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DEVELOPING NEWBORN INTENSIVE CARE UNITS (NICU)

Knowledge Product



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EXECUTIVE SUMMARY

This paper seeks to capture learning from VSO health programmes, specifically the role that international volunteers have played in setting up newborn intensive care units (NICUs) to address high levels of facility based neonatal mortality. VSO was awarded a three year development grant from DfID in 2017 and will be capturing and sharing learning as a key output. These learning outputs are known as knowledge products. This knowledge product on NICUs seeks to understand and present positive learning outcomes, and also key challenges and how these were addressed. We hope this learning will be of value to other clinicians seeking to improve newborn health outcomes in resource poor settings.

Newborn deaths account for 45 percent of under-five deaths globally, up from 40 percent in 1990. The global annual average rate of reduction in neonatal mortality since 1990 has only been two percent; lower than that of maternal mortality (2.6%) and under-5-year old mortality (2.9%). Most newborn deaths occur in low- and middle-income countries and two thirds of all neonatal mortality is reported from 12 countries.¹ Three-quarters of newborn deaths result from three preventable and treatable conditions – complications due to prematurity, events during childbirth and neonatal infections. The knowledge and tools to prevent at least two-thirds of these deaths are available. The global Every Newborn Action Plan (ENAP), launched in 2014, provides a road map of strategic actions for ending preventable newborn mortality and stillbirth.²

Sick and premature newborns need specialised care but the provision of inpatient care presents critical health system challenges. Significant or major bottlenecks include health workforce (lack of skilled staff), health financing (insufficient funds to provide quality maternal and newborn services) and community ownership and partnership³ (improving capabilities for individual and group participation;

developing and sustaining people-centred health services; and social accountability).⁴

The emergence of NICUs is recognised as a means of delivering the specialised care that some newborns need in terms of treatment and the prevention of infection and further complications. Prevention includes protection from hypothermia (ensuring warmth) and hospital acquired infection, as well as the provision of adequate nutrition (often with nasogastric or cup feeding), with the overall goal of establishing exclusive breastfeeding where possible. Many lives could be saved, and morbidity prevented with improved identification of those at high risk and timely provision of quality inpatient and supportive care.⁵ There is clear evidence that progress is possible; 11 low and lower middle-income countries have reduced their neonatal mortality rate (NMR) by more than 40 percent since 2000, showing that it is possible to make rapid progress.⁶

VSO health volunteers have played a key role in the provision of NICU care. They have witnessed high newborn mortality and taken action to improve how care and service provision is delivered. Volunteers have worked systematically to change attitudes, build alliances and practically model and teach best care practices. Their efforts have yielded great improvements in newborn care: facility based NMR has been reduced; NICUs have been integrated into wider care provision; tools and resources have been developed and are still being regularly used and there is widespread acknowledgement and praise for their inputs by senior managers and clinicians alike.

VSO has recently undertaken two internal evaluations of the NICU programme in Ethiopia⁷ and of the Accelerated Care and Treatment of Mothers and Neonates in Tanzania (ACTI).⁸ Learning from these evaluations and interviews with returned volunteers⁹ have provided valuable lessons which will inform future VSO planning and may also be of wider interest.

¹ In descending order of annual number of newborn deaths: India, Nigeria, Pakistan, China, Democratic Republic of the Congo, Ethiopia, Bangladesh, Indonesia, Angola, Kenya, United Republic of Tanzania, Afghanistan. Every Newborn Action Plan. ² http://www.who.int/maternal_child_adolescent/newborns/every-newborn/en/ ³ Moxon, S. G. et al. "Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions" BMC Pregnancy Childbirth 2015: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4577807/> ⁴ Marston, C. et al. "Community participation for transformative action on women's, children's and adolescents' health". Bull World Health Organ. 2016 May 1: <https://www.ncbi.nlm.nih.gov/pubmed/27152056> ⁵ Moxon, S. G. et al. "Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions" BMC Pregnancy Childbirth 2015 ⁶ Bangladesh, Cambodia, Democratic People's Republic of Korea, Egypt, El Salvador, Malawi, Mongolia, Rwanda, Senegal, Sri Lanka and United Republic of Tanzania. Every Newborn Action Plan. ⁷ VSO Ethiopia identified the need for NICUs and set up low cost units to reduce neonatal mortality in the targeted hospitals of Tigray, Southern Nations Nationalities and Peoples Region (SNNPR) and Oromia Regions. Since 2012 VSO has supported the establishment and strengthening of 42 NICUs; 4 HDUs; 3 MWHs and 4 NBCs, which are operational. Donors include: Irish Aid, Unicef, Vodacom, Pharo. ⁸ A three year project in Mtwara and Lindi regions in southern Tanzania due to end in May 2018 funded by HDIF. The project components include NICUs, Vscan (portable ultrasound, newborn triage checklist, staff capacity building, SMS platform for ANC health messaging. ⁹ Dr. Liz Ledger (1 year placement, Ethiopia); Dr. Jo Cryer (1 year placement, Ethiopia); Dr. Jim Pauling (1 year placement, Tanzania).

INTRODUCTION

VSO is required to report on knowledge gained from programming activities as one of the agreed outputs in the DfID Volunteering for Development grant.¹⁰ The purpose is to capture and share knowledge that can inform and enable effective action. This might be new information or insights that validate or challenge current working practices, or approaches that have been proven to work that have potential to be used more widely for greater impact. These learning outputs are described as knowledge products.

This paper aims to share learning from VSO maternal and newborn health (MNH) programming activities, specifically in newborn care and the support for newborn intensive care units (NICU). The knowledge product seeks to capture key learning from the NICU work which VSO has pioneered largely in Ethiopia and Tanzania.

The purpose is to understand the VSO contribution to newborn health outcomes; how the NICUs were established, and particularly the role of VSO volunteers in making this happen. It is important to also consider how the NICU model can be sustained and scaled up to reach even larger numbers of newborns needing specialised care.

VSO has recently undertaken two in depth evaluations of the NICU programmes in Ethiopia (August 2017) and in Tanzania (February 2018). Learning from these evaluations has been used to inform this report alongside interviews with returned volunteers from both countries



¹⁰ The Volunteering for Development grant is aimed at supporting the delivery of the UK Aid strategy to improve basic services and livelihoods for the vulnerable and extreme poor; building their resilience to the shocks and stresses that threaten their advancement from poverty. The grant recognises VSO's extensive experience of placing volunteers to tackle poverty and inequality. The accountable grant award is designed to provide targeted support over three years (2017-2020) to enable VSO to galvanise change.

