

# NEW BORN CARE IN SRI LANKA: A BOTTLE NECK ANALYSIS



This Report is published by the Family Health Bureau, Ministry of Health,  
231, De Seram Place, Colombo 10, Sri Lanka.

Web: [www.familyhealth.gov.lk](http://www.familyhealth.gov.lk)

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ISBN 978-955-1503-39-0



*A healthy start is central to the human life course, with birth holding the highest risk of death, disability and loss of development potential, leading to major societal effects.”*

*The Lancet, 2014*





## FORWARD FROM THE DIRECTOR GENERAL HEALTH SERVICES

Sri Lanka has made tremendous progress in improving maternal and newborn care over the past decades. Neonatal mortality rates have declined to rates comparable to higher income earning countries. As we pass the MDG target year 2015, the country is focusing on developing plans for further improvements of neonatal care with a special focus on improving quality of care.

At the World Health Assembly in 2014 an action plan named ‘Every Newborn Action Plan’ to improve neonatal care beyond 2015 was presented. In keeping with global developments Sri Lanka too is developing the ‘Every Newborn Action Plan’ for Sri Lanka, mainly focusing on ending preventable newborn deaths and preventable still births.

Prior to development of the Every Newborn Action Plan for Sri Lanka, Family Health Bureau as the focal point for Maternal and Newborn Health commissioned the Bottle Neck Analysis to identify the gaps in the current newborn care programme and propose evidence based solutions.

The National Technical Working Group under the chairmanship of the Deputy Director General Public Health Services II was appointed to provide technical guidance at each stage of the process.

The Bottle Neck Analysis report has given a detailed description of gaps in the newborn care programme, the relevant components of the maternal care programme and other relevant areas. This report also has proposed solutions for further improvement of the programmes. Therefore this report would primarily be useful to develop the Every Newborn Action Plan for Sri Lanka and the subsequent plans to achieve the Sustainable Development Goals.

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## ACKNOWLEDGEMENT

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This report would not have been possible without the commitment and support from many individuals and organizations.

Dr. Palitha G. Mahipala, Director General of Health Services provided invaluable guidance and administrative support to the initial activities of the Bottleneck Analysis (BNA) of Newborn Care in Sri Lanka and continued to provide leadership and guidance to this analysis.

Dr. RRMLR Siyambalagoda, Deputy Director General, Public Health Services II and the Technical Advisory Committee on Newborn and Child Health are acknowledged for their dedication, support and guidance in undertaking this BNA on Neonatal Care services of Sri Lanka. Dr Luxmi Somatunga, Deputy Director General Medical Services I, for the guidance and inputs for the BNA.

The key role played by the members of the National Technical Working Group on the Bottleneck Analysis of Newborn Care in Sri Lanka in providing guidance throughout the process of the assessment is greatly acknowledged. Their inputs in to identifying gaps and recommendations are specially appreciated.

The Heads of Institutions, Consultant Paediatricians, Consultant Neonatologists, Consultant Obstetricians, Matrons, Sisters in charge, Nursing Officers and Midwives in the selected institutions who took part in the stakeholder workshops, for providing valuable insights through the BNA tool.

The support extended by all Provincial Directors of Health Services, Regional Directors of Health Services, Hospital Directors and Medical Superintendents of the areas and Hospitals visited for their contribution and to the staff in maternal and neonatal care of the said hospitals for their valuable inputs.

The Deputy Director MCH Dr Chitramalee de Silva, and all the Consultant Community Physicians, the Senior Registrars and Registrars in Community Medicine and the Medical Officers of the Family Health Bureau for the support extended for planning, adaptation of the tool, conducting the stakeholder workshops and summarizing the findings of the workshops.

Appreciation is extended to Sri Lanka College of Obstetricians and Gynecologists (SLCOG), Sri Lanka College of Pediatricians (SLCP) and the Perinatal Society of Sri Lanka (PSSL) for their unwavering support towards this assessment. Presidents of SLCOG Dr. Kanishka Karunaratne, SLCP Prof. Sujeewa Amarasena, PSSL, Prof. Athula Kaluarachchi and their representatives are acknowledged for their technical expertise and productive comments.

Deep appreciation and commendations are due to:

- Dr Lalini Rajapaksa, retired Professor in Community Medicine of the Faculty of Medicine, Colombo, the National Consultant for the Bottle Neck Analysis in Sri Lanka. Her dedication from the beginning of the process, in adopting the BNA tool, in conducting the stakeholder workshops, visits to the institutions and finally compiling the report is deeply acknowledged. We appreciate

the comprehensive picture provided in the report in the face of limitations in data and specially value the suggestions on neonatal special care networks given in chapter 5. We have no doubt that the report would be extremely useful in the development of the every newborn action plan for Sri Lanka.

- The National Consultant was very ably supported by Dr Padmal de Silva, Consultant Community Physician, Head of the Department of Research of the National Institute of Health Science, throughout this process and is gratefully acknowledged. His contribution in mapping the proposed neonatal special care networks and compiling the table on real time distance between government hospitals with specialized care will no doubt be useful to health planners and this work is very specially appreciated.
- Consultant Pediatricians, Dr. Ramya de Silva and Dr Medha Weerasekera and Consultant Neonatologists Dr. Nishani Lucas and Dr Nalin Gamaethige are acknowledged for their technical inputs and support in adopting the BNA tool and conducting the stakeholder meetings.
- Consultant Obstetricians Prof Athula Kaluarachchi, Dr. Tiran Dias and Dr Madura Jayawardena for their technical inputs and their support in adopting the BNA tool for Sri Lanka and in conducting the stakeholder meetings
- Dr. Nilmini Hemachandra, Consultant Community Physician, NPM Maternal Care, Dr Nirosha Lansakara, Consultant Community Physician, Head of the Planning, Monitoring and Evaluation Unit, Dr Sapumal Dhanapala, Consultant Community Physician Head of the Research Unit, of the Family Health Bureau for the support, encouragement and guidance extended for the bottleneck analysis.
- Dr. Kapila Jayaratne, Consultant Community Physician, NPM Maternal and Child Morbidity and Mortality Surveillance of the Family Health Bureau, for providing the perinatal death review information and the WHO MCS survey data base for 2011 for the analysis.
- Dr. Supun Wijesinghe, Consultant Community Physician, Anti Leprosy Campaign and Dr. M.T.D Lakshan, Consultant ENT Surgeon, DGH Hambantota, for their technical expertise in setting up the networks and sharing their experiences in setting up telemedicine systems.
- All Medical Officers of the Intranatal and Newborn Care Unit of the Family Health Bureau and all the MOOMCH for supporting in conducting the BNA and in collecting data from the Neonatal Units
- Dr. Renuka Jayatissa, National Professional Officer, UNICEF was a great team player and provided valuable comments in improving the assessment. Her contribution in at all stages of the activity is admirable.

Development partners WHO, UNICEF and UNFPA for providing their technical support and guidance with generous sponsorship at all the stages of the assessment. We thank UNICEF for the financial support extended to conduct the Bottle Neck Analysis and to UNFPA for assisting us in printing.

However, the more difficult path of implementation still lays ahead, the dedicated and active cooperation of all above and many more professionals would be vital for that journey.

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## LIST OF ABBREVIATIONS

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|           |                                                  |
|-----------|--------------------------------------------------|
| NMR       | Neonatal Mortality Rate                          |
| WHO       | World Health Organization                        |
| UNICEF    | United Nations Children’s Fund                   |
| FHB       | Family Health Bureau                             |
| RG        | Registrar General                                |
| WHO – MCS | World Health Organization Multi Country Survey   |
| EmONC     | Emergency Obstetric and Neonatal Care            |
| MMR       | Maternal Mortality Ratio                         |
| RH – MIS  | Reproductive Health – Medical Information System |
| PNMR      | Post Neonatal Mortality Rate                     |
| CCP       | Consultant Community Physician                   |
| MNH       | Maternal and Newborn Health                      |
| CPD       | Continuous Professional Development              |
| BHT       | Bed Head Ticket                                  |
| MoH       | Ministry of Health                               |
| NALS      | Neonatal Advance Life Support                    |
| ENCC      | Essential Newborn Care                           |
| BME       | Bio Medical Engineering                          |
| TH        | Teaching Hospital                                |
| PGH       | Provincial General Hospital                      |
| DGH       | District General Hospital                        |
| BH        | Base Hospital                                    |
| DH        | Divisional Hospital                              |
| NICU      | Neonatal Intensive Care Unit                     |
| SCBU      | Special Care Baby unit                           |
| LMC       | Lactation Management Center                      |
| MBC       | Mother Baby Center                               |

|       |                                                       |
|-------|-------------------------------------------------------|
| ENAP  | Every Newborn Action Plan                             |
| SLCOG | Sri Lanka College of Obstetricians and Gynaecologists |
| SLCP  | Sri Lanka College of Paediatricians                   |
| PSSL  | Perinatal Society of Sri Lanka                        |
| HMIS  | Health Management Information System                  |
| DG    | Director General                                      |
| DDG   | Deputy Director General                               |
| LB    | Live births                                           |
| PHM   | Public Health Midwife                                 |
| SBR   | Stillbirth rate                                       |
| ENMR  | Early Neonatal Mortality Rate                         |
| MOH   | Medical Officer of Health                             |
| AARD  | Average Annual Rate of Reduction                      |
| CH    | Children's Hospital                                   |
| MCH   | Maternal and Child Health                             |



## EXECUTIVE SUMMARY

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### BACKGROUND

At the World Health Assembly in 2014, an action plan to improve neonatal care beyond 2015, named ‘Every newborn action plan’ was presented. The action plan aims to end preventable deaths and provides an evidence based road map towards achieving these health goals. In addition to the overall goal of the action plan, countries were set individual targets in relation to Neonatal Mortality Rates (NMR) and Stillbirth Rates to be achieved by 2025 and 2035. To assist countries to work towards the identified goals, a set of tools had been developed by WHO / UNICEF to identify bottlenecks and solutions to scale up the newborn care services.

Although Sri Lanka has made notable progress in improving maternal and neonatal health during the past few decades, it is observed that neonatal mortality declines have not kept pace with the improvements in maternal mortality and that the neonatal mortality rates lag behind in comparison with other countries with similar maternal mortality ratios. The current neonatal mortality rate of 6.5 / 1000 live births (2013) accounts for over 70% of infant mortality rate, emphasizing the need to focus on improving care around the time of birth and the first four weeks of life, with special emphasis on improving the quality of care.

In recognition of the identified need and in keeping with global developments, Sri Lanka is preparing an ‘Every Newborn Action Plan’ focusing on ending preventable newborn deaths and preventable stillbirths. The present external consultation was commissioned with the objective of identifying the gaps in the current newborn care program and bottlenecks for scaling up of interventions through a wide stakeholder consultation and to synthesize the feedback obtained from the above process to facilitate the formulation of a National Action Plan to achieve the goals for Sri Lanka.

### METHODOLOGY

A national technical working group chaired by the Deputy Director General: Public Health Services II was appointed to provide technical guidance and monitor all activities related to the consultation. This included representation from provincial, regional and institutional medical administration and public health staff, Sri Lankan College of Obstetricians and Gynecologists, Sri Lanka College of Pediatricians, Perinatal Society of Sri Lanka, development partners and the Family Health Bureau.

The identification of health system bottlenecks was carried out based on the WHO/UNICEF tool modified as appropriate to the current situation of neonatal care in the country. This was done through a consultative process and consensus was obtained from the Technical Working Group for the modified tool.

The WHO / UNICEF tool comprised of two sections and information was gathered based on seven health services building blocks: leadership & governance, health financing, health workforce, health service delivery, essential medical products and technologies, health information system and community ownership & partnerships.

Under section one of the tool, the current analysis focused specifically on the bottlenecks for strengthening the infrastructure necessary to provide essential and advanced care for the newborns

Under section two, bottlenecks for the implementation of the following were examined:

- *Providing the essential new born care package to every new born in the country irrespective of the place of delivery, (Kangaroo mother care and neonatal resuscitation is included in the package). This was examined against the National standards for neonatal care.*
- *Use of the partogram*
- *Management of preterm birth (tracer, use of antenatal corticosteroids)*
- *Treatment of severe infections and inpatient supportive care for the sick and small newborns*
- *Assisted vaginal delivery - the level of institution where this should be made available and bottlenecks for providing the service*
- *Providing companionship during labour which is specifically identified in the MNH strategic plan*

The data collection process consisted of collection and analysis of already available data, discussions with the two professional Colleges, two separate one day stake holder workshops with the obstetric team and the neonatal team, workshop with the director and consultants of the FHB, key informant interviews at national, provincial and regional level and field visits to selected medical institutions from five provinces.

Data routinely available at the FHB, data from the RGs Department and Department of Census and Statistics, stillbirth data available with the Medical Statistician derived from the Indoor Mortality and Morbidity Return, published literature on neonatal morbidity and mortality, findings from the EmONC 2012, published and unpublished data from the WHO – MCS on perinatal health 2011 and published data from the national perinatal mortality surveillance system of Sri Lanka were examined.

In addition reports and policy documents of the Ministry of Health and Family Health Bureau, Standards and Guidelines published by the Ministry of Health and FHB, Circulars issued by the Ministry of Health and Formats published by the Ministry of Health and FHB were perused.

## CURRENT SITUATION

Annual Report on Family Health (2013) presented the following statistics for the year 2013 based on the data obtained through the RH-MIS; MMR 32.5 / 100 000 live births, IMR 8.8 / 1000 live births, NMR 6.5 / 1000 live births, PNMR 11.2 / 1000 births and SBR at 6.4 / 1000 births.

Although statistics for 2013 are not available from the RG, comparison of data for earlier years shows that the infant, neonatal and early neonatal mortality rates reported by the FHB based on the RH-MIS is higher than those reported by the RG. It is noted that the under reporting of births through the returns from the field health services is higher than the under reporting of infant deaths. This may account for the discrepancies observed in the mortality rates.

The goal of the Every Newborn Action Plan for Sri Lanka is to reach an NMR of 3.4 / 1000 live births by the end of 2025 and further improve to 2.2 / 1000 live births by 2035. Based on data published in the Annual Report on Family Health (2013), the annual rate of reduction of NMR from 2007-2013 is 2.3%. It is estimated that an annual rate of reduction of 4.3% has to be achieved if the target NMR of 3.4/ 1000 live births is to be achieved by 2025.

The goal in respect of stillbirths is; to achieve a stillbirth rate of 3.5 per 1000 live births by 2025 and a rate of 2.2 per 1000 live births by 2035. It is noted that the FHB reported a stillbirth rate of 6.4 per 1000 live births in 2013 and an average annual rate of decline for the period 2007-2013 of 4.6%. The findings of the EmONC needs assessment of 2012 and the WHO MCS 2011 support the stillbirth rate reported by the FHB. It appears that the country is on target to achieve the goal for stillbirths. However, the data needs to be confirmed with a system of island wide registration of stillbirths using standard definitions.

According to the causes of neonatal deaths as reported by the Registrar General, 73.7% of the deaths were due to conditions originating in the perinatal period while 17% were reported as due to congenital malformations, deformations and chromosomal abnormalities.

The Ministry of Health has planned a hierarchical system of neonatal care facilities spread throughout the country, with four identified levels: level 1, level 2, level 3 and level 3+, where level 3+ centers provide super specialized services. The plan has identified 4 level 3+ facilities, 17 level 3 facilities, 36 level 2 facilities and 33 level 1 facilities. In addition to these there are 17 institutions (Base Hospitals) which provide specialist pediatric services but have not been identified as specialized neonatal care facilities and there are 493 Divisional hospitals which provide facilities for childbirth where only the “essential newborn care” package is provided.

A total of 365792 births were reported by the RG in 2013, and 348522 births were reported from government medical institutions. It is seen that, out of those reported from government institutions, 44.8% of the deliveries took place in a level 3/3+ facility while 41% and 8.8% of the deliveries took place in level 2 and level 1 facilities respectively. Base Hospitals with specialist services that have not been identified as specialized neonatal care facilities in the plan, accounted for 0.4% of deliveries while 5% were reported from divisional hospitals. The percentage of births occurring in level 3 / 3+ facilities was lowest in the Eastern Province (22.3%), highest in the North Central Province (73.5%) and the average for the country was 44.8%.

The Western Province is served by 7 level 3/3+ facilities, 4 for the Central Province, 3 for the Southern Province, 2 for the North Central Province and one each for the other provinces. In 2013, the number of deliveries per level 3 / 3+ facility was lowest for the North Central Province (11405.5) while the North Western Province (40458) had the highest, the average for the country being 16596.3 deliveries per level 3/3+ facility.

The area in km<sup>2</sup> served by a level 3/3+ facility was lowest in the Western Province (530.1 km<sup>2</sup>) and highest in the Eastern Province (9576.7 km<sup>2</sup>) with an average of 3122.3 km<sup>2</sup> for Sri Lanka.

The number of deliveries occurring in specialized hospitals outside a 70 km buffer area from a level 3 / 3+ facility was estimated at 6092 deliveries (Northern and Eastern Provinces) and 23387 deliveries (mainly Northern, Eastern and North Western Provinces) when the buffer distance was reduced to 50 kms.

Examining the availability of specialist services, it is noted that 94.9% of deliveries had taken place where at least one specialist Pediatrician was available and more than half (50.8%) had occurred in institutions where services of at least one Neonatologist was available.

## **BOTTLENECKS IDENTIFIED AND KEY RECOMMENDATIONS**

The key recommendations in respect of each area addressed in the consultation are presented under the WHO health systems building blocks framework.

## 1. Strengthening the infrastructure necessary to provide essential and advanced care for the newborns

### Leadership and Governance

#### *At national level*

Bottlenecks identified at national level under leadership and governance were; the lack of attention given to the perinatal / neonatal care services by policy makers, a separate unit for Intranatal and newborn care was set up at the FHB only in 2008, staff shortages in the unit, ineffectiveness of the mechanisms for dissemination of policy documents and plans to the provinces / districts and the absence of a mechanism to hold the key partners accountable for the implementation of the national plan within an agreed time frame.

It is recommended that;

- The health development links between national and provincial levels be strengthened through improved coordination through the National Health Development Committee
- To establish separate committees headed by the relevant DDGs for the different components of the plan for national newborn care services and that they be held accountable for timely implementation.
- The Intranatal and neonatal care unit of the FHB be strengthened with additional staff especially middle level officers with technical expertise,

#### *At provincial level*

The key bottlenecks identified in relation to leadership and governance at Provincial level were: weak and ineffective provincial planning processes, prioritization of competing interests often not being evidence based, the MO-MCH being ineffective specially in relation to supervision and monitoring of the institutional MNH program.

It is recommended that

- Provincial planning units be strengthened under the Provincial CCP and designated planning officers with appropriate postgraduate qualifications be appointed and these officers be provided with specific in-service training.
- The prerequisites for the post of MO-MCH be identified. These posts should not be advertised in the post internship appointments list. The selected individuals should undergo pre placement training. The knowledge and skills necessary for the supervision and monitoring of all programmes within the district that comes under the purview of the FHB should be strengthened in the pre placement training.
- Until such times that a CCP- MCH is appointed at Provincial level, the monitoring and supervision of the implementation of the institution based components of intranatal and neonatal care be included under the duties of the Provincial CCP - planning.
- Obtain concurrence of the Board of Study in Community Medicine to appoint Senior Registrars in Community Medicine to work under the Provincial CCP, and be responsible for institutional based MNH activities at Provincial and District levels, as an interim measure

### ***At institutional level***

The key bottlenecks identified in relation to leadership and governance at institutional level were the lack of knowledge of the level of neonatal care services assigned to the institution, priority and attention to location given to neonatal care facilities in institutional building construction plans and the absence of an institutional mechanism to address issues arising in service provision.

It is recommended that;

- Administrators and consultants be informed on the national plan for providing neonatal care services.
- Guidelines on buildings and facilities should be provided to all institutions based on the level of care assigned to a given institution in the national plan.
- Management committee meetings are held regularly under the chairmanship of the Head of the Institution and issues arising during service provision be discussed, corrective action taken and followed up at subsequent meetings.

### ***Health information system***

The key bottlenecks identified in relation to the health information system were the paucity of information on the extent and causes of neonatal deaths leading to low visibility of the problem, the current practice of stillbirth registration only in a few selected death registration divisions of the country, perinatal and early neonatal information not being given prominence at national level, lack of data disaggregated by province/district and the ineffectiveness of the current perinatal death surveillance system which is the responsibility of the maternal mortality surveillance unit at the FHB and difficulties in timely compiling and analysis of available data.

It is recommended that:

- The feasibility of registering foetal deaths (stillbirths) island wide be discussed with the Registrar General and necessary legislation and processes be identified. A stillbirth declaration form on the lines of the death declaration forms that are currently used in the hospital system may be suggested.
- The institutional health information be strengthened with special emphasis on accurate reporting, use of standard definitions and international classification of disease conditions through dissemination of definitions and guidelines for reporting in the form of flowcharts for easy reference to all institutions that provide services for child birth and training of personnel on correct identification and reporting of data
- Information necessary to monitor the use of intra-natal interventions both process and outcome indicators be included in the RH-MIS.
- A perinatal mortality information system be set up for collection, consolidation, analysis and dissemination of information within the RH-HMIS
- It is suggested that a few indicators of clinical standards in neonatal medicine be routinely included in the RH-MIS

- The current system of perinatal death audits be revisited and strengthened in consultation with the professional Colleges and move towards a system of confidential inquiry and the system be expanded with time to include audits of severe morbidity.
- A National Perinatal Mortality Registry be established based in the perinatal mortality surveillance unit at the FHB. Taking into consideration the likely increase in the quantum of work that is needed to improve the perinatal death audit, it may be judicious to assign the task of perinatal mortality surveillance to a separate unit at the FHB.

### ***Health workforce***

The key bottlenecks identified in relation to health workforce were; the non availability of policy, projections and plans for the development of human resources necessary for the planned neonatal care services of the country, absence of specific job descriptions and responsibilities of the different categories of staff, reluctance on the part of staff to work in specialized units leading to problems in providing 24\*7 care, difficulties in ensuring in-service training for all care providers to deliver the selected interventions. Absence of a database with information on in-service training of staff at institutional and district level, the absence of a regular training schedule at district level, lack of dedicated staff responsible for training (training faculty), a designated person to coordinate training in the district, as well as a dedicated financial allocation for continued in-service training.

It is recommended that;

- The human resources necessary for the staffing of neonatal care services be planned. Staffing norms, job descriptions and responsibilities be developed in respect of the different categories of staff providing specialised neonatal care.
- Staff recruitment and retention criteria be developed based on job descriptions so as to retain highly trained staff as well as provide opportunities for entry into the system.
- Designated cadre be given the responsibility of coordinating in-service training at district level, regional training centers dedicated for in-service training be setup with identified training Faculty from within the province and the allocation of the necessary resources from the Provincial and National health funds.
- Where the training is mainly the development of a skill followed by certification, institute regular skills drills to ensure skills are retained at an optimum and compulsory refresher training and re-certification.
- Annual training calendars be set up at institutional and district levels and a system of CPD be incorporated to all categories of staff and incentives be provided to encourage staff to acquire the CPD points, such as partial fulfillment for annual increments, transfers etc.

### ***Health service delivery***

The bottlenecks identified in relation to planning services are the paucity of information on the proportion of newborns that may need interventions. At institutional level there is a lack of knowledge about national / district targets to be achieved. Unplanned institutional upgrading and the absence of regular intakes for training has led to staff shortages, absence of a system of auditing of clinical care to monitor the implementation of standards and adherence to guidelines. The absence of a culture that promotes supportive supervision and mentoring at unit level.



It is recommended that:

- Institutional administrators and consultants are made aware of national goals in neonatal care, the strategies to reach the goals and the proposed plans for neonatal care.
- Consultant led clinical auditing systems be introduced and also advocate the use of already available tools such as checklists for supervision at institutional and unit level.
- Protocols and guidelines be made available in user friendly formats such as flow charts and table top guides and these be made available in Sinhala and Tamil languages for easy reference by all categories of staff.
- Quality accreditation systems for institutions/ units/labor rooms/ neonatal care units be established.
- A system of risk identification is implemented in all newborns using standardized protocols and surveillance using standardized observation charts with specific plans for management including transfer be planned and instituted in consultation with the professional bodies.
- Universal neonatal screening for specific morbidities to be established within the national plan.

### ***Health financing***

The key bottlenecks identified in relation to health financing were, that there were no means of identifying the financial allocation for MNH separately at national, regional and institutional levels. Although the health services were free at point of delivery, there were considerable out of pocket expenditure associated with maternal and newborn care, especially for infants admitted to specialized neonatal care units.

It is recommended that:

- A separate financial allocation for the implementation of the national plan for neonatal care including infrastructure development be identified. The fund may be managed through a special committee of the planning unit, which includes FHB representation.
- the out of pocket expenditure be minimized by addressing shortages and quality issues in the drug procurement and supply system and the implementation of a 24\*7 laboratory system as appropriate to the level of the institution.

### ***Essential medical products and technologies***

The key bottlenecks identified for essential medical products and technologies were, the ineffective functioning of the institutional drug review committees, essential items not being available continuously and lack of an information system on equipment and difficulties in relation to repair and maintenance of the equipment.

It is recommended that;

- An integrated logistics management system for drugs and commodities be established
- The quality control process for drugs be improved through strengthening the National Drug Quality Control Laboratory.
- Regional Bio Medical Engineering units be strengthened and that they maintain a computerized equipment database

## ***Community ownership and participation***

The key bottlenecks identified in relation to community ownership and participation were the delay in initiation of an educational strategy for the MNH strategy and the deficiency of knowledge about danger signals of illness in the newborn among parents.

It is recommended that:

- Specific communication strategies be developed concurrently with program plans
- The communication strategies developed by the HEB be implemented
- The mother support groups set up in the community be utilized to educate the public on the danger signs during the neonatal period
- A 'hot line' be established in specified maternity / neonatal care units with staffing to maintain a service 24\*7.
- A special place in the neonatal BHT/ diagnosis card be assigned to indicate that the consultant or a senior member of the team had spoken to the parents prior to discharge of a neonate from a special care unit.

## **2. Maternal and newborn facility based intervention packages at the time of birth** (labour, childbirth, immediate postnatal care)

### ***Essential newborn care***

Lack of awareness about the standards for newborn care and guidelines, unavailability of these at ward level and the documents not been available in Sinhala and Tamil, were key bottlenecks identified. It was observed that a considerable percentage of staff providing care at birth had not received training on the essential newborn care package. A lack of confidence in skills acquired such as use of bag and mask ventilation, absence of monitoring / audits of care practices and supervision of activities at ward level.

At institution and ward level bottlenecks identified were, absence of hand washing facilities at entrance to labour rooms, not having elbow or foot operated taps, inadequacy in quantity of hand rub available, low quality of cord clamps supplied through MoH, labour room beds not being of a standard size wide enough to have the baby with the mother, inadequate attention to labour room temperature and calibration of weighing scales,

### ***Recommendations***

Most of the bottlenecks identified above have been addressed in section one under health workforce and health service delivery. The recommendations that have not been addressed in section 1 are presented below.

It is recommended that

A system of accountability for the guidelines and protocols that are sent to institutions/units as well as methods to ensure that they are accessible and are made use of by the midwifery staff be introduced.

When new interventions/ guidelines and standards are introduced, the consultant in charge of the unit should introduce the guidelines/protocols to all members of his unit so that they are aware of the new care practices.



To make it compulsory that medical officers, nurses and midwives appointed to obstetrics and pediatrics units have undergone training in NALS and ENCC and certified and the Director of the institution as well as the Consultants in charge of obstetric and neonatal care be responsible for ensuring that medical officers working in their units are NALS trained

A wall thermometer in working condition to be available in all labour rooms and the temperature that has to be maintained displayed on the wall. This requirement should be included to the specification prepared for air conditioners for neonatal units.

A separate sterile baby pack with two towels be made available with the delivery pack so as to ensure availability of warm towels and a source of radiant heat to be available in the labour room at all times.

A systematic program for establishing hand washing facilities at the entrance to Labour Rooms and replacement of existing taps with elbow or foot operated taps

Decide on an ideal size and design for labour room beds and replace existing beds that are not the ideal size in a planned stepwise fashion.

Emphasize the need to have accurate records of birth weight. Maintain a log for noting the date on which the scales were calibrated in each labour room and include checking this aspect in the labour room supervision procedure with the task being the responsibility of a designated person/ persons.

The process of a normal delivery and the concept and importance of skin to skin care at birth be included in the antenatal educational packages so that mothers are aware of it before they come in for delivery.

### ***Skilled care at birth – use of the Partograph***

The bottlenecks identified were; in-service training programmes currently available do not deal adequately with the use of the Partograph, lack of supportive supervision of the accuracy of recording and interpretation of the partograph at unit level, no indicator to monitor its use. In addition, poor pain relief during labour was identified as a deficiency in providing skilled care at birth

#### **Recommendations**

In service training programs should be conducted at institution / ward level or at regional level for refreshing the knowledge on recording the progress of labour on the partogram and their interpretation.

Include the partogram as an essential component of the BHT of a woman for whom delivery care is provided.

Regular audits on the use of the partogram be made a feature at unit level.

Examine the partogram in maternal death and “near miss” investigations as well as in perinatal mortality surveillance.

Include the use of partogram as an indicator of skilled care at birth in the new e-MIS. Since a majority of births take place in institutions with specialized services it is suggested that protocols for providing pain relief during labour be discussed with the relevant Colleges.

## ***Management of preterm delivery***

Guidelines for the management of preterm deliveries are in the process of being developed by the Sri Lanka College of Obstetricians and Gynecologists in collaboration with the Family Health Bureau.

### ***Bottlenecks***

Although the neonatal management guidelines specify that preterm deliveries have to be managed in a level 3/3+ facility, difficulties have been encountered in in-utero transfer of patients. Difficulties are also encountered when preterm neonates need to be transferred. Many were not aware of the use of dexamethasone (steroids) to improve lung maturation in preterm deliveries. Information on dexamethasone use was available only from the WHO/MICS. In this study, out of 1412 preterm babies identified in the sample only 7 had received prophylactic steroids. The information on preterm birth, its management and outcomes are not included in the current RH-MIS.

It is recommended that:

- Cluster networks of institutions be identified where the capacity of the level 3/3+ institution has been planned to include preterm deliveries from the satellite institutions
- Admitting officers be made aware of the policy that preterm deliveries have to be managed in a level 3/3+ institution.
- Processes be developed to disseminate information on evidence based practices that are adopted and to develop protocols on such practices. Regular in-service training and updating of staff be carried out.
- Specific indicators are developed based on the tracer interventions identified and these incorporated in to the routine data collection system.
- The indicators be analysed and presented by level of institution / network, district and country.

### **Provision of care for sick and small newborns**

The overwhelming majority of the bottlenecks identified in this section were addressed in the section on strengthening the infrastructure necessary to provide essential and advanced care for the newborns.

In addition the following bottlenecks were identified: Norms for equipment for each level have to be updated at regular intervals, deficiencies in specifications of equipment and problems in maintenance of equipment. Overcrowding in higher level institutions and poor condition of neonates transferred to NICUs, absence of a culture of analysis and use of data at unit level.

It is recommended that:

- Norms for equipment for each level of care be updated regularly,
- Professional colleges to be involved in the preparation of specifications of equipment which are then submitted to BME unit at central level
- Strengthen BME units at regional levels.
- Proper referral system with clear guidelines be established together with a system of back referral to lower level units with clear management guidelines for further management of patients.
- Retrieval systems be established at each province with human resources, transport facilities and equipment necessary and to establish a web based bed management system.

### *Assisted vaginal delivery*

It is noted that the frequency of assisted vaginal delivery in the country is low. It is recognized that competency in the procedure is an important part of specialist training. The consensus of opinion was that the procedure should be carried out only in an institution where specialist services are available and under direct supervision of the consultant.

The bottlenecks identified were unavailability of disposable vacuum cups and instruments in proper working order. However, it was also felt that low use of the technique may have contributed to the necessary equipment not been available.

### *Companionship during labour*

The majority of providers felt that under the present facilities available in most labour rooms even the presence of a female companion would pose problems. They also felt that in an emergency this would hamper provision of services.

However, there are institutions/units where a female companion is allowed to be with the patient during labour. It was suggested that visits to such units would provide an opportunity to discuss the perceived problems and see how they have been overcome and also be made aware of the positive aspects of the practice for patients as well as service providers.

The consensus was that it could be introduced first on a voluntary basis to units who would like to provide the service and then gradually expanded.

### *A plan for Neonatal Special Care Networks*

- Taking into consideration the identified number of specialized neonatal care facilities, two plans are proposed with a view to improving the provision of neonatal care services in the country. The main objective of the proposed plans are to create neonatal care networks within the country to optimize the service provision also taking into consideration the limitations in specialized services and resources currently hindering the provision of these services.
- Plan 1 is based on a network per province except in the Western Province, which has a large number of births and therefore has been assigned 3 networks. There are 4 level 3+ institutions planned for the country, namely the Lady Ridgway Children's Hospitals, Sirimavo Bandaranayke Children's Hospital, Teaching Hospital Karapitiya and Teaching Hospital Jaffna. The three hospitals in the Central, Southern and Northern Province are considered as the lead institutions for the respective provincial networks. In the Western province in addition to the LRH based network, two additional networks are planned with two level 3 institutions (Teaching Hospital Ragama and Colombo South Teaching Hospital) as lead institutions. In each of the other Provinces a level 3 institution has been identified as lead hospital for the provincial networks namely; Teaching hospital Anuradhapura for the North Central Province, PGH Kurunegala for the North Western Province, PGH Ratnapura for the Sabaragamuwa Province, TH Batticaloa for the Eastern Province and PGH Badulla for the Uva Province.
- The number of deliveries taking place outside of a 70 km buffer from the lead institution (level 3/3+) was calculated to be 20706 (6%) and the total area outside of the 70 km buffer zone will be 10355.7 km<sup>2</sup> (15.8%). (Only deliveries occurring in government health institutions above the level of divisional hospitals have been considered).
- In the second plan four more institutions are added to the 11 3/3+ institutions identified in plan 1; These are namely; DGH Polonnaruwa and DGH Hambantota which are already functioning as level 3

facilities and the DGH Vavuniya and DGH Trincomalee both of which are currently functioning as level 2 facilities.

