Nurses' practices in the management of newborn asphyxia at birth: A cross-sectional study in selected health facilities in Turkana and West Pokot Counties, Kenya

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ABSTRACT

Birth asphyxia remains a major contributor to neonatal morbidity and mortality worldwide, accounting for a substantial proportion of newborn deaths, particularly in low-resource settings. Effective management of newborn asphyxia at birth depends largely on the competence of healthcare providers in implementing timely and appropriate neonatal resuscitation interventions. This study assessed nurses' practices in the management of newborn asphyxia at birth in selected health facilities in Turkana and West Pokot counties, Kenya. Guided by Benner's Novice-to-Expert Theory, which posits that clinical competence develops through education, experience, and practice, a descriptive cross-sectional study utilizing a quantitative approach was conducted among nurses working in maternity wards, newborn units, and operating theatres in six purposively selected health facilities in Turkana and West Pokot counties. A census sampling approach was employed to recruit all eligible nurses who had worked in their respective departments for at least one year. Data were collected through direct observation using a modified Helping Babies Breathe (HBB) skills observation checklist adapted from the Care of the Newborn Training Guide. Data were analyzed using SPSS version 28. Descriptive statistics summarized the findings, while inferential statistics examined associations between practice levels and selected variables, with statistical significance set at $p \leq 0.05$. A total of 99 nurses were observed. Overall, 85.9% demonstrated good practice in newborn asphyxia management, while 14.1% had poor practice. High levels of adherence were observed in key neonatal resuscitation procedures, including drying and stimulating the newborn (98%), evaluating breathing (99%), recognizing non-breathing newborns (99%), moving infants to a warm surface for ventilation (98%), and clearing airway secretions (99%). However, lower performance was noted in hand hygiene maintenance (74%), equipment preparation (76%), and preparation of the ventilation area (73%). West Pokot County recorded significantly higher good practice levels (92%) than Turkana County (76%) ($p=0.025$). No statistically significant association was found between practice level and facility ownership ($p=0.44$). Nurses in the selected facilities generally demonstrated desirable practices in the management of newborn asphyxia at birth, indicating adequate competency in essential neonatal resuscitation procedures. Nevertheless, important gaps remain in infection prevention practices and resuscitation preparedness, particularly in Turkana County. Strengthening competency-based training, mentorship, supportive supervision, and access to essential newborn resuscitation equipment may further improve the quality of newborn care and contribute to reductions in neonatal morbidity and mortality.

Keywords: Birth Asphyxia, Kenya, Newborn Resuscitation, Turkana County, West Pokot County

I. INTRODUCTION

Asphyxia in newborns is characterized by the inability to initiate or sustain spontaneous breathing at birth. Although multiple obstetric and neonatal factors may contribute to the condition, the fundamental pathophysiological mechanism involves impaired blood flow and reduced oxygen delivery to the brain, leading to hypoxic-ischemic injury (Indrawati et al., 2023). It is estimated that globally 2.5 million newborn deaths occur annually contributing to ~47% of the under-5 child mortality (Moshiro et al., 2019). Of these, about 23% are linked to asphyxia (Oyang et al. 2023). While birth asphyxia is recognized as a global health concern, its impact differs greatly between high-income and low-income countries due to variations in the quality of care and access to essential resources. In high-income settings, the incidence is about 1 per 1,000 live births, whereas in low-income countries it rises to 5–10 per 1,000 live births. The burden is particularly severe in Africa, where asphyxia is estimated to account for up to 27% of all newborn deaths (Abose et al., 2022).

Among neonates who experience perinatal asphyxia, approximately 15–20% succumb during the neonatal period, while up to 25% of survivors develop long-term neurological sequelae, including cognitive, motor, and

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developmental impairments (Stutchfield et al. 2017). Neonatal deaths present a significant obstacle to improving the survival rates of children under the age of five in developing countries. The global need for resuscitation can be categorized as follows: less than 1 million newborns necessitate advanced resuscitation yearly involving chest compressions, drugs, and intensive care; approximately 29% of non-breathing newborns following birth require basic resuscitation involving bag-and-mask ventilation; and about two-thirds of these babies require simple stimulation through drying and rubbing to facilitate breathing (Muli, 2020).

Inadequate competencies among healthcare providers—particularly nurses and midwives—in the prevention and management of birth asphyxia remain a major contributor to neonatal morbidity and mortality in many low-income countries across Sub-Saharan Africa. (Techane et al., 2022). Over 90% of neonatal deaths can be prevented through simple and effective resuscitation techniques, making it crucial for nurses to have the necessary practices to assist newborns in distress. Basic interventions such as stimulation, drying, warming, suction, and bag-mask ventilation in low-resource settings can significantly improve survival rates (Shukla et al., 2022). As highlighted above, nurses' proficiency in assisting newborns with breathing at birth is crucial for reducing neonatal mortality, particularly in low-resource settings such as Northern Kenya. For this reason, Turkana and West Pokot counties were selected to assess nurses' practice levels in managing newborn asphyxia at birth.