THE NEWBORN PERIOD – PERILS AND IMPERATIVES

Ending preventable newborn deaths and stillbirths is a moral imperative. It also contributes to healthier, more prosperous societies: the first month of life is a foundational period for lifelong health and development. Healthy babies grow into healthy adults who can thrive and contribute to their communities and societies. Professor Anthony Costello, Director, Maternal, Newborn Child and Adolescent Health, WHO

It is four years since the publication of *The Lancet Every Newborn Series*¹¹ which provided the evidence for the launch of the *Every Newborn Action Plan*¹² which aims to end preventable maternal and newborn deaths, and stillbirths by 2030. Newborn deaths account for almost half (45%) of deaths among children under the age of five globally, resulting in 2.7 million lives lost each year. In addition, 2.6 million babies die in the first three months of pregnancy or during childbirth (stillbirths) and 303,000 maternal deaths occur each year (see Appendix A). Furthermore, stillbirths, newborn survival and health are intrinsically linked with the survival, health and nutrition of women before conception and during and between pregnancies. For example, neonatal mortality is intimately related to maternal health; 34% of neonatal deaths are related to preterm birth complications.¹³

There is clear evidence that interventions and services for babies born small and sick, are affordable and it is argued that the cost of failing to provide this care could be far greater.¹⁴ Rising levels of facility deliveries globally mean that more newborn deaths are occurring within hospitals, and over two-thirds of these deaths could be prevented with effective hospital care.

Most maternal and newborn deaths can be prevented using existing, proven, cost effective interventions: antibiotics, cord care, drugs that prevent and treat post-partum haemorrhage, resuscitation, immediate and exclusive breastfeeding and kangaroo mother care (KMC) to keep the newborn warm with skin to skin contact. High quality inpatient care for sick neonates includes careful monitoring by trained health professionals with a sound understanding of the physiological and psychosocial needs of the small or sick newborn baby and their families. It has been estimated that optimal supportive care in a hospital Special Care Baby Unit (SCBU) could avert 70 percent of neonatal deaths due to preterm birth complications, and that 90 percent could be averted with availability of hospital Neonatal Intensive Care Units (NICUs).¹⁵



¹¹ The five papers advocate for quality care at birth, which requires facility and community actions with a focus on the time of birth. This is the time when most deaths occur and when most lives can be saved, and long-term disabilities averted, through higher coverage of effective interventions: <http://www.thelancet.com/series/everynewborn>

¹² The Every Newborn Action Plan presents evidence-based solutions to prevent newborn deaths and stillbirths. It sets out a clear path to 2020 with specific global and national milestones:

http://www.healthynetwork.org/hnn-content/uploads/Every_Newborn_Action_Plan-ENGLISH_updated_July2014.pdf

¹³ The Lancet Newborn Series, Vol 384 July 12, 2014

¹⁴ The Centre for Maternal, Adolescent, Reproductive and Child health (MARCH):

<http://march.ishtm.ac.uk/2018/02/09/caring-newborn-join-chifa-online-discussion/>

¹⁵ Moxon, S. G. et al. "Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions" BMC Pregnancy Childbirth 2015: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4577807/>

CARING FOR THE NEWBORN – A SENSITIVE MARKER FOR ANY HEALTH SYSTEM

Although remarkable progress has been made in recent decades to reduce the number of child deaths worldwide, too many newborns continue to die each year despite the availability of feasible, evidence-based solutions. Newborn deaths and stillbirths are reducing at a slower rate than under-5 deaths and maternal deaths. Now is the time for the global health community to prioritize this unfinished agenda. **Every Newborn: an action plan to end preventable deaths. WHO 2014**

In 2005, the Lancet Neonatal Survival Series sought to accelerate action by describing the timing, causes, and location of neonatal deaths; identifying highly cost effective interventions that could avert more than two thirds of neonatal deaths, including about a third through community care; and outlining how these solutions can be delivered by integration and scaling up at both facility and community levels for an estimated additional cost of US\$1 per person, of which about seventy percent would also benefit mothers and older children.¹⁶ Yet the burden of neonatal mortality, almost half of all deaths under five years, plus stillbirths and neonatal morbidity or disability remains substantial, and improvement of child survival will depend on greater investment in newborn survival.

Solutions to address the main causes of newborn death are available: more than 80% of all deaths result from three preventable and treatable conditions – complications due to prematurity (36%), intrapartum-related deaths (including birth asphyxia) (23%) and neonatal infections (23%). Improving quality of care around the time of birth will save the most lives, but this requires educated and equipped health workers, including those with midwifery skills, and availability of essential commodities.¹⁷ The highest risk of death or serious morbidity occurs among the ten million born at term with low birth weight (<2500 g) and the 15 million born preterm (before 37 completed weeks of gestation) each year.



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Mother with triplet in NICU in Axum, Ethiopia



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Assosa NICU, Ethiopia

¹⁶ Cited by Darmstadt, G. et al. The Lancet May 2014; 384: 174–88: [http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(14\)60458-X.pdf](http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(14)60458-X.pdf)

¹⁷ Every Newborn: an action plan to end preventable deaths. WHO 2014: http://www.healthynetwork.org/hnn-content/uploads/Every_Newborn_Action_Plan-ENGLISH_updated_July2014.pdf

THE EMERGENCE OF THE NICU – SPECIALISED CARE FOR HIGH RISK NEWBORNS

Quality care at facilities is crucial for ending preventable deaths amongst mothers and their babies. Care at the time of birth is highlighted as a sensitive marker of any health system. Improved quality of care at clinic and hospital level through management and procurement support were associated with increases in women delivering at health facilities instead of at home. Science Daily, Uganda 31 March 2015¹⁸

The actions needed for optimal newborn care are well documented.¹⁹ Unfortunately, the majority of mothers and newborns in low- and middle-income countries do not receive such optimal care during these periods.²⁰ For newborns who are sick, including those with infections, severe intrapartum insults (commonly birth asphyxia), severe jaundice, or those who are too small to maintain their body temperature or to breathe or to feed actively, will require inpatient care to survive. Many lives could be saved, and morbidity prevented, through a combined health systems approach along the continuum of care, with identification of those at high risk and timely provision of quality inpatient and supportive care.²¹

Preterm birth²² is the leading cause of child death worldwide. Small and sick newborns require timely, high-quality inpatient care to survive. This includes provision of warmth, feeding support, safe oxygen therapy and effective phototherapy with prevention and treatment of infections. Inpatient care for small or sick babies includes two cornerstone components: Kangaroo Mother Care (KMC) and sepsis case management. Inpatient care for newborns also requires dedicated ward space, staffed by health workers with specialist training and skills. Many of the estimated 2.7 million newborns that die every year do not have access to such specialised care.²³

Newborn facility based care is usually delivered across three levels focused on both treatment and prevention of infection and further complications (see Appendix B). Prevention includes protection from hypothermia (ensuring warmth) and hospital acquired infection, as well as the provision of adequate nutrition (often with nasogastric or cup feeding), with the overall goal of establishing exclusive breastfeeding where possible. Treatment, where available, centres on the management of common neonatal conditions including respiratory distress syndrome (RDS), neonatal infections, hyperbilirubinaemia,²⁴ feeding difficulties and the prevention and treatment of retinopathy of prematurity (ROP).²⁵ Advanced treatment for other important conditions²⁶ may also be undertaken. Basic newborn care (cleanliness, warmth and breastfeeding support) is essential for all babies, including timely resuscitation for up to 10 percent of babies that may require resuscitation at birth. While in a well-functioning health system all three levels of care will be available, many small babies can be managed without provision of any higher level neonatal intensive care and can be looked after in special care unit. Currently, however, over three quarters of babies born in Sub-Saharan Africa and Southern Asia cannot access special care if they were to require it (see Appendix C).