- According to plan 2, the number of deliveries taking place outside of a 70 km buffer from the lead institution (level 3/3+) was calculated to be 171 (0.0%) and the total land area outside a 70 km buffer zone from a level 3/3+ institution will be 1770 km<sup>2</sup> (2.7%). (Only deliveries occurring in government health institutions above the level of divisional hospitals have been considered).
- It is also proposed to strengthen the networks with the establishment of e-links within the networks and the establishment of real time e-tickets, which once commissioned will indicate the neonatal care bed occupancy and once discharged will indicate it becoming vacant. Such a real time virtual system if implemented will provide information on NICU bed / ventilator / special services / availability at the national level.
- Within a neonatal network a telemedicine system can be developed (if agreed upon by the relevant professionals) with the level 3/3+ institution taking the lead role. It is expected that this would result in improvement of the quality of neonatal services within a network, possible reduction in the need for transfer, improve the quality of the transferred neonate whenever a transfer is necessary and joint follow up management of back referrals. Such a system will also enable the lead institution to make arrangements for early retrieval of sick neonates and the added advantage of being aware of the full clinical profile of the neonate that they receive. The system would facilitate discussion of cases managed in level 1 and level 2 with the neonatologist in the lead institution and formulation of joint management plans. Such a system would optimize the use of the expertise and experience gained by those in a level 3/3+ institution.



*Neonatal Intensive Care Unit De Soysa Maternity Hospital Colombo  
Courtesy of Dr. Girle De Silva*





# CHAPTER 1: INTRODUCTION

*“A healthy start to life is central to the human life course, with birth holding the highest risk of death,”*

So began the, Lancet Every New Born Series (2014) highlighting the contribution that events around birth make towards survival and good health throughout life. Although interventions across the continuum of care, (pre conception, antenatal, intrapartum and neonatal) are essential in improving the health of mothers and children it is recognized that investing in providing quality care around the time of birth, first day and the first week of life with special care for small and sick babies has the highest impact on preventable neonatal deaths. The last few decades has witnessed a remarkable reduction in child mortality worldwide, most of the reduction has been due to lives saved after the first 4 weeks of life while changes in perinatal and neonatal mortality have lagged behind.

There are many reasons for the neglect of the health of newborn children. Firstly, neonatal deaths are often undocumented and as such have had low visibility on national and international agendas. Although there is documented evidence that neonatal mortality can be improved substantially through good care during pregnancy and around the time of birth, often the survival of newborns is perceived as requiring expensive technological interventions. More importantly, elements of care and interventions for neonatal survival fall between two health system programs, maternal health programs covering pregnancy, child birth and the immediate neonatal period and the child health programs which take on the responsibility for care through infancy and childhood. In many settings, the continuity of care that is needed is lacking resulting in the neglect of

newborns. The greatest gap in care has been identified as occurring during the first week of life when most of the deaths occur.

A robust body of knowledge on perinatal and neonatal survival has reached a critical mass in recent times catalysing the rethinking on newborn deaths. There is evidence that interventions concentrating on processes around the time of birth leads to a triple return on investments. This has led to an increased recognition among policy makers that newborn health is a crucial element in the continuum of care that needs systematic attention if health goals for women and children are to be realized. Progress in this area necessitates national leadership, adoption of interventions that have the greatest returns on investment, technical capacity to implement identified interventions, identifying and overcoming bottlenecks for scale up and most importantly collection and collation of data necessary for monitoring.

Thus, at the World Health Assembly in 2014 an action plan named ‘Every Newborn Action Plan’ (ENAP) (2014) to improve neonatal care beyond 2015 was presented. The action plan aims to end preventable deaths and provides an evidence based road map towards achieving these health goals. To support countries in their efforts towards planning processes to achieve these goals the WHO/UNICEF has developed and tested a tool to identify bottlenecks and solutions to scale up newborn care services.

Although Sri Lanka has made significant progress

in maternal and neonatal mortality over the past few decades it is noted that neonatal mortality declines have not kept pace with the improvements in maternal mortality. It is observed that the neonatal mortality rate lags behind other countries with similar maternal mortality ratios (Figure 1.1). It is also noted that the current neonatal mortality rate of 5.9 per 1000 live births accounts for over 70% of infant mortality. (Family Health Bureau, 2013)

Thus, the need to focus on further improvements in care around the time of birth and the first four weeks of life with a special focus on improving quality of care has been identified. In recognition of the identified need and in keeping with global developments, Sri

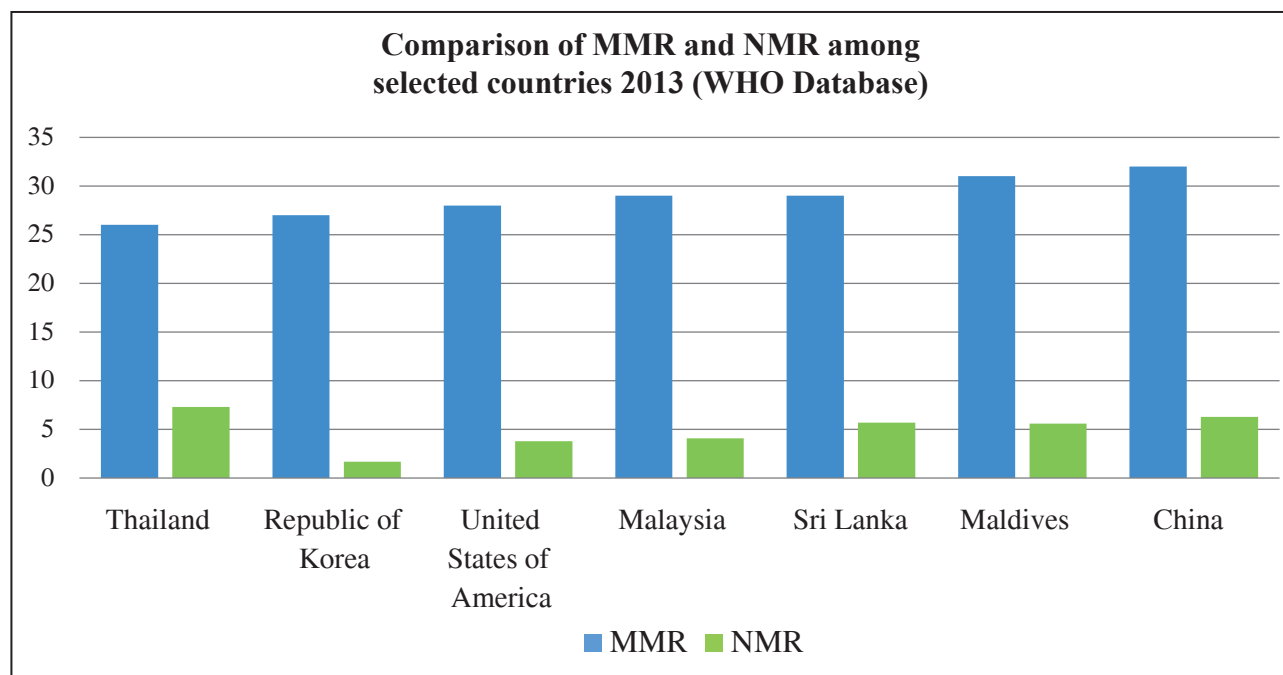
Lanka is preparing an ‘Every Newborn Action Plan’ focusing on ending preventable newborn deaths and preventable stillbirths.

The goal of the ‘Every Newborn Action Plan’ for Sri Lanka is to achieve

|                  | 2025                 | 2035                 |
|------------------|----------------------|----------------------|
| NMR of           | 3.4/1000 live births | 2.2/1000 live births |
| Still Birth Rate | 3.5/1000 live births | 2.2/1000 live births |

It is therefore imperative to identify the gaps in the current newborn care program, bottlenecks for scaling up of interventions and to propose evidence based solutions.

**Figure 1.1: Comparison of NMR among countries having similar MMR as Sri Lanka 2013**



## 1.2 Terms of reference

The terms of reference for the assignment were:

- to collate as well as analyse where necessary, currently available data
- to modify and adapt as appropriate for Sri Lanka, the WHO/ UNICEF tool to identify bottlenecks and solutions to scale up newborn care ,
- to use the modified tool to identify gaps in the current program as well as bottlenecks for scaling up interventions through a series of stakeholder meetings,
- based on consultations with stakeholders/ experts suggest evidence based solutions and actions to address challenges and bottlenecks identified,
- synthesize the feedback obtained from the above process to facilitate the formulation of a National Action Plan to achieve the stated NMR goals





*Labour Room Teaching Hospital Kandy  
Courtesy of Dr. Kapila Gunawardena*



# CHAPTER 2: METHODOLOGY

## 2.1: Technical working group

Family Health Bureau of the Ministry of Health and specifically the National Program Manager of the Intra natal and Newborn Care Program was responsible for the facilitation of the consultative process. A National Technical Working Group chaired by the Deputy Director General, Public Health Services II was appointed to provide technical guidance and monitor all activities related to the consultation. This included representation from the Provincial, regional and institutional medical administration, Sri Lanka College of Obstetricians and Gynaecologists (SLCOG), Sri Lanka College of Paediatricians (SLCP), Perinatal Society of Sri Lanka (PSSL), Development Partners and the Family Health Bureau.

## 2.2 Review of available data

The following sources of data were examined:

Routine data available at the FHB from the field investigation of infant deaths

Data from the Registrar General and the Department of Census and Statistics

Data on stillbirths available from the Medical Statistician from the Indoor Mortality and Morbidity Return

Published literature on neonatal mortality, morbidity and care in Sri Lanka

Findings of the National Emergency Obstetric and Neonatal Care Assessment 2012

Published and unpublished data from the WHO Multi-country Survey on Maternal and Perinatal Health 2013

Data from the National perinatal mortality surveillance program

The following documents were perused:

### 2.2.1 Reports

1. Report of the external review of Maternal and Newborn Health in Sri Lanka (2007)
2. Maternal and Child Health Policy 2012
3. National strategic plan on maternal and newborn health (2012-2016)
4. Annual report on family health Sri Lanka 2013
5. WHO multicounty survey on maternal and newborn health: country report for Sri Lanka (2014)

### 2.2.2 Standards and guidelines

1. National guideline for newborn care – volume 1 (2015)
2. National guideline for newborn care – volume 11 (2015)
3. National guideline for newborn care – volume 111 (2015)
4. Standards for newborn care (2012)
5. Building and other guidelines for: NICU, SCBU and MBC (2007)
6. PCPNC guide (2010)

### 2.2.3 Circulars

1. Circular on perinatal mortality
2. Formats for newborn care
3. Guidelines for surfactant use
4. Lactation management Centers

5. Levels of neonatal care for specialist hospitals of Sri Lanka
6. Newborn screening for congenital hypothyroidism in Southern Province
7. Neonatal National Intensive Care Surveillance (Neo-NICS) and bed availability system
8. Neonatal transport service for the Western Province

#### 2.2.4 Forms

1. Audit on perinatal deaths
2. Hospital infant death notification form
3. Field infant death notification form
4. Monthly lactation management center return
5. Post partum modified early warning system
6. Neonatal monthly return
7. Maternal and Neonatal data formats for the planned e-MCH HMIS

### 2.3: Bottleneck Analysis

The identification of health system bottlenecks that adversely affect the scale up of selected interventions to improve neonatal care was carried out based on the tool and methodology developed by WHO/UNICEF for this purpose. Bottlenecks were identified organized into 7 sub-sections according to the health system building blocks as follows:

1. Leadership and governance
2. Health finance
3. Health workforce
4. Health service delivery
5. Essential medical products and technologies
6. Health information systems
7. Community ownership and partnership

### 2.4 Modifications to the original tool

The WHO/UNICEF tool was modified as appropriate to the current situation of neonatal care in the country

through a consultative process and consensus was obtained from the Technical Working Group for the modified tool.

The tool is divided into two main sections.

#### **Section 1:**

This deals with the identification of bottlenecks applicable to all newborn interventions in general. The current analysis specifically examined the bottlenecks for strengthening the infrastructure necessary to provide essential and advanced care for the newborns

#### **Section 2:**

This section of the tool is based on maternal and newborn facility based intervention packages at the time of birth (labour, childbirth, immediate postnatal care) that have the potential for the greatest effect on mortality reduction for babies and mothers. For each intervention package a tracer intervention/s and commodities are selected to reflect common challenges to the package.

Section two was modified taking into consideration the following:

- A very comprehensive EmONC assessment was carried out in 2012-2013 providing information at institutional, district, provincial and national levels
- Nearly 94.9% of births in government sector hospitals occur in institutions with specialist pediatric services.
- Paucity of data to examine the tracer conditions given in the tool

For the package on skilled care at birth the tracer conditions given in the original tool is the use of the partogram. Therefore, bottlenecks encountered in the use of the partogram were examined.

The essential newborn care package (table 3.9) which should be delivered to every single newborn in the country irrespective of the level of institution where delivery takes place includes, kangaroo mother care,

and newborn resuscitation; the intervention packages identified in the original tool. National standards for neonatal care have been developed against which performance can be measured. Therefore, in the present exercise, bottlenecks to providing essential newborn care as given in the standard was collected from all categories of staff, working at the different levels of institutions including the private sector.

The bottlenecks for implementing the packages on:

- Management of preterm birth (tracer, use of antenatal corticosteroids)
- Treatment of severe infections and inpatient supportive care for the sick and small newborns
- The level of institution where assisted vaginal delivery should be made available and bottlenecks for providing the service as well as bottlenecks for providing companionship during labour, which is specifically identified in the MNH strategy were discussed.

## 2.5 Data collection process

The following methodologies were used

1. Collation and analysis of data available on neonatal mortality and morbidity
2. Discussions with representatives of
  - a. the Sri Lanka College of Obstetricians and Gynaecologists
  - b. the Sri Lanka College of Paediatricians
  - c. the Perinatal Society of Sri Lanka
3. Two large stake holder workshops (one day workshops) with representation of the different levels of care including the private sector and different categories of health care providers.
  - a. National and regional level health administrators
  - b. Medical administrators of TH / PGH and DGH
  - c. Consultants of TH / PGH

- d. Consultants of BH
- e. Medical officers from specialist hospitals
- f. Nursing officers from specialized hospitals
- g. Medical officers, nursing officers and midwifery staff of divisional hospitals
- h. Representatives from the private hospitals

4. Workshop with Director and consultants of the Family Health Bureau
5. Key informant interviews with central and institutional level administrators.
6. Filed visits to the following districts and institutions:
  - a. Northern Province: Vavunia District – DGH Vavunia
  - b. Central Province: Matale District – BH Dambulla
  - c. Eastern Province: Batticaloa District – BH Vallaichchnai and BH Eravur
  - d. Southern province: BH Elpitiya and BH Kamburupitiya
  - e. North Central Province; BH Thambuttegama and DH Kekirawa

During the field visits, group and individual discussions were held with the institutional administrators, consultant Obstetricians and Paediatricians, medical officers, nurses and midwives working in Obstetric and Paediatric units, labour rooms and special care baby units and record room officers.

7. A draft report was presented and discussed with the Additional Secretary Ministry of Health, DGHS and relevant DDGs prior to finalization of the report.

## 2.6 Presentation of findings

The bottle necks identified and possible ways of overcoming them identified under each section is presented under the seven health system building blocks.







*Mother Baby Unit Base Hospital Diyathalawa  
Courtesy of Dr. Kumudini Cooray*





## CHAPTER 3: CURRENT SITUATION

This chapter describes the current situation of neonatal and perinatal mortality, morbidity and services. Data available from different sources are brought together to build as complete a picture as possible.

Table 3.1 shows the trends in neonatal and perinatal mortality rates from 2007-2013 based on the FHB publication, Annual Report on Family Health 2013.

The data presented are based on the births and deaths reported through the RH-MIS.

### 3.1 Neonatal and perinatal mortality

The rates given in table 3.1 have been extracted from the Annual Report on Family Health (2013) and have been calculated based on the number of births reported by the PHMs (RH-MIS)

**Table 3.1: Trends in neonatal and perinatal mortality reported through the RH-MIS 2007-2013**

| Indicator                                 | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   | Annual Average decline% |
|-------------------------------------------|--------|--------|--------|--------|--------|--------|--------|-------------------------|
| Number of births reported by RG           | 386573 | 379912 | 368304 | 364565 | 363415 | 355900 | 365792 |                         |
| Number of births reported by PHM (RH-MIS) | 320287 | 327326 | 313958 | 310240 | 320021 | 319592 | 320943 |                         |
| Infant deaths reported (RH-MIS)           | 3500   | 3501   | 3263   | 3293   | 3269   | 2938   | 2835   |                         |
| % of infant deaths investigated           | 89.9   | 93.5   | 93.4   | 89.0   | 92.0   | 96.0   | 89.8   |                         |
| Maternal Mortality Ratio (100 000 LB)     | 38.4   | 33.4   | 40.2   | 31.1   | 32.5   | 37.7   | 32.5   | 2.10                    |
| Stillbirth rate (1000 births)             | 8.5    | 8.7    | 7.5    | 7.7    | 7.1    | 6.9    | 6.4    | 4.65                    |
| Neonatal mortality rate (1000 LB)         | 8.1    | 7.6    | 7.3    | 8.0    | 7.6    | 6.8    | 6.5    | 2.33                    |
| Post neonatal mortality rate (1000 LB)    | 2.8    | 3.1    | 3.1    | 2.6    | 2.7    | 2.4    | 2.3    | 4.75                    |
| Peri-natal mortality rate (1000 births)   | 14.6   | 14.3   | 13.0   | 13.7   | 12.6   | 12.0   | 11.2   | 3.84                    |
| Early neonatal death rate                 | 6.1    | 5.6    | 5.5    | 6.0    | 5.5    | 5.1    | 4.8    | 2.69                    |
| Infant mortality rate (1000 LB)           | 11     | 10.8   | 10.5   | 10.7   | 10.2   | 9.2    | 8.8    | 3.31                    |

**Table 3.2: Trends in neonatal and perinatal mortality reported by the Registrar General 2007-2013**

|                               | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   |
|-------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Registered births             | 386573 | 373575 | 368304 | 364565 | 363415 | 355900 | 365792 |
| Infant mortality rate         | 8.5    | 9.0    | 9.7    | 9.9    | 9.1    | 8.5    | 8.2    |
| Neonatal mortality rate       | 5.9    | 6.2    | 6.4    |        | 6.4    | 6.1    | 5.8    |
| Post neonatal mortality rate  | 2.6    | 2.8    | 3.3    |        |        |        |        |
| Early neonatal mortality rate | 4.5    | 4.6    | 4.6    | 4.9    | 5.2    |        |        |

**Table 3.3 Comparison of the number of births and infant deaths reported by the Registrar General and through the RH-MIS**

|   | Indicator                                                                             | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   |
|---|---------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| 1 | Number of births registered by (RG)                                                   | 386573 | 373575 | 368304 | 364565 | 363415 | 355900 | 365792 |
| 2 | Number of births reported from government hospitals (Medical Statistical Unit)        | 356852 | 352523 | 339437 | 334137 | N/A    | 340800 | 348522 |
| 3 | Number of births reported by (PHM)                                                    | 320287 | 327326 | 313958 | 310240 | 320021 | 319592 | 320943 |
| 4 | Percentage of births reported by PHM from total registered by RG                      | 82.9   | 87.6   | 85.2   | 85.1   | 88.1   | 89.8   | 87.7   |
| 5 | Percentage of births reported by PHM out of births reported from Government Hospitals | 89.8   | 92.9   | 92.5   | 92.8   | N/A    | 93.8   | 92.1   |
| 6 | Number of Infant deaths reported through the RH-MIS                                   | 3500   | 3501   | 3263   | 3293   | 3269   | 2938   | 2835   |
| 7 | Number of Infant deaths reported by (RG)                                              | 3298   | 3362   | 3566   | 3605   | 3295   | 3221   | 3008   |
| 8 | Percentage of Infant deaths reported from RH – MIS / from that reported by RG         | 106.1  | 104.1  | 91.5   | 91.3   | 99.2   | 97.3   | 94.2   |

It is seen that the infant, neonatal and early neonatal mortality rates reported through the RH-MIS is higher than those reported by the RG. Table 3.3 shows that the under reporting of births through the returns from the field health services is higher than the reporting of infant deaths. This may account for the discrepancies observed in the mortality rates.

It is noted (table 3.3) that in the years 2007 and 2008 the number of infant deaths reported through the RH-MIS exceeded the number reported by the RG. This may be because of under registration of infant deaths in the formal system from the conflict affected areas during these years whereas the public health field staff were aware of the deaths.

The Registrar General does not report a perinatal mortality rate since stillbirth rates are available only

from “proclaimed areas” where a medically qualified person is the Registrar of Deaths, a practice that has not changed from the year 1952, when institutional deliveries accounted for only 36.7% of all births.

Perinatal mortality information for the year 2012 is also available from the National Perinatal Mortality Surveillance system. This information is from the government sector institutions with specialist services, which are mandated by the MoH to conduct perinatal death reviews and reports were available from 97% of the institutions. However, there is no way of determining if all perinatal deaths occurring in an institution were reported. The institutions that reported investigations accounted for 88.8% of births in the country. This does not include any deaths during the early neonatal period that may have occurred in the community.

**Table 3.4 Perinatal mortality rates from perinatal mortality reviews**

|                                      | TH / PGH | DGH   | BH     | Non weighted rate |
|--------------------------------------|----------|-------|--------|-------------------|
| Live births                          | 122572   | 95986 | 118613 | 337171            |
| Stillbirths                          | 597      | 412   | 444    | 1453              |
| Live births and Stillbirths          | 123169   | 96398 | 119057 | 338624            |
| Early neonatal deaths                | 776      | 429   | 432    | 1637              |
| perinatal deaths                     | 1373     | 841   | 876    | 3090              |
| Stillbirth rate (SBR)                | 4.85     | 4.27  | 3.73   | 4.29              |
| Early neonatal mortality rate (ENMR) | 6.33     | 4.47  | 3.64   | 4.86              |
| Peri natal mortality rate (PNMR)     | 11.15    | 8.72  | 7.36   | 9.13              |

The stillbirth rate reported through the perinatal mortality reviews is 4.29 per 1000 births in 2012 (table 3.4) compared to 6.9 per 1000 births reported through the RH-MIS. Early neonatal mortality rate of 4.86 per 1000 live births is less than reported through the RH-MIS (5.1 per 1000 live births) for the same year. These figures suggest that there may be under reporting of perinatal deaths in the review reports. The under reporting appears to be more for stillbirths than early neonatal deaths.

Information on stillbirths and early neonatal deaths

for the year 2011 are available from a sample survey (WHO/MICS) and are given in table 3.5. The sample in this survey though large was mainly (55.2%) from teaching hospitals (table 3.5) where the perinatal mortality rates are likely to be higher. However, comparing the perinatal surveillance data with the survey data by type of institution suggests under reporting of perinatal mortality from District General Hospitals and Base hospitals through the surveillance system. The perinatal mortality rates from the two sources are similar (11.15 and 11.12 per 1000 births) in respect of Teaching Hospitals.

**Table 3.5: Stillbirth Rates and Perinatal Mortality rates based on WHO MCS**

|                                      | TH / PGH | DGH   | BH    | Non weighted rate |
|--------------------------------------|----------|-------|-------|-------------------|
| Total births                         | 10097    | 4165  | 3552  | 17814             |
| Stillbirths                          | 64       | 36    | 17    | 117               |
| Stillbirths and live births          | 10161    | 4201  | 3569  | 17931             |
| Early neonatal deaths                | 49       | 16    | 22    | 87                |
| perinatal deaths                     | 113      | 52    | 39    | 204               |
| Stillbirth rate (SBR)                | 6.30     | 8.57  | 4.76  | 6.53              |
| Early neonatal mortality rate (ENMR) | 4.85     | 3.84  | 6.19  | 4.88              |
| Peri natal mortality rate (PNMR)     | 11.12    | 12.38 | 10.93 | 11.38             |

**Table 3.6 Early neonatal death rate from different sources**

| Indicator                            | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|--------------------------------------|------|------|------|------|------|------|------|
| Annual Report on Family Health (FHB) | 6.1  | 5.6  | 5.5  | 6.0  | 5.5  | 5.1  | 4.8  |
| Registrar General Department         | 4.5  | 4.6  | 4.6  | 4.9  | 5.2  |      |      |
| Perinatal Mortality Surveillance     |      |      |      |      |      | 4.86 |      |
| WHO MCS 2012                         |      |      |      |      | 4.88 |      |      |

Table 3.6 summarises the early neonatal death rate from different sources. Probable reasons for discrepancies have been discussed earlier.

**Table 3.7 Still birth rate from different sources**

| Indicator                            | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|--------------------------------------|------|------|------|------|------|------|------|
| Annual Report on Family Health (FHB) | 8.5  | 8.7  | 7.5  | 7.7  | 7.1  | 6.9  | 6.4  |
| Annual Health Bulletin 2013          |      |      |      |      |      |      | 6.4  |
| EmONC Needs Assessment 2012          |      |      |      |      | 6.0  |      |      |
| Registrar General Department         |      |      |      |      |      |      |      |
| WHO MICS 2011                        |      |      |      |      | 6.7  |      |      |

Table 3.7 shows that the stillbirth rates given in the Report on Family Health and the Annual Health Bulletin is close to the rates reported from the EmONC survey and the WHO/MCS.

### 3.2 Timing of deaths

Figure 3.1 Percentage distributions of infant deaths by age at death

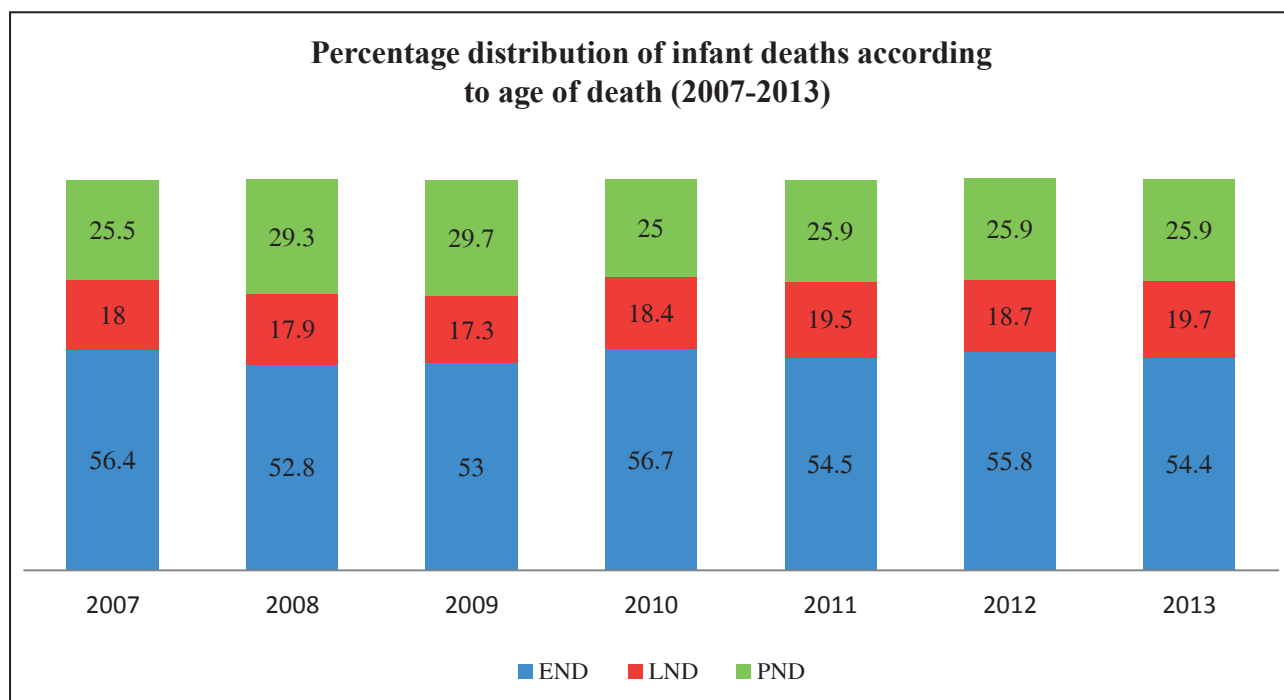


Figure 3.1 shows that the bulk of infant deaths occur within the first 7 days of life. This highlights the importance of focusing on the events around birth, to further reduce infant mortality.

#### District disparities in Infant mortality

Figure 3.2: District disparities in NMR and PNMR 2013

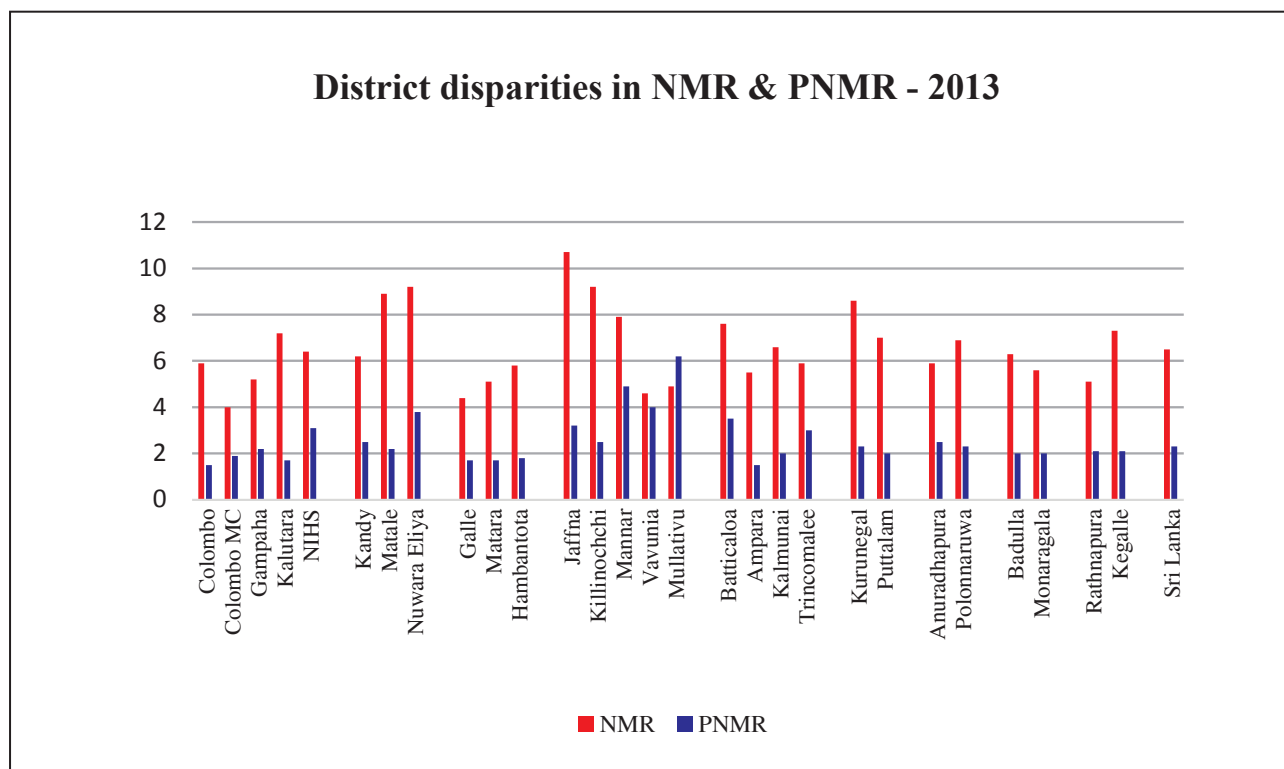


Figure 3.2 highlights the fact that there are wide district disparities in both neonatal and post neonatal mortality, the differentials being more in respect of NMR.

### 3.3 Causes of death

Causes of Infant and neonatal deaths are available from two sources, the Registrar General and through the field health services based on the field investigation of infant mortality.

It is seen from table 3.8, that the cause of neonatal death in the majority of cases (73.7%) is given as conditions originating in the perinatal period, with nearly 17% being reported as being due to congenital malformations, deformations and chromosomal abnormalities.

**Table 3.8: Causes of neonatal deaths in 2011 as reported by the Registrar General**

| Broad cause of death                                                                       | Early Neonatal Death |              | Late Neonatal Death |              |
|--------------------------------------------------------------------------------------------|----------------------|--------------|---------------------|--------------|
|                                                                                            | Number               | %            | Number              | %            |
| <b>1-001 Certain infectious and parasitic diseases A00-B99</b>                             | 28                   | 1.5          | 18                  | 2.7          |
| <b>1-026 Neoplasms C00-D48</b>                                                             | 2                    | 0.1          | 1                   | 0.1          |
| <b>1-051 Endocrine, nutritional and metabolic diseases E00-E88</b>                         | 4                    | 0.2          | 2                   | 0.3          |
| <b>1-058 Diseases of the nervous system G00-G98</b>                                        | 9                    | 0.5          | 12                  | 1.8          |
| <b>1-064 Diseases of the circulatory system I00-I99</b>                                    | 12                   | 0.6          | 8                   | 1.2          |
| <b>1-072 Diseases of the respiratory system J00-J98</b>                                    | 17                   | 0.9          | 9                   | 1.3          |
| <b>1-078 Diseases of the digestive system K00-K92</b>                                      | 3                    | 0.2          | 0                   | 0.0          |
| <b>1-084 Diseases of the genitourinary system N00-N98</b>                                  | 1                    | 0.1          | 0                   | 0.0          |
| <b>1-092 Certain condition originating in the perinatal period</b>                         | 1512                 | 80.3         | 495                 | 73.7         |
| <b>1-093 Congenital malformations, deformations and chromosomal abnormalities</b>          | 260                  | 13.8         | 113                 | 16.8         |
| <b>1-094 Symptoms, signs and abnormal clinical and laboratory findings, not classified</b> | 28                   | 1.5          | 10                  | 1.5          |
| <b>1-095 External causes of morbidity and mortality V01-Y99</b>                            | 8                    | 0.4          | 4                   | 0.6          |
| <b>Total</b>                                                                               | <b>1884</b>          | <b>100.0</b> | <b>672</b>          | <b>100.0</b> |

Registrar Generals Department 2011

**Figure 3.3: Percentage distribution of causes of infant deaths 2013 as reported in the Annual Report on Family Health 2013.**

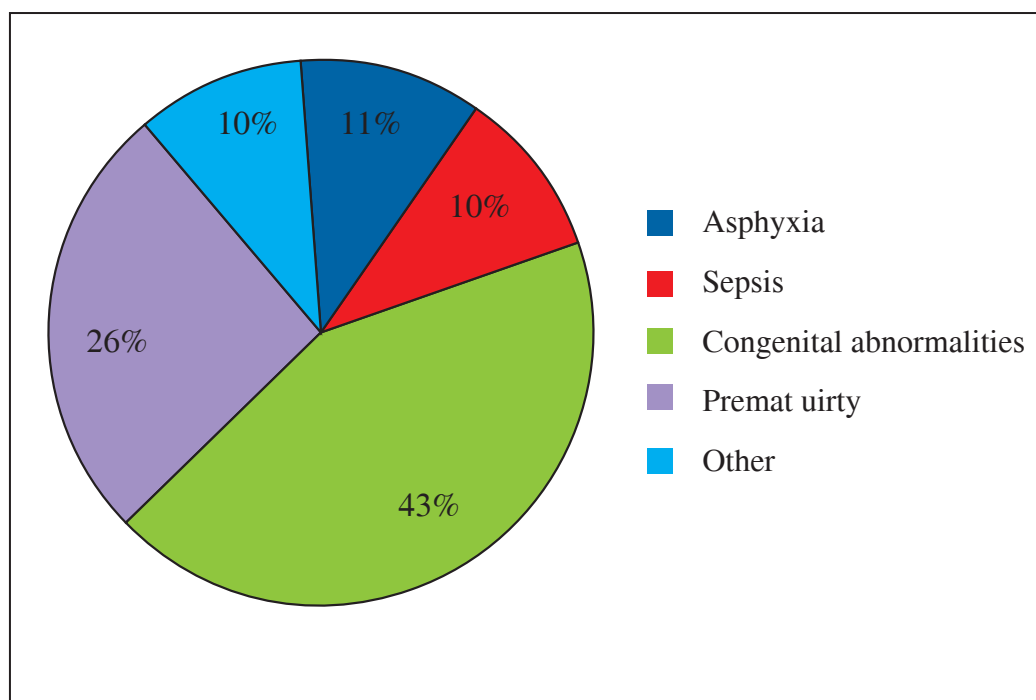


Figure 3.3 is extracted from the Annual Report on Family Health for 2013, published by the Family Health Bureau. The causes of death are given for all infant deaths based on the field investigation into infant deaths. Public Health Nursing Officers attached to the MOH office are responsible for the investigation and reporting. Figure 3.3 indicates that 43% of infant deaths are due to congenital deformities.

