Improving Newborn Care in South Africa

Lessons learned from Limpopo Initiative for Newborn Care (LINC)
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List of abbreviations

1° Primary
2° Secondary
3° Tertiary
BFHI Baby Friendly Hospital Initiative
CHC Community Health Centre
CPAP Continuous Positive Airway Pressure
DH District Hospital
DHIS District Health Information System
EN Enrolled Nurse
ENMR Early Neonatal Mortality Rate
ENND Early Neonatal Death
FTE Full Time Equivalent
IMCI Integrated Management of Childhood Illnesses
IPA Intrapartum Asphyxia
KMC Kangaroo Mother Care
LINC Limpopo Initiative for Newborn Care
NA Nursing Assistant
NC National Central
NMR Neonatal Mortality Rate
PHC Primary Health Care
PMTCT Prevention of Mother to Child Transmission
PN Professional Nurse
PPIP Perinatal Problem Identification Program
RH Regional Hospital
UNICEF United Nation Children’s Fund

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Introduction – Newborn care in district hospitals in South Africa

“The poorest quality of care and most of the perinatal deaths occur in district hospitals”

Saving Babies Interim Report in the National Perinatal Morbidity and Mortality Committee Report 2008
Every year, about 23,000 newborn babies die in South Africa, with an additional estimated 20,000 stillbirths. The National Perinatal Morbidity and Mortality Committee Report 2008 (released in 2009) draws on District Health Information System (DHIS) and Perinatal Problem Identification Programme (PIPP) data. The Saving Babies Interim Report 2008-2009 reveals that the majority of births and perinatal deaths in South Africa occur at district and regional hospitals (Figure 1.1). Unexplained stillbirth, intrapartum asphyxia (IPA) and birth trauma, and spontaneous preterm birth are listed as major causes. It should be noted that the PIPP data underestimates the role of newborn deaths due to infection as many of these deaths occur once babies have been discharged from hospital.

Of significant concern is that the perinatal mortality rates were highest in district hospitals for the major causes of perinatal death, and that according to the PIPP data, the majority of avoidable deaths from health care provider and administrative problems occurred at district hospitals.

The recommendations provide a list of interventions to improve the quality of prenatal, antenatal and intrapartum obstetric care as well as neonatal care. In addition, they point to important, but sometimes overlooked, administrative and management factors that could have a significant impact if properly addressed and strengthened. A significant challenge remains in implementing such recommendations and guidelines where the number of births and the burden of perinatal morbidity and mortality are highest – at the district hospital level, for a number of compounding reasons.

The Limpopo Initiative for Newborn Care (LINC) is a provincial newborn outreach project, supported by the Limpopo Provincial Department of Health, UNICEF and Save the Children. The LINC team advocates for attention to the issue of newborn care; developed a set of practical and useful tools for training and supporting newborn care at the regional and district level; and supports the implementation and improvement of care through ongoing support, data review and accreditation.

The LINC approach has demonstrated that a dedicated regional outreach programme can overcome many of the obstacles to improving newborn care.
facilities and services at the primary, district and regional levels. Over a period of 7 years, the programme has successfully built the capacity of facilities and individuals to improve the quality of care and perinatal outcomes on a sustained basis.

LINC thus represents a best practice approach for provinces, regions and districts to learn from and provides a ready made and easily-adapted package to facilitate the replication of this approach in other areas.

Figure 1.2. Avoidable factors by level of care that probably led to newborn deaths

CHC-community health centre; DH-District hospital; RH-Regional Hospital; PT-provincial Territory; NC-National Capital
Part 1: Introduction – Newborn care in district hospitals in South Africa

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Limpopo Province

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Limpopo Province

Figure 2.1. Map of Limpopo and its 5 districts

Limpopo Province is the northernmost province of South Africa, sharing borders with Botswana, Zimbabwe and Mozambique. It has only one city (Polokwane), and is divided into five districts (Capricorn, Mopani, Sekhukhune, Vhembe, Waterberg) and 24 municipalities.

