

Neonatal nursing research in low-and middle-income countries: A scoping review

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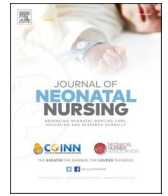
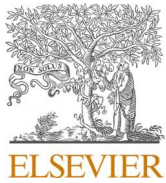
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Neonatal nursing research in low-and middle-income countries: A scoping review

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ABSTRACT

Neonatal outcomes contribute over 50% to under-five child mortality globally. Given that nurses in low- and lower-middle-income countries are often primary care providers, they are ideally positioned to impact outcomes. Our scoping review aims to explore how neonatal nurses in LMICs are represented in global health research.

Methods: This review was constructed using Arksey and O'Malley's five-step framework. Five databases were utilized in the search, and grey literature was included.

Results: A total of 651 articles were yielded, with 31 included in our review. We constructed themes based on the philosophical conceptualization of nursing knowledge as knowledge about nursing, knowledge for nursing, and knowledge of nursing.

Conclusion: Representation of neonatal nursing in LMIC in global health research is extremely limited. Literature that exists primarily describes challenges in neonatal nursing or provides practice-specific knowledge for nurses to utilize. Further, research exploring knowledge of nurses that does exist has been entirely driven by Western, non-nursing perspectives.

1. Introduction

Low-and Middle-Income Countries (LMIC) are disproportionately affected by healthcare challenges, with the highest burden of disease and most preventable deaths occurring in countries with limited financial resources (Adhena et al., 2018; Kasprovicz et al., 2020). Global healthcare inequities, particularly in LMIC, are complex and dynamic in nature and require strategies that rely on knowledge generated through research. However, it has been reported that less than ten percent of global research funding is allocated to health challenges in LMIC and less than two percent is awarded to researchers living in such countries (Beran et al., 2017; Franzen et al., 2017; Reidpath and Allotey, 2019; Schneider and Maleka, 2018; Trostle, 1992). Nurses in LMIC are ideally positioned to impact patient outcomes, given that they occupy nearly 50% of all positions in the global health sector and are often primary care providers (Coster et al., 2018; World Health Organization, 2020). Despite this reality, the involvement of LMIC nurses in global health research has been minimal, with the majority of research stemming from high-income countries and dominated by the biomedical model (Edwards et al., 2009).

Neonatal outcomes have been a significant focus of global health

research, given their substantial contribution of over 50% to under-five child mortality (World Health Organization, 2022). At-risk and sick neonates require specialized care, increasingly involving advanced technology, pharmaceuticals, and skilled healthcare providers (Adhena et al., 2018; Manley et al., 2015). In resource-constrained settings, these essential aspects of care can be difficult to reliably secure and provide. Additionally, given the significant shortage of physicians in many LMICs, these responsibilities are predominantly carried out by neonatal nurses in a process that has been coined "task-shifting" (Nzinga et al., 2019). Responsibilities can involve admission, diagnosis, initiation of treatment, ongoing management of care, and transition to the community. What remains uncertain is the voice of neonatal nurses in LMIC in global health research. Thus, this scoping review aims to explore how neonatal nurses in LMIC are represented in global health research.

2. Methods

This review was conducted using Arksey and O'Malley's five-step framework (2005), as a foundational approach to scoping reviews. The process for each of the steps is outlined below.

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2.1. Stage one: Identifying the research question

Prior to starting the review, we conducted a literature search to identify existing reviews. No other reviews on this topic were noted to have been previously published in the literature. The research question guiding our scoping review was: How are neonatal nurses currently represented in global health research in LMIC? The aim was to capture empirical, non-empirical, and grey literature as various forms of research that addressed neonatal nursing in LMIC.

2.2. Stage two: Identifying relevant studies

2.2.1. Inclusion criteria

We adopted a modified PICoT question to guide the search. We defined the population as neonatal nurses, comprising those who provide care to at-risk or sick newborns less than 28 days of life. The phenomenon of interest was the representation of neonatal nurses in global health research. Representation has a variety of definitions; however, for our review, we were interested in the phenomenon of neonatal nurses producing research, being included in the research process, or participating in the research (i.e., as research subjects). Further, we conceptualized global health research as the published literature itself, given it is a primary output of research activities. We also included grey literature to capture additional research that may not have been included in academic literature (Canadian Drug and Health Technology Agency, 2022). We made this decision given that academic literature from high-income countries may not encompass all research activities of neonatal nurses in LMIC and the challenging and costly nature of publishing and indexing may be barriers. We established the context of this review as LMIC using the World Bank classification system (2022). Countries categorized as low-income or lower-middle-income economies were included in the review (Table 1). Finally, we described the outcome as the synthesis of neonatal nursing representation in global health research as the product of this review. We also applied limiters for articles in English and those produced between the years 2000 and 2022. We chose this time period to elicit current, relevant research and acknowledge the role of the Millennium Development Goals (established in 2000), which emphasized maternal

and child health outcomes in LMIC and resulted in increasing interest in neonatal health research.

2.2.2. Exclusion criteria

We excluded articles from the review if neonatal nursing was not a central component of the article as indicated by a nurse not being a primary author, secondary author, or study participant. We also removed articles that focused on interventions with a variety of healthcare professionals in which neonatal nurses could not be isolated. Additionally, we did not include articles that focused on perinatal nurses who may provide initial care to newborns but typically focus on the care of the mother during and after birth.

2.2.3. Search strategy

We consulted a reference librarian to assist with database selection, collaborate on developing the search strategy, and provide guidance on searching grey literature (2005). We searched five databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Excerpta Medica database (EMBASE), Web of Science, CAB Direct, and Global Index Medicus. We choose CINAHL for its nursing-specific focus, EMBASE given its breadth of literature and publishing of conference proceedings, Web of Science for a wider lens, and CAB Direct and Global Index Medicus given their focus on global health. Keywords were defined based on commonly encountered variations of both neonatal nursing and LMIC, through familiarity of neonatal literature, thesaurus searches, and reviewing results of trial searches. We adjusted Medical Subject Headings and Medical Headings for CINAHL and EMBASE databases, respectively, as outlined in the vocabulary trees identified through multiple pre-search trials. To capture all LMIC, we added each continent/country to the search to ensure literature was captured if the common terms associated with LMIC were not identified within the research articles. The search strategies for CINAHL, EMBASE, and Web of Science are presented in Tables 2–4.

We conducted the grey literature search following the Canadian Drug and Health Technology Agency (2022) tool for searching health-related grey literature. We sought literature through ProQuest Dissertation and Thesis Index, an advanced Google search, and international organizations. Specifically, the International Council of Nurses, Sigma Theta Tau, and the Council of International Neonatal Nurses were chosen for their global nursing focus. We followed any additional sources that were encountered during the search to uncover additional materials that could be included in the review. Last, we hand-searched articles by reviewing references of eligible articles to identify additional studies.

2.3. Stage three: study selection

The search results were imported into Covidence (Veritas Health Veritas Health Innovation, 2019). We used this program to manage all exportations from the search process, including the removal of duplicates, title, and abstract screening, and full-text screening (Moher et al., 2009). Two authors independently screened titles and abstracts to assess

Table 1 World bank income classifications.

| Low-Income Economies | Lower-Middle Income Economies |
|--------------------------|-------------------------------|
| Afghanistan | Angola |
| Burkina Faso | Algeria |
| Burundi | Bangladesh |
| Central African Republic | Belize |
| Chad | Benin |
| Congo, Dem. Rep | Bolivia |
| Eritrea | Cabo Verde |
| Ethiopia | Cambodia |
| Gambia, The | Cameroon |
| Guinea | Comoros |
| Guinea-Bissau | Congo, Rep. |
| Korea, Dem. People’s Rep | Cote d’Ivoire |
| Liberia | Djibouti |
| Madagascar | Egypt, Arab Rep. |
| Malawi | El Salvador |
| Mali | Eswatini |
| Mozambique | Ghana |
| Niger | Haiti |
| Rwanda | Honduras |
| Sierra Leone | India |
| Somalia | Indonesia |
| South Sudan | Iran, Islamic Rep |
| Sudan | Kenya |
| Syrian Arab Republic | Kiribati |
| Togo | Kyrgyz Republic |
| Uganda | Lao PDR |
| Yemen, Rep. | Lesotho |
| | Mauritania |
| | Micronesia, Fed. Sts. |
| | Mongolia |
| | Morocco |
| | Myanmar |
| | Nepal |
| | Nicaragua |
| | Nigeria |
| | Pakistan |
| | Papua New Guinea |
| | Philippines |
| | Samoa |
| | Sao Tome and Principe |
| | Senegal |
| | Solomon Islands |
| | Sri Lanka |
| | Tanzania |
| | Tajikistan |
| | Timor-Leste |
| | Tunisia |
| | Ukraine |
| | Uzbekistan |
| | Vanuatu |
| | Vietnam |
| | West Bank and Gaza |
| | Zamia |
| | Zimbabwe |

Table 2 CINAHL comprehensive literature search strategy.

| Steps | Search Terms | Results |
|-------|---|---------|
| 1 | (MH “Neonatal Nursing+”) | 4665 |
| 2 | (MH “Neonatal Intensive Care Nursing”) | 3157 |
| 3 | “neonatal nursing research” | 7 |
| 4 | 1 or 2 or 3 | 7322 |
| 5 | (MH “Africa+”) or (MH “Asia+”) or (MH “South America+”) | 88820 |
| 6 | “develop* countr*” or “third world countr*” or “low and middle income countr*” or “LMIC” or “low income countr*” or “middle income countr*” | 38169 |
| 7 | 4 OR 5 | 120677 |
| 8 | 3 AND 6 | 106 |

Table 3
Embase comprehensive literature search strategy.

| Steps | Search Terms | Results |
|-------|---|---------|
| 1. | Exp newborn nursing/ | 3987 |
| 2. | Exp newborn intensive care nursing/ | 88 |
| 3. | 1 or 2 | 3987 |
| 4. | Exp developing country | 98169 |
| 5. | ((develop* or third world) adj3 countr*).ti,ab,kw. | 128942 |
| 6. | ((low and middle income countr*) or LMIC or low income countr*).ti,ab,kw. | 37997 |
| 7. | 4 or 5 or 6 | 217944 |
| 8. | Exp Africa/ | 373082 |
| 9. | Afric*.ti,ab,kw. | 333372 |
| 10. | 8 or 9 | 565820 |
| 11. | 7 or 10 | 739283 |
| 12. | Exp Asia/ | 1241824 |
| 13. | Asia*.ti,ab,kw. | 254373 |
| 14. | 12 or 13 | 1405114 |
| 15. | 11 or 14 | 2009457 |
| 16. | Exp South America/ | 232262 |
| 17. | South Americ*.ti,ab,kw. | 28755 |
| 18. | 16 or 17 | 245677 |
| 19. | 15 or 18 | 2221145 |
| 20. | Exp Pacific Islands/ | 54871 |
| 21. | Pacific Island*.ti,ab,kw. | 9353 |
| 22. | 20 or 21 | 61857 |
| 23. | 19 or 22 | 2232115 |
| 24. | 3 and 23 | 195 |