The causes of death from the two sources are not compatible. Nearly 75% of the infant deaths are those dying in the neonatal period and as such the causes of neonatal deaths will have a large influence on the causes of infant deaths. This suggests a probable misclassification of the causes of infant deaths as reported through the field investigation.

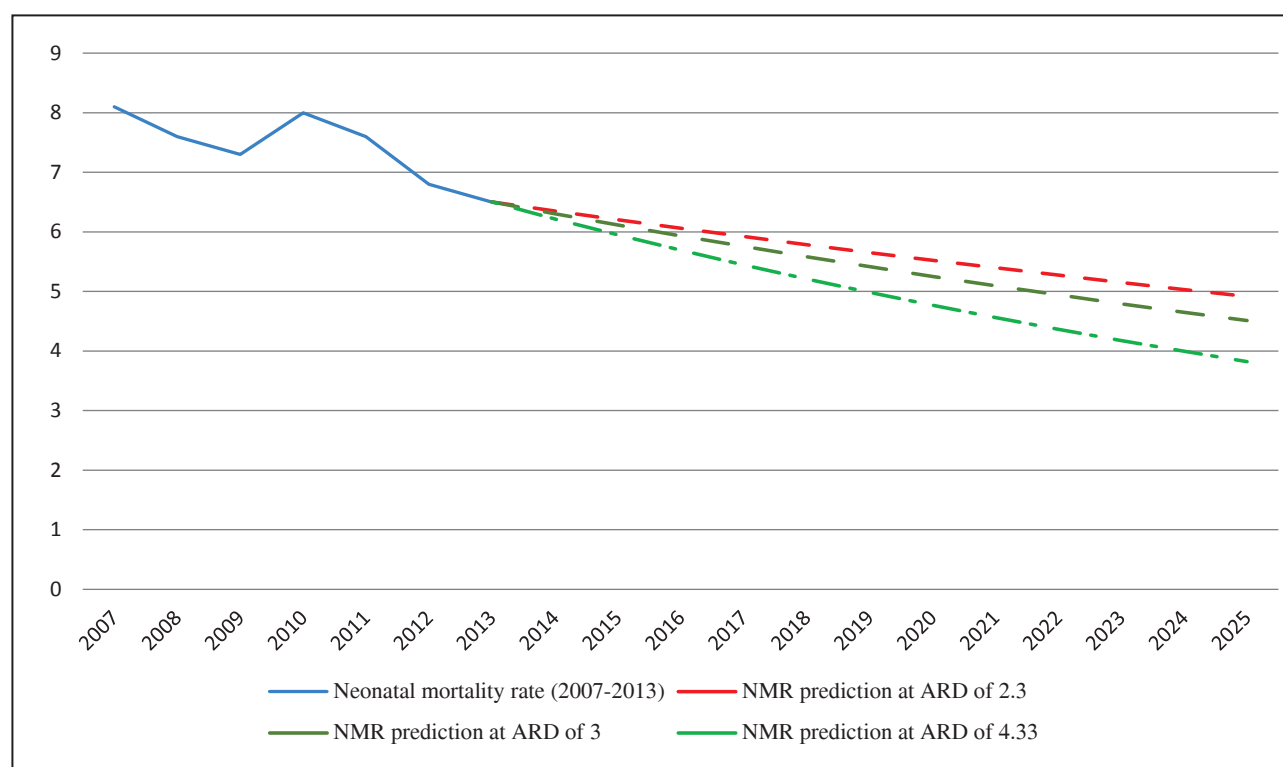
### 3.4 Goal of the newborn action plan

Sri Lanka has set a country specific goal of reaching an NNMR of 3.4 / 1000 live births by the end of 2025 and further improve to 2.2 / 1000 live births

by 2035. In setting this goal the average annual rate of reduction from 2000 to 2012 was taken as 4.35% and it was envisaged that the goal would be achieved if the neonatal mortality rate continued to decline at this rate.

However, the average annual rate of reduction (AARR) for the period 2007-2013 based on data reported by the FHB is 2.33%. It appears that if the neonatal mortality rate continues to decline at the current rate (as reported by the FHB) the goal would not be achieved. This is illustrated in figure 3.4 where projections based on different rates of decline are presented.

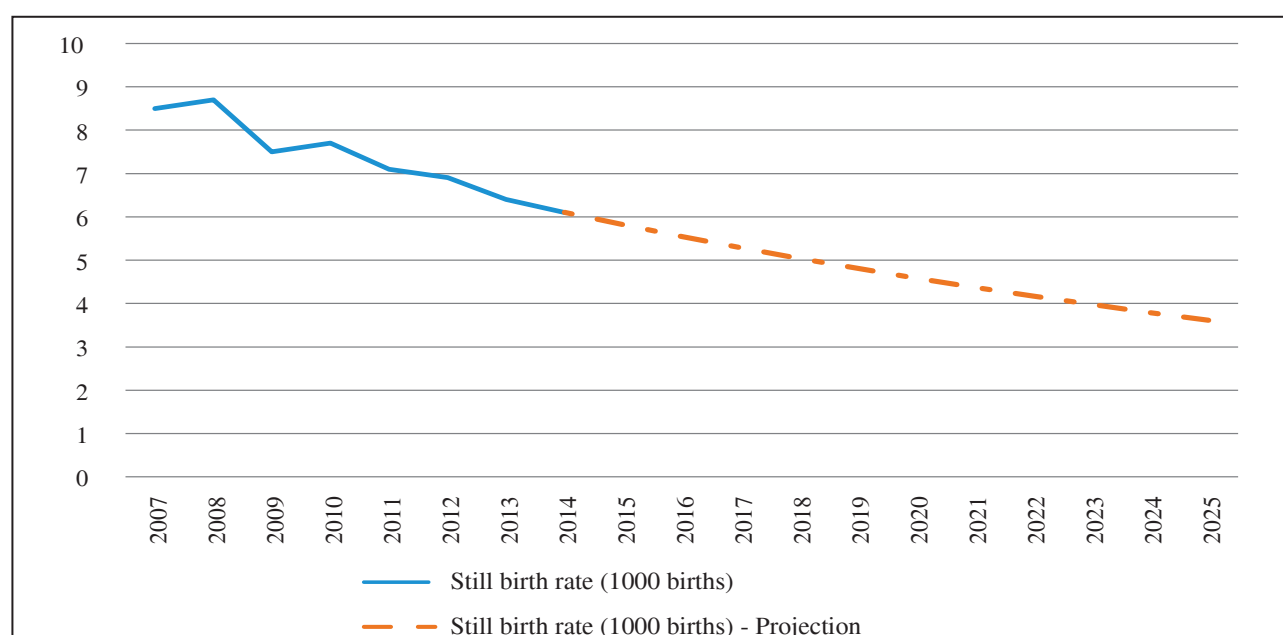
**Figure 3.4: Neonatal Mortality Rate for Sri Lanka 2007 – 2013 and projections for 2025**



The country specific goal in respect of stillbirths is to achieve a rate of 3.5 per 1000 live births by 2025 and a rate of 2.2 per 1000 live births by 2035. In setting this goal the rate for 2012 is taken as 16.6 per 1000 live births and the average annual rate of decline of stillbirth rate to be 1.32% from 2000 to 2009. The target average annual rate of reduction was set at 2.18%.

It is noted that the FHB reported a stillbirth rate of 6.4 per 1000 live births in 2013 and an average annual rate of decline for the period 2007-2013 of 4.6%. The findings of the EmONC needs assessment of 2012 and the WHO MCS 2012 support the stillbirth rate reported by the FHB. It appears that the country is on course to achieve the goals for stillbirths (Figure 3.5). However, this needs to be confirmed through a system of registration of stillbirths Island wide using standard definitions for the purpose.

**Figure 3.5: Stillbirth rate for Sri Lanka 2007 – 2013 and projection for 2025**





### 3.5 The current plan for provision of neonatal care

The Ministry of Health has planned a hierarchical system of neonatal care facilities spread throughout the country. All institutions where births take place will provide the package of “essential newborn care” (table 3.9). All government hospitals where specialist obstetric services are available should have a Mother baby Center (MBC) and a Lactation

Management Center (LMC). In addition, the system includes four levels of special care: level 1, level 2, level 3 and level 3+, where level 3+ Centers cater as super specialized Centers. Services planned for the different levels of special care are listed in table 3.10 given below.

**Table 3.9: The package of essential newborn care intervention**

| Interventions                                                                                             |
|-----------------------------------------------------------------------------------------------------------|
| Infection prevention (clean delivery)                                                                     |
| Delivery and immediate care of the newborn baby                                                           |
| Early initiation of breastfeeding                                                                         |
| Exclusive breastfeeding                                                                                   |
| Newborn resuscitation if required                                                                         |
| Skin to skin care                                                                                         |
| Thermal care                                                                                              |
| Hygienic cord care                                                                                        |
| Resuscitation if required,                                                                                |
| Early initiation of breastfeeding                                                                         |
| Exclusive breastfeeding                                                                                   |
| Rooming in                                                                                                |
| Recognition of danger signs and prompt treatment                                                          |
| Identification and initial management of newborn complications and appropriate referral                   |
| Management of newborn complications                                                                       |
| Special care for the small baby (including Kangaroo Mother Care)                                          |
| BCG Immunization                                                                                          |
| Prevention of mother-to-child transmission of HIV (Guidance and support for chosen infant feeding option) |

**Table 3.10: Planned levels of special neonatal care**

| Level 1                                                                                                                                                                                                                                                                                                                                               | Level 2                                                                                                                                                                                                                                                                                                        | Level 3                                                                                                                                                                                                                                                                                                                       | Level 3+                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>- Feeding problem - tube feeding</li> <li>- Nasal prong O2</li> <li>- Photo therapy – single</li> <li>- Incubator care</li> <li>- IV fluids</li> <li>- IV antibiotics</li> <li>- Management of hypoglycemia</li> <li>- Thermal care</li> <li>- Stabilization and transport</li> <li>- MBC &amp; LMC</li> </ul> | <ul style="list-style-type: none"> <li>- Level 1 facilities</li> <li>- Short term ventilation + CPAP</li> <li>- Other SCBU facilities</li> <li>- Continuation of care of transferred back babies from level 3 and 3+</li> <li>- Intensive photo therapy</li> <li>- BW &gt; 1250g with complications</li> </ul> | <ul style="list-style-type: none"> <li>- Level 2 facilities</li> <li>- Neonatal surgery (In selected Centers)</li> <li>- Ventilation up to CPAP, IPPV, high frequency + NO</li> <li>- Exchange transfusion</li> <li>- Cooling (selected Centers)</li> <li>- BW &lt; 1250g + &gt; with complications</li> <li>- TPN</li> </ul> | <ul style="list-style-type: none"> <li>- Level 3 facilities</li> <li>- Cardiac surgery</li> <li>- Neonatal neuro surgery</li> <li>- ECMO</li> <li>- Cooling</li> <li>- Extremely LBW &lt; 1000g</li> </ul> |

### 3.5.1 Lactation Management Centers (LMC) And Mother Baby Centers (MBC)

Only 42% of institutions that should provide services of a MBC and an LMC in fact do so (table 3.11).

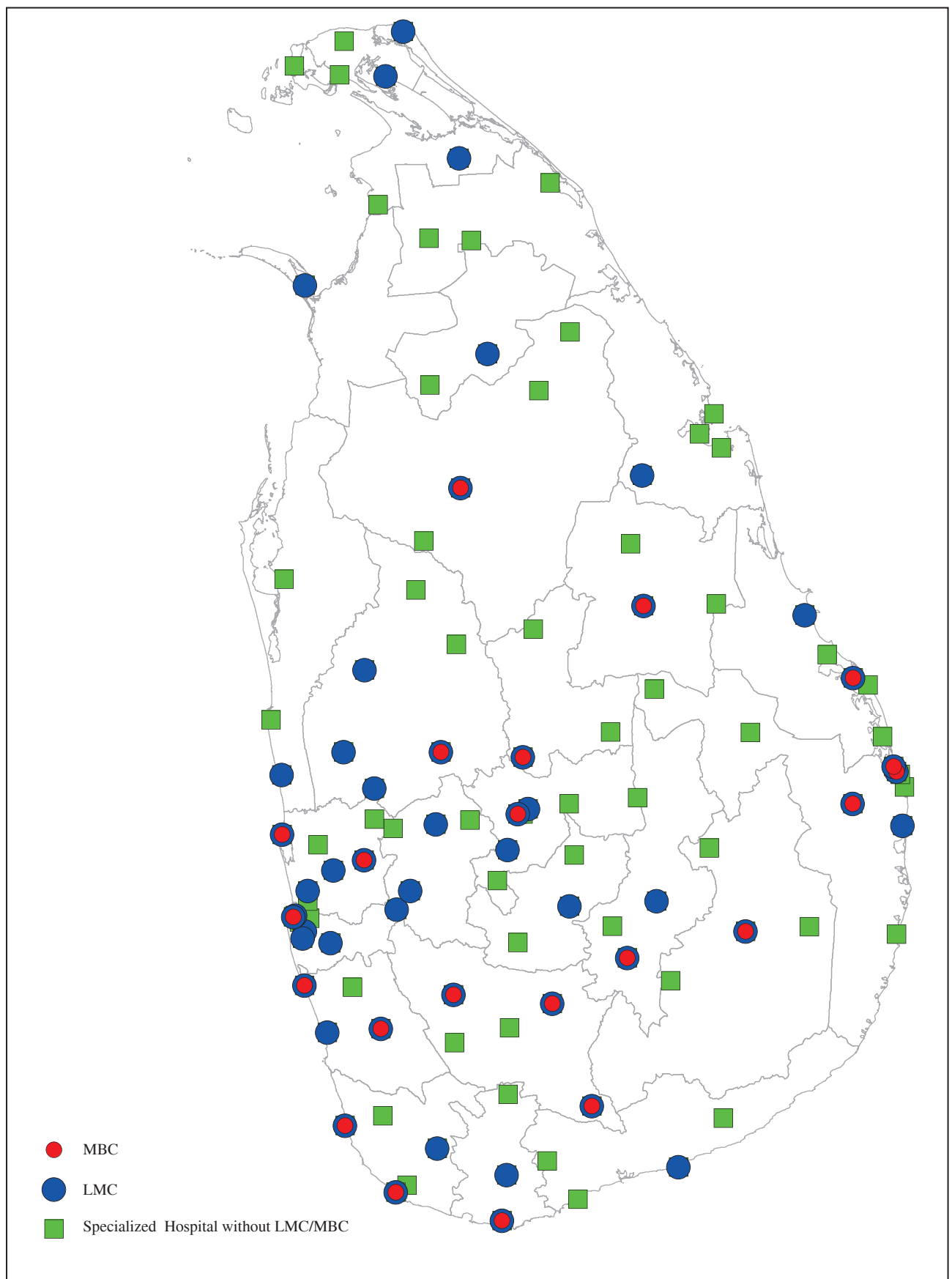
**Table 3.11 Distribution of LMC and MBCs**

| Hospital category                         | Births* | Percentage |
|-------------------------------------------|---------|------------|
| Specialized hospitals with LMC & MBC      | 146052  | 41.9       |
| Specialized hospitals with LMC            | 104392  | 30.0       |
| Specialized hospitals without LMC and MBC | 80680   | 23.2       |
| Divisional hospitals                      | 17353   | 5.0        |

(\* births are for the year 2013)

Map 3.1 shows the geographic distribution of these Centers highlighting the variation between districts and provinces.

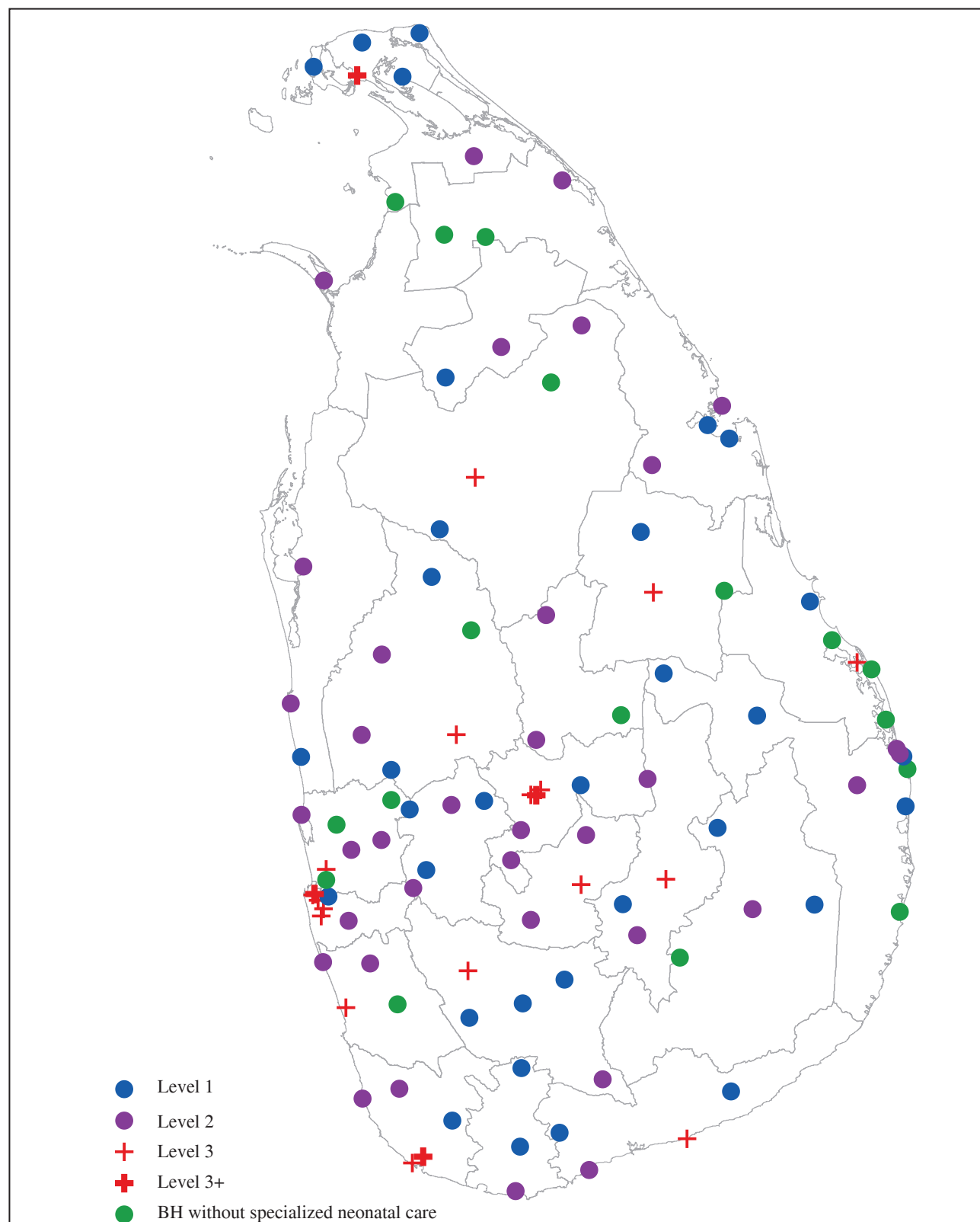
*Map 3.1 The distribution of LMCs and MBCs in the island.*



### 3.5.2 Special neonatal care facilities (Levels 1 to 3/3+)

The distribution of the planned special neonatal care facilities up to the level of base hospitals are displayed in the map given below (map 3.2) and the number of different level of care facilities per province and the percentage births occurring in them are presented in table 3.12.

*Map3.2: Distribution of planned special neonatal care facilities*



### 3.5.3 Availability of services

For the year 2013, the Registrar General had reported 365792 births for the country, while the government hospitals recorded 348522 births (95.3%). The RH-MIS reported 0.1% of deliveries to have taken place at home, the rest (4.6%) is assumed to have taken place in private health care facilities.

Table 3.12 describes the births reported from government hospitals in 2013 by the level of planned neonatal care services. It is seen that in the

country nearly 45% of births occur in a planned level 3+/3 facility and a further 41% in a level 2 facility. Although there are few hospitals which have specialist paediatric services, but are not included in the plan for neonatal special care, the percentage of births in these institutions are very small (0.4%). The 493 Divisional hospitals have 5% of the total deliveries in the country. Thus, 5.4% of deliveries occur in institutions providing only the essential newborn care package.

**Table 3.12: Levels of neonatal care and percentage of deliveries taking place in these hospitals (2013)**

| Level of neonatal care                                      | Number of hospitals | Deliveries (2013) | Percentage |
|-------------------------------------------------------------|---------------------|-------------------|------------|
| Level 1                                                     | 33 hospitals        | 30833             | 8.8        |
| Level 2                                                     | 36 hospitals        | 142736            | 41.0       |
| Level 3                                                     | 17 hospitals        | 149119            | 42.8       |
| Level 3+                                                    | 4 hospitals *       | 6987              | 2.0        |
| Specialized hospitals providing only essential newborn care | 17 hospitals        | 1529              | 0.4        |
| Divisional Hospitals                                        | 493 hospitals       | 17398             | 5.0        |

(\* Two hospitals: Lady Ridgway Hospital and Sirimavo Bandaranayke Children's Hospital are exclusively for children and do not have an obstetric care facility within its premises and the obstetric section of TH Karapitiya is situated at a separate location as TH Mahamodara. TH Jaffna is the only hospital that houses an Obstetric department at the same location as a level 3+ neonatal facility).

**Table 3.13: Distribution of identified neonatal care facilities and births per different level of facility by province**

| Province      | Births 2013 | Number of Level 1 | Number of Level 2 | Number of level 3 / 3+ | Births / level 3 /3+ facility | Births / level 1+2 facility |
|---------------|-------------|-------------------|-------------------|------------------------|-------------------------------|-----------------------------|
| Western       | 85564       | 1                 | 7                 | 7                      | 12223.4                       | 10695.5                     |
| Southern      | 42337       | 5                 | 4                 | 3                      | 14112.3                       | 4704.1                      |
| Central       | 51189       | 1                 | 6                 | 4                      | 12797.3                       | 7312.7                      |
| Northern      | 19053       | 5                 | 4                 | 1                      | 19053.0                       | 2117.0                      |
| Eastern       | 31773       | 7                 | 5                 | 1                      | 31773.0                       | 2647.8                      |
| North Central | 22811       | 2                 | 1                 | 2                      | 11405.5                       | 7603.7                      |
| Uva           | 23611       | 3                 | 3                 | 1                      | 23611.0                       | 3935.2                      |
| North Western | 40458       | 3                 | 4                 | 1                      | 40458.0                       | 5779.7                      |
| Sabaragamuwa  | 31726       | 6                 | 2                 | 1                      | 31726.0                       | 3965.8                      |
| Sri Lanka     | 348522      | 33                | 36                | 21                     | 16596.3                       | 5051.0                      |

Table 3.13 shows the differences between the provinces in terms of availability of services. In the North Western Province The number of births per level 3+/3 neonatal care facility is 3.3 times that of the Western province. In the Eastern and the Sabaragamuwa Provinces the births per level 3+/3 facility is 2.3 times that of the Western Province.

Births in government hospitals in 2013, by level of neonatal care and by province are presented in table 3.14.

**Table 3.14: births in government hospitals in 2013 by type of neonatal care facilities by province**

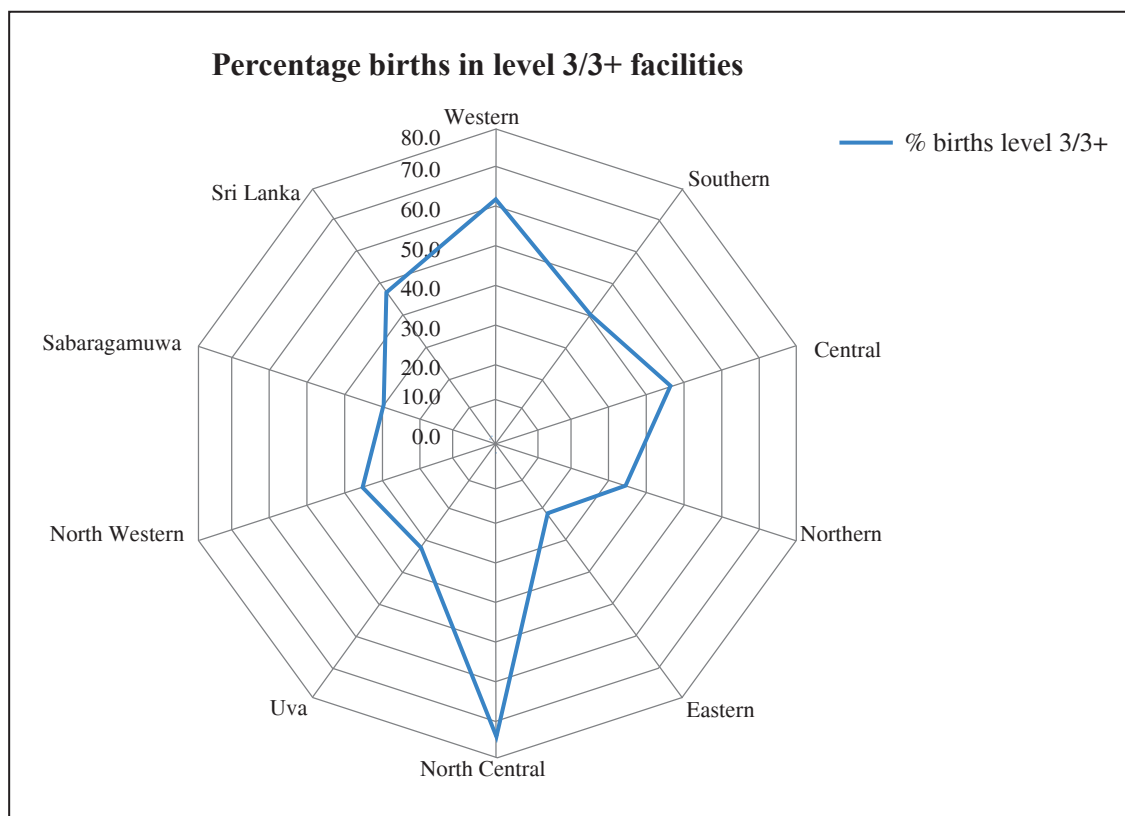
| Province      | Births 2013 | Births in Level 1 | % births level 1 | Births Level 11 | % births Level 11 | Births Level 3/3+ | % births Level 3/3+ | Births – Specialized Hospitals without special neonatal care facilities | % births in Specialized Hospitals without special neonatal care facilities | Births – Divisional Hospitals | % births in DH |
|---------------|-------------|-------------------|------------------|-----------------|-------------------|-------------------|---------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------|----------------|
| Western       | 85564       | 434               | 0.5              | 32266           | 37.7              | 52429             | 61.3                | 100                                                                     | 0.1                                                                        | 335                           | 0.4            |
| Southern      | 42337       | 2609              | 6.2              | 21203           | 50.1              | 16775             | 39.6                | 0                                                                       | 0.0                                                                        | 1750                          | 4.1            |
| Central       | 51189       | 124               | 0.2              | 22026           | 43.0              | 25049             | 48.9                | 76                                                                      | 0.1                                                                        | 3914                          | 7.6            |
| Northern      | 19053       | 2433              | 12.8             | 8756            | 46.0              | 6907              | 36.3                | 164                                                                     | 0.9                                                                        | 793                           | 4.2            |
| Eastern       | 31773       | 6462              | 20.3             | 13296           | 41.8              | 7076              | 22.3                | 515                                                                     | 1.6                                                                        | 4424                          | 13.9           |
| North Central | 22811       | 3397              | 14.9             | 202             | 0.9               | 16763             | 73.5                | 121                                                                     | 0.5                                                                        | 2328                          | 10.2           |
| Uva           | 23611       | 1346              | 5.7              | 12274           | 52.0              | 8050              | 34.1                | 308                                                                     | 1.3                                                                        | 1633                          | 6.9            |
| North Western | 40458       | 3859              | 9.5              | 20801           | 51.4              | 13945             | 34.5                | 245                                                                     | 0.6                                                                        | 1608                          | 4.0            |
| Sabaragamuwa  | 31726       | 10169             | 32.1             | 11912           | 37.5              | 9032              | 28.5                | 0                                                                       | 0.0                                                                        | 613                           | 1.9            |
| Sri Lanka     | 348522      | 30833             | 8.8              | 142736          | 41.0              | 156026            | 44.8                | 1529                                                                    | 0.4                                                                        | 17398                         | 5.0            |

Table 3.14 shows that 61% of deliveries in the Western Province take place in an institution that has level 3+/3 neonatal care facilities. This is because of the large number of level 3+/3 facilities in the Province. The North Central Province on the other hand has 73.5% of deliveries taking place in a level 3+/3 institution but it is noted that the total births is one third that of the Western Province. Ten percent

of deliveries in the Province are in divisional level hospitals.

The percentage of births occurring in facilities having level 3 / 3+ neonatal care services are presented in figure 3.6 and indicates a significant variation across provinces.

**Figure 3.6: Percentage of births in level 3 / 3+ facilities (2013)**





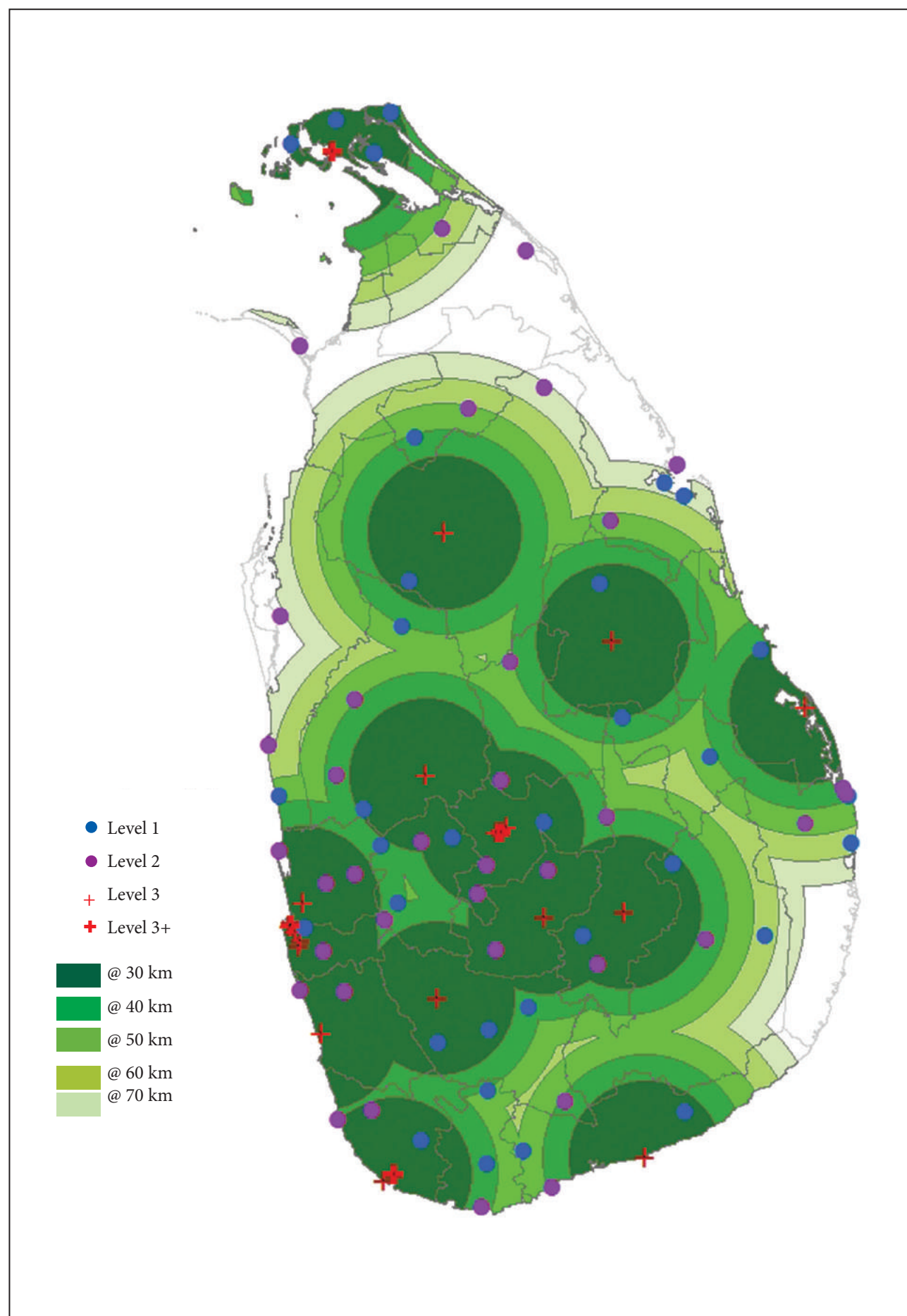
### 3.5.4 Accessibility of services

The land area per facility could be taken as a crude measure of accessibility to services. The variation between the provinces in accessibility is given in table 3.15.