It has a population of 5.4 million people, 39% of whom are under 15 years of age. Notably, it is the province with the highest proportion of rural citizens (86%). Table 1 lists the key relevant child health statistics indicators.
### Table 1. Limpopo Province - Relevant Health Statistics

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Limpopo</th>
<th>South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population and Births</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population</td>
<td>Stats SA 2007</td>
<td>5,323,009</td>
</tr>
<tr>
<td>No registered births</td>
<td>Stats SA 2007</td>
<td>120,826</td>
</tr>
<tr>
<td>Births in health facilities</td>
<td>DHIS 2007</td>
<td>122,514</td>
</tr>
<tr>
<td>Births in Hospital</td>
<td>PPIP 2007</td>
<td>93,495</td>
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<tr>
<td><strong>Perinatal data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perinatal Mortality Rate ⩾ 1000g</td>
<td>PPIP 2006</td>
<td>31.5</td>
</tr>
<tr>
<td>NNMR ⩾ 500g</td>
<td>PPIP 2006</td>
<td>15.9</td>
</tr>
<tr>
<td>NNMR ⩾ 10000g</td>
<td>PPIP 2006</td>
<td>12.9</td>
</tr>
<tr>
<td>ENMR ⩾ 500g</td>
<td>PPIP 2006</td>
<td>14.5</td>
</tr>
<tr>
<td>ENMR ⩾ 1000g</td>
<td>PPIP 2006</td>
<td>11.7</td>
</tr>
<tr>
<td>Low birth weight rate</td>
<td>PPIP 2006</td>
<td>14%</td>
</tr>
<tr>
<td><strong>Child Health statistics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infant Mortality Rate</td>
<td>Stats SA 2008</td>
<td>36.9</td>
</tr>
<tr>
<td>Under 5 Mortality Rate</td>
<td>Stats SA 2008</td>
<td>55</td>
</tr>
<tr>
<td><strong>Health Care Delivery Capacity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of hospitals</td>
<td>DHIS 2007</td>
<td>37</td>
</tr>
<tr>
<td>District Hospital</td>
<td>DHIS 2007</td>
<td>30</td>
</tr>
<tr>
<td>Regional (level 2) Hospital</td>
<td>DHIS 2007</td>
<td>5</td>
</tr>
<tr>
<td>Tertiary (level 3) Hospital</td>
<td>DHIS 2007</td>
<td>2</td>
</tr>
<tr>
<td>PHC facilities</td>
<td>DHIS 2007</td>
<td>453</td>
</tr>
<tr>
<td>Paediatricians in public sectors</td>
<td>CMSA 2008</td>
<td>7</td>
</tr>
<tr>
<td>Population per Paediatricians</td>
<td>Estimated</td>
<td>760,430</td>
</tr>
</tbody>
</table>
A baseline survey in the health facilities of Limpopo province was conducted in 2003 to ascertain the status and availability of newborn care services and infrastructure. The survey revealed that none of the health facilities had level 2 newborn care units, only minority of nursing staff was trained in newborn care and many health facilities had inadequate equipment to provide standard quality of care to newborn.

**Comparison with other Provinces**

The Child Health Gauge 2009-10 reports that in terms of poverty and inequality, there are “significant differences between provinces” and “marked inequalities in health spending” (Figure 2.3 and 2.4) . Limpopo province has the highest proportion of children living in income poverty. The poverty adversely impacts the health seeking by the recently delivered mothers for their newborn. About 49% children live at a large distance from nearest health facilities requiring travel for more than 30 minutes. Combination of these two factors often results in delayed health care seeking for newborns leading to increased neonatal mortality.

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With one of South Africa’s least developed health infrastructures and most rural and poorest populations, the health outcome statistics of Limpopo province cannot be directly compared with other provinces.

It is thus more useful and relevant to compare the progress of the health statistics of service capacity and outcomes over time in Limpopo Province. (see Part 4 on page 15).
Photo opposite: 16 March 2011. Malamulele, Limpopo, South Africa. Mother Nkhesani Ndleve gave birth to twins earlier that morning. A boy and a girl. In her arms is her newborn daughter while her son is receiving more care in the high care unit. With her is her own mother (in green) Modjadji Baloyi and her mother-in-law Mphepu Shuvambu.
The LINC approach
Part 3: The LINC approach

What is LINC and how does it work?

The Limpopo Initiative for Newborn Care (LINC) is a provincial programme package and established in 2003 to improve the quality of all aspects of newborn care in all district and regional hospitals in Limpopo Province. It started as a partnership between the Department of Paediatrics and Child Health at the University of Limpopo, the Centre for Rural Health under the University of Kwa-Zulu Natal and the Maternal Child and Women’s Health division of the provincial Department of Health.

The illustration below and Table 2 opposite outline the key components that comprise the comprehensive LINC approach. Appendix A provides the outline and contents of the LINC implementation package.

