

Continued nursing education in low-income and middle-income countries: a narrative synthesis

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ABSTRACT

Introduction Continued nursing education and development can reduce mortality and morbidity of patients and can alleviate the shortage of healthcare workers by training of nurses for high-demand skill sets. We reviewed patterns of educational interventions and strategies in initiating behaviour change, improving patient outcomes or knowledge for nurses in low- and middle-income countries (LMICs).

Methods The study searched the MEDLINE (PubMed), Embase, CINAHL, Google Scholar and Web of Science databases. The study included interventional studies on continued nursing education from 2007 to 2017. Of the 6216 publications retrieved, 98 articles were included and analysed by three independent reviewers.

Results Of the 98 studies that met inclusion criteria, five were randomised controlled trials, two were qualitative in design and the remaining 91 were quasi-experimental, before-and-after studies. Of these studies, the median sample size of participants was 64, and the majority were conducted in Asia (53.1%). During the 10-year study period, 20.4% was conducted in 2015, the highest proportion, with a general increase in number of studies over time from 2007 to 2017. Main themes that arose from the review included train-the-trainer models, low-dose/high-frequency models, use of multiple media for training, and emphasis on nurse empowerment, strong international partnerships, and the integration of cultural context. Overall, the studies were limited in quality and lacked rigorous study design.

Conclusion Continued nursing education in LMICs is essential and effective in improving nurses' knowledge base, and thus patient outcomes and quality of care. Long-term, randomised studies are needed to understand how training strategies compare in impact on nurses and patients.

INTRODUCTION

With the WHO projecting a global shortage of 12.9 million health workers by 2035, of which nurses and midwives constitute more than 50%, innovative models of service delivery and staffing are necessary to mitigate the problems these shortages will cause.^{1,2} Of the current shortage, cited as 7.2 million, the majority of the deficit is observed in low- and

Key questions

What is already known?

- The existing evidence on continued nursing education by Horntvedt *et al* (2018) identified seven studies and described strategies such as interactive teaching strategies, interactive and clinical integrated teaching strategies, learning outcomes, and barriers.
- There is a dearth of literature on the effect of teaching and learning strategies within nursing education and an overall inability to assess whether this training improves nursing practice.

What are the new findings?

- This review is the largest and only study of its kind that focuses on continued nursing education in low- and middle-income countries (LMICs)—the areas most severely impacted by the health worker shortage
- Our work builds on prior literature and demonstrates the need for more experimental study designs to better study and analyse practices regarding continued nursing education in LMICs.

What do the new findings imply?

- This paper encourages the further study of promising elements in interventional strategies that have been tried in delivering and improving continued nursing education in LMICs, which includes the train-the-trainer model, the low-dose/high-frequency strategy, the use of multiple modalities, the focus on nurse empowerment, the formation of strong local partnerships and the integration to the cultural context.
- Beyond this, our paper highlights the dearth of empirical evidence on the matter, which should spark urgency in governments and other stakeholders to invest in filling this gap due to extensive implications continued nursing education has on quality of healthcare globally, especially in the context of the global healthcare workforce shortage we referenced in this paper.

middle-income countries (LMICs). Components contributing to this shortage include an ageing health workforce, fewer young people entering and a growing world population.³ However, increasing the sheer number of



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healthcare workers is only one aspect of creating access to safe care for the world’s population.¹ Another primary challenge is ensuring that the global population has access to well-trained and competent health staff.² Gaps in practice and knowledge lead to poor outcomes. When combined with a lack of financial resources, severe staff shortages and lack of healthcare infrastructure, these gaps in knowledge and clinical practice can disproportionately affect LMICs.³

