%), that rooting, licking, and dripping saliva indicate readiness (93.9%), that good attachment is fundamental to successful breastfeeding (99.2%), and that slow, deep sucking with pauses reflects a correct breastfeeding position (78.8%). However, substantial knowledge gaps are evident regarding the safety of skin-to-skin contact in specific clinical scenarios: only 34.8% correctly identified that skin-to-skin treatment should not be recommended in the context of over 1000 ml blood loss and blurred vision, and just 49.2% appropriately recommended skin-to-skin care when the baby wheezes immediately after birth, indicating considerable uncertainty and potential misapplication of skin-to-skin guidance among nearly half to two-thirds of respondents.

Table 3. Knowledge of EENC among Health Professionals in Indonesia

Health Professionals Knowledge	Correct answer n	%	Incorrect Answer n	%	Standard Deviation
A breastfeeding cue means that the baby is ready to breastfeed.	113	85.6	19	14.4	0.362
Rooting, licking, and dripping saliva indicate breastfeeding readiness.	124	93.9	8	6.1	0.24
Good attachment is the key to successful breastfeeding.	131	99.2	1	0.8	0.87
A sign of the correct breastfeeding position is slow, deep sucking with pauses.	104	78.8	28	21.2	0.41
With over 1000ml of blood loss and blurred vision, skin-to-skin treatments should not be recommended.	46	34.8	86	65.2	0.478
Recommend skin-to-skin care if the baby wheezes right after birth.	65	49.2	67	90.8	0.501

Table 4. EENC Practice among Health Professionals in Indonesia

Health Professionals Practice	Correct answer		Incorrect Answer		Standard Deviation
	n	%	n	%	
Immediate baby care covers the period from birth to postpartum.	118	89.4	14	10.6	0.309
Important newborn care includes preventing hypothermia, umbilical cord care, direct skin-to-skin contact, exclusive breastfeeding, and infection prevention.	123	93.2	9	6.8	0.253
The supine position is best for the second stage of labor	64	48.5	68	51.2	0.502
Funding pressures can support the workforce effectively.	80	60.6	52	39.4	0.49
Skin-to-skin contact should last at least 10 minutes.	53	40.2	79	59.8	0.492
After birth, call the time and then dry the baby thoroughly.	21	15.9	111	84.1	0.367
After birth, announce the time and suck on the baby's mouth and nose	67	50.8	65	49.2	0.502
During drying and stimulation, if the baby cries, pinch and cut the umbilical cord	98	74.2	34	25.8	0.439
In skin-to-skin, the baby is placed upright between the mother's breasts.	119	90.2	13	9.8	0.299
Suck the baby's mouth and nose if he is not breathing and the blockage is not visible, after drying.	110	83.3	22	16.7	0.374
To prevent heat loss, cover the baby with a cloth and hat	106	80.3	26	19.7	0.399

Most respondents correctly understand that immediate baby care covers the period from birth to postpartum (89.4% correct) and that important newborn care includes hypothermia prevention, cord care, skin-to-skin contact, exclusive breastfeeding, and infection prevention (93.2% correct). High correct responses are also seen for positioning the baby upright between the mother's breasts during skin-to-skin (90.2%), suctioning the baby's mouth and nose if not breathing and obstruction is not visible (83.3%), and covering the baby with cloth and hat to prevent heat loss (80.3%). Several specific procedures show weaker performance: only 48.5% correctly identify the supine position as best for second stage of labor, and 40.2% know that skin-to-skin contact should last at least 10 minutes. Very few respondents correctly practice timing and then thoroughly drying the baby after birth (15.9% correct), and about half correctly "announce the time and suck on the baby's mouth and nose" after birth (50.8%) **(See Table 4).**

3.2.Discussion

Age and length of working experience did not significantly affect midwives' and nurses' understanding of EENC. These findings are consistent with the results of a study conducted in Ethiopia, where the average age of respondents was 26 years, but age was not significantly related to knowledge of EENC (Mose et al., 2021). Similarly, research in Mali found that the level of EENC knowledge was not significantly affected by length of practice (Traoré et al., 2021). Knowledge is flexible and highly dependent on new information based on the latest evidence, not simply on age or work experience. Without the willingness to continue learning and keep up with the latest guidelines, years of experience in this field can actually cause knowledge to stagnate. Therefore, the most important factors in understanding EENC are not age or length of service, but rather how easily one can access the latest guidelines, how actively one is involved in neonatal practice, positive supportive supervision, and support from a work environment that facilitates continuous learning (Agus, 2025; Ali & Ghafel, 2022; Arba & Zana, 2020; Khosravi et al., 2022).

Formal education and EENC training background had no statistically significant relationship with the level of knowledge among health workers. Some previous research findings contradict the results of this study, where the level of education has a 3.26 to 8.83 times greater chance of having good EENC knowledge (Arba & Zana, 2020; Bakar & Joho, 2023; Yosef et al., 2021). Formal education and training participation do not always guarantee good knowledge mastery or optimal clinical practice application. Knowledge gained through education and training is theoretical and may decline if not reinforced through routine application, supervision, and continuous competency updates (Alsaqer et al., 2025; Tosif et al., 2020). Education and training are important foundations, but when not supported by a conducive practice context, their impact becomes limited (Pueyo-Garrigues et al., 2022).

