



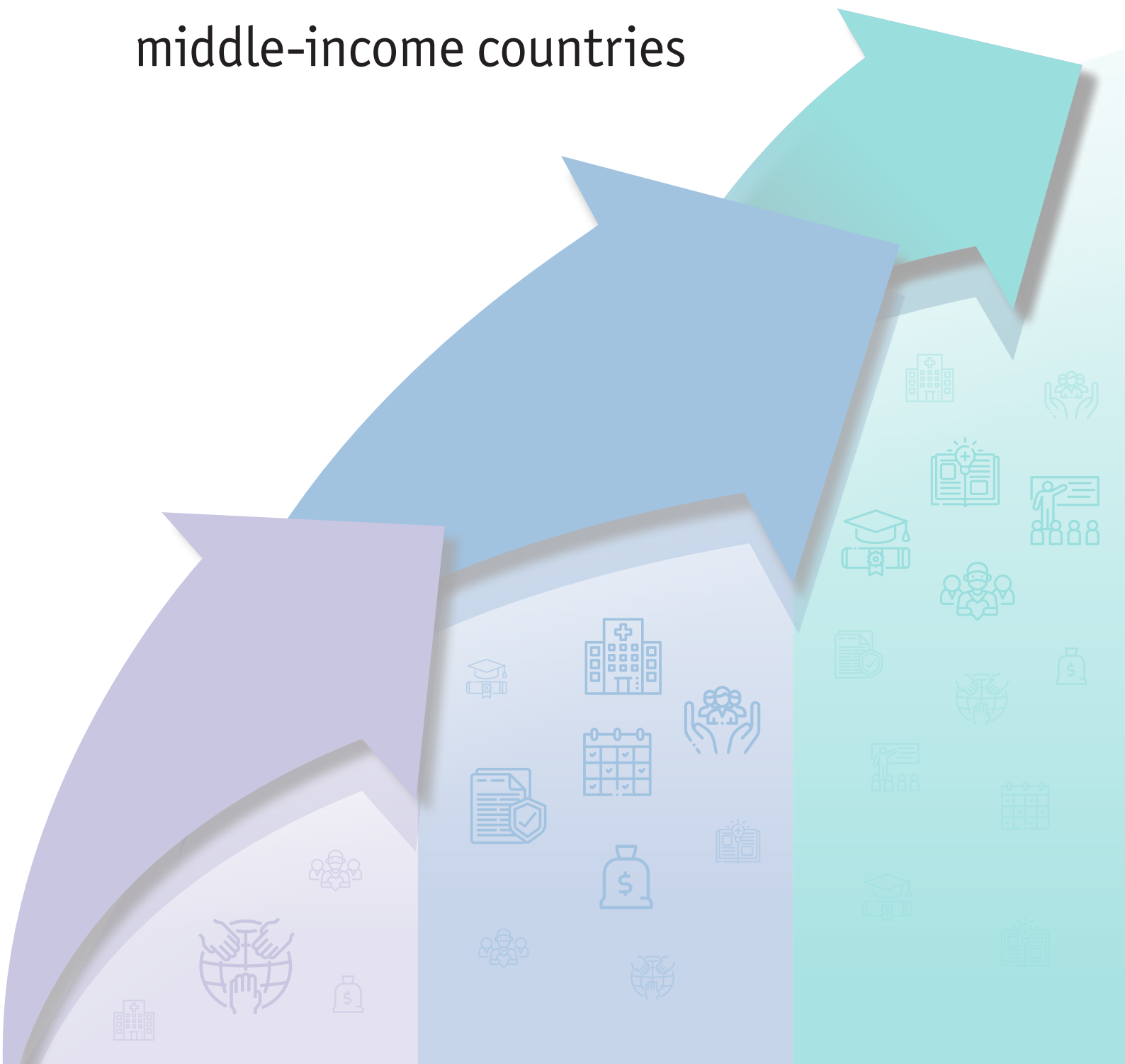
World Health
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Roadmap on human resource strategies to improve newborn care in health facilities in low- and middle-income countries



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Abbreviations

AAP	American Academy of Pediatrics
COINN	Council of International Neonatal Nurses
HRH	human resources for health
LMIC	low- and middle-income countries
iHRIS	integrated Human Resources Information System
NHWA	National Health Workforce Accounts
NICU	neonatal intensive care unit
SDG	Sustainable Development Goaliations
UNICEF	United Nations Children’s Fund
UNFPA	United Nations Population Fund

The roadmap at a glance

Purpose

To provide a framework and strategies for countries to transform their policies on human resources for health (HRH) and provide their health workers with the knowledge and technical and behavioural skills necessary for high-quality care by 2030, to ensure that all newborns survive and thrive.

Key messages

- **Critical for universal health coverage and for meeting the Sustainable Development Goals (SDGs) by 2030:** Countries must invest in their health care workforce to achieve universal health coverage, meet the SDG targets and fulfil the vision of the Every Newborn Action Plan to ensure that every newborn has the opportunity to survive and thrive.
- **Rights-based and family-centred:** All newborns have the right to high-quality, evidence-based, nurturing care from health workers with appropriate knowledge and technical and behavioural skills, working in partnership with families.
- **Opportunity to save lives now:** The birth of more babies in facilities provides a major opportunity to link to maternal care, end preventable stillbirths and extend newborn services to improve outcomes.
- **Preventing disability:** As neonatal mortality decreases, more focus should be directed to high-quality care and follow up to optimize neurodevelopmental outcomes.
- **Promoting equity:** Addressing inequity in human resources and in skilled 24-hour neonatal coverage will reduce neonatal mortality and morbidity.
- **Ensuring high-quality care and well-being:** Strengthening policies for HRH will enable countries to manage training, recruitment and retention of health workers who care for newborns.
- **HRH planning:** National HRH plans should be costed, financed, implemented and continually revised to ensure that the estimated numbers, categories and qualifications of health workers are available to meet public health goals and population health needs.
- **Policy action now:** This document outlines 10 human resources strategies for countries to achieve SDG target 3.2 (national neonatal mortality rate of ≤ 12 per 1000 live births) by 2030.

Strategies

NATIONAL AND SUBNATIONAL TRAINING OPTIONS TO OPTIMIZE CURRENT HRH CADRES AND TO PLAN SPECIALIST ROLES



Improve and standardize the content, curricula and development of competence in pre-service programmes for health workers in neonatal care.



Build the capacity of existing newborn care providers through orientation programmes, continuing education, skills training, quality improvement initiatives and support to maintain or increase competence.



Upgrade existing cadres with additional specialized training in neonatal care, with additional qualification or certification at undergraduate level.



Create and train a new cadre of specialized neonatal nurses.

NATIONAL AND SUBNATIONAL ACTIONS FOR THE PROVISION OF NEONATAL CARE



Standardize the levels of neonatal care provision, with safe referral of mothers and infants.



Establish strategies for health worker recruitment, well-being, motivation and retention.



Ensure effective staffing, staff ratios and skill mixes in local neonatal units.



Strengthen national human resources planning, policy and regulations for development and management of neonatal services at all levels.



Allocate adequate funds for capacity-building and support for neonatal care in the national budget for human resources for health.

GLOBAL ACTIONS FOR THE PROVISION OF NEONATAL CARE



Promote global strategies, collaborations, accountability, leadership and governance for human resources for neonatal care, integrating innovative multi-country research and learning networks.

Introduction



The need to scale up newborn care services in low- and middle-income countries

Deaths in the neonatal period (the first 28 days of life) now represent nearly half (47%) of all deaths of children under 5 years, with 2.5 million neonatal deaths (1) and 1.9 million stillbirths per year (2). In addition, more than 1.5 million newborns survive each year with long-term neurodevelopmental impairment (3). Almost all neonatal deaths (98%) occur in low- and middle-income countries (LMICs), and the highest rates of neonatal mortality are in countries with humanitarian crises. For every country to meet Sustainable Development Goal (SDG) 3.2 for neonatal survival by 2030, more investment is necessary in health facility care for all mothers and newborns (3). Newborns are the most vulnerable population in the world; they have specific needs and are a sensitive marker of the quality of care, as they can die within minutes (4). Yet, of the 30 million newborns who require inpatient care every year, approximately half do not have access to neonatal care services and those who have access often receive care of suboptimal quality (3).

Cost-effective, proven interventions to reduce newborn morbidity and mortality are available, and most newborns can survive and thrive if they have access to high-quality health care, including as inpatients (3). Most births in LMICs now take place in health facilities, from 60% of all births in low-income settings worldwide in 2000 to 80% in 2016 (5), ensuring opportunities to improve newborn care soon after birth. It has been estimated that 1.7 million newborns could be saved each year with investment to ensure universal access to high-quality newborn care. Almost half of the effect would result from providing special and intensive hospital care for preterm, low-birth-weight or sick newborns (3). Scaling up interventions in LMICs will require innovations such as family-centred care, local adaptation, appropriate use of technology, financial protection and development of dedicated human resources.

Gaps in human resources for newborn care services

Nurses and midwives provide most of the care for mothers and newborns in facilities throughout the world; however, there is a global shortage of nurses, midwives, medical doctors and other health workers (6,7). There is also a critical shortage of specialist medical practitioners such as obstetricians, neonatologists, paediatricians and surgeons. The global shortage of nurses was estimated recently to be 5.9 million, of whom 89% are needed in LMICs, where the increase in the number of nurses is barely keeping pace with population growth, so that the nurse-to-population ratio is increasing only marginally (8).