**Table 3.15: Distribution of identified neonatal care facilities & area served by level of care facility by province**

| Province      | Births 2013 | Total land area Km <sup>2</sup> | Number of Level 1 | Number of Level 2 | Number of level 3 / 3+ | Area served by a level 3/3+ facility | Area served by level 1+2 facility |
|---------------|-------------|---------------------------------|-------------------|-------------------|------------------------|--------------------------------------|-----------------------------------|
| Western       | 85564       | 3711.0                          | 1                 | 7                 | 7                      | 530.1                                | 463.9                             |
| Southern      | 42337       | 5534.0                          | 5                 | 4                 | 3                      | 1844.7                               | 614.9                             |
| Central       | 51189       | 5741.1                          | 1                 | 6                 | 4                      | 1435.3                               | 820.2                             |
| Northern      | 19053       | 8756.5                          | 5                 | 4                 | 1                      | 8756.5                               | 972.9                             |
| Eastern       | 31773       | 9576.7                          | 7                 | 5                 | 1                      | 9576.7                               | 798.1                             |
| North Central | 22811       | 10643.3                         | 2                 | 1                 | 2                      | 5321.7                               | 3547.8                            |
| Uva           | 23611       | 8626.4                          | 3                 | 3                 | 1                      | 8626.4                               | 1437.7                            |
| North Western | 40458       | 8025.7                          | 3                 | 4                 | 1                      | 8025.7                               | 1146.5                            |
| Sabaragamuwa  | 31726       | 4953.7                          | 6                 | 2                 | 1                      | 4953.7                               | 619.2                             |
| Sri Lanka     | 348522      | 65568.4                         | 33                | 36                | 21                     | 3122.3                               | 950.3                             |

Map 3.3 The distances from a level 3/3+ facility to level 2 and level 1 hospitals



Map 3.3 highlights areas and institutions that are more than 70 Km from a 3/3+ neonatal care facility. The inequalities between the districts and provinces in the distribution of special neonatal care services in terms of distance from a 3+/3 facilities are also shown. This is a more refined indicator of access to services than land area per se.

It is seen that except a few institutions in the Northern and Eastern provinces, the majority of government

hospitals (base hospital and above) are within a 70 km. distance from a level 3+/3 facility.

Table 3.16 shows that in 2013, only 1970 deliveries (10.3%) in the Northern Province and 4122 deliveries (13.0%) in the Eastern Province occurred in government hospitals with specialist services outside the 70 km buffer zone. Out of this, DGH Trincomalee with 3951 births was situated within a buffer zone of 75km.

**Table 3.16: Population, land area, births for 2013, number of level 3 & 3+ facilities for the province and deliveries outside a 70 km radius from these institutions**

| Province               | Births 2013 | Level 3+ | Level 3 | Deliveries outside a 50 km buffer area from a level 3+/3 institution * | % deliveries outside of a 50 km buffer area from a level 3+/3 institution | Deliveries outside a 70 km buffer area from a level 3+/3 institution * | % deliveries outside of a 70 km buffer area from a level 3+/3 institution |
|------------------------|-------------|----------|---------|------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Western Province       | 85564       | 1        | 6       | 0                                                                      | 0.0                                                                       | 0                                                                      | 0.0                                                                       |
| Southern Province      | 42337       | 1        | 2       | 0                                                                      | 0.0                                                                       | 0                                                                      | 0.0                                                                       |
| Central Province       | 51189       | 1        | 3       | 0                                                                      | 0.0                                                                       | 0                                                                      | 0.0                                                                       |
| Northern Province      | 19053       | 1        |         | 4470                                                                   | 23.5                                                                      | 1970                                                                   | 10.3                                                                      |
| Eastern Province       | 31773       |          | 1       | 6361                                                                   | 20.0                                                                      | 4122                                                                   | 13.0                                                                      |
| North Central Province | 22811       |          | 2       | 202                                                                    | 0.9                                                                       | 0                                                                      | 0.0                                                                       |
| Uva Province           | 23611       |          | 1       | 160                                                                    | 0.6                                                                       | 0                                                                      | 0.0                                                                       |
| North Western Province | 40458       |          | 1       | 12194                                                                  | 30.1                                                                      | 0                                                                      | 0.0                                                                       |
| Sabaragamuwa Province  | 31726       |          | 1       | 0                                                                      | 0.0                                                                       | 0                                                                      | 0.0                                                                       |
| Sri Lanka              | 348522      | 4        | 17      | 23387                                                                  | 6.4                                                                       | 6092                                                                   | 1.7                                                                       |

\* in table 3.16 only deliveries occurring in government health institutions above the level of divisional hospitals have been included.

The access to level 3/3+ facilities from level 1 and level 2 facilities were assessed and is summarized in tables 3.17 (level 1) and 3.18(level 2) by province.

**Table 3.17: Access to level 3/3+ facilities from level 1 facilities by province**

| Province      | Births 2013 | No. of Level 1 hospitals in the district | Level 1 institutions outside a 50km buffer | Births in level 1 institutions outside the 50 km buffer | Level 1 institutions outside a 70 km buffer | Births in level 1 institutions outside the 70 km buffer | No of L3 / L3+ ins / province |
|---------------|-------------|------------------------------------------|--------------------------------------------|---------------------------------------------------------|---------------------------------------------|---------------------------------------------------------|-------------------------------|
| Western       | 85564       | 1                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 7                             |
| Southern      | 42337       | 5                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 3                             |
| Central       | 51189       | 1                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 4                             |
| Northern      | 19053       | 5                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 1                             |
| Eastern       | 31773       | 7                                        | 3                                          | 5139                                                    | 0                                           | 0                                                       | 1                             |
| North Central | 22811       | 2                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 2                             |
| Uva           | 23611       | 3                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 1                             |
| North Western | 40458       | 3                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 1                             |
| Sabaragamuwa  | 31726       | 6                                        | 0                                          | 0                                                       | 0                                           | 0                                                       | 1                             |
|               |             |                                          |                                            |                                                         |                                             |                                                         |                               |

**Table 3.18: Access to level 3/3+ facilities from level 2 facilities by province**

| Province      | Births 2013 | No. of Level 2 ins/ district | Level2 institutions outside a 50 km buffer | Births in level 2 institutions outside the 50 km buffer | Level2 institutions outside a 70 km buffer | Births in level 2 institutions outside the 70 km buffer | No of L3 / L3+ ins / Province |
|---------------|-------------|------------------------------|--------------------------------------------|---------------------------------------------------------|--------------------------------------------|---------------------------------------------------------|-------------------------------|
| Western       | 85564       | 7                            | 0                                          | 0                                                       | 0                                          | 0                                                       | 7                             |
| Southern      | 42337       | 3                            | 0                                          | 0                                                       | 0                                          | 0                                                       | 3                             |
| Central       | 51189       | 6                            | 0                                          | 0                                                       | 0                                          | 0                                                       | 4                             |
| Northern      | 19053       | 4                            | 3                                          | 4412                                                    | 2                                          | 1970                                                    | 1                             |
| Eastern       | 31773       | 5                            | 1                                          | 3951                                                    | 1                                          | 3951                                                    | 1                             |
| North Central | 22811       | 1                            | 0                                          | 0                                                       | 0                                          | 0                                                       | 2                             |
| Uva           | 23611       | 3                            | 0                                          | 0                                                       | 0                                          | 0                                                       | 1                             |
| North Western | 40458       | 4                            | 2                                          | 12194                                                   | 0                                          | 0                                                       | 1                             |
| Sabaragamuwa  | 31726       | 2                            | 0                                          | 0                                                       | 0                                          | 0                                                       | 1                             |

### 3.5.5 Selected characteristics of level 3/3+ institutions

An attempt was made to obtain information pertaining to the admissions, workload, human resources and infrastructure from hospitals included in the planned specialized neonatal care services in Sri Lanka. Since complete information was not available for

a majority of the level 1 and level 2 facilities, the information pertaining to level 3/3+ facilities only are presented here.

### 3.5.6. Admissions

Characteristics of admissions to level 3/3+ neonatal care facilities are summarized in table 3.19.

**Table 3.19: Characteristics of admissions to level 3 / 3+ neonatal care facilities during the 2nd Quarter 2015 (April, May & June)**

| Hospital Name          | Births Q2 2015 | Admissions for Q2 2015 | Percentage of neonatal admissions from total births | Transferred in as % of total admissions | Transferred out as percentage of total admissions | Percentage of neonates with LBW | Percentage with pre term | % Normal Vaginal Delivery | % Caesarean Sections | % Elective sections | % Emergency sections | Stillbirth Rate / 1000 births |
|------------------------|----------------|------------------------|-----------------------------------------------------|-----------------------------------------|---------------------------------------------------|---------------------------------|--------------------------|---------------------------|----------------------|---------------------|----------------------|-------------------------------|
| TH Jaffna              | 1218           | 309                    | 25.4                                                | 16.8                                    | 5.8                                               | 35.9                            | 33.0                     | 59.9                      | 33.9                 | 49.4                | 50.6                 | 10.6                          |
| TH Karapitiya          | CH             | 37                     | CH                                                  | 73.0                                    | 10.8                                              | 62.2                            | 37.8                     | CH                        | CH                   | CH                  | CH                   | CH                            |
| LRH                    | CH             | 65                     | CH                                                  | 53.8                                    | 3.1                                               | 72.3                            | 67.7                     | CH                        | CH                   | CH                  | CH                   | CH                            |
| SBCH                   | CH             | 331                    | CH                                                  | 12.7                                    | 3.0                                               | 35.0                            | 35.0                     | CH                        | CH                   | CH                  | CH                   | CH                            |
| TH Ragama              | 2030           | 247                    | 12.2                                                | 6.5                                     | 6.1                                               | 54.3                            | 45.3                     | 62.4                      | 38.1                 | 58.8                | 41.2                 | 8.8                           |
| TH Anuradhapura        | 2832           | 271                    | 9.6                                                 | 12.2                                    | 0.4                                               | 52.8                            | 54.2                     | 61.7                      | 33.4                 | 57.1                | 42.9                 | 7.4                           |
| TH Mahamodara          | 2986           | 223                    | 7.5                                                 | 2.7                                     | 2.2                                               | 59.6                            | 56.1                     | 65.1                      | 31.5                 | 38.1                | 61.9                 | 7.6                           |
| TH Batticaloa          | 1588           | 275                    | 17.3                                                | 14.2                                    | 3.3                                               | 44.7                            | 37.5                     | 66.6                      | 30.7                 | 80.1                | 19.9                 | 8.1                           |
| TH Peradeniya          | 2130           | 253                    | 11.9                                                | 2.0                                     | 5.1                                               | NI                              | NI                       | 57.8                      | 42.1                 | 53.7                | 46.3                 | 4.7                           |
| GH Kandy               | 2532           | 616                    | 24.3                                                | 5.8                                     | 1.0                                               | 22.4                            | 2.9                      | 60.0                      | 39.9                 | 38.7                | 61.3                 | 7.4                           |
| DMH                    | 901            | 253                    | 28.1                                                | 2.0                                     | 9.1                                               | 56.1                            | 47.8                     | 63.3                      | 30.5                 | 49.5                | 50.5                 | 2.2                           |
| Castle Street Hospital | 3338           | NI                     | NI                                                  | NI                                      | NI                                                | NI                              | NI                       | 68.3                      | 26.1                 | 51.3                | 48.7                 | 6.5                           |
| Colombo South TH       | 1580           | 112                    | 7.1                                                 | 4.5                                     | 3.6                                               | 58                              | 56.3                     | 55.3                      | 33.7                 | 52.3                | 47.7                 | 5.0                           |
| PGH Kurunegala         | 3193           | 672                    | 21.0                                                | 9.5                                     | 0.0                                               | 38.4                            | 31.4                     | 60.6                      | 38.7                 | 54.4                | 45.6                 | 5.6                           |
| PGH Ratnapura          | 1957           | 308                    | 19.9                                                | 5.9                                     | 5.4                                               | 39.8                            | 25.4                     | 62.5                      | 37.0                 | 53.0                | 47.0                 | 7.2                           |
| PGH Badulla            | 1910           | 331                    | 16.1                                                | NI                                      | NI                                                | 49.4                            | 32.8                     | 65.8                      | 31.5                 | 52.1                | 47.9                 | 9.9                           |
| DGH Mannar             | 391            | 69                     | 17.6                                                | 0.0                                     | 4.3                                               | 30.4                            | 30.4                     | 72.4                      | 22.8                 | 49.4                | 50.6                 | 2.6                           |
| DGH Hambantota         | 1190           | 230                    | 19.3                                                | 0.9                                     | 1.3                                               | 45.2                            | 32.2                     | 56.8                      | 43.9                 | 57.0                | 43.0                 | 4.2                           |
| DGH Killinochchi       | 484            | 106                    | 21.9                                                | 5.7                                     | 6.6                                               | 29.2                            | 24.5                     | 81.0                      | 11.2                 | 24.1                | 75.9                 | 6.2                           |
| DGH Vavuniya           | 830            | 152                    | 18.3                                                | 8.6                                     | 21.1                                              | 32.9                            | 27.6                     | 58.1                      | 41.1                 | 49.6                | 50.4                 | 13.1                          |
| DGH Mullaitivu         | 231            | 62                     | 26.8                                                | 0.0                                     | 8.1                                               | 32.3                            | 8.1                      | 88.3                      | 11.7                 | 59.3                | 40.7                 | 0.0                           |
| DGH Kalutara           | 1863           | 273                    | 14.7                                                | 0.4                                     | 3.3                                               | 30.8                            | 23.4                     | 57.3                      | 41.2                 | 66.4                | 33.6                 | 5.9                           |
| Total                  | 33184          | 5858                   | 17.7                                                | 6.3                                     | 3.1                                               | 39.8                            | 28.1                     | 62.5                      | 34.5                 | 52.9                | 46.1                 | 6.4                           |

Table 3.19 shows the variation in the number of admissions and deliveries occurring in these institutions. The births in these institutions for the second quarter of 2015, ranged from a minimum of 231 reported for DGH Mullativu to 3338 reported from Castle Street Hospital for Women. Similarly the percentage admissions to the neonatal care facilities ranged from 7.1% for Colombo South Teaching Hospital to 28.1% for that of De Soyza Maternity Hospital. On average 17.7% of the deliveries required specialized neonatal care, out of which 6.0% were transferred from other institutions. It is also noted that 6.4% stillbirths were reported from these institutions for the 2nd quarter for 2015.

Low birth weight was reported in 40.0% of the admissions to the level 3/3+ specialized neonatal care

facilities. It is noted that 62.3% of the admissions were ‘normal vaginal deliveries’, while 34.5% were following LSCS. Out of the admissions following a caesarean section, 47.7% were after an elective sections while 52.3% were following an emergency section. Information on reasons for admission or morbidity are not available for comment.

### 3.6 Infrastructure

The births occurring in government hospitals in 2013 were analysed based on the availability of specialized personnel and are presented in table 3.20.

**Table 3.20: Births in government institutions for the year 2013 by the availability of specialized care**

| <i>Description</i>                                                         | <i>Number</i> | <i>Percentage</i> | <i>Cumulative %</i> |
|----------------------------------------------------------------------------|---------------|-------------------|---------------------|
| <i>Births in hospitals with 2 Neonatologists + pediatricians</i>           | 56750         | 16.3              | 16.3                |
| <i>Births in hospitals with at least one Neonatologist + Pediatricians</i> | 120394        | 34.5              | 50.8                |
| <i>Births in hospitals with 2 or more Pediatricians only</i>               | 70236         | 20.2              | 71.0                |
| <i>Births in hospitals with 1 Pediatrician only</i>                        | 83176         | 23.9              | 94.9                |
| <i>Births in specialized hospitals with no Pediatrician</i>                | 568           | 0.2               | 95.0                |
| <i>Births in Divisional Hospitals</i>                                      | 17353         | 5.0               | 100.0               |
| <i>Total births in government hospitals 2013</i>                           | 348477        | 100.0             |                     |

**Table 3.21: Distribution of births, human resources and workload among level 3 / 3+ neonatal care facilities**

| Hospital name          | Tot_admQ2 | Admissions / specialist | Admissions per day | births per day | No of functional ventilators / day/admission | No of functional C-PAP / day / admission | No of functional incubators / day / admission | No of transport ventilators/day/admission | No of functional Multiparameter monitors/day/admission | No of functional Pulse Oximeter / admission / day | No of Open Resuscitators / admission / day | No of functional Photo Therapy Units / admission / day | No of functional Syringe Pumps / admission / day | No of functional Infusion Pumps / admission / day |
|------------------------|-----------|-------------------------|--------------------|----------------|----------------------------------------------|------------------------------------------|-----------------------------------------------|-------------------------------------------|--------------------------------------------------------|---------------------------------------------------|--------------------------------------------|--------------------------------------------------------|--------------------------------------------------|---------------------------------------------------|
| TH Jaffna*             | 309       | 3.4                     | 3.4                | 13.5           | 0.9                                          | 0.6                                      | 2.6                                           | 0.0                                       | 0.6                                                    | 0.9                                               | 2.6                                        | 3.5                                                    | 0.9                                              | 2.6                                               |
| TH Karapitiya*         | 37        | 0.4                     | 0.4                | NR             | 12.2                                         | 2.4                                      | 21.9                                          | 0.0                                       | 21.9                                                   | 7.3                                               | 4.9                                        | 12.2                                                   | 48.6                                             | 17.0                                              |
| LRH*                   | 65        | 0.4                     | 0.7                | NR             | 6.9                                          | 1.4                                      | 20.8                                          | 2.8                                       | 13.8                                                   | 1.4                                               | 0.0                                        | 4.2                                                    | 48.5                                             | 5.5                                               |
| SBCH*                  | 331       | 0.9                     | 3.7                | NR             | 1.1                                          | 1.1                                      | 6.8                                           | 0.3                                       | 4.1                                                    | 0.3                                               | 0.5                                        | 3.0                                                    | 4.4                                              | 1.9                                               |
| TH Ragama              | 247       | 0.4                     | 2.7                | 22.6           | 2.9                                          | 0.7                                      | 5.1                                           | 0.0                                       | 1.8                                                    | 2.2                                               | 1.8                                        | 3.6                                                    | 6.9                                              | 0.4                                               |
| TH Anuradhapura        | 271       | 3.0                     | 3.0                | 31.5           | 1.7                                          | 0.3                                      | 6.6                                           | 0.7                                       | 3.0                                                    | 1.0                                               | 1.3                                        | 3.3                                                    | 3.0                                              | 1.0                                               |
| TH Mahamodara          | 223       | 1.2                     | 2.5                | 33.2           | 2.0                                          | 0.8                                      | 4.4                                           | 0.8                                       | 1.2                                                    | 3.2                                               | 2.4                                        | 2.4                                                    | 4.0                                              | 3.2                                               |
| TH Batticaloa          | 275       | 3.1                     | 3.1                | 17.6           | 1.0                                          | 0.7                                      | 4.6                                           | 0.0                                       | 1.6                                                    | 2.6                                               | 2.3                                        | 4.3                                                    | 3.6                                              | 3.9                                               |
| TH Peradeniya          | 253       | 0.9                     | 2.8                | 23.7           | 0.7                                          | 0.7                                      | 5.0                                           | NR                                        | 0.0                                                    | 0.0                                               | 0.0                                        | 0.0                                                    | 0.0                                              | 0.0                                               |
| GH Kandy               | 616       | 3.4                     | 6.8                | 28.1           | 0.0                                          | 0.0                                      | 0.0                                           | NR                                        | 0.0                                                    | 0.0                                               | 0.0                                        | 0.0                                                    | 0.0                                              | 0.0                                               |
| DMH                    | 253       | 0.7                     | 2.8                | 10.0           | 0.0                                          | 2.8                                      | 6.4                                           | 0.4                                       | 1.8                                                    | 7.8                                               | 1.4                                        | 6.4                                                    | 9.6                                              | 1.4                                               |
| Castle Street Hospital | 605       | 3.4                     | 6.7                | 37.1           | 0.9                                          | 0.4                                      | 2.7                                           | 0.1                                       | 0.7                                                    | 1.2                                               | 0.7                                        | 2.7                                                    | 3.0                                              | 3.3                                               |
| Colombo South TH       | 112       | 0.1                     | 1.2                | 17.6           | 2.4                                          | 1.6                                      | 16.9                                          | 0.0                                       | 5.6                                                    | 4.0                                               | 0.8                                        | 4.8                                                    | 16.1                                             | 3.2                                               |
| PGH Kurunegala         | 672       | 3.7                     | 7.5                | 35.5           | 0.4                                          | 0.1                                      | 2.5                                           | 0.0                                       | 0.9                                                    | 0.7                                               | 0.0                                        | 1.3                                                    | 1.2                                              | 0.0                                               |
| PGH Ratnapura          | 389       | 1.44                    | 4.3                | 21.7           | 0.7                                          | 0.5                                      | 2.5                                           | 0.2                                       | 0.9                                                    | 1.2                                               | 1.2                                        | 2.1                                                    | 1.9                                              | 0.9                                               |
| PGH Badulla            | 308       | 1.14                    | 3.4                | 21.2           | 1.5                                          | 0.9                                      | 3.5                                           | 0.0                                       | 2.6                                                    | 0.3                                               | 1.8                                        | 2.6                                                    | 6.1                                              | 0.0                                               |
| DGH Mannar             | 69        | 0.4                     | 0.8                | 4.3            | 2.6                                          | 5.2                                      | 5.2                                           | NR                                        | 2.6                                                    | 0.0                                               | 0.0                                        | 3.9                                                    | 7.8                                              | 6.5                                               |
| DGH Hambantota         | 230       | 0.6                     | 2.6                | 13.2           | 1.2                                          | 0.4                                      | 4.3                                           | 0.0                                       | 2.3                                                    | 1.2                                               | 0.8                                        | 4.3                                                    | 1.6                                              | 0.8                                               |
| DGH Killinochchi       | 106       | 0.6                     | 1.2                | 5.4            | 0.8                                          | 0.8                                      | 4.2                                           | NR                                        | 2.5                                                    | 1.7                                               | 2.5                                        | 2.5                                                    | 1.7                                              | 1.7                                               |
| DGH Vavuniya           | 152       | 0.8                     | 1.7                | 9.2            | 1.2                                          | 1.2                                      | 3.6                                           | NR                                        | 2.4                                                    | 1.8                                               | 1.2                                        | 3.0                                                    | 4.1                                              | 0.0                                               |
| DGH Mullaitivu         | 62        | 0.7                     | 0.7                | 2.6            | 1.5                                          | 1.5                                      | 4.4                                           | NR                                        | 1.5                                                    | 2.9                                               | 0.0                                        | 5.8                                                    | 1.5                                              | 1.5                                               |
| DGH Kalutara           | 273       | 3.0                     | 3.0                | 20.7           | 1.0                                          | 1.0                                      | 5.6                                           | NR                                        | 1.6                                                    | 2.0                                               | 0.7                                        | 3.6                                                    | 3.3                                              | 3.6                                               |

(Information for Sirimavo Bandaranayke Children's Hospital, PGH Ratnapura and PGH Badulla were not available for analysis) (\*Level 3+ care) (NR – Not Relevant & NI = No Information)

|  |                                     |
|--|-------------------------------------|
|  | More than 2.0 per admission per day |
|  | 1.1 – 2.0 per admission per day     |
|  | Up to 1.0 per admission per day     |

The table has been colour coded to highlight the variation between institutions. The equipment requirement for the different levels of facilities will have to be decided through expert consultation based on the estimated admissions and morbidity information. Currently there is a paucity of information on these aspects.





*At the launch of Neonatal Retrieval in Western Province, with the team of Trainers from John Radcliff Hospital, Oxford, at Lady Ridgeway Hospital for Children, Colombo  
Courtesy of Dr Ramya de Silva*



## CHAPTER 4: BOTTLENECKS AND SOLUTIONS

Improving newborn care is a key area addressed in the MCH policy 2012 and a national MNH strategic plan 2012-2016 has been published. National goals for neonatal /perinatal mortality have been agreed upon and are available.

There has been significant progress on most of the neonatal components of the MNH strategy (annex 2). The two areas given below have made little progress.

1. To ensure that the infrastructure is strengthened to provide essential and advanced care for the newborns
2. Ensure effective implementation of the Baby Friendly Hospital Initiative

However, considering the fact that the planned period ends in 2016, the overall progress shown is inadequate. A midterm progress review has not been carried out. Data on process indicators are not available and there is only limited data on outcome.

### Section 4.1: Strengthening the infrastructure necessary to provide essential and advanced care for the newborns

Generic and specific bottlenecks to the implementation of the national plan for providing essential and advanced care of the newborn that were identified during the review process are presented, based on the WHO health systems building blocks framework.

#### 4.1.1 Infrastructure development

##### A. LEADERSHIP AND GOVERNANCE

##### A.1. BOTTLE NECKS AT NATIONAL LEVEL

- Perinatal / neonatal care has not received the

same degree of attention as maternal care from the policy makers.

- A Consultant Community Physician for intranatal and newborn care was appointed only after the external review of Maternal and Newborn Health in 2007. The unit is severely understaffed in respect of all grades of personnel and the absence of middle level medical officers is a drawback in carrying out the functions of training, monitoring and evaluation effectively.
- The mechanism available to disseminate national policy documents and decisions to the provinces/districts has been ineffective. There is no mechanism to hold them accountable for implementing / incorporating national policies in their plans.
- Although the FHB is responsible for planning the services for essential and advanced newborn care, the implementation of these plans need the cooperation of many key partners, viz. all DDGs, Provincial and Regional health authorities and institutional heads.
- There is no effective mechanism for holding key partners accountable for implementation of national plans within an agreed upon time frame.
- This has resulted in adhoc actions outside the national plan which leads to disruption of the overall plan.
- The absence of a time based and costed implementation /activity plan for the necessary infrastructure strengthening has contributed to delays.
- The position of the FHB within the organogram of the Ministry of Health has also contributed to difficulties in implementation.

## A.2. RECOMMENDATIONS

1. The Intranatal and Newborn Care Unit should be further strengthened with special emphasis towards improvements in:

- a. Additional staff / designated posts and duties and responsibilities
- b. Middle level officers with technical competency should be appointed to the unit to facilitate its functions

2. Strengthen the health development links and improve coordination between the National, Provincial and District health authorities in the implementation of the National MNH strategy and plans for improving intranatal and neonatal care Services Island wide through the National Health Development Committee.

Preparation of a costed and time based implementation plan necessary to develop the neonatal care services island wide, according to the four levels of care that has been decided upon, and identifying accountability of different stakeholders.

The plan should include building needs, upgrading / establishment of supporting services (X-ray, laboratory, blood bank etc) equipment currently available and the shortfall of the human resources necessary to run the services according to the norms and standards that have been identified.

3. It is recommended that separate committees headed by the relevant DDGs are established and held accountable for the different areas listed above.

Progress should be reviewed at the Technical Advisory Committee Meetings held once in two months to monitor the level of implementation and findings presented at the National Committee on Family Health chaired by the Secretary Health.

4. The position of the FHB within the organogram of the Ministry of Health should be revisited taking into consideration the very wide scope of its activities.

## A.3. BOTTLE NECKS AT PROVINCIAL LEVEL

- In the absence of a central mechanism to influence provinces and districts to adhere to national plans, strong advocacy for MNH is needed at Provincial level to overcome competing interests in health and non health sectors for provincial resources.
- District level planning processes are often weak and prioritization of competing interests is not often evidence based. The lack of an evaluation culture that feeds into the planning process is a weakness.
- The MO-MCH is the key person who serves as a liaison between the FHB and the district and is responsible for supervision, monitoring and evaluation of all programs (field and institution based) that are under the purview of the FHB. However, the absence of criteria for selection for the post and inadequacy of the current in-service training programme for appointed officers has made the MO-MCH ineffective in supervision & monitoring, especially the institutional MNH programs.

## A.4 RECOMMENDATIONS

1. It is recommended that the Provincial planning units be strengthened under the Provincial CCP, with the appointment of designated planning officers with appropriate postgraduate qualifications and these officers be provided in-service training as appropriate.
2. Guidelines be formulated and adhered to in setting up regional planning committees.



3. Protocols for planning at Provincial level and appropriate training be provided based on the MNH strategic plan.

#### MO-MCH

4. Prerequisites for the post of MO-MCH must be identified and these posts should not be advertised in the post internship appointments list. The selected individuals should undergo pre placement training. The knowledge and skills necessary for the supervision and monitoring of all programmes within the district that comes under the purview of the FHB should be strengthened in the pre placement training.
5. It is suggested that until such times that a CCP- MCH is appointed at Provincial level, the monitoring and supervision of the implementation of the institution based components of intranatal and neonatal care be included under the duties of the Provincial CCP - planning.
6. It is recommended that, concurrence of the Board of Study in Community Medicine be sought to appoint Senior Registrars in Community Medicine, (post MD, before Board Certification) to work under the Provincial CCP, to be responsible for institution based MNH activities in a District until such times that a CCP- MCH is appointed per Province.

#### A.5 BOTTLENECKS AT INSTITUTIONAL LEVEL

- Lack of knowledge of the level of neonatal care services that should be made available in the institution based on the national plan
- It was observed that even when upgrading / building new neonatal care facilities were included in institutional master plans, the

priority given to these units in terms of the order of construction was low in spite of the fact that adequate facilities were not available.

- The location and allocation of space of the neonatal care facilities often did not adhere to the buildings and facilities guidelines. Access to the unit is also another area that has not received much attention.
- Absence of an institutional mechanism to address issues arising in service provision

#### A.6. RECOMMENDATIONS

1. It is recommended that administrators and consultants should be informed of the national plan for providing neonatal care services.
2. Guidelines on buildings and facilities be provided to all institutions based on the level of care assigned to a given institution in the national plan.
3. It is recommended that management committee meetings be held regularly with the participation of the relevant officers under the chairmanship of the Head of the Institution. The issues identified at unit supervisions and unit meetings should be discussed and corrective action taken and followed up at this meeting.

#### B. HEALTH INFORMATION SYSTEM

Strengthening data production and use of good quality data is fundamental to policy making, monitoring programmes, and health outcomes. Thus improvements in neonatal health demands improvement in availability, quality, timeliness and disaggregation of data on outcome as well as process indicators.

##### B.1. BOTTLENECKS

- Paucity of published information on the extent and causes of neonatal deaths especially deaths in the early neonatal period is a main

reason for the low visibility of the problem at all levels.

- Stillbirth registration is undertaken only in 65 “proclaimed areas” where medical registrars are available out of a total of 914 death registration divisions. This is a practice that has not changed since 1952, when only 37% of births occurred in institutions.
- Perinatal and early neonatal mortality information (rate and causes) is not given prominence at national level. Mortality rates disaggregated by Province/District are not available.
- Perinatal death surveillance system is an important tool for examining causes of perinatal mortality, especially identifying preventable mortality. The system has been in operation from 2006. However, many difficulties have been encountered.
  - o There has been difficulty in initiating the process in some institutions and regular perinatal death surveillance meetings are not held in some institutions.
  - o There have been issues on definitions used varying between institutions and no information on completeness of data (whether all deaths from an institution are captured).
  - o The Ministry of Health circular on perinatal death surveillance has not been revised and data collection and reporting formats have not been updated for the last 8-9 years.
  - o Currently, the perinatal death surveillance is the responsibility of the Maternal Mortality Surveillance unit at the FHB and has not received the attention needed at the initiation of a project of this nature. The unit is understaffed and there have been difficulties in compiling and analyzing available data. Preliminary analysis of data for 2014 based on 91% of the

institutions was made available this year and it appears that data from earlier times are not available.

- Although many of the critical intra-natal and newborn interventions have been introduced into the service settings, process indicators are not available.
- Standard definitions necessary for the collection of accurate data are not available at point of generation of data.
- Data is not available from the smaller institutions (below the level of a Base Hospital where specialist services are not available) which account for 20 000 (5%) of births in the country and from private healthcare institutions which account for around 20 000 births (5%).

## **B.2 RECOMMENDATIONS**

### **B.2.1 REGISTRATION OF STILLBIRTHS**

1. Taking into consideration that 99.9 % of births in the country take place in a health care institution the feasibility of registering foetal deaths (stillbirths) island wide needs to be discussed with the Registrar General and necessary legislation and processes be identified. A stillbirth declaration form on the lines of the death declaration forms that are currently used in the hospital system may be suggested.

This would lead to the RG publishing in his annual report a perinatal mortality rate for the country as well as disaggregated by Province and District.

2. The setting up of a perinatal mortality information system for collection, consolidation, analysis and dissemination of information within the RH-HMIS is strongly recommended

Reporting of deaths

Accurately defining and reporting perinatal deaths (i.e., fetal and early neonatal deaths)

is a critical first step in understanding the magnitude and causes of these important events. Thus it is important that all health care providers working at the point of generation of data know the definitions and reporting requirements for foetal deaths/stillbirths, perinatal deaths, early and late neonatal deaths. Strengthening of the institutional health information with special emphasis on accurate reporting, use of standard definitions and international classification of disease conditions (International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) Version for 2010)(World Health Organization, 2010) so as to improve the quality of reported data is important. Therefore, dissemination of definitions and guidelines for reporting in the form of flowcharts for easy reference to all institutions that provide services for births and training of personnel on correct identification and reporting of data is recommended

3. The definitions.

As per WHO criteria it is recommended that all fetuses and infants weighing at least 500 grams at birth be included in the statistics.

“The criteria for deciding whether an event has taken place within the perinatal period should be applied in the order: (1) birth weight, (2) gestational age, (3) crown-heel length. The inclusion of fetuses and infants weighing between 500g and 1000g in national statistics is recommended both because of its inherent value and because it improves the coverage of reporting at 1000g and over” (World Health Organization, 2006).

4. Perinatal mortality investigation and neonatal mortality registry.

Revisit and strengthen the current system of perinatal death audits, in consultation with the professional Colleges and move towards a system of confidential inquiry and expansion of the system in the future, to include audits of severe morbidity.

An important objective of an investigation into perinatal deaths is to understand the nature of problems that lead to death both in terms of the cause of death and the antecedent events; especially an understanding of factors that may have lessened the risk of death. Such information is needed for improvement of the quality of clinical services, development of health care policy, comparisons between areas within a country as well as for research.

The key concept in the International Classification of Disease (ICD) is the identification of the underlying cause of death. However, the ICD has shortcomings in classifying perinatal deaths, particularly stillbirths. This has led to the development of a multiplicity of classification systems and divergent opinions on what is best. These classification systems attempt to classify foetal and neonatal deaths with a view to understanding the underlying factors contributing to death, highlighting preventable factors. The Aberdeen classification, Wigglesworth classification, PSANZ guidelines for Perinatal Mortality Audit and the Causes of Death and Associated Conditions (Codac) classification are some that are used. The Codac classification has been tested in a variety of population groups including developing country settings, following which version II of the Codac has been proposed.