¹⁸ New measures identified for newborn care in Uganda. Science Daily 31 March 2015: <https://www.sciencedaily.com/releases/2015/03/150331175827.htm>

¹⁹ i) The baby's need to breathe normally; ii) Keeping the baby warm; iii) Immediate cord and eye care; iv) Monitoring the baby; v) Skin-to-skin contact and breastfeeding. WHO Essential Newborn Care course: http://www.who.int/maternal_child_adolescent/documents/newborncare_course/en/ ²⁰ Newborn care at birth: http://www.who.int/maternal_child_adolescent/newborns/care_at_birth/en/ ²¹ Moxon, S.G. et al. "Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions". BMC Pregnancy and Childbirth, v15, Supp 2, 2015 ²² Preterm birth, also known as premature birth, is the birth of a baby at fewer than 37 weeks gestational age ²³ Moxon, S.G. et al. "Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions". BMC Pregnancy and Childbirth, v15, Supp 2, 2015: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4577807/> ²⁴ About 60 percent of term newborns and 80 percent of premature babies develop jaundice. Infants of diabetic mothers and of mothers with Rh disease are more likely to develop hyperbilirubinemia and jaundice. Although low levels of bilirubin are not usually a concern, large amounts can circulate to tissues in the brain and may cause seizures and brain damage. This is <http://www.stanfordchildrens.org/en/topic/default?id=hyperbilirubinemia-and-jaundice-90-P02375a> condition called kernicterus: <http://www.stanfordchildrens.org/en/topic/default?id=hyperbilirubinemia-and-jaundice-90-P02375> ²⁵ Retinopathy of prematurity (ROP) is a potentially blinding eye disorder that primarily affects premature infants weighing about 1250 grams or less that are born before 31 weeks of gestation. The smaller a baby is at birth, the more likely that baby is to develop ROP: <https://nei.nih.gov/health/rop/rop> ²⁶ Such as necrotising enterocolitis (NEC), patent ductus arteriosus (PDA), correctable congenital anomalies and broncho-pulmonary dysplasia (BPD)

THE UNIQUE CONTRIBUTION OF VOLUNTEERS – FORGING RELATIONSHIPS FOR BETTER CARE

“Volunteers are well placed to engage in work which is more about brokering change and shifting attitudes than about ‘delivery’. Given that most extreme poverty has less to do with lack of resources and services and more to do with power relations that restrict some people’s access to them, this is rather key²⁷” Institute of Development Studies 2015

VSO brings people together to share skills, build capabilities and promote national and international understanding and action. VSO volunteers are selected by VSO to work in health, livelihoods and education; they are central in achieving the mission of bringing people together. VSO is the world’s leading

independent international development organisation that works through volunteers to fight poverty in developing countries.

VSO has responded to requests to improve maternal and newborn health in a number of countries and has placed experienced international volunteers including paediatricians, obstetricians, GPs, paediatric and neonatal nurses who have been instrumental in establishing NICUs in Ethiopia, Tanzania and Uganda and in improving the quality of healthcare in existing NICUs (Myanmar). What challenges did they face, and how were these challenges overcome?



Baby in NICU, Ngangao, Tanzania

CASE STUDY – ETHIOPIA

Two VSO volunteer paediatricians were placed at Yirgalem General hospital in Southern Ethiopia for one year. VSO had an agreement to support the delivery of paediatric care services in Ethiopia during 2012. On arrival the volunteers describe being "horrified" at what they found in the paediatric ward including regular stock outs of supplies, no running water (water pump was broken) and, unsurprisingly, high rates of mortality. Premature babies were sent home to die. The volunteers developed an 'essentials of newborn care' training of trainers (ToT) course, taking this idea of ToT from previous volunteers working elsewhere in obstetrics. There was an empty room in the hospital that the Ethiopian paediatric consultant had wanted to use as a newborn care unit (NICU), however nothing had been initiated before the arrival of the volunteers. Subsequently, they worked together to motivate the medical officers and nurses and set up a newborn intensive care unit to address high mortality and change preconceptions and attitudes about newborn care. Twelve staff (6 nurses plus medical officers, midwives and operating theatre staff) received the ToT. They were sent for further newborn care training provided by the Ethiopian Paediatric Association in Addis Ababa and became crucial "drivers for change" for improved newborn care at Yirgalem.

The NICU was established with significant support from the hospital administrator who was engaged and involved throughout. A partnership with a local technical college was established to source low cost equipment, and this centre went on to provide low cost equipment for NICUs at other hospitals. The volunteers responded to the high levels of mortality and the lack of knowledge and understanding of how newborn lives could be saved. In turn local staff including a key senior manager responded to their ideas and they worked together to bring about the establishment of the NICU which is still functioning. They were also able to influence a newly appointed paediatric consultant who visited the NICU at Yirgalem and wanted to set up a NICU at his own place of work in Hosanna. The volunteers helped to set this second NICU up and this is also still a high functioning NICU today.

What was the added value of the volunteers in setting up the first NICU in Ethiopia? There was a real need for this service which had already been identified by the Ethiopian medical consultant but not actioned. Nurses described not having what they needed to care for newborns and the volunteers worked to change attitudes and improve knowledge about newborn care using participatory teaching methods including picture cards to start a dialogue and address knowledge gaps. The volunteers also applied for funding for additional resources for the NICU (from Irish Aid) with help from the VSO Ethiopia team. The volunteers applied drive, determination, an understanding the local context, building rapport with local staff and, critically, identifying a senior colleague who had the authority to be able to support their activities and deliver change.

There were ongoing challenges. Not all personnel were in favour of setting up a NICU and the volunteers faced opposition from some medical colleagues. In the absence of a hospital management team it took time for the volunteers to identify a member of staff who would be willing and able to support them. Furthermore, the prevalence of male medical doctors was identified as a barrier for the female volunteer i.e. dismissive of her medical inputs and more respectful towards her male counterpart.

CASE STUDY – TANZANIA

VSO sent a paediatrician to work in Nyangao mission hospital in Lindi, southern Tanzania in 2011. The hospital had a paediatric ward but no neonatal ward; sick neonates were looked after on the postnatal ward. Newborns were assessed and discharged by the obstetric medical staff but there were no standardised processes for assessment of risk factors or danger signs. The volunteer soon became aware of the high numbers of newborn deaths (case fatality rates) in the hospital. Also newborns treated in the hospital were often not admitted as patients in their own right; the details of any sick newborns assessed would be included in their mothers' notes. Numbers of qualified nursing staff were limited – much of the nursing care was done by nursing assistants with one to two years of training. Many newborns were diagnosed and treated by clinical officers without any training in paediatrics or newborn care and misdiagnoses were common as well as treatments such as oral antibiotics for sepsis. It was clear that newborns were not being systematically checked beyond the delivery period.

The volunteer decided to review neonatal mortality data and discovered that the neonatal mortality rate (NMR) was 47 per 1000 live births for the southern zone; the national rate in the same survey was 32:1000. The volunteer studied the delivery room data from 2010 and found a facility-based NMR of 41:1000 live births. This presented a compelling case that newborns and newborn care must be prioritised and this was approved by the medical director and by the paediatrician in the hospital. A three day newborn care training course was developed by the volunteer in collaboration with the paediatrician. A newborn checklist (Appendix E) and observation checklist for at risk newborns (Appendix F) were also developed for nurses and clinicians to use after the baby was born. This checklist identified newborns needing treatment; those needing further monitoring and those who were well and could be discharged home. The forms were audited and there was a 78% uptake in the first month, rising to 86% in the fourth month. There were committed nurse champions in the maternity and paediatric wards who were happy to be trained in newborn care and to use the newborn checklist. The case fatality rate for all newborns admitted for care fell from 28% in 2010 to 15.7% in 2011. There was a drop in the NMR for all deliveries from 41 per 1000 live births in the first half of 2011 to 28 per 1000 live births in July to November.