In observing the disparate burden of illnesses on communities in LMICs, Buser *et al* and several other investigators found an unmet need for training and education to handle diseases and interventions in these communities.⁴⁻⁷ Recently, initiatives sponsored by the Robert Wood Johnson Foundation, the Institute for Healthcare Improvement, the Bill & Melinda Gates Foundation, and the Global Fund to Fight AIDS, Tuberculosis and Malaria have focused on improving the work environment to attract nursing staff and to provide continuing education to healthcare workers.^{8,9} However, while the importance of continued nursing education has been described, the specific training interventions have not been rigorously studied with regards to efficacy of design and long-term outcomes.¹⁰

There are implications on patient outcomes associated with inadequately trained nurses. This is especially true

in LMICs where the deficit in health workforce is greatest and the existing infrastructure the most challenging. Due to the gap in the literature on the quality and best practices of nursing education in LMICs, and the high impact training has on healthcare outcomes around the world, we conducted a narrative synthesis to summarise and analyse the evidence that does exist on continuing nursing education in LMICs. The purpose of this study is to aggregate over-arching themes of nursing education programme implemented LMICs and describe the most commonly used educational interventions and strategies.

METHODS

Data sources and search strategy

We used a curated search strategy for the electronic databases MEDLINE (PubMed), Embase, CINAHL, Web of Science and Google Scholar to select studies from 2007 to 2017 in the broad domain of continuing nursing education. Databases were searched using the following MeSH headings: ‘Nursing’, ‘Continuing education’, ‘Training’, ‘Professional development’, ‘LMIC’ and ‘Developing countries’. These articles were reviewed by members of the study team. Summaries with main outcomes measures were entered into a computerised and retrievable format using EndNote X8 and Excel.

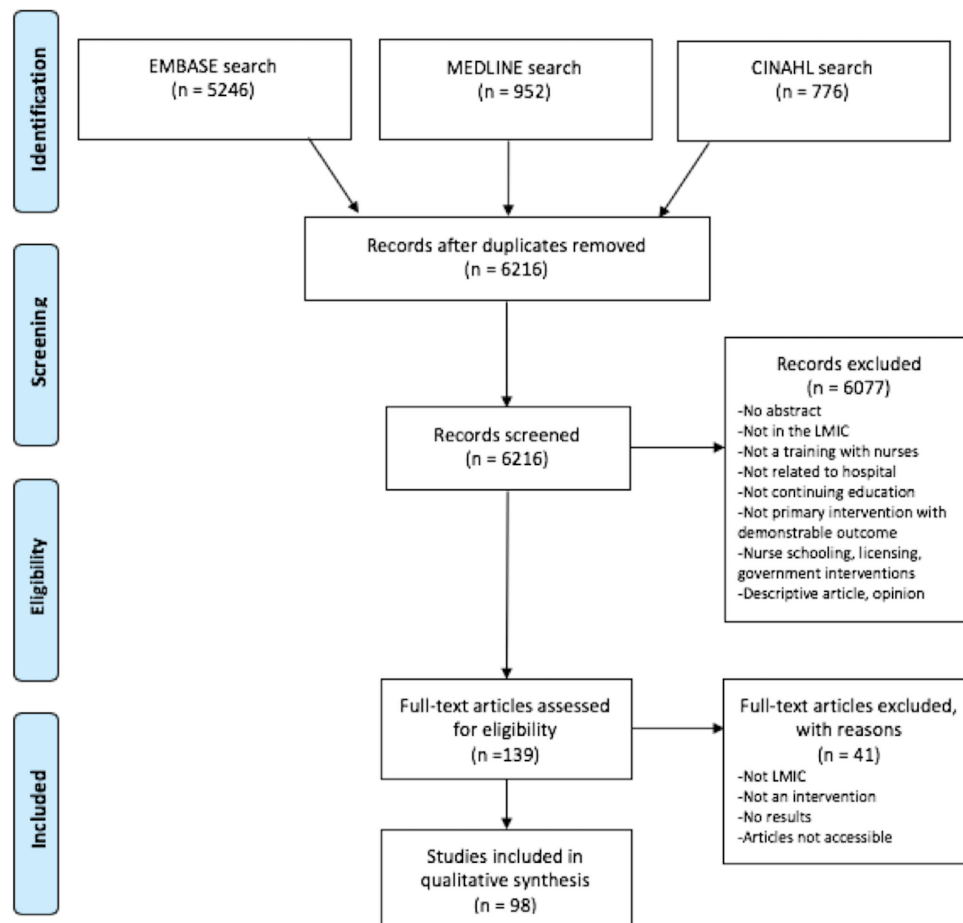


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analysis diagram of article selection.

