

An Exploration of National Policies and Effective Practices for Electronic and Mobile Learning for Nursing and Midwifery Education

Patricia A. Abbott, Kathleen Omollo, Sue Anne Bell,
Gurpreet K. Rana, Nancy Hammond, Massy
Mutumba, Yun Jiang, and Rama Mwenesi

University of Michigan; Ann Arbor, Michigan. USA

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Contributors

Patricia A. Abbott, PhD, RN, FAAN, FACMI is an Associate Professor, Director of the Hillman Scholars Program in Nursing Innovation, and a member of the Office of Global Outreach at the University of Michigan School of Nursing. Dr. Abbott's research is focused on mHealth, eHealth, and distributed learning strategies in nursing education and practice. She is a current member of the WHO eHealth Technical Advisory Group as well as several other U.S. and international professional organisations. She was the founder of the Global Alliance for Nursing and Midwifery (GANM) electronic community of practice, and directed the Johns Hopkins School of Nursing's WHO/PAHO Collaborating Center for Knowledge Management for 9 years prior to her arrival in Michigan in 2013. She currently serves on the Editorial Board of the International Journal of Hispanic Nursing. Dr. Abbott is the lead of this project.

Kathleen Ludewig Omollo, MPP, MSI is the Department Strategist for the Department of Learning Health Sciences in the University of Michigan Medical School and an Associate of the Medical School Office of Global REACH (Research Education And Collaboration in Health). Ms. Omollo has nine years professional experience in information technology, policy, and project/program management roles spanning higher education, private industry, and the nonprofit sector. Kathleen has co-led educational technology partnerships with several regional health networks and has on-site, project experience with colleges and universities in Ethiopia, Ghana, South Africa, Kenya, and Liberia. Ms. Omollo is the co-lead of this project.

Sue Anne Bell, PhD, FNP-BC is a Clinical Associate Professor and a member of the Office of Global Outreach at the University of Michigan School of Nursing. Dr. Bell has practised nursing and conducted research globally, including Ghana, Ethiopia, India, Cambodia, and the Caribbean. Her global health focus includes the implementation of an emergency nursing specialization program in Kumasi, Ghana, as part of the Ghana Emergency Medicine Collaborative, and building nursing capacity in Ethiopia.

Gurpreet K. Rana, MLIS is the Global Health Coordinator and Health Sciences Informationist at the Taubman Health Sciences Library at the University of Michigan and a Faculty Associate of the Medical School Office of Global REACH (Research Education And Collaboration in Health). Ms. Rana develops instructional programs and collaborates on global health research initiatives internationally. Ms. Rana provides awareness of health information resources and information seeking strategies to the global health user community. She is experienced in expert literature searching and in developing integrated information skills curricula in health sciences education. She is the 2015-2016 Chair of the Medical Library Association Librarians Without Borders Advisory Committee.

Nancy Hammond, MEd, MHI Candidate, BSE is an instructional design and development professional with an emphasis in electronic and mobile learning systems. As an independent contractor, Ms. Hammond provides needs analysis and educational strategy, and instructional design, development, and deployment on behalf of organisations in a variety of industries. She is also experienced in project and team management and is the project manager for this report.

Massy Mutumba, PhD, MPH, RN is a midwife and a Research Fellow at the University of Michigan School of Nursing. She received her Doctorate and Masters of Public Health degrees at the University of Michigan and holds a Bachelor of Science in Nursing from Mbarara University of Science and Technology in Uganda. In addition to her clinical and research experience with paediatric HIV in Uganda, Kenya and USA, Dr. Mutumba has been involved in systematic reviews of the education curricula and resources for training baccalaureate nursing and standards for professional nursing practice in Uganda.

Yun Jiang, PhD, MS, RN is a Research Fellow at the University of Michigan School of Nursing. Dr. Jiang received her PhD in Nursing from the University of Pittsburgh, and holds a Bachelor of Medicine in Medical Information Science from the Hunan Medical University in Hunan, China. Dr. Jiang's research is in nursing informatics as well as technology-assisted health self-management and decision-making in patients with chronic illnesses and their families.

Rama Mwenesi, BSE, MSE Candidate is a Healthcare Engineering and Patient Safety Consultant at the University of Michigan Health System. He is also a Research Fellow at the University of Michigan specializing in nursing workforce capacity planning and development and institutional health policy implementation. As an entrepreneur, Mr. Mwenesi founded the ICT start-up E-MAGINE and brings experience in designing, developing and deploying ICTs for access to eLearning and informational resources in Brazil and Sub-Saharan Africa.

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Dr. Lori is a Professor, Associate Dean for Global Affairs, and Director of the WHO/PAHO Collaborating Center for Nursing and Midwifery at the University of Michigan School of Nursing. A Fellow in the American College of Nurse Midwives and the American Academy of Nursing, Dr. Lori's research focuses on the development of new models of care to address the high rates of maternal and neonatal mortality in sub-Saharan Africa. With diverse funding sources including NIH-Fogarty, United States Agency for International Development, and private foundations, she currently has research projects in Ghana, Liberia, and Zambia.

Dr. Toyama is the W.K. Kellogg Associate Professor of Community Information at the University of Michigan School of Information and former Assistant Managing Director of Microsoft Research India. His research is focused on understanding and evaluating the relationships between technology and global development. He is also author of *Geek Heresy: Rescuing Social Change from the Cult of Technology* and co-founder of the IEEE/ACM International Conference on Information and Communication Technologies and Development (ICTD).

Executive Summary

The shortages in the global nursing and midwifery workforce are undeniable and untenable. In the quest to scale up the production and deployment of nurses and midwives, various entities have undertaken major initiatives to increase access to learning opportunities, reform educational systems, re-align distribution with need, and bolster existing educational resources. The increasing availability of, and demand for, digital learning resources and opportunities (eLearning) as a potential tool for increasing the production of nurses and midwives is an area of growing interest and activity.

Using eLearning as a mechanism for nursing and midwifery scale-up is accompanied by both challenges and opportunities. As global connectivity increases, new avenues for digital content access and learning object distribution escalate. Collaboration and knowledge exchange opportunities increase, creating new avenues to educate and train the cadres of nurses and midwives that are needed to support universal care. At the same time, misguided or uninformed eLearning initiatives can divert precious resources from vitally needed health services, and distract governments from the matter at hand. Increasing the quantity of nurses and midwives without a matching commitment to improving quality is a short-sighted solution. Short-term gains may result in long-term losses without strategic planning and deep understanding.

As the pressures for digital innovation and workforce scale-up grow, so do the questions. In this regard, requests to the World Health Organization (WHO) for guidance are increasing. The complex interplay between policy, demographic and labour market changes, financing, emerging technologies, and critical nursing and midwifery workforce challenges drives national governments to the WHO. In response to this pattern of requests for assistance in planning investments and initiatives for nursing and midwifery scale-up, the WHO has commissioned this work by the University of Michigan.

Specifically, this report will address the following high-level goals: (1) to identify the range of policies and practices that need to be in place for successful adoption of electronic and mobile learning (e/mLearning) for nursing and midwifery education and (2) to provide policy recommendations for national governments looking to establishing national programs for e/mLearning for nursing and midwifery education. Using the framework of the eHealth Strategy Toolkit developed by the WHO and the International Telecommunication Union, the authors explore the seven environmental factors that can enable or hinder eLearning: Leadership and Governance; Strategy and Investment; Legislation, Policy, Compliance; Workforce; Standards and Interoperability; Infrastructure; and Services and Applications.

This report synthesises research conducted through a broad exploration of: (1) peer-reviewed academic literature; (2) un-indexed materials such as policy papers and governmental white papers, strategic plans, and program evaluations from licensing and accrediting bodies from nursing and midwifery organisations, educational institutions, conferences, and communities of practice across WHO regions and World Bank Income classifications; and (3) personal experiences of the authors' own first-hand

experience in eLearning implementation projects for health professions education. A total of fifty-seven key findings emerged.

Based on these findings and acknowledged limitations, the report includes policy recommendations for national ministries of health or similar institutions considering national-level eLearning for nursing/midwifery initiatives. A total of 57 recommendations are provided, which are included in each relevant environmental factor section as well as consolidated at the end of the report. The number of references, findings, and recommendations demonstrate the complexity involved in creating and executing a national-level eLearning plan for nursing and midwifery. There are notable instances of success of regional and institutional eLearning initiatives in nursing and midwifery that have resulted in an increased production of nurses, midwives, and other desperately needed health providers. These examples are also included as part of this report in Appendix 2.

The most salient points that recurred throughout the findings and touch on many of the environment factors are four-fold. **First**, strong, visible, and active leadership and political at the national level is necessary for training institutions to provide adequate infrastructure - equipment, people, and services - to effectively implement eLearning for pre-service and in-service training for nurses and midwives. **Second**, the human element - instructors, students, and support staff for nursing and midwifery education - of delivering eLearning is the linchpin for its success. **Third**, an eLearning program is a long-term financial commitment that often requires the mobilization of resources from national governments, regional consortia, donors, and corporate partners. **Lastly**, eLearning for nurses and midwives can take many forms in terms of methods and modalities and has been shown to be most effective in blended format, where the digital content is used to enhance in-person instruction.

The prevalence of eLearning in nursing and midwifery education continues to grow at a rapid pace. Many of the activities to date were initiated by well-intended, but short-sighted groups resulting in the sub-optimal, disconnected, and non-scalable eLearning projects that now exist in many countries. National governments, particularly Ministries of Health, Ministries of Education, and Ministries of ICT, have a critical leadership role to play in harmonizing these efforts and preventing further proliferation. It is important to understand that while eLearning has been shown to be method that can augment existing nursing and midwifery educational systems, it requires substantial investment of time and money, and does not supersede the need for skilled nursing and midwifery personnel. Furthermore, eLearning for nursing and midwifery depends upon on institutional capacity and deep commitment for nursing and midwifery education for pre-service and in-service training. If, and only if, these conditions are in place, can eLearning be a catalyst to expand the geographic reach of nursing and midwifery education; to standardise curriculum nursing and midwifery education across the country; to develop instructional materials that can be re-used and adapted across institutions; to develop a national and worldwide professional network of peers in nursing and midwifery as education and research collaborators, and to scale-up the production of qualified and well-prepared nurses and midwives.

1. Introduction, Aims and Methods

1.1 About this Report

The World Health Organization (WHO) eHealth team within the Knowledge, Ethics and Research Department commissioned the University of Michigan School of Nursing Office of Global Outreach to identify and describe a range of policies and practices that need to be in place for the successful adoption of electronic and mobile learning (e/mLearning) for nursing and midwifery education. This report was motivated by a pattern of requests to the World Health Organization from national governments and other national-level organisations for strategic advice on the adoption of technology-enhanced models for addressing the shortage of qualified nursing and midwifery workforce worldwide.

Many countries are planning for e/mLearning within their national eHealth strategies as an integral part of education for addressing the imbalance between the supply and demand for nursing and midwifery personnel. The complex interplay between policy, demographic, and labour market changes, emerging technologies, and critical nursing and midwifery workforce supply challenges has accelerated the need for high-level guidance to plan and coordinate eLearning investments and initiatives. In response, WHO requested the University of Michigan team identify and describe a range of policies and practices that need to be in place for the successful adoption of e/mLearning for nursing and midwifery education.

This report uses the following definition of e/mLearning: e/mLearning is an overarching concept, incorporating many different delivery modalities, which includes mobile learning (mLearning), blended learning (mixed modalities that may include the use of information communication technologies, also known as ICTs and face-to-face sessions), and/or self-contained digitally-oriented learning modules (electronic or eLearning) that can be used in the absence of access to telecommunication networks.¹

The terms eLearning, mLearning, and e/mLearning are hereafter abbreviated as eLearning.

1.2 Aims and Scope

This report aims to:

- Identify and discuss critical success factors and lessons from established programs for of eLearning (see definition in Section 1.1 About This Report) within nursing and midwifery
- Identify the range of policies and practices that need to be in place for successful adoption of eLearning for nursing and midwifery education (e.g. minimum competency; working with others sectors such as Ministry of Education, Ministry of Telecommunication and Ministry of Finance; all stakeholders; public-private-partnership; enabling environment including curriculum that can fit this model of delivery ; infrastructure; licensing and accreditation; etc.)
- Provide policy recommendations for national governments looking to establishing national eLearning programs for nursing and midwifery

The scope of this report:

- Focuses on nursing and midwifery education delivered via eLearning modalities, particularly formal degree training degree (pre-service) and for continuing education (in-service)
- Includes representative policies and existing programs distributed across the clusters in the WHO Regions and World Bank Income Group classifications (see Appendix 1)

The scope of this report does not include:

- Other eHealth initiatives for nursing and midwifery that focus on clinical care or research
- Ad-hoc or self-directed learning initiatives that are separate from formal training or certification programs in nursing and/or midwifery
- A systematic review of all eHealth or eLearning country policies
- A systematic review of all eLearning programs for nursing and midwifery education
- Detailed implementation strategies
- A review of resources in languages other than English

1.3 Structure of the Report

This report follows the structure of the enabling environment factors framework from the National eHealth Strategy Toolkit developed by WHO and ITU:² Leadership and Governance; Strategy and Investment; Legislation, Policy, Compliance; Workforce; Standards and Interoperability; Infrastructure; and Services and Applications. For each of the enabling factors, the authors explore the factor's relevance to eLearning for nursing and midwifery, synthesise findings from policies, guidelines, and implementation from the literature review, and provide policy recommendations for countries considering eLearning for nursing/midwifery initiatives.

The report is inclusive of materials gathered from across all clusters of the WHO Regions and World Bank Income Classifications (Appendix 1). The distribution of the classifications to each factor varies across the WHO and World Bank clusters, however a reasonable representation emerged. Appendix 2 provides a high-level of overview of select policies, regional collaborations, and projects that the authors identified as embodying best practices that may be useful models for national nursing and midwifery initiatives.

2. Background

2.1 eLearning Sector

The common prefixes of e-, m- tele-, and digital in the names of educational initiatives signal the growth of the penetration of technology within the educational sector. This trend has included all levels of education, from primary school to higher education to professional development and personal enrichment. The UNESCO directory of virtual universities includes 130 institutions across 42 countries.³ Furthermore, “the distinction between virtual universities and universities going virtual is becoming blurred.”⁴ The global eLearning market was estimated at US\$107 billion in 2015, with projected growth to \$169 billion in 2018.⁵ Even Coursera, a leading provider of Massive Online Open Courses (MOOCs), which gives away its content for free and charges for optional features, currently receives \$1M in revenue per month through verified certificates alone.⁶ The eLearning market includes a diverse mix of technical products: audio visual solutions for high definition video conferencing across geographic boundaries, software solutions to manage course materials and assessments for students, interactive textbooks, demonstration videos, educational games that use point systems or badges to motivate participation and personalise learning, high-definition simulators that model patient symptoms, and much more.