Volunteer in NICU at Masasi, Tanzania

The volunteer then worked with senior managers and clinicians to draw up a plan to roll out training, improve referrals and establish a NICU. This included rolling out the checklist to the dispensaries where almost half of all deliveries were taking place. By the end of the year, use of the newborn triage checklist was consistently good, not only in terms of the overall use of the checklist but also in the accuracy of the recording of respiratory rate and the actions of monitoring babies with risk factors. The total number of admissions of newborns born at Nyangao increased from 30 in 2010 to 117 in 2011 (to end of November). The newborn training and checklist were important interventions which improved newborn mortality. The checklist was further developed in subsequent partnership with the GIZ team working in Lindi regional hospital, becoming the newborn triage checklist which is now widely used in the southern zone (Lindi and Mtwara regions) in Tanzania.

Key learning

i) a NICU change pathway

We have learned from recent VSO health programme evaluations in Ethiopia and Tanzania that volunteers' contributions to NICUs are highly valued by senior managers and clinical colleagues. This was expressed recently by a District Medical Officer in Tanzania:

“Without volunteers it would be very difficult to have the NICU – they are specialists in newborn care and are sharing and transferring knowledge daily as they work in NICU.”

Their regular presence in clinical areas enables volunteers to model best practice and deliver on the job training on a daily basis. For example, teaching on

ward rounds and when carrying out procedures on newborns such as inserting intravenous lines or nasogastric tubes. Staff report feeling confident in using the skills, having been taught theory and practice, and valuing both the technical knowledge and the way in which volunteers have delivered this:

“The cooperative approach of the volunteers is key – they work together with others, they are available in the institution and they are solving problems as they go.”

(Head nurse Arba Minch hospital, Ethiopia)

Having reviewed what the volunteers did to set up and support NICUs a change pathway emerges as follows:

NICU change pathway



Ensure that there is enough air
condition, by opening all windows &
doors to allow for an early exit.

Attend to all coughing patients first
by taking history, physical examination
and send to the lab. for Sputum
Diagnosis.

Ultrasonnd

and after procedures
Ensure that all cough patients
identified, separated from
patients.



ii) Relational approach – connecting with colleagues

The need to navigate complex politics, engage people who are often highly marginalised, and achieve results makes the work of volunteers highly relational. Research conducted by VSO and the Institute of Development Studies highlighted that “relationships and relationship building between volunteers and their counterparts were as important as technical skills and hard outcomes” and that these relational approaches were what contributed to the generation of the soft outcomes, such as leadership skills, communication skills and people management, that led to the solutions identified being locally owned and sustained²⁸. It is not just what volunteers do, but how they support change that makes their contribution unique. Volunteers’ embeddedness, living and working alongside colleagues, enables them to develop a shared understanding of the challenges they face. Where this works effectively, it creates strong personal bonds and relationships leading to a different kind of collaboration, based on a mutual appreciation of each other’s knowledge, skills and networks. Elsewhere this relational approach is described as finding an optimal balance between three interrelated elements: self; other; situation. Added to this is the context or culture. In practice this means interdependence; exploring values and supporting shared decision making in order to build a better and sustainable future²⁹. Skilled volunteers who can help to provide specific technical inputs are needed, but the evidence demonstrates that volunteering is most effective when it builds two-way, reciprocal relationships. Volunteers involved in establishing NICUs describe the importance of finding at least one key colleague whom they could relate to, collaborate with and build an effective working relationship. Staff also describe the importance of agreeing shared objectives with the volunteers and building trust in order to work effectively to deliver improved newborn care.

What was the added value of the volunteers in setting up the first NICU in Ethiopia? There was an urgent unmet need to address the high rates of neonatal mortality. This had been identified as a concern but not actioned. Nurses described not having what they needed to care for newborns. The volunteers found ways to change attitudes and improve knowledge about newborn care using participatory teaching methods including picture cards to start a dialogue and address knowledge gaps e.g. using Kangaroo

Mother Care (skin to skin contact) to keep premature babies warm. The volunteers also successfully applied for funding for additional resources for the NICU. The ability to merge insider and outsider knowledge is crucial to sustainable impact. Volunteers were able both to bring in and connect people to outside knowledge but also to embed themselves within communities in a way which connects them to inside knowledge. By acting as intermediaries, they can broker access to information, networks and resources within and beyond the community, encouraging new forms of collaboration and strengthening local action³⁰. This is highlighted by comments from staff as follows:

“Volunteers discussed that it was possible to control and reduce newborn mortality by setting up a NICU and training nurses. VSO provided the initiative. Always positive working with the volunteers. They have saved lives.”

Former CEO Arba Minch, Ethiopia

“They provided good information and empowerment to establish the unit.”

Paediatrician Arba Minch, Ethiopia³¹

iii) Motivating staff

Health priorities of the post-2015 agenda for sustainable development – including achieving reductions in maternal mortality and ending preventable deaths of newborns and children under-5 – will remain aspirational unless accompanied by strategies involving transformational efforts on health workforce capability³². In 2014, the World Health Assembly recognized that the Sustainable Development Goal (SDG) for health and its 13 health targets – including a renewed focus on equity and Universal Health Care – would only be attained through substantive and strategic investment in the global health workforce. However, it is acknowledged that countries at all levels of socioeconomic development face, to varying degrees, difficulties in the education, deployment, retention, and performance of their workforce. The problem of inadequate health-worker performance in low and middle income countries has been described as “particularly urgent”.³³



Mother and baby outside NICU in Assosa, Ethiopia

Having volunteers present each day in the NICUs, working alongside local staff, provided opportunities for on the job training; supervision, boosting staff morale and motivation. Staff interviewed as part of the VSO evaluation exercises all described having skilled volunteers present in the NICUs as highly beneficial; they had developed a rapport and were able to discuss and share concerns and seek solutions to clinical problems and other challenges e.g. resourcing. Training sessions, materials and protocols developed by volunteers were greatly appreciated by clinical staff and there was evidence that these were regularly used, even after the volunteer had left e.g. newborn triage checklist (Tanzania); newborn care protocols (Ethiopia).

Volunteers' inputs concerning staff supervision may be considered one of the most valued inputs. Trials have shown that supervision can improve performance, at least in the short term. Second, if correctly done,

supervision could be a mechanism for providing professional development, improving health workers' job satisfaction, and increasing motivation. The main challenges for supervision are improving quality, increasing the time supervisors actually spend with health workers, and measuring its cost-effectiveness³⁴.

iv) Volunteers as change agents

Volunteers have been able to gain a clear insight into the challenges facing service providers and service users and have found ways to gain buy in for change and work with colleagues to make improvements happen. For example, in one NICU in Tanzania a volunteer³⁵ found that staff and mothers were not happy as the ward was too hot and as a result babies were being left unattended to get cold and were not receiving regular feeds. The volunteer suggested reconfiguring the NICU and having a smaller "hot room" for premature/small babies and creating a larger ward where mothers can stay with their babies who do not require such high room temperature. This worked well and both mothers and staff are happy.