1.1 Statement of the Problem

Neonatal mortality remains a major global health challenge, with an estimated 2.5 million newborn deaths occurring annually among approximately 140 million live births, most of which occur during the neonatal period. Despite progress under the Millennium Development Goals and Sustainable Development Goals, neonatal deaths account for nearly half of all under-five mortality worldwide, with 98% occurring in low- and middle-income countries (Rosa-Mangeret et al., 2022). Sub-Saharan Africa bears the highest burden, reporting a neonatal mortality rate of 29 deaths per 1,000 live births and accounting for 36% of under-five deaths in the region (Bitew et al., 2020).

Although Kenya has made notable progress in reducing neonatal mortality, the rate remains high at 21 deaths per 1,000 live births. Neonatal deaths contribute to 66% of infant mortality and 51% of under-five mortality nationally (KNBS & ICF, 2023). One of the persistent challenges is inadequate training of healthcare workers, particularly in resource-limited settings, which undermines their ability to effectively support newborns experiencing birth asphyxia. Furthermore, there is limited evidence on the actual performance of nurses in newborn resuscitation and the individual and facility-level factors influencing these competencies (Kebaya et al., 2018).

Existing studies on newborn resuscitation have largely focused on training interventions, with limited attention to long-term retention of and skills among healthcare providers in specific regions of Kenya. To date, little evidence exists on the practices of nurses in supporting newborn breathing at birth in marginalized and resource-constrained settings such as Turkana and West Pokot Counties. These counties face significant socioeconomic and health system challenges. Absolute poverty affects 82.7% of the population in Turkana and 61.4% in West Pokot, while shortages of healthcare workers, long distances to health facilities, and limited training institutions constrain access to quality maternal and newborn care (KNBS, 2024; World Bank Group, 2023). Given that nurses are the primary providers of newborn care in these settings, assessing their practices in managing birth asphyxia is critical. This study therefore assessed nurses' practices in selected hospitals in Turkana and West Pokot Counties to generate evidence that can inform strategies for improving neonatal outcomes and the quality of newborn care.

1.2 Research Objective

The study's objective was to assess the practice levels of nurses in Turkana and West Pokot counties regarding newborn asphyxia management at birth.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Patricia Benner's Novice to Expert Theory

This study is guided by Patricia Benner's Novice-to-Expert Theory (1984), which explains how nurses acquire and develop clinical competence through education, training, and practical experience. According to Benner, nurses progress through five levels of proficiency: novice, advanced beginner, competent, proficient, and expert (Bang et al., 2016). As nurses gain experience and are exposed to diverse clinical situations, they develop critical thinking skills and become more effective in making clinical decisions and providing quality patient care.

The theory is relevant to the management of newborn asphyxia because effective neonatal resuscitation requires not only theoretical knowledge but also practical skills gained through repeated clinical exposure, mentorship, and supportive supervision. Nurses who receive training in neonatal resuscitation and who regularly participate in the care of newborns are expected to demonstrate higher levels of competence in recognizing and managing birth asphyxia. Conversely, inadequate training, limited experience, and insufficient opportunities for skills reinforcement may

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negatively affect the quality of care provided. In the context of this study, Benner's theory provides a framework for understanding how factors such as training, work experience, mentorship, and availability of resources influence nurses' practices in the management of newborn asphyxia at birth. The theory supports the assumption that continuous professional development and practical exposure enhance nurses' ability to perform neonatal resuscitation effectively, thereby improving newborn outcomes.

2.2 Empirical Review

Effective neonatal resuscitation practices are essential for reducing mortality associated with birth asphyxia. Evidence indicates that basic interventions such as drying, warming, stimulation, airway clearance when indicated, and bag-mask ventilation can prevent most neonatal deaths, particularly in low-resource settings (Shikuku et al., 2017; Aziz et al., 2020). Despite the availability of evidence-based guidelines, adherence to recommended resuscitation practices remains inconsistent across health facilities.

Studies have reported gaps in the implementation of neonatal resuscitation protocols among healthcare providers. Berger et al. (2018) found that improper newborn positioning, unnecessary suctioning, and poor thermal management were common deviations from recommended practice and were associated with inadequate training and limited clinical mentorship. Similarly, Bitew et al., (2020) observed that 76.4% of healthcare providers failed to seek assistance when a newborn did not initiate breathing within 30 seconds of birth, highlighting deficiencies in emergency response practices.

Training interventions have shown potential in improving neonatal resuscitation practices. Usman et al. (2022) reported that the Helping Babies Breathe (HBB) program improved providers' resuscitation performance and newborn outcomes. However, concerns regarding retention and consistent application of acquired skills in routine clinical settings persist. In Rwanda, Prullage, et al. (2022) found that nurses and midwives experienced difficulties performing infrequently used procedures, including bag-valve-mask ventilation, due to limited opportunities for practical application.

Preparedness for neonatal resuscitation has also been identified as an important determinant of effective practice. Mayer et al. (2022) reported that routine equipment checks, availability of resuscitation supplies, and adherence to preparedness protocols contributed to improved resuscitation performance. Nevertheless, evidence from low-resource settings continues to demonstrate gaps in the implementation of recommended newborn resuscitation practices. While previous studies have documented challenges related to adherence to guidelines, skills retention, and emergency preparedness, limited evidence exists regarding nurses' practices in the management of birth asphyxia in Turkana and West Pokot Counties, Kenya. This study therefore seeks to address this gap.