The shortage of human resources for health (HRH) is one of the main factors in the persistently high mortality rates of women and newborns in many countries, particularly in remote areas and in disadvantaged populations, and the rates are exacerbated during outbreaks and humanitarian crises (3). Shortages and inequitable distribution of competent, motivated HRH result in heavy workloads for existing staff, unacceptable staffing ratios and gaps in effective coverage of newborn care (9). The concept of 'effective coverage' covers both access to care by the population and the quality of the care provided. The World Health Organization (WHO) Quality of Care framework for maternal and newborn health (10) includes both the provision and the experience of care and the health system components of HRH and essential physical resources.

As neonatal care is inextricably linked to maternal perinatal care and well-being, the provision of interventions for both is closely linked, especially at the time of birth. Skilled birth attendants, including medical doctors and midwives, are thus critical to the provision of high-quality newborn care and to improving newborn outcomes, not only at the time of birth and for routine postnatal care but also in health facilities to which mothers and newborns with complications are referred. Countries that have improved maternal and newborn survival and health during the past three decades by investing in their nursing and midwifery workforces have achieved sustained reductions in maternal and newborn mortality. Nevertheless, all cadres have gaps in competence (11).

Critical gaps also remain in neonatal nursing (6,7) and the numbers of specialized medical doctors. The survival of preterm infants in facilities in high-income countries has been linked to a high neonatal nurse-to-infant ratio and the number of neonatal nurses working per shift, as well as to the levels of specialist education and experience of the nurses delivering care (12). Specialized nurses are essential to care for small and sick newborns, and they are proven to improve the chances of survival and ability to thrive. Yet, despite the vital role for nurses in the care of sick newborns, neonatal nursing is not a widely recognized cadre in LMICs, and few countries have formal training.

Nurses in LMICs generally acquire their competence in neonatal care through training on the job. Training of nurses in neonatal care is often not recognized, and participants are categorized as general nurses (e.g. in South Africa) (13). Additionally, nurses are frequently rotated out of neonatal care, even if they are specialized (14). In high-income countries, neonatal nursing is an established specialty, and neonatal nurse practitioners provide primary management of small and sick newborns, working in collaboration with specialist medical doctors, bedside nurses and the other members of a multidisciplinary team (15,16).

Even the best trained and motivated health worker needs a supportive, enabling environment to work effectively, yet ensuring high-quality care faces many health systems gaps (17,18). Supportive environments are those that provide appropriate infrastructure, including water, sanitation and hand-washing facilities, well-maintained neonatal-specific equipment, reliable medications and electricity, adequate funding, robust monitoring systems, emotional support for health workers and evidence-based policies and procedures such as standardized care protocols (9).

Opportunities to improve newborn survival and health

To save 1.7 million newborns each year and reach SDG target 3.2 by 2030, the priority is to provide universal health coverage of high-quality care to newborns by investing in:

- strategies to ensure universal access to high-quality essential newborn care, including functioning referral systems for small and sick newborns with their mothers. The interventions should include minimizing separation, early exclusive breastfeeding, timely, effective resuscitation for the 10% of newborns who require it at birth, and early identification and referral of small and sick newborns (19,20). Midwives and nurses, in collaboration with parents, should provide such essential care; they should have access to specialists for advice and, if necessary, facilitate safe referral for management of maternal and newborn complications. The high coverage of institutional deliveries offers an opportunity to strengthen the quality of essential newborn care services linked with maternity services.
- policies to ensure universal access to high-quality specialized inpatient care for newborns delivered preterm or who are small or sick. Small and sick newborns need special support and timely, high-quality inpatient care to survive. This requires dedicated space, equipment and support services, such as laboratory and radiological services and care that is available at all times (3). Nurses and midwives with specialized skills in newborn intensive care should

deliver the care, supported by medical doctors and other members of local multidisciplinary neonatal teams. It has been estimated that nearly half of all neonatal lives could be saved with the provision of specific interventions for small and sick newborns through high coverage with high-quality 'special' and 'intensive' care (3).

To improve neonatal outcomes, particularly in the countries with the highest rates of newborn deaths and morbidity, all health worker cadres must be strengthened. In particular, nurses and midwives must be recruited and offered specialized education, as well as regular hands-on skill training in caring for small and sick newborns. They must be provided with resources, including additional auxiliary staff, and a supportive environment to enable them to give consistently high-quality care (17).

Improved newborn health improves national well-being and provides an opportunity to ensure a rights-based approach (21), in recognition of high-quality health care as a human right for newborns, and equity and fairness throughout the population. This approach includes prioritizing newborn- and family-centred models of care such as kangaroo mother care for preterm and small babies, the presence of parents in neonatal units 24 h a day and follow-up of high-risk newborns and families after discharge from hospital. Family-centred care improves the quality of care, resulting in better outcomes for both the mother and the baby. This model requires specific health worker competence in communication, ability to support and engage parents in the care of their newborn, teamwork, consideration of requirements for developmental follow up and linkage with other services and specialists on the multidisciplinary team (3). Importantly, all interventions for neonatal care in a country require supportive health system structures.

An HRH roadmap to accelerate progress

The HRH-related challenges to the provision of high-quality care to mothers and newborns in countries are complex and intertwined, and should receive continuous attention and prioritization at all levels of the health system. Neonatal outcomes will be improved by implementation of sound national HRH policies and dedicated leadership to increase coverage, access and use of services, improve quality and generate political support (22). This roadmap, based on the three levels of facility care to survive and thrive (see below), consists of 10 strategies to guide countries in developing their policies (3).

The development of high-quality care for every newborn is guided by strategies to improve the capacity of health facilities in LMIC by focusing on the nursing and midwifery workforces. The strategies recommended in this report are based on pertinent WHO documents, reports from countries and organizations and informative studies and should be used as options to be selected by countries according to their context and resources. Additional resources are provided in Annexes 1 and 2.

Model for three levels of facility care

A well-functioning health system ensures comprehensive, high-quality care for all newborns and their mothers, with appropriate, timely referral for specialized care. Inpatient care for newborns is provided within a network of facilities to meet the needs of newborns, linked with maternity services. All facilities in the network provide primary care (level 1 or basic care); some provide more complex secondary care (level 2 or special care); and a smaller number provide the most complex tertiary care (level 3 or neonatal intensive care) for the smallest and sickest newborns (3,17,23). Implicit in the model is that every facility in the network can deliver immediate life-saving care, with the necessary skills and equipment to stabilize a neonate before safe transport.

It is estimated that two of three small and sick newborns can be managed in 'special care' units (level 2), without higher-level neonatal intensive care, and that 70% of all preterm deaths could be avoided by special care alone (24). Currently, however, over 75% of babies born in sub-Saharan Africa and southern Asia have no access to special care (17). Intensive care plays an increasing role in countries with a neonatal mortality rate < 15/1000 live births (25). As the complexity of care increases, so does the requirement for adequate numbers of nurses, medical doctors, allied health professionals and support staff with specialized skills and additional competences, reflecting the multi- and interdisciplinary nature of newborn care (26).

The levels of care are represented in Table 1 and further explained in reference 3 (chapter 3, pp. 59–69). They are based on WHO standards, guidelines, newborn intervention packages, publications of professional associations and selected national programmes (22,27–29). The increasing complexity of care calls for appropriate resources and personnel at each level. High-quality care requires an interdisciplinary team but also requires that each health worker performs specific tasks in one-to-one interactions with newborns, their mothers and families. Health professionals involved in neonatal care must have specific competences, so that, overall, newborns and their families receive comprehensive neonatal care (30).

Table 1. Requirements for newborn care at various levels of a health system

Level	Type of care provided	Health system requirements		Standards of care & evidence-based interventions
Primary	Essential newborn care	Place	<ul style="list-style-type: none"> • Space for childbirth, with specific areas for resuscitation, stabilization and care, and for postnatal care for mother and baby to stay together • Infrastructure for handwashing • Outpatient facility for routine postnatal care and management of newborn problems 	<ul style="list-style-type: none"> • Immediate newborn care (thorough drying, skin-to-skin contact of the newborn with the mother, delayed cord clamping, hygienic cord care) • Neonatal resuscitation (for those who need it) • Early initiation and support for exclusive breastfeeding • Routine care (Vitamin K, eye care and vaccinations, weighing and clinical examination) • Prevention of mother-to-child transmission of HIV • Assessment, management and referral of: <ul style="list-style-type: none"> – bacterial infections, including treatment of Possible Severe Bacterial Infection (PSBI) where referral is not possible^a – jaundice and diarrhoea – feeding problems – birth defects and other problems • Pre-discharge advice on maternal and baby care and follow-up
		People	<ul style="list-style-type: none"> • Skilled attendance 24/7 (e.g. midwifery and nursing staff +/- doctors) • Support staff for cleaning 	
		Health technologies	<ul style="list-style-type: none"> • Linen/towels for drying and wrapping • Bag and mask resuscitation • Radiant heater, warmth source • Thermometer • Equipment for cleaning cord care • Vitamin K, eye ointment • Weighing and digital scale, tape • Immunization commodities • Antibiotics • Oxygen • Pulse oximeter 	

^a Outpatient care.