Volunteers have acted as change agents in their roles in setting up and working in the NICUs. Change agent characteristics include: clear vision; patient yet persistent; ask tough questions; knowledgeable and leads by example; strong relationships built on trust³⁶. Determination, drive, understanding the local context, building rapport with local staff and, critically, identifying a senior colleague who had the authority to be able to support the volunteers' proposed ideas were fundamental to achieving the desired changes. It is fair to say that without the volunteers' commitment and ability to identify key stakeholders and resources and harness these for change the NICUs in Tanzania and Ethiopia might never have been set up. Volunteers have undoubtedly contributed to improving the quality of care for newborns, as defined in the WHO Quality of Care Framework for maternal and newborn health (2015) (see Appendix F).

²⁸ "The role of volunteering in sustainable development" VSO & IDS 2015: https://www.vsointernational.org/sites/default/files/the_role_of_volunteering_in_sustainable_development_2015_vso_ids.pdf

²⁹ Relational Change: <http://www.relationalchange.org/index.html>

³⁰ "The role of volunteering in sustainable development" 2015

³¹ Interview responses from VSO Ethiopia NICU programme evaluation, July 2017

³² Global Strategy on Human Resources for Health: Workforce 2030. WHO 2016: http://www.who.int/hrh/resources/global_strategy_workforce2030_14_print.pdf?ua=1

³³ Rowe, A.K. "How can we achieve and maintain high-quality performance of health workers in low-resource settings?" The Lancet. Vol 366 September 17, 2005

³⁴ Rowe, A.K. As above.

³⁵ Dr. Eirini Bikou, VSO volunteer, Nyngao District Hospital, Tanzania. 2017/18

³⁶ <https://georgecoursos.ca/blog/archives/3615>

NEWBORN CARE – THE CHALLENGES AHEAD



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VSO volunteer Midwife Marianne Bontenbal runs a workshop, Awach Medical Centre, Uganda

Although remarkable progress has been made in recent decades to reduce the number of child deaths worldwide, too many newborns continue to die each year despite the availability of feasible, evidence-based solutions. Every Newborn Action Plan (ENAP) 2014.

Volunteers, as health professionals, are a key constituent group in the ENAP with a significant role to play in achieving the vision of improving newborn health and preventing stillbirths by 2035. The key actions outlined for health professionals include:

- Prioritising essential interventions around the time of birth and care of small and sick newborns as part of an integrated package of RMNCAH services.
- Providing quality and respectful integrated services to babies and women through accelerated training, retention and motivation approaches.
- Working with local and national bodies to ensure consistent availability of commodities and supplies essential for key interventions around the period of birth.

- Monitoring quality of care, including through use of maternal and perinatal death surveillance and response.

Volunteers working in NICUs have already made significant contributions in these areas and yet there is more to do. There is scope for volunteer input also to the ENAP research agenda, which includes:

- Removing barriers to the extension of exclusive breastfeeding and facility-based kangaroo mother care
- Evaluating the use of chlorhexidine for cord care in neonates born in health facilities
- Developing strategies to improve the quality of facility-based care provided during labour and childbirth
- Finding approaches to scale-up simplified newborn resuscitation at lower levels of the health system
- Identifying and managing newborn infection at community level

SUSTAINABILITY – HOLDING THE GAINS

The Sustainable Development Goals have set ambitious health-related targets for mothers, newborns, children under the umbrella of Universal Health Coverage by 2030. Addressing quality of care will be fundamental in reducing maternal and newborn mortality and achieving the health-related SDG targets³⁷. WHO 2016.

We have clear evidence of the impact that volunteers have made in establishing functioning NICUs. What has contributed to these achievements and what more could be done to ensure the improvements are maintained? If we consider a quality improvement approach³⁸ there are eight recommendations to ensure that quality is sustained over time. These include:

- 1. Plan for sustainability from the start** – if left until the end of the project it will be too late to influence many of the factors that determine whether a project will have a long-term impact. Make sure sustainability is included in the project work plan, and create a task checklist to cover the key factors that influence it.
- 2. Consider communication and engagement** – very early there should be a clear understanding of who should be engaged with, how to reach and communicate with those people, and the key messages to get across. It is important to focus on why the work is necessary and what the anticipated benefits will be. Articulate the benefits the project will deliver for staff as well as for patients and the wider organisation/health care system. These discussions should begin before the deployment of the volunteer. Change can be difficult; to get staff on board they need help to understand the full range of benefits of the proposed project/intervention. Making staff feel part of the process is also key to engagement. People will support what they helped to create. Rather than simply telling them what to do, actively seek their thoughts, ideas and involvement from the beginning and throughout the project.
- 3. Engage senior leaders** – involving senior clinical and managerial leaders is invaluable for securing organisational support and resources, spreading the word about what the planned changes are and negotiating the inevitable barriers. Using a quality improvement compact, which is a tool for project teams to create a common understanding with senior leaders about role expectations and how best to work together on a project, will help to make the relationship a success.
- 4. Align with organisational strategy** – if a project is a good fit with organisational strategy and priorities, it is much more likely to secure the support of senior leaders and to survive any disruption caused by other things happening in the organisation.
- 5. Establish sustainable measures** – Teams often collect a whole host of measures during a project. Look at the measures the organisation is already collecting and plan which could be used, or adjusted without difficulty, to demonstrate ongoing benefits.
- 6. Plan for resource needs** – If the project involves testing new equipment or technology, take steps to ensure continued access to the equipment you need after the project has ended.
- 7. Plan for scale-up** – the project may involve developing a new process or system that requires people to acquire new knowledge or skills. If so, work with the organisation's human resources or building capability team to develop a training programme for all the people who will need those skills. Plan ahead so that training can occur before your project finishes, or promptly afterwards.
- 8. Anticipate impact on wider stakeholders** – consider whether the new way of working could have an impact on organisational policies, procedures, job descriptions or other administrative factors. If so, engage with affected stakeholders in a timely manner to anticipate and mitigate any potential delays or barriers³⁹.

³⁷ Standards for improving quality of maternal and newborn care in health facilities. WHO 2016:

<http://apps.who.int/iris/bitstream/handle/10665/249155/9789241511216eng.pdf;jsessionid=FBB58502D30E52F43C01A3154B71E8E8?sequence=1>

³⁸ In February 2017 a *Network for Improving Quality of Care for Maternal, Newborn and Child Health* which fosters cross-country exchange for nine first-wave countries was set up. Additionally, large-scale quality improvement learning activities are progressing through regional leadership in South and Southeast Asia and the Pacific region, including a regional quality improvement learning hub and extensive coaching and mentoring in facilities.