Selection criteria

Inclusion criteria were as follows: primary source and peer-reviewed studies that analysed an educational intervention to improve nursing care provided by practicing nurses, were conducted in LMICs and published since 2007. Only those interventions that collected objective data pre-implementation and post-implementation were assessed. Studies were chosen from a 10-year span to maximise the number of studies while maintaining relevancy. Exclusion criteria were as follows: any study lacking formal analytic methodology or conducted outside of a healthcare setting; studies with interventions implemented within nursing school curricula, licensing exams or governmental programme; editorial or narrative reviews; and studies not written in English.

Data extraction

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis checklist and flowsheet to guide the reporting of this review (figure 1). Independent review authors (AA, JM and SS) removed duplicates and undertook initial screening of titles and abstracts to remove those clearly outside the scope of the review from the original 6216 articles that resulted from the database query. This process excluded 6077 articles and resulted in unique articles from only three of the five databases: Embase, CINAHL and MEDLINE (PubMed). From the remaining 139 articles, the full-text papers were reviewed and those that met the inclusion criteria were included in the final analysis. Any disagreements on inclusion of

studies were resolved with discussion among reviewers. Prior to any study exclusion, the review team agreed on a data extraction form which enabled each reviewer to collect data from the included studies. Information about setting type, location, sample size, population focus, study design type, intervention, main outcome measures and results were extracted.

Patient and public involvement

This research was done without patient or public involvement. Patients/public were not invited to comment on the study design and were not consulted to develop patient/public relevant outcomes or interpret the results. Patients/public were not invited to contribute to the writing or editing of this document for readability or accuracy.

RESULTS

At the time of preparation of this review, the initial search contained 6216 articles on the broadly defined topic of continuing nursing education. Of these, 98 met our criteria for inclusion. To describe the various aspects of effective nursing training interventions, we identified these main components from a review of the limited literature on continuing nursing education: training strategies, such as train-the-trainer model; training aids, such as live simulations, nurse empowerment, partnerships, cultural context and evaluation of the interventions (table 1).

Table 1 Major themes of continued nursing education

Theme	Description
Training strategies	
<i>Train-the-trainer</i>	The train-the-trainer model allows for scalability of training to prepare those who deliver training for knowledge dissemination to large numbers of trainees
<i>Short, repeated education</i>	The low-dose, high-frequency training approach is defined as short, targeted learning activities that are spaced out over time and reinforced with ongoing review sessions to reinforce learnt material and introduce new material
<i>Comprehensive education with multiple modalities</i>	The use of interactive techniques to engage the learner, provide simulated practice and offer feedback to suit each participant's needs
Training aids	Training aids can help participants whose learning styles vary. Types of aids can be broken down into three subcategories: paper-based supplements, audiovisual learning modalities and simulation models
Nurse empowerment	The empowerment of nurses to perform at high levels within their responsibilities and take on leadership roles in practice is crucial to improve patient outcomes and teamwork in healthcare settings
Partnerships	Collaborations between institutions in high-income and low/middle-income countries draw on the expertise, skills, knowledge and resources acquired in high-income countries to aid in the delivery of care in low-resource settings
Cultural context	To design an effective training that is specific to a community, an understanding of the values, language, culture and attitudes of a given population is essential for communication and interaction
Assessment/feedback	Short-term and long-term assessment and feedback are essential to evaluate the effectiveness and impact of a training. It is crucial to have participant feedback to tailor the training for long-term knowledge retention and behaviour change