Figure 3.1. The LINC approach
Table 2. Key components of the LINC approach

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentoring</td>
<td>Comprehensive and practical provincial mentoring programme in newborn care, driven by a small regional technical team, with additional part-time expertise</td>
</tr>
<tr>
<td>Advocacy</td>
<td>Raised awareness to mobilize key stakeholders in improving newborn care (including hospital management, clinical staff) stimulating institutional momentum</td>
</tr>
<tr>
<td>Integration</td>
<td>Integrated promotion of national programmes &amp; protocols with consolidation of quality care standards (e.g. PMTCT, breastfeeding, KMC, BFHI, PIPP, IMCI)</td>
</tr>
<tr>
<td>Training</td>
<td>Practical and comprehensive training materials developed, reviewed and tested, based on IMCI learning methodology, adaptable to several levels of clinical skill</td>
</tr>
<tr>
<td>Clinical tools</td>
<td>Practical Newborn Care chart book created and published that correspond to training methodology; posters that consolidated knowledge and allowed quick reference in practice; Standard clinical registers prepared and disseminated.</td>
</tr>
<tr>
<td>Supportive Supervision</td>
<td>Ongoing on-site and remote supervision through monthly district meetings, scheduled site visits and phone calls to support implementation and problems solving</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Strengthening of record keeping, data collection, electronic data capture, data analysis and use of standardised audits such as PIPP</td>
</tr>
<tr>
<td>Accreditation</td>
<td>Auditing and accreditation of hospitals according to norms and standards appropriate for different levels of facilities</td>
</tr>
<tr>
<td>Resource Mobilization</td>
<td>With more interest, attention, and tools to improve newborn care, resources could be mobilized for training, additional equipment and facility improvements, etc.</td>
</tr>
</tbody>
</table>

The process of introduction, implementation, monitoring results & impacts of the LINC initiative are documented in detail in the LINC Progress Report 2003 – 2007. The elements deemed to be most critical to the successful implementation of a newborn outreach programme were examined and listed in the following sections.
Part 3: The LINC approach

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Photo opposite: 16 March 2011. Malamulele District Hospital, Limpopo, South Africa.
Impact on capacity, quality and outcomes of neonatal care
Impacts on capacity for and quality of neonatal care

The LINC initiative has laid the foundations for a fully functional provincial neonatal service. Before the existence of LINC, newborn care was mostly seen as a routine task for nurses in post-natal wards. Sick newborns were often unrecognised, their management was inadequate and referral did not take place, even when indicated. Even the tertiary referral hospital had only a 10 bed neonatal unit for a province of over 5 million people, when the norms and standards from benchmarking other South African provinces and international data showed that more than six times as many beds were needed at that facility alone.

The first tangible impact the LINC initiative has had is on the expansion and availability of appropriate facilities at the district, regional and provincial level (Figure 4.1). The tertiary level facility built its 60 bed facility (which now runs at full capacity), while almost all district hospitals now have established neonatal units (even if only a small 3 bed neonatal facility), and all but one have dedicated rooms for Kangaroo Mother Care as well. These units are stocked with at a
Part 4: Impact on capacity, quality and outcomes of neonatal care

minimum the most basic equipment for newborn care, and some have capacity for more advanced care, such as Continuous Positive Airway Pressure (CPAP) as depicted below, although many still lack some fundamental equipment items like infusion pumps and pulse oximeters.

Another significant impact is the establishment of a support network of hospitals that allows the referral of sick newborns up the chain of hospitals to the appropriate referral level. This hardly existed before the LINC initiative raised awareness, prioritised the identification of sick and small newborns and strengthened the referral facilities.

LINC training has given nurses and doctors the skills, knowledge and confidence to recognise, manage and treat small and sick newborns. This has a direct impact on how patients are managed and thus the quality of care and is evident in the PIPP data collected.

With the implementation of assessment tools, continual record keeping, clinical audits, and monthly newborn mortality meetings, hospitals have been able to assess their own quality of care, compare themselves with their peers and intervene to address problems. 18 out of 36 possible hospitals (50%) have passed and achieved LINC accreditation so far. Seven of these hospitals failed the accreditation process the first time around and between 6 – 18 months later improved their quality of care to pass and achieve accreditation. This serves as a direct indicator of progress of improved capacity and quality of care measured by a rigorous assessment tool (Figure 4.1 above).

All of the above direct measures of quality of care are assessed in the LINC Accreditation process, including the assessment of the facility set-up, appropriate policies, adequate and trained staff, KMC, baby-friendliness (BHFI accreditation is a prerequisite), and essential equipment working,
measurable improved outcomes, observed care and the sampling of case records for scored case review (Figure 4.1).

There is still much to be done in improving the quality of care of newborns in Limpopo, but it is clear that the LINC initiative has laid a strong foundation by institutionalising newborn care as a priority and facilitating the upgrade of facilities, skills and tools to monitor progress in providing care.
Case study A:
Sister Morema, Professional Midwife, Neonatal Unit, Mokopani Regional Hospital.