³⁹ Adapted from *‘Holding the Gain: sustaining change in quality improvement’*:

<http://koawatea.co.nz/holding-the-gains-sustaining-change-in-quality-improvement/>

⁴⁰ This was corroborated by a VSO biomedical engineer volunteer in 2017 during the VSO NICU programme evaluation who said the visits were extremely useful: <http://www.wales.nhs.uk/sitesplus/861/news/35520>



Newborn baby girl, Awach Medical Centre, Uganda

We know from the shared case studies and recent evaluations that volunteers have, wherever possible, undertaken these steps to ensure that newborn care interventions had local buy in, were locally appropriate (using local and/or low cost materials where possible), and that senior managers were kept informed and local clinical staff were engaged. Sustainability is, however, a key challenge as funds and funding cycles are not always available when needed; staff continuity may also be an issue as a result of moving senior managers or skilled clinicians, reducing availability of clinical expertise. In both case studies volunteers described resistance to change from some staff.

However the NICUs have proven to be a highly effective intervention reducing newborn mortality

in all of the facilities where newborn care has been prioritised. Staff morale and motivation has been increased but critically maintaining motivation and morale requires leadership inputs, from volunteers modelling good practice, and engagement and ownership by local leaders and senior clinicians to ensure care in the NICUs is meeting standard operating procedures. There could be scope to twin some of the established NICUs with similar centres elsewhere to provide occasional but regular staff training, exchange visits and equipment maintenance as this is also often a key challenge. There is evidence that this approach works effectively in other centres e.g. Glan Clywd hospital, Wales and Nigist Eleni Mohammed hospital Hosanna, Ethiopia⁴⁰

SUMMARY

Within a generation it is possible to reach global equity, where all countries achieve levels of maternal, newborn and child survival in line with those in richer countries today. This will require sustained and enhanced investment, principally from domestic financing, boosted by international support, to deliver the full range of quality programmes and policies that have the greatest impact⁴¹. The Partnership for Maternal, Newborn, and Child Health.

Over three quarters of babies born in Sub-Saharan Africa and Southern Asia cannot access special care if they were to require it. Small and sick newborns require care from trained and skilled staff; core competencies, by level of care, are required as with emergency obstetric care. Rather than fatalism that small and sick newborns will die, community interventions also need to create demand for accessible, high-quality, family-centred inpatient care so that every newborn can survive and thrive⁴².

Volunteers have made significant contributions in improving newborn health. We have good evidence that their interventions have not only reduced mortality through the provision of specialised newborn care in NICUs, but that these interventions have been sustained and integrated into local health systems, regional planning and national training.

Volunteers have found ways to make these changes: identifying a process, using data and building a case for change with local colleagues (a NICU care pathway); developing effective working relationships to gain leadership approval and commitment, but also, buy in from local clinicians (relational approach). They have worked systematically as catalysts for change in highly challenging circumstances (change agents). At the same time finding ways to model good practice (quality improvement) and mentor local staff, which over time built trust and belief that the proposed interventions could achieve improvements in care (motivating staff). These inputs and the benefits they have brought to newborns and their mothers are widely acknowledged and highly regarded by local colleagues. Without the volunteers it is reasonable

to summarise that the NICUs may never have been developed. The remaining challenge now is to find ways to further embed, scale up and sustain the quality of these proven interventions.

Newborn survival, and health and prevention of stillbirths, were not specifically addressed in the Millennium Development Goal (MDG) framework and consequently received less attention and investment. Newborn deaths and stillbirths are reducing at a slower rate than under-5 deaths and maternal deaths. Now is the time for the global health community to prioritize this unfinished agenda.



⁴¹ The Partnership for Maternal, Newborn & Child Health in support of Every Woman Every Child. Strategic Plan 2016-2020. Geneva, Switzerland: PMNCH.

⁴² Moxon, S.G. et al. "Inpatient care of small and sick newborns: a multi-country analysis of health system bottlenecks and potential solutions". *BMC Pregnancy and Childbirth*, v15, Supp 2, 2015

RECOMMENDATIONS – FOR FUTURE NICU PROGRAMME INPUTS

VSO has gained significant insights and experience in improving newborn care provision and service delivery since 2011, and remains committed to providing expert volunteers to address the gaps in neonatal care. From this learning we hope that the following recommendations (1-6) may apply beyond VSO to any organisation considering working in maternal and newborn health. Recommendations (7-12) apply specifically to future VSO project planning but may also be of interest more widely to agencies sending clinical staff overseas.

1. Consider aligning MNH projects to Every Newborn Action Plan five strategic goals:
 - Strengthen and invest in care during labour, birth and the first day and week of life
 - Improve the quality of maternal and newborn care
 - Reach every woman and newborn to reduce inequities
 - Harness the power of parents, families and communities
 - Count every newborn through measurement, programme-tracking and accountability
2. Plan projects with sustainability and handover plans at the outset including resourcing (staff/ staff training); equipment (supplies/maintenance); leadership (partnership agreements/clinical mentors)
3. Strengthen the NICU model including: regular staff training (affordable, effective, low dose/high input training); equipment maintenance (systems in place to mitigate this; staff trained to clean/monitor equipment wherever possible); identify NICU champions (provide training/mentorship support possibly through twinning); provision/extension of outreach services e.g. Vscan, NTC, staff training for newborn care e.g. Helping Babies Breathe
4. Share/utilise newborn care champion toolkit (SCF 2016): <https://resourcecentre.savethechildren.net/library/saving-newborn-lives-champions-toolkit-first-edition>
5. Developing projects that address the MNH care continuum i.e. addressing service provision and demand for services at community/primary care levels
6. Join CHIFA network – the CHIFA Newborn Care Project supports the CHIFA community (>3500 child health professionals worldwide) in global discussions to explore and address how to improve

quality of care for newborns within the overall care continuum, particularly for those born small and sick in low and middle-income countries: <http://march.lshtm.ac.uk/2018/02/09/caring-newborn-join-chifa-online-discussion/>

7. Ensure all outgoing volunteers produce final learning reports summarising: key learning/ research findings, available resources, remaining challenges, key relationships.
8. Build on existing programmes and partnerships to reach greater numbers of newborns e.g. GIZ, Tanzania
9. Consider how to pilot and/or establish a learning network between NICUs/NICU programmes – Ethiopia is keen to set up a learning network in country but there could be scope to extend this even if through informal networks initially e.g. WhatsApp
10. Consider how VSO alumni/RVs who have worked in NICU/MNH could be engaged in programme support and/or learning networks
11. Ensure systems are in place to support volunteers working in NICU e.g. pairing volunteers⁴³; providing mentor support as the environment is highly challenging
12. Build links with academic bodies to address research gaps in newborn care