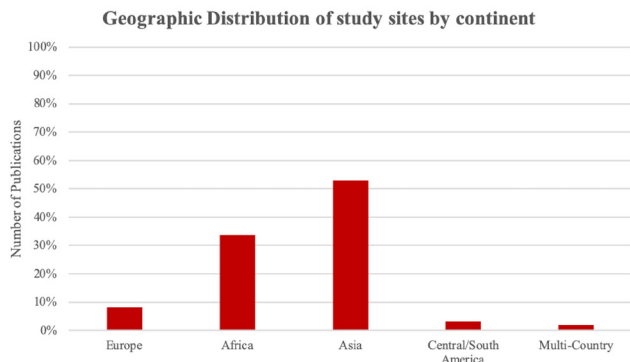


Figure 2 Geographic distribution of study sites by continent.

Description of studies

In all, 91 of the 98 studies were quasi-experimental in design, lacking the element of random assignment to treatment and control groups. Five studies were classified as true randomised controlled trials (RCTs) and two studies were purely qualitative in design. Median sample size included 64 participants with an interquartile range of 9-127 —either nurses, physicians or a combination of both. The majority of the studies (53.1%) were conducted at a single institution, meaning only implemented at one site, in Asia. Thirty-four per cent were conducted in Africa and only 2.0% included multiple study sites (figure 2). During the 10-year study period (2007–2017), there was an increase in the number of studies over time with the greatest percentage (20.4%) occurring in 2015 (figure 3).

Training strategies

Training strategies were analysed to better understand commonly used practices for continuing nursing education. Three distinct categories were yielded.

Train-the-trainer

The train-the-trainer model is an educational strategy whereby individuals identified to teach, mentor and train others attend training themselves before multiplying the dissemination of knowledge to large numbers of trainees. Several articles discussed the benefits of the train-the-trainer model in cascading newly acquired

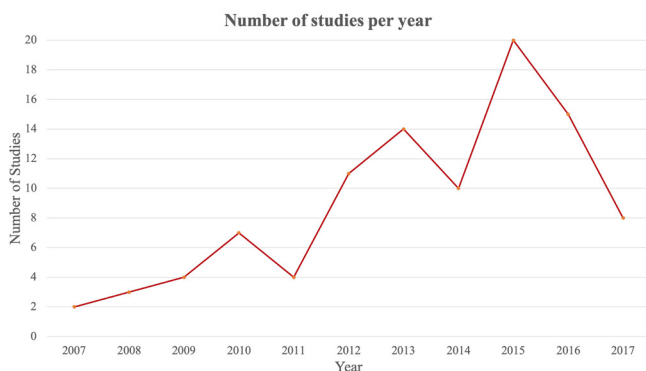


Figure 3 Number of studies per year.

nursing skills through the hierarchy of nursing care. Williams *et al* demonstrated the capacity of train-the-trainer programme to reach upwards of 60 000 health-care workers to improve knowledge and treatment of HIV in Cambodia.¹¹ Goucke *et al* reported a similarly significant rate with the training of 340 instructors and programme delivery to 1600 local health workers in 30 countries.¹² The effectiveness of these large-scale training programme meant to optimise transmission of information is also based on the evidence of these articles. Several articles cited a significant improvement in post-intervention test scores regarding trainee knowledge of themes. Goudar *et al* were able to demonstrate a reduction in stillbirths without increasing neonatal mortality with the Helping Babies Breathe training and train-the-trainer cascade.¹³ Qualitatively, Thukral *et al* indicated that the Essential Care for Every Baby programme with a train-the-trainer cascade was associated with an increase in confidence alongside an improvement in post-training test scores and clinical evaluation.¹⁴ Holm *et al* noted that the train-the-trainer model improved communication between healthcare staff and improved job satisfaction.¹⁵