It is recommended that an appropriate classification system be decided upon and used in the perinatal death audits in addition to the ICD classification of deaths.

The best understanding of the cause of death is provided by a multidisciplinary group of health care providers reviewing the death at the institution where the event occurred. This remains the “gold standard” for classification of the cause of death; highlighting the importance of the perinatal death audit at institutional level. The information collected in the audit process must contain all relevant information for;

*Classification and establishing the diagnosis,*

*The sequence and an assessment of the relative significance of events leading to death,*

*Availability and appropriateness of care,*

*An assessment of the “preventability” of the event*

*Avoidable factors which may have lessened the risk of death.*

The collection, analysis and interpretation of this data by district/province/country and over time, would provide a rich source of information for understanding the key factors that affect perinatal mortality. Hence, it is important to establish a Perinatal Mortality Registry. The initiation and maintenance of a neonatal mortality and morbidity registry at the national level must therefore be planned for, from the inception of services so that the necessary resources for this purpose can be identified and developed.

It is recommended that this be based in the perinatal mortality surveillance unit at the FHB. This would serve as an important and rich resource for research used on its own and used in conjunction with the planned e-HMIS which would enable linking of maternal data, child development and long term morbidity data with data from the registry.

Access to data without identification details must be made available to researchers on data sharing/accessing agreements and systems to facilitate these processes built in from the inception of the registry.

5. In this regard it is recommended that the function of Perinatal Mortality Surveillance at the FHB be strengthened. Taking into consideration the likely increase in the quantum of work that is needed to improve the perinatal death audit, it may be judicious to assign the task to a separate unit.
6. It is important to establish methods for translating “lessons learnt” into actions at

institutional, regional and national level so that the professionals involved perceive the usefulness of the exercise.

7. The new e-health management information system (e-HMIS) that is currently piloted would provide information on most of the neonatal interventions that have been introduced. However, it is necessary to include information necessary to monitor the use of intra-natal interventions.

It is important to include in the information system the health institutions below the level of Base Hospitals. If it is not feasible to collect this information from all such hospitals, a subsample of institutions from districts where the number of deliveries in this category of institution is high may be included in the first instance and gradually expanded to cover all institutions.

8. It is recommended that both outcome and process indicators be routinely presented disaggregated by “neonatal network”/ district/ province, so that performance may be examined linked to outcome.
9. It is suggested that a few indicators of clinical standards in neonatal medicine be routinely included in the HMIS. These may be selected in consultation with the professional colleges as appropriate for the level of neonatal services.

It is suggested that therapeutic and management techniques which have been well researched and shown to have important effects on mortality and morbidity such as use of antenatal corticosteroids, surfactant replacement therapy, use of Magnesium Sulphate for neuroprotection, nitric oxide for persistent pulmonary hypertension, therapeutic hypothermia for babies with hypoxic ischemic encephalopathy, screening for retinopathy of prematurity be considered for inclusion in information from level 3 and 3+ units.

10. Information at unit level should be collected quarterly to monitor workload and training



needs of all categories of staff in neonatal care.

It is recommended that standard data collection systems be developed and used at unit level so that information from all units can be pooled for analysis. Data necessary to monitor performance including audit tools and protocols appropriate for each level of care must be developed in consultation with the College of Pediatricians. The data from these sources can form the basis of a standardized annual report from units/ "neonatal networks"/neonatal services in a Province.

## C. HEALTH WORKFORCE

### C.1. BOTTLENECKS

- A policy, projections and a plan for development of human resources needed for the planned neonatal care services are not available.
- The discussions revealed that many of the different categories of staff were not aware of their job descriptions.
- A reluctance on the part of staff to undertake service provision in specialized units providing neonatal care have been noted resulting in difficulties in providing 24\*7 services in some instances. Issues of overwork, work related stress, burnout etc. were raised and these are not addressed in the routine system.
- Designated PHOs are not available in all institutions providing specialized neonatal care (level one and above) and often intern house officers provide first contact care.
- There are difficulties in ensuring in-service training of all care providers to deliver the selected interventions.
- A financial allocation dedicated to in-service training is not available at district level. There is also the lack of dedicated staff responsible for training (training faculty) and a designated person to coordinate training in the district.

- The absence of a database giving information on in-service training of staff at institutional level and the absence of a regular training schedule at district level hinders the continued training of staff categories.
- Staff in the private sector and the government hospitals below the level of base hospitals are often left out of in-service training activities.
- Where the training is mainly the development of a skill followed by certification, regular skills drills are necessary to ensure that the skills are retained at an optimum. There is also the necessity for refresher training and re-certification. These are aspects that have not been addressed.
- Designated competency based training programmes for the different categories of staff newly assigned to neonatal care services are not available.

### C.2. RECOMMENDATION

1. Human resources necessary for the staffing of neonatal care services have to be planned. Staffing norms and job descriptions and responsibilities have to be developed in respect of the different categories of staff providing specialised neonatal care.
2. A policy decision has to be made on whether intern house officers in paediatrics should be the first contact medical person in a neonatal unit level 1 and above.
3. There is a need to develop staff recruitment and retention criteria based on job descriptions with an intention of retention of highly trained staff as well as provide opportunities for entry into the system.
4. Develop and implement institution based compulsory competency based training for all grades of new comers into neonatal care services. Development of training curricula, undertaking training and certification may be an assigned function of Level 3 and 3+ institutions within a Province.
5. It is recommended that HR management

systems be set up at Provincial level and that designated cadre (MO training) be assigned responsibility for in-service training at District level and be given facilities and supporting staff necessary for effective functioning be provided.

6. A training Faculty should be identified from among the Medical Specialists in the District/ Province and their contribution be recognized in an appropriate fashion. (Adequate monetary compensation and or special points in considering transfers/special posts etc.)
7. Equipment and material necessary such as mannequins, training guides and audiovisual material necessary to ensure uniformity of training programmes should be made available.
8. There should be adequate dedicated funding for in-service training and refresher training at District level.
9. Setting up of annual training calendars at district and institutional level for competence based in-service training and certification is recommended.
10. It is recommended that the concept of CPD be applied to all categories of staff and incentives be provided to encourage staff to acquire CPD points such as partial fulfillment for annual increments, transfers etc.

## **D. HEALTH SERVICE DELIVERY**

### **D.1. BOTTLENECKS**

- One of the key bottlenecks in planning neonatal care services is the paucity of data on the proportion of newborns that may need interventions.

The WHO Multi-country survey where the sample consisted of 78% of births from level 3 institutions 19.4% from level 2 and 2.6% from private hospitals, reported that 7.8 % of births were pre-term deliveries. Of these 38.1% needed special care 1.8 % of newborns needed resuscitation and 32.2% had some complication. Overall 9.7% of the sample had

received special care at a NICU / SCBU.

- At institutional level there is a lack of knowledge about national / district targets to be achieved and the expected level of neonatal care resulting in lack of adherence to national plans.
- Unplanned institutional upgrades and not having regular intakes for training have led to staff shortages
- There is no system of auditing of clinical care to monitor the implementation of standards of care and adherence to guidelines accepted by the MoH.
- The absence of a culture that promotes supportive supervision and mentoring at the level of a unit/institution is an important bottleneck.
- Guidelines on interventions are available in the form of books in the English language only. Thus they are not user friendly to most of the end users such as nursing officers and midwives.
- The absence of national neonatal screening services was identified as a deficiency in services.

### **D.2. RECOMMENDATIONS**

1. Advocate institutional administrators and consultants on national targets in neonatal care, the strategies to reach goals and the proposed plans for neonatal care.
2. Introduce clinical auditing systems that are led by the consultant.
3. Promote the use of tools already available such as checklists for supervision of labour rooms and neonatal units for supervision at unit /institutional level.
4. Protocols and clinical guidelines to be made available in user friendly formats such as flow charts, wall charts and desktop guides in Sinhala and Tamil for easy reference by nurses and midwives.

5. Institution of quality accreditation systems for institutions/ units/labor rooms/ neonatal care units.
6. Institutional arrangements for universal neonatal screening for specific morbidities to be established within the national plan.
7. It is recommended that a system of risk identification in all newborns using standardized protocols and surveillance using standardized observation charts with specific plans for management including transfer be planned and instituted in consultation with the professional bodies.

## **E. HEALTH FINANCE**

The general opinion expressed during discussions was that the financial allocations are often sufficient but shortages and delays occur due to poor planning and mismanagement.

### ***E.1. BOTTLENECKS***

- Data is not available in a form that would help identify the financial allocation for MNH activities separately at national or district level. Estimates of expenditure for MCH services are available but not MNH.
- The total cost of initiating the national plan for neonatal care services has not yet been determined.
- Although the health service is free at point of delivery, there is considerable out of pocket expenditure associated with maternal and newborn care, especially when children are admitted to specialized neonatal care units,. The expenditure reported is mainly for purchase of drugs and at times for laboratory investigations.

### ***E.2. RECOMMENDATIONS***

1. A separate financial allocation may be necessary for implementation of the national plan for neonatal care including infrastructure

development. The funds may be managed through a special committee of the planning unit, which includes FHB representation to ensure coordination and adherence to the national strategic plan.

Financial allocations for establishing a national neonatal screening programme as a part of the planned neonatal care services also needs to be identified.

2. A separate financial allocation should be made available for NICUs at institution/ district level with audit of the usage of such accounts.
3. Out of pocket expenditure for patients could be minimized by addressing shortages and quality issues in drugs supplied through the system and by improving laboratory services so that services are available 24\*7 as appropriate to the level of the institution.

The reliability of reports needs to be established through quality control systems and accreditation of laboratory services.

## **F. ESSENTIAL MEDICAL PRODUCTS AND TECHNOLOGIES**

### ***F.1 BOTTLENECKS***

- The drug review committees are not functioning effectively at institutional level and annual requirements are often identified based on previous use.
- Although there are anecdotal complaints on the poor quality of drugs available through the government system, the issue is not addressed with supporting documented data and through the institutional drug review committees.
- Some essential items do not have continuous and uninterrupted supply.
- Deficiencies in specifications of equipment and variations observed even within a district
- There is no information system for equipment at institutional or district level which would alert users/managers of the timing of

replacement etc. Such a system would also provide information on repairs /replacement of parts carried out on equipment.

- Difficulties / delays with maintenance and repair of equipment and no replacement being made available while the necessary repairs are being undertaken was highlighted as a major bottleneck during discussions.

## **F.2. RECOMMENDATIONS**

1. An integrated logistics management system for drugs and commodities for neonatal care be developed within the planned national drug logistics system.
2. Improve the quality control process for drugs and commodities through strengthening the National Drug Quality control Laboratory (NDQL) with necessary equipment and human resources
3. Develop specifications for equipment with inputs from the professional colleges and submit to BME. Provinces and districts should follow the same specifications.
4. It is recommended that Regional Bio-Medical Engineering units be strengthened
5. A computerized equipment database should be maintained at the national and regional level BME units.
6. Ensure that a replacement is available when a piece of equipment is removed for repair.

## **G. COMMUNITY OWNERSHIP AND PARTICIPATION**

This component of the health system is the weakest.

### **G.1. BOTTLENECKS**

- The health education / promotion component of programmes often lag behind program initiation. The education strategy for the national MNH strategy was launched almost 4 years after the strategy itself.

- Deficiencies in knowledge about danger signals of illness in the newborn among parents resulting in delays in seeking care.

- Lack of communication about the neonate between care providers and parents especially in babies needing special care.

## **G.2. RECOMMENDATIONS**

1. It is recommended that appropriate communication strategies be developed concurrently with program plans.
2. Take early steps to implement the communication strategy related to newborn care that has been developed by the Health Education Bureau.
3. The planned community based mother support groups should be utilised to educate the community on the danger signs during the neonatal period and provide support to parents especially those with small and sick infants.
4. Establish “phone in services” (hot lines) in specified maternity / neonatal units in a district with adequate staffing to maintain a 24 hour service so that the public as well as community based health care workers can obtain advice on neonatal problems.
5. The inclusion of a special place in the neonatal BHT/ diagnosis card to indicate that the consultant or a senior member of the team had spoken to the parents prior to discharge of a baby from a special care unit.

## **Section 4.2: Maternal and newborn facility based intervention packages at the time of birth (labour, childbirth and immediate postnatal care)**

Some of the bottlenecks identified in this section are generic issues and have been discussed in detail in section 1. The areas which have been discussed in detail earlier are marked with an asterisk (\*)

### 4.2.1 Essential newborn care

| <i>Bottlenecks</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <i>Recommendations</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Guidelines on newborn care as well as standards for newborn care have been developed and published in the print form and are also available on the MoH/FHB web site, and available in a mobile application form. However, awareness about these documents was very poor among all levels of service providers.</p> <p>The fact that these were available only in the English language limited its use by the majority of midwifery staff.</p> <p>Often guidelines sent to institutions/units are not available to the end user.</p> | <p>* To have protocols developed based on the standards and guidelines in all three languages and to have e-based copies of same.</p> <p>To have the documents in a user friendly format.</p> <p>A system of accountability for the guidelines and protocols that are sent to institutions/units as well as methods to ensure that they are accessible and are made use of by the midwifery staff needs to be introduced.</p> <p>It is suggested that when new interventions/ guidelines and standards are introduced, the consultant in charge of the unit should introduce the guidelines/protocols to all members of his unit so that they are aware of the new care practices.</p> |
| <p>Although training of trainer programs on ENC and KMC has been carried out to cover all districts of the country, It was observed that a considerable percentage of staff providing care at birth had not received the training.</p>                                                                                                                                                                                                                                                                                                 | <p>* District in-service training has been dealt with in detail earlier.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>It was noted that midwives and nurses in the labour room were reluctant to initiate bag and mask ventilation until a medical officer arrived, even in instances where a person trained in the procedure was available in the labour room.</p>                                                                                                                                                                                                                                                                                       | <p>Roles and responsibilities of the different levels of care providers should be identified and circularized.</p> <p>The concept of the “Golden Minute” must be emphasized in training</p> <p>* The need to have “skills drills” and refresher training and recertification has been discussed earlier (section 4.1.1.C.2)</p>                                                                                                                                                                                                                                                                                                                                                        |
| <p>Although the SLCP has a well organized training program on NALS, there are considerable differences between districts and between institutions within a district in the availability of trained personnel to provide a 24*7 cover.</p>                                                                                                                                                                                                                                                                                              | <p>The Director of the institution as well as the consultants in charge of obstetric and neonatal care must be responsible to make sure that medical officers working in their units are NALS trained.</p> <p>Compulsory training in NALS and ENCC for medical officers, nurses and midwives appointed to obstetrics and pediatrics units.</p>                                                                                                                                                                                                                                                                                                                                         |
| <p>Although health services are free at point of delivery, patients have to incur some out of pocket expenditure for cord clamps and surgical suture materials, due to inadequacy of supplies as well as due to perceived poor quality of the material supplied.</p>                                                                                                                                                                                                                                                                   | <p>Systems within the MoH for ensuring quality of supplies have to be strengthened.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



|                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Difficulties in maintaining the temperature of labour rooms/ operating theaters at a level optimum for the baby.                                                  | A wall thermometer in working condition to be available in all labour rooms.                                                                                                                                                                                                                        |
| Majority of persons were unaware of the temperature/ range necessary for optimum comfort of the baby.                                                             | <p>The temperature that has to be maintained must be displayed on the wall.</p> <p>This requirement should be included to the specification prepared for the air conditioners for the neonatal units.</p> <p>Warm towels and a source of radiant heat to be available at all times.</p>             |
| Sometimes mothers are reluctant to have the newborn delivered on to the abdomen and after cleaning have the baby skin to skin on their chest.                     | The process of a normal delivery and the concept and importance of skin to skin care at birth must be included in the antenatal educational packages so that mothers are aware of it before they come in for delivery.                                                                              |
| Sterile towels used for the baby are part of the sterile pack used for the delivery and as such cannot be pre warmed.                                             | Have separate packs with two towels for the babies use so that they can be pre-warmed (a baby pack with the delivery set).                                                                                                                                                                          |
| Not all labour rooms have hand washing facilities at the entrance and elbow or foot operated taps.                                                                | To have a systematic program for establishing hand washing facilities at the entrance to Labour Rooms and replacement of existing taps with elbow or foot operated taps.                                                                                                                            |
| Often the hand rub used is prepared in ward.                                                                                                                      | <p>Procure sufficient quantities of hand rub.</p> <p>Test the efficacy of the local preparation and ensure standard procedures for preparation if the local product is found to be effective.</p>                                                                                                   |
| Often labour room beds are too narrow to have the baby with the mother.                                                                                           | Decide on an ideal size and design for labour room beds and replace existing beds that are not the ideal size in a planned stepwise fashion.                                                                                                                                                        |
| Although measurement of weight of the newborn is an important routine activity, it was observed that calibration of weighing scales was not undertaken regularly. | <p>Emphasize the need to have accurate records of birth weight.</p> <p>Designated person/persons for the activity.</p> <p>Maintain a log for noting the date on which the scales were calibrated in each labour room and include checking this aspect in the labour room supervision procedure.</p> |
| Absence of regular monitoring / audits of care practices and supervision of activities at ward level.                                                             | * Discussed in section 4.1.B.2                                                                                                                                                                                                                                                                      |
| Absence of indicators of quality of care in the RH-MIS.                                                                                                           | * Discussed in section 4.1.B.2                                                                                                                                                                                                                                                                      |

#### 4.2.1.1. Observation

The WHO/MICS shows that IV antibiotics were used during the first 7 days of life, in 6% of term infants born in level 3/3+ institutions and in 7.5% born in level 2 institutions.

#### 4.2.2 Skilled care at birth: Use of Partogram

Some of the bottlenecks identified in this section are generic issues and have been discussed in detail in section 1. The areas which have been discussed in detail earlier are marked with an asterisk (\*)

| <i><b>Bottlenecks</b></i>                                                                                                                                                                                                                                                                                                           | <i><b>Recommendations</b></i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Training on the use of the Partogram is limited to what was included in pre service training (basic training) of midwifery staff.</p> <p>The in service training programs currently available do not deal adequately with the use of the Partogram.</p>                                                                          | <p>* In service training programs should be conducted at institution / ward level or at regional level for refreshing the knowledge on recording the progress of labour on the partogram and their interpretation.</p> <p>* A system of competency certification at specific intervals of time (3-5 years) is recommended for all levels of midwifery staff (doctors, nurses and mid wives). This would include the use of the partogram as well as other skills necessary for providing care during labour and essential newborn care.</p> |
| There are no guidelines and protocols on partogram use at national /regional / institutional level although it was observed that the SLCOG had developed guidelines                                                                                                                                                                 | * Easy to use guidelines and protocols in the form of wall charts, desk references in Sinhala, Tamil and English should be made available to every unit/labour room.                                                                                                                                                                                                                                                                                                                                                                        |
| There is no supportive supervision or monitoring of the accuracy of recording and interpretation of the partogram at unit level                                                                                                                                                                                                     | Audits on the use of the partogram should be a regular feature at unit level.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>The use of the partogram appears to be dependent on the enthusiasm of the individual consultants and not recognized within the system as an essential tool for providing skilled care at birth.</p> <p>As such there is no indicator to monitor its use in the MCH –MIS used currently nor in the e-MIS that is being tested</p> | <p>Include the partogram as an essential component of the BHT of a woman for whom delivery care has been provided.</p> <p>Examine the partogram in maternal death and “near miss” investigations as well as in perinatal mortality surveillance.</p> <p>Include the use of partogram as an indicator of skilled care at birth in the new e-MIS.</p>                                                                                                                                                                                         |
| An important deficiency in providing skilled care at birth was identified as poor pain relief during labour                                                                                                                                                                                                                         | Since a majority of births take place in institutions with specialized services it was suggested that protocols for providing pain relief during labour should be discussed with the relevant Colleges.                                                                                                                                                                                                                                                                                                                                     |

#### **4.2.2.1 Observation**

National Emergency Obstetric and Neonatal Care Needs Assessment Survey – carried out in 2012, reported that the proportion of specialist institutions using a partograph is 91.4% while only 41.7% of non-specialist institutions use the partograph. Even in institutions where use was higher, the recording was found to be poor, especially the recording of the descent of the head and drawing an alert line. It was seen that the overall quality of recording on the partograph was unsatisfactory.

The study also examined the use of partograph in a sample of women who had emergency caesarean

sections. Out of a total of 450 emergency sections, a partograph had been maintained only in 198 (44%), however it was not possible to assess whether the partograph was used in a comprehensive manner in reaching the decision to do the CS (Rajapakse et al., 2014).

#### **4. 2.3 Management of preterm delivery**

Guidelines for the management of preterm deliveries are in the process of being developed by the Sri Lanka College of Obstetricians and Gynecologists in collaboration with the Family Health Bureau.

Availability and use of dexamethasone and

magnesium sulphate were the tracer interventions discussed.

#### 4.2.3.1. Observation

There is no national level routine data to monitor the tracer interventions. Limited information on preterm births and use of steroids is available from the WHO/MCS (Jayaratne et al., 2014).

The study showed that 7.8% of the sample (1412 births) was preterm deliveries. The majority of births (78 %) in the sample were from Level 3 / 3+ (14262 / 18294) tertiary care institutions that account for 44.8% of births in the country. The national

proportion of preterm deliveries is likely to be less than in this sample. Of the 1654 preterm babies in the sample 14.3% (236) were born in an institution that has been identified as a level 2 institution.

Only 7 out of the 1412 preterm deliveries in the study had received prophylactic steroids.

It is observed that the risk of dying in hospital during the first 7 days of life is more for a preterm baby born in a level 2 institution (5.1%) compared to those born in a level 3/3+ institution (2.8%), highlighting the importance of in-utero transfer of such neonates to a level 3/3+ institution.

| <i>Bottlenecks</i>                                                                                                                                                                                                                                                                                                                     | <i>Recommendations</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The neonatal management guidelines specify that pre term deliveries need to be managed in level 3/3+ facilities.</p> <p>However, there are instances when in-utero transfers are not accepted by the higher level institution.</p> <p>There are similar difficulties encountered when pre term neonates need to be transferred.</p> | <p>Identification of cluster networks of institutions where the capacity of the level 3/3+ institution has been planned to include preterm deliveries from the satellite institutions</p> <p>Admitting officers be made aware of the policy that preterm deliveries have to be managed in a level 3/3+ institution.</p> <p>Infrastructure facilities in Level III/III+ institutions need to be upgraded so that they are able to cater to the needs of the draining area/institutions.</p> |
| <p>Many health care providers were not aware of the use of dexamethasone (steroids) to improve lung maturation in preterm deliveries</p> <p>Protocols for its use are unavailable</p> <p>In the WHO/MICS out of 1412 pre term babies identified in the sample only 7 had received prophylactic steroids</p>                            | <p>Develop processes to disseminate information on evidence based practices that are adopted.</p> <p>Develop protocols on these key management practices.</p> <p>Regular in-service training to update the staff on these practices</p>                                                                                                                                                                                                                                                    |
| <p>The majority of care providers were unaware of the use of magnesium sulphate for neuroprotection although they were familiar with its use in pre-eclampsia.</p>                                                                                                                                                                     | <p>Develop processes to disseminate information on evidence based practices that are advocated.</p>                                                                                                                                                                                                                                                                                                                                                                                        |
| <p>The information on pre term birth, its management and outcomes are not included in the current RH-MIS.</p>                                                                                                                                                                                                                          | <p>Specific indicators need to be developed based on the tracer interventions identified.</p> <p>The indicator needs to be incorporated in to the routine data collection system</p> <p>The indicators have to be presented by level of institution / network, district and country.</p>                                                                                                                                                                                                   |



#### 4.2.4 Provision of care for sick and small newborns

| <i>Bottlenecks</i>                                                                                                                                                   | <i>Recommendations</i>                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Leadership and governance</b>                                                                                                                                     |                                                                                                                                                                                                                                                                        |
| Lack of knowledge on and adherence to levels of neonatal care services.                                                                                              | Advocate the planners, administrators and consultants on proposed levels of neonatal care.                                                                                                                                                                             |
| Strategic and policy documents, and even guidelines do not reach end users.                                                                                          | Unit heads to be made aware of these documents and be given the responsibility of disseminating it among their staff.                                                                                                                                                  |
| Lack of an auditing system to monitor the implementation of standards of care & guidelines.                                                                          | Introduction of an auditing system led by consultant.                                                                                                                                                                                                                  |
| <b>Financing</b>                                                                                                                                                     |                                                                                                                                                                                                                                                                        |
| Financing available for services is adequate.<br>But issues were identified in management of the finances, at all levels.                                            | Separate allocation for NICUs and audit the usage of such allocation.                                                                                                                                                                                                  |
| Out of pocket expenditure incurred by patients for drugs due to shortages and poor quality of what is available.                                                     | Improve the National Drug Quality assurance Laboratory with equipment and human resources.                                                                                                                                                                             |
| Out of pocket expenditure for investigations incurred by patients.                                                                                                   | Ensure quality in the laboratory system (quality accreditation) and availability of services 24*7.                                                                                                                                                                     |
| <b>Health workforce</b>                                                                                                                                              |                                                                                                                                                                                                                                                                        |
| Inability to provide 24* 7 services in some institutions due to lack of human resources.                                                                             | Establish HR development and management units at national/provincial/district levels to ensure regular recruitment and revision of carder norms to cater to current demand.                                                                                            |
| Inadequate numbers of health workers (MW, NO, MO).                                                                                                                   |                                                                                                                                                                                                                                                                        |
| Lack of designated competency based training for new staff to NICUs.                                                                                                 | Develop and implement compulsory competency based training for all categories of new staff.<br>Introduce CPD and link with benefits.                                                                                                                                   |
| Lack of CPD for all categories.                                                                                                                                      |                                                                                                                                                                                                                                                                        |
| <b>Essential medical products and technologies</b>                                                                                                                   |                                                                                                                                                                                                                                                                        |
| Poor quality of drugs.                                                                                                                                               | Streamline the process and system of procurement.                                                                                                                                                                                                                      |
| Some essential drugs and commodities do not have an uninterrupted supply.                                                                                            | Streamline logistic management system for drugs and commodities at all levels.                                                                                                                                                                                         |
| Norms for equipment for each level have to be updated at regular intervals.<br>Deficiencies in specifications of equipment.<br>Problems in maintenance of equipment. | Update norms for equipment<br><br>Professional colleges to be involved in the preparation of specifications and submit to BME unit at central level<br><br>Strengthen BME units at regional levels.<br><br>Regional BME to establish & maintain an equipment database. |
| <b>Health service delivery</b>                                                                                                                                       |                                                                                                                                                                                                                                                                        |
| Overcrowding in specialist units                                                                                                                                     | Establish a proper referral system with clear guidelines.<br><br>A system of back referral to smaller units with clear management guidelines.                                                                                                                          |

|                                                                                                      |                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Poor conditions of sick newborns transferred for NICU care                                           | Retrieval systems to be established at each province with necessary human resources, transport facilities and equipment.<br>Streamline web based bed management system.                                |
| <b>Health information</b>                                                                            |                                                                                                                                                                                                        |
| Absence of a culture of analysis and use of available information at unit level.                     | Regular unit meetings with the participation of all levels of staff where analysed data is discussed.                                                                                                  |
|                                                                                                      | Perinatal audits to include severe morbidities.                                                                                                                                                        |
| Perinatal audits only focus on deaths.                                                               | To maintain a computer based database at unit level using a standard format so that data from the different units can be collated.                                                                     |
| <b>Community ownership and participation</b>                                                         |                                                                                                                                                                                                        |
| Lack of communication with parents of babies needing special care.                                   | Provide specific opportunities to discuss with the consultant.<br><br>Insert a separate sheet in different colour to the BHT to record communication with parents by the consultant/ senior registrar. |
| Deficiencies in knowledge among parents on danger signals and delay in decision making to seek care. | Establish a hot-line in neonatal/ maternity units to communicate with health care providers.<br><br>Improve the postnatal care services at field level.                                                |

#### 4.2.5 Assisted vaginal delivery

It is noted that the frequency of assisted vaginal delivery in the country is low. It is recognized that competency in the procedure is an important part of specialist training. The consensus of opinion was that the procedure should be carried out only in an institution where specialist services are available and under direct supervision of the consultant.

The bottlenecks identified were unavailability of disposable vacuum cups and instruments in proper working order. However, it was also felt that low use of the technique may have contributed to the necessary equipment not being available.

#### 4.2.6 Companionship during labour

The majority of providers felt that under the present facilities available in most labour rooms even the presence of a female companion would pose problems. They also felt that in an emergency this would hamper provision of services.

However, there are institutions/units where a female companion is allowed to be with the patient during labour. It was suggested that visits to such units would provide an opportunity to discuss the perceived problems and see how they have been overcome and also be made aware of the positive aspects of the practice for patients as well as service providers.

The consensus was that it could be introduced first on a voluntary basis to units who would like to provide the service and then gradually expanded.

#### 4.2.7 Baby friendly hospital initiative (BFHI)

##### 4.2.7.1 Bottlenecks

The Baby Friendly Hospital Initiative was initiated, functioned for some time and has been forgotten and limited to a name board or plaque in most of the hospitals. Most of the staff that had come for the discussions were not able to describe clearly the components of the initiative, although they were certain that the components were being practiced at their institutions. This picture was seen

during field visits to selected hospitals where many had name boards that had been placed during the initial stages when BFHI was being implemented but staff were not certain of practices. It was also evident that in institutions where BFHI was being practiced it was driven mainly by the personal interest of an administrator or a consultant. In some of the hospitals the BFHI boards and posters were sponsored by formula milk producers, with their brand information.

#### *4.2.7.2 Recommendation*

The Baby Friendly Hospital Initiative needs to be revamped and incorporated into the system with an inbuilt accreditation mechanism





*Launch of Newborn Screening for Critical Congenital Heart Disease,  
by Prof Sujeewa Amarasena, President of SLCP at Teaching Hospital Mahamodara  
Courtesy of Dr Priyani Senadeera*



## CHAPTER 5: A PLAN FOR NEONATAL SPECIAL CARE NETWORKS

In this chapter we offer some suggestions for overall improvement of the planned neonatal care services in the country.

The current plan for neonatal care services has been described in section 3.5. According to this, there are 4 level 3+ facilities and an additional 17 level 3 facilities, (21 level 3+/3 units). Having such a large number of special neonatal intensive care units have several disadvantages. The cost of establishing and servicing 21 neonatal intensive care units would be high and it will take considerable effort and time to develop a body of skilled personnel (all categories) to service these units. More importantly, the service providers will not get an opportunity to develop experience /expertise in managing complicated morbidity, since the few cases would be distributed among many units. For optimum functioning of a unit and to achieve successful outcomes experience is an important factor.

On the other hand having a smaller number of highly specialized facilities with relevant infrastructure and human resources with experience, together with optimum supporting services such as laboratory and x-ray facilities, would result in the development of units that would be able to provide a high quality service.

### 5.1 The proposed model

Taking the above into consideration as well as the difficulties in transfer of sick babies needing higher levels of care that were expressed during discussions, a cluster system of special neonatal care units are proposed. We propose that such a cluster be called a neonatal network.

A neonatal network would have a 3/3+ institution as the lead institution with a specified network of level 2 and level 1 institutions. The lead hospital in

a province currently identified as a 3/3+ institution should be equipped with all the relevant facilities and be staffed by a specially trained team providing 24\*7 care. An important function of a lead institution would be retrieval of sick babies who require services that are not available in the lower level institutions and therefore should have specially trained and adequately equipped retrieval teams.

The neonatal networks that are presented below have been developed based on real time distances to level 3 / level 3+ facilities. Where relevant, the distance has been given priority over the provincial border. A chart giving the real time distances between institutions is given in Annex 2.

Under the proposed plans the geographic distribution of the level 3 / 3+ institutions and the coverage in terms of births taking place within the 70 km radius from these institutions, are presented.

### 5.2 Plan 1

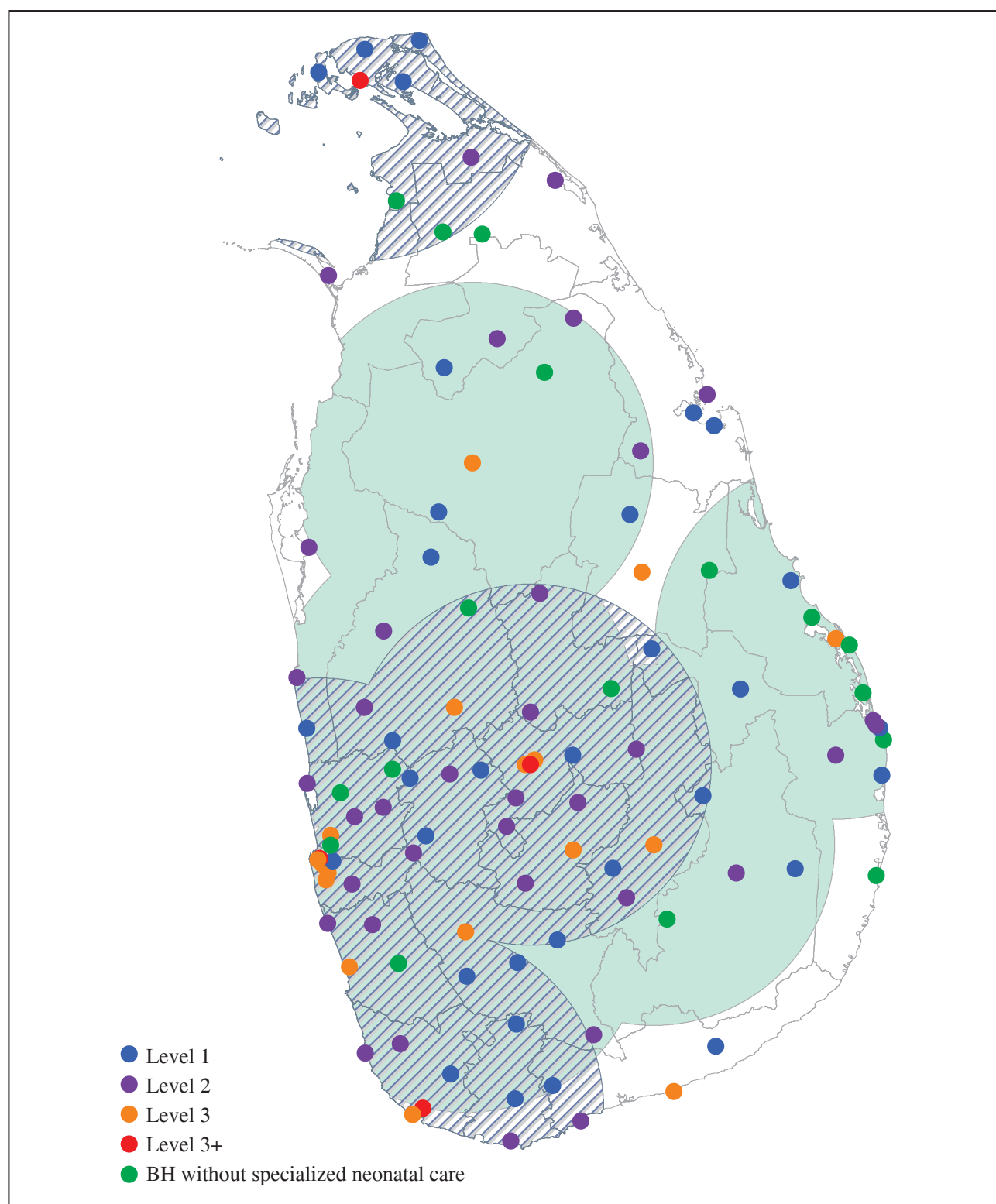
Plan 1 is based on a network per province except in the Western Province, which has a large number of births and therefore has been assigned 3 networks. There are 4 level 3+ institutions planned for the country, namely the Lady Ridgway Children's Hospitals, Sirimavo Bandaranayke Children's Hospital, Teaching Hospital Karapitiya and Teaching Hospital Jaffna. The three hospitals in the Central, Southern and Northern Province are considered as the lead institutions for the respective provincial networks. In the Western province in addition to the LRH based network, two additional networks are planned with two level 3 institutions (Teaching Hospital Ragama and Colombo South Teaching Hospital) as lead institutions. In each of the other Provinces a level 3 institution has been identified as lead hospital for the provincial networks namely; Teaching hospital Anuradhapura for the North Central Province, PGH

Kurunegala for the North Western Province, PGH Ratnapura for the Sabaragamuwa Province, TH Batticaloa for the Eastern Province and PGH Badulla for the Uva Province.

and 2 institutions falling within 70 km radius from these institutions. In addition the base hospitals that have not been identified to provide specialized neonatal care facilities in the current MoH plan are also indicated in the same map.