Table 4
Web of science comprehensive literature search strategy.

| Steps | Search Terms | Results |
|-------------|--|---------|
| 1. | TS=(neonatal nursing) | 5848 |
| 2. | TI=(neonat* nurs*) AND AB=(neonat* nurs*) AND | 308 |
| 3. | AK=(neonat* nurs*) | 5858 |
| | 1 or 2 | |
| 4. | TS=(Neonatal nursing research) | 1184 |
| 6. | 3 or 4 | 5858 |
| 7. | TS=(low and middle income countr* or develop* countr* or third world countr* or low income countr* or middle income countr*) | 518519 |
| 8. | TI=(low and middle income countr* or develop* countr* or third world countr* or low income countr* or middle income countr*) AND AB=(low and middle income countr* or develop* countr* or third world countr* or low income countr* or middle income countr*) AND AK=(low and middle income countr* or develop* countr* or third world countr* or low income countr* or middle income countr*) | 6857 |
| 9. | 7 or 8 | 330 |
| 10. | 6 and 9 | 322 |
| Refinements | 2000–2022; Country/Region: India or Kenya or Nigeria or Ethiopia or Malawi or Pakistan or Bangladesh or Democratic Republic of the Congo or Egypt or Vietnam or Burkina Faso or Burundi or Cameroon or Central African Republic or Comoros or Gambia or Guinea Bissau | 108 |

eligibility for the review. Then, based on abstract screening, two authors independently conducted a full-text review of the articles and documented reasons for exclusion. Critical appraisal was not conducted, given the expected variance in the production of research in resource-limited settings.

2.4. Stage four: Charting the data

We extracted data using a template derived from the matrix method to structure the review comprehensively and methodically (Garrard, 2020). Following the framework, general information from each article was extracted, leaving room to apply a broader view where

interpretation and contextualization of findings could occur (Arksey and O'Malley, 2005). This flexible approach allowed for the iterative emergence of themes. First, we collected the titles of the articles and information about the authors, including names, credentials, and affiliations. We hand-searched author names and matched them to publications and affiliations to determine credentials in cases where they were not provided. Next, we documented the publication year and source followed by the country of focus, type of study, purpose of the research, outcomes of the study, contributions to the nursing discipline, and gaps/future directions. Finally, we recorded nursing representation in the research by indicating if a nurse was a primary author, secondary author, or study participant. When possible, we extracted information verbatim, and when information was not reported, it was documented as not available (N/A).

2.5. Stage five: Collating, summarizing, and reporting the results

First, we examined the results based on general study characteristics (Arksey and O'Malley, 2005). Second, after spending time reviewing the extracted results, we iteratively developed themes to depict how the literature represents neonatal nurses in LMIC. We constructed themes based on the conceptualization of nursing knowledge derived from foundational texts (Donaldson and Crowley, 1978; Rodgers, 2005; Thoun and Tschanz, 2021). These categories are knowledge about nursing, which describes the role, and challenges for nurses or nursing-specific outcomes; knowledge for nursing, which was generated by nurses or other disciplines but can be used by nurses; and knowledge of nursing, which was produced in the context of nursing-specific disciplinary knowledge that intersects with a phenomenon in nursing. We present the results in a narrative description.

3. Results

The results of the search can be seen in Fig. 1. An electronic search of the databases yielded 651 articles. We screened 603 titles and abstracts and identified 62 articles for full-text review. Of those, we excluded 39, with the most common reason being the lack of inclusion of neonatal nurses from LMIC. The grey literature search did not yield any further resources that were included in the review. Ultimately, we included 31 articles in this review.

3.1. Article characteristics

Article characteristics can be seen in Table 5. All studies were published from 2007 to 2021, with 18 articles (58%) from 2012 or later and 13 (42%) articles from 2017 or later. Nursing journals published seven (23%) of the studies, while the remainder were published in biomedical or multidisciplinary journals. A small number of countries were represented, with the most articles from Kenya and India (Fig. 2). The majority of articles presented research produced in lower-middle-income economies compared to low-income contexts, accounting for 19 (61%) of the articles. The designs of research studies were varied, with 11 (35%) quantitative methodologies, five (16%) qualitative methodologies, and one mixed-methods study (3%). There were also three discussion articles (9%) and two perspective/opinion articles (6%). Nurses were primary authors in 13 (42%) articles, supplemental authors in two (6%), and participants in five (16%). Further, one (3%) article was written by nurses in high-income countries and two (9%) articles were editorials written by freelance writers. Thirteen (42%) of the articles had nurses as authors and nurses as participants.

3.2. Knowledge about nursing

Knowledge about nursing was represented in nine (29%) of the articles. Four of the articles were research studies; of these, two were conducted by nurses (Phuma-Ngaiyaye et al., 2017; Wari et al., 2021),

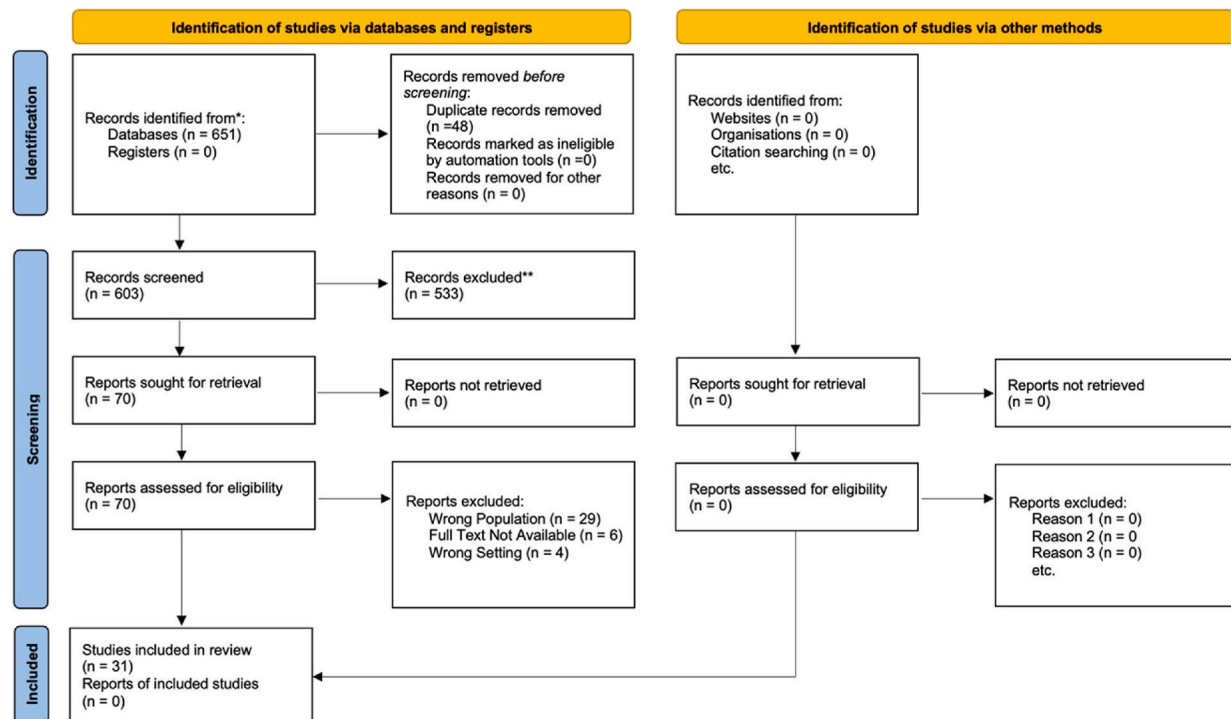


Fig. 1. PRISMA flow chart neonatal nursing research in LMIC

one by physicians (James et al., 2007), and one by a multidisciplinary group (Gathara et al., 2018). One nursing-led study was an exploratory qualitative study in Malawi, Africa looking to identify the challenges educators and students faced in teaching and learning about neonatal nursing practice (Phuma-Ngaiyaye et al., 2017). The researchers determined that students perceived neonatal nursing as less important compared to other areas of practice and recommended that nursing programs consider maximizing student learning opportunities to increase student interest. The affiliations of the authors of this study expanded through Africa to include Rwanda and Ghana. A second nursing study was a cross-sectional study in Ethiopia aiming to assess neonatal nurses' knowledge of pain and associated practices (Wari et al., 2021). The authors determined that nurses possessed adequate knowledge, but pain management practices did not meet practice recommendations. Strategies were provided for further training and the development of a hospital policy on neonatal pain to support the implementation of best practices (Wari et al., 2021). A third research study led by physicians was a prospective quantitative study that assessed the level of agreement between nurses and physicians on the subjective assessment of sick neonates, meaning only physical examination data were utilized (James et al., 2007). They determined neonatal nurses' assessment was aligned closely with that of physicians and recommended future research be expanded to perinatal nurses who are often in charge of referrals for intensive care. The fourth study was a cross-sectional direct observation study protocol by a multidisciplinary team that sought to quantify essential neonatal nursing care in Kenya (Gathara et al., 2018).

The remaining five articles consisted of three discussion papers written by nurses and two editorials written by journalists. The first discussion paper explored the scope of neonatal practice for nurses in India, emphasizing the multitude of challenges in practice due to infrastructure, lack of roles and responsibilities, limited education, and no career advancement opportunities (Vatsa, 2008). Suggestions were targeted at administrators and nursing educators to provide more consistent education. This paper was written by one nurse affiliated in India. The second discussion paper also focused on describing the challenges of neonatal nursing practice in India and providing

recommendations (Kalyan and Vatsa, 2014). These nurse authors emphasized challenges such as a shortage of trained nurses, lack of expert faculty, minimal clinical experiences, lack of research, poor motivation due to insufficient wages, lack of collaborative team culture, and no continuing education (Kalyan and Vatsa, 2014). Solutions focused on increasing nursing faculty, providing higher wages, and considering advanced practice roles to fill the gaps. The final discussion paper was written by nurses from high-income countries describing the state of neonatal nursing in LMIC as it relates to neonatal mortality (Premji et al., 2013). Challenges identified were a lack of formal training programs, varied regulatory practices, nursing shortages, and fiscal constraints. Recommendations included a standardized curriculum, local and distant models of care that embraced task-shifting, global education standards, and international legislation (Premji et al., 2013). Scaling up nursing education between governments, non-governmental organizations, institutions, and private sectors was emphasized as the way to reduce neonatal mortality. Last, two editorials focused on individual nurses, including one in Ghana (Samarasekera, 2010) and one in Malawi (Frey, 2017). Samarasekera (2010) described some of the history and challenges with neonatal nursing in the country and considered the life work of one nurse who received the first International Neonatal Nursing Excellence Award. Frey (2017) outlined the approach of a neonatal nurse who recognized neonatal hypothermia as a significant problem and implemented strategies to reduce the incidence by 40% in one year in their clinical unit.