Short, repeated education

Another category of training strategies was the low-dose, high-frequency approach, which is defined as short, targeted learning activities that are spaced out over time and reinforced with ongoing practice sessions to review material learnt and introduce new material. Four studies were able to demonstrate positive behaviour change, such as increased incidence of cannula securement post-training,¹⁶ with this targeted learning approach and reinforcement sessions ranging from 10 to 45 min in length.¹⁶⁻¹⁹ Harerimana showed that a comparison between a single longer training (11 days) and a shorter training (6 days) showed no difference in nurses’ ability for classification and treatment of childhood illnesses.²⁰ Many studies endorsed the importance of short, repeated education as a strategy leading to greater retention of knowledge and skills.²¹⁻²⁴

Comprehensive education with multiple modalities

The third category characterised the use of multiple modalities and tools to aid the training process and accommodate trainees’ different learning styles. While many studies broadly encouraged the use of several teaching modalities, only 11 studies described the modes employed in detail.²⁵⁻²⁷ Of these studies, the most common approach combined lecture-based learning with practical application. The theory-based content included interactive classes, self-learning materials and web-based didactic lectures.²⁸⁻³¹ There was more diversity of methods within the practical applications, including hands-on practice, role-play, online simulation and video demonstrations.³²⁻³⁸ The efficacy of multiple modalities in training was demonstrated by improved post-intervention scores, patient care and clinical skills in many of these studies. More directly related to health outcomes, Walker *et al* were able to demonstrate a short-term decrease

in incidence of caesarean deliveries at 8 months at a hospital in Mexico after training using a combination of simulations, skill-building sessions, videos and planning sessions; however, a subanalysis was not conducted to analyse differences between these methods.³³

Training aids

In total, 20 studies described the use of teaching aids, defined as supplemental materials outside of designated training time, as part of a continuing education intervention. These aids can be broken down into three subcategories: paper-based supplements, audiovisual learning modalities, and simulation models.

Paper-based supplements were either utilised as the primary form of continuing education or as adjuncts to more comprehensive interventions. Hirschhorn *et al* described an adaptive design approach to the WHO Safe Childbirth Checklist to instil internal commitment and motivation that resulted in improved nursing ability to take maternal blood pressure, measure postpartum oxytocin levels and initiate timely breastfeeding.³⁹ Studies also indicated effectiveness of using information booklets and WHO posters to improve knowledge and performance.

Audiovisual aids took multiple forms including video presentations, online modules and smartphone apps to transmit information on demand directly to nurses. Jain *et al* showed that when compared with traditional in-person lectures, tele-education, consisting of live interactive sessions via a television screen, was an effective alternative in improving nurses' knowledge.⁴⁰ In response to in-country technological infrastructure constraints, Diedhiou *et al* demonstrated the effectiveness of a prototypical mobile learning system that employed interactive voice response and text messaging to provide in-service training that could be accessed from most simple mobile phones.²¹

The last major category of learning aids described was simulation models to provide practice and improve both knowledge and clinical performance. Many studies demonstrated some level of effectiveness after training with commercially available models. A sixth by Tran *et al* indicated that the use of a teacher-made, in-house simulation model could be just as effective in improving clinical performance of intravenous injections.⁴¹

Nurse empowerment

Multiple studies reported the importance of continuing nursing education to empower nurses to perform at high levels within their duties and take leadership roles both explicitly in training and implicitly through acquisition of skills and knowledge. Specifically, the discussion focused on the insufficiency of solely instilling knowledge or skills in nurses, but that it was necessary to also develop a sense of motivation and self-efficacy in performing tasks and implementing changes in their day-to-day work.⁴²⁻⁴⁴ For example, Brennan *et al* showed increased self-efficacy through self-reported measures in 41 nurses in conjunction with increased knowledge on intubation methods.⁴⁴ One study recognised the importance of empowerment

especially when training for task shifting, which is defined as the delegation of tasks to less specialised health workers.⁴⁵ The sense of empowerment and increasing confidence are also important for nurses in communication with their healthcare teams and bringing about change in their respective environments.^{11 46}