As the price of mobile devices and computers has become more affordable, there is increased ownership and access to computing technology and digital information among the general world population.⁷ In 2012, 4.4 billion individuals worldwide had mobile phones, with a projection of 4.88 billion individuals worldwide by the end of 2015.⁸ In 2012, the device household penetration worldwide was 60% for desktop computers, 55% for laptops, 17% for tablets and 14% for netbooks.⁹ Of worldwide mobile phone users, 32.4% owned and used a smartphone in 2013, with a forecast of 42.9% forecasted for smartphone ownership by the end of 2015.¹⁰ The growth in access to computing technology continues to grow at a faster rate than access to high-speed Internet and reliable electricity. The introduction of wireless technology and mobile networks has facilitated the emergence of data networks not bound by the constraints of fixed wires. An estimated 93% of the world population is within access of the mobile voice coverage¹¹ and an estimated 90% has data coverage of 2G or higher, with approximately 50% having access to 3G or higher services.¹² Mobile technology has become the cornerstone of the global economy, empowering communities and bridging the digital divide.

This increased role of technology within personal lives has led to the expectation for the same type of integration within educational endeavours.¹³ A 2013 review of ICT in education policies conducted by the World Bank found that all 194 WHO member states have some type of national-level policy or strategic ICT plan for education or eLearning through the ministry of education, ministry of ICT, or another government agency.¹⁴ Tangentially related to eLearning modalities in the health professions, 85 countries also had eHealth policies contained in the WHO directory at the time of this report.¹⁵ Numerous guidelines and reports from international organisations, including UNESCO, Commonwealth of Learning, World Bank, and the organisation for Economic Development and Cooperation, tout the potential

benefits of the eLearning field. Benefits cited included enabling more access, interactivity, and collaboration beyond the classroom time and space; improving access to curricula that may be repurposed to avoid unnecessary duplication; personalization of the learning experiences based on student behaviour and performance; reinforcing self-assessment and problem solving skills; increasing learner access to resources and experts beyond geographical boundaries, increasing student involvement beyond residential enrolment to reach an international audience or professional workforce; and innovation and expansion of local ICT industry itself.^{16,17,18,19,20,21} The briefs and reports from these organisations provide an overview of many of the achievements and challenges of the industry dating back more than two decades, covering the pre- and post-mobile era.

2.2 eLearning within Nursing and Midwifery

The use of eLearning modalities in the nursing and midwifery sectors has been powerfully influenced by many factors, most notably the global imbalance of qualified nursing and midwifery personnel to meet demand and the massive growth of worldwide telecommunications which has opened new avenues to scale-up the needed workforce. The literature illustrates the extent of the nursing and midwifery shortage - 43% of the WHO member states have fewer than 2 nurses and midwives per 1,000 people, and 28% have fewer than 1.²² The marked growth of non-communicable disease and the aging global population combined with health-sector reform, the quest to achieve the WHO Millennium Development Goals (and now the Sustainable Development Goals), and advocacy for universal health coverage have all added additional impetus to change the status-quo. The potential for global health improvement augmented by the increased production of qualified practitioners enabled by ICT technologies is far-reaching.

However, in the face of rapid growth, low regulation, ICT ubiquity, and uncertainty, the concerns that unsafe and non-licensable personnel will proliferate is a commonly expressed issue. The demand for innovative ICT-based methods to scale-up the nursing and midwifery workforce has far outstripped the supply, giving rise to “fly by night” nursing education initiatives prone to dangerously low quality and corruption.^{23,24} Lack of oversight, regulation, and standardization has resulted in role confusion, quality degradation, and serious concerns for patient safety expressed across all WHO regions. Even fully vetted and well-funded initiatives to scale-up nursing and midwifery workforces have not achieved their own internal benchmarks. For example, the United States President’s Emergency Plan for AIDS Relief (PEPFAR) launched its Nursing Education Partnership Initiative (NEPI), which aimed to train 140,000 new nurses across 5 countries in sub-Saharan Africa between 2010-2015 including Malawi, Lesotho, Zambia, Democratic Republic of Congo (DRC), and Ethiopia.²⁵ In a 2014 commentary article reflecting on the first few years of NEPI, several of the project investigators noted, “Institutional capacity assessments demonstrated that the overall teaching/learning infrastructure and resources were severely limited, rendering it nearly impossible to expand student enrolment, implement innovative teaching methods, and enhance student learning. Thus, the need to focus on clinical simulation and eLearning as important capacity-building innovations to improve students’ clinical skills and knowledge was identified.”²⁶ The

NEPI evaluation clearly illustrates the necessity of investment in, and oversight of, innovative eLearning approaches for nursing and midwifery capacity building.

There are commendable instances of success in eLearning initiatives in nursing and midwifery that have resulted in an increased production of nurses, midwives, and other desperately needed health providers. In 2014, AMREF Health Africa trained of 227 diploma-level health students including 95 nurses through eLearning across Ethiopia, Ghana, Kenya, Malawi, Nigeria, Tanzania, Uganda and Zambia.²⁷ The Pacific Open Learning Health Net (POHLN) is another example. This key program of the World Health Organization in partnership with Pacific Ministries of Health and located in 14 countries (American Samoa, Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu) reports over 2,000 participants in its continuing professional development (CPD) programs for health workers.²⁸ There are hundreds of examples of success in using eLearning successfully in nursing and midwifery education across the globe (see Appendix 2 for a select series of examples).

Summing up, the following excerpt from the newly released draft version of the “Global Strategy on Human Resources for Health: Workforce 2030” illuminates both the challenges and the opportunities for transformational technology-enabled initiatives to increase the nursing and midwifery workforce.

“...Health systems can only function with health workers; improving health services coverage and health outcomes is dependent on their availability, accessibility, acceptability and quality. However, countries at all levels of socioeconomic development face, to varying degrees, difficulties in the education, deployment, retention, and performance of their workforce. Health priorities of the emerging post-2015 development framework ... will remain aspirational unless accompanied by strategies involving transformational efforts on health workforce capability.”²⁹

The need for an enhanced nursing and midwifery workforce is undeniable, and innovation is needed to match supply with demand. eLearning cannot be viewed as a panacea, or one that is a simple solution for workforce scale-up. There is a balance to be struck in assessing the potentials and the caveats of eLearning in nursing and midwifery. Therefore, the innovation of eLearning initiatives is one to be embraced and facilitated, yet safeguarded and shepherded.

3. Research Methods

The research approach used for this report included broad exploration of peer-reviewed academic literature; examination of un-indexed materials such as policy papers and governmental white papers, strategic plans, and program evaluations; licensing and accrediting bodies; and other organisations and institutions across WHO regions and World Bank-described income levels. eLearning exemplars in nursing and midwifery education and training were gleaned from searches of related conference websites, program sites, communities of practice, and professional experiences of team members.

The themes driving the initial and broadest searches included:

- Existing national legislation, policies, and strategies for ICT, education, and eLearning
- Definitions for operational components of enabling environments in eLearning
- Current eLearning best practices
- Leadership and oversight necessary for driving creation of a national eLearning policy
- Existing nursing and midwifery education (pre-service) and professional training (in-service) initiatives
- Initial investment and maintenance resource considerations for integrating eLearning into existing curricula
- Public-private and non-profit partnerships as a strategy for funding and implementation
- National and regional licensing and accrediting bodies

Each iteration of the review led to further refinements of topics, search criteria, and analytic approach.

Search strategies were developed and implemented in MEDLINE, CINAHL, EMBASE, Global Health (CABI), SCOPUS, and Health Policy Reference Center databases in an iterative manner during October-November 2015 in order to retrieve peer-reviewed scholarly literature articles on existing national policies, strategies, attitudes, and best practices of integrating nursing and midwifery eLearning into existing curricula. Due to the breadth and scope of the topic, broad search strategies composed of controlled vocabulary and keywords were formulated, using the same conceptual search term framework in each of the six databases searched. Search results were limited to literature from 2000 to the present, as that is when interval when eLearning has come to the fore as a viable educational mode. Initial search strategies were developed to investigate topical peer-reviewed literature on WHO regions with no limit on income levels. Final search strategies focused upon identifying curricular eLearning in nursing education in developing countries, regions, and in low to middle-income environments.

As represented by the range of scholarly databases, articles were retrieved from diverse fields of study: nursing and midwifery education and practice; women's and public health; education and eLearning; health information technology (HIT); health and medical informatics; ICT, and human resources. In addition to searching the journal literature, country-specific eHealth and ICT policies and strategic plans were identified through a search of governmental web sites and information portals of international organisations. Criteria for inclusion evolved with each iteration as the research revealed additional key

factors relevant to the development of a comprehensive overview of policies and best practices. Lastly, a small collection of monographs and book chapters were identified as background information sources.

Six team reviewers independently evaluated the relevance of all materials retrieved. The reviewers determined the initial inclusion or exclusion of the search retrieval comprised of peer-reviewed articles, grey literature, organisation reports, and government documents. Next, the reviewers categorised the search retrieval according to the environment factors framework, identifying publications for classification and tagging with one or more of the seven factors.

The reviewers then performed a more detailed review of the publications. A final decision to include or exclude publications was made. Final publications included were subsequently reviewed in-depth to draw out salient points. Reviewers wrote summary findings for each included publication. These findings were synthesised into this final report.

4. Enabling Environment Factors

4.1 Overview

The WHO-ITU National eHealth Strategy Toolkit captures the essential technical, social, and political considerations involved in creating a national strategy for the integration of information and communication technologies in the health sector. The same high-level approach is used here as a framework for the adoption of ICT in nursing and midwifery education. The Toolkit identifies components in the enabling environment interpreted here in the context of eLearning:

1. **Leadership and Governance** focuses on identifying the mechanisms and stakeholders from the national, organisational and local levels who will be responsible for oversight, policy and coordination of the adoption of eLearning in support of national objectives in nursing and midwifery education and continuing education.
2. **Strategy and Investment** focuses on aligning eLearning for nursing and midwifery education with other national priorities, identifying objectives, and securing funds to implement and sustain those objectives.
3. **Legislation, Policy, and Compliance** focuses on the rules and regulations necessary to support the adoption of eLearning in a national system of nursing and midwifery education, and its licensure and accreditation at the national level.
4. **Workforce** focuses on (1) the roles and skills of those responsible for the design, delivery, evaluation, and support of eLearning in nursing and midwifery education, and (2) on the health care workforce who will be the primary audience for eLearning systems.
5. **Standards and Interoperability** focuses on structures and terminologies needed to enable consistent, contextualised and interoperable eLearning services and applications across settings and devices.
6. **Infrastructure** refers to the networks, equipment, systems and processes, as well as the health system structure and educational context, required to effectively deploy and deliver a national nursing and midwifery eLearning program.
7. **Services and Applications** refer to the approaches and digital resources used in the development and deployment of a national eLearning program in nursing and midwifery education.

4.2 Leadership and Governance

Leadership and Governance focuses on identifying the mechanisms and stakeholders from the national, organisational and local levels who will be responsible for oversight, policy and coordination of the adoption of eLearning in support of national objectives in nursing and midwifery education and continuing education. Leadership and governance is the most critical component of successful eLearning programs for nursing and midwifery.

4.2.1 Overview

Successful integration of ICT and eLearning in nursing and midwifery education is dependent upon a solid framework that includes national commitment to improving ICT infrastructure and investing in critical sectors that support eLearning. The focus of leadership and governance in this context is to: (1) identify and coordinate eLearning initiatives for nursing and midwifery for at the national level; (2) ensure alignment between national health goals and priorities and eLearning goals for nursing and midwifery specifically; (3) promote awareness and engagement of stakeholders involved in eLearning for nursing and midwifery; (4) provide guidance on how to ensure quality of instruction and assessment for nursing and midwifery through eLearning methods; and (5) create mechanisms for monitoring and evaluation for eLearning in nursing and midwifery.

Identifying the mechanisms and stakeholders: The mechanisms of leadership and governance in nursing and midwifery eLearning efforts include (1) decision-making processes and structures, and (2) the communication approaches used to disseminate the process and results of the decisions that have been taken. Examples of such mechanisms include the manner and processes involved in investment approvals, the structures used to track national eLearning progress and use of resources, the processes used for the development, management, and maintenance of eLearning, and the mechanisms for the evaluation and assessment of initiatives. The stakeholders for eLearning for nursing and midwifery education include a variety of policy, clinical, professional, and technological organisations - within the national government and intergovernmental organisations (see tables 1 and 2). Direct involvement of nursing and midwifery stakeholders in all aspects of leadership and governance, and clarity regarding the processes and decision-making is crucial to altering the current state of affairs. Effective governance is as much about the actions taken and their transparency as it is about the actual decisions made.³⁰

Although several international, regional and national guidelines have been developed to support implementation of eLearning in general, they do not specifically target eLearning in nursing or midwifery. However, because these guidelines seek to establish implementation standards, improve inter-governmental and institutional interoperability, and enhance collaboration towards mutually shared goals and priorities, they may provide a rubric and set of guiding principles for developing successful eLearning programs in nursing and midwifery (see Appendix 2).