3.3. Knowledge for nursing

Knowledge for nursing comprised the most articles at 11 (35%). Seven employed a quantitative approach, two a qualitative methodology, one a mixed method study, and one a document review. Of the studies that employed a quantitative approach, six were conducted by nurses in LMIC, and one was conducted by a physician in a high-income country. One study, set in Egypt, employed a quasi-experimental design and demonstrated a statistically significant improvement in total parenteral nutrition administration for neonates when an educational intervention was applied (Al-Rafay and Al-Sharkawy, 2012). The

Table 5
Study characteristics

| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
|--|---|--|------|----------------------------------|---------|------------------------------------|--|--|---|---|---|
| Essential newborn care-a need to reorient nursing staff | Adhisivam, B. (MD, PhD); Narayanan, P. (MD); Femittha, P. (MD); & Bhat, V. (MD) | Department of Pediatrics, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Pondicherry, India | 2010 | The Indian Journal of Pediatrics | India | Letter to the Editor | A three day workshop on essential newborn nursing was conducted by the department of Pediatrics for neonatal nurses | To evaluate objectively the effectiveness of the work- shop, a test with 40 questions containing 80 items in the "must know" domain of essential newborn nursing was administered before and after the workshop. The average score of the participants in the pretest was 36/80 (45%) while that of the post test was 69/80 (86%). | Nurses were the participants in the study | Though all the nurses were already working in NICU for several years, their knowledge regarding important components of essential newborn care was not satisfactory. However, the average post test score was significantly high reflecting improvement in their knowledge component Hence, the teaching methods used in the workshop were effective. | Reorienting NICU nursing staff in essential newborn nursing by workshops will be a useful tool in improving neonatal survival. Such workshops should be organized for nurses regularly. |
| Educational outcomes associated with providing a comprehensive guideline program about nursing care of preterm neonates receiving total parenteral nutrition | Al-Rafay, S.S. (PhD, RN); & Al-Sharkawy, S.S. (RN) | Ain Shams University, Egypt, | 2012 | Clinical Nursing Research | Egypt | Quasi- experimental Design | To describe the extent to which comprehensive guidelines associated with nursing care of preterm neonates who are receiving total parenteral nutrition affects the educational outcomes of the NICU nurses. Knowledge assessment used a questionnaire. | Statistically significant improvement in knowledge after the education intervention. Highest scores related to goals, indications, and components of TPN. | Authors and participants were all nurses | The study demonstrated that implementation of TPN guidelines had a significant positive impact on NICU nurses' knowledge and practice and led to higher monitoring of TPN complications among preterm neonates. | Offer regular education and in-services that target nurses on all shifts. Impact should be measured over a longer period. Leaders should be involved to support program implementation. |
| Perceived stress and professional quality of life in neonatal intensive care unit nurses in Gujarat, India | Amin, A.A. (MD); Vankar, J.R. (MD); Nimbalkar, S.M. (MD); & Phatak, A.G. (M.Sc., MPH) | Pramukhswami Medical College, Karamsad-Anand, Gujarat, India, Central Research Services, Charutar Arogya Mandali, Karamsad-Anand, Gujarat, India | 2015 | Indian Journal of Pediatrics | India | Multicenter Cross- sectional Study | To study the levels of perceived stress in Neonatal Intensive Care Unit (NICU) nurses and its association with professional quality of life domains viz. compassion satisfaction, burnout and secondary trauma | High compassion satisfaction, high burnout, and high secondary traumatic stress were reported by 25 (19.4 %), 30 (23.3 %) and 30 (23.3 %) nurses respectively. Most of the nurses (91, 70.5%) were identified as perceiving | Nurses were the participants of the study | Identifying stress and QOL issues in NICU nurses can help formulate relevant policies. | There is further need to study domains influencing NICU nurses' professional QOL. |

(continued on next page)

Table 5 (continued)

| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
|---|---|---|------|--------------------------------|---------|-----------------------------------|--|--|---|---|--|
| Reducing length of stay in hospital for very low birthweight infants by involving mothers in a stepdown unit: An experience from Karachi (Pakistan) | Bhutta, Z.A (MD); Khan, I. (MD); Salat, S. (MD); Raza, F. (MD); & Ara, H. (MD) | Aga Khan University, Karachi 74800, Pakistan | 2004 | British Medical Journal | India | Retrospective Review | We analysed neonatal outcomes before and after the stepdown unit was created (1987-94 and 1995–2001). We compared these two time periods for survival after birth until discharge, morbidity patterns during hospitalisation, length of stay in hospital, and readmission rates to hospital in the four weeks after discharge. | Reduction in length of stay, fewer infections | Nursing practice was discussed in the review. | Our results indicate that it is possible to involve mothers in the active care of their very low birthweight infants before discharge. This may translate into earlier discharge from hospital to home settings without any increase in short term complications and readmissions. | We believe that our experience in Karachi and the concept of involving mothers in the care of some very low birthweight infants, especially those with a birth weight of 1000–1500 g, can be replicated in other settings in Pakistan and developing countries of comparable resources and staffing. |
| PAIN-perception and assessment of painful procedures in the NICU | Britto, C.D. (MD); Rao Ph, S. (MD); Nesargi, S. (MD); Nair, S. (RN); Rao, S. (MD); Thiagavathy, T. (MD); Ramesh, A (MD); & Bhat, S. | Department of Neonatology, St. John's Medical College, Bangalore, Karnataka 560034, India; Department of Pediatrics, St. John's College of Nursing, Bangalore, Karnataka 560034, India; Department of Otolaryngology, Head and neck surgery, St. John's Medical College Hospital, Bangalore, Karnataka 560034, India. | 2014 | Journal of Tropical Pediatrics | India | Prospective cross-sectional study | To determine the frequency of procedural pain among 101 neonates in the first 14 days of admission to a neonatal intensive care unit (NICU) in South India and to study the perception of health-care professionals (HCP) about newborn procedural pain | The total number of painful procedures was 8.09 ± 5.53 per baby per day and 68.32 ± 64.78 per baby during hospital stay. The most common procedure was heel prick (30%). The HCP were administered a questionnaire to assess their perception of pain for various procedures. Procedures were perceived as more painful by nurses than by doctors. Chest tube placements and lumbar puncture were considered most painful. | One nurse co-author and nurses were participants of the study | The focus should be on clustering of procedures, giving a 'disturbance free time' to protect sleep. The study highlights the procedures that could cause maximum pain. This awareness of this intensity of pain should help the HCP of low resource settings to prioritize and focus on common severely painful procedures. The PRP should be individualized for the baby and be specific for the procedure. There is still a gap between perception and use of pain-relief measures. | The results of this study have identified key areas for interventions, which will facilitate development and introduction of a customized 'pain reduction protocol'. |

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Table 5 (continued)

| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
|--|--|--|------|------------------|---------|-------------------|---|---|---------------------------------------|---|--|
| Healthcare workers' views on the use of continuous positive airway pressure (CPAP) in neonates: A qualitative study in Andhra Pradesh, India | Dewez, J.E. (Research associate); Chellani, H. (MD); Nangia, S. (MD); Metsis, K. (Research assistant); Smith, H. (Social scientist); Mathai, M. (MD); & van den Broek, N. (MD) | Centre for Maternal and Newborn Health, Liverpool School of Tropical Medicine; Department of Paediatrics, Vardhman Mahavir Medical College & Safdarjung Hospital; Department of Neonatology, Lady Hardinge Medical College & Kalawati Saran Children's Hospital; Centre for Maternal and Newborn Health, Liverpool School of Tropical Medicine | 2018 | BMC Pediatrics | India | Qualitative Study | The study had three objectives: 1) to explore the perspectives and experiences of healthcare workers on the use of CPAP in neonates in a middle-income country; 2) to identify what might help or hinder implementation of CPAP; and 3) to provide suggestions for what would be needed to improve the use of CPAP and further scale up in middle-income countries | Common structural factors that limit the use of CPAP include shortages of staff, consumables and equipment, and problems with regard to the organisation of neonatal units. Providing care under constrained circumstances left staff feeling powerless to provide good quality care. CPAP use was mostly perceived as technically easier to provide than ventilation and allowed nurses to provide advanced neonatal care, independently of doctors. | Nurses were participants of the study | The five main themes which emerged included: 1) Shortages of supplies, infrastructure, and staff mean CPAP is not always available and/or of the highest quality; 2) Poor organisational support hinders optimal implementation of CPAP and neonatal care; 3) Healthcare providers feel powerless to provide better care for neonates; 4) Healthcare providers perceive CPAP as a beneficial intervention; and 5) CPAP enables nurses to work independently. | Operational research should investigate the quality of CPAP use, particularly the knowledge and skills of the staff using CPAP, and the impact of the introduction and scale-up of CPAP on important clinical outcomes such as neonatal mortality, and adverse events. |
| Malawi nurse leads effort to decrease neonate hypothermia | Frey, R. (Journalist) | Sigma Theta Tau International Foundation for Nursing | 2017 | Sigma Newsletter | Malawi | Perspective | To describe the leadership and approach of a Malawi nurse in decreasing the incidence of hypothermia in neonates. | Reduction in neonatal hypothermia by 40% in one year. | Focus on a neonatal nurse in Malawi | Outlines strategies used by the nurse to address a common challenge of neonatal hypothermia. | N/A |
| Nursing & parental perceptions of neonatal care in Central Vietnam: A longitudinal qualitative study | Gallagher, K. (Researcher); Partridge, C. (MD); Tran, H.T. (MD); Lubran, S. (Researcher); & Macrae, D. (MD) | Institute for Women's Health, University College London; Department of Pediatrics, University of California, San Francisco, San Francisco, USA; Neonatal Unit, Da Nang Hospital for Women and Children, Da Nang, Vietnam; Newborns Vietnam, Da Nang, Vietnam; Pediatric | 2017 | BMC Pediatrics | Vietnam | Qualitative | This study explored changes in nursing perceptions towards their role following a neonatal educational intervention. Parents' perceptions of nursing care were explored to determine any changes as nurses gained more experience | Analysis of nursing transcripts identified 14 basic categories which could be grouped into 3 themes: (1) perceptions of the role of the neonatal nurse, (2) perception of the parental role, and (3) professional reflections. Analysis of parent transcripts identified 14 basic categories which | Nurses were participants of the study | Qualitative interviews highlighted the short-term effect that the introduction of an educational intervention can have on both nursing attitudes towards and parental experience of care in one neonatal unit in central Vietnam. Nurses shared a growing awareness of their role along with its ethical issues and challenges, whilst | Further research is required to determine the long-term impact of the intervention, the ability of nurses to translate knowledge into clinical practice through assessment of nursing knowledge and competence, and the impact and needs of parents. |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
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| | | Intensive Care, Royal Brompton and Harefield NHS Trust, London, UK. | | | | | | could be grouped into 3 themes: (1) information sharing, (2) participation in care, and (3) personal experience. | | parents discussed their overall desire for more participation in their infants care. | |
| Quantifying nursing care delivered in Kenya newborn units: Protocol for a cross-sectional direct observational study | Gathara, D. (PhD, MSc); Serem, G. (MSc, RN); Murphy, G.A.V. (MD); Abuya, N. (MD); Kuria, R. (RN); Tallam, E. (RN); & English, M. (MD) | Wellcome Trust Research Programme, Nairobi, Kenya; University of Oxford, UK; Department of Curative and Preventative Services, Nairobi, Kenya; Department of Nursing, Nairobi, Kenya; Nursing Council of Kenya, Nairobi, Kenya | 2018 | BMJ Open | Kenya | Cross-sectional Direct Observational Study Protocol | To quantify essential neonatal nursing care provided within newborn unit. This will report on the overall prevalence of care left undone, the common tasks left undone and describe any sharing of tasks with people not formally qualified to provide care. It allows opportunity to examine missed care in association with patient outcomes | Protocol only | Nurses included as secondary authors. Nurses will be participants of the study. | It allows opportunity to examine missed care in association with patient outcomes which has not previously been done in LMIC. This can inform nursing practice, which is particularly important given they are the primary care providers and essential to delivery of safe and effective care. | N/A |
| Acceptability of donor breast milk banking, its use for feeding infants and factors among mothers in eastern Ethiopia | Gelano, T.F. (PhD, RN); Bacha, Y.D. (PhD); Assefa, N. (PhD); Motumma, A. (PhD, RN); Roba, A.A. (MSc, RN); Y. (Pharmacy); & Tsige, F. (MD). | Haramaya University, Harar, Ethiopia | 2018 | International Breastfeeding Journal | Ethiopia | Mixed Methods | To discover the acceptability of donor breast milk banking, its use for feeding infants, and associated factors among mothers in eastern Ethiopia | Eleven percent were willing to donate breast milk for banking and 15.2% of mothers were willing to use. The acceptance of donor milk banking was 5.8 times more likely if mothers heard about donor milk, 4.2 times if mothers heard about wet-nurses; 2 times more among mothers who had visited a NICU. | Nurse was primary author and nurses are secondary authors. | The acceptance of breast milk donation for banking and its use for feeding infants was very low, due to lack of information and misconceptions about the safety of breast milk. | Before initiation of any donor milk banking program awareness should be created about donor breast milk and its safety. |
| The implementation of a neonatal nurse training | Guiles, S. (MD); Lemons, J. (MD); Trautman, M. | Tulane University School of Medicine, New Orleans, USA; | 2016 | Newborn & Infant Reviews | Kenya | Pre-post Intervention Design | To evaluate the effectiveness of neonatal nurse-training program, | Overall improved nursing competency. Improved hand | Nurses were participants of the study | Easily reproducible education that follows a curriculum. Includes outcome | Further studies to validate the importance of nursing education |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
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| program at the Riley Mother Baby Hospital of Kenya | (MD); Bucher, S. (PhD, MA, BA); Songok, J. (MBeH, MMED); Gisore, P. (MBeH, MMED) | Indiana University School of Medicine, Indianapolis, USA; Moi University Eldoret, Kenya | | | | | with emphasis on sugar, safe care, temperature, airway, and lab work. Included sections on hyperbilirubinaemia and bubble CPAP, incubators and radiant warmers. | hygiene before procedures, no significant difference in documentation, reduced mortality, and decreased length of stay. | Nurses were participants of the study | assessments. A strong foundation for the successful implementation of the neonatal nurse training program. | in resource limited settings. |
| Observational sickness assessment by the NICU staff nurses | James, J. (MD); Lokesh Tiwari (MD); Swahney, P. (MD); & Kumar, N. (MD) | St. Stephens Hospital, Tis Hazari, Delhi | 2007 | Indian Journal of Pediatrics | India | Prospective Study | To assess the level of agreement on subjectively assessed sickness by NICU staff nurse with doctor | Considerable accuracy was noted on comparing symptoms picked up by the nurses and the doctors. A significant correlation was seen between the two groups with regard to the treatment given. | Nurses were participants of the study | The study shows that diploma nurses are capable of assessment. Considers the use of advanced practice nurses such as neonatal nurse practitioners. | This study needs to be extended to nurses in the labor room and postnatal wards because it is they who refer sick babies to the neonatal unit. In assessment is not appropriate it can be recommended for a posting in the nursery to improve their assessment skills. |
| Neonatal nursing: An unmet challenge in India | Kalyan, G. (RN, MSN) & Vatsa, M. (PhD, RN) | Post Graduate Institute of Medical Education and Research, Chandigarh, India; All India Institute of Medical Sciences, New Delhi | 2014 | Indian Journal of Pediatrics | India | Discussion Paper | To highlight the challenges related to neonatal nursing in India and propose solutions. | Challenges: Significant shortage of trained nurses; lack of expert faculty; few clinical experiences; lack of research, poor motivation; and lack of collaborative team culture. Solutions: Increasing faculty who can also provide ongoing education, more neonatal research, increase in salary, and advanced practice roles. | Authors are nurses | Outlines the challenges with specialized neonatal nursing practice in a LMIC. Provides solutions to be considered. | N/A |
| Non-nutritive sucking for preterm infants in Egypt | Kamhawry, H. (PhD, RN); Holditch-Davis, D. (PhD, RN); Alsharkawy, S. (PhD, RN); | Mansoura University, Egypt; Duke University, NC; Ain Shams University, Egypt; | 2014 | Journal of Obstetric, Gynecologic and Neonatal Nursing | Egypt | Short-term longitudinal, experimental design | To assess how NNS using a pacifier during NG feeds affected physiological and behavioural | NNS accelerated time to nipple feeding (5 days earlier) due to more organized behaviours resulting | Authors are all nurses | Inexpensive developmental support that results in early discharge from hospital. | Time periods for NNS; outcomes for infants discharged; combination with other |