III METHODOLOGY

3.1 Research Design

The study utilized a descriptive cross-sectional design with a quantitative approach. This design enabled the collection of data on nurses' practices in newborn asphyxia management at a single point in time, thereby providing a clear description of the prevailing practice levels.

3.2 Study setting

The study was conducted in six health facilities: Lodwar County Referral Hospital, Lopiding Sub-county Hospital, and Kakuma Mission Hospital in Turkana County, and Kapenguria County Referral Hospital, Chepareria Sub-county Hospital, and Ortum Mission Hospital in West Pokot County. These facilities were purposively selected because they provide newborn care services and report a high burden of asphyxia-related neonatal deaths. Turkana and West Pokot counties were chosen due to their comparable socio-demographic, economic, and geographic characteristics. Both counties are predominantly inhabited by pastoralist communities and face similar challenges, including insecurity, inter-community conflicts, and cattle rustling. The selection of these counties enabled a comparison of nurses' practices in the management of newborn asphyxia at birth.

3.3 Subjects

The study targeted nurses employed in the selected health facilities in Turkana and West Pokot counties who were directly involved in the immediate care of newborns following delivery. These nurses worked in maternity wards, newborn units, and operating theatres, where newborns with asphyxia are routinely assessed and managed at birth. *Inclusion Criteria:* The study included nurses working in the maternity wards, newborn units, and operating theatres of the six selected health facilities during the study period. To ensure that participants had adequate exposure to newborn care and the management of birth asphyxia, only nurses who had served in their respective departments for at least one year were eligible for inclusion. Additionally, participation was voluntary, and only nurses who provided informed consent were enrolled in the study.

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Exclusion Criteria: The study excluded nurse managers and administrators because they were not directly involved in the routine clinical management of newborns and therefore could not provide observations relevant to newborn asphyxia management practices. Additionally, nurses who were sick, incapacitated, on leave, or otherwise unable to participate during the data collection period were excluded from the study. *Sample size determination:* Given the relatively small and accessible target population, a census approach was adopted, whereby all eligible nurses from the selected health facilities were recruited into the study. This approach ensured comprehensive coverage of the study population, reduced sampling bias, and enhanced the validity and representativeness of the findings on nurses' practices in newborn asphyxia management at birth.

Sites: Lodwar County Referral Hospital (LCRH), Kakuma Mission Hospital (KMH), and Lopiding Sub-County Hospital (LSCH) in Turkana County, together with Kapenguria County Referral Hospital (KCRH), Chepareria Sub-County Hospital (CSCH), and Ortum Mission Hospital (OMH) in West Pokot County, were purposively selected as study sites. The facilities were chosen based on their high neonatal mortality burden, substantial caseloads of birth asphyxia and asphyxia-related deaths, and the availability of newborn care services. This approach ensured that the selected facilities provided a relevant context for assessing nurses' practices in the management of newborn asphyxia at birth. *Subjects:* All nurses who had worked for at least one year in the labour and delivery rooms, reproductive health theatres, antenatal wards, postnatal wards, Newborn Care Units (NBUs), and Kangaroo Mother Care (KMC) units in the selected facilities were included in the study using a census sampling approach.

3.4 Tools and Data Collection

Nurses' practices in the management of newborn asphyxia at birth were assessed using a skills observation checklist designed to evaluate key practices in the provision of essential interventions to assist newborns in establishing effective breathing. The checklist was adapted from the *Care of the Newborn Training Guide* developed by Save the Children Federation, and modified to align with the Kenya Basic Pediatric Protocol and the Essential Newborn Care guidelines. The tool focused on key newborn resuscitation and immediate newborn care procedures and was used to objectively assess nurses' adherence to recommended practices during the management of newborn asphyxia.

3.5 Procedures

Ethical Considerations: Approval to conduct the study was obtained from the School of Nursing, Midwifery and Paramedical Sciences, Masinde Muliro University of Science and Technology (MMUST) (Ref: MMU/COR:509099). Ethical clearance was granted by the MMUST Institutional Scientific Ethics Review Committee (MMUST-ISERC) (Ref: MMU/COR:403012 Vol. 6 [01]). A research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) (Ref: 459226). Additional permission was sought from the County Governments of Turkana and West Pokot and the administrations of the participating health facilities. Written informed consent was obtained from all participants before data collection. Participation was voluntary, and respondents were informed of their right to withdraw from the study at any stage without penalty. Confidentiality and anonymity were maintained by excluding personal identifiers from study records and restricting data access to the researcher.

Validity of the Instrument: Content validity of the skills observation checklist was established through expert review. The instrument was evaluated by two senior nursing lecturers and a statistician for relevance, clarity, comprehensiveness, and alignment with the study objectives. Recommendations from the reviewers were incorporated through revision, removal, and reorganization of items, resulting in the final version of the checklist. *Reliability of the Instrument:* Reliability was assessed through a pilot study conducted at Kanamkemer Sub-County Hospital, a facility with characteristics similar to the study sites but excluded from the main study. The instrument was administered to 19 nurses who met the inclusion criteria. Internal consistency was evaluated using Cronbach's alpha, yielding a coefficient of 0.80, which indicated good reliability.