Table 1: National Stakeholders Influencing the Objectives, Coordination, Monitoring, and Financing of eLearning within Nursing and Midwifery Education

| Department/Agency | Key Role |
|---|--|
| Ministry of Health | Provides guidance for matters related to the training and certification across health professions and aggregating health-related data, practices, and research |
| Ministry of Education | Sets the policy for educational systems from primary to higher education |
| Ministry of Information Communication Technology | Regulates and may subsidise the broadband infrastructure and the telephony used to deliver eLearning programs |
| Professional nursing associations | Establishes basic standards and competencies for training, accreditation, and licensure of nurses |
| Public and private health care organisations including not-for-profit and religious organisations | Hires nurses and provide care to meet national goals and priorities. Involvement is critical to identifying gaps and opportunities and in informing and delivering eLearning programs for in-service training for practicing nurses and midwives |
| Health training institutions (e.g. University and Nurse training schools) | Implement national curriculum for pre-service training for nurses and midwives, including eLearning programs |
| Telecommunications Companies | Implements the expansion of broadband and telephony infrastructure, and may provide subsidised services, equipment, or training in support of eLearning for learning and |
| Local business ICT community including hardware and software retailers, and content Providers (e.g. Publishers) | Ensures sustainability, innovation and creativity in any eLearning environment by contextualizing of hardware, software, training for eLearning to the local nursing and midwifery context. |

Table 2: Intergovernmental Organisations Influencing the Objectives, Coordination, Monitoring, and Financing of eLearning within Nursing and Midwifery Education

| Department/Agency | Key Role |
|---|--|
| World Health Organization | Provides guidance for matters related to the training and certification across health professions and aggregating health-related data, practices, and research. |
| International Telecommunications Union | Develops the technical standards for the connection of voice, data, and electrical networks around the world, including radio, fixed line, mobile, and satellite. |
| UNESCO | Provides guidelines, research, symposium, and technical support focused on strengthening educational systems from primary to higher education and in scientific cooperation, including pre-service education. |
| International Council of Nurses ³¹ | Acts as network of national nursing associations and focuses on the policies and quality of nursing training and care, acts as a broker with the World Health Organisation, International Labour Organisation, and the World Bank. |
| World Bank | Facilitates a technical group called infoDev that focuses on the application of ICT that focuses on the application of ICT in priority development sectors, including health and education. |
| Commonwealth of Learning | Provides guidelines, research, and technical support in the area of knowledge, resources and technologies for open learning and distance education. |

4.2.2 Findings

1. The importance of leadership as a critical component in successful implementation of eLearning is echoed throughout the 2012-2015 eLearning Africa Reports, which identified the lack of political will as a significant barrier to successful implementation of eLearning.^{32,33,34,35}
2. Government support for eLearning can be a catalyst increasing public awareness and buy-in and for framing the connection of nursing and midwifery education to social and economic goals.³⁶
3. Partnerships - national and international, private and public, and within and between government agencies - are critical for successful development and implementation of eLearning programs.^{48,49}

4. There is a need to harmonise various national efforts to avoid “pilot-itis” and to avoid the proliferation of unregulated ICT-based projects in country. Rwanda has implemented a structured review and approval process (see Rwanda example in Appendix 2).
5. Multi-country nursing initiatives can drive the development of national policies and guidelines to support nursing education. Bahrain’s work with 5 other nations in 1992 resulted in a national strategic plan for nursing (see Bahrain example in Appendix 2).
6. Effective eLearning for nursing and midwifery education must reinforce licensure requirements and often includes blended learning with face-to-face classroom instruction and supervised clinical practice.³⁷ Blended education that is distributed over several weeks has been found to be more effective than education that is short and intensive.³⁸ In nursing and midwifery, regular in-person oversight is necessary to ensure quality for clinical training.³⁹
7. Mentorship, such as through tutoring programs, is a critical success factor for ensuring quality in nursing and midwifery education, especially in newer schools with less experienced instructors or high faculty-to-student ratios.⁴⁰
8. Shared visioning, shared decision-making, and transparency in decision-making processes is critical to successful multi-stakeholder initiatives.
9. Effective strategy requires strong visionary leadership and governance to be executed efficaciously. Leadership and governance is a derivative of informed policy-makers who have a comprehensive and unbiased view of the environment and the full scope of the challenges that will be faced.⁴²

4.2.3 Limitations of Review

This review uncovered a number of national level policies for nursing education, which included governance models for licensure and renewal of licensure and their connection to pre-service and in-service training.⁴¹ The search did not reveal many examples of national governing bodies with guidelines or oversight for quality of instruction within eLearning within nursing and midwifery specifically. Most often, quality at that level is left to individual institutions or departments. The Guidelines for Assessing Distance Learning Programs authored by International Council of Nursing, last revised in 2003⁴², is one of the few examples located, but it is markedly out of date.

4.2.4 Policy Recommendations

1. Identify and engage all relevant stakeholders for nursing and midwifery pre-service and in-service eLearning (national and international, private and public, and within and between government agencies, and professional practice & technical organisations).
2. Establish mechanisms for shared decision-making, developing shared visions and goals, and evaluating program outcomes across stakeholders at the national level in a way that ensures equity, integrity, transparency, and reproducibility. Collective action and multi-stakeholder alliances are powerful tools in governance and problem-solving efforts.

3. Develop an overarching national strategic framework for eLearning in nursing and midwifery education that includes a national vision and the achievement of common goals for health. These goals must clearly lay the expectations of, and support for, multi-sector collaboration across health professions and all stakeholders.
4. Establish and prioritise the goals and challenges that eLearning for nursing and midwifery will address based on population, health system needs, technical and preparedness capacity, financial ability, economic, social and development goals of the nation.
5. Optimise partnerships by building on existing international regional consortia, both with representatives of national governments and of ranked and/or high quality universities. These consortia have existing subject matter expertise, services and content, relationships with potential donors, and established business models.
6. Assess governance capacity for eLearning for nursing and midwifery at the local, regional, and national levels. If this capacity is lacking, efforts must be immediately undertaken to build and/or bolster prior to launching eLearning initiatives.
7. In partnership with professional nursing organisations, develop guidelines for creating and selecting eLearning resources to assure quality and alignment with national nursing and midwifery curriculum, licensing standards, and fiscal capacity.
8. Select and continually align eLearning nursing and midwifery pre-service and in-service initiatives with national, regional, and international standards to enhance quality and exchange of content, technologies, and workforce.
9. In partnership with the professional nursing organisations and health sciences training institutions, incorporate completion and assessment of certified eLearning as a recognised method of curriculum implementation and continuing education credits.
10. Develop an eLearning implementation plan that includes well-defined benchmarks for nursing and midwifery training (e.g. graduation rates), indicators of quality (e.g. increased pass rates of licensure exams, decreased error rates in clinical care), and rigorous mechanisms for program evaluation.

4.3 Strategy and Investment

Strategy and Investment focuses on aligning eLearning with national nursing and midwifery workforce priorities, identifying objectives, and securing funds to implement and sustain those objectives.

4.3.1 Overview

Key strategic drivers for nursing and midwifery education at the national level are likely to come from number of policies or plans across government agencies and professional associations (see Appendix 2).

Aligning priorities: Investment and strategy for eLearning efforts in nursing and midwifery are influenced by a variety of stakeholders and policy-making groups. National priorities for human resource enhancement originating in a ministry of health may include priorities for increasing the number of nurses and midwives, with funding directed to faculty hiring, opening schools, launching new nursing specialties, or creating in-service programs to reach the existing nursing and midwifery workforce. These efforts often set the expectations for targets for quantity of nursing and midwifery graduates to be produced and establish the benchmarks for quality improvement in instruction and clinical practice of nurses and midwives. A national eHealth plan may be a catalyst for the development of ICT skills among the workforce. The skills and confidence gained from eHealth efforts in the workplace can be transferred into the eLearning domain, easing acceptance and facilitating use.⁴³ A plan from a ministry of education may include investment in the hardware, software, or ICT training for faculty development for nursing and midwifery programs. A national Science, Technology, Engineering, and Math (STEM) education initiative or technology innovation program may lay the groundwork for the development of a local eLearning industry.

Identifying strategic objectives: The objectives for eLearning for nursing and midwifery must be aligned within these national priorities for developing the nursing and midwifery workforce and are often centred upon access, quality, or quantity. Objectives may include: increasing access to pre-service nursing education across geographic areas, increasing access to career paths within various nursing specialities through new in-service training, increasing the quantity of trainees by engaging more people remotely than can be reached in a physical classroom, increasing the quality of instruction by providing standardised materials that can be adopted across institutions, increasing the quality of trainees by enabling more opportunities for practice and self-assessment in preparation for licensure examinations, or increasing the quality of care by targeted in-service training for national health priorities. The selection of strategic objectives will influence both the methods and modalities of eLearning, such as use of telecommunications and convergent broadband, the selected hardware and software, electricity to power the technology, and the digital platforms needed to support national and international exchange of eLearning materials for nursing and midwifery education.

Securing funding: Funding for nursing and midwifery education is highly dependent on national and international priorities. Globally, during the 15-year period of the Millennium Development Goals (MDGs) from 2000 – 2015, 3 of the 8 goals were health related and often used as anchors for guiding donations, investments, and program priorities with nursing and midwifery training efforts. With the transition from

the MDGs to the Sustainable Development Goals (SDGs) guiding the global development agenda for 2015-2030, SDG goal #3 – “Ensure healthy lives and promote well-being for all at all ages” has tremendous implications for nursing and midwifery scale-up efforts. SDG #3 is comprised of 13 health targets derived from the fundamentals of Universal Health Care (UHC) including health promotion, education, prevention, protection, treatment and palliative care – all of which point to the services of nurses, midwives, and other healthcare providers. Moreover, the “attainment of health” specified in SDG #3 is inherently linked with the social determinants of health that are embedded in many of the other SDGs (i.e. education- SDG #4, poverty – SDG#1, and gender equity - SDG #5). Additionally, the eLearning in nursing and midwifery builds upon innovative modern technologies and infrastructure, the gap between SDG #3 with SDG #9 – “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation” is lessened. Therefore, although it is too soon to assess whether these Sustainable Development Goals will increase or decrease the donor funds for nursing and midwifery education in low- and middle-income countries, a business case exists for those who can articulate the linkages between workforce scale-up and the attainment of other SDGs. Finally, neonatal and maternal health have historically been mainstay funding priorities for many development agencies and foundations. Securing funding for nursing and midwifery workforce development, as a critical part of the primary care system for expectant or new mothers, is expected to remain as a high priority goal for national governments.

4.3.2 Findings

1. Awareness of existing relevant national policies appears to be a common problem, even among government representatives.⁴⁴ Current policies are not always included in UN agency directories nor are they easy to locate on national government websites.
2. Training of nursing and midwifery educators, students, and ICT professionals who support eLearning is often grossly estimated and left until the end. Overwhelming evidence suggests it is necessary throughout the process.⁴⁵ This is explored more in-depth later in the workforce section.
3. Nursing and midwifery education, particularly in areas with shortages in the field, can benefit from partnerships with other health professions. Examples from Eritrea and Canada (see Appendix 2) illustrate interprofessional education initiatives that were reported to be highly successful. As has been shown in global efforts to control infectious disease, scaling up implementation of interventions involves collaboration across the health sector as well as the need to focus on what is feasible.⁴⁶
4. The most successful eLearning initiatives have a team dedicated to mobilizing funds, including identifying possible external funders to cover start-up costs.⁴⁷ Financing for national initiatives for eLearning in nursing and midwifery initiatives is likely to require partnership of multiple government agencies, donors, and private corporations (see Appendix 2). Cooperative agreements between Ministry of Health, Ministry of Education, and large philanthropic agencies are more effective than piecemeal efforts.⁴⁸ Public-private partnerships are a potential way to fund training for vendor products that nursing students are likely to use post-graduation.⁴⁹

5. From a finance perspective, technology initiatives tend to require large upfront costs, underestimate the maintenance costs, and overestimate the time when cost-savings or revenue generation will be realised. (See examples from Ghana and Belize in Appendix 2). Even in high-income countries this challenge exists, as ICT investments do not necessarily improve profit margins.⁵⁰ This has led to a reframing of ICT-based initiatives from cost-savings to capability generating. Long-term eLearning programs include anticipated recurring costs into operational budgets as part of quality control for training. Ethiopia's 2012 strategic planning process (as illustrated in Appendix 2) provides an example of long term financial planning for eLearning.
6. A local eLearning industry is essential to support & sustain eLearning efforts long term. A skilled ICT workforce capable of continuing training, maintenance and other technical support for eLearning in nursing and midwifery education must be factored in the recurring costs. Developing the local ICT public workforce rather than relying on expensive external organisations for technical support will be prudent investment.^{113,114}
7. Incentives from the ministries, such as scholarships, fellowships, honours, or research grants, may spur development of champions for eLearning in nursing and midwifery.⁵¹ Such funding opportunities demonstrate true commitment and may persuade upper level leaders who do not understand or value eLearning and the potential beneficial impact on needed nursing and midwifery workforce scale up.⁵²
8. From a strategic perspective, language and local authorship is essential for contextual relevance and adoption of eLearning initiatives.^{53,54} Though there are millions of learning resources and thousands of software applications that may be adapted from around the world to integrate into new eLearning initiatives; plans to include translation and adaptation of content must be considered.
9. There are three distinct stages within eLearning strategies, according to a 2006 review of eLearning strategies from 9 countries and 5 intergovernmental agencies. The first stage focused on physical infrastructure necessary to introduce eLearning, the second on training and collaboration of instructors to improve quality, and the third on increasing efficiency through new software systems and partnerships.⁵⁵
10. While most national strategies for nursing and midwifery focus on addressing *shortages within the country*, there are a few notable examples that focus on capitalizing on *shortages in other countries* by training nurses and midwives to migrate to practice in other countries. See the examples from India and the Philippines in Appendix 2. If out migration is a goal, then eLearning may be a tactic to connect learners in one country with peers and instructors in their target country.

4.3.3 Limitations of Review

Most of the eLearning in nursing and midwifery programs that were examined in this review were initiated by the individual institutions or by the donor agencies rather than high-level policy setting organizations. Ministries of health were found to have eHealth policies that supported related goals for a myriad of workforce development initiatives, but those had sparse or very high-level information about

eLearning as a method to achieve those goals. There were a number of national plans found for nursing workforce development, which were spearheaded by professional nursing associations. Interestingly, these plans included ICT as possible tactic or necessary competency, but failed to include specifics about eLearning strategies in particular. The source identified during the review that most closely captured the intersection of nursing and midwifery, eLearning, and national government policy was a 2014 report by USAID and JHPIEGO, “Assessing the Feasibility of Utilizing eLearning Content in Midwifery Schools in Ghana.”⁵⁶

Funding sources for the eLearning initiatives reviewed for this report were diverse and most policies mentioned the need for a collaborative investment from governments, foundations, and private corporations in order to be able to amass sufficient resources for sustainable eLearning programs. Due to this heterogeneous, opportunistic approach to funding, it was difficult to get a complete picture of how an existing, national eLearning initiative could be funded in the long-term. It is clear that there are many possible approaches and much work to be done for national eLearning nursing and midwifery initiatives to identify realistic, feasible, and sustainable funding streams.

4.3.4 Policy Recommendations

1. Align national eLearning initiatives nursing and midwifery training with national and international development and health goals, such as the Sustainable Development Goals, the WHO Global Health Workforce Strategic Plan, and Universal Health Care.
2. Match proposed eLearning interventions against realistic appraisals of what is feasible. Combining this with robust budget justifications can help to mobilise resources and maintain accountability.
3. Pursue equitable interprofessional partnerships that intersect with nursing and midwifery education priorities (e.g. coordination of care, universal health, maternal child, primary and chronic disease care, electronic health record education, etc.). Efforts that enable pooling of resources between health professional education programs can be very cost effective and demonstrate the power of distributed and mixed teams.
4. Shift funding mind-sets and investment strategies from one of a cost-saving perspective to one that considers the effort as a longer-range, capacity generating strategy.
5. Focus content development for eLearning nursing and midwifery education on national, regional and/or international goals for workforce development, such as development of particular nursing/midwifery specializations or knowledge of high priority health domains (e.g. emergency and critical care, emerging disease, maternal-child, public health goals, etc.).
6. Establish a coordinating body with financial management responsibilities and accountability to review funding proposals and liaise with potential funders from the private and philanthropic sector.

7. Link eLearning training for nurses, midwives, and educators to the attainment of the basic ICT competencies required in today's knowledge economy. A strategy that integrates eLearning with achieving ICT competencies (in-service and pre-service level) for nurses and midwives will effectively elevate the ICT skills of the current and future workforce in tandem.
8. Incorporate eLearning costs such as equipment replacement, ICT support personnel, and software licensing into the budget forecast for operational costs for nursing and midwifery training. Importantly, consider realistic, long-term investments that are inherent in efforts of this nature.
9. Promote North-South and South-South peer partnerships among nurses, midwives, institutions, and eLearning experts to develop a professional network for collaboration and knowledge and experience sharing. This strategy can begin to address initial gaps in local expertise and develop that local workforce capacity for the longer-term.