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|---|--|--|------|-----------------------------|---------|---|---|---|--|--|---|
| Collective strategies to cope with work related stress among nurses in resource constrained settings: An ethnography of neonatal nursing in Kenya | Alrafay, S. (PhD, RN); & Corazzini, K. (PhD, RN) | Duke University, NC | 2020 | Social Science and Medicine | Kenya | Ethnography | To explore the uniquely stressful environment including meeting the standards of international neonatal nursing to understand how nurses work within such pressures and what techniques they use to organize and cope. | Empirically based model of the ways in which nurses cope in a LMIC setting. Core nursing activities include routines, triage administration of records that reduce stress. Relationships and autonomy offered a unique form of coping to LMIC. Nurses also cope through improvising and a spirit of professional pragmatism. | Participants were nurses | Addresses the gap left by prevalent theories of nursing stress that have focused on the personal characteristics of individual nurses. Consider how a deeper understanding of collective strategies to reduce stress might inform policy. | Acknowledge the use of collective coping (versus individual burnout) on reducing stress that will have implications for quality of care. Needs to be combined with human and technical resources. |
| Expectations for nursing care in newborn units in Kenya: Moving from implicit to explicit standards | Murphy, G.A.V. (MD); Omondi, G.B. (RN); Gathara, D. (PhD, MSc); Abuya, N. (MD); Mwachiro, J (MSc, RN); Kuria, R. (RN); Tallam-Kimaiyo, E (RN); & Mike English, M. (MD) | Nuffield Department of Medicine, University of Oxford, Oxford, UK; KEMRI-Wellcome Trust Research Programme, Nairobi, Kenya | 2018 | BMJ Global Health | Kenya | Document Review | To review the Nursing Council of Kenya Manual of Clinical Procedures to identify tasks relevant for the care of inpatient neonates. An expert advisory group comprising major stakeholders, policymakers, trainers, and frontline health-workers was invited to a workshop with the purpose of defining tasks for which nurses are responsible. | The key outcome was a comprehensive list and grouping of neonatal nursing tasks and the minimum frequency with which these tasks should be performed. Second, a simple categorisation of neonatal patients based on care needs was agreed upon. In addition, acceptable forms of task sharing were agreed upon and described. | Nurses as secondary authors, focus on neonatal nursing tasks | Standards could form the basis for audit and quality evaluation. An agreement on minimum standards creates a baseline for discussion on how to both clearly define the role of nurses and improve neonatal care in this low-resource, high-burden setting. | Standards also form a platform for further discussions to refine definitions of levels of care and to develop wider guidance spanning the multi-professional nature of neonatal care. |
| Randomized controlled trial on effectiveness of mHealth (mobile/smartph one) | Nayak, B.S. (PhD, RN); Lewis, L.E. (MD); Margaret, B. (PhD, RN); | Mamipal Academy of Higher Education (MAHE), Mamipal, India | 2018 | Journal of Advanced Nursing | India | Prospective, Randomized Controlled Clinical Trial | To describe a randomized controlled trial protocol designed to evaluate the effectiveness of | Protocol only | Nurse was a primary author and nurses are secondary authors | Supporting continuity of preterm care is vital. Empowering mothers and community health workers by | N/A |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
|---|--|--|------|----------------------------|---------|--|--|--|---------------------------------------|--|--|
| based preterm home care program on developmental outcomes of preterms: Study protocol | Bhat, R. (MD); D'Almeida, J. (PhD, RN); Phagool, T. (PhD, RN) | College of Medicine, University of Malawi, Blantyre; College of Medicine, IMCHA; Department of Obstetrics and Gynaecology, BC Children's and Women's; Institute for Global Health; Rice University, Houston, Texas; Center of Bioethics for Eastern & Southern Africa (CEBESA), Blantyre, Malawi; Department of Pathology and Laboratory Medicine, BC Children's and Women's Hospital; | 2020 | PLOS One | Malawi | Qualitative Study | The study explored the factors that influence the implementation of bubble CPAP among health care professionals in secondary and tertiary hospitals in Malawi. | Factors that influenced the implementation of bubble CPAP occurred in an interconnected manner and included inadequate healthcare provider training in preparation for use, rigid division of roles and responsibilities among providers, lack of effective communication among providers and between providers and newborn's caregivers, human resource constraints, and inadequate equipment and infrastructure. | Nurses were participants of the study | While our research findings agree with previous recommendations for regular training, mentorship and investment in nursing staff our study suggests that efforts must go deeper to understand the health system issues around staffing of nursery wards, empowerment of nurses and developing medical team cohesion. decision to initiate. | These findings will have to be triangulated with perspectives from healthcare policy decision makers, such as government officials, who are able to speak about barriers and facilitators to bubble CPAP implementation from a system level perspective. |
| Barriers and enablers of implementing bubble Continuous Positive Airway Pressure (CPAP): Perspectives of health professionals in Malawi | Nyondo-Mipando, A.L. (PhD); Woo Kinshella, M.L. (PhD)(c); Bohne, C. (Researcher); Suwedi-Kapesa, L.C. (Researcher); Salimu, S. (Researcher); Banda, M. (MD); Newberry, L. (MD); Njirramadzi, J. (MD); Hiwa, T. (MD); Chiyawa, B. (MD); Chikoti, F. (MD); Vidler, M. (PhD); Dube, W. (MD); Molyneux, E. (MD); Mfutsobengo, J. (PhD); Goldfarb, D.M. (MD); Kawaza, K. (MD); & Mijovic, H. (MD) | College of Medicine, University of Malawi, Blantyre; Rice University, Houston, Texas; Center of Bioethics for Eastern & Southern Africa (CEBESA), Blantyre, Malawi; Department of Pathology and Laboratory Medicine, BC Children's and Women's Hospital; | 2020 | PLOS One | Malawi | Qualitative Study | The study explored the factors that influence the implementation of bubble CPAP among health care professionals in secondary and tertiary hospitals in Malawi. | Factors that influenced the implementation of bubble CPAP occurred in an interconnected manner and included inadequate healthcare provider training in preparation for use, rigid division of roles and responsibilities among providers, lack of effective communication among providers and between providers and newborn's caregivers, human resource constraints, and inadequate equipment and infrastructure. | Nurses were participants of the study | While our research findings agree with previous recommendations for regular training, mentorship and investment in nursing staff our study suggests that efforts must go deeper to understand the health system issues around staffing of nursery wards, empowerment of nurses and developing medical team cohesion. decision to initiate. | These findings will have to be triangulated with perspectives from healthcare policy decision makers, such as government officials, who are able to speak about barriers and facilitators to bubble CPAP implementation from a system level perspective. |
| Exploring the space for task shifting to support nursing on neonatal wards in Kenyan public hospitals | Nzingab, J. (PhD); McKnight, J. (PhD); Jepkogei, J. (MSc, BSc); & English, M. (MD) | Nuffield Department of Medicine, University of Oxford, Oxford, UK; KEMRI-Wellcome Trust Research | 2019 | Human Resources for Health | Kenya | Qualitative Study using an Ethnographic Approach | To understand the nature and practice of neonatal nursing in public hospitals in Nairobi so as to determine what prospect there might be for | Informal, organic task shifting was already taking place with tasks delegated to students, mothers and support staff, without supervision. | Participants of the study were nurses | We found that this model of nursing encouraged delegation of less technical tasks to subordinates, through the process of 'subconscious | There is space for a well- designed task-shifting programme that could have a positive and supportive effect on nursing care and on nurses themselves. |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
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| Neonatal nasogastric tube feeding in a low-resource African ergonomics methods to explore quality and safety issues in task sharing | Omondi, G.B. (RN); Serem, G. (RN); Abuya, N. (MD); Gathara, D. (PhD, MSc); Stanton, N.A. (PhD, DSc); Agedo, D. (RN); English, M. (MD); & Murphy, G.A.V. (MD) | KEMRI-Wellcome Trust Research Programme, Nairobi, Kenya; Nairobi, Kenya; Nairobi City County Government, Nairobi, Kenya; University of Southampton, UK; Kenyatta National Hospital, Nairobi, Kenya; Nuffield Department of Medicine, University of Oxford, UK | 2018 | BMC Nursing | Kenya | Hierarchical Task Analysis (HTA) and the Systematic Human Error Reduction and Prediction Approach (SHERPA) | To explore Human Factors and Ergonomics (HFE) method as a novel approach to address quality and safety of task shifting and inform policies in neonatal care settings in Kenya. | The inclusion of mothers and casual workers in care provided to sick infants is reported by subject matter experts (SMEs) in the Kenyan neonatal settings. Ergonomics methods proved useful in working with Kenyan SMEs to identify possible errors and the training and supervision needs for safer task-sharing. | Primary and secondary authors as nurses. Nurses as participants. | Sharing tasks with lower cadre workers or even with a patient's family in low- resourced healthcare settings may help ease the pressure of high workloads and nursing shortages. | Findings could lead to targeted, evidence-based local policy on reorganisation of tasks and detailed training and standard guidance for NGT feeding in neonatal care in LMIC as part of efforts to improve quality of care and reduce neonatal mortality. |
| Challenges in neonatal nursing clinical teaching to nurse- midwife technicians in Malawi | Phuma-Ngayayve, E. E. (PhD, RN, RM); Adejumo, O. (RN), & Dartey, A.F. (MSN, RN) | Mzuzu University, Malawi; University of Rwanda; Kigali; University of Health and Allied Science, Ghana | 2017 | Journal of Nursing Education | Malawi | Explorative Qualitative Study | To describe the challenges faced by educators and students in clinical teaching and learning neonatal nursing | Six themes were identified: short duration in clinical placement, inadequate resources, student congestion in the clinical area, lack of clinical teaching, lack of supervision, and lack of skills. | Authors are all nurses; participants are nursing students | Students perceive neonatal nursing as less important, compromising acquisition of skills and competence for entry-level practice, which is necessary to improve outcomes. | Nursing programs should consider maximizing student learning opportunities and create more practice-based learning opportunities to meet students' needs. |
| Call for neonatal specialization in developing countries | Premji, S. (PhD, RN); Spence, K. (MN, RN); & Kenner, C. | University of Calgary, Canada; The Children's Hospital Westmead, | 2013 | The American Journal of Maternal? Child Nursing | Written in Canada/ USA targeting | Discussion Paper | To examine the state of neonatal nursing in developing countries as it | Challenges: no formal training programs for neonatal nursing; varied regulatory | Authors are nurses from HIC | Outlines challenges in neonatal nursing in LMIC and provides solutions to be considered. | A coordinated effort between governmental, nongovernmental organizations, |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
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| | (PhD, RN, FAAN) | Sydney, Australia; Northeastern University, Boston, USA. | | | all LMIC countries | | relates to neonatal mortality. | practices; nurse shortages; fiscal constraints. Solutions: standardized curriculum; local and distant models of care (task shifting); global standards; mechanisms to fund neonatal specialization programs. | | Considers scaling: up of neonatal nurses in LMIC. | private and semiprivate education, and healthcare institutions to scale up investment in educating and hiring neonatal nurses will be imperative to reducing infant mortality. |
| Effect of spiritual care on hope and self-transcendence of mothers of premature neonates hospitalized in the neonatal intensive care unit | Roveshty, M.A. (RN); Farahani, A.S. (PhD, RN); Memaryan, N. (Spiritual Care); & Rassouli, M. (PhD, RN) | Shahid Beheshti University of Medical Sciences, Tehran, Iran; School of Behavioral Sciences and Mental Health, Tehran; Iran University of Medical Sciences, Tehran, Iran | 2020 | Iranian Journal of Neonatology | Iran | Quasi-experimental, Single Group Study | To investigate the effect of spiritual care on hope and self-transcendence in mothers with premature newborns hospitalized in the NICUs | In examining the effect of spiritual care on hope and self-transcendence in mothers, the results showed that there was a difference among the pre-test, post-test, and follow-up stages in terms of the mean scores of mothers' hope. | Authors were nurses and the participants of the study were nurses | Since spirituality can lead to an increase in hope and self-transcendence of mothers with premature infants hospitalized in the NICUs, this approach can be used as an appropriate intervention method to help improve their adaptation and peace of mind. | Barriers to providing these types of care and managing them must be identified so that nurses in the NICUs can use them. |
| Health care providers' perspectives for providing quality infection control measures at the neonatal intensive care unit, Cairo University Hospital | Salem, M.R. MD; & Youssef, M. R. L. (MD) | Department of Public Health and Community Medicine, Faculty of Medicine, Cairo University, Cairo, Egypt; Department of Pediatrics, Faculty of Medicine, Cairo University, Cairo, Egypt | 2017 | American Journal of Infection Control | Egypt | Exploratory Qualitative Study | This study identified health care providers' perspectives for providing quality infection control measures at a NICU | All interviewees cited a shortage in staffing, especially nurses, as a barrier to meeting the infection control measures. Three-quarters of respondents said it was difficult to access protective equipment, such as gloves, aprons, and face protection. The nurses declared the reasons interfering with good compliance to infection control guidelines are related to the workload and the excessive number of patients to be handled by | Nurses were participants of the study | All interviewees cited shortage in staffing, especially nurses, as a barrier to meeting the infection control measures. Three-quarters of respondents said it was difficult to access protective equipment, such as gloves, aprons, and face protection. The nurses declared the reasons interfering with good compliance to infection control guidelines are related to the workload and the excessive number of patients to be handled by | Further studies using different research methods and that involve different institutions are needed for the development of new nursing strategies for the prevention and control of infections in NICU. |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
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| Profile Regina Obeng—improving newborn health in Ghana | Samarasekera, U. (Journalist) | Freelance Health and Science Writer and Editor | 2010 | Lancet | Ghana | Perspective | To describe the experience of the first International Neonatal Nursing Excellence Award | N/A | Focus on a neonatal nurse in Ghana | Describes some of the history and challenges of neonatal nursing in Ghana through the life's work of a nurse. | N/A |
| Randomized controlled trial of compact fluorescent lamp versus standard phototherapy for the treatment of neonatal hyperbilirubinaemia | Sarin, M. (MD); Dutta, S. (MD); Narang, A. (MD) | Division of Neonatology, Department of Pediatrics, Postgraduate Institute of Medical Education and Research, Chandigarh 160 012, India | 2006 | Indian Pediatrics | India | RCT | To test the hypothesis that compact fluorescent lamps are superior to conventional phototherapy units, we performed a randomized, controlled trial. | The results of our randomized controlled trial showed that, overall, CFL has no advantage over STL phototherapy in reducing the duration of phototherapy, and both have no adverse effects on temperature maintenance and hydration. | Nurses were participants of the study | The analysis of the reports of the nursing staff showed a slight trend towards more disadvantages associated with STL, but it did not reach statistical significance. | None identified |
| Promoting developmental supportive care in preterm infants and families in a level III neonatal intensive care unit (NICU) setting in India | Sathisha, Y. (PhD, RN); Lewis, L.E. (MD); Noronhac, J.A. (PhD, RN); Nayak, B.S. (PhD, RN); Paic, M.S. (PhD, RN); Altimier, L. (DNP, RN) | Manipal College of Nursing, Manipal, India; Philips HealthTech & Northeastern University, Boston, USA | 2019 | Nurse Education in Practice | India | Non-randomized Before and After Intervention Design | To enhance neonatal nurses' abilities to acquire care practices (knowledge and skills) regarding developmental supportive care | A significant increase in the knowledge score was seen among. The improvement in the skills of providing DSC among neonatal nurses was also higher in the intervention group relative to the control group. | Authors are nurses and the participants of the studies are nurses | Mortality is reduced with advancement in technology and care. Challenges not only to ensure infants' survival, but to also reduce stress levels for infants and families and to optimize their developmental course and ultimately, outcomes. | N/A |
| Application of neurobiologic risk score in a tertiary care hospital in Pakistan | Usman, S. (RN, RM, BScN, MBA); Butt, Z.A. (MBBS, MSc); Rattani, S. (RN, RM, BScN); & Somani, N. (RN, BScN, MBA) | The Aga Khan University, Karachi, Pakistan | 2007 | International Pediatric Nursing | Pakistan | Descriptive Study Design | To validate a neurobiologic risk score tool. It also aims to assess the ratio of neonates who were at a higher risk of developmental delay, after having the NICU care | NBRS is applicable in our setting; data were collected by nurses without any difficulty. NBRS can be used to screen neonates who might be at high risk for later developmental delays or problems. | Authors were nurses and the participants of the study | NBRS was transformed into a working document that would be a permanent part of patient's records. | Further studies on this topic should be conducted in Pakistan. |
| Fathers: The lost ring in the chain of family-centered care | Valizadeh, S. (MSc, PhD); Miralashari, J. (MSc, PhD); Navab, E. (MSc) | Tabriz University of Medical Sciences, Tabriz, Iran; Tehran University of | 2018 | Advances in Neonatal Care | Iran | Qualitative Study using a Phenomenological Approach | To understand NICU nurses' lived experiences of family participation | Iran's NICU was appropriate for mothers' care but the fathers' participation was | Authors are nurses from Iran and one from England. | Identifies essential themes that describe the pattern of family participation in FCC; Highlights multiple | Future research should explore: Other factors that contribute to parents' limited |