Sister Morema has worked at Mokopani for a decade. Before the LINC programme was implemented, all staff worked haphazardly with newborns with no nurses having any specialised knowledge or confidence in providing neonatal care. Staff was relegated on random days to go to “look for sick babies” – this was not a routine and care for sick or small newborns was not given for 24 hours as babies were mostly with their mothers in postnatal wards, and some were cared for in 3 old incubators they had. Sister Morema says she was like most Professional Midwives who worked in labour ward, but had no real interest in babies once they were delivered.

In 2004, a fellow Professional Midwife attended the LINC briefing with managers, and Sr Morema attended training in 2005, during which she went to work at Mankweng tertiary hospital and was also exposed to private neonatal care at Mediclinic (Figure 9 below). On return to Mokopani, she started getting both medical and nursing staff to use the LINC protocols and get training. She was stimulated to motivate for the purchase of a pulse oximeter, apnoea monitors, CPAP, overhead heaters, bilicheck, new phototherapy lamps, servo-controlled incubators and open incubators to adequately staff their newborn unit to deliver high quality care. She says that LINC has been very motivating for her personally and her staff and is now dedicated to the newborn unit full time. She states that “we have improved a lot” pointing to the reduction in newborn mortality and the empowerment of nurses to stabilise babies by following protocols if doctors are unavailable.
When Sister Khosa was first assigned to the newborn section of maternity, she wanted to “get out as soon as possible” and requested a transfer after her first month. Years later, she became the Area Manager for Maternity at Malamulela Hospital and after exposure to the LINC briefings on the need to focus on newborn care, she became passionate about improving standards at Malamulela and confident in their abilities to improve care and reduce preventable newborn deaths. Malamulela have been very successful in reducing newborn mortality over 30%.

Sr Khosa ascribes the improvements to strong teamwork. Several staff rallied around the push to improve their newborn care and this improved morale greatly amongst the staff, despite relative lack of staff, which is mostly nursing auxiliaries who are all sent for training and are encouraged to work independently. She specifically allocated people who had passion to work with babies and the managers. The team morale is so high that the doctor working in the unit has stayed for four years and is passionate about the unit.

She also highlights the role of recognition and support from administration and management. They initiated excellence awards end of year to recognise good practice. Every month, appreciation letters signed by the CEO are written to staff that have been complimented by patients and family in the Patient Satisfaction Questionnaire (PSQ) – apparently these compliments happens on a weekly basis. Management are also involved in the audits and continuous review when monthly mortality statistics are presented to clinical staff and discussed for improvements.

The policies, norms and standards set out in the LINC package has helped them to understand their equipment needs for a distant rural district hospital (such as transport incubators and apnoea monitors) and provided them with the routine protocols to check and stock equipment in the wards, in labour ward and in theatre.

Sr Khosa notes how KMC has had a huge impact on mortality at their district hospital. She describes far fewer complications with premature infants both in hospital and after discharge as mothers and their families are far better educated, prepared and empowered to care for these small newborns.

Previously Sr Khosa thought newborn care was fundamentally impossible at a rural hospital such as Malamulela. The LINC initiative made them realise that they have the ability, skills and facilities to care for most of the newborns very well (she relates that they have a successful 600g premature infant now 2 years old healthy and thriving), and to recognise, stabilise and transport those who need more advanced care.
Case study C:

**Nurse J. Chabangu**, Enrolled Nursing Assistant, Neonatal Unit, Letaba Hospital

Nurse Chabangu was hired in 2006 to work in the adult medical wards and clinics at Letaba Regional Hospital. In 2007, she was then allocated to work in the neonatal ward and was initially very scared of caring for the babies in the ward. But the other nurses in the ward had been trained in the LINC programme and helped her to quickly get comfortable with her assistant duties. Because she was seen to be interested in newborn care, she was selected to go for LINC training and has since asked to stay in the neonatal ward for the last three years.

Nurse Chabangu says she now knows how to recognise sick babies or those with abnormalities, how to set up and maintain neonatal unit, how to give oxygen therapy, how to teach mothers infant feeding and to oversee the mothers and babies in KMC.

She also says she feels very confident to deal with any baby on her own if necessary. She relates how the professional nurses and midwives are often busy in labour ward, and on the occasion that a baby in the neonatal ward has stopped breathing, she then resuscitates the baby with bag mask ventilation with oxygen while calling for help.

Case study D:

**Dr Kwena Talakgale** (Medical staff: Community Service Officer – Registrar)

Dr Kwena Talakgale arrived in the Limpopo province to do her internship and community service following the completion of her medical studies. Like many other junior (and even senior) doctors, she had very little experience in managing neonates, and admits to avoiding them if possible.

She attended one of the earlier LINC training programmes during her community service year. Following this training programme, she became more confident in dealing with newborns and started working with nursing staff to implement the newborn care interventions, such as KMC, BFHI and understand and follow the protocols for treating specific conditions in the neonatal period.