Partnerships

Institutional partnerships with academic hospitals in high-income countries, manifesting as long-term trainee and educator relationships, were described in many studies to streamline efforts and integrate support for training in LMICs. These collaborations, also known as international twinning, draw on multiple training approaches and the expertise of the health workforce at a particular institution to support health systems in LMICs.⁴⁷ Crofts *et al* demonstrated the efficacy of partnerships by involving Zimbabwean expatriates with experience working in high-resource settings abroad in the training process.⁴⁸ De Silva *et al* and Kohi *et al* also supported collaboration with overseas experts, Oxford University and University of California San Francisco, respectively, and reported improvement in post-course clinical assessments and trainee confidence.^{49 50} It should be noted that partnerships with non-governmental organisations play a large role in training healthcare workers in LMICs, but were not included in this narrative synthesis due to a lack of peer-reviewed publications from these efforts.

Cultural context

When administering trainings across cultures, specifically to remote or rural cultural groups within countries, the importance of context and cultural relativism cannot be overlooked. Beliefs among nurses and other healthcare providers can differ about healthcare administration and patient care across a distance of a few kilometres or ethnic boundaries. The studies in this review offered many approaches to navigating the cultural challenges that training in LMICs can offer, such as adapting the language used in trainings, navigating local barriers to education, obtaining endorsement of the training by local administrators and understanding the limitations of infrastructure often seen in LMICs.^{48 51-53}

Assessment/feedback

In all, 14 studies indicated the use of continuous feedback and assessment of results in their interventions. Jayanna *et al* utilised a one-on-one mentor model, in which the training was continuously improvised and tailored to the mentees needs.⁵⁴ Other studies also utilised feedback from initial assessments to guide later stages of their education plans. While not all studies utilised multiple time points for assessment of effectiveness, many indicated that it was necessary and crucial to understand long-term implications of these training interventions. On this note, Saramma *et al* indicated that while they observed significant knowledge and performance increases immediately after training, this effect was not observed when

subjects were reassessed a few years out.⁵⁵ This trend was observed in four other studies.^{37 56–58} Sarayani *et al* indicated that while this may be true for one training style such as didactic lectures, other training interventions like collaborative, brainstorming workshops demonstrate retained knowledge several months out.³⁸

DISCUSSION

Understanding patterns and practices in continuing nursing education is important to make progress against the ongoing global shortage of healthcare workers and to provide communities with increased access to high-quality care. The evidence derived from this review supports some clear conclusions regarding commonly used practices of continuing nursing education interventions. First, there is not a rigorous body of research assessing the outcomes of nurses' continuing education, as evidenced by the vast number of quasi-experimental articles included and minimal number of RCTs on educational interventions (online supplementary table 1). Of these, the limited sample sizes, inadequate quality of study design and majority single institution study sites demonstrate the need for further and more rigorous evaluation of nursing education strategies. Since the start of the defined study period, there have been an increase in frequency of interventions each year with the greatest number occurring in 2015. This may represent greater attention on the subject of shortage of healthcare workers that has been highlighted by several leading global health organisations in the recent past.

After careful examination of the findings and conclusions from 98 interventions for the purposes of improving continuing nursing education in LMICs, we were able to determine frequently used training strategies in studies that endorsed positive behavioural change, defined as a statistically significant change in at least one major outcome at the level of $p < 0.050$.⁵⁹ Facets of training that were tied to positive behavioural change in the trainees or improved health outcomes for patients included practical measures such as using training aids and engaging in short, repeated sessions. Other studies associated with a positive primary outcome were ones that addressed the cultural context of the target population, forming partnerships with international academic hospitals, and overall empowerment of nurses to be active decision-makers in the clinical setting.