Map 5.1 shows these 11 institutions and the level 1,

*Map 5.1: The eleven lead institutions and the level 1, 2 and 3 institutions falling within 70 km radius from these institutions according to plan 1*





**Table 5.1: The population, births, land area, and deliveries occurring in institutions within a 70 km. buffer zone from a level 3+/3 institution according to Plan 1 by Province**

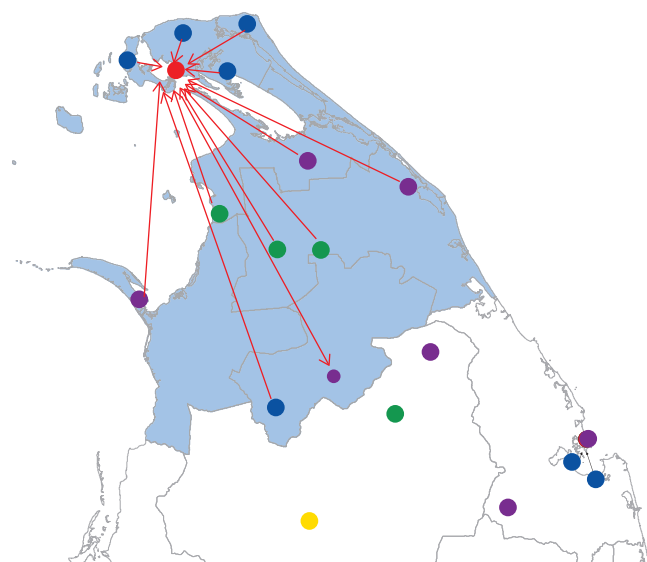
|               | Population | Births 2013 | Land area km2 | Level 3+ | Level 3 | Number and % of deliveries occurring in institutions outside the 70 km buffer * |      | Area in km2 outside the buffer | Percentage births occurring in Divisional Hospitals |
|---------------|------------|-------------|---------------|----------|---------|---------------------------------------------------------------------------------|------|--------------------------------|-----------------------------------------------------|
|               |            |             |               |          |         | Number                                                                          | %    |                                |                                                     |
| Western       | 5984055    | 85564       | 3711.0        | 1        | 2       | 0                                                                               | 0.0  | 0.0                            | 0.4                                                 |
| Southern      | 2621586    | 42337       | 5534.0        | 1        |         | 5538                                                                            | 13.1 | 1799.7                         | 4.1                                                 |
| Central       | 2766066    | 51189       | 5741.1        | 1        |         | 0                                                                               | 0.0  | 0.0                            | 7.6                                                 |
| Northern      | 1126149    | 19053       | 8756.5        | 1        |         | 1970                                                                            | 10.3 | 3197.0                         | 4.2                                                 |
| Eastern       | 1680343    | 31773       | 9576.7        |          | 1       | 6637                                                                            | 20.9 | 3353.2                         | 13.9                                                |
| North Central | 1426177    | 22811       | 10643.3       |          | 1       | 6570                                                                            | 28.8 | 1259.9                         | 10.2                                                |
| Uva           | 1426177    | 22811       | 8626.4        |          | 1       | 0                                                                               | 0.0  | 295.2                          | 6.9                                                 |
| North Western | 2578157    | 40458       | 8025.7        |          | 1       | 0                                                                               | 0.0  | 406.2                          | 4.0                                                 |
| Sabaragamuwa  | 2031126    | 31726       | 4953.7        |          | 1       | 0                                                                               | 0.0  | 44.5                           | 1.9                                                 |
| Sri Lanka     | 21639836   | 347722      | 65568.4       | 4        | 7       | 20706                                                                           | 6.0  | 10355.7                        | 5.0                                                 |

In table 5.1 only deliveries occurring in government health institutions above the level of divisional hospitals have been included.

Table 5.1 shows that the Eastern Province has the largest number of births occurring in institutions above the level of a divisional hospital that lies outside a 70 km radius from a level 3+/3 institution. The proportion of births falling outside the buffer zone institutions is highest in the North Central Province.

The eleven networks developed based on these institutions are described below.

### 5.2.1 Northern Provincial Network



Northern Province is the second largest province in the country. The referral hospital for the province is located in the Jaffna peninsula. Travel to the peninsula is mainly through Elephant Pass and this adds considerably to the real time distances from institutions in some of the other districts constituting the Province.

As shown in the table below it is seen that when real time distances are used DGH Mannar and DGH Vavunia are closer to the lead institution identified for the adjacent province (Teaching Hospital Anuradhapura).

|                 | DGH Mannar | DGH Vavunia | BH Cheddikulam |
|-----------------|------------|-------------|----------------|
| TH Jaffna       | 118 km     | 131 km      | 155 km         |
| TH Anuradhapura | 106 km     | 56.4 km     | 55.7 km        |

#### Hospitals included in the network:

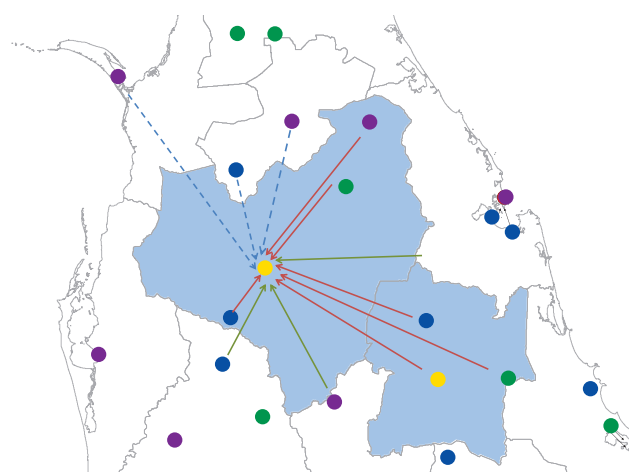
| District     | Hospital                                                  | Level of neonatal care |
|--------------|-----------------------------------------------------------|------------------------|
| Jaffna       | BH Point Pedro , BH Tellipai, BH Chavakachcheri, BH Kayts | Level 1                |
| Killinochchi | DGH Killinochchi                                          | Level 2                |
| Mannar       | DGH Mannar                                                | Level 2                |
| Vavunia      | DGH Vavunia<br>BH Cheddikulam                             | Level 2<br>Level 1     |
| Mullativu    | DGH Mullativu                                             | Level 2                |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District     | Hospital                                |
|--------------|-----------------------------------------|
| Killinochchi | BH Mulankavil, BH Mallavi & BH Mankulam |
| Mullativu    |                                         |

|                                                                |                                          |
|----------------------------------------------------------------|------------------------------------------|
| Hospitals of other provinces served by this network:           | None                                     |
| Number of births occurring in institutions within the network: | 18144 (95.2% of total provincial births) |
| Maximum real time distance to the lead institution:            | 155km (BH Cheddikulam)                   |
| Minimum real time distance to the lead institution:            | 17.6km (BH Chavakachcheri)               |

### 5.2.2 North Central Provincial Network



Teaching Hospital Anuradhapura will be functioning as the lead institution for the province. By virtue of its central position, it is noted to be closer to some institutions in the Northern, Eastern, North Western and Central Provinces.

|                 | DGH Mannar    | DGH Vavunia    | BH Cheddikulam |
|-----------------|---------------|----------------|----------------|
| TH Jaffna       | 118 km        | 131 km         | 155 km         |
| TH Anuradhapura | <b>106 km</b> | <b>56.4 km</b> | <b>55.7 km</b> |

|                 | BH Dambulla    | BH Kantale    | BH Galgamuwa   |
|-----------------|----------------|---------------|----------------|
| TH Anuradhapura | <b>64.4 km</b> | <b>106 km</b> | <b>45.4 km</b> |
| PGH Kurunegala  |                |               | 67.5 km        |
| TH Batticaloa   |                | 134 km        |                |
| SBCH            | 76.1 km        |               |                |

#### Hospitals included in the network:

| District     | Hospital                           | Level of neonatal care |
|--------------|------------------------------------|------------------------|
| Anuradhapura | BH Padaviya<br>BH Thambuttegama    | Level 2<br>Level 1     |
| Polonnaruwa  | DGH Polonnaruwa<br>BH Madirigiriya | Level 3<br>Level 1     |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District     | Hospital          |
|--------------|-------------------|
| Anuradhapura | BH Kebethigollewa |
| Polonnaruwa  | BH Welikanda      |

#### Hospitals of other provinces served by this network:

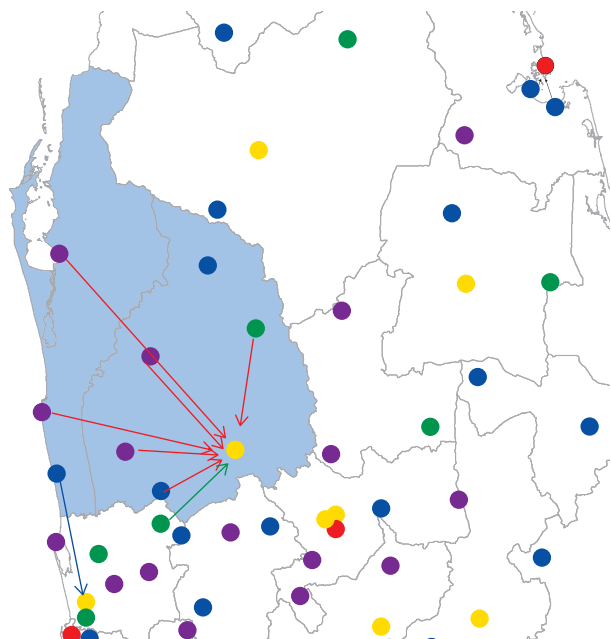
| District    | Hospital                                            | Level of neonatal care | Births 2013 |
|-------------|-----------------------------------------------------|------------------------|-------------|
| Mannar      | DGH Mannar (optional)                               | Level 2                | 1323        |
| Vavunia     | DGH Vavunia (optional)<br>BH Cheddikulam (optional) | Level 2<br>Level 1     | 4344<br>188 |
| Matale      | BH Dambulla                                         | Level 2                | 4064        |
| Trincomalee | BH Kantale                                          | Level 2                | 1039        |
| Kurunegala  | BH Galgamuwa                                        | Level 1                | 264         |

Number of births occurring in institutions within the network: 20483 (90.0% of provincial births) + 5367 from outside (additional 5855 births if DGH Mannar, DGH Vavunia & BH Cheddikulam are also considered)

Maximum real time distance to the lead institution: 130 (BH Welikanda)

Minimum real time distance to the lead institution: 26.6 (BH Thambuttegama)

### 5.2.3 North Western Provincial Network



Provincial General Hospital Kurunegala is identified as the lead institution for the province.

Two institutions from this Province, namely Base Hospital Galgamuwa and Base Hospital Marawilla are closer in real time distance to the lead institutions in the North Central Province and Ragama network respectively and are therefore included in these. In addition it will also provide services for BH Warakapola from the Kegalle District.

|                 | BH Marawilla   | BH Galgamuwa   | BH Warakapola |
|-----------------|----------------|----------------|---------------|
| PGH Kurunegala  | 69.1 km        | 67.5 km        | 36.3 km       |
| TH Anuradhapura |                | <b>45.4 km</b> |               |
| TH Ragama       | <b>48.1 km</b> |                | 45.8 km       |
| SBCH            |                |                | 53.2 km       |

#### Hospitals included in the network:

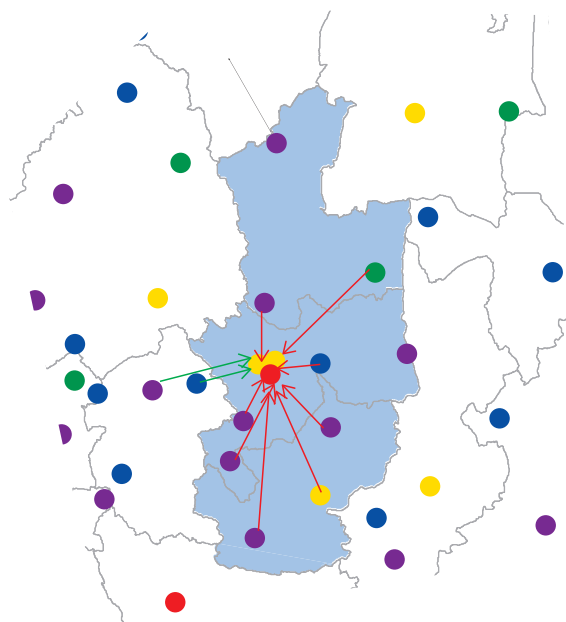
| District   | Hospital        | Level of neonatal care |
|------------|-----------------|------------------------|
| Kurunegala | BH Kuliapitiya  | Level 2                |
|            | BH Nikaweratiya | Level 2                |
|            | BH Dambadeniya  | Level 1                |
| Puttlam    | DGH Chillaw     | Level 2                |
|            | BH Puttlam      | Level 2                |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District   | Hospital       |
|------------|----------------|
| Kurunegala | BH Polpitigama |

|                                                                |                                                                             |
|----------------------------------------------------------------|-----------------------------------------------------------------------------|
| Hospitals of other provinces served by this network:           | BH Warakapola                                                               |
| Number of births occurring in institutions within the network: | 35777 (88.4% of the total provincial births) & 88 from outside the province |
| Maximum real time distance to the lead institution:            | 87.1 (BH Puttlam)                                                           |
| Minimum real time distance to the lead institution:            | 32.0 (BH Dambadeniya)                                                       |

## 5.2.4 Central Provincial Network



Sirimavo Bandaranayke Children's Hospital (Teaching) is identified as the lead institution for the province.

One institution from this Province, namely BH Dambulla (Matale District) is closer in real time distance to the lead institutions in the North Central Province and therefore has been included in it.

Two institutions located within the North Western Province (Kegalle District), namely DGH Kegalle and BH Mawanella are closer in real time distance to the lead institution of the Central Province and will be included into this network.

|                 | DGH Kegalle | BH Mawanella | BH Dambulla |
|-----------------|-------------|--------------|-------------|
| SBCH            | 32.1 km     | 19.5 km      | 76.1 km     |
| TH Anuradhapura |             |              | 64.4 km     |
| PGH Kurunegala  | 35.2 km     | 38.3 km      | 65.0 km     |
| PGH Ratnapura   | 99.1 km     | 111 km       |             |

### Hospitals included in the network:

| District     | Hospital                    | Level of neonatal care |
|--------------|-----------------------------|------------------------|
| Kandy        | TH Kandy (11741 births)     | Level 3                |
|              | TH Peradeniya (7846 births) | Level 3                |
|              | DGH Gampola                 | Level 2                |
|              | DGH Nawalapitiya            | Level 2                |
|              | BH Teldeniya                | Level 2                |
| Matale       | DGH Matale                  | Level 2                |
| Nuwara Eliya | DGH Nuwara Eliya            | Level 3                |
|              | BH Dickoya                  | Level 2                |
|              | BH Rikillagaskade           | Level 2                |

### Base Hospitals not identified as specialized neonatal care facilities:

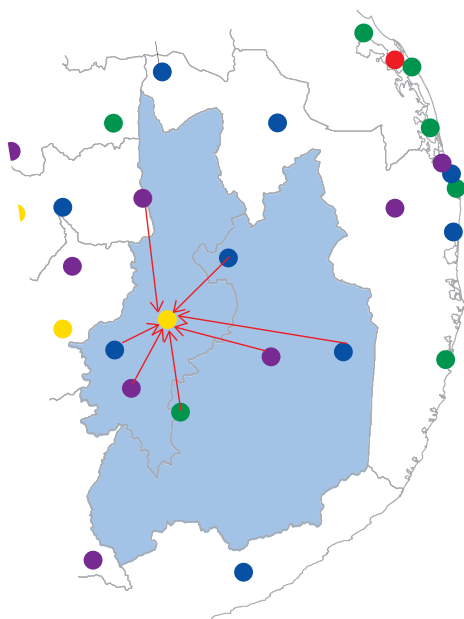
| District | Hospital     |
|----------|--------------|
| Matale   | BH Hettipola |

| District | Hospital         | Level of neonatal care | Births 2013 |
|----------|------------------|------------------------|-------------|
| Kegalle  | DGH Kegalle      | Level 2                | 5478        |
|          | DGH BH Mawanella | Level 1                | 2980        |

Number of births occurring in institutions within the network: 43135 (84.3% of provincial births) + 8458 from outside

Maximum real time distance to the lead institution: 104.0km (BH Hettipola)  
Minimum real time distance to the lead institution: 0.4km (TH Peradeniya)

### 5.2.5 Uva Provincial Network



Provincial General Hospital Badulla is identified as the lead institution for the province.

#### Hospitals included in the network:

| District   | Hospital          | Level of neonatal care |
|------------|-------------------|------------------------|
| Badulla    | BH Diyathalawa    | Level 2                |
|            | BH Mahiyangana    | Level 2                |
|            | BH Welimada       | Level 1                |
| Monaragala | DGH Monaragala    | Level 2                |
|            | BH Bibile         | Level 1                |
|            | BH Siyambalanduwa | Level 1                |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District   | Hospital     |
|------------|--------------|
| Monaragala | BH Wellawaya |

Hospitals of other provinces served by this network: None

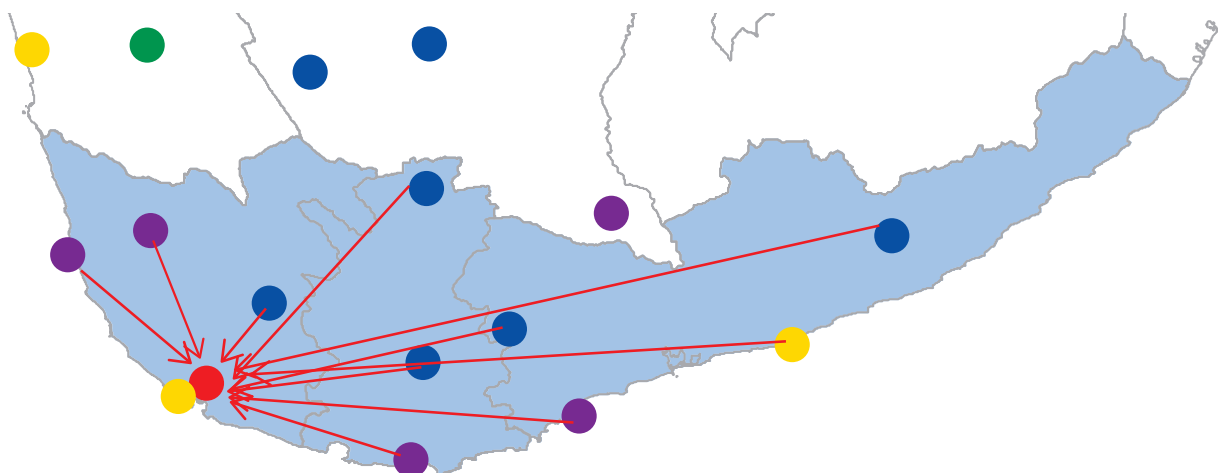
Number of births occurring in institutions within the networks: 21978 (93.1 % of the total provincial births)

Maximum real time distance to the lead institution: 86.2 km (BH Siyambalanduwa)

Minimum real time distance to the lead institution: 38.6 km (BH Diyathalawa)

## 5.2.6 Southern Provincial Network

Teaching Hospital Karapitiya is identified as the lead institution for the province.



### Hospitals included in the network:

| District   | Hospital         | Level of neonatal care |
|------------|------------------|------------------------|
| Galle      | TH Mahamodara    | Level 3                |
|            | BH Balapitiya    | Level 2                |
|            | BH Elpitiya      | Level 2                |
|            | BH Udugama       | Level 1                |
| Matara     | DGH Matara       | Level 2                |
|            | BH Deniyaya      | Level 1                |
|            | BH Kamburupitiya | Level 1                |
| Hambantota | DGH Hambantota   | Level 3                |
|            | BH Tangalle      | Level 2                |
|            | BH Tissamaharama | Level 1                |
|            | BH Walasmulla    | Level 1                |

Base Hospitals not identified as specialized neonatal care facilities: None

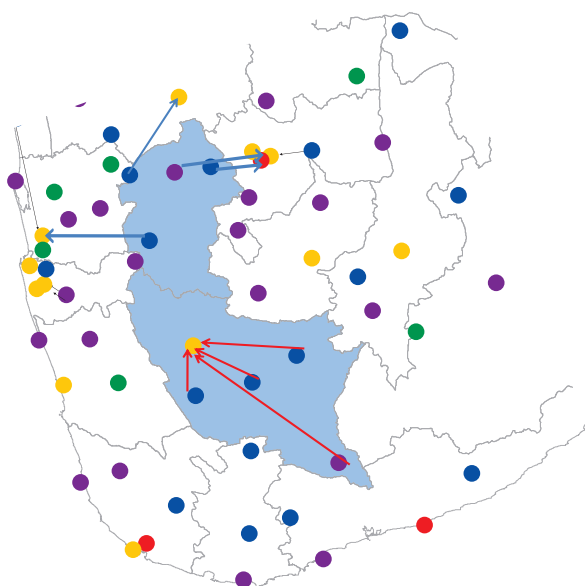
Hospitals of other provinces served by this network: None

Number of births occurring in institutions within the network: 40587 (95.9% of total provincial births)

Maximum real time distance to the lead institution: 147 km (BH Tissamaharama)

Minimum real time distance to the lead institution: 4.4 km (TH Mahamodara)

### 5.2.7 Sabaragamuwa Provincial Network



Provincial General Hospital Ratnapura is identified as the lead institution for the province.

All four institutions of the Kegalle District, namely DGH Kegalle, BH Mawanella, BH Warakapola and BH Karawanella are closer in real time distance to the lead institutions in the Central Province, North Western Province and Western Province (Ragama Network) respectively and therefore, will be included in these networks.

|                | DGH Kegalle    | BH Mawanella   | BH Karawanella | BH Warakapola  |
|----------------|----------------|----------------|----------------|----------------|
| PGH Ratnapura  | 99.1 km        | 111 km         | 59.1 km        | 86.4 km        |
| SBCH           | <b>32.1 km</b> | <b>19.5 km</b> | 68.1 km        | 53.2 km        |
| TH Ragama      |                |                | <b>55.2 km</b> | 45.8 km        |
| PGH Kurunegala | 35.2 km        | 38.3 km        | 62.6 km        | <b>36.3 km</b> |

#### Hospitals included in the network:

| District  | Hospital        | Level of neonatal care |
|-----------|-----------------|------------------------|
| Ratnapura | BH Embilipitiya | Level 2                |
|           | BH Kahawatte    | Level 1                |
|           | BH Balangoda    | Level 1                |
|           | BH Kalawana     | Level 1                |

Base Hospitals not identified as specialized neonatal care facilities: None

Hospitals of other provinces served by this network: None

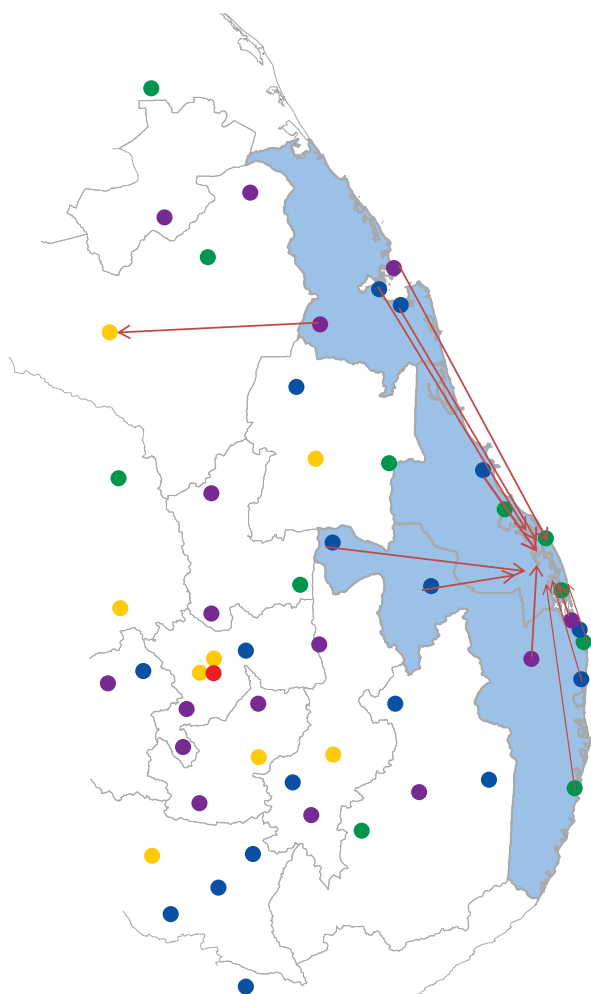
Number of births occurring in institutions within the network 20364 (65.5 % of the total provincial births)

Maximum real time distance to the lead institution: 74.5 (BH Embilipitiya)

Minimum real time distance to the lead institution: 26.0 (BH Kahawatte)



## 5.2.8 Eastern Provincial Network



Teaching Hospital Batticaloa is identified as the lead institution within the province.

BH Kantale of this province is closer in real time distance to the lead institution of the North Central Province and therefore will be linked to the NCP network.

|                 | <b>BH Kantale</b> |
|-----------------|-------------------|
| TH Batticaloa   | 134 km            |
| TH Anuradhapura | 106 km            |
| DGH Polonnaruwa | 70.7 km           |

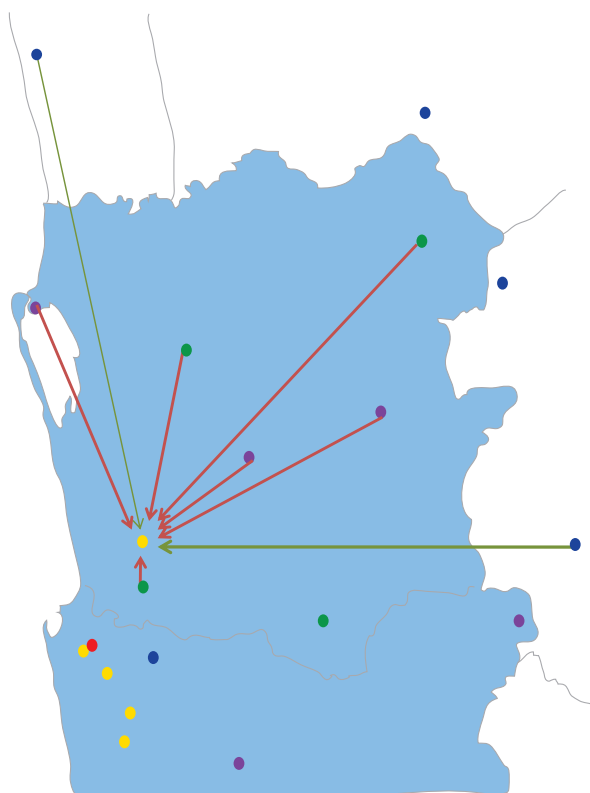
| <b>District</b> | <b>Hospital</b>    | <b>Level of neonatal care</b> |
|-----------------|--------------------|-------------------------------|
| Batticaloa      | BH Vallaichchnai   | Level 2                       |
| Ampara          | DGH Ampara         | Level 2                       |
|                 | BH Kalmunai South  | Level 2                       |
|                 | BH Kalmunai North  | Level 2                       |
|                 | BH Dehiattakandiya | Level 1                       |
|                 | BH Mahaoya         | Level 1                       |
|                 | BH Akkaraipattu    | Level 1                       |
|                 | BH Samanthurai     | Level 1                       |
| Trincomalee     | DGH Trincomalee    | Level 2                       |
|                 | BH Muttur          | Level 1                       |
|                 | BH Kinniya         | Level 1                       |

### Base Hospitals not identified as specialized neonatal care facilities:

| <b>District</b> | <b>Hospital</b>                  |
|-----------------|----------------------------------|
| Batticaloa      | BH Kalavanchikudi, BH Kathankudi |
| Ampara          | BH Pothuvil, BH Nindavur         |

|                                                                |                                              |
|----------------------------------------------------------------|----------------------------------------------|
| Hospitals of other provinces served by this network:           | None                                         |
| Number of births occurring in institutions within the network: | 28983 (91.2% of the total provincial births) |
| Maximum real time distance to the lead institution:            | 141 km (DGH Trincomalee)                     |
| Minimum real time distance to the lead institution:            | 8.0 km (BH Kathankudi)                       |

### 5.2.9 Western Province: North Colombo Network



Colombo North teaching Hospital (TH Ragama) is identified as the lead institution for this network. It will serve the Gampaha District mainly.

Two other hospitals, namely BH Marawilla and BH Karawanella are closer in real time distance to the lead institution of this network and therefore will be linked to this network.

|                | BH Marawilla | BH Karawanella |
|----------------|--------------|----------------|
| TH Ragama      | 48.1 km      | 55.2 km        |
| PGH Kurunegala | 69.1 km      |                |
| PGH Ratnapura  |              | 59.1 km        |

#### Hospitals included in the network:

| District | Hospital          | Level of neonatal care |
|----------|-------------------|------------------------|
| Gampaha  | DGH Gampaha       | Level 2                |
|          | DGH Negambo       | Level 2                |
|          | BH Wathupitiwella | Level 2                |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District | Hospital        |
|----------|-----------------|
| Gampaha  | BH Meerigama    |
|          | BH Minuwangoda  |
|          | BH Kiribathgoda |

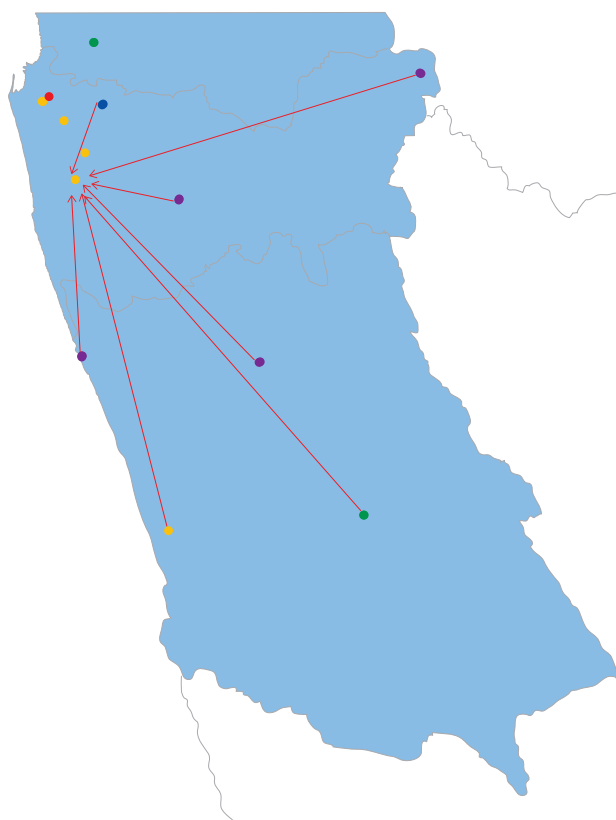
| District | Hospital       | Level of neonatal care | Births 2013 |
|----------|----------------|------------------------|-------------|
| Puttlam  | BH Marawilla   | Level 1                | 2564        |
| Kegalle  | BH Karawanella | Level 1                | 2205        |

Number of births occurring in institutions within the network: 25140 (29.7% of the total provincial births / 99.5% of the district births) + 4769 from outside (BH Marawilla) & (BH Karawanella)

Maximum real time distance to the lead institution: 42.4 km (BH Meerigama)

Minimum real time distance to the lead institution: 6.6 km (BH Kiribathgoda)

### 5.2.10 Western Province: Colombo South Network



Colombo South Teaching Hospital is identified as the lead institution for this network. It will serve the Kalutara district mainly and the institutions in the Colombo district that are not included in the Colombo Group network.