This experience had such a profound interest on her, that she has pursued further specialist training in Paediatrics. 2011 is the last of her registrar years and she hopes to fill one of the many vacant Paediatric consultant posts in Limpopo. She still credits LINC and the little newborns for influencing her life in such a fundamental way.
Impacts on human resources

There have been widespread positive impacts on healthcare workers and public servants in the province. Through numerous site visits and several in-depth interviews, it is clear that a widespread training and support programme can boost morale and confidence, provide ongoing motivation and stimulate a deeper and more dedicated interest in a field. A strong recurring indicator of this is the fact that nursing staff at district hospitals often specifically request to remain in the neonatal unit after having developed an interest in neonates through the LINC initiative, instead of being rotated through other departments.

The case studies below illustrate the personal and professional impact the LINC initiative has had on nursing and medical staff at various levels.

Figure 4.7 & 4.8. Limpopo district nursing staff visiting tertiary facilities
Part 4: Impact on capacity, quality and outcomes of neonatal care

Figure 4.9. Accreditation team doing clinical audit

Figure 4.10. Hospital staff receiving accreditation
Part 4: Impact on capacity, quality and outcomes of neonatal care

Impact on neonatal health outcomes

There is clear evidence that over the years that the LINC outreach programme has trained, supported and assisted with improving facilities and care, the newborn mortality rate for the province has decreased. For newborns over 999g, the provincial early neonatal mortality rates have decreased overall by 8% from 2006 to 2009. (The overall neonatal mortality rates have decreased 5% in the same period, but this data is less reliable as the quality of late neonatal death data is not as good). There were no other significant province wide interventions in newborn care that might account for this decrease.

In four districts in Limpopo the rates have decreased significantly, while in one district, there is a worrying upward trend (Figure 4.12). Because data is now collected monthly and submitted by each hospital, it is clear that there are two hospitals in the Mopani district accounting for the increase, and in both cases, key individuals have left positions where they had been driving newborn care support.
Although the LINC initiative began in 2003, the first training programmes only started taking place in 2004. Between 2003-2006, the quantity and quality of newborn data collected was relatively poor, inconsistent and incomplete, with only some hospitals contributing data to the LINC team for collation. It was only by 2006 that widespread implementation standardised forms for record keeping, data collection, electronic data entry and data submission had been achieved. Data for early neonatal deaths is of relatively good quality, however late neonatal deaths are still underestimated as they are often admitted to paediatric wards, and thus do not appear on the neonatal registers.

If the provincial data is stratified by hospital size, the data suggests that LINC has had the most impact in regional hospitals and larger district hospitals (more than 2000 live births a year or 5.5 births per day) than smaller district hospitals (less than 2000 live births per year) (Table 5). One explanation might be that it has been difficult for managers to commit dedicated staff to neonatal care when so few babies are in the units or need attention, but this is still insufficient to explain a rise in neonatal mortality in these hospitals.

<table>
<thead>
<tr>
<th>Hospital size</th>
<th>Early Neonatal Death Rate (among birth weight &gt; 999g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
</tr>
<tr>
<td>Small District Hospital</td>
<td>8.2</td>
</tr>
<tr>
<td>Large District Hospital</td>
<td>13.1</td>
</tr>
<tr>
<td>Regional Hospital</td>
<td>12.8</td>
</tr>
</tbody>
</table>
Case study: 
**Malamulele District Hospital, Vhembe District, Limpopo**

- Malamulele Hospital is a rural district hospital in the Vhembe region of Limpopo, not far from the Zimbabwean border. Over 200kms (2.5hrs) from Polokwane, the provincial capital
- Serves a population of over 300,000 with 17 feeder clinics
- With support from the LINC team and LINC training, they started a dedicated Neonatal Unit and KMC unit in 2005 (Figure 14 below)
- They received LINC Newborn Care Accreditation in 2006
- Since 2006 they have been collecting data and have continued to improve the quality of care and outcomes
- More than 30% reduction in mortality since 2006 (Figure 13)
- LINC team provided strong initial support and some ongoing support, but other local factors also contributed to continuing improvement in newborn care and outcomes
- Good people management, caring attitude, strong management involvement (from CEO as well), regular audit and responsiveness, strong KMC, non-rotation of staff

![Figure 4.13. Early Noenatal Mortality Rate among newborns with birth weight >1000g (Malamulela Hospital 2006–2010)]
Figure 4.14 & 4.15 Kangaroo Mother Care Ward in Malamulele Hospital. Fathers and relatives are strongly encouraged to provide skin-to-skin care / KMC to the newborn
Part 4: Impact on capacity, quality and outcomes of neonatal care

Photo opposite: 16 March 2011. District Hospital, Malamulele, Limpopo, South Africa.
Cost & resources
Part 5: Costs and resources

At provincial level

The annual estimated costs of running such a programme at provincial level have been approximately R1.5 million per annum, with staff and operational costs each accounting for approximately 50%.