Data Collection Procedure: Seven trained nurse research assistants supported data collection, with three recruited from West Pokot County and four from Turkana County. Prior to data collection, they underwent training on study objective, ethical considerations, data collection procedures, and use of the digital tools. Data were collected using KoboToolBox, which facilitated electronic data capture, real-time monitoring, and secure data management. Nurses' practices in newborn asphyxia management were assessed through direct observation using the Helping Babies Breathe (HBB) skills observation checklist. Research assistants observed participants during routine clinical practice and recorded performance against predefined criteria. Data quality was ensured through regular supervision and monitoring by the principal investigator. Data collection was conducted over six months, from February to July 2024.

3.6 Data Analysis

Data obtained through KoboToolBox were exported, cleaned, coded, and analyzed using the Statistical Package for Social Sciences (SPSS) version 28. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize and present the quantitative data. The findings were presented using tables, charts,

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and narrative summaries where appropriate. Inferential statistical analyses were conducted to examine relationships between study variables. Throughout the analysis, a p-value of less than 0.05 ($p \leq 0.05$) was considered statistically significant.

IV. FINDINGS & DISCUSSION

4.1 Findings

The findings are derived from observations of 99 nurses as they conducted deliveries at six selected facilities in West Pokot and Turkana counties. All observed nurses had worked at their respective facilities for at least 12 months before the study.

4.1.1 Emergency preparedness

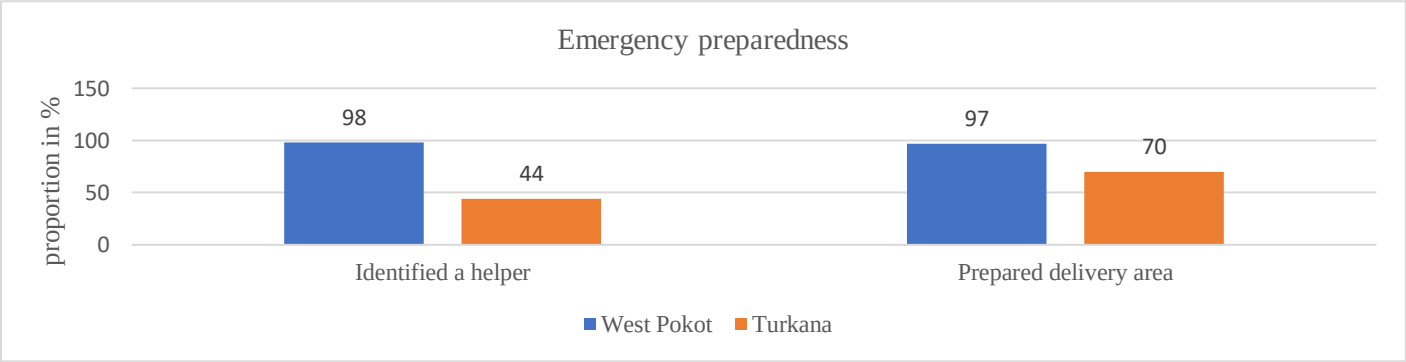


Figure 1
Emergency Preparedness

In West Pokot, 98% (61) of nurses identified a helper and developed an emergency plan, whereas only 16 (44%) did so in Turkana. Likewise, 60 (97%) nurses in West Pokot prepared the delivery area, compared to 26 (70%) in Turkana. This is well illustrated in **Figure 1** above. Overall, 79% and 87% participants showed good practices in the identification of a helper and development of an emergency plan, respectively.

4.1.2 Hygiene and Equipment Preparation

Compliance with hand hygiene was 95% in West Pokot but only 38% in Turkana. Similarly, equipment preparation was significantly higher in West Pokot (92%) compared to Turkana (47%), as shown in **Figure 2** below.

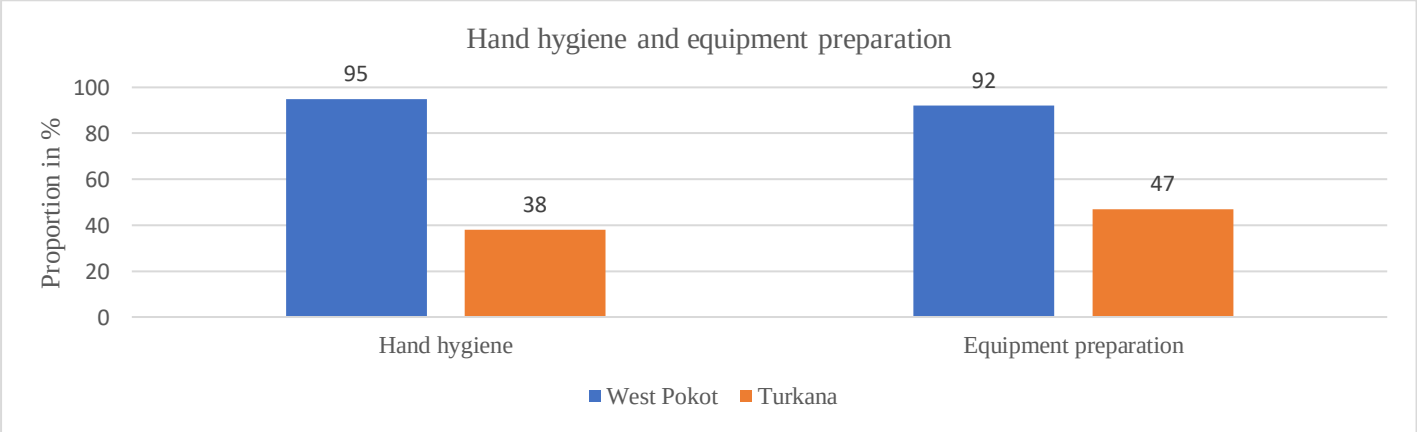


Figure 2
Hand Hygiene and equipment preparation.