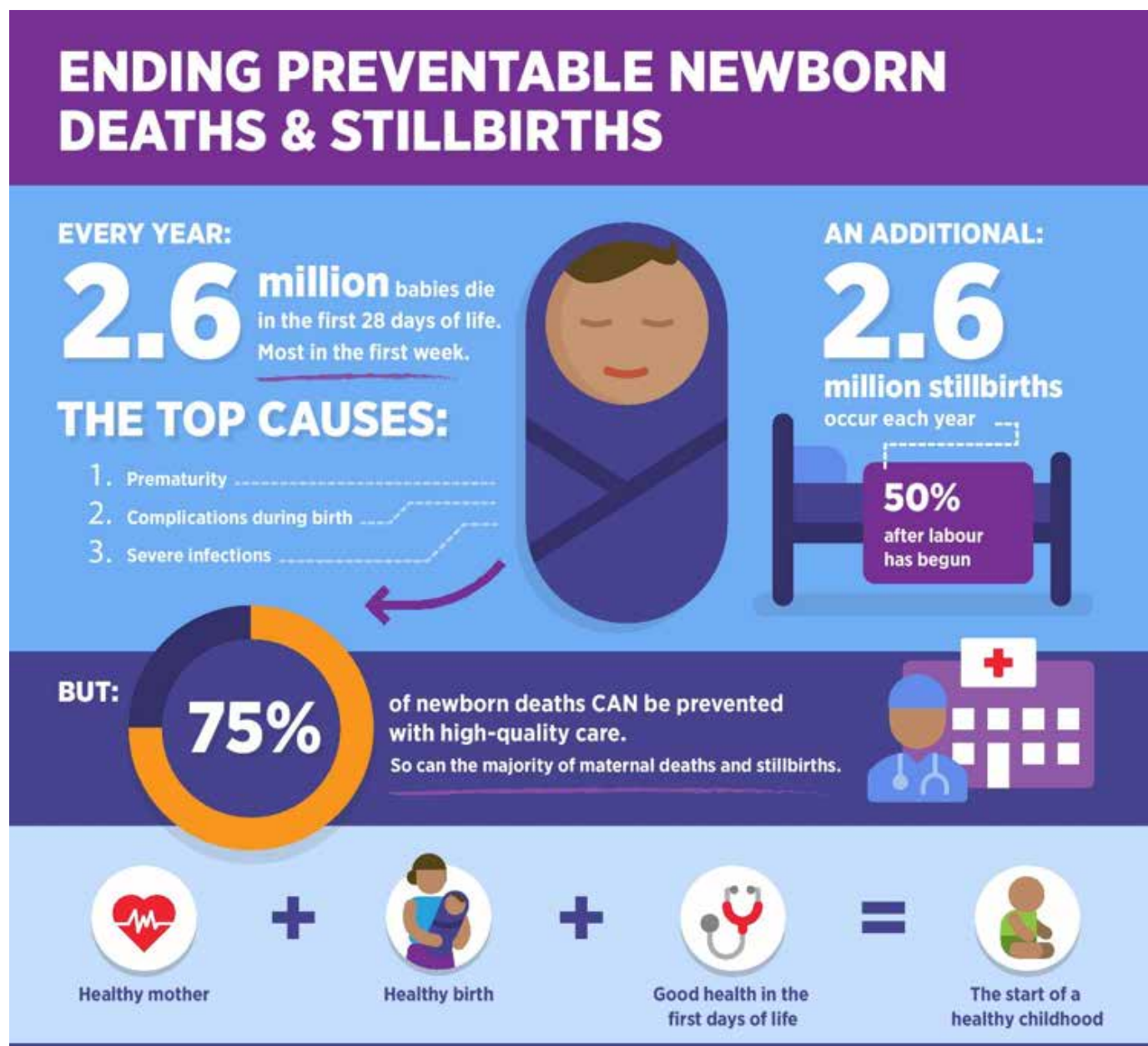


⁴³ Volunteers interviewed described the importance of being posted with their partner or of having other volunteers around. A GP posted in Sierra Leone working on an MNH project spoke highly of the regular support received by a mentor from the RCGPs.

APPENDIX




Appendix A – WHO factsheet

http://www.who.int/maternal_child_adolescent/newborns/every-newborn/newborns-stillbirths-75percent-preventable.jpg?ua=1



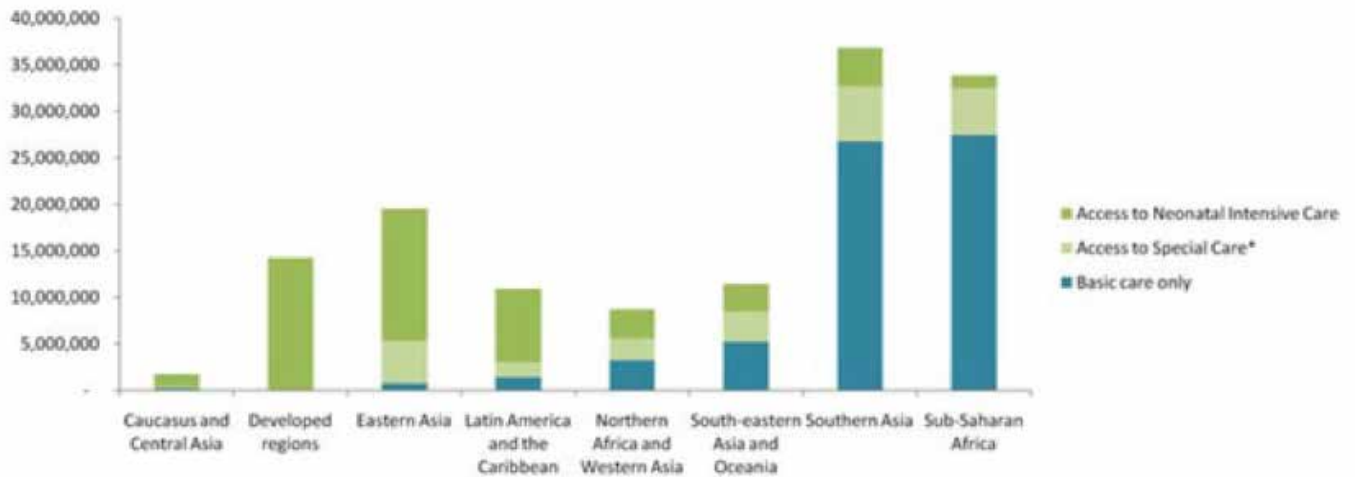
Appendix B: Levels of newborn care

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4577807/>

Tertiary	<h3>Neonatal Intensive Care</h3> <p>For babies including ventilation</p> 	<p>Place</p> <ul style="list-style-type: none"> • A special ward that includes neonatal care facilities • Incubators, resuscitaires • Space for kangaroo mother care* and supporting breastfeeding
	<p>People</p> <ul style="list-style-type: none"> • Nurses with specialised neonatal skills • High nurse-newborn ratio e.g. 1:1 in the UK • At least one doctor with specialised neonatal training 	<p>Equipment and commodities</p> <p>In addition to special care equipment and commodities (see below)</p> <ul style="list-style-type: none"> • Availability of Continuous Positive Airway Pressure, Intermittent Positive Pressure ventilation and monitoring equipment • Surfactant therapy for extremely premature newborns, if appropriate
	<p>Support system</p> <ul style="list-style-type: none"> • 24 hour laboratory support • Transport and safe referral if needed • Space for mother and family to stay close to their baby 	
Secondary	<h3>Special Care</h3> <p>For small & sick newborns</p> 	<p>Place</p> <ul style="list-style-type: none"> • A specific room or specially allocated corner of a warm facility, with specific areas for resuscitation, stabilisation and space for kangaroo mother care* • Incubators/resuscitaires overhead heaters
	<p>People</p> <ul style="list-style-type: none"> • Specialised nursing and midwifery staff • High nurse/midwife to newborn ratio e.g. 1:4 in United Kingdom 	<p>Equipment and commodities</p> <ul style="list-style-type: none"> • Feeding support with nasogastric tubes and intravenous fluids • Infection prevention and management, including antibiotics • Some access to oxygen provision (with pulse oximetry), and effective phototherapy for jaundice case management
	<p>Support system</p> <ul style="list-style-type: none"> • Space and support for mothers including place to express breast milk 	
Primary	<h3>Basic Care*</h3> <p>For all newborns</p> 	<p>Place</p> <ul style="list-style-type: none"> • Basic facility or home birth with skilled attendance
	<p>People</p> <ul style="list-style-type: none"> • Midwifery and nursing staff 	<p>Equipment and commodities</p> <ul style="list-style-type: none"> • No specialised equipment (apart from bag and mask for resuscitation when required).
	<p>Support system</p> <ul style="list-style-type: none"> • Warmth, cleanliness and breastfeeding support 	

Appendix C - Estimated coverage of neonatal care by region of the world and level of care.