Staff costs cover a regional paediatrician, a regional nurse coordinator and part-time trainers and experts brought in on a regular basis for assessment, training and support of all hospitals in the province on a systematic basis.

Operational costs cover mostly the transport, training and meeting costs to bring together relevant facility staff at clinical, management and administrative levels from all hospitals in the province (on a district basis) for advocacy and training, in addition to the ongoing costs of maintenance support.

Table 6 shows an estimated annual budget for such a programme, based on the LINC costs.

<table>
<thead>
<tr>
<th>Table 6. Estimated Annual Budget for Provincial Newborn Outreach Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff costs</strong></td>
</tr>
<tr>
<td>Regional Paediatrician (FTE 33%)</td>
</tr>
<tr>
<td>Regional Nurse coordinator (full time)</td>
</tr>
<tr>
<td>Part time experts &amp; trainers (2 x FTE 10%)</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
</tr>
<tr>
<td><strong>Operational costs</strong></td>
</tr>
<tr>
<td>Transport for ongoing site visits (for assessments, support, accreditation)</td>
</tr>
<tr>
<td>Advocacy meetings (including venue, transport &amp; catering)</td>
</tr>
<tr>
<td>Training workshops (including venue, transport, trainers &amp; catering)</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
</tr>
<tr>
<td><strong>Total budget</strong></td>
</tr>
</tbody>
</table>
At facility level

Costs at facility level can vary enormously. Some facilities have established adequate neonatal services with only available resources, for example, they converted a bathing room into a dedicated neonatal ward and the mother’s room into the KMC unit and reprioritised the annual budget to only purchase essential equipment for newborn care. Others have shifted budgets towards newborn care, or motivated for additional budgets to improve the staffing and equipping of dedicated neonatal units.

It is recommended that a situation and needs assessment is done on each facility as part of initiating a newborn care improvement programme, to determine the changes to be implemented, and the potential need for additional budgets for renovations, equipment and/or staff.
Photo opposite: 16 March 2011. Malamulele, Limpopo, South Africa. Dr Benni Mathiba, a senior medical officer at just 32 years old has the responsibility over the most helpless and vulnerable of beings – the perilously underweight and prematurely born infants in the neonatal unit of Malamulele hospital.
Summary of key achievements
**Advancing the commitment to newborn care**

The most important achievement of the LINC initiative has been the **institutionalisation** and **prioritisation** of newborn care throughout various levels of the health system, from provincial to district and from management to clinical staff.

There is a **greater commitment** to and **awareness** of the value of a newborn life, awareness of the opportunities to intervene, and an increased interest in neonatology as a professional nursing and medical discipline.

There has been a significant **increase in skills, confidence, moral and motivation** of the key human resources (nursing, medical and management staff) in addressing issues in newborn care.

**Building system-wide capacity**

By **building substantial capacity** in facilities, a strong foundation has been laid for expanding the service and continuing to improve the quality of care and outcomes.

Developing a **comprehensive package for newborn care outreach** including assessment tools, norms & standards, training materials and reference guidelines to address issues affecting the standard of care at multiple levels.

Routine collection, capturing and auditing of newborn data greatly increased and standardised, with almost universal application and resultant **vastly improved data quality**.

Almost all district hospitals now have **dedicated neonatal units** with greatly improved facilities for newborn care and for maternal support during newborn admission.

Almost all district hospitals now have **dedicated Kangaroo Mother Care units** is appropriately practiced in most district hospital settings.

**Tertiary care has grown and strengthened**, now fully equipped with adequate capacity to handle referrals from district and regional hospitals. (eg. Mangkweng hospital has grown from a 10 bed neonatal unit to a busy 60 bed neonatal unit that was thought unnecessary).
Part 6: Summary of key achievements

Outputs and outcomes

Training: between 2003 and 2009, **553 nurses** (331 PNs + 232 ENs) & **333 doctors** were trained in comprehensive newborn care on the LINC programme.

Support: Between 2003 and 2009, the LINC team provided at least **208 on site support visits** (additional to training visits at hospitals). Each hospital had on average 6 visits from the LINC team.

Improved capacity and quality of care in the province – 21 hospitals (57%) have achieved LINC accreditation so far.