Level	Type of care provided	Health system requirements	Standards of care & evidence-based interventions
Secondary		Support system <ul style="list-style-type: none"> • Water, sanitation and hygiene (WASH) and infection prevention and control • Communication and functional referral system • Newborn patient record and facility register • Written policy on zero separation • Easy access to fathers/caregivers 	
	Special care	Place <ul style="list-style-type: none"> • A dedicated warm space of a facility, with specific areas for resuscitation, stabilization and care • Dedicated area for mothers • Accommodation for mothers • Electricity supply (e.g. generator back-up) • Infrastructure for storage of human milk 	<ul style="list-style-type: none"> • Thermal care • Comfort and pain management • Kangaroo mother care, including follow-up^a • Assisted feeding for optimal nutrition (cup and nasogastric feeding) • Safe administration of oxygen
		People <ul style="list-style-type: none"> • Specialized nursing and midwifery staff 24/7 • Doctor with neonatal skills on call • Support staff (nursing auxiliary and cleaning staff) 	<ul style="list-style-type: none"> • Prevention of apnoea • Detection and management of neonatal infection • Detection and management of hypoglycaemia • Detection and management of jaundice
		Health technology <ul style="list-style-type: none"> • Oxygen supply, pulse oximetry and newborn oxygen accessories (e.g. oxygen concentrator and blenders) • Syringe pump and accessories (e.g. neonatal cannulae) • Feeding equipment (nasogastric tubes, cups/spoons) • Basic diagnostics (e.g. glucometer, urine dipsticks) and micro-methods • Medicines (e.g. antibiotics, caffeine, IV fluids, phenobarbital) • Mobile X-ray system • Warmers and cots • Effective phototherapy equipment (e.g. LED lights) • Continuous positive airway pressure 	<ul style="list-style-type: none"> • Detection and management of anaemia, including blood transfusion • Detection and management of neonatal encephalopathy • Seizure management • Safe administration of intravenous fluids • Detection and referral of birth defects <p>Transition to intensive care</p> <ul style="list-style-type: none"> • Continuous positive airway pressure^b • Exchange transfusion^b • Detection and management of necrotizing enterocolitis (NEC)^b • Specialized follow-up of high-risk infants (including preterm)


^b The interventions listed under special care mark a transition to intensive care. Hospitals providing special care should introduce these interventions before upgrading to intensive care.

Level	Type of care provided	Health system requirements		Standards of care & evidence-based interventions
Tertiary	Intensive newborn care	Support system	<ul style="list-style-type: none"> • 24/7 access to the facility for mothers and caregivers • Facilities for bathing, laundry, cooking/food • Clinical charts and facility register 	
		Place	<ul style="list-style-type: none"> • Designated intensive care ward • 24/7 uninterrupted electricity • Space for mothers to room in and stay close to their babies 	<ul style="list-style-type: none"> • Advanced feeding support (e.g. parenteral nutrition) • Mechanical/assisted ventilation, including intubation
		People	<ul style="list-style-type: none"> • Nurses with specialized competencies in neonatal care 24/7 • Doctors with specialized competencies in neonatal care 24/7 • Neonatologist on call • Other specialists with competencies in neonatal care (anaesthetics, surgery, radiology, cardiology, neurology, ophthalmology) • Allied health professionals (physiotherapy, nutrition, speech therapy, occupational therapy, audiology, etc.) 	<ul style="list-style-type: none"> • Screening and treatment for retinopathy of prematurity • Surfactant treatment • Investigation and management of birth defects • Paediatric surgery • Genetic services
		Health technology	<i>In addition to special care equipment and commodities</i> <ul style="list-style-type: none"> • Intermittent positive-pressure ventilation, high flow oxygen through nasal cannula • Monitoring equipment • Surfactant therapy • Advanced medicines • Supplies for advanced nutrition support (e.g. total parenteral nutrition) • Specialist equipment and accessories 	
		Support system	<ul style="list-style-type: none"> • 24/7 advanced laboratory support and other diagnostics, including medical imaging • Transport and safe referral if necessary • Hospital information management system 	

Each country should adapt the recommendations in Table 1 to their context, national norms and the frameworks for health service delivery and neonatal care. Countries provide various levels of neonatal care with various combinations of health workers. National newborn programme managers may assign interventions to different cadres or levels of care as appropriate. Individual cadres are not expected to provide the full range of neonatal care; nevertheless, it is vital that they understand clearly what they are expected to provide and both internal and external referral mechanisms to more specialized care (30).

To ensure that neonates receive comprehensive, continuous care, health care staff at each level should be aware of the competences and resources available at the next referral level and vice versa. Health workers should also have the competence to recognize when newborns are ill and to refer them vertically to a higher level. Referral may also be horizontal, such as referral of a lactating woman by a nurse to a midwife who is a breastfeeding counsellor (30). National or district policies and practices should be in place to limit rotation of staff who are specialized in the management of small and sick newborns to other departments and to limit rotation of new or untrained staff to specialized newborn units. Orientation and mentorship programmes should be available for new staff (31).

Table 1 and reference 2 outline the education and training requirements for health workers to be used by policy-makers, planners, service organizations and academic and training establishments and could be used for assessing clinical practice (3,26). Health facilities could use the information as a guide to providing comprehensive newborn care. The information in the table could also be used as a basis for job descriptions at the three levels of care, reflecting the tasks and skills required at each level and ensuring that they also have the necessary structures, equipment, commodities, supervision, performance support and reporting tools.



Roadmap on human resource for health strategies to improve newborn care in health facilities in low- and middle-income countries

Vision

Every newborn will receive high-quality, evidence-based care from competent health workers with skills in newborn care consistent with WHO guidelines.

Goal

To strengthen the provision of nurturing care by competent health workers at critical times at all three levels of care for maximum improvement of newborn survival, development and well-being.

Objectives

1. To improve the number and competence of health workers to deliver high-quality essential care for all newborns and specialized care for small and sick newborns.
2. To fill the gap in the numbers of health workers with specialized neonatal skills in LMICs required to provide high-quality inpatient care for small and sick newborns.

National and subnational training options to optimize current cadres now (strategies 1–3) and plan for more specialist roles (strategy 4)

Countries may choose one or more of the four strategies below after an assessment of the local context, needs, epidemiological data and resources. At all levels, training should include how to maintain neonatal equipment and to stabilize and transport newborns safely to the next level of care.



Strategy 1: Improve and standardize the content, curricula and development of competence in neonatal care in pre-service programmes for health workers

∞ Rationale

Countries should review pre-service education of all cadres to improve the quality of newborn care. Training in neonatal care is often limited in pre-service programmes in nursing, midwifery and medical education, and there are few programmes for training specialized neonatal health workers in LMICs (14,32). Furthermore, the curricula in certain countries do not meet global standards, and educators who teach newborn care have been reported to lack certain skills (33).

→ Interventions

- 1.1 Review pre-service educational programmes for health professionals in both the public and the private sector, including:
 - pathways for initial educational preparation;
 - student recruitment and admission;
 - standardization of the curriculum nationally and regionally to meet priorities;
 - curricula based on required core competences;
 - standards for clinical experience in pre-service training linked to competence development;
 - faculty preparation for academic teaching, clinical mentorship and supportive supervision;
 - consistent communication and collaboration among educators and facilitators at clinical practice sites;
 - standardized, functioning skills laboratory available for regular simulation and blended learning approach, where possible;
 - dissemination of curriculum and innovative teaching and learning strategies for hard-to-reach workers;
 - programme accreditation;
 - qualifications for entry into practice; and
 - assessment of continued competence.
- 1.2 Emphasize neglected topics in newborn care, including hygiene, infection prevention and control, pain management, neurodevelopmental care, family-centred, respectful care, cleaning and maintenance of equipment, and use of data for decision-making and quality improvement of facilities.

- 1.3 Standardize requirements for pre-service curricula according to competences and standards, with advice from pertinent professional associations and teaching institutions.
- 1.4 Encourage educational institutions and regulatory and professional associations to foster intra- and inter-professional learning in both their pre-service and continuing professional development programmes, including North–South and South–South collaborations and public–private partnerships (34).
- 1.5 Harness the power of digital technology and innovation in training.

Box 1. South-East Asia Nursing and Midwifery Education Institutions Network



The Southeast Asia Nursing and Midwifery Educational Institutions Network, created in 2006, was a multinational collaboration to support midwifery and nursing education. The network, a Collaborating Centre of the WHO Regional Office for South-East Asia, allowed countries in the region to call on one another for assistance in achieving the common objective of preparing the workforce necessary for health care services for women and newborns (34).

Good progress has been made recently in recruiting and training nurses and midwives, resulting in an increase in the density from 15.7 per 10 000 population in 2014 to 17.9 per 10 000 population in 2018. There are still, however, shortages of nurses and midwives. WHO has estimated that the world needs an additional 7.6 million nurses and midwives by 2030 (8), with 1.9 million required in the South-East Asia Region alone (34).

The aims of the Network are to:

- share and exchange information and educational resources;
- contribute to and facilitate setting the standard and quality of nursing and midwifery preservice, in-service and continuing education and training;
- facilitate strengthening and capacity-building in teaching, learning and education in member institutions;
- facilitate the development of standards, protocols and evidence-based nursing and midwifery practice; and
- encourage and enhance research activities in collaborating institutes.



Strategy 2: Build the capacity of existing newborn care providers through orientation programmes, continuing education, skills training, quality improvement initiatives and support to maintain and increase competence

Rationale

The next step for countries is to develop effective, regular, accessible refresher training for providers of newborn care, ensuring that they remain up to date with regard to changing care practices (35–37). They should focus on strengthening the competence of existing care providers with regard to

practice and skills, ensuring collaboration with and regulation of educational institutions and the private sector. National regulations requiring evaluation of continued competence are essential (6).

Most small and sick newborns require inpatient hospital care, ideally in a dedicated unit. There is great potential for quality improvement in such settings, especially in LMIC, defined as “better patient experience and outcomes achieved by changing providers’ behaviour and organization through a systematic change in method and strategy” (38). All health workers should be given opportunities to engage in some aspect of quality improvement (39).