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| Title | Authors & Disciplines | Authors Affiliations | Year | Source | Country | Research Type | Purpose | Outcomes | Nursing Representation | Contribution to the Discipline | Gaps/Future Directions |
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| | PhD); Higman, W. (PhD, MSc, MA, BA, RGN); & Ghorbani, F. (MSc, PhD)(C, RN) | Medical Sciences, Tehran, Iran; Coventry University, Coventry, England | | | | | in family- centered care | limited due to traditional attitudes, cultural-religious background, and difficulties relating to the hospitals' organizational rules. | Participants were nurses. | factors that lead to fathers' low participation; Identifies methods for improving FCC in Islamic countries, altering the organizational rules, attempting to modify traditional social attitudes, and participation in caregiving. | participation in FCC; Feelings and experiences of NICU parents; Fathers' role and requirements for engaging in FCC; Practical interventions that encourage father's participation in caregiving. |
| Current scenario of neonatal nursing in India and the way forward | Vatsa, M. (RN) | All India Institute of Medical Sciences, New Delhi, India | 2008 | Journal of Neonatology | India | Discussion Paper | To examine scope of neonatal practice in India and provide recommendations | Current challenges in the country: shortages of nurses, lack of clear roles, inadequate infrastructure, inadequate training, no career advancement opportunities, and no clinical nurse specialists. Suggestions: provide more opportunities and stronger education. | Author is a nurse | Outlines challenges in neonatal nursing in LMIC and provides solutions to be considered. | N/A |
| Knowledge and practice of nurses and associated factors in managing neonatal pain at selected public hospitals in Addis Ababa, Ethiopia, 2020 | Wari, G. (RN); Wordofa, B. (PhD, RN); Alemu, W. (RN); & Habte, T. (MSc, RN) | College of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia | 2021 | Journal of Multi-disciplinary Healthcare | Ethiopia | Cross-sectional Study | To assess the neonatal ICU nurses' knowledge and practice and factors associated with neonatal pain management at selected public hospital of Addis Ababa, Ethiopia | The study reveals that 68.7% of nurses had adequate knowledge and 32.2% of them had good practice. There was a significant relationship with receiving in-service training. Having a policy in place, getting training on neonatal pain management and knowledge category were factors significantly associated with the practice of nurses in neonatal pain management. | Authors were nurses and the participants of the study were nurses | The respective hospitals and Ethiopian Ministry of Health should provide gap-filling training on neonatal pain management to the nurses. | Provide continuous on-job training related to neonatal pain management to all nurses; Implement an infant pain management policy; Review the educational curriculum in order to include neonatal pain management; Further research with qualitative study design to evaluate more accurately nurses' knowledge and practice as well as perception on neonatal pain assessment. |

researchers recommended regular in-services to target nurses in preventing adverse outcomes for babies. A second study, also conducted in Egypt, used a short-term longitudinal design to assess how non-nutritive sucking affected physiologic stability and behavioural outcomes for infants (Kamhawy et al., 2014). The use of non-nutritive sucking contributed to earlier discharge for neonates who underwent the intervention and was recommended as an inexpensive solution to developmental support. The third study, conducted in India, explored how to enhance neonatal nursing practice regarding developmental care using a non-randomized before and after intervention design (Sathish et al., 2019). A significant increase in knowledge was demonstrated, and emphasis was placed on considering developmental outcomes as an important factor. Researchers in a fourth study in Iran looked at the effects of spiritual care on hope and self-transcendence in mothers with hospitalized newborns using a quasi-experimental design (Roveshty et al., 2020). The team found the intervention effective and encouraged consideration of the barriers to such care for neonatal nurses. The fifth study outlined a protocol for a randomized controlled trial to determine the effectiveness of a mobile preterm home care program on improving parent and infant interaction and development in preterm babies in India (Nayak et al., 2019). The intention was to integrate hospital and home-based care for preterm babies through technology. The sixth study used hierarchical task analysis and a systematic human error reduction and prevention approach to analyze and identify the potential errors of nasogastric tube feeding in neonates, with a particular focus on shifting the tasks to mothers and casual workers (Omondi et al., 2018). They concluded that sharing tasks may help to reduce the pressure of high workloads and nursing shortages in low-resource settings; however, they did not evaluate the safety considerations of this approach. The seventh study, conducted in Kenya by a physician, utilized a pre-post intervention design to evaluate the effectiveness of a neonatal nurse training program on knowledge, focusing on glucose regulation, temperature regulation, airway patency, and lab work stability (Guiles et al., 2016). Overall, they demonstrated improved nurse competencies, most notably improved hand hygiene practices.

Qualitative studies employed a descriptive study design and a phenomenological methodology. The descriptive study was conducted in Pakistan by nurses to validate a neurobiological risk score tool (Usman et al., 2007). The tool was shown to be used without difficulty, and the study concluded it would be beneficial to identify neonates at risk for developmental delay. The phenomenological study took place in Iran and was not conducted by a nurse but had one as a co-author (Sousan Valizadeh et al., 2018). The purpose was to understand nurses' lived experiences of family participation in family-centered care, and the results focused on describing barriers to fathers' involvement.

Ethiopian nurses conducted a mixed-methods study to explore the acceptability of donor breastmilk among mothers for neonates (Gelano et al., 2018). This study revealed that a small percentage of mothers were willing to donate. The acceptability to receive donor breastmilk was higher among those who had previously heard about donor banking, wet nurses, or those who had a sick neonate (Gelano et al., 2018).

Last, the document review was conducted to identify nursing tasks relevant to the care of neonates. This study was conducted by physicians in high-income countries with nurses in LMICs as supplementary authors to include a variety of stakeholders (Murphy et al., 2018). The outcome was a comprehensive list of tasks for which low-income neonatal nurses are responsible, including tasks that could be shared.

3.4. Knowledge of nursing

Three studies (9%) specifically addressed processes of nursing practice; however, none were conducted by nurses. Two studies took place in Kenya and one in India, all being comprised of a multidisciplinary team such as researchers in public health, health administration, and physicians. Employing an ethnographic approach, one study in

Kenya aimed to understand the nature and practice of neonatal nursing in public hospitals to determine how the pressure of workload can be relieved (Nzinga et al., 2019). The researchers constructed a model of nursing that encouraged the delegation of less technical tasks to others and suggested that a well-designed task-shifting programme could be supportive of nursing practice. The next study in Kenya also utilized an ethnographic design to explore the uniquely stressful environment of neonatal nurses in LMIC in trying to meet the demands of international nursing standards, carrying high patient workloads, and working long hours (McKnight et al., 2020). The results highlighted the need to focus on system-based strategies to reduce stress as opposed to individual characteristics previously emphasized in research. Similarly, a third study conducted in India explored the levels of stress in the neonatal intensive care unit and considered the quality of life for nurses with the intention of formulating relevant local policies for nursing work (Amin et al., 2015). Findings suggest that future studies could provide further recommendations about managing stress levels and increasing retention.

4. Discussion

The results of our scoping review illustrate that the representation of neonatal nurses in LMIC in global health research is extremely limited. However, our study adds a unique perspective by examining the types of nursing knowledge produced in LMIC and the associated contextual factors. This discussion focuses on the salient points derived from our review, including the association between income level and research, authorship patterns, the collaboration between high-income countries and LMIC, and dominant narratives in the literature.