Reduced neonatal death rates in the province – 8% reduction in early neonatal mortality in babies over 1kg since 2006.
Photo opposite: 16 March 2011. District Hospital, Malamulele, Limpopo, South Africa. Mateko Maxakini (23) looks after 2-day old Sasi, safely tucked into the pouch that will hold her in constant skin contact with her mother in a life-saving technique called Kangaroo Mother Care. Sasi was born at 32 weeks weighing 1,650 grams.
7

Lessons for policy makers & programme officers
At national and provincial levels

- A comprehensive regional outreach programme can be an effective tool through which to implement evidence based interventions to improve newborn care and integrate vertical programmes such as BFHI, PMTCT and KMC.

- Wide scale implementation and success of such a programme is enabled by provincial support, by bestowing endorsement and providing essential resources to ensure a well executed and supported effort that can be sustained across multiple facilities over time.

- Because newborn care has long been neglected both internationally and in South Africa as a critical component of infant and under 5 child mortality, a strong advocacy campaign is an important first step in mobilising key stakeholders.

- A multi-disciplinary regional team to drive the outreach programme is a key factor. The combination of a dedicated regional clinician and neonatal care nurse coordinator is more likely to succeed than either alone, as a range of skills and networks are vital. Part time support of neonatal experts in and beyond the province is also very important (retired or part time professional nurses and neonatologists with significant experience could be targeted to provide training and support).

- Maternal care training should have increased foetal and neonatal attention to the assessments and interventions that determine the neonatal outcomes.

- Outside the major centres of South Africa, there is still much to do to build capacity and skills in district and regional hospitals. Laying the foundations to improve the quality of newborn care and to reduce neonatal mortality will take time, but is worth the investment.

At health facility level

- Health facilities can significantly improve newborn care with trained clinical staff, adequate infrastructure and an interested, informed and supportive management team.

- There was a wide variation in improvements at the facility level which is highly dependent on the motivation and support of facility champions, on the culture in the facility and on individuals in key positions. Buy-in from management, especially from clinical, nursing and operational managers has been shown to be great enabler for clinical staff to develop and improve their skills and quality of services.
Enabling innovations and flexibility in operations at facility level can also assist greatly – for example, not rotating nurses who have been trained in newborn care, so they can stay dedicated to the neonatal unit.

Much can be achieved at facility level with existing available resources, for example, space can be converted (bathing room into extra ward, or mother’s room into KMC unit); tasks can be shifted to assistant staff (eg. caring for babies in KMC unit can be managed by an Enrolled Nurse); essential equipment prioritised (staff are empowered to request that budgets are used only for critical items and not items that are not used or needed).

What are the key strengths and limitations of the LINC approach?

The LINC initiative has been recognized by a number of national and international institutions as providing a comprehensive approach to deliver a package of evidence-based interventions at district and regional facilities to improve the quality and outcomes of newborn care. It provides a successful approach to strengthening management of neonatal care and in motivating, maintaining and mentoring of medical and nursing staff. Table 3 outlines the key strengths and limitations of the LINC approach.

<table>
<thead>
<tr>
<th>Outreach &amp; advocacy</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td>Provides a practical approach and set of tools to reduce newborn mortality in line with Strategic Output 2 of the NSDA,</td>
<td>Advocacy requires a longer starting up process to lay the foundations for a more sustained approach with the backing of key stakeholders</td>
</tr>
<tr>
<td></td>
<td>Raises general awareness and increases prioritization of newborn care in clinical, administration and management levels</td>
<td>Experienced newborn care experts required for situation assessments, training and support are not always readily available in all provinces, or willing to participate</td>
</tr>
<tr>
<td></td>
<td>Builds capacity not only at 1° &amp; 2° outreach targets (regional &amp; district) but also at 3° level</td>
<td></td>
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<tr>
<td></td>
<td>Province wide outreach provides cost effective intervention with highly replicable approach</td>
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</table>
### Training & Clinical Tools

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrates other vertical programmes and interventions such as PMTCT, KMC, BFHI, PIPP</td>
<td>Has been limited to training maternity staff on newborn care, and has not yet had sufficient influence on maternal care training (e.g. training of proper use of partogram with foetal monitoring to prevent birth asphyxia)</td>
</tr>
<tr>
<td>Promotes the specialization of nurses in newborn care and reduced staff rotation</td>
<td></td>
</tr>
<tr>
<td>Continues IMCI skills-based learning methodology in training which is brought over to clinical practice with reference chartbook</td>
<td></td>
</tr>
<tr>
<td>Training tools adaptable to varying levels of clinical skill – professional nurses (PN), enrolled nurses (ENA), nursing assistants (NA) and to junior and more experienced doctors</td>
<td></td>
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</tbody>
</table>