→ Interventions

- 2.1 Supply relevant clinical guidelines and standards of care to neonatal facilities.
- 2.2 Provide health workers with point-of-care decision tools or job aids, either paper- or technology-based (see Annex 2).
- 2.3 Provide on-the-job or short continuing education with established training packages or digital learning, ideally with a hands-on skill enhancement component (blended learning) or through coaching and mentorship programmes (36).
- 2.4 Use competence-based learning methods in short, frequent training courses led by experienced trainers, delivered as close to the working environment as possible or in an allocated space in the health facility for recurrent simulation and hands-on training (34).
- 2.5 Institutionalize regular in-service training to ensure continued competence, incorporating emerging practices for areas of care and follow-up care of small and sick newborns and early child development.
- 2.6 Establish mandatory requirements for continuing professional development, including tracking and documentation for re-licensure or re-certification by professional associations or other regulatory bodies. These should include documentation of continued evaluations of competence and performance and annual reviews.
- 2.7 Provide orientation programmes and mentoring for new staff in neonatal care units according to established competences.
- 2.8 Strengthen quality improvement capacity by the health care workforce by developing and implementing quality improvement approaches and supporting regional quality collaboratives in perinatal care.
- 2.9 Build institutional capacity at national, regional and district levels to provide the necessary support for capacity-building of existing newborn care providers.
- 2.10 Establish partnerships, including with the private sector and professional bodies, for capacity-building and on-the-job mentoring.
- 2.11 Establish standards, accreditation procedures and evaluation activities to certify and ensure the quality of training delivered with information and communication technology, including mobile health approaches, and for handling workforce data with the required confidentiality (34).
- 2.12 Consider rotation to specialized neonatal units for teaching and refreshing skills.

Box 2. Practical, low-cost, accessible continuing education, with a certificate

The Perinatal Education Programme (www.pepcourse.co.za), now called Bettercare, has been used in South Africa and elsewhere to provide both basic and in-service training for health workers in maternal and neonatal health since 1993. This innovative system of self-directed learning by groups of nurses and other providers is based on specially prepared course books, without the need for trainers. Through self-study and peer discussion groups, participants take responsibility for their own professional growth, building competence and confidence. The courses are presented as study books, including one on newborn care. Each module addresses common conditions and appropriate care practices in a question-and-answer format to promote problem-solving, case studies, simple skills workshops and multiple-choice tests. Study groups identify a regional facilitator to support hands-on training. Participants pay a minimal price for the hard-copy study books, but no cost is involved in managing the courses at hospitals or clinics. The training material is also available free of charge online and as e-books that can be downloaded onto personal computers, tablet readers and smartphones. They are supplemented by regular SMS providing relevant 'knowledge bites'. A formal examination is offered at the end of each course. Successful candidates are given a certificate of course completion and can apply for a retrospective bursary to repay the cost of the course book. The practice of participants paying for courses themselves with the prospect of a refund is an incentive for completing the course successfully. The Perinatal Education Programme has provided learning opportunities to tens of thousands of medical doctors and nurses. Data from a prospective study of nurses who used the course in newborn care showed significant improvements in knowledge, clinical skills and care practices (40).



Strategy 3: Upgrade existing cadres with additional specialized training in neonatal care, with additional qualification or certification at undergraduate level

Rationale

Before developing a specialized neonatal nursing post-graduate cadre, countries can offer additional training with commensurate specialist qualification or certification, registration and corresponding accreditation of health workers. This increases competence, responsibility and recognition and may result in higher salaries and job satisfaction, improving retention. Changes in responsibilities should be reflected in job descriptions, status and salaries. These health workers could be deployed to secondary level neonatal units as a transition while countries build specialized neonatal intensive care capacity to work at the tertiary level of care. Attention must be paid to preventing rotation of specialized staff out of newborn care units.

Interventions

- 3.1 Extend the competence of existing cadres with 3-, 6- or 12-month training programmes in neonatal care.
- 3.2 Establish competence-based specialist training for health workers to complete qualification or certification based on national or international standards.
- 3.3 Assure accreditation of neonatal health workers with updated job descriptions and recognition by national policies for career progression and remuneration (34).
- 3.4 Establish links between teaching and clinical care facilities for hands-on clinical skill acquisition through simulated learning and clinical preceptorship (41).
- 3.5 Consider the training requirements for other support services as neonatal units expand.

Box 3. Transforming the role of nurses and midwives with specialty training in Liberia

The Government of Liberia plans to achieve a 50% reduction in national maternal and newborn deaths and stillbirths by 2023 as part of acceleration of progress towards SDG3. For this purpose, the Liberian Ministry of Health, WHO Liberia, the United Nations Population Fund (UNFPA) Liberia and the nongovernmental organization Maternal and Child Health Advocacy International are collaborating in a European Union-funded, WHO-hosted partnership.

The aim of the project is to facilitate in-depth training of midwives and nurses to qualify them as neonatal clinicians after two years and as qualified obstetric clinicians after three years. After training, clinicians can provide advanced obstetric and neonatal care independently and safely. Achieving the health-related SDG targets in Liberia and other countries will require equitable access to high-quality, affordable health care services. Nurses and midwives play a vital role in connecting communities and families with the health system, particularly in rural and hard-to-reach areas. Therefore, investing in a highly trained, well-remunerated workforce, including nurses and midwives, is critical to saving the lives of mothers and newborns and to ensuring that communities have access to high-quality primary care from the beginning of life (42).



Strategy 4: Create and train a new cadre of specialized neonatal nurses

Rationale

Countries that provide tertiary level neonatal intensive care could take this step, according to their needs, resources and the policy environment to sustain such a cadre. These providers should be in charge of education, supervision, mentoring and support to primary and secondary level units, in addition to intensive care provision. Curricula should be tailored to ensure expertise at all three levels of care, including stabilization and safe transfer. Creation of this cadre will provide highly skilled nurses. While more costly than non-specialized neonatal nurse cadre, university degrees might be more attractive to candidates, resulting in the possibility of better salaries and career options and perhaps less staff turnover.

Interventions

- 4.1 Establish a new cadre through a national policy, with definition of the scope of practice, and regulations for integration of the cadre into the civil service structure, including registration.
- 4.2 Assure programme accreditation by a relevant authority to strengthen the quality of educational institutions and their faculties (43).
- 4.3 Establish competence-based pre-service training curricula for a specialist neonatal nursing cadre, based on national or international standards, with national or international accreditation.
- 4.4 Review the selection criteria for the programme to ensure that students will meet the desired deployment goals (44).
- 4.5 Establish links between teaching and clinical care facilities for hands-on clinical skill acquisition through virtual or actual simulated skill learning and clinical mentorship.

- 4.6 Review the process for issuing diplomas or licenses to ensure that standards are in place for licensing health workers for safe practice, with input or control by professional councils or boards.
- 4.7 Assure continuing competence, including accreditation of post-licensure education providers and continuing education programmes (34).
- 4.8 Consider direct-entry degree programmes for neonatal nurses.

Box 4. Direct-entry neonatal nurse bachelor's degree

Morocco has created a 'direct-entry' post-secondary school neonatal nurse specialization at bachelor's level ("license"), taught over three years in five higher-education institutions. In addition to a full specialized curriculum, the course includes instruction in neonatal resuscitation, a clinical internship in neonatal acute care and a required thesis. The first cohort of 60 nurses graduated from the course in 2019, and 125 will graduate in 2020. They will be qualified to work in neonatal care at all three levels of the health system, including in neonatal intensive care units (NICUs), in public and private facilities. The ministries of Health and Civil Service in Morocco have formally recognized the specialty. Acceptance into the programme is based on scores in the baccalaureate examinations (science specialty) and the results of a written test and a panel interview. Direct-entry programmes speed training time and thus reduce costs for the Government and the trainees (45).



Morocco, neonatal nursing students

National and subnational actions for the provision of neonatal care



Strategy 5: Standardize the levels of neonatal care provision, with safe referral of mothers and infants

Rationale

There is strong evidence that regionalization of maternal and newborn care, through networks of health facilities organized by population size and needs, with referral of high-risk patients to higher-level care, and appropriate resources and personnel improve outcomes (17,23). Most small and sick newborns can be managed in a dedicated neonatal unit at the secondary level (3). Therefore, health-care systems should prioritize high-quality essential and special newborn care, with regionalized access to neonatal intensive care for the few who may need it, all supported by a strong referral system (3). Clear standards and admission policies can ensure that newborns receive care at the most appropriate level and as close as possible to their homes.

Costing data also support the cost-effectiveness of neonatal intensive care (46). In high-income countries, newborn services are usually organized in integrated networks covering a health area. The concept emerged about 50 years ago as a means to maximize access to and the capacity of NICUs, while controlling costs by centralizing expensive technologies and developing expertise at a few locations to improve the outcomes of preterm and low-birth-weight infants (47). Studies in high-income countries show that large regional neonatal centres with high levels of activity are associated with better outcomes for newborn and preterm babies born in units with intensive care facilities and when women are transported to perinatal centres for delivery instead of delivering in smaller units (23). Investment in this strategy will be necessary as neonatal mortality decreases to further improve survival, especially for small and sick newborns.

Provision of high-quality care includes consideration of the experience of care of mothers, families and newborns in facilities at all levels. All health workers must thus assure effective communication with women, newborns and families about the care provided, their expectations and their rights and respectful care of all women and newborns, assuring preservation of dignity and access to social and emotional support (22,48).