4.1.3 Basic HBB Steps

Drying the baby using a warm towel while stimulating breathing was the most consistently applied practice, with 97% adherence in West Pokot and 100% in Turkana. However, 94% of nurses in West Pokot were able to remove the wet linen after drying the newborn at birth and covering with a dry one while 73% did the same in Turkana. However,

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preparation for ventilation was observed in 94% of cases in West Pokot but only in 38% in Turkana. Evaluating whether the baby is crying was done correctly in 100% of observations in West Pokot and 86% in Turkana (**Figure 3).**

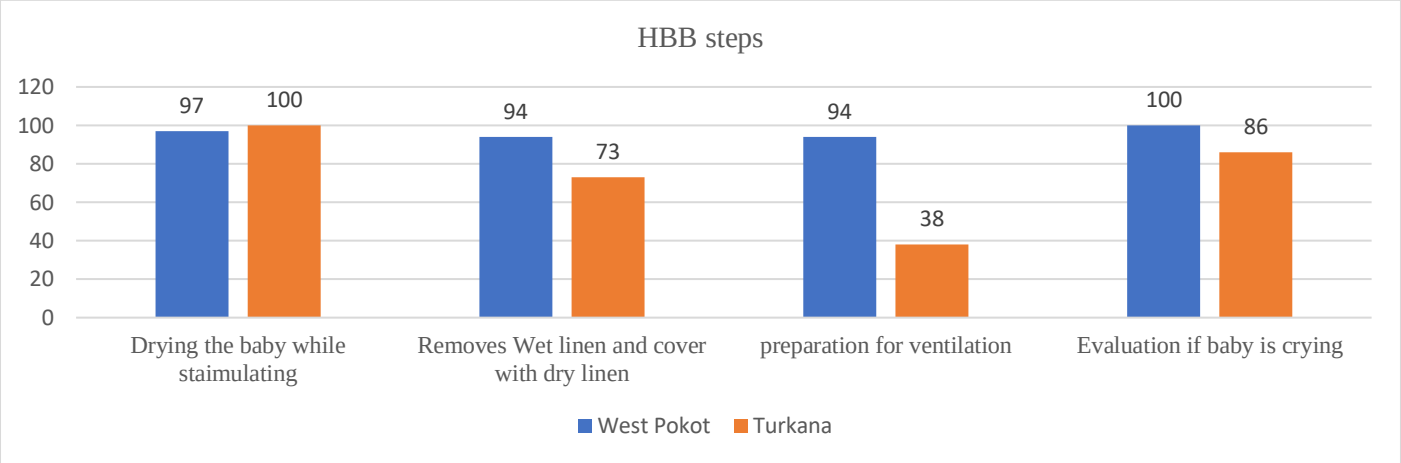


Figure 3
HBB steps

4.1.4 Airway management and ventilation

As demonstrated in **Table 1** below, in West Pokot, 95% of nurses correctly positioned the newborns in a neutral position, while 78% of providers in Turkana followed this practice. In terms of airway management, both counties performed well, with 96% of nurses in West Pokot and 86% in Turkana clearing the airway using a penguin sucker. However, starting ventilation within the "Golden Minute" was significantly higher in West Pokot (95%) compared to Turkana (78%). When responding to non-breathing newborns, 98% of participants in West Pokot and 90% in Turkana correctly identified a non-breathing newborn. Yet, Turkana showed better observance in calling for help and reapplying the mask, with 98% and 98% adherence, respectively, compared to 85% and 81% in West Pokot.

Table 1
Airway Management and Ventilation

Variables	**West Pokot Freq. (%)**	**Turkana Freq. (%)**	**Total Freq. (%)**
Proportion of correct practices			
Positions the baby in a neutral position	54 (95%)	28 (78%)	82 (88%)
Clears airway by use of a penguin sucker	57 (96%)	31 (86%)	88 (93%)
Stimulates breathing by rubbing the back	57 (97%)	30 (84%)	88 (92%)
Evaluates response to initial steps	56 (95%)	27 (75%)	83 (87%)
Recognizes baby is not breathing	58 (97%)	31 (87%)	89 (93%)
Clamps and cuts the cord.	54 (89%)	36 (100%)	90 (93%)
Moves baby to a warm, firm surface for ventilation	58 (97%)	36 (99%)	94 (98%)
Selects the appropriate mask size	56 (93%)	34 (97%)	90 (95%)
Starts ventilation within the Golden Minute	57 (95%)	28 (78%)	85 (89%)
Gives 5 initial rescue breaths using bag and mask	55 (92%)	31 (86%)	86 (90%)
Confirms rising and falling of the chest after every ventilation	57 (95%)	34 (94%)	92 (95%)
Evaluates breathing	60 (100%)	35 (97%)	95 (99%)
Recognizes baby is not breathing	58 (98%)	36 (90%)	95 (99%)
Calls for help	51 (85%)	35 (98%)	86 (90%)
Re-applies the mask	49 (81%)	35 (98%)	84 (87%)
Repositions the head	50 (86%)	31 (86%)	81 (88%)
Clears secretions,	58 (100%)	35 (98%)	93 (99%)
Squeezes bag reasonably harder	49 (83%)	33 (94%)	82 (87%)
Evaluates breathing and heart rate	59 (98%)	32 (89%)	91 (95%)
Continues with CPR	46 (77%)	34 (94%)	80 (83%)