### Support, Monitoring & Accreditation

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated coordinator sustains attention on newborn care and acts as a focussed contact point for ongoing support</td>
<td>Ambitious plans without dedicated resources to support every hospital in the province spreads the support very thin, and not all hospitals can get sustained support</td>
</tr>
<tr>
<td>Situation assessment tools, norms &amp; standards and audit tools allow for benchmarking, monitoring and auditing of facilities, quality of care and outcomes</td>
<td>Unless it becomes a provincial requirement to have LINC accreditation, it is difficult to enforce or encourage all hospitals to become accredited</td>
</tr>
<tr>
<td>Accreditation stimulates a positive competitive dynamic between district hospital</td>
<td></td>
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### Resource Mobilization

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINC has been a useful focus point (with a memorable name) for advocacy, but also for raising resources dedicated to newborn care</td>
<td>Annual fundraising from various sources, threatens the longer term sustainability of the programme. (Key staff and resources should be dedicated to newborn care programmes).</td>
</tr>
</tbody>
</table>
What were the key enabling factors and challenges in implementing LINC?

The LINC initiative has faced many challenges and has had setbacks along the way, yet it has succeeded in overcoming many of these, and in improving the overall service, despite some individual hospitals that are not yet providing adequate newborn care. Table 4 outlines some of the key success and enabling factors and some of the limiting factors and challenges in implementing a newborn outreach programme such as LINC.
### Table 4. Success / enabling factors and limiting factors / challenges

#### At provincial & programme level

<table>
<thead>
<tr>
<th>Success / enabling factors</th>
<th>Limiting factors / challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated regional team to drive outreach programme</td>
<td>Without provincial support, the outreach programme can still happen, but with much less probability of success and uptake</td>
</tr>
<tr>
<td>Provincial support from Maternal, Women and Child Health and Nutrition division, in terms of endorsement, funding and coordination</td>
<td>Insufficient skilled human resources to do multiple training workshops, multiple site visits and support facilitation</td>
</tr>
<tr>
<td>Strong advocacy campaign</td>
<td>Even once trained and implemented, much of the outreach programme needs to be continually sustained, as staff rotations and departures mean that gains can be reversed</td>
</tr>
<tr>
<td>Comprehensive set of tested tools, including assessments, norms &amp; standards, training materials and reference guidelines</td>
<td>The uptake of the programme will vary from facility to facility, and this requires flexibility</td>
</tr>
<tr>
<td>An electronic database to collect and collate data from all hospitals</td>
<td></td>
</tr>
</tbody>
</table>

#### At district / facility level

<table>
<thead>
<tr>
<th>Success / enabling factors</th>
<th>Limiting factors / challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local champions and buy in from management – particularly clinical manager, nursing manager and operational manager</td>
<td>Disinterested management and insufficient awareness or prioritization of newborn care</td>
</tr>
<tr>
<td>Positive people management and a culture of respect and teamwork</td>
<td>Culture of individuality</td>
</tr>
<tr>
<td>Strong clinical governance with continual feedback cycle from audits and reviews</td>
<td>Concern about being evaluated</td>
</tr>
<tr>
<td>Engaging obstetric team in being in part accountable for neonatal outcomes</td>
<td>Disinterested obstetric teams</td>
</tr>
<tr>
<td>Strong data collection capabilities</td>
<td>Resistance to change and additional workload</td>
</tr>
<tr>
<td>Regular liaison with staff at 2° and 3° hospitals</td>
<td>Financing may be required for expansion or renovation of facilities or to purchase new equipment or additional dedicated staff</td>
</tr>
</tbody>
</table>
Appendix A

LINC newborn care implementation package contents & structure

Table A1: Contents of newborn care implementation package

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Introduction &amp; guide for Health Service Managers (including a set of tools for initial situation assessment, ongoing reviews and audits)</td>
</tr>
<tr>
<td>Newborn care reference charts (for teaching and practical use on daily basis)</td>
</tr>
<tr>
<td>Facilitator manual (to prepare and guide trainers)</td>
</tr>
<tr>
<td>Trainee Manual (workbook that relates to content in reference charts)</td>
</tr>
<tr>
<td>Visual Materials (presentations, posters &amp; multimedia for teaching and ward use)</td>
</tr>
</tbody>
</table>

Table A2: Structure of newborn care training & charts in package

<table>
<thead>
<tr>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine care of the newborn</td>
</tr>
<tr>
<td>Assess &amp; Classify</td>
</tr>
<tr>
<td>Treat, Observe &amp; Care</td>
</tr>
<tr>
<td>Assess Feeding &amp; Counsel</td>
</tr>
<tr>
<td>Follow Up</td>
</tr>
<tr>
<td>Reference charts &amp; forms</td>
</tr>
</tbody>
</table>