4.4 Legislation, Policy, and Compliance

Legislation, Policy, and Compliance focuses on the rules and regulations necessary to support the adoption of eLearning in a national system of nursing and midwifery education, and its licensure and accreditation at the national level.

4.4.1 Overview

Elements of relevance include (1) national legislation, policy, and regulatory components; (2) broader public policy required to support development; and (3) guidelines necessary to assure compliance with national policies. There is some degree of overlap with the framework components of Leadership & Governance and Standards & Interoperability, however the focus in this section is more closely aligned with the formation and ownership of upper level policies and regulations that must be considered to sufficiently develop and operate high quality and sustainable eLearning initiatives. Considerations include curricular content, regulations, policies, guidelines, and people that exert significant influence on the development and operation of wide-scale nursing and midwifery eLearning environments.

The call for common educational standards for nursing and midwifery has been resonating for decades. The World Health Assembly (WHA), in 2001, passed resolution WHA54.12, which laid the groundwork for concerted efforts in nursing and midwifery workforce scale up in Member States.⁵⁷ The Strategic Directions for Strengthening Nursing and Midwifery Services 2002-2008 served as the blueprint for action on WHA54.12.⁵⁸ A subsequent resolution (WHA59.23) was adopted in 2006 prioritizing the setting of global nursing education standards for strengthening nursing and midwifery to achieve the Millennium Development Goals (MDGs).⁵⁹ In 2009, the WHO Office of Nursing and Midwifery, Human Resources for Health, published proposed “Global Standards for the Initial Education of Nurses and Midwives.”⁶⁰ This publication acknowledged that achieving these standards is a future goal for many countries and one that is specific to country and context. Progress towards achieving these resolutions and the global standards is unknown at this time.

Stakeholders involved in policymaking for eLearning for nursing and midwifery often include governmental and non-governmental entities, nursing and midwifery professional groups and accrediting bodies or boards, civil-society groups, multilaterals, philanthropic organisations or businesses in the eLearning space including ICT provisioners, existing educational programs and Universities who train pre-service and in-service nurses and midwives. The Ministries of Health and Education, professional nursing associations/accrediting boards and large employers (such as the National Health Service in the United Kingdom, or governmentally operated health systems) are often viewed as primary partners in the planning process. Tables 3 and 4 below highlight several important documents and professional organisations that influence accreditation, licensure, and other professional definitions for nursing and midwifery.

Table 3: Key Documents Influencing the Accreditation, Licensure, and Professional Definitions for Nursing and Midwifery

| Document | Impact on Legislation and Compliance |
|---|--|
| <p>The 1999 Bologna Process in Europe was designed to ensure more comparable, compatible and coherent systems of higher education in Europe.</p> | <p>The Bologna Process resulted in the creation of standard definitions of nursing titles and the knowledge skills and abilities associated with each.⁶¹</p> |
| <p>Global Strategy on Human Resources for Health: Workforce 2030, issued in draft form by WHO in late October 2015, provides excellent policy options for Member States at all levels of socio-economic development and addresses the issues of setting standards for health professional classification and education.⁶²</p> | <p>Transformation of the global educational agenda accompanied by capitalization on technological innovations is provided, as is a future vision and blueprint for advancement. This document is highly relevant to nursing and midwifery professional practice and the use of eLearning modalities to address pressing workforce needs.</p> |
| <p>Global Standards for the Initial Education of Professional Nurses and Midwives from WHO provides guidance and benchmarks for moving nursing and midwifery education forward in a standard, competency-based fashion.⁶³</p> | <p>The goal of the Global Standards for the Initial Education for Professional Nurses and Midwives is to establish educational criteria and assure outcomes that:</p> <ul style="list-style-type: none"> a) are based on evidence and competency; b) promote the progressive nature of education and lifelong learning; and c) ensure the employment of practitioners who are competent and who, by providing quality care, promote positive health outcomes in the populations they serve.⁶⁵ <p>The standards are crucial to the development of policies that govern, legislate, and enforce compliance with minimal levels of nursing and midwifery educational preparation.</p> |

Table 4: Key Organisations Influencing the Accreditation, Licensure, and Professional Definitions for Nursing and Midwifery

| Organisation | Impact on Legislation and Compliance |
|--|--|
| <p>The International Council of Nurses (ICN) provides guidance and policy governing and defining nursing practice at the global level.</p> | <p>ICN provides definitions of various levels of nursing and associated workforce competencies for each.⁶⁴</p> |
| <p>The International Council of Midwives (ICM) provides definitions, guidance, and policy governing midwifery or nurse-midwifery practice and education at the global level.⁶⁵</p> | <p>ICM provides associated workforce competencies and definitions of the scope of practice. ICM accredited midwifery programs are those who are recognised at the country level and who based their education and certification on achievement of the competencies associated with the ICM Global Standards for Midwifery Education.⁶⁶</p> |
| <p>The American College of Nurse-Midwives (ACNM) provide definitions, guidance, and policy governing midwifery or nurse-midwifery practice and education within the USA.⁶⁷</p> | <p>The American College of Nurse-Midwives is somewhat unique in that there are two categories of certification. Certified nurse midwives are also registered nurses whereas certified midwives are educated in the discipline of midwifery. Both certifications require graduate level education, coursework in programs that are accredited by the Accreditation Commission for Midwifery Education and that individuals pass the national certification exam administered by the American Midwifery Certification Board. These programs are specific to the USA and generalizability elsewhere may be limited.</p> |

4.4.2 Findings

1. Level setting between various high-level agencies regarding definitions of terms, concepts, and requirements for nursing and midwifery training (pre-service and in-service) is important to prevent different definitions, preparation, and quality of providers.²⁹
2. The realities of the healthcare environment in which the intervention is delivered must match the situation with the content being delivered. While standardization and efforts to control quality and rigor are important, so is cultural and contextual sensitivity. Therefore, compliance with educational and program objectives is situation specific and must be flexible, customizable, and easy to change as social situations change (conflict, migration, etc.).⁶⁸

3. Policies related to identification are important, especially when educational program completion is tied to licensure and/or visa issuance. Many countries offer national funding for students to complete their training in return for a “pay-back” period when students work for public hospitals or educational institutions. Visas are not issued for those who have not completed their required service.⁵¹
4. Tracking nurses, midwives, and other health workers throughout their education, licensure, and practice is both necessary and feasible.⁶⁹
5. The proliferation of online programs, some of which are capable of bypassing accrediting agencies, are of increasing global concern. The issues of consistency and quality of education for regulated professions such as nursing and midwifery obtained via poorly regulated and/or non-accredited programs delivered by eLearning modalities is adding impetus to oversight, regulation, and standardization.⁸⁵
6. Policies are needed to assist with privacy and intellectual property ownership issues as well as ensuring licensing capabilities to utilise commercial and open-source learning platforms. Data sharing, legal disclaimers, information exchange considerations are important, particularly as learners are involved. Some nations have regulations that limit what can be shared, e.g. FERPA in the United States.⁷⁰
7. The use of Open Educational Resources (OER) and free open source software (FOSS) is an important policy consideration, with caveats. Detailed further in the Workforce and other sections, the use of these resources requires a skilled workforce to design, build, and maintain these assets. The benefit is less reliance on external entities, reduced cost, and the ability to freely exchange assets across entities and regions.¹⁷
8. Many of the existing eLearning policies were created before the expansion of mobile technologies and do not consider the privacy implications of delivering or collecting content via mobile devices, which can easily collect personally identifiable information through sensors or location awareness.⁷¹
9. The convergence of, or lack thereof, the telecommunications and ICT environments must be understood and managed. When voice and data environments are owned and/or governed by independent entities, ineffectual bandwidth management or discord between entities can result in crippling bottlenecks to progress. Convergence of different telecommunications services (Internet, telephony and broadcasting) on a single platform is a potential strategy.⁷²
10. Notable and highly publicised corruption and bribery scandals in the telecommunications sectors underscore the need for legal frameworks to deal with domestic and foreign telecommunications activities. The perceived corruption index has a distinct inverse relationship with investment (including foreign direct investment), competition, entrepreneurship, and government.⁷³

4.4.3 Limitations of Review

While there were numerous resources that touched upon many different aspects of Legislation, Policy, and Compliance, there was a dearth of a consolidated view or articulation of how these intersect and interact. Therefore, while the concepts were all closely related and overlapped to some degree, a

comprehensive overview - particularly as related to nursing and midwifery eLearning, was seemingly not available. There was a noted lack of references and official policies specifically targeting nursing and midwifery eLearning aspects at the ministerial levels. Additionally, the majority of the resources, except those that dealt with the definition and competencies of the practice of nursing and midwifery, were not related specifically to eLearning for nurses and midwives. Therefore, best practices from other disciplines and interventions were used to form the lessons learned and the policy recommendations.

There was a scarcity of resources related to the blended dimension of eLearning for nurses and midwives. Much of the material found dealt with digital learning or classroom teaching, with little focus on the blended environment. As will be seen in the Standards and Interoperability section, there are new technological standards that are beginning to acknowledge the learning and documentation needs of health professional students (both pre-service and in-service) and their accommodation. In this review, no literature was found that specifically related this linkage to nursing and midwifery education.

The effort to arrive at a final consolidated set of recommendations, with specific relevance for nursing and midwifery eLearning, felt to be similar to stitching a quilt together. There were many innovative and intriguing pieces, which, while disconnected, could be quite powerful if consolidated. With that said, maybe one can consider road taken to arrive at the current point to be similar to the path taken by developing world “leapfrogging” over the industrial world in regards to cellular telephony. Early adopters of eLearning in nursing and midwifery have learned by observation and example, and have benefitted from the experiences and lessons learned by others. Regardless, the difficulty encountered in piecing the evidence together illustrates an unmet need for a focused review, a consolidation that takes into account the uniqueness of nursing and midwifery eLearning educational needs, and a targeted set of guiding principles.

4.4.4 Policy Recommendations

1. Gain an understanding of the current landscape eLearning environment for nursing and midwifery at macro and micro levels (local, national, regional), including nursing and midwifery concentrations (numbers and geographic distribution), current preparation (type, duration, ownership of educational institutions), licensure, accreditation, projections for future needs, the business case, and contributors to outflow of nurses and midwives.
2. Involve key health and non-health stakeholders in creating a national eLearning vision and a transparent planning process for implementation that is equitable, flexible, inclusive, and sustainable. Stakeholders can include (not inclusive) governmental and non-governmental entities, nursing and midwifery professional groups and accrediting bodies or boards, existing educational programs and universities who train pre-service and in-service nurses and midwives.
3. Establish governmental policy initiatives, governance mechanisms, and sound regulatory practices to provide improved visibility, accountability, security, coordination and control of eLearning activities in nursing and midwifery at the national level.

4. Assess investment capacity and resources to support the effort and accompany with sustainability plans for the long term. Early, equitable, and on-going appraisals of investments and resources are necessary for quality and sustainment.
5. Include in eLearning policies and funding considerations the support of open platforms, open source, and interoperability initiatives. Investigate the applicability and utility of Tin Can API specifications and build for the future of eLearning in health professional education, as this specification embraces the provision and documentation of learning both inside and outside of the classroom.
6. Undertake national efforts to converge telecommunications (Internet, telephony and broadcasting).
7. Develop policies and methods for uniquely identifying learners, considering the relationship to licensure, accountability, out-migration, and quality while also considering the challenges inherent in efforts surrounding the unique identification of individuals.
8. Create and share the strategic context for eLearning for nursing and midwifery to align tactics and investments. This will enable governments and key stakeholders to make informed decisions regarding future investments and the formation of sound policy.
9. Include a budget for research and evaluation for eLearning and its impact on pedagogical change and learning outcomes.
10. Develop a comprehensive understanding of and investment in the deep pedagogical change that accompanies eLearning initiatives across disparate groups of nursing and midwifery learners.

4.5 Workforce

Workforce focuses on the (1) nursing and midwifery professionals as the primary consumers of eLearning and (2) skills of those responsible for the design, delivery, evaluation, and support of eLearning within nursing and midwifery education.

4.5.1 Overview

Developing eLearning consumers: The ability to work, teach, and learn in digital environments requires minimum computing literacy among the nursing and midwifery students and educators who are expected to consume eLearning. In order for nursing and midwifery professionals to be able to use eLearning effectively as part of pre-service and in-service training, targeted training is necessary for them to understand how to teach and learn within virtual environments. Far beyond basic introductions for how to use computers and how to use a web browser, the skills needed for eLearning cut across technical and social dimensions. Some of the necessary skills and knowledge areas include: how to focus one's attention to complete a self-paced learning module, how to interact with peers through online discussion forums, how to locate and critique online resources for their accuracy and relevance to nursing and midwifery, how to annotate readings and organize one's notes in a digital environment, and how to complete digital assignments in compliance within copyright, plagiarism, and cheating policies.

Developing eLearning producers: Teaching within an eLearning environment, even a blended one, alters the dynamic of the instructor-student and student-student interactions. With a traditional face-to-face didactic lecture within a large auditorium, an instructor may have few visual aids, may have sparse questions from the students, and may spend much of the time talking while students mostly listen. In eLearning environments, there is heightened focus on the visual aids – whether presentation slides, images, or videos – as well as on the increased engagement with individual students. In order to be able to teach with eLearning, nursing and midwifery instructors will require a mix of pedagogical and ICT training and support. As noted earlier in the Strategy section of report, local authorship is essential for ensuring relevant and sustainable eLearning with nursing and midwifery education. Purchasing or wholly importing instructional content from other countries will lead to a mismatch of eLearning content to the local nursing and midwifery curriculum. It is essential for ownership and for curricular fit to cultivate the capacity of local instructors and local ICT staff to create or adapt learning materials that are suited to the national nursing and midwifery standards and priorities.