#### Hospitals included in the network:

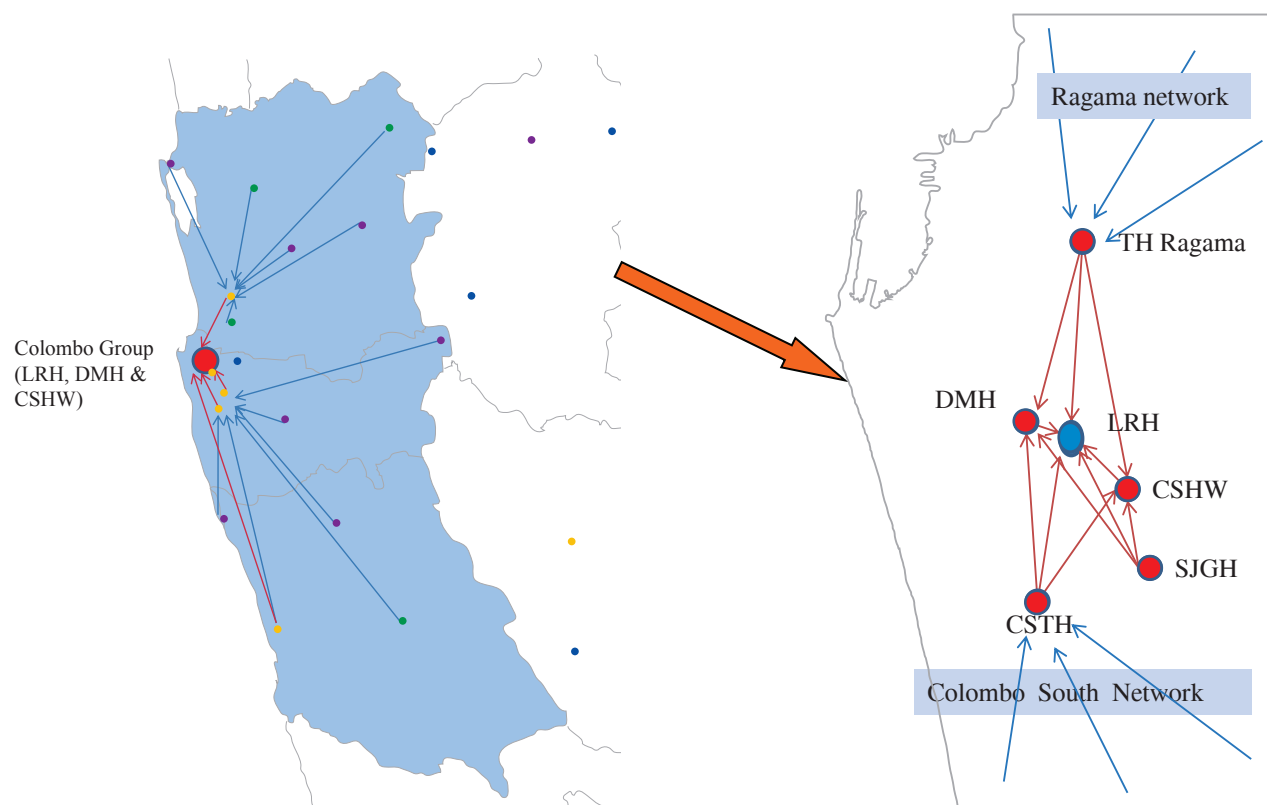
| District | Hospital                       | Level of neonatal care |
|----------|--------------------------------|------------------------|
| Colombo  | BH Awissawella                 | Level 2                |
|          | BH Homagama                    | Level 2                |
|          | BH Mulleriyawa                 | Level 1                |
| Kalutara | DGH Kalutara                   | Level 3                |
|          | Kethumathie Maternity Hospital | Level 2                |
|          | BH Horana                      | Level 2                |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District | Hospital   |
|----------|------------|
| Kalutara | BH Pimbura |

|                                                                |                                              |
|----------------------------------------------------------------|----------------------------------------------|
| Hospitals of other provinces served by this network:           | None                                         |
| Number of births occurring in institutions within the network: | 31933 (29.0% of the total provincial births) |
| Maximum real time distance to the lead institution:            | 61.0 km (BH Pimbura)                         |
| Minimum real time distance to the lead institution:            | 15.0 km (BH Homagama)                        |

### 5.2.11 Western Province: Colombo Group Network



Lady Ridgway Children's Hospital is identified as the lead institution for this network. It will serve the two teaching hospitals: Castle Street Hospital for Women and the De Soyza Maternity Hospital, as well as the North Colombo and South Colombo Networks. With 14576 births occurring in 2013, Castle Street Hospital for women remains the largest hospital for maternity care in Sri Lanka and is equal to a National Hospital for Women. Together with De Soyza Maternity Hospital, the oldest maternity hospital in Sri Lanka, account for nearly 22000 births annually. Both of these institutions are considered as teaching hospitals for the Colombo Medical Faculty. Being the highest level referral facilities for women in Sri Lanka, and the volume of births in these institutions justify each of these facilities having a level 3 neonatal care facility.

The Lady Ridgway Hospital for Children should function as a super specialized care facility for all the specialized neonatal care facilities in the country.

#### Hospitals included in the network:

| District | Hospital                         | Level of neonatal care |
|----------|----------------------------------|------------------------|
| Colombo  | Castle Street Hospital for Women | Level 3                |
|          | De Soyza Maternity Hospital      | Level 3                |
|          | TH Sri Jayewardenepura Kotte     | Level 3                |

Base Hospitals not identified as specialized neonatal care facilities: None  
Hospitals of other provinces served by this network: None  
Number of births occurring in institutions within the network: 26117 (30.5% of the total provincial births)  
Maximum real time distance to the lead institution: 9.8 km (TH Sri Jayewardenepura Kotte)  
Minimum real time distance to the lead institution: 1.1 km (DMH)

The networks having a level 3 institution as the lead institution need to be linked to a 3+ super specialized facilities in the country. Map 5.2 below displays the proposed networks and their links to a level 3+ referral care facility based on real time distance. In addition, the summary of the networks in terms of hospitals included, births served by the network and their proposed level 3+ referral care facility are summarized in table 5.2 and 5.3.

Map 5.2: The Proposed networks according to plan 1

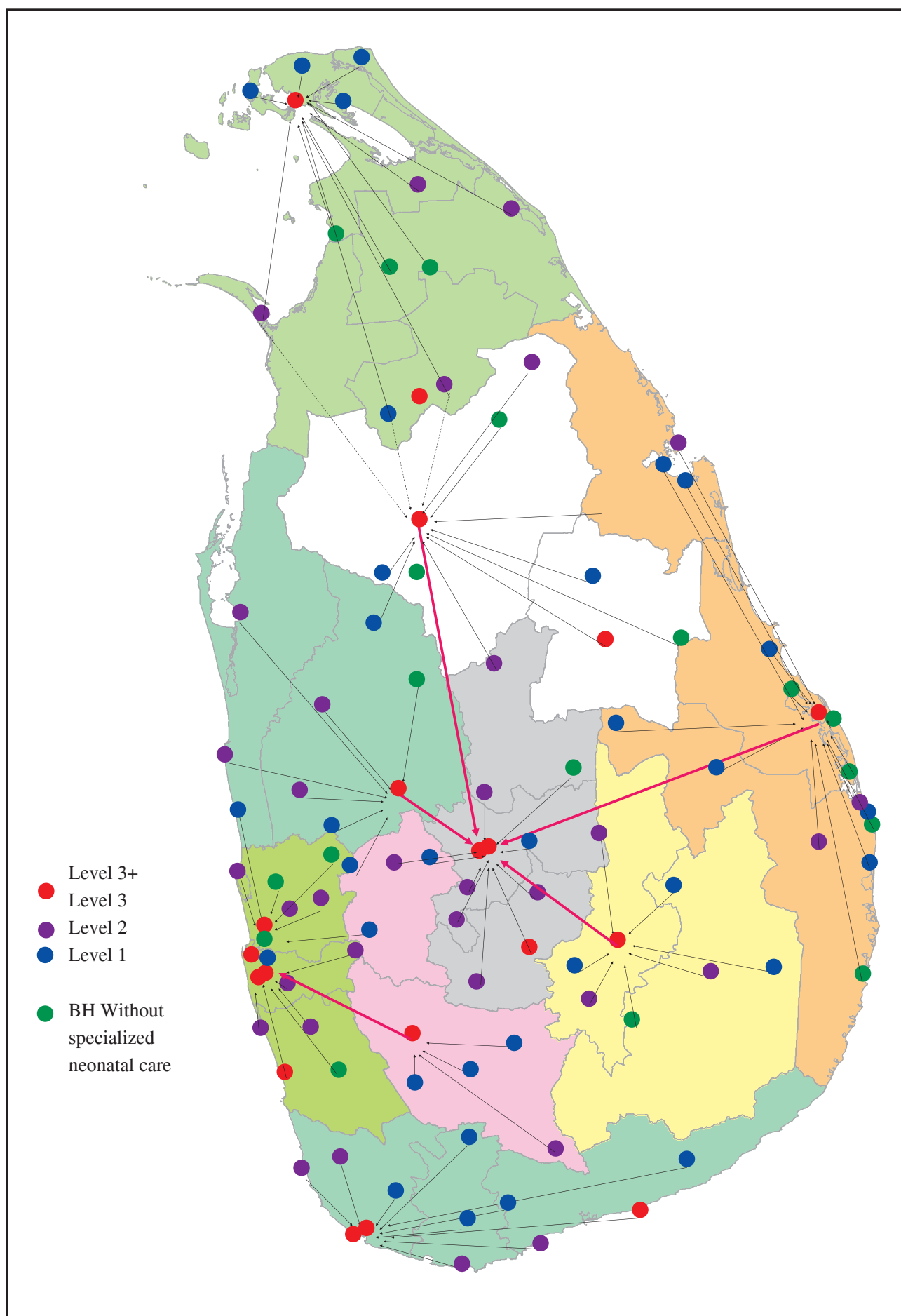


Table 5.2: Summary of the neonatal care networks as proposed in plan 1

| Province      | Lead Institution          | District     | Other hospitals   | Level of care | Real time distance to lead institution (km) | Births 2013                                         | Level 3+ facility linked |
|---------------|---------------------------|--------------|-------------------|---------------|---------------------------------------------|-----------------------------------------------------|--------------------------|
| Northern      | TH Jaffna (Level 3+)      | Jaffna       | BH Point Pedro    | Level 1       | 30.2                                        | 18144 births (95.2% of total provincial births)     | TH Jaffna                |
|               |                           |              | BH Tellipai       | Level 1       | 19.4                                        |                                                     |                          |
|               |                           |              | BH Chavakachcheri | Level 1       | 17.6                                        |                                                     |                          |
|               |                           |              | BH Kayts          | Level 1       | 21.4                                        |                                                     |                          |
|               |                           | Killinochchi | DGH Killinochchi  | Level 2       | 64.2                                        |                                                     |                          |
|               |                           |              | BH Mulankavil     |               | 65.2                                        |                                                     |                          |
|               |                           |              | BH Mallavi        |               | 95.4                                        |                                                     |                          |
|               |                           |              | BH Mankulam       |               | 92.1                                        |                                                     |                          |
|               |                           | Mannar       | DGH Mannar        | Level 2       | 118.0                                       |                                                     |                          |
|               |                           | Vavunia      | DGH Vavunia       | Level 2       | 131.0                                       |                                                     |                          |
|               |                           |              | BH Cheddikulam    | Level 1       | 155.0                                       |                                                     |                          |
| North Central | TH Anuradhapura (Level 3) | Mullativu    | DGH Mullativu     | Level 2       | 118.0                                       | 20483 births (90.0% of the total provincial births) | SBCH                     |
|               |                           | Anuradhapura | BH Padaviya       | Level 2       | 89.0                                        |                                                     |                          |
|               |                           |              | BH Thambuttegama  | Level 1       | 26.6                                        |                                                     |                          |
|               |                           |              | BH Kebethigollewa |               | 30.9                                        |                                                     |                          |
|               |                           | Polonnaruwa  | DGH Polonnaruwa   | Level 3       | 102.0                                       |                                                     |                          |
|               |                           |              | BH Madirigiriya   | Level 1       | 97.1                                        |                                                     |                          |
|               |                           |              | BH Welikanda      |               | 130.0                                       |                                                     |                          |
|               |                           | Matale       | BH Dambulla       | Level 2       | 64.4                                        |                                                     |                          |
|               |                           | Trincomalee  | BH Kantale        | Level 2       | 106.0                                       | 4064                                                | SBCH                     |
|               |                           | Kurunegala   |                   |               |                                             | 1039                                                |                          |
|               |                           |              | BH Galgamuwa      | Level 1       | 45.4                                        | 264                                                 |                          |
| North Western | TH Kurunegala (Level 3)   | Kurunegala   | BH Kuliyaipitiya  | Level 2       | 38.8                                        | 35777 births (88.4% of the total provincial births) | SBCH                     |
|               |                           |              | BH Nikaweratiya   | Level 2       | 42.2                                        |                                                     |                          |
|               |                           |              | BH Dambadeniya    | Level 1       | 32.0                                        |                                                     |                          |
|               |                           |              | BH Polpitigama    |               | 50.9                                        |                                                     |                          |
|               |                           | Puttalam     | DGH Chillaw       | Level 2       | 72.8                                        |                                                     |                          |
|               |                           |              | BH Puttalam       | Level 2       | 87.1                                        |                                                     |                          |
|               |                           | Kegalle      | BH Warakapola     | Level 1       | 36.3                                        |                                                     |                          |
|               |                           |              |                   |               |                                             | 88                                                  |                          |
|               |                           | Kandy        | TH Kandy          | Level 3       | 5.0                                         | 43135 births (84.3% of total provincial births)     | SBCH                     |
|               |                           |              | TH Peradeniya     | Level 3       | 0.4                                         |                                                     |                          |
|               |                           |              | DGH Gampola       | Level 2       | 16.1                                        |                                                     |                          |
|               |                           |              | DGH Nawalapitiya  | Level 2       | 31.8                                        |                                                     |                          |
| Central       | SBCH (Level 3+)           |              | BH Teldeniya      | Level 2       | 31.5                                        |                                                     |                          |

| Province | Lead Institution      | District                | Other hospitals                                     | Level of care                                                                                                                                               | Real time distance to lead institution (km)                               | Births 2013                                                            | Level 3+ facility linked                 |                                                     |
|----------|-----------------------|-------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|
| Uva      | PGH Badulla (Level 3) | Matale                  | DGH Matale<br>BH Hettipola                          | Level 2                                                                                                                                                     | 28.1<br>104.0                                                             |                                                                        | SBCH                                     |                                                     |
|          |                       | Nuwara Eliya            | DGH Nuwara Eliya<br>BH Dickoya<br>BH Rikillagaskade | Level 3<br>Level 2<br>Level 2                                                                                                                               | 78.5<br>77.5<br>39.3                                                      |                                                                        |                                          |                                                     |
|          |                       |                         | Kegalle                                             | DGH Kegalle<br>BH Mawanella                                                                                                                                 | Level 2<br>Level 1                                                        |                                                                        |                                          | 32.1<br>19.5                                        |
|          |                       | Badulla                 | BH Diyathalawa<br>BH Mahiyangana<br>BH Welimada     | Level 2<br>Level 2<br>Level 1                                                                                                                               | 38.6<br>51.2<br>30.3                                                      | 21978 births (93.1% of the total provincial births)                    |                                          |                                                     |
|          |                       |                         | Monaragala                                          | DGH Monaragala<br>BH Bibile<br>BH Siyambalanduwa<br>BH Wellawaya                                                                                            | Level 2<br>Level 1<br>Level 1                                             |                                                                        |                                          | 57.2<br>60.5<br>86.2<br>61.3                        |
|          |                       | TH Batticaloa (Level 3) | Batticaloa                                          | BH Vallaichchnai<br>BH Kalavanchikudi<br>BH Kathankudi                                                                                                      | Level 1                                                                   | 34.3<br>29.2<br>8.0                                                    |                                          | 28983 births (91.2% of the total provincial births) |
|          | Trincomalee           |                         | DGH Trincomalee<br>BH Muttur<br>BH Kinniya          | Level 2<br>Level 1<br>Level 1                                                                                                                               | 141.0<br>112.0<br>123.0                                                   |                                                                        |                                          |                                                     |
|          |                       |                         | Ampara                                              | DGH Ampara<br>BH Kalmunai South<br>BH Kalmunai North<br>BH Dehiattakandiya<br>BH Mahaoya<br>BH Akkaraipattu<br>BH Samanthurai<br>BH Pothuvil<br>BH Nindavur | Level 2<br>Level 2<br>Level 2<br>Level 1<br>Level 1<br>Level 1<br>Level 1 | 69.3<br>43.5<br>41.2<br>100.0<br>51.8<br>65.5<br>58.8<br>110.0<br>50.4 |                                          |                                                     |
|          | Southern              |                         |                                                     | TH Karapitiya (Level 3+)                                                                                                                                    | Galle                                                                     | TH Mahamodara<br>BH Balapitiya<br>BH Elpitiya<br>BH Udugama            | Level 3<br>Level 2<br>Level 2<br>Level 1 |                                                     |

| Province        | Lead Institution        | District   | Other hospitals   | Level of care          | Real time distance to lead institution (km) | Births 2013                                         | Level 3+ facility linked                            |     |
|-----------------|-------------------------|------------|-------------------|------------------------|---------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|-----|
| Sabaragamuwa    |                         | Matara     | DGH Matara        | Level 2                | 42.8                                        | births)                                             |                                                     |     |
|                 |                         |            | BH Deniyaya       | Level 1                | 83.9                                        |                                                     |                                                     |     |
|                 |                         |            | BH Kamburupitiya  | Level 1                | 56.0                                        |                                                     |                                                     |     |
|                 |                         | Hambantota | DGH Hambantota    | Level 3                | 127.0                                       |                                                     |                                                     |     |
|                 |                         |            | BH Tangalle       | Level 2                | 82.1                                        |                                                     |                                                     |     |
|                 | PGH Ratnapura (Level 3) |            | BH Tissamaharama  | Level 1                | 147.0                                       |                                                     |                                                     |     |
|                 |                         |            | BH Walasmulla     | Level 1                | 76.2                                        |                                                     |                                                     |     |
|                 |                         | Rathnapura | BH Embilipitiya   | Level 2                | 76.0                                        | 20364 births (65.5% of the total provincial births) | LRH                                                 |     |
|                 |                         |            | BH Kahawatte      | Level 1                | 26.0                                        |                                                     |                                                     |     |
|                 |                         |            | BH Balangoda      | Level 1                | 54.1                                        |                                                     |                                                     |     |
|                 | BH Kalawana             | Level 1    | 31.3              |                        |                                             |                                                     |                                                     |     |
| Western – North | TH Ragama (Level 3)     | Gampaha    | DGH Gampaha       | Level 2                | 14.5                                        | 25188 births (29.4% of the total provincial births) | LRH                                                 |     |
|                 |                         |            | DGH Negambo       | Level 2                | 26.1                                        |                                                     |                                                     |     |
|                 |                         |            | BH Wathupitiwella | Level 2                | 30.8                                        |                                                     |                                                     |     |
|                 |                         |            | BH Meerigama      |                        | 42.4                                        |                                                     |                                                     |     |
|                 |                         |            | BH Minuwangoda    |                        | 21.8                                        |                                                     |                                                     |     |
|                 |                         | Puttlam    |                   | BH Kiribathgoda        |                                             | 6.6                                                 |                                                     |     |
|                 |                         |            | BH Marawilla      | Level 1                | 48.1                                        | 2564                                                |                                                     |     |
|                 |                         | Kegalle    | BH Karawanella    | Level 1                | 55.2                                        | 2205                                                |                                                     |     |
|                 |                         | Colombo    | BH Awissawella    | Level 2                | 49.8                                        | 31933 births (37.3% of the total provincial births) | LRH                                                 |     |
|                 |                         |            | BH Homagama       | Level 2                | 15.0                                        |                                                     |                                                     |     |
| Western – South | TH CSTH (Level 3)       |            | BH Mulleriyawa    | Level 1                | 12.1                                        |                                                     |                                                     |     |
|                 |                         | Kalutara   | DGH Kalutara      | Level 3                | 40.5                                        |                                                     |                                                     |     |
|                 |                         |            | Kethumathie MH    | Level 2                | 19.3                                        |                                                     |                                                     |     |
|                 |                         |            | BH Horana         | Level 2                | 33.8                                        |                                                     |                                                     |     |
|                 |                         |            | BH Pimbura        |                        | 61.0                                        |                                                     |                                                     |     |
|                 | LRH (Level 3+)          | Colombo    |                   | Castle Street HW       | Level 3                                     | 1.5                                                 | 26117 births (30.5% of the total provincial births) | LRH |
|                 |                         |            |                   | De Soyza MH            | Level 3                                     | 1.1                                                 |                                                     |     |
|                 |                         |            |                   | TH Sri Jayawerdenapura | Level 3                                     | 9.8                                                 |                                                     |     |
|                 |                         |            |                   |                        |                                             |                                                     |                                                     |     |
|                 |                         |            |                   |                        |                                             |                                                     |                                                     |     |



**Table 5.3: Summary of the number and percentage of births served by the proposed networks as per plan 1**

| No. | Network       | Total number of births in the province | Births in institutions within the network | Births served from other provinces | % births from the province served by the network | Hospitals linked to other networks                            | Births within the province shifted to other networks |
|-----|---------------|----------------------------------------|-------------------------------------------|------------------------------------|--------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------|
| 1   | Northern      | 19053                                  | 18144                                     | None                               | 95.2                                             | None                                                          | None                                                 |
| 2   | North Central | 22766                                  | 20483                                     | 5367                               | 90.0                                             | None                                                          | None                                                 |
| 3   | North Western | 40458                                  | 35777                                     | 88                                 | 88.4                                             | BH Marawilla<br>BH Galgamuwa                                  | 2828                                                 |
| 4   | Central       | 51189                                  | 43135                                     | 8458                               | 84.3                                             | BH Dambulla                                                   | 4064                                                 |
| 5   | Uva           | 23611                                  | 21978                                     | None                               | 93.1                                             | None                                                          | None                                                 |
| 6   | Southern      | 42337                                  | 40587                                     | None                               | 95.9                                             | None                                                          | None                                                 |
| 7   | Sabaragamuwa  | 31726                                  | 20364                                     | None                               | 65.5                                             | TH Kegalle<br>BH Mawanella<br>BH Karawanella<br>BH Warakapola | 10749                                                |
| 8   | Eastern       | 31773                                  | 28983                                     | None                               | 91.2                                             | BH Kantale                                                    | 1039                                                 |
| 9   | North Colombo | 85564                                  | 25188                                     | 4769                               | 29.4                                             | None                                                          | None                                                 |
| 10  | South Colombo |                                        | 31933                                     | None                               | 37.3                                             | None                                                          | None                                                 |
| 11  | Colombo Group |                                        | 26117                                     | None                               | 30.5                                             | None                                                          | None                                                 |

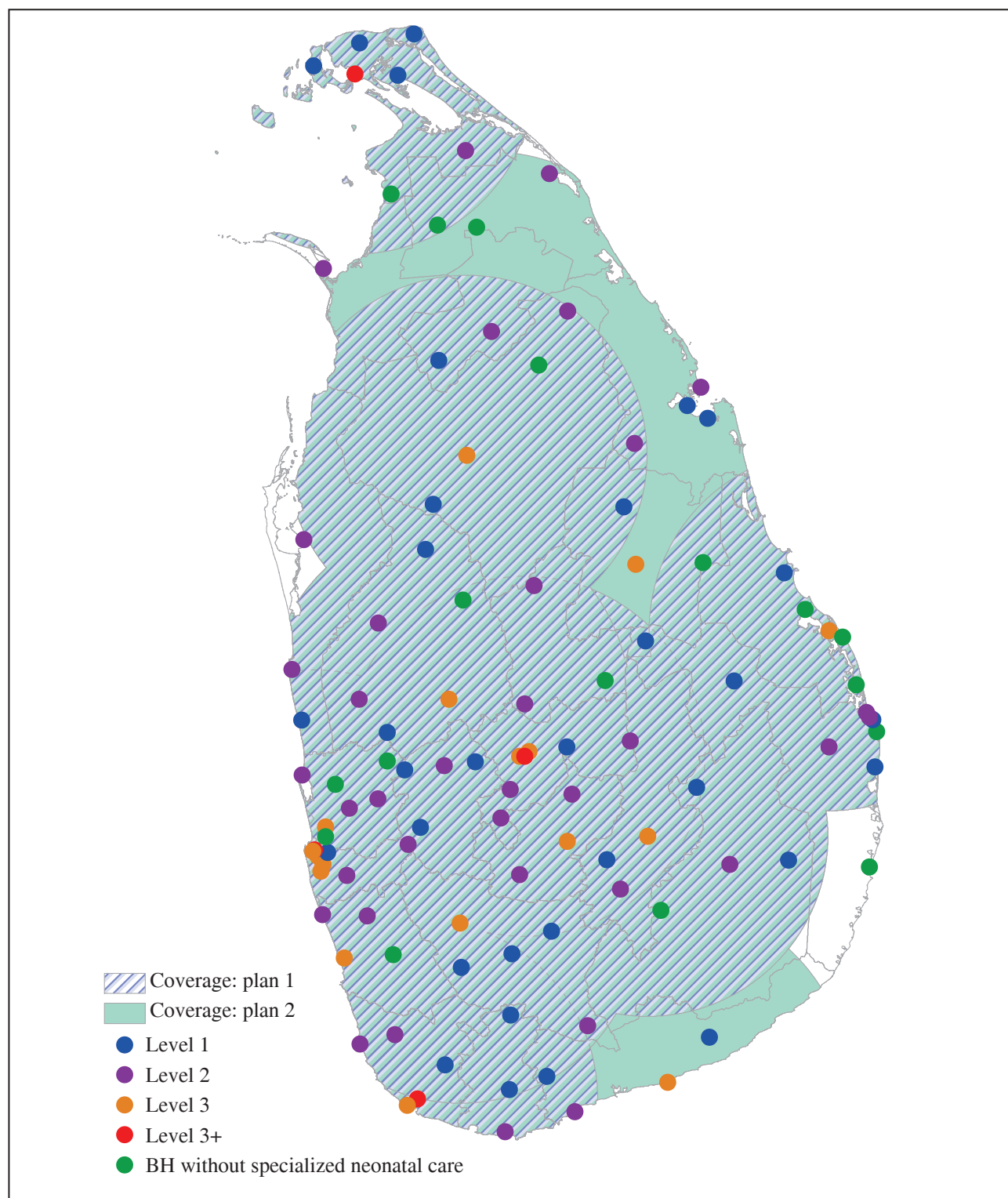
(Only births in institutions identified by the MoH for the provision of special neonatal services and have been upgraded, as hospitals with specialized services are included for these networks).

### 5.3 Plan 2

In the second plan four more institutions are added to the 11 3/3+ institutions identified in plan 1; These are namely; DGH Polonnaruwa and DGH Hambantota which are already functioning as level 3 facilities and

the DGH Vavuniya and DGH Trincomalee both of which are currently functioning as level 2 facilities. The expansion and the 15 networks thus created are given below.

*Map 5.3: The fourteen lead institutions and the level 1, 2 and 3 institutions falling within 70 km radius from these institutions according to plan 2*



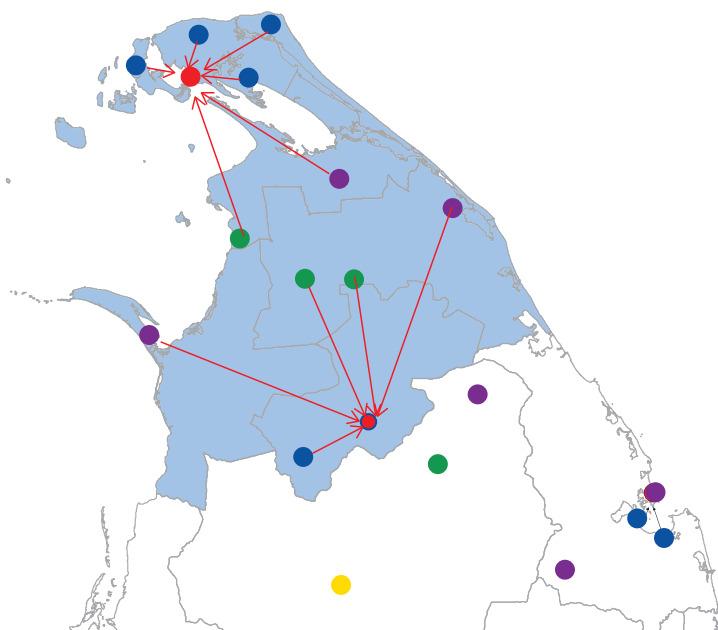
**Table 5.4: The population, births, land area, and deliveries occurring in institutions within a 70 km. buffer zone from a level 3+/3 institution according to Plan 2 by Province**

|               | Population | Births 2013 | Land area km2 | Level 3+ | Level 3 | Number and % of deliveries occurring in institutions outside the 70 km buffer * |     | Percentage land area outside the buffer |
|---------------|------------|-------------|---------------|----------|---------|---------------------------------------------------------------------------------|-----|-----------------------------------------|
|               |            |             |               |          |         | Number                                                                          | %   |                                         |
| Western       | 5984055    | 85564       | 3711.0        | 1        | 2       | 0                                                                               | 0.0 | 0.0                                     |
| Southern      | 2621586    | 42337       | 5534.0        | 1        | 1       | 0                                                                               | 0.0 | 1.3                                     |
| Central       | 2766066    | 51189       | 5741.1        | 1        |         | 0                                                                               | 0.0 | 0.0                                     |
| Northern      | 1126149    | 19053       | 8756.5        | 1        | 1       | 0                                                                               | 0.0 | 1.7                                     |
| Eastern       | 1680343    | 31773       | 9576.7        |          | 2       | 171                                                                             | 0.5 | 11.4                                    |
| North Central | 1426177    | 22811       | 10643.3       |          | 2       | 0                                                                               | 0.0 | 0.0                                     |
| Uva           | 1426177    | 22811       | 8626.4        |          | 1       | 0                                                                               | 0.0 | 0.7                                     |
| North Western | 2578157    | 40458       | 8025.7        |          | 1       | 0                                                                               | 0.0 | 5.1                                     |
| Sabaragamuwa  | 2031126    | 31726       | 4953.7        |          | 1       | 0                                                                               | 0.0 | 0.0                                     |
| Sri Lanka     | 21639836   | 347722      | 65568.4       | 4        | 11      | 171                                                                             | 0.0 | 2.7                                     |

Suggested Plan 2 with 15 neonatal clusters as proposed would achieve greater coverage in comparison to the currently proposed national plan with 21 levels 3/3+ specialized neonatal care facilities.

Networks that were modified as a result of the extension to 15 level 3/3+ facilities are presented below.

### 5.3.1 Modified Northern Provincial Network



|             | DGH Mannar     | DGH Mullativu  | BH Cheddikulam | BH Mallavi     | BH Mankulam    |
|-------------|----------------|----------------|----------------|----------------|----------------|
| TH Jaffna   | 118 km         | 118 km         | 155 km         | 95.4 km        | 92.1 km        |
| DGH Vavunia | <b>79.2 km</b> | <b>68.4 km</b> | <b>34.3 km</b> | <b>61.9 km</b> | <b>45.7 km</b> |

Under plan 2, two lead institutions are identified for the Northern Province: TH Jaffna and the DGH Vavunia. This will also result in reduced travel times within the networks and reduced workload for TH Jaffna and Anuradhapura. DGH Vavunia will need to be upgraded to a level 3 Institution.

#### Hospitals included in the network:

| District        | Hospital                                                  | Level of neonatal care |
|-----------------|-----------------------------------------------------------|------------------------|
| Jaffna network  | BH Point Pedro , BH Tellipai, BH Chavakachcheri, BH Kayts | Level 1                |
|                 | DGH Killinochchi                                          | Level 2                |
| Vavunia network | DGH Mannar                                                | Level 2                |
|                 | DGH Vavunia                                               | Level 2                |
|                 | BH Cheddikulam                                            | Level 1                |
|                 | DGH Mullativu                                             | Level 2                |

#### Base Hospitals not identified as specialized neonatal care facilities:

| District        | Hospital                 |
|-----------------|--------------------------|
| Jaffna network  | BH Mulankavil            |
| Vavunia network | BH Mallavi & BH Mankulam |

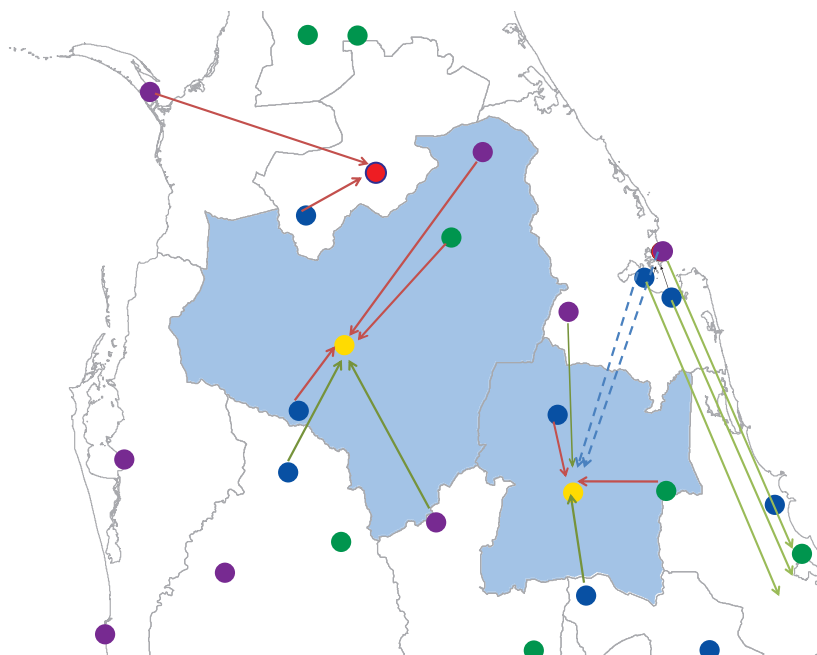
#### Jaffna network

Number of births occurring in institutions within the network: 11546 (60.6% of provincial births)  
Maximum real time distance to the lead institution: 65.2 km (BH Mulankavil)  
Minimum real time distance to the lead institution: 17.6 km (BH Chavakachcheri)

#### Vavunia network

Number of births occurring in institutions within the network: 6598 (34.6% of the provincial births)  
Maximum real time distance to the lead institution: 79.2 (DGH Mannar)  
Minimum real time distance to the lead institution: 34.3 km (BH Cheddikulam)

### 5.3.2 Modified North Central Provincial Network



|                 | BH Dambulla | BH Kantale | BH Dehiattakandiya | BH Madirigiriya | BH Welikanda | DGH Trincomalee | BH Kinnya |
|-----------------|-------------|------------|--------------------|-----------------|--------------|-----------------|-----------|
| TH Anuradhapura | 64.4 km     |            |                    | 97.1 km         | 131 km       |                 |           |
| DGH Polonnaruwa | 69.8 km     | 70.7 km    | 45.2 km            | 29.6 km         | 29.3 km      | 111 km          | 103 km    |
| TH Batticaloa   |             | 134 km     | 100 km             |                 |              | 141 km          | 123 km    |

Under plan 2 there are two lead institutions identified for the North Central Province: TH Anuradhapura and DGH Polonnaruwa. DGH Polonnaruwa will function as a referral care facility for parts of the Eastern Province as well as parts of the Central Province.