Often, EENC training is only held once (one-off training), with a short duration and minimal follow-up. As a result, its impact is insufficient to change knowledge and practices in the long term. This situation is exacerbated when health workers return to work in environments that are not conducive to the implementation of EENC standards. This is due to limited resources, workload, or a work culture that does not encourage evidence-based practices (Effa et al., 2021; He et al., 2024, 2025; Kinshella et al., 2021). This may explain why EENC training does not significantly affect knowledge, even though its purpose is to improve competence.

We found that the work environment greatly influences the level of EENC knowledge among health professionals. Interestingly, health professionals in hospitals had the lowest proportion of knowledge, followed by those working in community health centers. Meanwhile, independent midwifery practices had the best knowledge profile. Midwives working in hospitals did not always have a better understanding of EENC than those working in clinics (Arba & Zana, 2020). This pattern is consistent with previous research indicating that hospitals often face high workloads, rapid task rotation, and a dominance of curative approaches (Bangcola & Caorong, 2016; He et al., 2025), resulting in EENC principles being overlooked. In such conditions, health professionals tend to work according to procedures and routines without considering evidence-based practice standards. In contrast, independent midwives usually have greater clinical autonomy and continuous direct involvement in the care of mothers and newborns, from pregnancy and delivery to the postpartum period. This allows them to consistently apply EENC principles, while strengthening their knowledge through daily practice experience. Previous research has shown that continuity of care and personal responsibility for clinical outcomes encourage health professionals to continue learning and updating their knowledge (Razavinia et al., 2024).

In conclusion, EENC knowledge and practice are influenced not only by formal education and training, but also by the work environment, organizational culture, and opportunities to apply knowledge in clinical practice. To improve the quality of newborn care, we need to focus on strengthening a work environment that supports continuous learning, clinical supervision, and consistent application of EENC standards at all levels of service. Regular training and workshops on EENC practices are essential to keep midwives and nurses updated on the latest guidelines and best practices (Bakar & Joho, 2023). In addition, encouraging collaboration and teamwork is essential. Encouraging collaboration between healthcare providers and departments can facilitate the implementation of EENC practices and improve overall knowledge and skills (Morseth et al., 2020; Wang et al., 2022).

Although our study shows that most midwives and nurses have adequate knowledge of essential newborn care (EENC) (more than 70% of items were answered correctly for 4 out of 6 questions), significant gaps remain. notable gaps persisted, particularly in practice: only 15.9% correctly identified the need for immediate and thorough drying of newborns a critical step to stimulate the first cry, clear airways, initiate breathing, regulate body temperature, and prevent hypothermia and

infection, as delaying it risks these complications (McCall et al., 2018; UNICEF, 2018; WHO, 2022), with this deficit likely stemming from limited exposure to EENC updates, entrenched traditional practices, inadequate supervision, heavy workloads, and inconsistent pre-service training. These findings diverged from Ethiopian research showing stronger comprehension among providers (Mose et al., 2021) and underscored the urgency of ongoing capacity-building to reinforce evidence-based thermal care.

Only 34.8% of health professionals correctly recognized that skin-to-skin care (SSC) is contraindicated in cases of maternal blood loss exceeding 1000 ml accompanied by blurred vision. This low rate likely stems from disparities in experience, education, and training exposure. Notably, years of work experience did not correlate with better knowledge of early essential newborn care (EENC) contraindications, indicating that routine practice alone is inadequate. Variations in educational backgrounds and inconsistent EENC training further hinder recognition of such exceptions. Although SSC reduces postpartum blood loss within 24 hours, particularly with extended duration (Martínez-Rodríguez et al., 2025; Wiley et al., 2025), these findings underscore the need for regular, standardized training to ensure guideline adherence in emergencies. These results align with prior studies emphasizing clinical assessments for SSC initiation, as severe bleeding and blurred vision demand immediate intervention (Qu et al., 2020). Targeted education on contraindications like significant hemorrhage is essential for best practices. EENC training enhances provider knowledge and skills, though gains fade without reinforcement; regular practice sustains higher proficiency (Horiuchi et al., 2018). Such programs build skills in danger sign recognition, newborn exams, and care from birth through 28 days (Tran et al., 2018; Wang et al., 2022), with complementary quality improvement strategies needed to maintain resuscitation competencies over time (Tosif et al., 2020).

4. Conclusion

The investigation showed that health professionals still have major gaps in their understanding and use of key newborn care procedures. Even though there is a good level of overall knowledge about the foundational ideas, consistently using this knowledge in clinical situations is still difficult, particularly when it involves crucial actions like drying babies quickly and completely after delivery. These deficits mirror patterns found in previous research conducted in different healthcare environments, where the recommended procedures for early newborn care are not always followed. Even in hospitals with enough money, the timing and order of initial newborn treatments are still inconsistent. Provider skills and adherence to established guidelines are also affected by variations in work environments and structural conditions.

Resolving these problems requires more focused, skill-based training strategies that seek to improve not just abilities but also consistent adherence to evidence-based practices.To ensure the development, dissemination, and consistent enforcement of standard medical protocols, as well as ongoing monitoring and regular evaluations of health professionals' performance, it is also important for authorities to take action. Further studies would benefit from the employment of direct observational methods in order to better record actual clinical behaviors and assess how successfully training courses and policy initiatives improve newborn care outcomes.

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