4.5.2 Findings

1. Pedagogical skills of educators are much more important than the type of technology used.⁷⁴ Evidence of this is strongly supported by eLearning methodologies and ICT development in other disciplines. Ensure faculty members' values are focused on the foundations of sound educational methods using in-class, low-tech, and repeatable methods (e.g. role play, simulations, discussions, case studies) in combination with complementary and optimizing online education (e.g. lectures, resources) that enhances the foundations.⁷⁵ ICT can act as an enabler to improve and expand upon existing teaching skills and evaluate both faculty and students.⁷⁶
2. Faculty workforce development policies at the institutional and national levels ensure that nursing and midwifery professors are able to incorporate new ICT ideas for improved approaches to creating and delivering coursework.⁷⁷ A critical underpinning for sustainable use of eLearning in nursing and midwifery education and training is that faculty are properly trained in using ICT methodologies, specific software programs, and troubleshooting, and can also lead students to embrace ICT methodologies.
3. ICT literacy and confidence in using ICT among both clinical and nonclinical health care providers is low.^{78,79} Perceived and real functional abilities may be a challenge, particularly for in-service training.⁸⁰ Sustained practice in eLearning environments ensures more flexible and empowered educators, students, and in-service health care providers as more modern eLearning and ICT methodologies and equipment are introduced.
4. A system of ICT support with personnel who can repair equipment and instruct faculty how to use equipment is essential to the successful use of eLearning. Without regular maintenance and quick repair, technology will become out-dated and useless.⁸¹
5. A common cause of failure of eLearning activities is the external development partners' expectations that local governments assume responsibility for equipment and maintenance costs as well as salary for support personnel.⁸² When low-income countries' eLearning and eHealth activities are primarily funded and launched by these partners through personnel support for ICT, a knowledge and resource gap is created after launch for on-going maintenance.
6. National job classifications for eLearning professionals are often not recognised or provided by Ministries of Health.⁸³ Roles typically involved in developing and deploying eLearning include instructional designers, technical support staff, subject matter experts as authors and reviewers (e.g. nurses and midwives), project managers, media teams, editors, and health librarians.^{84,85}
7. There is unequal access to eLearning during formal training in nursing and midwifery due to institutions' and funders' perceptions of eLearning as temporary or special projects. A lack of a national strategy makes inclusion of eLearning appear optional for both educators and students, resulting in piecemeal and inconsistent use of eLearning methodologies that benefit some but not all.⁸⁶
8. Gender, age, literacy, competency, and cultural issues must be considered as part of workforce development.^{87,88} Those with a higher socioeconomic advantage begin and maintain that advantage in eLearning.⁸⁹

4.5.3 Limitations of Review

This review reveals a growing collection of diverse yet simple technologies that can be used for eLearning programs in a variety of educational settings. This proliferation means that training institutions have an overwhelming number of options and often take an ad-hoc approach to decide which technology to use when for which education purpose and to whom to go for help. The haste to adopt the newest technologies has meant that training on the use of, or support for, these technologies has not been able to keep the same pace at the institutional or national levels. There is a dearth of strategic national approaches about how to systematically train nursing/midwifery students and educators regarding wise product selection and the best practices for the use the eLearning tools. The adoption and use of ICT by the health workforce is often hampered by infrastructure limitations, and the close interplay of these two environmental factors is also reflected in section 4.7 (Infrastructure) of this report.

A skilled ICT workforce to partner with nursing and midwifery professionals in regards to eLearning efforts is a critical component for optimal decision-making, purchase and maintenance. The current literature did not reveal any examples of national policies that specifically address training the ICT workforce that supports eLearning for nursing and midwifery. In addition, no best practices for collaboration around eLearning initiatives across teams of ICT and nursing and midwifery groups were identified. There were a number of programs and policies about nursing informatics and health informatics, but those focused on largely on clinical ICT support, such as for electronic health record systems.

4.5.4 Policy Recommendations

1. Engage senior-level nursing professionals as champions to strengthen change management and training and to establish local ownership.⁹⁰
2. Prioritise faculty development in eLearning design and implementation in pre-service nursing education.⁹¹ Ensure that all professors, teachers, and management of educational institutions have received basic ICT training, the use of innovative teaching models and how to maximise learning opportunities with technology.^{92, 93} This enables them to incorporate these technologies effectively into the teaching-learning process.
3. Coordinate with the ICT sector to support investments in expanding the ICT workforce capacity to support the technology infrastructure that enables eLearning within nursing and midwifery education. Skilled ICT personnel are essential in order for the eLearning workforce development to progress to adequately support nursing and midwifery education.^{94,95}
4. Provide opportunities for early adopter eLearning initiatives to document and share lessons learned about effective teaching strategies for integrating technologies into instruction for institutions with similar levels of resources.⁹⁶
5. Document lessons learned and share across funders, designers, and implementers to inform local, regional, and national strategies for eLearning and ICT capacity building.⁹⁷ Examples and case studies about implementation efforts can help raise awareness of specific eLearning and ICT implementation issues.⁹⁸

6. Provide faculty mobile access to eLearning education resources like curriculum, educational resources, and lesson plans. Targeting faculty for eLearning interventions needs to be a consideration at the same time students are provided access.⁹⁹
7. Remain flexible through eLearning implementation, working together with nursing and midwifery educators and students to adjust the program to evolving local needs and challenges.¹⁰⁰

4.6 Standards and Interoperability

Standards and Interoperability focuses on structures and terminologies needed to enable consistent, contextualised and interoperable eLearning services and applications across settings and devices.

4.6.1 Overview

Standards are essential for harmonising and managing eLearning projects for nursing and midwifery education within a country or region. The PAHO eHealth Strategy specifically addresses the need for, and quest to obtain, the standards required to ensure interoperability across organisations and countries within the region as a core requirement to build the knowledge economy.¹⁰¹ In this regard, one can think of standards as the building blocks for eLearning interoperability that allows data and programs to be exchanged; supports blended learning approaches; and takes advantage of multiple learning environments. Interoperability is multi-faceted, requiring the use of standards that govern semantics (the meaning of the word(s), similar to a dictionary) and syntax (which provide the rules for the structure of a communication, such as XML). Certain groups of standards are used directly in eLearning initiatives such as those that govern interchange and interoperability between learning management systems (LMS) such as Aviation Industry Computer-Based Training Committee (AICC), and Sharable Content Object Reference Model (SCORM). Specifications used to facilitate interoperability of learning content outside of standard LMS included Tin Can Application Programming Interface (API) and Learning Tools Interoperability (LTI).

It is important to note that discussions surrounding standards and interoperability in regards to eLearning in nursing and midwifery and not all technical in nature. Standards for accommodating the disabled, reflected in the WHO Global Disability Action Plan 2014-2021,¹⁰² have relevance in regards to equity in access for eLearning programs not only for nursing and midwifery efforts, but all participants in the global knowledge economy. Finally, the standards that govern nursing and midwifery definition, practice, and education are also relevant to any discussion related to eLearning for nursing and midwifery. This has been detailed earlier (see Section 4.4) and will not be discussed further. Table 5 provides additional detail for a selection of relevant standards.

Standards and interoperability are far-reaching and complex with numerous stakeholders and competing agendas. Understanding the interplay requires patience, wisdom, and vision to align and manage. In summary, as elegantly stated by Bollinger et al., trying to standardise eHealth or eLearning endeavours at the national level “can only be achieved by aligning the efforts of international and bilateral institutions, standards development organisations (SDOs), donors, mobile network operators (MNOs), and other private sector actors with local government and health system priorities.”¹⁰³

Table 5: Types of Standards and their Relevance to eLearning

| Type of Standard/ Purpose | Relevance to eLearning in Nursing and Midwifery | Most common standard for this purpose | Source or Champion |
|--|--|---|---|
| Open licensing | These licences allow the legal duplication and modification of content and software, including for translation or other localization. The licensing standards enable searching by licence. | Creative Commons licences for content such as Open Educational Resources (OER), ¹⁰⁴ Numerous free and open source software licences (FOSS) | UNESCO, ITU World Summit on Information Society |
| Disability in ICT and eLearning products | Provides equitable access to digitally produced learning materials by disabled individuals. | W3C Web Accessibility Initiative ¹⁰⁵ WHO Global Disability Action Plan 2014-2021 ¹¹⁹ | W3C ¹²⁴ & WHO ¹¹⁹ |
| Syntax and semantics | These govern structure for the packaging of the data that includes the <i>content</i> of the learning (syntax) with the <i>meaning</i> of that data (semantics). ¹⁰⁶ This enables learning “objects” to be exchanged across entities (semantic interoperability). There is some degree of overlap with the technical standards below. | Numerous | W3C ¹²³ (Semantic Web) |
| Technical | Technical standards applicable to eLearning include TCP/IP standards, which are used to enable web transfer and access as well as IEC multimedia standards and ITU technical standards, which enable eLearning to interoperate efficiently, and others. These aspects are all critical to eLearning initiatives. | Numerous (HTTP, HTTPS, etc.) | Internet Engineering Task Force (<i>TCP/IP standards</i>), International Organisation for Standardization (<i>overarching all</i>), International Electrotechnical Commission/IEC (<i>multimedia</i>) |

| Type of Standard/ Purpose | Relevance to eLearning in Nursing and Midwifery | Most common standard for this purpose | Source or Champion |
|-----------------------------------|--|--|--|
| | | | <i>standards</i>), & International Telecommunication Union/ITU (<i>technical standards</i>) |
| Translation | Important to enable language translation of knowledge and learning modules to facilitate exchange in the global context. | ASTM F2575 - 14 Standard Guide for Quality Assurance in Translation ¹⁰⁷ | ASTM |
| Cataloguing and classification | Organizing by subject heading, idea of controlled vocabulary, and indexing is necessary for people to be able to find eLearning materials that are relevant | ISO/IEC JTC 1/SC 36 - Information technology for learning, education and training ¹⁰⁸ | ISO |
| Student privacy | International standards for cloud privacy - a uniform, international approach to protecting privacy of any data stored or exchanged in the cloud. ¹⁰⁹ This affords nursing and midwifery students protection and privacy as they expand their horizons. | ISO/IEC 27018 ¹¹⁰ | ISO |
| Learning Management Systems (LMS) | Specifications for building digital course content, enables the production of small and easily reusable e-Learning objects | Aviation Industry Computer-Based Training Committee (AICC) & Sharable Content Object Reference Model (SCORM) | Advanced Distributed Learning Organisation (ADL.org) |

| Type of Standard/ Purpose | Relevance to eLearning in Nursing and Midwifery | Most common standard for this purpose | Source or Champion |
|-------------------------------|---|---------------------------------------|---|
| Learning Records Stores (LRS) | Specification allows for the documentation of learning activities inside and outside of a LMS using learning record stores (LRS). A successor to SCORM, handles more modern eLearning approaches - an important consideration for blended learning approaches and for professional training that involves hands on practical skill building and certification outside of a LMS. | Tin Can API/Experience API | Advanced Distributed Learning Organisation (ADL.org) |
| Interoperable Learning Tools | Used by Coursera, Moodle, and similar efforts, this eLearning standard facilitates the integration of internet-based learning applications with online platforms offered by learning providers - an important consideration for sharing of learning resources for nurses and midwives. | Learning Tools Interoperability (LTI) | Instructional Management System (IMS) Global Learning Consortium ¹¹¹ |

4.6.2 Findings

1. Incentivizing developers and agencies to innovate may be beneficial in the long run, however firm policies for the use of standards that support exchange and interoperability are highly advised. UNESCO suggests that developers are encouraged to “think mobile first” considering streamlined content for presentation and use on devices with small screens and limited input options instead of trying to retrofit materials designed for other delivery modalities.¹¹²
2. The sentiment reflected by the examination of various policies and guidelines is that open licences and open source products will result in a proliferation of eLearning materials and publications that will increase equitable access and exchange, maximise efficiency, and enable local modification to content (an important dimension of long-term sustainability). Low-income countries are at increased risk when relying on proprietary solutions, often owned by foreign companies.^{113,114}
3. The use of open standards can engender ownership at the local level, reduce reliance on expensive proprietary products, and empower educators and students to innovate.¹¹⁵

4. Considerations of standards that enable the exchange of learning objects between various systems and learning environments are important. Several standards that already exist in this regard, such as AICC, SCORM, LTI, and Tin Can.^{116,117,118} The use of Tin Can API is growing in utility as education for nurses and midwives often occurs outside of traditional learning management systems. This consideration is very important for the training of health professionals due to the need to capture and store on hands on practical learning and educational experiences that occur outside of standard classrooms. The area of standards for eLearning is in rapid flux at this time with increasing movement towards the semantic web, and “anywhere, anytime” learning, therefore a high-level of forward-facing and unbiased expertise is required when decisions of this nature are under consideration.
5. Privacy and intellectual property rights must be acknowledged and protected. Many examples of privacy standards for identity, student data, information exchange, and personal health information exist that should be modelled or adopted.⁸⁰

4.6.3 Limitations of Review

Standards and interoperability have many subcategories that make this vitally important component rather complex and difficult to assess in a consolidated fashion. The interplay of syntax, semantics, privacy standards, LMS standards, technical standards, and disability standards contribute to the complexity. Discussion of wireless communication standards and those of telephony in general are beyond the scope of this report and were not addressed. No materials were found that discussed the potentials or implications of Tin Can API or the semantic web specifically in nursing and midwifery eLearning. The majority of materials found were not technically innovative.

4.6.4 Policy Recommendations

1. Identify a national body that will be responsible for standards assessment, adoption, and enforcing compliance with appropriate *content and competency standards* for eLearning in nursing and midwifery education. This may be a national level professional organisation.
2. Identify a national body that will be responsible for *technical standards* assessment, adoption, and enforcing compliance for eLearning in nursing and midwifery education. This would include standards that enable the exchange of learning objects between various systems and learning environments.
3. Consider adopting open standards for products and publications authored by or funded by government agencies to ensure full access to and use/sharing of resources in higher education.¹¹⁹
4. Include accessibility for people with disabilities as requirement for eLearning products and initiatives.¹²⁰
5. Seek independent and unbiased assessments of standards that robustly support interoperability, are most current, most extensible, stable, non-proprietary, and widely used.

6. Investigate newer standards such as Tin Can API that enable learning that occurs outside of the classroom to be captured, stored, and analysed. This is smart forward-leaning planning, as mobile technologies proliferate and new ways are needed to record learning that occurs outside of a LMS.
7. Require eLearning design and products that fully accommodate mobile technologies (smaller screens, limited internal memory, and inconsistent connectivity) for nursing and midwifery education.¹²¹

4.7 Infrastructure

Infrastructure refers to the networks, equipment, systems and processes, as well as the health system structure and educational context, required to effectively deploy and deliver a national nursing and midwifery eLearning program.

4.7.1 Overview

Infrastructure for eLearning focuses how to connect the nursing and midwifery workforce nationally, where they are located geographically, what their connection, equipment, and support options are in those locations, and the common methods to interact with them across that diversity of location, equipment, and tools. Infrastructure includes (1) the physical equipment to develop and deliver eLearning at national level; (2) the virtual methods to support secure authentication and identification at national scale; and (3) the human support, particularly by ICT personnel, that is needed in order to select, maintain, and provide training for physical equipment and electronic systems that are used to deliver or create eLearning within nursing and midwifery.

Physical equipment: One of the most important needs for eLearning to be able to scale and reach a critical mass of nursing and midwifery students and practitioners is a robust high-speed data network that can reliably transmit large files, such as streaming audio and video, between different locations across the country as well as across the globe. High-speed data networks, also referred to as broadband, is possible through a variety of mediums (see Table 5 below) depending on the cost and the equipment available. This is essential for communication within and between organisations in country and even more so for communication with organisations located in other countries. Once a network connection is in place, then there is great flexibility in the computing infrastructure, which includes the equipment and space that is necessary to deliver, access, and store electronic content. This includes end-user devices such as mobile phones, tablets, laptops, desktops as well as the networking equipment required within buildings that will be connected, such as servers for storing files or hosting applications, wireless access points, or Ethernet ports, as well as the physical rooms where the servers and computers will be located.