The majority of research came from lower-middle-income economies with low-income countries only contributing three research studies and two editorials (Frey, 2017; Gelano et al., 2018; Phuma-Ngaiyaye et al., 2017; Samarasekera, 2010; Wari et al., 2021). The necessity of adequate resources to allocate time and expenses to conduct research is a plausible explanation for this (Edwards et al., 2009). However, the advancement of neonatal care may also provide a broader landscape from which nursing research topics are derived and could explain the significant increase in article output over the last five years. Studies from lower-middle-income countries included in our review had a focus beyond mortality and considered developmental outcomes (Kamhawy et al., 2014; Usman et al., 2007), advanced care practices (Al-Rafay and Al-Sharkawy, 2012; Kamhawy et al., 2014; Nayak et al., 2019; Roveshty et al., 2020; Usman et al., 2007; S. Valizadeh et al., 2018), family-centered care (Valizadeh et al., 2018), spiritual care (Roveshty et al., 2020), and follow-up practices (Nayak et al., 2019). In contrast, studies from low-income countries focused on assessing neonatal nursing knowledge (Wari et al., 2021), student's perceptions of neonatal nursing (Gelano et al., 2018; Phuma-Ngaiyaye et al., 2017; Wari et al.,

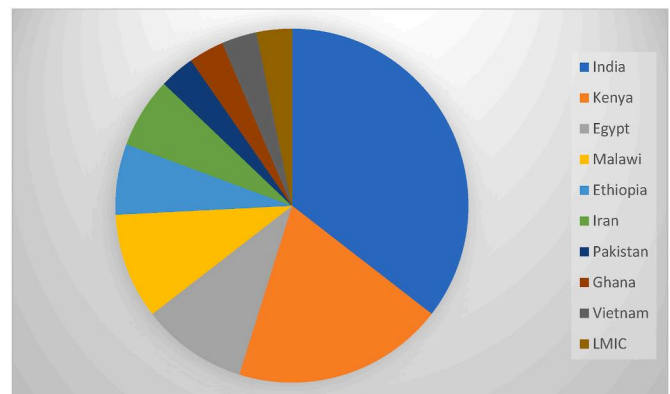


Fig. 2. Country distribution of neonatal nursing research in LMIC

2021) and milk banking (Gelano et al., 2018) as strategies focused on improving survival. Importantly, the editorials clearly describe the research activities of nurses in low-income countries and the significant impact they had on neonatal outcomes, yet there were no original research articles published on this topic (Frey, 2017; Samarasekera, 2010).

Patterns of authorship have been a subject of focus in global health research, given the persistent inequality between research conducted in LMIC and academic output governed by authors in high-income countries (Schneider and Maleka, 2018). While our review excluded studies that did not include nurses as authors, examination of patterns in the included studies revealed some notable points. Most first-author nurses in LMIC held a PhD designation. Nursing authors who did not hold this designation were either included as co-authors or supported by authors with PhD credentials or physicians. This is an important consideration given the challenges of accessing and completing a nursing PhD in many LMICs (Edwards et al., 2009; Segrott et al., 2006). Combined with the knowledge that nurses in low-income countries are undertaking research activities not captured in academic literature, we suggest that the representation of neonatal nursing research in LMIC may not be included in the current conceptualization of research derived from high-income countries.

Complicating assessment of authorship is the consideration of collaboration, commonly referred to as North-South partnerships in global health research (Franzen et al., 2017). This is a suggested strategy to improve research output in LMIC and overcome the challenges of resources. Such partnerships have faced criticism given the power dynamics inherent in the concept (Walsh et al., 2016). The results of our review reveal that nearly half of the studies had authors with affiliations from high-income countries, with the remaining studies conducted solely by authors in LMIC. Interestingly, knowledge *about* and knowledge *for* nurses was primarily driven by nurses in LMIC (Al-Rafay and Al-Sharkawy, 2012; Gelano et al., 2018; Kalyan and Vatsa, 2014; Kamhawy et al., 2014; Nayak et al., 2019; Omondi et al., 2018; Phuma-Ngaiyaye et al., 2017; Premji et al., 2013; Roveshty et al., 2020; Sathish et al., 2019; Usman et al., 2007; Vatsa, 2008; Wari et al., 2021). Knowledge *of* nursing, on the other hand, was entirely driven by researchers in high-income countries with no nursing representation (Amin et al., 2015; McKnight et al., 2020; Nzinga et al., 2019). This raises questions about the epistemological underpinnings of nursing knowledge in the context of LMIC, leaving us to ponder if there is a difference between nursing disciplinary knowledge in high-income countries and LMIC. On the other hand, knowledge of nursing in stressful environments may justify a need for increased nursing voice and representation to take up further research about their own contextual experience. The prominent narratives in the literature, including those that are transparent and those that we view as more covert, need to be considered. First, there is a clear divergence in the research topics, divided between the tasks of neonatal nursing practice and the general evaluation of neonatal nursing practice in LMIC. The former emphasizes the dominant discourses in nursing research in LMIC that strongly support postpositivist, biomedical knowledge (Al-Rafay and Al-Sharkawy, 2012; Frey, 2017; Gelano et al., 2018; Kamhawy et al., 2014; Nayak et al., 2019; Roveshty et al., 2020; Samarasekera, 2010; Usman et al., 2007; Sousan Valizadeh et al., 2018).

Biomedical knowledge is a valuable and necessary part of nursing knowledge, although it must be considered whether contextual influences are impacting nursing knowledge production. For example, three articles in our review discuss task shifting and seek to evaluate its effectiveness in reducing neonatal health inequities (Gathara et al., 2018; McKnight et al., 2020; Nzinga et al., 2019). Understanding that nurses in LMIC are commonly taking on roles historically occupied by physicians, we suggest it is necessary to consider whether this alters research priorities and processes.

Further, the notion of trickle-down science is worth considering. This encompasses the idea that effective interventions from high-income

countries will naturally diffuse into practice settings in LMIC (Reidpath and Allotey, 2019). If neonatal nurses in LMIC are primarily influenced by biomedical research, it could also be contributing to the unequal distribution of research priorities. A substantial portion of the literature we reviewed took a deficit-based approach, focusing on the lack of education among nurses and evaluation of the effectiveness of neonatal nursing care (Gathara et al., 2018; Guiles et al., 2016; James et al., 2007; Kalyan and Vatsa, 2014; Murphy et al., 2018; Omondi et al., 2018; Phuma-Ngaiyaye et al., 2017; Premji et al., 2013; Sathish et al., 2019; Vatsa, 2008; Wari et al., 2021). We suggest that the subtle narrative underscoring this literature is the problematization of neonatal nursing in LMIC. It comes with the assumption that poor neonatal outcomes are determined by poor nursing care with little consideration for the structures in place that limit the capabilities of nurses. Further, when such studies are conducted without nursing representation, it serves to silence the nursing voice, perpetuating the lack of representation in global health research. It is interesting to see physicians undertaking studies for nursing knowledge (Amin et al., 2015; McKnight et al., 2020; Nzinga et al., 2019). In a way, we could interpret this as physicians acknowledging the central role nurses play in neonatal outcomes in LMIC, but in another way, it underscores that nurses are not always included in generating knowledge of themselves. This is further supported by the publication of these research findings in non-nursing journals (Amin et al., 2015; McKnight et al., 2020; Nzinga et al., 2019). We argue that the dichotomy of knowledge of neonatal nurses in LMIC being produced by non-nursing researchers in high-income countries needs to be addressed.

5. Limitations

While our scoping review has served to provide a comprehensive overview of the representation of neonatal nursing in LMIC in global health research, there are several limitations to this work. First, our conceptualization of the term ‘representation’ is subjective in focusing on publications as evidence of nursing research in LMIC. Second, the term global health research is derived from a Western interpretation of academic productivity indicated in research output. Consequently, this narrow definition precludes consideration of research activities conducted by nurses in LMIC high-income countries that may not conform to these standards. Examples of this include quality improvement, protocols, and policies that constitute forms of research. Further, this excludes culturally grounded forms of inquiry that are more relevant to the context and the population. Additionally, given the context of LMIC, using the English language as a limiter likely excludes a variety of studies from our review such as those done locally and not disseminated or available through the utilized search strategy. Finally, 31 articles represent a small sample, and conclusions derived from our scoping review may not be entirely representative.

6. Conclusion

Local nursing-led research is necessary to improve neonatal outcomes in LMIC; however, the representation of neonatal nursing in these countries in global health research is extremely limited. Literature that exists primarily describes challenges in neonatal nursing or provides practice-specific knowledge for nurses to utilize. Further, research exploring knowledge of nurses that does exist has been entirely driven by Western, non-nursing perspectives. We believe neonatal nurses in LMIC occupy a unique and powerful position that can improve overwhelming neonatal health inequities. It is essential to support local nurses in deriving nursing-specific knowledge and to continually challenge Western notions of research to honour the contributions neonatal nurses in low and lower-middle income are making to research despite limited formal recognition in academic publications.

Declaration of competing interest

None.