Interventions

- 5.1 Integrate neonatal facilities in different geographical health areas into a network of health facilities organized by population size and needs.
- 5.2 Set up effective, timely referral systems to link all levels of the health system for referral to both higher and lower levels of care, as necessary.
- 5.4 Ensure that all facilities in the network can provide immediate life-saving care to stabilize newborns before transfer.
- 5.3 Ensure that referral-level facilities at levels 2 and 3 have neonatal units with well-defined protocols and skilled personnel.

- 5.5 Provide specialized emergency transport, with trained health workers, adequate communication systems and appropriate equipment, and provisions for the mother or family to accompany the newborn.
- 5.6 Build collaborative managerial and clinical leadership for all facilities
- 5.7 Integrate systematic monitoring of quality into health policy and processes at all levels of care (49).
- 5.8 Assess the integration of standards for experience of care at all levels, including respectful maternal and newborn care, parental involvement in all care, non-separation of parent and newborn and communication with and support for families and newborns (48).
- 5.9 Build the capacity of health workers to support family participation in the care of newborns.

Box 5. Networks of care in countries

India has set up three levels of networked neonatal care (50,51). Newborn care 'corners' are established at every level to provide essential care at birth, including resuscitation. Level I care includes referral of sick newborns from primary health centres to centres at higher levels and to neonatal stabilization units in first-referral units, where care includes stabilization of sick newborns and care of low-birth-weight babies who do not require intensive care. Level II care includes functioning special care newborn units at district hospitals, which are equipped to handle sick newborns other than those who require ventilation and surgical care. Level III units are the NICUs, where infants referred from level II special care newborn units are treated.

Some territories, such as **the West Bank and Gaza Strip**, have an additional level 4, at which complex surgical cases are dealt with (52).



Strategy 6: Establish strategies for health worker recruitment, well-being, motivation and retention

Rationale

The well-being and motivation of health workers are essential determinants of their performance and the quality of care they provide and also of their retention. Low levels of well-being and motivation are often-neglected problems and are linked to absenteeism and poor retention (53). Low morale and moral distress are due to factors that include poor working conditions, low salaries, lack of career opportunities, insufficient training, insecurity, burnout and stress (53–55). Higher levels of motivation are an important driver for health professionals to maintain their professional competence and continue in the workforce (56). Several approaches have been used to increase retention, motivation, satisfaction and attracting health workers in all settings, particularly in rural and remote areas (57).

Poor supervision is a common problem and often lowers morale, leading to poor care provision and poor retention (58). Health workers frequently provide neonatal care services in rural and remote areas with limited supervision and poor access to other providers and services. While their knowledge, skills and attitudes save lives, lack of competence and support may threaten the lives of newborns in their care (30,59). To ensure the health and safety of newborns and their families and to maintain health workers' performance and well-being, all workers in neonatal care must be regularly supervised and supported in their work (60).

→ Interventions

- 6.1 Ensure fair salaries and salary incentives paid consistently, including hardship allowances and family and lifestyle incentives (such as housing and education allowances), with formal employment contracts that state clear roles and expectations.
- 6.2 Ensure that work processes and organizational management include a manageable workload and working conditions, with adequate facilities, a decent working environment (including water and electricity) and the availability of medications, supplies, equipment and treatment guidelines.
- 6.3 Provide measures to improve occupational health and safety, including protective equipment and an inclusive working environment free from any type of violence, discrimination or harassment (34).
- 6.4 Provide continuing education and professional development; accreditation; performance appraisal; performance recognition, career-development pathways and promotion; and job security.
- 6.5 Consider the use of targeted, inter-related educational, regulatory, financial, personal and professional support to recruit and retain qualified health workers in remote and underserved areas, including student selection, faculty support and professional autonomy (9,34,61).
- 6.6 Extend recruitment and retention options, including decentralization of recruitment, walk-in interviews, intensive care allowance for working in newborn care units, reviewing the retirement age, time-bound regularization of contractual staff and retention in the same area in cases of transfer between facilities or districts.
- 6.7 Develop, implement and evaluate systems for supportive supervision, including skills, tools and transport for supervisors when necessary.
- 6.8 Explore alternatives to standard supervisory approaches, such as self-managed continuous monitoring (58).

Box 6. Compulsory post-training service commitment to NICU work

Ethiopia has instituted a compulsory service commitment in NICUs after a 4-week off-site neonatal nursing course. Participants in NICU training are providers of newborn care with at least a bachelor of science degree in nursing, public health or a related field. As the training is intensive and requires a large investment, participants who return from training must commit themselves to work at the NICU in their hospital. The Ministry of Health strongly recommends that the hospital management provide close support and follow-up to strengthen or establish NICUs in their hospitals and ensure that health care providers trained in intensive neonatal care are assigned to and work in NICUs (62).



Strategy 7: Ensure effective staffing, staff ratios and skill mixes in local neonatal units

Rationale

All facilities that provide maternal and newborn care should ensure that services can be provided continuously, 24 h a day, 7 days a week, by competent health care providers. This requires staffing levels proportionate to the workload, patient requirements and numbers in the neonatal unit or the number of births in the population. The health worker team should be multidisciplinary and include specialists when possible to prevent and manage maternal and neonatal complications, data clerks to digitalize neonatal records and mandatory support staff to ensure adequate cleaning, hygiene and infection prevention in the unit (9). Other health specialists should be part of the multidisciplinary team when possible, such as surgeons, biomedical engineers, laboratory and radiology technicians, nutritionists and dieticians, lactation consultants, speech therapists, occupational therapists, physiotherapists, social workers, paramedics and psychologists (63).

The requirements for nursing staff in a neonatal nursery depend on the workload (direct and indirect care) and the estimated time required to care for each patient (see intervention 7.1). They also depend on patient needs and the context, level of care and organization of care in a unit or facility (64,65). Patient censuses can also be used to calculate the number of staff needed. There are no definitive international standards for staffing ratios for newborn care (63), and, although some countries have set staffing ratio standards that could be used to calculate numbers, most are high-income countries (66).

Staff who have received specialized training in the care of sick newborns and who have experience in NICUs should be exempted from mandatory rotation to ensure the quality of care and the best use of resources (31). Prevention of the rotation of experienced staff from neonatal care is important to ensure that neonatal staff are not shifted from department to department in a hospital or into other specialties (17). Rotation can be detrimental to the quality of care of sick newborns, obviates opportunities for mentorship and supervision of junior staff and can contribute to dissatisfaction. Similarly, rotation of untrained staff to newborn units should be avoided, unless no other staff are available.

Given the frequent shortages of skilled health workers and disparities in their skills, the potential of the existing health workforce must be maximized by rational distribution of tasks and responsibilities among cadres, to ensure access to essential interventions and the cost-effectiveness of health systems. Short additional training of cadres to allow them to take part in new activities is known as 'task-shifting' or 'task-sharing', which can optimize the use of health system resources, especially in settings with few specialized staff (60,67). Parents can support staff in performing certain tasks and should be encouraged to participate in the care of their babies.

Interventions

- 7.1 Calculate staffing on the basis of the workload with WHO planning tools such as "Workload indicators of staff need" (65), a human resource management tool promoted by WHO (see box below).
- 7.2 Calculate the number of staff required for each unit and level from nurse-to-patient ratios, and calculate the number of staff required to maintain that ratio from the patient census. Factor in days off roster, annual leave, maternity leave and equal distribution over the 24-h period.

- 7.3 Calculate staffing from the anticipated numbers of births and referrals. In neonatal units, staffing must be calculated according to the condition and requirements of each patient (68).
- 7.4 Establish the skill mix of staff according to the availability of staff and the activities they can perform (69).
- 7.5 Set up interdisciplinary teams when possible, including paediatric or neonatal doctors, nursing assistants and other support staff, working with qualified neonatal nurses and midwives (63).
- 7.6 In small facilities, establish a functioning network with a larger facility to ensure access to other disciplines as required.
- 7.7 Prioritize a no-rotation policy for skilled and specialized health workers in neonatal units.
- 7.8 Advocate for no rotation of non-specialized staff to neonatal units (17).
- 7.9 Conduct situation analyses to establish available cadres and resources and to determine needed HRH inputs (60).
- 7.10 Assess any local task-sharing and -shifting to determine whether it should be systematized and institutionalized (60).
- 7.11 Rescind policies or laws that prohibit capable staff from performing any skilled task or intervention in their scope of practice (39).
- 7.12 Establish policies to allow nursing assistants and auxiliaries to perform essential and routine non-skilled tasks after orientation and mentorship.
- 7.13 Establish clear, formal, written guidelines for any new responsibilities introduced into scopes of practice and job descriptions, with regular supportive supervision and mentoring to maintain safety.

Box 7. Staffing needs assessment based on workload

Burkina Faso used the “Workload indicators of staffing need” method recommended by WHO to assess staffing needs in three referral maternity hospitals, analysing data for nurse and midwife staffing versus workforce availability (64). This method of calculating staffing requirements is based on calculation of the time required for various activities (e.g. direct patient care, indirect care, teaching, administrative work and meetings) (65). The method indicates the numbers of health workers of each type required to cover the workload in a given health facility or unit. The total time required to cover a unit is divided by the hours worked by a full-time staff member to estimate the number of full-time staff (full-time equivalents) required to cover the workload. Such an analysis should be undertaken locally and include the professionals involved, clinical staff and management to ensure consideration of issues such as the quality of care being provided (69).