Table 6: High Speed Data Network Methods and Relative Speeds

| Method | Description | Download Speed |
|--|---|---|
| Digital Subscriber Line (DSL) | Operates over fixed copper wire, which is commonly used for landline telephony | 256 Kbps - 52 Mbps |
| Cable Modem | Operates over fixed coaxial cable, which is commonly used for cable television | 1 Mbps - 10 Mbps |
| Fibre | Operates over fixed fibre optic cables | 300 Kbps - 3 Mbps |
| Power Line Internet | Operates over fixed electrical lines | 256 Kbps - 2.7 Mbps |
| Satellite Broadband via VSAT (Very Small Aperture Terminal) | Operates wirelessly over satellite dishes, with one at the point of connection and the other in geostationary Earth orbit | 300 Kbps - 2 Mbps |
| Mobile Broadband | Operates wirelessly using cellular towers | 300 Kbps - 16 Mbps, for 3G, 100–300 Mbps, for 4G LTE |

Note: Kbps = 1 Kilobit (1000 bits) per second. Mbps = Megabits (1000 Kilobits) per second. Gbps = Gigabit (1000 Megabits) per second.

Virtual identity verification: Within health facilities or educational institutions with mature ICT infrastructure, there are often dozens if not hundreds of software applications across the entire organisation. Identity verification is necessary for any eLearning activity or assessment that is tied to formal credit toward a degree or toward continuing education requirements. At the institutional training level, many institutions implement both a unique identification number (used for administration) and a unique username (used for daily interactions such as email) that are used for tracking student usage across eLearning, email, and other software systems throughout their degree training. Centralised identification and authentication services such as Single Sign On (SSO) allows individuals to be able to access a variety of software applications with a consistent user name and password that they use throughout the organisation. Centralised authentication at the institutional level also allows others beyond the institution to verify if a nursing/midwifery student or educator has an active affiliation with a particular institution, which, for example, is used for implementing licencing requirements for library subscriptions. At the national level, nursing and midwifery students may receive a national unique identifier once they become certified or licenced. For in-service training, some countries, states, or provinces have policies that practicing nurses and midwifery must complete a certain number of hours of annual training in order to maintain their licences and request the licence number be included when reporting continuing education credit.

ICT Support Personnel: As noted above in the Strategy and Investment and expanded in the Workforce sections, a functioning eLearning infrastructure relies on skilled ICT personnel who are able to implement and maintain the network, the computing infrastructure, and integrate essential services such as the virtual identification. With a skilled local ICT workforce in country, the nursing and midwifery students and instructors can focus on the content and the pedagogy and not be distracted by trying to figure out what type of computers are available to them and whether they can find working Internet access within their organisation.¹²²

4.7.2 Findings

1. Inadequate staffing weakens infrastructure and leads to an ad hoc, reactive approach rather than a proactive one.¹²³ As detailed in the Workforce section, a reliable eLearning infrastructure for nursing and midwifery education requires investments in professional development for ICT support staff.
2. A designated point person for eLearning with the ministry of health minimises time-consuming communication barriers for instructors and tutors who support nursing and midwifery education for nursing and midwifery education.¹²⁴
3. Government initiatives for broadband adoption have focused on incentives for both service providers and consumers.¹²⁵ Examples include (1) government initiatives to connect their institutions with each other, such as the case of WoredaNet in Ethiopia;¹²⁶ (2) public institutions looking to connect with each other through research and education networks; and (3) public initiatives looking to improve the Internet connections within certain geographic areas, such as rural areas, which suffers from the “last mile” problem of fixed line access, where the cost of connecting remote areas with lower population density is often technically difficult and costly for telecommunications companies.¹²⁷ Methods 1 and 2 can be used to connect nursing and midwifery institutions within country for local collaboration. Method 3 opens up opportunities for collaboration around the world.
4. Successful eLearning programs offer reliable technology delivery with failsafe measures to minimise disruptions or outages to Internet and electricity, a documented technology plan that includes electronic security measures is in place and operational, and a centralised system provides support for building and maintaining the distance education infrastructure.¹²⁸ Offline and local network for sharing within the same physical access is important to provide failsafe access to eLearning materials used on a regular basis in a manner that does not require Internet access or consume Internet bandwidth quotas.
5. With the decreased cost of computers and mobile devices in particular, there is now increased ownership among both students and professionals.¹²⁹ This had led to a shift toward Bring Your Own Device (BYOD) policies, where educational institutions provide less equipment and instead design their applications and services to be compatible with a range of operating systems and screen sizes to accommodate the range of devices that students, instructors, and other employees may have. Flexibility in choice of learners’ mobile devices supports learning and innovation.¹³⁰

6. Physical space for computing infrastructure must be considered to ensure proper care of and access to equipment.¹³¹ This includes computer labs, server rooms, and other dedicated workspaces. Libraries, in particular, are becoming common spaces to access computers, with computer labs with desktops as well as tables and electrical outlets for people to bring their own devices.
7. Cloud hosting can be a failsafe method when local ICT staff are not available to maintain local servers.¹³² The trade-off is local institutions must have in place reliable Internet and a legal office that is able to represent and approve the licensing and service level agreements with the cloud hosting provider and ICT specialists who know how to setup the configuration requirements.¹³³
8. In order to identify virtual learners for assessment, transfer, or recognition of completion across national institutions, some third-party online-only providers of eLearning provide verified certificates that verify a person's identity electronically by having students submit a digital of scan of a nationally issued ID, such as a passport or driver's licence.^{134,135}

4.7.3 Limitations of Review

Through the ITU and national ministries of ICT aggregate level data about Internet connectivity within a country is plentiful, information about electricity is less complete. The World Development Indicators from the World Bank include general access to electricity per country.¹³⁶ It is very difficult, though, to find data about the extent of electricity outages, which is often one of the most significant infrastructural barriers to implementing eLearning in low-income countries.

The review did not reveal any examples of a national identifier used specifically for tracking educational attainment, other than the customary social security number, visa, passport, or birth certificate number used for administrative purposes of registration and tuition fees. Some countries have a national licensure system with a unique identification number assigned to individual nurses or midwives once they become certified. However, this review indicates that the licence number is used primarily for clinical reasons, and is not regularly connected to in-service education. Where in-service education is reported against a licence number, it is often done manually via paper records.

4.7.4 Policy Recommendations

1. Prioritise the creation of a nation-wide high-speed network infrastructure. Without it, eLearning initiatives will be silo-ed within institutions, with disproportionate development within urban areas. This relates to the recommendation earlier regarding the consolidation of Internet, telephony and broadcasting (Section 4.4.2).
2. Support the provision of mobile data networks at public universities, hospitals, and libraries for flexible, affordable Internet access for nursing and midwifery eLearning from those locations.

3. Negotiate with telecommunications companies at the national level to exclude eLearning websites for nursing and midwifery from mobile data quotas to reduce the financial burden on individual learners and instructors for using their own devices to access eLearning from their homes or other off-site locations.
4. Encourage equitable, neutral, national access to radio-frequency spectrum to foster competition for high-speed mobile data networks, which will in turn increase the affordability of Internet access for institutions implementing eLearning.
5. At the national level, provide subsidies for and facilitate collective bargaining for nursing and midwifery institutions with ICT vendors to provide affordable computing infrastructure for ownership by institutions and for ownership by individual learners and instructors.
6. Encourage institutional participation in consortia initiatives for open authentication and federated identification management. These are common industry requirements for licensing for scholarly databases and enterprise cloud hosting solutions.
7. Appoint a designated eLearning contact or team within the Ministry of Health who can provide technical and strategy assistance with the nursing and midwifery training institutions.

4.8 Services and Applications

Services and Applications refers to the approaches and digital resources used in the development and deployment of a national eLearning program in nursing and midwifery education.

4.8.1 Overview

For pre-service nursing and midwifery education, eLearning services and applications that support and simplify blended educational approaches (i.e. a combination of technology-assisted or online methods with traditional face-to-face instructor-led teaching), and simulation-based approaches, have been identified as the most commonly used and widely accepted delivery methods for instruction. Given the wide variety of synchronous and asynchronous (see Table 7), as well as formal and informal modalities available, the effectiveness of different blends of face-to-face versus online activities at local, regional or national levels has yet to be determined. For in-service education and training, learning management systems have been accepted as the most widespread tool for synchronous and asynchronous eLearning.¹³⁷ Informal teaching and learning environments or virtual communities established across social media platforms (such as blogs, Facebook, LinkedIn and YouTube) have also proven effective for supporting collaborative eLearning in both pre- and in-service nursing and midwifery education. Leveraging the opportunities that these virtual communities present to informally create, evaluate and deliver content to broad and dispersed populations. Virtual communities have also been identified to be effective in promoting and fostering knowledge-share across geographical borders, and development of regional standards, strategies and best practices for eLearning services and applications.

Despite the myriad of both open source and commercial eLearning services and applications available, national exemplar models have finally shown that the full potential and sustainment of any modalities will only be realised when they are selected in alignment with “the intended curriculum, the teaching methods, the learning environment and assessment methods.”¹³⁸ As technological advancements continue, therefore, the harmonization of existing-- and strategic selection of future tools will be imperative in creating sustainable yet flexible eLearning environments for nursing and midwifery education.

Table 7: Synchronous and Asynchronous Methods for a Blended eLearning Approach

| Synchronous | Asynchronous |
|---|--|
| Live Face-2-Face | Online Instructional Materials/Modules |
| Live eLearning (e.g. Virtual Classrooms, Web Conferencing, Webinar, Instructional Television/Streaming, Teleconferencing) | Computer Based Instruction |
| Mobile Learning | Offline Instructional Materials (e.g. CD ROM, Video Tape, Print Correspondence, Recorded Audio, Digital Libraries) |
| Distance/Distributed Learning (real-time) | Distance/Distributed Learning (self-paced) |
| | Collaborative Tools (e.g. Wikis, Blogs, Discussion Boards, Chat, Social Media Forums) |

4.8.2 Findings

1. Effective governmental policies clearly support, encourage and legitimise the adoption of intended eLearning services and applications in order to promote the economic and socio-cultural legitimization of eLearning interventions.^{139,140}
2. Strengthening inter-governmental collaborations on ICT and eLearning service and application use can facilitate development of regional standards, sharing of best practices and internationalization of local institutions.^{141,142,143, 144}
3. Policies encouraging private sector investment and competition are important to attract local and foreign investors to develop the local sector of eLearning services and applications.¹²³
4. Successful eLearning is achieved when services and applications align practically with intended learning outcomes (existing educational practices/curricula); learning environments (technological infrastructure); and learner characteristics (familiarity with technology and ICT competencies).¹⁴⁵ Progress toward learning outcomes is best measured through a combination of formative and summative evaluation methods.¹⁴⁶
5. Equity-based deployment strategies for services and applications can prevent widening the digital divide.¹⁴⁷
6. Cross-platform and cross-modality are among the groupings of problems commonly found with eLearning services and applications.¹⁴⁸
7. Virtual communities facilitated through social media tools can be effective in mitigating some common challenges of eLearning such as learner isolation and low student-to-instructor interaction.²⁴

4.8.3 Limitations of Review

Although the scope of this research included a review of representative policies and programs distributed across the seven clusters in the WHO Regions and World Bank Income Group classifications, a vast majority of the findings were identified from high-income countries. Heterogeneity across many of the studies disallowed for robust conclusions to be drawn regarding the adoption, implementation and sustainability of eLearning services and applications.

While there existed strong evidence to support the promotion of eLearning services and applications that facilitated blended educational approaches in nursing and midwifery education, fairly little evidence was identified supporting the various types of “blends” and their associated levels of effectiveness. Of the studies that did evaluate effectiveness, a high risk of bias in their design diminished their generalizability. Three critical gaps in the research were identified since none of the studies or national programs reviewed reported (1) any adverse effects of implemented eLearning services and applications, (2) any economic evaluations or robust cost-effectiveness analyses of interventions, or (3) any strategies on the effective use of social media tools to create virtual learning communities in nursing and midwifery education.

4.8.4 Policy Recommendations

1. Establish a national body that will be responsible for developing local and modelling best practice standards for the adoption, use, and sustainment of eLearning services and applications in nursing and midwifery education, reviewing such standards, and then enforcing compliance with the standards.
2. At the national level guide and support the use of evidence-based guided selection of eLearning services and applications that have been proven to be effective, affordable, scalable, and modifiable in practice.
3. Develop easy to use frameworks for local and regional constituents to customise them to local contexts and sustain them.
4. Ensure alignment of selected eLearning services and applications with the intended learning outcomes, learning environment, and learner characteristics.
5. Develop and enact appropriate policies surrounding intellectual property ownership, privacy, security, and access to information to encourage the creation and delivery of educational content at the national level.
6. Promote regional portals to foster joint production, shared repositories of multimedia resources, and virtual learning communities to connect nursing and midwifery eLearning programs across the country.¹⁴⁹
7. At the national level, encourage distance training proposals and teaching models that focus on convergence of media in education and the promotion of cultural diversity.¹⁵⁰

5. Consolidated Policy Recommendations

Leadership and Governance

8. Identify and engage all relevant stakeholders for nursing and midwifery pre-service and in-service eLearning (national and international, private and public, and within and between government agencies, and professional practice & technical organisations).
9. Establish mechanisms for shared decision-making, developing shared visions and goals, and evaluating program outcomes across stakeholders at the national level in a way that ensures equity, integrity, transparency, and reproducibility. Collective action and multi-stakeholder alliances are powerful tools in governance and problem-solving efforts.
10. Develop an overarching national strategic framework for eLearning in nursing and midwifery education that includes a national vision and the achievement of common goals for health. These goals must clearly lay the expectations of, and support for, multi-sector collaboration across health professions and all stakeholders.
11. Establish and prioritise the goals and challenges that eLearning for nursing and midwifery will address based on population, health system needs, technical and preparedness capacity, financial ability, economic, social and development goals of the nation.
12. Optimise partnerships by building on existing international regional consortia, both with representatives of national governments and of ranked and/or high quality universities. These consortia have existing subject matter expertise, services and content, relationships with potential donors, and established business models.
13. Assess governance capacity for eLearning for nursing and midwifery at the local, regional, and national levels. If this capacity is lacking, efforts must be immediately undertaken to build and/or bolster prior to launching eLearning initiatives.
14. In partnership with professional nursing organisations, develop guidelines for creating and selecting eLearning resources to assure quality and alignment with national nursing and midwifery curriculum, licensing standards, and fiscal capacity.
15. Select and continually align eLearning nursing and midwifery pre-service and in-service initiatives with national, regional, and international standards to enhance quality and exchange of content, technologies, and workforce.
16. In partnership with the professional nursing organisations and health sciences training institutions, incorporate completion and assessment of certified eLearning as a recognised method of curriculum implementation and continuing education credits.
17. Develop an eLearning implementation plan that includes well-defined benchmarks for nursing and midwifery training (e.g. graduation rates), indicators of quality (e.g. increased pass rates of licensure exams, decreased error rates in clinical care), and rigorous mechanisms for program evaluation.