4.1.5 Practice levels by facility ownership

The analysis of the practices geared towards helping newborns breathe at birth based on facility ownership reveals generally high adherence to correct steps across both government and mission facilities, with some variations. As illustrated in Table 2, the government facilities demonstrated slightly higher compliance in evaluating breathing

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(99%), recognizing when a baby is not breathing (99%), and moving the baby to a warm surface for ventilation (99%), while mission facilities had higher adherence in confirming chest rise after ventilation (100%) and calling for help (100%). Overall, 30% of participants achieved a perfect practice score, with 33% from mission facilities and 29% from government facilities. However, mission facilities had a higher proportion of poor performers (19%) compared to government facilities (13%).

Table 2

Practice levels by facility affiliation

	Government-owned	**Mission-owned**	**Total**
Proportion of correct practices	**Freq. (%)**	**Freq. (%)**	**Freq. (%)**
Identifies helper and makes an emergency plan	56 (79%)	21 (78%)	77 (79%)
Prepares area for delivery	62 (86%)	24 (89%)	86 (87%)
Washes hands and maintains clean technique throughout	54 (75%)	19 (70%)	73 (74%)
Prepares and checks equipment	56 (79%)	18 (67%)	74 (76%)
Prepares an area for ventilation	56 (78%)	16 (59%)	72 (73%)
Dries the baby using dry warm towel while stimulating breathing	70 (99%)	25 (96%)	95 (98%)
Removes wet linen and covers the baby with a clean, warm, and dry linen	60 (83%)	23 (92%)	83 (86%)
Evaluate baby is crying or not	70 (99%)	21 (84%)	91 (95%)
Positions the baby in a neutral position	63 (93%)	19 (76%)	82 (88%)
Clears airway by use of a penguin sucker	66 (94%)	22 (88%)	88 (93%)
Stimulates breathing by rubbing the back	65 (92%)	23 (92%)	88 (92%)
Evaluates response to initial steps	62 (87%)	21 (88%)	83 (87%)
Recognizes baby is not breathing	68 (96%)	21 (84%)	89 (93%)
Clamps and cuts the cord.			
Moves baby to a warm, firm surface for ventilation	70 (99%)	24 (96%)	94 (98%)
Selects the appropriate mask size	66 (94%)	24 (96%)	90 (95%)
Starts ventilation within the Golden Minute	63 (89%)	22 (88%)	85 (89%)
Gives 5 initial rescue breaths using bag and mask	63 (89%)	23 (92%)	86 (90%)
Confirms rising and falling of the chest after every ventilation	66 (93%)	25 (100%)	91 (95%)
Evaluates breathing	70 (99%)	25 (100%)	95 (99%)
Recognizes baby is not breathing	69 (99%)	25 (100%)	94 (99%)
Calls for help	61 (86%)	25 (100%)	86 (90%)
Re-applies the mask	60 (85%)	24 (96%)	84 (88%)
Repositions the head	59 (86%)	22 (96%)	81 (88%)
Clears secretions,	68 (99%)	25 (100%)	93 (99%)
Squeezes bag reasonably harder	57 (83%)	25 (100%)	82 (87%)
Evaluates breathing and heart rate	67 (94%)	24 (96%)	91 (95%)
Continues with CPR	56 (79%)	24 (96%)	80 (83%)
Practice			
Bad	9 (13%)	5 (19%)	14 (14%)
Good	63 (88%)	22 (81%)	85 (86%)

4.2 Bivariate Analysis of Practice Level

4.2.1 Bivariate Analysis Across Facilities

As illustrated in **Table 3**, the distribution of good and bad practices in newborn asphyxia management at birth varied across the six study sites, though the differences were not statistically significant (95% CI, p=0.13). Notably, Chepareria Sub-County Hospital demonstrated the highest adherence to the stipulated steps, with all observed providers (100%) categorized under good practice. Kapenguria County Referral Hospital also had a high proportion of good practice, with 91% of providers meeting the threshold. In contrast, Lopiding Sub-County Hospital had the highest proportion of providers categorized under bad practice, with 33% scoring below the 75% threshold. Similarly, Lodwar County Referral Hospital and Ortum Mission Hospital recorded 25% and 19% of nurses respectively, under bad practice.

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Table 3
Bivariate analysis by facility

	Bad practice	Good practice	p-value
	N=14	N=85	
Name of the facility			0.13
Chepareria Sub County Hospital	0 (0%)	24 (100%)	
Kapenguria County Referral Hospital	2 (9%)	20 (91%)	
Kakuma mission hospital	2 (18%)	9 (82%)	
Lodwar County referral hospital	5 (25%)	15 (75%)	
Lopiding sub county hospital	2 (33%)	4 (67%)	
Ortum Mission Hospital	3 (19%)	13 (81%)	

4.2.2 Bivariate Analysis of Practice Levels by County and Affiliation

The analysis of asphyxia management practices at birth by facility affiliation shows significant variation across the two counties. West Pokot had a higher proportion of good practices (92%) compared to Turkana (76%), with a statistically significant difference (95% CI, p=0.025) as shown in **Table 4** below. When comparing facility ownership, government facilities had 88% good practices, while mission facilities had 81%, but this difference was not statistically significant (95% CI, p=0.44).