Strategy 8: Strengthen national human resources planning, policy and regulations for development and management of neonatal services at all levels

Rationale

Comprehensive national or subnational plans for extending maternal and newborn health services should be based on evidence that includes the quality of care and patient outcomes and should be baby- and mother-centred to determine the care required by the dyad. Plans should be costed, financed, implemented and continually revised to improve them and to estimate the numbers, categories and qualifications of health workers necessary to meet public health and population health goals. Data on which, where and how health workers care for newborns and related HRH metrics and monitoring frameworks are essential for planning and management (3,70). Human resources information systems for data collection and national health workforce accounts can ensure standardization and interoperability of HRH data, and national or regional workforce observatories may be useful for understanding health labour markets and the design of effective policies (34).

Governments should ensure that they have the capacity to produce sufficient, adequately qualified, skilled workers and have a labour market with the capacity to recruit, deploy and retain health workers and should strengthen the leadership capacity of the ministry of health and professional associations. They should ensure that they have mechanisms to manage and supervise workers (34), regulations on the quality of health worker training and on service provision, such as accreditation, and national continuing education or re-certification requirements (49). Regulations may apply at various levels to impact the quality and competence of HRH when governments collaborate with professional councils and other regulatory authorities (34).

Interventions

- 8.1 Improve national, regional and local HRH data collection, analysis and use from both the public and the private sector, including data on the availability, distribution, trends and requirements of personnel and on migration, attrition, population growth and projected epidemiological changes (71).
- 8.2 Define a standard package of maternal and newborn care for each level, and determine the number of staff and constitution of teams, including midwives, nurses, medical doctors, specialists such as obstetricians, paediatricians, neonatologists, surgeons and others, such as laboratory, radiology, pharmacy and support staff.
- 8.3 Link public and private sector investments in health worker education with maternal, neonatal and health system demands (41).
- 8.4 Define and make available appropriate job descriptions for health workers at all levels.
- 8.5 Establish clear scopes of practice for all cadres, and ensure that health practitioners can work to the highest scope of practice allowed.
- 8.6 Define appropriate employment contracts and career development pathways, including adequate remuneration packages to attract and retain skilled providers, as necessary.

- 8.7 Adopt and support licensing and certification of health workers to ensure that public- and private-sector professionals are competent, sufficiently experienced and adhere to agreed standards for their scope of practice (34).
- 8.8 Engage with nursing and midwifery professional associations involved in normative guidance, policies, projects, education planning and research (72).
- 8.9 Strengthen links between higher education institutions and ministries of health.
- 8.10 Use technology for planning, such as databases that link human resource profiles and placement data (e.g. WHO National Health Workforce Accounts (NAWA) and the integrated Human Resources Information System (iHRIS)) and geographical mapping (63,73).

Box 8. Using technology to improve human resource management

The **Democratic Republic of the Congo** identified health workforce management and compensation as issues requiring attention, including the problem of ‘ghost workers’, who are individuals on the payroll who do not exist or show up at work. Recognizing that reliable information on the health workforce was necessary rather than a paper-based system, the Government used iHRIS, an integrated, open-source human resources information system to facilitate health workforce management. In two provinces, health workers brought relevant documentation to data collection points, where trained teams entered the information and photo identification into the system on laptops. The Ministry of Public Health used the database of over 11 500 verified health worker records to analyse their characteristics, density and compensation. Most of the health workers registered in the system (65%) reported having received no regular Government pay of any kind, including salaries and risk allowances. Analysis of the payroll showed that 27% of the health workers listed as receiving a salary in the electronic payroll system and 42% of those receiving a risk allowance were ghost workers. The ministries of Public Health, Public Service and Finance then reallocated the funds to cover salaries and risk allowances for thousands of previously uncompensated health workers, particularly nurses, laboratory technicians and midwives. Accurate health worker records can help governments understand the health workforce characteristics and direct scarce domestic resources to where they are most needed (73).



Maternity health workers, Kindu, DRC. Photo credit: Davis Makasy



Strategy 9: Allocate adequate funds for capacity-building and support for neonatal care in the national budget for human resources for health

Rationale

Investment in neonatal health is an investment in human capital. More investment is required in many countries in basic education and continuing education programmes to increase the numbers of nurses, midwives, medical doctors and other health workers who are competent in neonatal care in order to extend the access of all newborns to the care they need. Investment in health professional regulations is critical to assuring and maintaining quality through licensing, registration and accreditation. Governments should also ensure that adequate funds are available for service provision, including health worker salaries and incentives to retain specialized staff, and organizational mechanisms to provide an enabling environment and supportive supervision of health worker performance (22). Key ministries of governments, including those of finance, budget, planning, and civil service, in addition to the ministry of health, should commit themselves to increasing funding for HRH for newborn care.

Interventions

- 9.1 Focus investment on trainers, as there is good evidence of a high social rate of return for education strategies (34).
- 9.2 Invest in educational infrastructure and innovative training methods that allow flexible learning, simulation and wider access to learning opportunities for remote and rural health workers.
- 9.3 Reinforce public sector investment to ensure sufficient provision of health workers, equitable deployment and better motivation and performance.
- 9.4 Dedicate a budget line to human resources for neonatal health in district, provincial and national budgets.

Global actions for the provision of neonatal care



Strategy 10: Promote global strategies, collaborations, accountability, leadership and governance for human resources for neonatal care, integrating innovative multi-country research and learning networks.

Rationale

It has been estimated that LMICs have a gap of 18 million health workers (35). Issues of international relevance, such as health worker migration, recognition of qualifications in different countries and specific issues in humanitarian and fragile settings, should be addressed by global policies and plans for human resources. Innovations and multi-country research with shared learning networks are necessary for global progress.

Human resources for neonatal units should be included in global and national policies, as it has been shown that the survival of preterm infants in facilities in high-income countries is associated with a high ratio of neonatal nurse-to-infant, the number of neonatal nurses working per shift and the levels of specialist education and experience of the nurses delivering care (46).

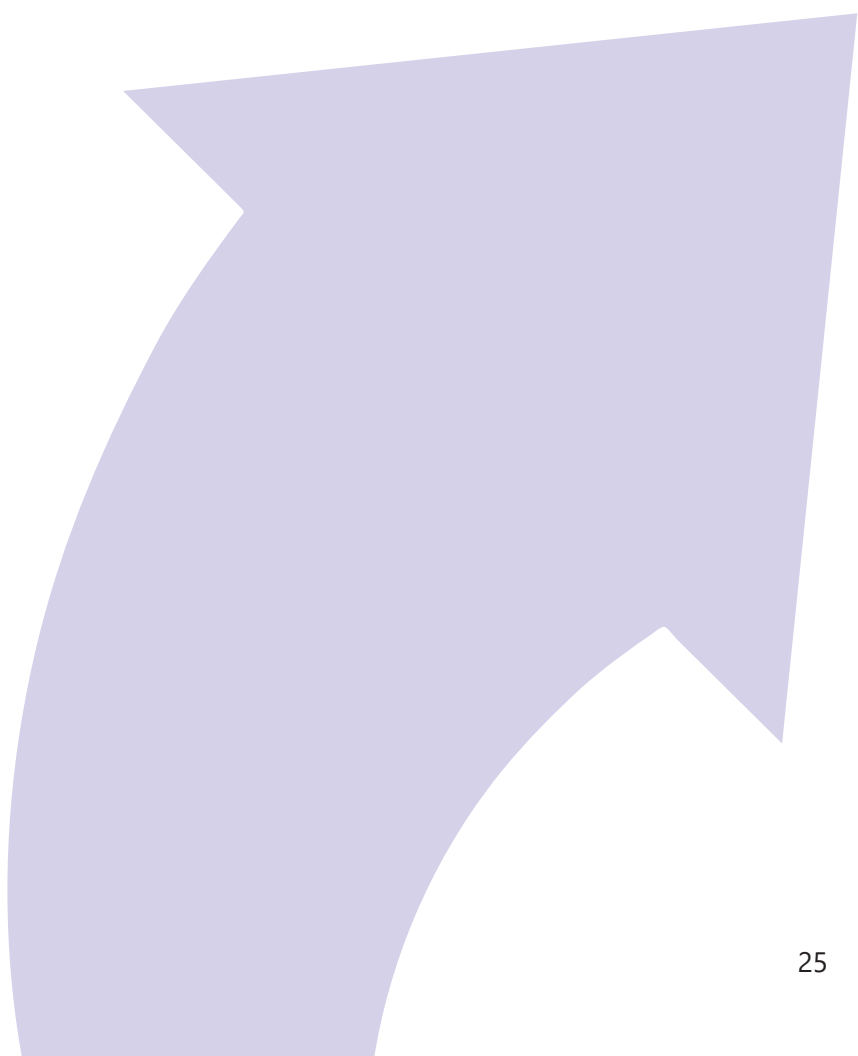
Strong political commitment is necessary at all levels to ensure that existing resources are invested judiciously according to economic data to build strong health systems, including referral to secondary and tertiary care and NICUs and prioritization of maternal and newborn health and financial access for the population that needs care (46).

Interventions

- 10.1 Advocate for adequate investment in HRH by governments and partners, aligned with coordinated, long-term national needs as expressed in national sector plans.
- 10.2 Support priority countries in developing their policies, programmes and monitoring frameworks.
- 10.3 Ensure the involvement of all key health professional groups at all levels of policy development.
- 10.4 Adopt and implement relevant policies for international recruitment and migration of health workers to optimize retention, in alignment with the Global Code of Practice on the International Recruitment of Health Personnel (74).
- 10.5 Plan human resources and legal requirements for emergencies.
- 10.6 Support the creation and strengthening of local and national professional organizations, and foster interdisciplinary partnerships with related global health professional associations (e.g. the International Council of Nurses, Council of International Neonatal Nurses, Inc., International Confederation of Midwives, International Federation of Gynecology and Obstetrics, International Pediatric Association).
- 10.7 Facilitate the involvement of and interdisciplinary collaboration with professional organizations and knowledge-sharing at relevant global events.