Strategy and Investment

18. Align national eLearning initiatives nursing and midwifery training with national and international development and health goals, such as the Sustainable Development Goals, the WHO Global Health Workforce Strategic Plan, and Universal Health Care.
19. Match proposed eLearning interventions against realistic appraisals of what is feasible. Combining this with robust budget justifications can help to mobilise resources and maintain accountability.
20. Pursue equitable interprofessional partnerships that intersect with nursing and midwifery education priorities (e.g. coordination of care, universal health, maternal child, primary and chronic disease care, electronic health record education, etc.). Efforts that enable pooling of resources between health professional education programs can be very cost effective and demonstrate the power of distributed and mixed teams.
21. Shift funding mind-sets and investment strategies from one of a cost-saving perspective to one that considers the effort as a longer-range, capacity generating strategy.
22. Focus content development for eLearning nursing and midwifery education on national, regional and/or international goals for workforce development, such as development of particular nursing/midwifery specializations or knowledge of high priority health domains (e.g. emergency and critical care, emerging disease, maternal-child, public health goals, etc.).
23. Establish a coordinating body with financial management responsibilities and accountability to review funding proposals and liaise with potential funders from the private and philanthropic sector.
24. Link eLearning training for nurses, midwives, and educators to the attainment of the basic ICT competencies required in today's knowledge economy. A strategy that integrates eLearning with achieving ICT competencies (in-service and pre-service level) for nurses and midwives will effectively elevate the ICT skills of the current and future workforce in tandem.
25. Incorporate eLearning costs such as equipment replacement, ICT support personnel, and software licensing into the budget forecast for operational costs for nursing and midwifery training. Importantly, consider realistic, long-term investments that are inherent in efforts of this nature.
26. Promote North-South and South-South peer partnerships among nurses, midwives, institutions, and eLearning experts to develop a professional network for collaboration and knowledge and experience sharing. This strategy can begin to address initial gaps in local expertise and develop that local workforce capacity for the longer-term.

Legislation, Policy, and Compliance

27. Gain an understanding of the current landscape eLearning environment for nursing and midwifery at macro and micro levels (local, national, regional), including nursing and midwifery concentrations (numbers and geographic distribution), current preparation (type, duration, ownership of educational institutions), licensure, accreditation, projections for future needs, the business case, and contributors to outflow of nurses and midwives.
28. Involve key health and non-health stakeholders in creating a national eLearning vision and a transparent planning process for implementation that is equitable, flexible, inclusive, and sustainable. Stakeholders can include (not inclusive) governmental and non-governmental entities, nursing and midwifery professional groups and accrediting bodies or boards, existing educational programs and universities who train pre-service and in-service nurses and midwives.
29. Establish governmental policy initiatives, governance mechanisms, and sound regulatory practices to provide improved visibility, accountability, security, coordination and control of eLearning activities in nursing and midwifery at the national level.
30. Assess investment capacity and resources to support the effort and accompany with sustainability plans for the long term. Early, equitable, and on-going appraisals of investments and resources are necessary for quality and sustainment.
31. Include in eLearning policies and funding considerations the support of open platforms, open source, and interoperability initiatives. Investigate the applicability and utility of Tin Can API specifications and build for the future of eLearning in health professional education, as this specification embraces the provision and documentation of learning both inside and outside of the classroom.
32. Undertake national efforts to converge telecommunications (Internet, telephony and broadcasting).
33. Develop policies and methods for uniquely identifying learners, considering the relationship to licensure, accountability, out-migration, and quality while also considering the challenges inherent in efforts surrounding the unique identification of individuals.
34. Create and share the strategic context for eLearning for nursing and midwifery to align tactics and investments. This will enable governments and key stakeholders to make informed decisions regarding future investments and the formation of sound policy.
35. Include a budget for research and evaluation for eLearning and its impact on pedagogical change and learning outcomes.
36. Develop a comprehensive understanding of and investment in the deep pedagogical change that accompanies eLearning initiatives across disparate groups of nursing and midwifery learners.

Workforce

37. Engage senior-level nursing professionals as champions to strengthen change management and training and to establish local ownership.¹⁵¹

38. Prioritise faculty development in eLearning design and implementation in pre-service nursing education.¹⁵² Ensure that all professors, teachers, and management of educational institutions have received basic ICT training, the use of innovative teaching models and how to maximise learning opportunities with technology.^{153, 154} This enables them to incorporate these technologies effectively into the teaching-learning process.
39. Coordinate with the ICT sector to support investments in expanding the ICT workforce capacity to support the technology infrastructure that enables eLearning within nursing and midwifery education. Skilled ICT personnel are essential in order for the eLearning workforce development to progress to adequately support nursing and midwifery education.^{155,156}
40. Provide opportunities for early adopter eLearning initiatives to document and share lessons learned about effective teaching strategies for integrating technologies into instruction for institutions with similar levels of resources.¹⁵⁷
41. Document lessons learned and share across funders, designers, and implementers to inform local, regional, and national strategies for eLearning and ICT capacity building.¹⁵⁸ Examples and case studies about implementation efforts can help raise awareness of specific eLearning and ICT implementation issues.¹⁵⁹
42. Provide faculty mobile access to eLearning education resources like curriculum, educational resources, and lesson plans. Targeting faculty for eLearning interventions needs to be a consideration at the same time students are provided access.¹⁶⁰
43. Remain flexible through eLearning implementation, working together with nursing and midwifery educators and students to adjust the program to evolving local needs and challenges.¹⁶¹

Standards and Interoperability

44. Identify a national body that will be responsible for standards assessment, adoption, and enforcing compliance with appropriate *content and competency standards* for eLearning in nursing and midwifery education. This may be a national level professional organisation.
45. Identify a national body that will be responsible for *technical standards* assessment, adoption, and enforcing compliance for eLearning in nursing and midwifery education. This would include standards that enable the exchange of learning objects between various systems and learning environments.
46. Consider adopting open standards for products and publications authored by or funded by government agencies to ensure full access to and use/sharing of resources in higher education.¹⁶²
47. Include accessibility for people with disabilities as requirement for eLearning products and initiatives.¹⁶³
48. Seek independent and unbiased assessments of standards that robustly support interoperability, are most current, most extensible, stable, non-proprietary, and widely used.
49. Investigate newer standards such as Tin Can API that enable learning that occurs outside of the classroom to be captured, stored, and analysed. This is smart forward-leaning planning, as mobile technologies proliferate and new ways are needed to record learning that occurs outside of a LMS.

50. Require eLearning design and products that fully accommodate mobile technologies (smaller screens, limited internal memory, and inconsistent connectivity) for nursing and midwifery education.¹⁶⁴

Infrastructure

51. Prioritise the creation of a nation-wide high-speed network infrastructure. Without it, eLearning initiatives will be silo-ed within institutions, with disproportionate development within urban areas. This relates to the recommendation earlier regarding the consolidation of Internet, telephony and broadcasting (Section 4.4.2).
52. Support the provision of mobile data networks at public universities, hospitals, and libraries for flexible, affordable Internet access for nursing and midwifery eLearning from those locations.
53. Negotiate with telecommunications companies at the national level to exclude eLearning websites for nursing and midwifery from mobile data quotas to reduce the financial burden on individual learners and instructors for using their own devices to access eLearning from their homes or other off-site locations.
54. Encourage equitable, neutral, national access to radio-frequency spectrum to foster competition for high-speed mobile data networks, which will in turn increase the affordability of Internet access for institutions implementing eLearning.
55. At the national level, provide subsidies for and facilitate collective bargaining for nursing and midwifery institutions with ICT vendors to provide affordable computing infrastructure for ownership by institutions and for ownership by individual learners and instructors.
56. Encourage institutional participation in consortia initiatives for open authentication and federated identification management. These are common industry requirements for licensing for scholarly databases and enterprise cloud hosting solutions.
57. Appoint a designated eLearning contact or team within the Ministry of Health who can provide technical and strategy assistance with the nursing and midwifery training institutions.

Services and Applications

58. Establish a national body that will be responsible for developing local and modelling best practice standards for the adoption, use, and sustainment of eLearning services and applications in nursing and midwifery education, reviewing such standards, and then enforcing compliance with the standards.
59. At the national level guide and support the use of evidence-based guided selection of eLearning services and applications that have been proven to be effective, affordable, scalable, and modifiable in practice.
60. Develop easy to use frameworks for local and regional constituents to customise them to local contexts and sustain them.
61. Ensure alignment of selected eLearning services and applications with the intended learning outcomes, learning environment, and learner characteristics.

62. Develop and enact appropriate policies surrounding intellectual property ownership, privacy, security, and access to information to encourage the creation and delivery of educational content at the national level.
63. Promote regional portals to foster joint production, shared repositories of multimedia resources, and virtual learning communities to connect nursing and midwifery eLearning programs across the country.¹⁶⁵
64. At the national level, encourage distance training proposals and teaching models that focus on convergence of media in education and the promotion of cultural diversity.¹⁶⁶

6. Summary and Conclusions

The prevalence of eLearning in nursing and midwifery education is growing at a rapid pace. Many of the activities to date emerged in an uncoordinated and unregulated fashion over the past several decades. The result has been segregated, fragmented, and non-interoperable systems of education that in many cases are not serving nations well. National governments, particularly ministries of health, ministries of education, and ministries of ICT/communication, have a critical leadership role to play in harmonizing these efforts and aligning eLearning education with national workforce priorities. Government-led strategies and plans may ensure equitable and reliable access, quality of instruction and assessment, accountability, and clear alignment with national priorities for nursing and midwifery education and workforce development. The achievement of the SDGs and assuring universal healthcare are intimately linked with the strategies for workforce scale-up. It is obvious that the current approach to managing the supply and demand mismatch in nursing and midwifery is not working. Changing the status quo will require innovation, coordination, and strong leadership.

eLearning has been shown to be method that can augment *existing* nursing and midwifery educational systems, but it requires substantial investment and does not supersede the need for skilled nursing and midwifery educators. eLearning for nursing and midwifery depends upon on institutional capacity and commitment for nursing and midwifery education for pre-service and in-service training. In the absence of national nursing and midwifery professional organisations; national policies and plans that identify shared goals and standards for nursing and midwifery education across the country; professional development programs to train nurses and midwives to be effective instructors; and without budget to invest in equipment, people, and applications, eLearning is not an appropriate method to strengthen the nursing and midwifery workforce. If those conditions are in place though, then eLearning can be a catalyst to expand the geographic reach of nursing and midwifery education, to standardise curriculum nursing and midwifery education across the country, to develop instructional materials that can be re-used and adapted across institutions, and to develop a national and worldwide professional network of peers in nursing and midwifery as education and research collaborators. It is then that we can begin to bridge the gap between the demand and supply of nurses and midwives that can potentially cripple efforts to boost economic growth, reduce poverty, and enable universal health care. Using the framework established in the WHO and ITU eHealth Strategy Toolkit, this report includes dozens of findings and policy recommendations that affect the environmental factors that enable national-level eLearning initiatives. The number of references, findings, and recommendations demonstrate the complexity involved in creating and executing a national-level eLearning plan for nursing and midwifery. The most salient points that recurred throughout the findings and touch on many of the environment factors are four-fold:

1. Strong, visible, and active leadership at the national level facilitates the necessary political will and investment for the institutional leadership at nursing and midwifery schools to provide adequate infrastructure - equipment, people, and services - to effectively implement eLearning for pre-service and in-service training. Without this high-level leadership commitment and inter-agency collaboration, eLearning cannot scale, cannot be sustained be long-term, and may not advance the national priorities for nursing and midwifery.

2. The human element of delivering eLearning is the linchpin for its success. Effective eLearning requires ample ICT training for instructors, students, and support staff for nursing and midwifery education. ICT is a tool that can amplify eLearning, but without knowledge instructors who know how to integrate into pedagogy, without students who understand how to use it to direct their own learning, and without ICT support staff who maintain the infrastructure and train others, it ends up being a blunt instrument for social change for nursing and midwifery workforce development.
3. An eLearning program is a long-term financial commitment that often requires the mobilization of resources from national governments, regional consortia, donors, and corporate partners. ICT initiatives such as eLearning are capability generating rather than cost-savings and have high-recurring costs (such as for equipment and service maintenance and upgrades) that must be factored into operational costs for budget forecasts.
4. eLearning can take many forms in terms of methods and modalities - from entirely at a distance to mostly face-to-face, from learning management systems that mainly act as an archive for reading materials to clinical simulation with lifelike machines that model real-world patient symptoms. eLearning has been shown to be most effective in blended format, where the digital content is used to enhance in-person instruction with skilled faculty, available tutors to help students and instructors navigate both content and technology, and opportunities for peer engagement.

Appendices

Appendix 1: WHO regions and World Bank Income Clusters (7) with Corresponding Countries

According to the classification:

(http://www.who.int/healthinfo/global_burden_disease/definition_regions/en/)

“WHO Member States are grouped into low and middle-income countries (LMIC) by WHO region (the 6 WHO regions are used), separating out high-income countries within each of these regions into a 7th group.”

This report includes example policies and programs from each of the 7 groups.