*By Special Care Baby Unit, this is the highest level of care available (i.e. no Neonatal Intensive Care): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4577807/>



Appendix D – Newborn checklist, Nyangao hospital, Tanzania

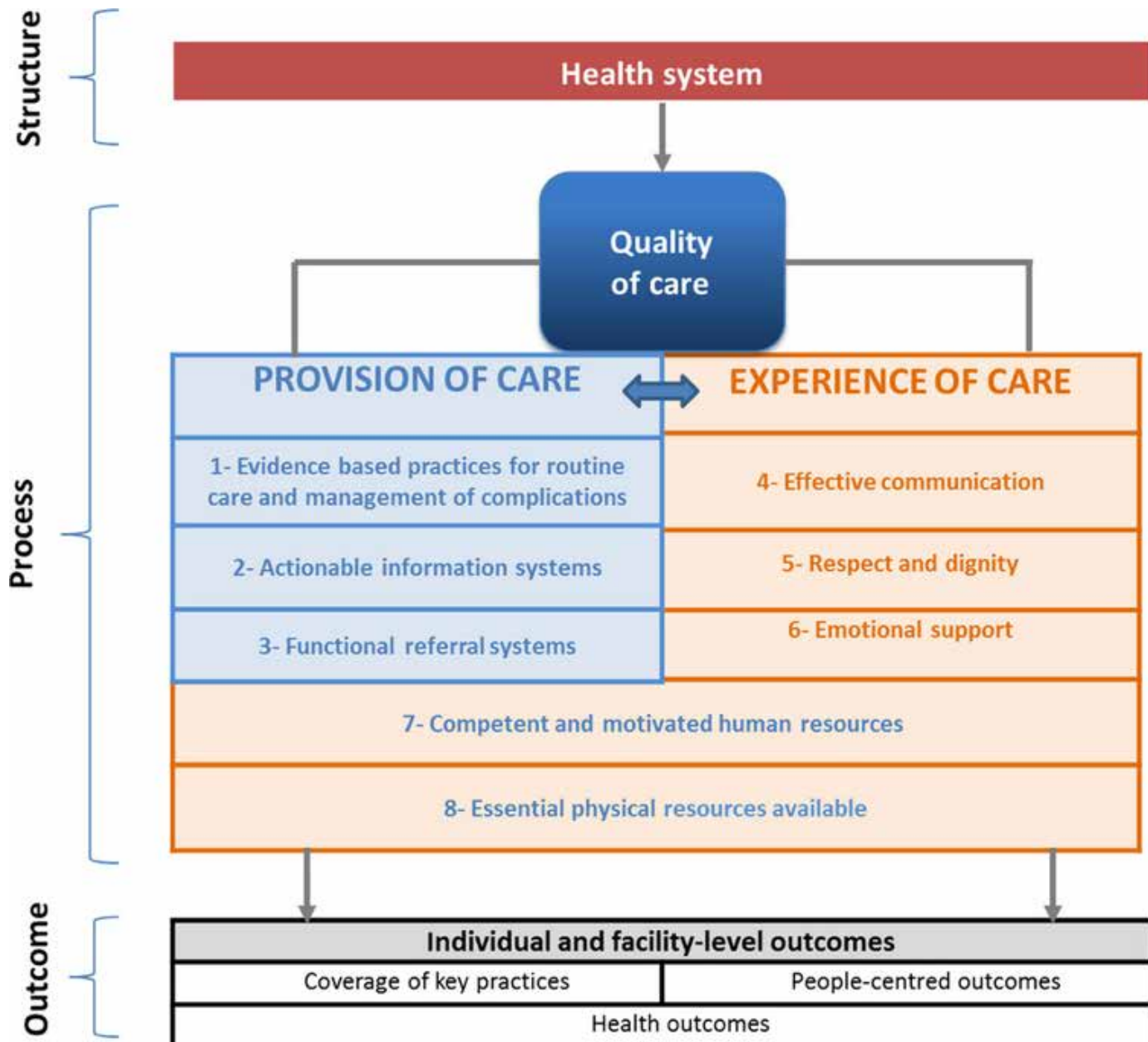
Jina la Mama.....		Kiji.....		Jareha ya kuzaa.....		Uzito wa mtoto.....		
Gestational age	Uzito wa mtoto	Maternal pyrexia >38°C	Prolonged ROM >24 hours	Apgar score at 10 mins. of age	Baby's temperature	Baby's Respiratory rate	Foul smelling Liquor?	Action to take
7 months or less <input type="checkbox"/>	<2kg <input type="checkbox"/>			<7 <input type="checkbox"/>	>38C <input type="checkbox"/> * <35.5C <input type="checkbox"/> *	> 60 <input type="checkbox"/> * coughing/ <input type="checkbox"/> * nasal flare/ signs of distress	Yes <input type="checkbox"/> *	REFERRAL TO HOSPITAL – PAEDIATRICS DEPARTMENT * Immediate administration of <u>1cc</u> Ampicillin 50mg/kg and gentamicin 4mg/kg
8 months <input type="checkbox"/>	2-2.2kg <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	7-8 <input type="checkbox"/>	37.5 - 38C <input type="checkbox"/> 35.5 - 36C <input type="checkbox"/>			NOT FOR EARLY DISCHARGE Needs close observation with temperature and respiratory rate every 8 hours. If breathing fast or <u>pyrexial</u> , treat and refer as above
9 months <input type="checkbox"/>	>2.2kg <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	9-10 <input type="checkbox"/>	36-37.5C <input type="checkbox"/>	30 - 60 <input type="checkbox"/>	No <input type="checkbox"/>	Low risk baby. Can be planned for early discharge after passes stool and urine and has neonatal examination

Appendix E – observation checklist for at risk neonates, Tanzania

-risk			<p>If the temperature is >38C or if respiratory rate is >60 then start antibiotics and refer to paediatric staff or doctor on call at Ward 4, Nyagao</p> <p>Ampicillin 50mg/kg 12 hourly</p> <p>Gentamicin 4 mg/kg Term = OD</p> <p>Premature AND under 1.5kg every 36 hours</p>
Time from initial observation (hours)	Temp (°C)	Respiratory Rate (/minute)	
0 hours (initial)	.....°C	...../min
8 hours	.....°C	...../min
16 hours	.....°C	...../min
24 hours	.....°C	...../min
32 hours	.....°C	...../min
40 hours	.....°C	...../min
48 hours	.....°C	...../min

Appendix F - WHO Quality of Care Framework for maternal and newborn health (2015):

<https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/1471-0528.13451>





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