10.8 Monitor and evaluate progress in the development of human resources for newborn health.

10.9 Promote innovation, implementation research and global learning networks, especially for topics such as staff ratios in newborn units in LMICs and the long-term costs associated with neurodevelopmental disability due to no or poor care.



NATIONAL AND SUBNATIONAL TRAINING OPTIONS TO OPTIMIZE CURRENT HRH CADRES AND TO PLAN SPECIALIST ROLES



Improve and standardize the content, curricula and development of competence in pre-service programmes for health workers in neonatal care.



Build the capacity of existing newborn care providers through orientation programmes, continuing education, skills training, quality improvement initiatives and support to maintain or increase competence.



Upgrade existing cadres with additional specialized training in neonatal care, with additional qualification or certification at undergraduate level.



Create and train a new cadre of specialized neonatal nurses.

NATIONAL AND SUBNATIONAL ACTIONS FOR THE PROVISION OF NEONATAL CARE



Standardize the levels of neonatal care provision, with safe referral of mothers and infants.



Establish strategies for health worker recruitment, well-being, motivation and retention.



Ensure effective staffing, staff ratios and skill mixes in local neonatal units.



Strengthen national human resources planning, policy and regulations for development and management of neonatal services at all levels.



Allocate adequate funds for capacity-building and support for neonatal care in the national budget for human resources for health.

GLOBAL ACTIONS FOR THE PROVISION OF NEONATAL CARE



Promote global strategies, collaborations, accountability, leadership and governance for human resources for neonatal care, integrating innovative multi-country research and learning networks.

2020–2022

- Quantify numbers, categories, and qualifications of health workers focusing on newborn care to meet national and global goals in all countries.
- Ensure HRH needs for newborn care embedded in national and subnational HRH plans that are costing and financed in all countries.
- Establish baseline and gaps for neonatal coverage and access to care in all countries.
- Assess newborn care training program capacity regionally and nationally and develop plan for training strengthening to include pre-service, orientation, in-service, quality improvement and specialized training programme options depending on context (Strategies 1–4).
- Evaluate and prioritize national and subnational HRH policies required to support newborn care provision and health systems at all levels (Strategies 5–9).

Priorities and timeline for action



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Annex 1. Examples of education programmes and career options for nurses and midwives working with newborns

This table complements the training programmes presented in the first four strategies, with concrete examples of the neonatal cadres and credentials used in countries, often with different nomenclature. The examples include non-degree certificates in neonatal care as well as bachelor's, master's and advanced practice degrees, with examples in different countries. The table presents levels of preparation and practice, with entry points that depend on each individual's experience, skill set and educational attainment. The role at each level of practice depends on the level of competence, with differences in career progression (7). Progression through each level of preparation and practice is achieved on the basis of:

- acquisition of knowledge in preparation or education programmes within or external to higher education; and
- relating the knowledge to demonstrate the competences required by the Council of International Neonatal Nurses and the International Council of Midwives.

Job descriptions will reflect achievement and maintenance of the minimum competence and core skills required to practice at the corresponding level.

Pathway option	Description (examples)	Other names	WHO definition (2)	Country examples
Health support worker or assistant: certificate or diploma	Care for well infants and those requiring special care: Detect changes in condition of newborns Support colleagues in diagnostic procedures and provide treatment as instructed under supervision of a registered practitioner	Auxiliary nurse, nurse assistant, enrolled nurse Auxiliary midwife, auxiliary nurse midwife	Training in secondary school, may have some training post-secondary; on-the-job training may be included and sometimes formalized in apprenticeships. Auxiliary nurses have basic nursing skills but no training in decision-making. The level of training may vary from a few months to 2–3 years. Auxiliary midwives assist in the provision of maternal and newborn health care. They have some competence in midwifery but are not fully qualified as midwives.	Royal College of Nursing (3) The Philippines hires “nursing aides” and requires them to complete a “caregiver course” before entry into service (4). Sierra Leone currently staffs “special baby care units” primarily (77%), with “state-enrolled community health nurses” (auxiliary nurses) (5).

Pathway option	Description (examples)	Other names	WHO definition (2)	Country examples
Registered nurse or midwife – beginner	Basic skills and knowledge for supervised practice in special care or intensive care	Registered nurse, nurse Registered midwife, midwife	<p>Nurse: A graduate who has been legally authorized (registered) to practice after examination by a regulatory authority.</p> <p>Midwife: Assessed and registered by a regulatory authority; they offer care to childbearing women during pregnancy, labour, birth and the postpartum period. They also care for newborns.</p> <p>Education for health professionals lasts ≥ 3–4 years, and may lead to a university (bachelor's) or postgraduate degree.</p>	<p>Kenyan newborn units are staffed primarily with registered nurses (3-year post-secondary programme) (6).</p> <p>The Philippines requires registered nurses and midwives to complete courses in essential newborn care and neonatal resuscitation (4).</p>
Registered nurse or midwife with a post-degree qualification or certificate in neonatal care	Neonatal specialty knowledge and skills for higher supervised care or more independent basic care in a neonatal unit. With experience, can provide effective management at all levels of care independently (special care, NICU). Teach and supervise skills within their competence.	Associate clinician	<p>Nurses and midwives are generally trained for 3–4 years after secondary education in established higher-education institutions. Clinicians are registered, and their national or subnational regulatory authority regulates their practice. The prerequisites and training may differ from country to country. Many countries offer post-degree certificates or additional qualifications.</p>	<p>The Philippines provides a certificate for “care for small babies” for interprofessional groups (hands-on team training) that include nurses, midwives, doctors, social workers (4).</p> <p>Ethiopia has instituted a compulsory service commitment in NICUs after a 4-week off-site neonatal nursing course. Participants in NICU training are providers of newborn care with at least a bachelor of science degree in nursing, public health or related field (7,8).</p> <p>Sierra Leone provides paediatric and neonatal training at bachelor level, with support from partners, and concurrent training by clinical teachers in neonatal care, with mentorship for both groups (5).</p>

Pathway option	Description (examples)	Other names	WHO definition (2)	Country examples
Postgraduate study (e.g. master's or equivalent) – advanced neonatal practitioner	<p>Achievement and maintenance of competence for expert neonatal nurses. Roles could include management, education, research, policy, advanced or specialist role.</p> <p>All expert neonatal nurses and midwives will have undertaken postgraduate study. Only clinical practice experts directly provide neonatal care.</p>	<p>Advanced level associate clinician</p> <p>Advanced practice nurse</p> <p>Advanced practice registered nurse</p>	<p>A professional clinician with advanced competence. Advanced-level associate clinicians are generally trained for 4–5 years after secondary education in established higher-education institutions.</p> <p>Advanced practice nurses provide total care for a caseload of infants (9). The neonatal nurse practitioner programme should be part of a national accredited educational programme, and neonatal nurse practitioners should have a designated role.</p> <p>Professionals could continue to doctoral or post-doctoral education, when appropriate.</p>	<p>Rwanda has created a 2-year master's degree programme for advanced practice nurses and nurse practitioners. Programme accreditation, scope of practice, licensure, registration, certification and credentialling are under way (9).</p> <p>Ethiopia offers a 2-year, accredited master's degree in neonatal nursing (10).</p> <p>South Africa offers a master's degree in neonatal nursing (11).</p>

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Annex 2. Learning and support options for workers in neonatal health in low- and middle-income countries, with examples of implementation

The table lists examples of learning and support options for neonatal health workers, with websites, examples of implementation and examples of published studies.

Intervention approach	Definition	Details and examples
Clinical training packages for use pre- or in-service	Didactic or simulation	Note: some training must be followed by skill verification; others rely on frequent retraining.
Essential newborn care course (WHO) https://www.who.int/maternal_child_adolescent/documents/newborn_care_course/en/	Includes evidence-based guidelines for routine care and initial management of newborns after birth and during the first weeks after birth.	Includes routine neonatal care, initiation of breathing and neonatal resuscitation, thermoregulation, early and exclusive breastfeeding, skin-to-skin care, care of small babies, counselling on baby care and danger signs and recognition and initial management of complications. Teaching techniques are based on the principles of adult participatory learning, including demonstrations, presentations, simulations, role play, case studies and clinical practice in the ward. Ex: (1): RCT in rural India; significant decrease in perinatal mortality after ENC training.
Helping Babies Breathe® course (AAP) https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/helping-babies-survive/Pages/Helping-Babies-Breathe.aspx	Evidence-based training programme in basic neonatal stabilization and resuscitation with low-cost simulation training. Designed to educate large numbers of birth attendants.	Centred on essential immediate care for all babies (warmth, drying, skin-to-skin contact, physiological umbilical cord clamping and early initiation of breastfeeding) and basic interventions for babies who require help to breathe, including ventilation within the first minute of birth. Has the same scientific basis as the Neonatal Resuscitation Program®, the International Liaison Committee on Resuscitation Consensus on Science and Treatment Recommendations. Promotes active learning of hands-on skills with the “NeoNatalie” newborn simulator; practice and quality improvement continue in the facility after the workshop. Ex: (2): Cohort study on HBB QI cycle reduced intrapartum stillbirth and first-day neonatal mortality.