High-income countries

Andorra
Australia
Austria
Bahamas
Bahrain
Barbados
Belgium
Brunei Darussalam
Canada
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Kuwait
Luxembourg
Malta
Monaco

Netherlands
New Zealand
Norway
Oman
Poland
Portugal
Qatar
Republic of Korea
Saint Kitts and Nevis
San Marino
Saudi Arabia
Singapore
Slovakia
Slovenia
Spain
Sweden
Switzerland
Trinidad and Tobago
United Arab Emirates
United Kingdom
United States of America

LMIC African Region

Algeria
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Comoros
Congo
Côte d'Ivoire
Democratic Republic of the Congo
Equatorial Guinea

Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mozambique
Namibia
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
South Africa
Swaziland
Togo
Uganda
United Republic of Tanzania
Zambia
Zimbabwe

LMIC Region of the Americas

Antigua and Barbuda
Argentina
Belize
Bolivia (Plurinational State of)
Brazil

Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Republic
Ecuador
El Salvador
Grenada
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Saint Lucia
Saint Vincent and the Grenadines
Suriname
Uruguay
Venezuela (Bolivarian Republic of)

LMIC South-East Asia Region

Bangladesh
Bhutan
Democratic People's Republic of Korea
India
Indonesia
Maldives
Myanmar
Nepal
Sri Lanka
Thailand
Timor-Leste

LMIC European Region

Albania
Armenia
Azerbaijan
Belarus
Bosnia and Herzegovina
Bulgaria
Georgia
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Montenegro
Republic of Moldova
Romania
Russian Federation
Serbia
Tajikistan
The former Yugoslav Republic of Macedonia
Turkey
Turkmenistan
Ukraine
Uzbekistan

LMIC Eastern Mediterranean Region

Afghanistan
Djibouti
Egypt
Iran (Islamic Republic of)
Iraq
Jordan
Lebanon
Libya
Morocco
Pakistan
Somalia
South Sudan
Sudan
Syrian Arab Republic
Tunisia
Yemen

LMIC Western Pacific Region

Cambodia
China
Cook Islands
Fiji
Kiribati
Lao People's Democratic Republic
Malaysia
Marshall Islands
Micronesia (Federated States of)
Mongolia
Nauru
Niue
Palau
Papua New Guinea
Philippines
Samoa
Solomon Islands

Tonga
Tuvalu
Vanuatu
Viet Nam

Appendix 2: Model Policies, Regional Collaborations, and Projects

Policies

- At the international level, the United Nations Educational, Scientific and Cultural organisation (UNESCO) has published several reports on policies on ICT education, including the recent report “Transforming Education: the power of ICT policies” which provides useful information on contemporary challenges for and approaches to public policies in the field of ICT in education.¹⁶⁷
- The Ghana eHealth Strategy, authored between 2009-2011, is an example of a 5-year national plan for eHealth.¹⁶⁸ Initiated through an annual regional meeting of the United Nations Economic and Social Council (ECOSOC). The Novartis Foundation provided financial and technical support for the stakeholder engagement and developing of the plan for Sustainable Development. Representatives from the Ministry of Health, Ministry of Communication, National Information Technology Agency, a public university, national centres of excellence in ICT and in health information management, and a local private telecommunications company were all involved in the development of the policy. In Ghana, health training and research institutions report to the ministry as do the professional councils, including the Nursing and Midwives Council which oversees curriculum, training, continuing education, and certification of all nursing and midwifery personnel. The Ghana eHealth policy created the Ministerial Committee on eHealth to oversee the review and awards of proposals for eHealth.
- In 2010, the Government of Ghana began a 5-year national eLearning for nursing program in partnership with USAID’s Maternal and Child Health Integrated Program (MCHIP) program to use eLearning to improve the quality of instruction at new midwifery schools. The program developed 6 eLearning modules in priority topics and facilitated a mobile mentoring program to improve nursing and midwifery student access to tutors.¹⁶⁹
- On-going costs for general operations and quality improvement of eLearning efforts have been incorporated into Ethiopia’s strategic planning process. In Ethiopia’s 2012 strategic plan for human resources, the estimation of the total cost of training for a single nursing and midwifery graduate was projected to be \$1,051 - \$1,733. After a subsequent study that focused on enhancing the quality of the eLearning offerings for nurses and midwives, the next version of the strategic plan revised the estimate to \$1,233 - \$2,384.¹⁷⁰
- The United Nations “Framework for Information and Communications Technology Policy Reviews: Helping Countries Leverage Technology ICT for Development” from 2014 provides step-by-step recommendations for the reviewing of existing ICT policies. This resource may be best used for subsequent periodic reviews of ICT policy to ensure on-going maintenance and to support organic growth into other areas that ICT touches.¹⁷¹
- The United Nations “Framework for Information and Communications Technology Policy Reviews: Helping Countries Leverage Technology ICT for Development” from 2014 provides step-by-step recommendations for the reviewing of existing ICT policies. This resource may be best used for subsequent periodic reviews of ICT policy to ensure on-going maintenance and to support organic growth into other areas that ICT touches.¹⁷²

- The World Summit on the Information Society/ITU “Outcomes Document” (2014) is focused upon the use of ICT as a mechanism for spanning the digital divide and using ICT to improve people’s lives. The WSIT+10 document emphasised the point of the efforts needed to promote equality, particularly around gender, within eLearning efforts.¹⁷³
- The Philippines eHealth Strategic Framework and Plan 2014-2020 is a model for a thoughtfully planned, phased approach for the growth of eHealth.¹⁷⁴ Phase 1, from 2013 - 2014, named “Standardise and Connect” aims to begin basic information sharing between institutions. Phase 2, from 2015 - 2016, named “Transform” focused on the development and deployment of technical systems across those institutions. Phase 3, from 2017-2020, named “Maintain and Measure” aims to have an established infrastructure that is now focuses on maintenance, measurement, continuous improvement. Their plan includes milestones, indicators and outputs, and the responsible implementing organisations for each milestone, which includes the Department of Health, PhilHealth, the Department of Science and Technology, and Department of Budget and Management Budget, the Korea International Cooperation Agency, the Philippine Council for Health Research and Development.
- The South African Strategic Plan for Nurse Education, Training and Practice 2012-2017, developed under the Director of the Minister of Health and supported with an endowment from the Atlantic Philanthropies, is an excellent example of a national effort designed to reconstruct and revitalise the nursing profession in South Africa.¹⁷⁵ This strategic plan provides a very detailed and well-articulated strategy and implementation plan that speaks to the broader issues of education, quality, competence, accreditation, defining, and licensing of nursing practice.
- The Ghana eHealth policy proposed a US\$115 million budget over five years for eHealth costs for hardware, software, and personnel and does not include national network infrastructure. The policy relies on the securing donor funding for initial start-up costs for hardware, initial training programs, and technical support. The Government of Ghana internal funds are expected to be able to cover all small projects. The Ghana eHealth policy estimates 5-10 years of supplemental funding is required for sustainable programs.¹⁷⁶
- Ireland has in place a mechanism to track 10 million bovines over the course of their lifespan, a practice mandated by EU regulators. The political will is strong and the technology is available to enable the agricultural industry to track and monitor quality. This is not true of the global health workforce, a factor that prevents comprehensive understanding, tracking, and monitoring of health workforce.⁷⁵
- Rwanda’s eHealth projects are funded through a mixture of government and donors, with renewal funding tied to project performance.¹⁷⁷ Their national policy does not identify a specific policy or budget. Rwanda has directly addressed the fragmentation of digital health initiatives in country by systematizing the way in which all eHealth related requests are reviewed. The Rwandan Ministry of Health reviews all requests of this nature to ensure that all programs of work adhere to national standards and goals.

- Bahrain's national nursing strategic plan was created through momentum from multiple regional initiatives. In 1992, the Gulf Cooperation Council (GCC) Nursing Committees by the Ministers of Health in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates created a 5-year national strategy for nursing development that was adopted by all 6 countries. At the end of that period, the WHO Eastern Mediterranean Regional Office (EMRO) released their strategy for nursing and midwifery development in 23 countries.¹⁷⁸In Nigeria, the Connect Nigeria Initiative, which focused on ICT in education including health and other disciplines, was jointly funded by the Communication and Education Ministries, a World Bank project support science and technical education, and the Nigerian Research and Education Network.¹⁷⁹
- The Philippines established a national eHealth fund in 2013.¹⁸⁰
- The State of the World's Midwifery 2014 report (SoWMy2014), coordinated by the United Nations Population Fund (UNFPA), ICM, and WHO focuses on 73 of the world's 75 low- and middle- income countries. This report provides a comprehensive overview of the current state of global midwifery and policy briefs in the developing world. These materials provide an exceptional snapshot of midwifery impact and needs across these 73 countries.¹⁸¹
- India and Philippines have formal strategies to train a surplus of nurses in expectation that many of them will migrate to other countries and send back remittances to spur economic growth back in their home country. A reported 88,000 nurses trained in the Philippines were employed overseas during 1992 - 2003.¹⁸² One noted challenge with this approach is differences in degree duration, competencies within the curriculum, and certification exams for nursing and midwifery between countries.
- Australia published its National eHealth Strategy in 2008, providing a common framework for states and territories to implement eHealth strategies within a flexible system. The focus of the National eHealth Strategy is on three core ideas; how to best utilise the existing Australian eHealth landscape; how to best manage of the variable scale of capacity that exists within the health sector already across its states and territories, and to support change as ICT development advances, with an overall goal of building long term national eHealth capacity “ in an incremental and pragmatic manner,” with an eye towards not only the health workforce, but consumers as well.
- In the United States, ensuring equitable access of individuals with disabilities to digitally-based educational opportunities is supported by the US Rehabilitation Act of 1973 (Section 508) and has resulted in high-levels of compliance. Section 508 requires that all federal agencies and institutions that receive federal funding adhere to compliance measures designed to provide equitable access to anyone with disabilities. Agencies that are required to adhere include government agencies, federally funded nonprofits, public higher education institutions, and public K-12 schools. Examples of 508 compliance that has bearing on eLearning includes digitally delivered information using closed captioning by those with hearing disabilities, JAWS screen readers for the visually impaired, etc.

- The Belize National Health Information System Strategic Plan for 2010-2014 lists as its first objective the expansion of network infrastructure to include rural and outlying areas. The strategic plan mentioned that continuing medical education via video conferencing with a partner in the United States is currently underway at some locations in Belize but limited bandwidth has been a challenge. The plan does not provide details about the connection medium or devices, but has earmarked 33% of its 5-year budget - US\$882,751 of a total of US\$2,722,770 - for enhanced ICT infrastructure.
- The University of Amsara in Eritrea started a distance education program for advanced nursing practice, physicians served as preceptors for the first batch of advanced nursing students. Later, the Ministry of Health in Eritrea formally recognised that role and had a fresh group of graduates who could step in as preceptors.¹⁸³
- A paediatric cardiac-thoracic nursing program Canada, after a comparison of pros and cons of an institutional model vs. a national nursing approach vs. a national interprofessional approach with other health sciences, the course leaders decided that the national interprofessional approach would be the most cost-effective and sustainable long-term.¹⁸⁴
- The Government of Ethiopia launched WoredaNet in 2011 to connect 600 national agencies through a national wide area network for the exchange of video conferencing and other electronic information that can be routed locally within country. The policy, which connects a number of public hospitals and public universities, in each of the districts (woredas) across the country. One of the primary purposes of the network is to support video conferencing between government employees from the district up to the state level. One of the current uses of the network is for video conferencing to teach basic science courses for undergraduate medical education at three Ethiopian medical schools via a fourth medical school located in Addis Ababa.
- The Jordan Education Initiative (JEI) is an often-cited example of a successful public-private partnership for eLearning. JEI was created in 2003 through a partnership between the Ministry of Education and private enterprises that was facilitated by the World Economic Forum. JEI is an external autonomous body whose advisory board includes senior officials from the Ministry of Education. To date, JEI has raised US\$25 million total, with US\$18 million for eLearning. The funding was split between global private sector partners (50%), donors (32%), national government (11%), and Jordanian private sector (7%). JEI includes monitoring and evaluation in annual work plans.¹⁸⁵
- The Turkey eHealth Policy, which was passed in 2004, received seed funding from the World Bank. It does not specifically mention professional standards for nurses or midwives in the policy, a limitation that was noted by both ITU amidst recommendations for improvement.¹⁸⁶

Regional Collaborations

- The African Virtual University is an example of a multi-national collaborative.¹⁸⁷ Sponsored by the African Development Bank, this innovative education institution services 57 eLearning centres in 27 African countries to provide academic programs and short courses as well as digital library resources to African students and academics.

- The International Education and Resource Network (iEARN) is a non-profit global network that enables teachers and students to use the Internet and technologies to collaborate on projects that enhance learning.¹⁸⁸
- The Open Education Consortium is an international consortium of mostly higher education institutions focused on the policy, research, and creation of open educational resources (shared under flexible public copyright licences, such as Creative Commons).¹⁸⁹
- The Pan African eNetwork Project, an initiative from the Minister of External Affairs in India launched in 2007, aimed to establish video conferencing for education and for clinical care between universities and hospitals in Africa and India.¹⁹⁰ The collaboration includes 58 hospitals, 5, universities, and 53 learning centres in Africa with 5 universities and 12 hospitals in India. The partner institutions are connected by satellite.
- The East African Community (EAC) member states met in 2014 to discuss the variations in nursing and midwifery education, legislation and practice. Over 90% of all nurses and midwives in the EAC are educated at the certificate or diploma levels, which has resulted in decreased labor mobility. In keeping with the needs for severe shortages in nursing and midwifery, and to align with the EAC Common Market Protocol and the East African Community Establishment Treaty, the EAC has adopted the “Collaborative Change: An Interdependent Model of Nursing Education”, and is in the process of modifying them for the region.²⁰⁰

Projects

- The annual eLearning Africa conference provides an international forum for African public and private organisations and institutions to share their experiences with ICT in education.¹⁹¹
- The list of large funders for international eLearning conferences provides leads for potential investors. The 2014 Global Education and Technology Health Summit was funded by the Novartis Foundation for Sustainable Development, Johnson and Johnson, the Norwegian Agency for Development Cooperation, the U.S. Institutes of Health, and Qualcomm Wireless Reach.¹⁹² The Information Communication Technologies and Development 2015 conference was sponsored by Brac, Microsoft Research, Internet Society, IBM Research, The Swedish Program for ICT in Developing Regions, Nanyang Technological University, Internet Corporation for Assigned Names and Numbers, University of Cape Town, and the Singapore Network Information Centre.¹⁹³ The eLearning Africa 2015 conference was sponsored by Yazmi, Itida, Ethio Telecom, Oracle Academy, Egyptian Information Technology Industry Development Agency, Emerald Group Publishing, Avanti, and DesignMate.¹⁹⁴ The Global mHealth Forum is funded by USAID.¹⁹⁵

- South African National Household Survey asserts that rapid technological advances have the potential to exacerbate existing inequalities due to income disparity and geographic barriers. Therefore the goal of using ICT to bridge the spatial exclusion gap and to increase equitable access to the highly vulnerable is threatened. This work provides an index of current ICT measures by region in South Africa, providing a baseline against which progress in equitable ICT distribution can be measured. This report is highlighted as an example for evaluation and measurement principles that are important to hard infrastructure assessments in eLearning initiatives.¹⁹⁶
- The Information Training and Outreach Centre for Africa focuses on building capacity through the enhancement of ICT skills for African librarians, information specialists, researchers, scientists and students throughout sub-Saharan Africa.
- IntraHealth International has produced an open source tool called iHRIS for national governments to track and manage health worker data, such as health worker numbers, skills, qualifications, training, employment history, and location.¹⁹⁷ It is currently in use in over 20 countries and has 1 million health worker records. It has saved an estimated \$226 million in licensing fees for similar, proprietary software.
- The Canadian Nurses Association released the *e-Nursing Strategy for Canada* in 2006 to coincide with the launch of its NurseONE portal.^{198,199} The strategy aimed to provide a coordinated and collaborative approach for applying eLearning to nursing across the country. Still active today, the portal includes a number of tools created and curated for an audience of nursing professionals, including webinars, guides to scholarly journals and databases, career path guides, formal continuing education courses, and virtual communities.

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