References

- Adhena, B.M., Ahmadi, A., Ansariadi, A., Arora, M., Atre, S.R., Basaleem, H., Bassat, Q., Belay, Y.A., Bensenor, I.M., Bernabe, E., Biadgo, B., Bikbov, B., Campos-Nonato, I.R., Cárdenas, R., Çavlin, A., Chaiah, Y., Champs, A.P., Chang, H.-Y., Chitbeer, A., Woodside, A., 2018. Global, regional, and national age-sex-specific mortality and life expectancy, 1950–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet (British edition)* 392 (10159), 1684–1735. [https://doi.org/10.1016/S0140-6736\(18\)31891-9](https://doi.org/10.1016/S0140-6736(18)31891-9).
- Al-Rafay, S.S., Al-Sharkawy, S.S., 2012. Educational outcomes associated with providing a comprehensive guidelines program about nursing care of preterm neonates receiving total parenteral nutrition. *Clin. Nurs. Res.* 21 (2), 142–158. <https://doi.org/10.1177/1054773811417314>.
- Amin, A.A., Vankar, J.R., Nimbalkar, S.M., Phatak, A.G., 2015. Perceived stress and professional quality of life in neonatal intensive care unit nurses in Gujarat, India. *Indian Journal of Pediatrics* 82 (11), 1001–1005. <https://doi.org/10.1007/s12098-015-1794-3>.
- Arksey, H., O'Malley, L., 2005. Scoping studies: towards a methodological framework. *Int. J. Soc. Res. Methodol.* 8 (1), 19–32. <https://doi.org/10.1080/1364557032000119616>.
- Beran, D., Byass, P., Gbakima, A., Kahn, K., Sankoh, O., Tollman, S., Witham, M., Davies, J., 2017. Research capacity building—obligations for global health partners. *Lancet Global Health* 5 (6), e567–e568. [https://doi.org/10.1016/S2214-109X\(17\)30180-8](https://doi.org/10.1016/S2214-109X(17)30180-8).
- Canadian Drug and Health Technology Agency, 2022. Grey matters: a tool for searching health-related grey literature. <https://greymatters.cadth.ca>.
- Coster, S., Watkins, M., Norman, I.J., 2018. What is the impact of professional nursing on patients' outcomes globally? An overview of research evidence. *Int. J. Nurs. Stud.* 78, 76–83. <https://doi.org/10.1016/j.ijnurstu.2017.10.009>.
- Donaldson, S.K., Crowley, D.M., 1978. The discipline of nursing. *Nurs. Outlook* 26 (2), 113.
- Edwards, N., Webber, J., Mill, J., Kahwa, E., Roelofs, S., 2009. Building capacity for nurse-led research. *Int. Nurs. Rev.* 56 (1), 88–94. <https://doi.org/10.1111/j.1466-7657.2008.00683.x>.
- Franzen, S.R., Chandler, C., Lang, T., 2017. Health research capacity development in low and middle income countries: reality or rhetoric? A systematic meta-narrative review of the qualitative literature. *BMJ Open* 7 (1), e012332. <https://doi.org/10.1136/bmjopen-2016-012332>.
- Frey, R., 2017. Malawi nurse leads effort to decrease neonate hypothermia. *Sigma Theta Tau Newsletter*. <https://nursingcentered.sigmanursing.org/news/top-news/Vol43-2-malawi-nurse-leads-effort-to-decrease-neonate-hypothermia>.
- Garrard, J., 2020. In: *Health Sciences Literature Review Made Easy*, sixth ed. Jones & Bartlett Learning, LLC. <https://go.exlibris.link/m0YbQ8cv>.
- Gathara, D., Serem, G., Murphy, G.A.V., Abuya, N., Kuria, R., Tallam, E., English, M., 2018. Quantifying nursing care delivered in Kenyan newborn units: protocol for a cross-sectional direct observational study. *BMJ Open* 8 (7), e022020. <https://doi.org/10.1136/bmjopen-2018-022020>.
- Gelano, T.F., Bacha, Y.D., Assefa, N., Motumma, A., Roba, A.A., Ayele, Y., Tsigie, F., 2018. Acceptability of donor breast milk banking, its use for feeding infants, and associated factors among mothers in eastern Ethiopia. *Int. Breastfeed. J.* 13 (1) <https://doi.org/10.1186/s13006-018-0163-z>, 23–23.
- Guiles, S., Lemons, J., Trautman, M., Bucher, S., Songok, J., Gisore, P., 2016. The implementation of a neonatal nurse training program at the riley mother baby hospital of Kenya. *N. born Infant Nurs. Rev.* 16 (4), 184–189. <https://doi.org/10.1053/j.nainr.2016.09.031>.
- James, J., Tiwari, L., Swahney, P., Srinivas, V., Francis, R.M., Kumar, N., 2007. Observational sickness assessment by the NICU staff nurses. *Indian Journal of Pediatrics* 74 (2), 123–125. <https://doi.org/10.1007/s12098-007-0002-5>.
- Kalyan, G., Vatsa, M., 2014. Neonatal nursing: an unmet challenge in India. *Indian Journal of Pediatrics* 81 (11), 1205–1211. <https://doi.org/10.1007/s12098-014-1567-4>.
- Kamhawly, H., Holditch-Davis, D., Al-Sharkawy, S., Alrafay, S., Corazzini, K., 2014. Non-nutritive sucking for preterm infants in Egypt. *J. Obstet. Gynecol. Neonatal Nurs.* 43 (3), 330–340. <https://doi.org/10.1111/1552-6909.12310>.
- Kasprowicz, V.O., Chopera, D., Waddilove, K.D., Brockman, M.A., Gilmour, J., Hunter, E., Kilembe, W., Karita, E., Gaseitsiwe, S., Sanders, E.J., Ndung'u, T., 2020. African-led health research and capacity building— is it working? *BMC Publ. Health* 20 (1). <https://doi.org/10.1186/s12889-020-08875-3>, 1104–1104.
- Manley, B.J., Doyle, L.W., Davies, M.W., Davis, P.G., 2015. Fifty years in neonatology. *J. Paediatr. Child Health* 51 (1), 118–121. <https://doi.org/10.1111/jpc.12798>.
- McKnight, J., Nzinga, J., Jepkosgei, J., English, M., 2020. Collective strategies to cope with work related stress among nurses in resource constrained settings: an ethnography of neonatal nursing in Kenya. *Soc. Sci. Med.* 245, 112698. <https://doi.org/10.1016/j.socscimed.2019.112698>.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., Group, P., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 339 (7716), 332–336. <https://doi.org/10.1136/bmj.b2535>.
- Murphy, G.A.V., Omondi, G.B., Gathara, D., Abuya, N., Mwachiro, J., Kuria, R., Tallam-Kimayi, E., English, M., 2018. Expectations for nursing care in newborn units in Kenya: moving from implicit to explicit standards. *BMJ Glob. Health* 3 (2), e000645. <https://doi.org/10.1136/bmjgh-2017-000645>. –e000645.
- Nayak, B.S., Lewis, L.E., Margaret, B., Bhat, Y.R., Dalmeida, J., Phagdol, T., 2019. Randomized controlled trial on effectiveness of mHealth (mobile/smartphone) based Preterm Home Care Program on developmental outcomes of preterms: study protocol. *J. Adv. Nurs.* 75 (2), 452–460. <https://doi.org/10.1111/jan.13879>.
- Nzinga, J., McKnight, J., Jepkosgei, J., English, M., 2019. Exploring the space for task shifting to support nursing on neonatal wards in Kenyan public hospitals. *Hum. Resour. Health* 17 (1). <https://doi.org/10.1186/s12960-019-0352-x>, 18–18.
- Omondi, G.B., Serem, G., Abuya, N., Gathara, D., Stanton, N.A., Agedo, D., English, M., Murphy, G.A.V., 2018. Neonatal nasogastric tube feeding in a low-resource African setting - using ergonomics methods to explore quality and safety issues in task sharing. *BMC Nurs.* 17 (1) <https://doi.org/10.1186/s12912-018-0314-y>, 46–46.
- Phuma Ngaiyaye, E.E., Adejumo, O., Dartey, A.F., 2017. Challenges in neonatal nursing clinical teaching to nurse-midwife technicians in Malawi. *J. Nurs. Educ.* 56 (4), 215–221. <https://doi.org/10.3928/01484834-20170323-05>.
- Premji, S.S., Spence, K., Kenner, C., 2013. Call for neonatal nursing specialization in developing countries. *MCN Am. J. Matern./Child Nurs.* 38 (6), 336–342. <https://doi.org/10.1097/NMC.0b013e31829f2c94>.
- Reidpath, D.D., Allotey, P., 2019. The problem of 'trickle-down science' from the global north to the global south. *BMJ Glob. Health* 4 (4), e001719. <https://doi.org/10.1136/bmjgh-2019-001719>. –e001719.
- Rodgers, B.L., 2005. In: *Developing Nursing Knowledge: Philosophical Traditions and Influences*. Lippincott Williams & Wilkins. <https://go.exlibris.link/4w1mZ8X4>.
- Roveshty, M.A., Farahani, A.S., Memaryan, N., Rassouli, M., 2020. Effect of spiritual care on hope and self-transcendence of mothers of premature neonates hospitalized in the neonatal intensive care unit. *Iranian Journal of Neonatology* 11 (4), 106–113. <https://doi.org/10.22038/ijn.2020.42178.1700>.
- Samarasekera, 2010. Regina Obeng—dedicated to improving newborn health in Ghana. *The Lancet (British edition)* 376 (9757). [https://doi.org/10.1016/S0140-6736\(10\)62250-7](https://doi.org/10.1016/S0140-6736(10)62250-7), 1979–1979.
- Sathish, Y., Lewis, L.E., Noronha, J.A., Nayak, B.S., Pai, M.S., Altimier, L., 2019. Promoting developmental supportive care in preterm infants and families in a level III neonatal intensive care unit (NICU) setting in India. *Nurse Educ. Pract.* 40, 102612. <https://doi.org/10.1016/j.nepr.2019.08.006>.
- Schneider, H., Maleka, N., 2018. Patterns of authorship on community health workers in low- and middle-income countries: an analysis of publications (2012–2016). *BMJ Glob. Health* 3 (3), e000797. <https://doi.org/10.1136/bmjgh-2018-000797>. –e000797.
- Segrott, J., McIvor, M., Green, B., 2006. Challenges and strategies in developing nursing research capacity: a review of the literature. *Int. J. Nurs. Stud.* 43 (5), 637–651. <https://doi.org/10.1016/j.ijnurstu.2005.07.011>.
- The World Bank, 2022. World Bank country and lending groups. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>.
- Thoun, D.S., Tschanz, C.L., 2021. More than words? Embracing a practice-care distinction for nursing practice education. *Nurs. Sci. Q.* 34 (2), 149–156. <https://doi.org/10.1177/0894318420987175>.
- Trostle, J., 1992. Research capacity building in international health: definitions, evaluations and strategies for success. *Soc. Sci. Med.* 35 (11), 1321–1324. [https://doi.org/10.1016/0277-9536\(92\)90035-o](https://doi.org/10.1016/0277-9536(92)90035-o).
- Usman, S., Butt, Z.A., Rattani, S., Somani, N., 2007. Application of neurobiologic risk score in a tertiary care hospital in Pakistan. *J. Pediatr. Nurs.* 22 (5), 419–423. <https://doi.org/10.1016/j.pedn.2007.08.014>.
- Valizadeh, S., Mirlashari, J., Navab, E., Higma, W., Ghorbani, F., 2018. Fathers: the lost ring in the chain of family-centered care: a phenomenological study in neonatal intensive care units of Iran. *Adv. Neonatal Care: official journal of the National Association of Neonatal Nurses* 18 (1), E3–E11. <https://doi.org/10.1097/ANC.0000000000000449>.
- Vatsa, M., 2008. Current scenario of neonatal nursing in India and the way forward. *Journal of Neonatology* 22 (2), 79–82. <https://doi.org/10.1177/0973217920080202>.
- Veritas Health Innovation, 2019. Covidence. www.covidence.org.
- Walsh, A., Brugha, R., Byrne, E., 2016. "The way the country has been carved up by researchers": ethics and power in north-south public health research. *Int. J. Equity Health* 15 (1). <https://doi.org/10.1186/s12939-016-0488-4>, 204–204.
- Wari, G., Wordofa, B., Alemu, W., Habte, T., 2021. Knowledge and practice of nurses and associated factors in managing neonatal pain at selected public hospitals in addis Ababa. *J. Multidiscip. Healthc.* 14, 2275–2286. <https://doi.org/10.2147/JMDH.S322903>. Ethiopia, 2020.
- World Health Organization, 2020. Nursing and midwifery. <https://www.who.int/news-room/fact-sheets/detail/nursing-and-midwifery>.
- World Health Organization, 2022. Neonatal mortality. <https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021>.