An overarching theme that was demonstrated in the design of many studies included a high frequency, longitudinal approach with multiple training modalities. The significance of this finding is supported by educational research demonstrating the benefit of low-dose, high-frequency approach with improvements in healthcare outcomes.⁶⁰ Some interventions, however, demonstrated a positive behaviour change with a one-time training.^{61–64} Though longer training has the potential to increase the amount and retention of information, it was often cited

that this approach was not always feasible in terms of resources and availability of nurses.

The use of multifaceted educational material was also frequently described in the studies that demonstrated positive behavioural change in their target populations. This concept of utilising multiple media to encapsulate the best of each modality has been shown effective in other fields than global medicine.^{65 66} For example, a hybrid learning system that combines the best of web-based technology and traditional face-to-face interaction was shown to elicit mostly positive responses from a group of candidate elementary school teachers.⁶⁷ These interventions were reviewed to be effective because they allow the student to tailor the learning style to their strengths and foster connectivity and interactivity.

Several obstacles to training LMIC nurses were expressed in a few studies, such as disorganised public health infrastructure and diverse cultural contexts.⁶⁸ A method to navigate these issues included use of the train-the-trainer model, utilised by many initiatives including Jhpiego and WHO's essential obstetrics care programme and the Helping Babies Breath initiatives.¹³ This model bypasses many of the cultural and resource constraints of traditional teacher-to-student training because it recruits trainers from the local communities who are familiar with the healthcare systems and customs and can transmit the information to trainees exponentially. By doing so, the train-the-trainer model encourages scalability and cultural sensitivity that is crucial to the success of trainings in LMICs.

Another significant theme throughout this review was the concept of nurse empowerment. The importance of empowering this portion of the healthcare systems has been well described in the literature from high-income countries, but incorporation of this into continuing nursing education in LMICs demands more attention. Not only is there a growing recognition that significant efforts in delivering healthcare in the face of a shortage will depend on nurses having an equal platform as a part of an interdisciplinary healthcare team, but empowered nurses are effective nurses who can provide higher quality care.^{69 70} Some of the interventions studied reflect this, citing the need for nurses to increase in self-efficacy in the workspace and taking positions of leadership in making decisions on the behalf of patients. Unfortunately, in many LMICs, nurses remain undereducated and under-resourced, creating an uneven power dynamic that needs to be actively recognised and resolved.

While every effort was made to minimise the limitations of this study, the data itself are limited by the dearth of high-quality research. This study found a profound lack of rigorously designed studies to evaluate the effectiveness of continuing nursing education interventions in LMICs, a critique often cited in the global health literature.⁷¹ The studies included were of great variability in design and population that estimates of a cumulative impact and ideal design are of limited value. Major factors compounding this lack of evidence included lack of randomisation and of standardised

outcome measurement resulting in high rates of bias.^{71 72} Another limitation is the lack of information regarding training of nurses by non-governmental and non-profit organisations. We recognise that these groups support the training of thousands of nurses every year, but their outcomes are rarely published in peer-reviewed journals. Despite these limitations, our study serves the purpose of analysing and better understanding the best practices on continuing nurse education in LMICs.

CONCLUSIONS

The current study represents an effort to describe globally the qualities of continuing nursing education in the LMICs and the lessons derived from these interventions. Some of the themes that emerge from our analysis include the train-the-trainer model, the low-dose/high-frequency strategy, the use of multiple modalities, the focus on nurse empowerment, the formation of strong local partnerships and the integration to the cultural context. This is the first study of its kind that examines nursing education in the LMICs through a comprehensive literature review during the designated time period. The purpose of our endeavours was to provide best practices for the construction of educational interventions for nurses in the LMIC, an important facet in the effort to combat the dearth of healthcare workers that is projected to approach 12.9 million by 2030.

Correction notice This article has been corrected since it published online to include correct data in the result section of abstract.

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