Table 4
Bivariate analysis of practices by facility location and affiliation

Variable	Bad practice Freq. (%)	Good practice Freq. (%)	P value
County			**0.025**
West Pokot	5 (8%)	57 (92%)	
Turkana	9 (24%)	28 (76%)	
Facility ownership			0.44
Government	9 (13%)	63 (88%)	
Mission	5 (19%)	22 (81%)	

4.2.3 Overall Practice Levels Regarding Helping Newborns Breathe at birth

The practice score was determined by summing the responses to 24 steps assessing adherence to best practices, with each response recorded as either "Not done = 0" or "Done/Not applicable = 1." The total score was then converted into a percentage. Following the OSCE classification as recommended by Napier et al. (2009), a score of 75% or higher was categorized as good practice, while scores below this threshold were classified as bad practice. Based on this criterion, 85.9% of the observed participants demonstrated good practice as shown in **Figure 4** below. The practice scores ranged from 21.4 to 100, with a mean of 86.9 ± 16 and a median of 92.9 (IQR: 78.6,100).

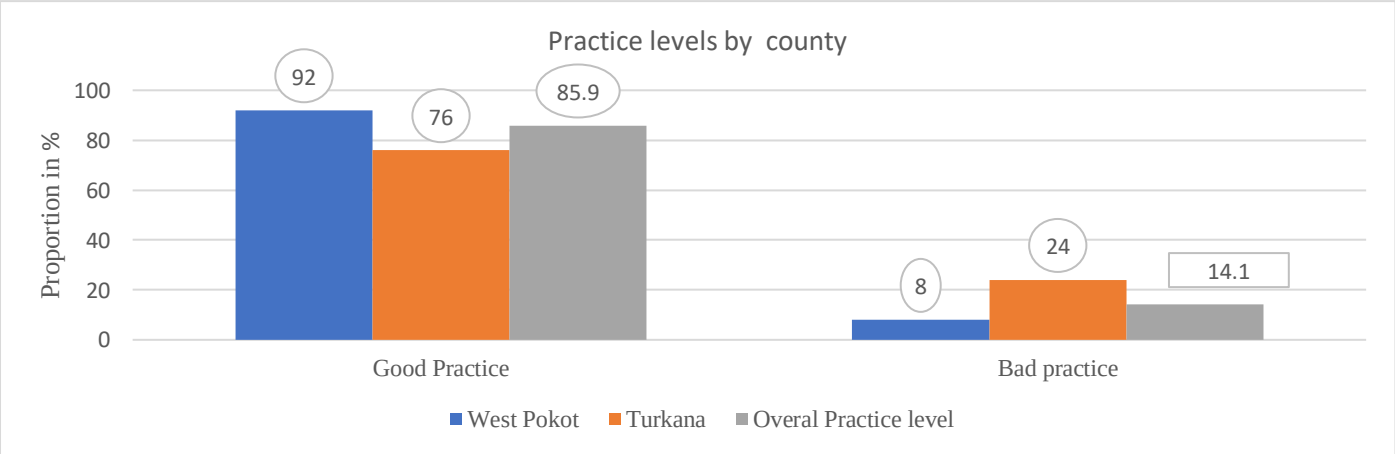


Figure 4
Practice levels by county

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4.3 Discussion

The American Academy of Pediatrics (AAP), in collaboration with organizations such as Laerdal Medical and the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Global Network for Women's and Children's Health Research, developed the Helping Babies Breathe (HBB) program to improve neonatal outcomes in low-resource settings. The HBB program emphasizes simple, evidence-based interventions during the first minute after birth, commonly referred to as the "Golden Minute." These interventions include immediate drying, provision of warmth, stimulation of breathing, and initiation of bag-mask ventilation when indicated (Bang et al., 2016). According to Bettinger et al. (2021), effective newborn resuscitation practices depend on strict adherence to standardized algorithms, which play a critical role in reducing neonatal mortality resulting from birth asphyxia.

Findings showed that 79% of participants identified a helper before delivery, while 87% developed an emergency plan in anticipation of potential complications. These findings are consistent with those reported by Moshiro et al. (2018), who observed that inadequate preparation contributes to delays in initiating ventilation because valuable time is lost gathering personnel and equipment. However, the current findings differ considerably from those of Usman et al. (2022), who reported a neonatal emergency preparedness rate of only 18% among healthcare providers in Kano, Nigeria. The higher preparedness levels observed in the present study suggest that nurses in Turkana and West Pokot prioritize advance planning, likely reflecting institutional efforts to strengthen birth preparedness and ensure prompt initiation of life-saving interventions.