Intervention approach	Definition	Details and examples
<p>Helping Babies Survive: including Essential Care for Every Baby (ECEB), Essential Care for Small Babies (ECSB)® and Helping Babies Breathe®, 2nd edition (AAP)</p> <p>https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/helping-babies-survive/Pages/About.aspx;</p> <p>http://globalhealth.org/helping-babies-survive/</p>	<p>ECEB teaches essential newborn care practices from time of birth to discharge. ECSB guides providers in the specialized care that small and preterm babies need, with a focus on reducing newborn deaths from infections and preterm birth.</p>	<p>Techniques are skills-based and taught in small groups with simulation methods and role-play to practise technical and communication skills. Knowledge is tested in multiple-choice questions and observed structured clinical evaluations. Programmes include visual guidebooks, flipcharts and posters with clear, specific instructions for health care providers to follow after the birth of a baby. As no electricity or specialized technology is required, the programmes can be taught anywhere. They are based on systems designed to change and improve clinical practices in all systems of care. The curricula can be used alone, integrated with each other or integrated into a country's health infrastructure. Can be used with Helping Mothers Survive.</p>
<p>Neonatal Resuscitation Program® (AAP)</p> <p>https://www.aap.org/en-us/continuing-medical-education/life-support/NRP/Pages/Course-Info.aspx</p>	<p>Evidence-based approach to the care of newborns at birth; facilitates effective team-based care.</p>	<p>Involves a blended learning approach, with online case-based simulations, testing, hands-on simulations and debriefing, focusing on critical leadership, communication and teamwork skills.</p> <p>Ex: (3): NRP training in Japan.</p>
<p>Perinatal Continuing Education Program® (AAP)</p> <p>https://shop.aap.org/pcep-perinatal-package/</p>	<p>Maternal and fetal evaluation and immediate newborn care.</p>	<p>Step-by-step instruction in skills and practice exercises. Books and e-books can be used for self-paced learning or as adjuncts to instructor-led training.</p>
<p>PRONTO Program (<i>Programa de Rescate Obstétrico y Neonatal: Tratamiento Óptimo y Oportuno</i>) (Pronto International)</p> <p>https://prontointernational.org</p>	<p>Low-technology, low-cost simulation-based obstetric and neonatal team-training programme for use in facilities.</p>	<p>Teaches providers to manage maternal and neonatal complications simultaneously rather than focusing on neonatal resuscitation in isolation.</p> <p>Ex. (4): PRONTO with auxiliary nurses and midwives in Bihar, India; found that, as the complexity of simulations increased, the time between key NR steps decreased.</p>
<p>Acute Care of At-risk Newborns (Canadian Pediatric Society)</p> <p>https://www.cps.ca/en/acorn</p>	<p>Designed to teach neonatal stabilization and preparation for transport to a referral facility.</p>	<p>Teaches a systematic approach to the identification and management of babies who are at risk or become unwell in the first hours or days after birth in eight steps. Addresses neonatal morbidity such as respiratory distress, sepsis, unstable temperature, asphyxia, infection and low birth weight.</p> <p>Ex. (5): 15 level-2 county hospitals in China; Confidence and knowledge in neonatal stabilization improved significantly.</p>

Intervention approach	Definition	Details and examples
S.T.A.B.L.E. Program (6) https://stableprogram.org	Teaches post-resuscitation, pre-transport stabilization of sick infants.	S.T.A.B.L.E. is the acronym for six assessment parameters: Sugar, Temperature, Airway, Blood pressure, Laboratory work and Emotional support for the family. A seventh module is on quality improvement for improving and evaluating care. Prevention of adverse events and delivery of safe care are stressed. Materials are for self-study or for instructors.
Digital clinical learning initiatives	e.g. M-learning, E-learning	
Online neonatal training and orientation programme in South-East Asia (All-India Institute of Medical Sciences) https://www.ontop-in.org	Internet-based distance learning.	Includes local hands-on skill training in essential newborn care and identification of areas for quality improvement. Ex. (7): Course modules based on WHO essential newborn care materials, delivered online over five weeks to 98 nurses at seven health facilities in India and the Maldives. Participants managed case scenarios and participated in discussion forums moderated by local online tutors. Computer literacy was not an essential prerequisite for participation, but course delivery was limited to areas with an Internet connection. Participants scored significantly higher in knowledge and skill scores after than before training.
Safe delivery App (Maternity Foundation, Denmark) https://www.maternity.dk/safe-delivery-app/	Training and point-of-care app for mobile devices.	To improve basic emergency obstetric and newborn care management and care for small and sick babies in LMICs through visual guidance in animated videos with clinical instructions and other features. Ex: (8): Clinical trial in Ethiopia, in which use of the app was associated with significant increases in knowledge and skill scores for neonatal resuscitation 6 and 12 months after training and with lower perinatal mortality in intervention clusters than in controls. Ex: (9) RCT to evaluate use of the French version of the app in the Democratic Republic of the Congo.
Eliminating retinopathy of prematurity by improving quality of care (Public Health Foundation of India) https://www.pretermcare-eliminatingrop.com	Completion of modules followed by team training and skill learning in hands-on workshop. Developed for nurses and neonatologists.	The modules are based on participatory learning; skills are acquired in competence-based learning in small groups with low-cost innovative models (simulations). Skills are then evaluated in an objective structured clinical examination. The entire package will be administered by State medical colleges in SNCUs under their supervision.

Intervention approach	Definition	Details and examples
NeoReviews (AAP) https://shop.aap.org/2019-neoreviews/	Online neonatology journal with reviews of continuing medical education activities.	Provides clinical review articles, teaching slides, case discussions, online quizzes, videos and skills assessment exercises.
NeoReviews Plus (AAP) https://shop.aap.org/2019-neoreviewsplus	Online monthly reviews of continuing medical education activities in neonatal intensive care.	A comprehensive neonatology review package, including online access to the <i>NeoReviews</i> journal, case-based questions and critiques, case discussions and other features.
Clinical practice guidelines (NNF-India) Android app: NNF CPG (Google play)	App containing evidence-based guidelines for health care providers, programme managers and policy-makers involved in the care of newborns as a bedside tool for doctors and nurses.	Evidence-based guidelines based on the standard rigorous process of guideline development with the GRADE method available as a bedside tool, with summary recommendations and separate practice questions for each clinical situation.
Birth and Beyond (Global Health Media) Apple: free from the Apple App Store. Android version coming soon.	New smartphone app to provide mothers and families with easy access to Global Health Media videos.	Contains all 28 videos developed for mothers and caregivers on care from the time of birth through the baby's first two years. The main topics covered are birth, breastfeeding, newborn care, small baby care and complementary feeding. The videos are available in 21 languages and can be streamed, downloaded to an offline library or shared.
Clinical decision support software (for points of care)		Guidelines and clinical technology algorithms for use at points of care
All-India Institute of Medical Sciences WHO Collaborating Centre: Standard Treatment Protocols: Android App (https://play.google.com/store/apps/details?id=who.searo.stpapps&hl=en_US) IOS App: Sick newborn	Bedside tool for improving clinical practice and for refresher training.	Android-based mobile phone app for evidence-based management of sick newborns; runs offline once downloaded.
All-India Institute of Medical Sciences WHO Collaborating Centre: Preterm Care blended training tool and job aid Android app IOS app: PretermCare	Bedside tool for improving clinical practice and for refresher training for teams of doctors and nurses.	Android-based mobile phone app for evidence-based management of preterm newborns, with knowledge check after completion of each objective in a module. Contains 10 modules.
NoviGuide (Global Strategies) https://www.globalstrategies.org/projects/noviguide	Designed to optimize facility-based care of newborns by health workers in LMICs.	Allows health ministries to customize neonatal algorithms to align them with national protocols. Use of the app then populates a dashboard to guide resource allocation and quality initiatives.

Intervention approach	Definition	Details and examples
Paper-based job aides		
WHO safe childbirth checklist https://www.who.int/patientsafety/topics/safe-childbirth/childbirth/en/	28 essential practices in checklist format.	Checklist practices known to improve the quality of facility-based childbirth care, including newborn care. Ex: (10). A trial in Uttar Pradesh, India, to test the effect of eight months of coaching in use of the checklist. Ex: (11). Overview of collaboration and lessons learnt from using the checklist in a range of settings.
Mentorship, coaching, supervised practice for building skills		
Early essential newborn care (WHO Regional Office for South-East Asia) https://www.who.int/westernpacific/activities/scaling-up-early-essential-newborn-care	Package of evidence-based interventions shown to reduce newborn mortality	Approved, qualified mentor or coach assesses skills with a standardized tool. Has been introduced in 12 countries (Cambodia, China, Lao People's Democratic Republic, Mongolia, Papua New Guinea, Philippines, Solomon Islands and Viet Nam) (12). A cross-sectional observational study from 150 national, provincial and district hospitals implementing early essential newborn care in eight countries in East Asia and the Pacific found that duration of skin-to-skin contact showed a strong dose–response relationship with early breastfeeding initiation (13).
Courses to improve quality at points of care		
Point of care continuous quality Improvement (WHO Regional Office for South-East Asia) https://apps.who.int/iris/handle/10665/331664 https://apps.who.int/iris/handle/10665/331665 https://apps.who.int/iris/handle/10665/310421 https://apps.who.int/iris/handle/10665/310420 http://www.pocqi.org/	All-India Institute of Medical Sciences WHO Collaborating Centre for Newborns, UNICEF, UNFPA, United States Agency for International Development.	POCQI package includes facilitator guide, participant manual, coaching guide and district implementation guide. Includes a collaborative learning platform with an e-workbook, webinars, project templates, successful projects and country progress reports to build the capacity of South-East Asia regional health care teams and stakeholders in quality improvement.

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