The study further evaluated adherence to key HBB steps aimed at preventing and managing newborn asphyxia. These practices included drying the newborn while providing tactile stimulation, removing wet linen after drying, covering the newborn with a dry warm cloth, assessing whether the infant was crying, and preparing for ventilation when necessary. Overall adherence to these essential steps exceeded 85%, demonstrating satisfactory compliance with recommended resuscitation protocols. Notably, all participants in Turkana County correctly dried and stimulated newborns, compared to 97% in West Pokot County. Similarly, 94% of participants in West Pokot appropriately removed wet linen and covered the newborn with a dry warm cloth, compared to 73% in Turkana County. Despite the generally favorable performance, approximately 27% of nurses in Turkana did not remove the wet towel after drying the newborn, thereby increasing the risk of hypothermia. This finding is consistent with studies conducted in Kakamega County, Kenya, which identified thermal care as a significant gap in early newborn management (Shikuku et al., 2017). The observed variation between the two counties may be attributable to resource constraints in Turkana, particularly shortages of clean, dry linen. Additionally, the region's consistently high ambient temperatures may create a false perception that replacing wet towels is unnecessary, despite recommendations emphasizing the importance of maintaining newborn warmth irrespective of environmental conditions.

Regarding airway management, 95% of nurses in West Pokot and 78% in Turkana correctly positioned newborns in a neutral position to maintain airway patency. Similarly, 96% and 86% of participants in West Pokot and Turkana, respectively, correctly cleared the airway using a penguin suction device. Comparable findings were reported by Shikuku et al. (2017), where only a small proportion of providers demonstrated improper head positioning during newborn resuscitation. Although performance was generally good, the lower proportions observed in Turkana may reflect disparities in access to equipment, mentorship, and opportunities for regular skills reinforcement. Limited availability of essential resuscitation resources and insufficient hands-on practice may negatively affect healthcare workers' ability to consistently perform effective airway management. Overall, 85.9% of participants demonstrated satisfactory practice levels in supporting newborns with asphyxia, while 14.1% exhibited unsatisfactory practices. County-specific analysis revealed that 24% of respondents from Turkana County had suboptimal practice levels compared to 8% in West Pokot County. Conversely, satisfactory practice levels were observed among 76% of respondents in Turkana and 92% in West Pokot. These findings indicate generally strong competency in newborn resuscitation while highlighting notable geographical disparities that warrant targeted interventions.

Analysis by facility ownership further revealed variations in performance. Among the 27 respondents from faith-based health facilities, 19% demonstrated unsatisfactory skills, compared to only 13% of the 72 respondents from county government-owned facilities. Although the differences were modest, they may reflect variability in access to training opportunities, equipment availability, supervision, and clinical exposure across facility types. Among the 24 HBB steps assessed, the poorest-performing areas included hand hygiene and maintenance of clean technique (74%), preparation and checking of resuscitation equipment (76%), and preparation of the ventilation area (73%). These gaps suggest that, although participants were generally competent in the direct clinical management of newborns, deficiencies remain in infection prevention practices and resuscitation readiness. Similar observations have been reported in neonatal resuscitation studies, where procedural and preparation-related components tend to be less consistently practiced than hands-on resuscitation skills.

The findings of this study compare favorably with those reported in several other settings. For example, Kamau et al. (2022) found that only 5% of healthcare workers in Uasin Gishu County possessed adequate neonatal resuscitation skills. Likewise, Ahmed (2022) reported that only 14.3% of nurses and midwives in Mogadishu demonstrated good

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resuscitation skills, while the majority were categorized as having fair, poor, or very poor competency levels. Similarly, Usman et al. (2022) reported that only 5% of healthcare providers in Kano, Nigeria, exhibited good neonatal resuscitation practices. The substantially higher competency levels observed in the current study may be attributed to prior exposure to HBB training, frequent involvement in delivery and newborn care services, and repeated opportunities to perform neonatal resuscitation procedures during routine clinical practice. Continuous hands-on experience likely contributed to skill retention and improved adherence to recommended newborn resuscitation protocols.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study concludes that nurses working in selected health facilities in Turkana and West Pokot counties generally demonstrate desirable practices in the management of newborn asphyxia at birth. The practice assessment revealed a high level of proficiency in the implementation of key newborn resuscitation interventions, indicating that most nurses possess the practical competencies required to support newborns in establishing effective breathing immediately after birth.

A statistically significant association was observed between nurses' practice levels and the county of employment (p=0.025), with respondents from West Pokot County demonstrating better practical competence than their counterparts in Turkana County. This finding suggests the existence of contextual differences that may influence the quality of newborn resuscitation practices across the two counties. Possible contributing factors include variations in access to essential resuscitation equipment and supplies, opportunities for skills reinforcement, mentorship, supportive supervision, and the frequency of exposure to neonatal resuscitation cases.

5.2 Conclusion

The study recommends that County Departments of Health, facility administrators, and policymakers strengthen nurses' competencies in newborn asphyxia management through comprehensive, competency-based training programs. These programs should incorporate structured on-the-job training, simulation-based learning, and mentorship from experienced practitioners to reinforce practical skills and adherence to evidence-based practices such as the Helping Babies Breathe protocol. In addition, health facilities should ensure the availability of essential newborn resuscitation equipment and supplies to sustain high-quality newborn care. The study further recommends that future research should investigate the factors influencing nurses' practical competence in the management of newborn asphyxia, including the roles of training, mentorship, workload, resource availability, and institutional support.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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