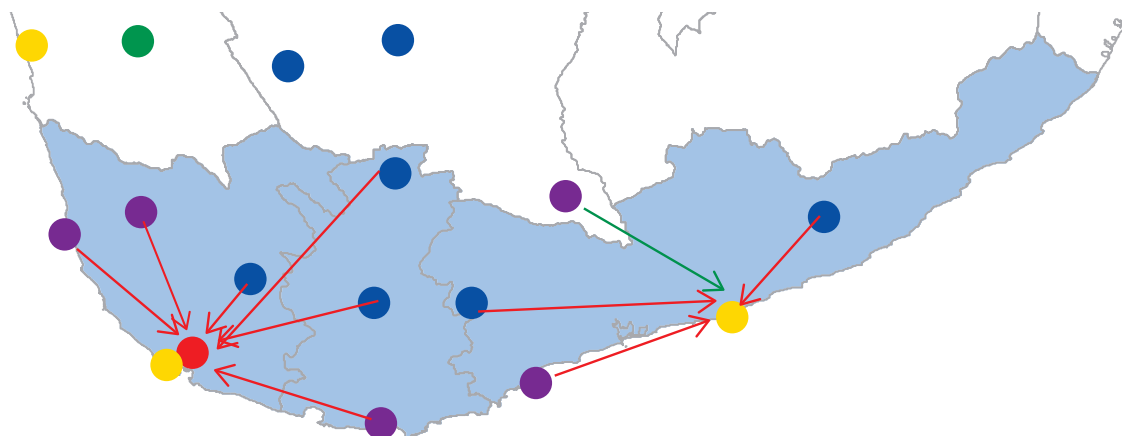
#### Name of the network: North Central Province –Anuradhapura network

Lead institution: Teaching Hospital Anuradhapura (level 3)  
 Other institutions: BH Padaviya (2), BH Thambuttegama (1),  
 BH not identified as specialized neonatal care facilities: BH Kebethigollewa  
 Institutions coming under different provinces: BH Galgamuwa & BH Dambulla  
 Number of births occurring in institutions within the network: 13362 (58.7% of provincial births) + 4328 from out side  
 Maximum real time distance to the lead institution: 89.9 km (BH Padaviya)  
 Minimum real time distance to the lead institution: 29.7 km (BH Thambuttegama)

#### Name of the network: North Central Province –Polonnaruwa network

Lead institution: District General Hospital Polonnaruwa (level 3)  
 Other institutions: BH Madirigiriya (1),  
 BH not identified as specialized neonatal care facilities: BH Welikanda  
 Institutions coming under different provinces: DGH Trincomalee (2) optional, BH Kantale (2), BH Dehiattakandiya (1) & BH Kinnya (optional)  
 Number of births occurring in institutions within the network: 7121 (31.3% of provincial births) + 7900 from out side  
 Maximum real time distance to the lead institution: 112 km (DGH Trincomalee)  
 Minimum real time distance to the lead institution: 29.6 km (BH Madirigiriya)

### 5.3.3 Modified Southern Provincial Network



|                | BH Tangalle    | BH Tissa       | BH Walasmulla  | BH Embilipitiya |
|----------------|----------------|----------------|----------------|-----------------|
| TH Karapitiya  | 82.1 km        | 147 km         | 76.2 km        |                 |
| DGH Hambantota | <b>49.6 km</b> | <b>26.8 km</b> | <b>60.4 km</b> | <b>55.0 km</b>  |
| PGH Ratnapura  |                |                |                | <b>74.5 km</b>  |

Under plan 2 there are two lead institutions identified for the Southern Province: TH Karapitiya and DGH Hambantota. GH Hambantota will function as a referral care facility for the Hambantota District as well as for selected hospitals of the Sabaragamuwa Province. This new network will decrease the number of deliveries by 10303 (24.3%) from the Karapitiya based Southern network, and at the same time provide access to BH Embilipitiya (6434 births) and decrease the access distance from 74.5km (to PGH Ratnapura) to 55 km (to DGH Hambantota).

#### ***Name of the network: Southern Provincial Network (Karapitiya)***

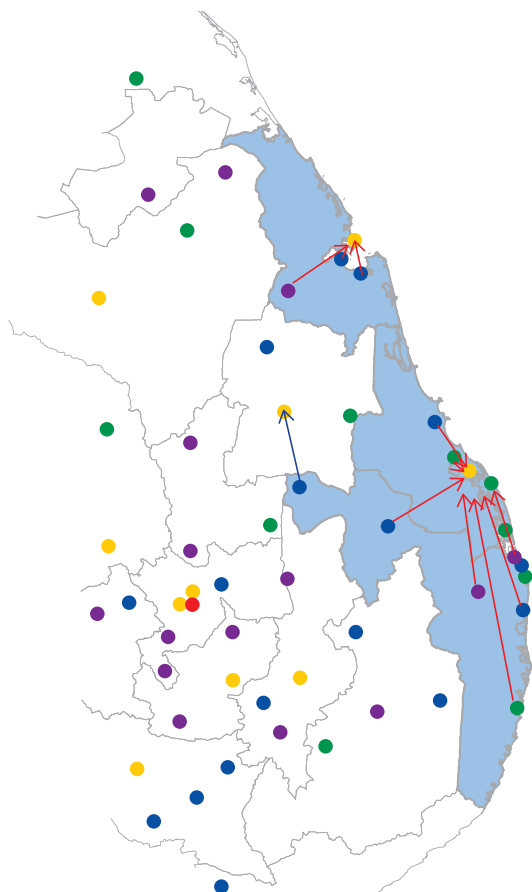
Lead institution: Teaching Hospital Karapitiya (level 3+)  
 Other institutions: TH Mahamodara (3), DGH Matara (2), BH Balapitiya (2), BH Elpitiya (2), BH Kamburupitiya (1) and BH Deniyaya (1)

BH not identified as specialized neonatal care facilities: None  
 Institutions coming under different provinces: None  
 Number of births occurring in institutions within the network: 30284 (71.5% of provincial network)  
 Maximum real time distance to the lead institution: 83.9 km (BH Deniyaya)  
 Minimum real time distance to the lead institution: 4.3 km (TH Mahamodara)

#### ***Name of the network: Southern Provincial Network (Hambantota)***

Lead institution: District General Hospital Hambantota (level 3)  
 Other institutions: BH Tangalle (2), BH Tissamaharama (1), BH Walasmulla (1)  
 BH not identified as specialized neonatal care facilities: None  
 Institutions coming under different provinces: BH Embilipitiya (2)  
 Number of births occurring in institutions within the network: 10303 (24.3% provincial births) + 6434 from out side  
 Maximum real time distance to the lead institution: 62.2 (BH Walasmulla)  
 Minimum real time distance to the lead institution: 31.3 (BH Tissamaharama)

### 5.3.4 Modified Eastern Network



|                    | TH<br>Batticaloa | DGH<br>Trincomalee | DGH<br>Polonnaruwa |
|--------------------|------------------|--------------------|--------------------|
| BH Kantale         | 134 km           | 40.4 km            | 70.7 km            |
| BH Kinniya         | 123 km           | 19.1 km            | 103 km             |
| BH Muttur          | 112 km           | 32.7 km            | 118 km             |
| BH Dehiattakandiya | 100 km           | 157 km             | 45.2 km            |

Under plan 2 there are two lead institutions identified for the Eastern Province: TH Batticaloa and DGH Trincomalee. Prior to the establishment of the network DGH Trincomalee needs to be upgraded to a level 3 facility. DGH Trincomalee will function as a referral care facility for the Trincomalee District. This new network will decrease the number of deliveries by 7505 (25.9%) from the Batticaloa based Eastern network. Linking BH Dehiattakandiya to the Polonnaruwa based NCP network will further decrease the case load by 1301(4.5%).

#### ***Name of the network: Eastern Provincial Network (Batticaloa)***

Lead institution: Teaching Hospital Batticaloa (level 3)  
 Other institutions: BH Vallaichchnai (1), DGH Ampara (2), BH Kalmunai South (2), BH Kalmunai North (2), BH Mahaoya (1), BH Akkaraipattu (1), BH Samanthurai (1)  
 BH not identified as specialized neonatal care facilities: BHKalavanchchikudi, BHKathankudi, BHPothuvilandBH Nindavur  
 Institutions coming under different provinces: None

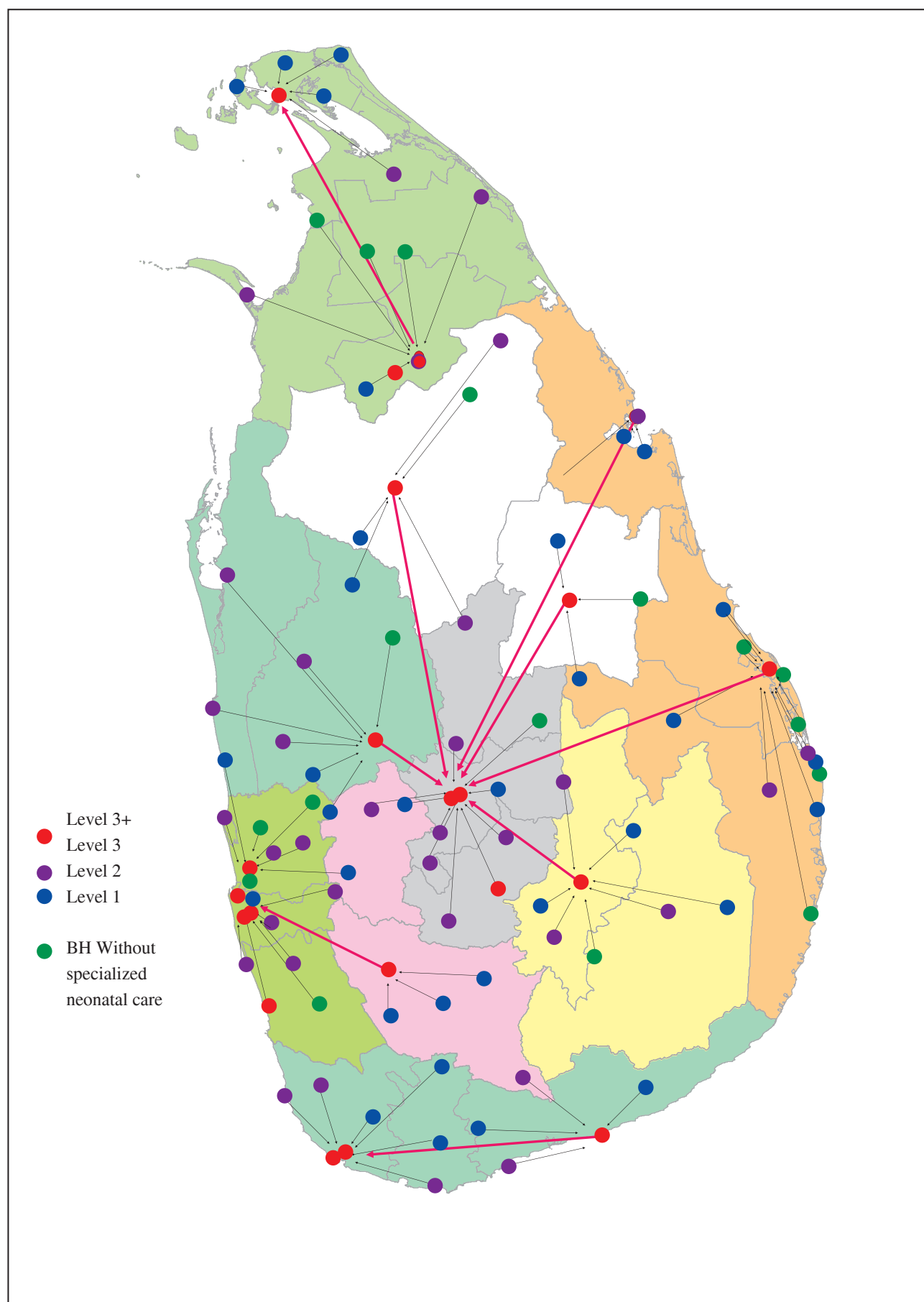
Number of births occurring in institutions within the network: 21216 (66.8% of Eastern network)  
 Maximum real time distance to the lead institution: 110 km (BH Pothuvil)  
 Minimum real time distance to the lead institution: 8.0 km (BH Kathankudi)

#### ***Name of the network: Eastern Provincial Network (Trincomalee)***

Lead institution: District General Hospital Trincomalee (Currently level 2 & needs to be upgraded as a level 3 facility)  
 Other institutions: BH Kantale (2), BH Muttur (1) and BH Kinniya (1)  
 BH not identified as specialized neonatal care facilities: None  
 Institutions coming under different provinces: None

Number of births occurring in institutions within the network: 7505 (23.6% of Eastern network)  
 Maximum real time distance to the lead institution: 40.4 km (BH Kantale)  
 Minimum real time distance to the lead institution: 19.1 km (BH Kinniya)

#### 5.4 The proposed plan 2 networks in relation to their proposed level 3+ referral facility.





5. 5: Summary of the neonatal care networks as proposed in plan 2

| Province                  | Lead Institution                                        | District               | Other hospitals   | Level of care   | Real time distance to lead institution (km) | Births 2013                                         | Level 3+ facility linked |      |
|---------------------------|---------------------------------------------------------|------------------------|-------------------|-----------------|---------------------------------------------|-----------------------------------------------------|--------------------------|------|
| Northern                  | TH Jaffna (Level 3+)                                    | Jaffna                 | BH Point Pedro    | Level 1         | 30.2                                        | 11546 births (60.6% of Jaffna network)              | TH Jaffna                |      |
|                           |                                                         |                        | BH Tellipai       | Level 1         | 19.4                                        |                                                     |                          |      |
|                           |                                                         |                        | BH Chavakachcheri | Level 1         | 17.6                                        |                                                     |                          |      |
|                           |                                                         |                        | BH Kayts          | Level 1         | 21.4                                        |                                                     |                          |      |
|                           | Killinochchi                                            | DGH Killinochchi       | Level 2           | 64.2            |                                             |                                                     |                          |      |
|                           |                                                         | BH Mulankavil          |                   | 65.2            |                                             |                                                     |                          |      |
| North Central             | DGH Vavunia (Need to be upgraded to a level 3 facility) | Killinochchi           | BH Mallavi        |                 | 79.7                                        | 6598 births (34.6% of the Jaffna network)           | TH Jaffna                |      |
|                           |                                                         |                        | BH Mankulam       |                 | 45.7                                        |                                                     |                          |      |
|                           |                                                         |                        | DGH Mannar        |                 | Level 2                                     |                                                     |                          | 79.2 |
|                           |                                                         |                        | BH Cheddikulam    |                 | Level 1                                     |                                                     |                          | 34.3 |
|                           | Mullativu                                               | DGH Mullativu          | Level 2           | 68.4            | 13362 births (58.7% of provincial births)   | SBCH                                                |                          |      |
|                           | Anuradhapura                                            | BH Padaviya            | Level 2           | 89.9            |                                             |                                                     |                          |      |
|                           |                                                         | BH Thambuttegama       | Level 1           | 29.7            |                                             |                                                     |                          |      |
|                           |                                                         | BH Kebethigollewa      |                   | 30.9            |                                             |                                                     |                          |      |
|                           | Kurunegala                                              | BH Galgamuwa           | Level 1           | 45.4            |                                             |                                                     | 264                      |      |
|                           |                                                         | BH Dambulla            | Level 2           | 64.4            |                                             |                                                     | 4064                     |      |
| DGH Polonnaruwa (Level 3) | Polonnaruwa                                             | BH Madirigiriya        | Level 1           | 29.6            | 7121 births (31.3% of provincial births)    |                                                     |                          |      |
|                           |                                                         | BH Welikanda           |                   | 29.3            |                                             |                                                     |                          |      |
|                           |                                                         | Trincomalee (optional) |                   | DGH Trincomalee |                                             | Level 2                                             | 111.0                    | 3951 |
|                           |                                                         |                        |                   | BH Kantale      |                                             | Level 2                                             | 70.7                     | 1039 |
| BH Kinnya                 | Level 1                                                 |                        | 103.0             | 1609            |                                             |                                                     |                          |      |
| Ampara                    | BH Dehiattakandiya                                      |                        | Level 1           | 45.2            | 1301                                        |                                                     |                          |      |
| North Western             | TH Kurunegala (Level 3)                                 | Kurunegala             | BH Kuliyaipitiya  | Level 2         | 38.8                                        | 35777 births (88.4% of the total provincial births) | SBCH                     |      |
|                           |                                                         |                        | BH Nikaweratiya   | Level 2         | 42.2                                        |                                                     |                          |      |
|                           |                                                         |                        | BH Dambadeniya    | Level 1         | 32.0                                        |                                                     |                          |      |
|                           |                                                         |                        | BH Polpitiyagama  |                 | 50.9                                        |                                                     |                          |      |
|                           | Puttlam                                                 | DGH Chillaw            | Level 2           | 72.8            |                                             |                                                     |                          |      |
|                           |                                                         | BH Puttlam             | Level 2           | 87.1            |                                             |                                                     |                          |      |
|                           | Kegalle                                                 | BH Warakapola          | Level 1           | 29.3            | 88                                          |                                                     |                          |      |

| Province          | Lead Institution      | District     | Other hospitals         | Level of care  | Real time distance to lead institution (km) | Births 2013                                        | Level 3+ facility linked                            |                                                     |      |
|-------------------|-----------------------|--------------|-------------------------|----------------|---------------------------------------------|----------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|------|
| Central           | SBCH (Level 3+)       | Kandy        | TH Kandy                | Level 3        | 5.0                                         | 43135 births (84.3% of total provincial births)    | SBCH                                                |                                                     |      |
|                   |                       |              | TH Peradeniya           | Level 3        | 0.4                                         |                                                    |                                                     |                                                     |      |
|                   |                       |              | DGH Gampola             | Level 2        | 16.1                                        |                                                    |                                                     |                                                     |      |
|                   |                       |              | DGH Nawalapitiya        | Level 2        | 31.8                                        |                                                    |                                                     |                                                     |      |
|                   |                       |              | BH Teldeniya            | Level 2        | 31.5                                        |                                                    |                                                     |                                                     |      |
|                   |                       | Matale       | DGH Matale              | Level 2        | 28.1                                        |                                                    |                                                     | 104.0                                               |      |
|                   |                       | BH Hettipola |                         |                |                                             |                                                    |                                                     |                                                     |      |
|                   |                       | Nuwara Eliya | DGH Nuwara Eliya        | Level 3        | 78.5                                        |                                                    |                                                     |                                                     |      |
|                   |                       |              | BH Dickoya              | Level 2        | 77.5                                        |                                                    |                                                     |                                                     |      |
|                   |                       | Kegalle      | BH Rikillagaskade       | Level 2        | 39.3                                        |                                                    |                                                     |                                                     |      |
| Uva               | PGH Badulla (Level 3) | Badulla      | DGH Kegalle             | Level 2        | 32.1                                        | 5478 births (93.1% of the total provincial births) | SBCH                                                |                                                     |      |
|                   |                       |              | BH Mawanella            | Level 1        | 19.5                                        |                                                    |                                                     |                                                     |      |
|                   |                       |              | Monaragala              | BH Diyathalawa | Level 2                                     | 38.6                                               | 21978 births (70.7% of the total provincial births) |                                                     |      |
|                   |                       |              |                         | BH Mahiyangana | Level 2                                     | 51.2                                               |                                                     |                                                     |      |
|                   |                       |              |                         | BH Welimada    | Level 1                                     | 30.3                                               |                                                     |                                                     |      |
|                   |                       | Monaragala   | DGH Monaragala          | Level 2        | 57.2                                        |                                                    |                                                     |                                                     |      |
|                   |                       |              | BH Bibile               | Level 1        | 60.5                                        |                                                    |                                                     |                                                     |      |
|                   |                       | Eastern      | TH Batticaloa (Level 3) | Batticaloa     | BH Siyambalanduwa                           | Level 1                                            | 86.2                                                | 21216 births (70.7% of the total provincial births) | SBCH |
|                   |                       |              |                         |                | BH Wellawaya                                |                                                    | 61.3                                                |                                                     |      |
|                   |                       |              |                         |                | BH Vallaichchnai                            | Level 1                                            | 34.3                                                |                                                     |      |
| BH Kalavanchikudi |                       |              |                         |                |                                             |                                                    |                                                     |                                                     |      |
| BH Kathankudi     |                       |              |                         |                | 8.0                                         |                                                    |                                                     |                                                     |      |
| Ampara            | DGH Ampara            |              |                         | Level 2        | 69.3                                        | 43.5                                               |                                                     |                                                     |      |
|                   | BH Kalmunai South     |              |                         | Level 2        | 41.2                                        |                                                    |                                                     |                                                     |      |
|                   | BH Kalmunai North     |              |                         | Level 2        | 51.8                                        |                                                    |                                                     |                                                     |      |
|                   | BH Mahaoya            |              |                         | Level 1        | 65.5                                        |                                                    |                                                     |                                                     |      |
|                   | BH Akkaraipattu       |              |                         | Level 1        | 58.8                                        |                                                    |                                                     |                                                     |      |
| BH Samanthurai    | Level 1               | 110.0        | 50.4                    |                |                                             |                                                    |                                                     |                                                     |      |
| BH Pothuvil       |                       |              |                         |                |                                             |                                                    |                                                     |                                                     |      |
| BH Nindavur       |                       |              |                         |                |                                             |                                                    |                                                     |                                                     |      |

| Province        | Lead Institution          | District    | Other hospitals        | Level of care | Real time distance to lead institution (km) | Births 2013                                                  | Level 3+ facility linked |
|-----------------|---------------------------|-------------|------------------------|---------------|---------------------------------------------|--------------------------------------------------------------|--------------------------|
| Southern        | DGH Trincomalee (Level 3) | Trincomalee | BH Kantale             | Level 2       | 40.4                                        | 7505 births (25.0% of the Eastern Provincial network births) |                          |
|                 |                           |             | BH Muttur              | Level 1       | 32.7                                        |                                                              |                          |
|                 |                           |             | BH Kinnya              | Level 1       | 19.1                                        |                                                              |                          |
| Southern        | TH Karapitiya (Level 3+)  | Galle       | TH Mahamodara          | Level 3       | 4.4                                         | 30284 births (71.5% of Southern provincial network)          | TH Karapitiya            |
|                 |                           |             | BH Balapitiya          | Level 2       | 35.5                                        |                                                              |                          |
|                 |                           |             | BH Elpitiya            | Level 2       | 38.2                                        |                                                              |                          |
|                 |                           |             | BH Udugama             | Level 1       | 38.2                                        |                                                              |                          |
|                 |                           | Matara      | DGH Matara             | Level 2       | 42.8                                        |                                                              |                          |
|                 |                           |             | BH Deniyaya            | Level 1       | 83.9                                        |                                                              |                          |
| Sabaragamuwa    | DGH Hambantota (Level 3)  | Hambantota  | BH Kamburupitiya       | Level 1       | 56.0                                        | 10303 births (24.3% of provincial births)                    | TH Karapitiya            |
|                 |                           |             | BH Tangalle            | Level 2       | 35.4                                        |                                                              |                          |
|                 |                           |             | BH Tissamaharama       | Level 1       | 31.3                                        |                                                              |                          |
|                 |                           |             | BH Walasmulla          | Level 1       | 62.2                                        |                                                              |                          |
|                 |                           | Ratnapura   | BH Embilipitiya        | Level 2       | 55.0                                        | 6434                                                         |                          |
|                 |                           |             | BH Kahawatte           | Level 1       | 26.0                                        |                                                              |                          |
| Western – North | PGH Ratnapura (Level 3)   | Rathnapura  | BH Balangoda           | Level 1       | 54.1                                        | 13930 births (44.7% of the total provincial births)          | LRH                      |
|                 |                           |             | BH Kalawana            | Level 1       | 31.3                                        |                                                              |                          |
|                 |                           |             | DGH Gampaha            | Level 2       | 14.5                                        |                                                              |                          |
|                 |                           |             | DGH Negambo            | Level 2       | 26.1                                        |                                                              |                          |
|                 |                           | Gampaha     | BH Wathupitiwella      | Level 2       | 30.8                                        | 25188 births (29.4% of the total provincial births)          | LRH                      |
|                 |                           |             | BH Meerigama           | Level 2       | 42.4                                        |                                                              |                          |
| Western – South | TH Ragama (Level 3)       | Kegalle     | BH Minuwangoda         | Level 1       | 21.8                                        | 2205                                                         |                          |
|                 |                           |             | BH Kiribathgoda        | Level 1       | 6.6                                         |                                                              |                          |
|                 |                           |             | BH Karawanella         | Level 1       | 55.2                                        |                                                              |                          |
|                 |                           |             | BH Marawilla           | Level 1       | 48.1                                        |                                                              |                          |
|                 |                           | Puttlam     | BH Awissawella         | Level 2       | 49.8                                        | 2564                                                         | LRH                      |
|                 |                           |             | BH Homagama            | Level 2       | 15.0                                        |                                                              |                          |
| Colombo group   | TH CSTDH (Level 3)        | Kalutara    | BH Mulleriyawa         | Level 1       | 12.1                                        | 31933 births (37.3% of the total provincial births)          |                          |
|                 |                           |             | DGH Kalutara           | Level 3       | 40.5                                        |                                                              |                          |
|                 |                           |             | Kethumathie MH         | Level 2       | 19.3                                        |                                                              |                          |
|                 |                           |             | BH Horana              | Level 2       | 33.8                                        |                                                              |                          |
|                 |                           | Colombo     | BH Pimbura             | Level 2       | 61.0                                        | 26117 births (30.5% of the total provincial births)          | LRH                      |
|                 |                           |             | Castle Street HW       | Level 3       | 1.5                                         |                                                              |                          |
| Colombo group   | LRH (Level 3+)            | Colombo     | De Soyza MH            | Level 3       | 1.1                                         |                                                              |                          |
|                 |                           |             | TH Ragama              | Level 3       | 16.6                                        |                                                              |                          |
|                 |                           |             | CSTDH                  | Level 3       | 6.1                                         |                                                              |                          |
|                 |                           |             | TH Sri Jayawardenapura | Level 3       | 9.8                                         |                                                              |                          |

*Table 5.6: Summary of the number and percentage of births served by the proposed networks as per plan 2*

| No. | Network                       | Total number of births in the province | Births in institutions within the network | Births served from other provinces | % births from the province served by the network | Hospitals linked to other networks                                               | Births within the province shifted to other networks |
|-----|-------------------------------|----------------------------------------|-------------------------------------------|------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------|
| 1   | Jaffna network                | 19053                                  | 11546                                     | None                               | 60.6                                             | None                                                                             | None                                                 |
| 2   | Vavunia network               |                                        | 6598                                      | None                               | 34.6                                             | None                                                                             | None                                                 |
| 3   | Anuradhapura network          | 22766                                  | 13362                                     | 4328                               | 58.7                                             | None                                                                             | None                                                 |
| 4   | Polonnaruwa network           |                                        | 7121                                      | 7900                               | 31.3                                             | None                                                                             | None                                                 |
| 5   | North Western                 | 40458                                  | 35777                                     | None                               | 88.4                                             | BH Marawilla<br>BH Galgamuwa                                                     | 2828                                                 |
| 6   | Central                       | 51189                                  | 43135                                     | 8458                               | 84.3                                             | BH Dambulla                                                                      | 4064                                                 |
| 7   | Uva                           | 23611                                  | 21978                                     | None                               | 93.1                                             | None                                                                             | None                                                 |
| 8   | Karapitiya network            | 42337                                  | 30284                                     | None                               | 71.5                                             | None                                                                             | None                                                 |
| 9   | Hambantota network            |                                        | 10303                                     | 6434                               | 24.3                                             | None                                                                             | None                                                 |
| 10  | Sabaragamuwa                  | 31726                                  | 13930                                     | None                               | 43.9                                             | TH Kegalle<br>BH Mawanelle<br>BH Karawanella<br>BH Warakapola<br>BH Embilipitiya | 17183                                                |
| 11  | Eastern (Batticaloa network)  | 31773                                  | 21216                                     | None                               | 66.8                                             | BH Dehiattakandiya                                                               | None                                                 |
| 12  | Eastern (Trincomalee network) |                                        | 7505                                      | None                               | 23.6                                             | None                                                                             | None                                                 |
| 13  | North Colombo                 | 85564                                  | 25188                                     | 4769                               | 29.4                                             | None                                                                             | None                                                 |
| 14  | South Colombo                 |                                        | 31933                                     | None                               | 37.3                                             | None                                                                             | None                                                 |
| 15  | Colombo Group                 |                                        | 26117                                     | None                               | 30.5                                             | None                                                                             | None                                                 |

## 5.4 Linking networks

It is proposed that a telemedicine link be established within a network. A real time e-BHT (neonatal e-BHT) which once commenced will indicate the neonatal care bed occupancy and once discharged will indicate it becoming vacant. Such a real time virtual system if implemented will provide information on NICU bed / ventilator / special services / availability at the national level.

Within a neonatal network a telemedicine system can be developed (if agreed upon by the relevant professionals) with the level3/3+ institution taking the lead role. It is expected that this would result in improvement of the quality of neonatal services within a network, possible reduction in the need for transfer, improve the quality of the transferred

neonate whenever a transfer is necessary and joint follow up management of back referrals. Such a system will also enable the lead institution to make arrangements for early retrieval of sick neonates and the added advantage of being aware of the full clinical profile of the neonate that they receive. The system would facilitate discussion of cases managed in level 1 and level 2 with the neonatologist in the lead institution and formulation of joint management plans. Such a system would optimize the use of the expertise and experience gained by those in a level 3/3+ institution.

### 5.4.1 Possible advantages of using the system

The advantages and uses for the different stakeholders are listed in table 5.7.

**Table 5.7: Advantages of a telemedicine network for separate stakeholders**

| For patients                                                                                        | Health professionals                                                                        | Ministry of Health / Country                                                |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Best Possible care with improved outcome                                                            | Time savings                                                                                | Maximizing specialized resources                                            |
| Opportunities for obtaining specialized neonatal consultation without transfer                      | Good outcome for the patients for whom they are responsible                                 | Reduced health care costs, especially avoiding advanced states of morbidity |
| When transfer is necessary the transition to higher level of care is optimized                      | Accountability                                                                              |                                                                             |
| Contacts both at the local and teaching hospital level should they need further care in the future. | Complete patient details are readily available within the network for auditing and research | Inexpensive technology used for the proposed system                         |

#### 5.4.2 Possible concerns to be addressed through discussions with pediatricians, administrators / technical experts

For such a system to be successful the cooperation and commitment of the key persons in a network and clearly identified accountability structures are necessary and it is suggested that detailed plans with roles and responsibilities of the different levels, personnel be identified and discussed in detail with the College of Paediatricians and the setting up of telemedicine links be reserved in the first instance to those networks that agree to try it out.

#### 5.4.3 Administrative arrangements

Special administrative requirements and arrangements for the functioning of the networks will have to be identified. Financial provision for the networks may have to be made as for a separate entity.

Medico legal cover: Once the system is established the MoH will need to provide the necessary legal and administrative cover for sharing of patient information through electronic channels using the internet as well as the legal cover for two or more institutions and its experts to manage the same patient using virtual telemedicine systems.

#### 5.4.4 The following are some areas that would need discussion:

- *Ownership of management and responsibility for the neonate.*
- *Issues of breach of confidentiality in making patient details available over the internet.*
- *Possible legal concerns in making available patient details from one institution to another.*
- *Levels of access to data need to be discussed and agreed upon.*
- *Allocation of dedicated staff for the telemedicine system. A separate medical officer is needed at each of these stations for the optimum functioning of the telemedicine system within a network for preparation of necessary documents, follow up etc*
- *Operational cost of the system: in terms of running costs for the system, backups, virus guards and rental of high bandwidth internet facilities*

N.B. There is an already functioning telemedicine system between the Hambantota DGH and Karapitiya TH for the management of Head and Neck Carcinoma, which could be studied to examine the advantages and problems encountered within such a system.

The basic infrastructure necessary for setting up such a system based on the Karapitiya / DGH Hambantota experience is given in annex 3.

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## **ANNEXURES**

**Annexure 1: Review of the progress of the MNH strategic plan and the bottlenecks identified in its implementation**

**Annexure 2: Chart indicating real time distances from level 1 / 2 / 3 neonatal care facilities to level 3 / 3+ facilities**

**Annexure 3: The basic infrastructure necessary for setting up such a system based on the Karapitiya / DGH Hambantota experience**



## ANNEXURE 1:

### Review of the progress of the MNH strategic plan and the bottlenecks identified in its implementation

|     | Strategy/Major Activity                                                                                                                                                                                                                                                                | Progress                                                                                                                                                                                                                     | Bottlenecks identified for this activity                                                                                                                                                 |   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|     |                                                                                                                                                                                                                                                                                        | (completed / partially completed / not done at all)                                                                                                                                                                          |                                                                                                                                                                                          |   |
| 1   | Ensure that the newborn care is adequately addressed within the MCH/FP policy and strategic plan                                                                                                                                                                                       |                                                                                                                                                                                                                              |                                                                                                                                                                                          |   |
| 1.1 | Develop and make available a national MCH/FP policy encompassing all components of the newborn care programme.                                                                                                                                                                         | Done                                                                                                                                                                                                                         |                                                                                                                                                                                          | 3 |
| 1.2 | Advocate and create awareness on the newborn care program within the national MCH/FP policy among parliamentarians, policy makers, central and provincial administrators, programme planners, implementers, service providers, development partners, all other stakeholders and public | Done as an ongoing process. Some areas have still have not been addressed like addressing Parliamentarians                                                                                                                   | Opportunities for such advocacy activities are rare.                                                                                                                                     | 2 |
| 1.3 | Develop, implement and monitor a five year strategic plan, annual operational plan on newborn care based on the MCH policy and strategic plan                                                                                                                                          | Strategic plan developed, implemented and monitored to some extent.                                                                                                                                                          |                                                                                                                                                                                          | 2 |
|     | Facilitate, coordinate and guide the provinces and districts to develop their operational plans based on the MCH/FP policy.                                                                                                                                                            | Done.                                                                                                                                                                                                                        | The capacity of the district planning cells for this activity is deficient. Though the MNH strategic plan is available, its usage in the district planning annually is not satisfactory. | 3 |
|     |                                                                                                                                                                                                                                                                                        | Annually at a district programme planning workshop the districts (MOMCH, MO planning, Provincial CCPs) develop annual plans. MNH Strategic Plan is referred in the development of the district operational plans.            | In some of the districts coordination between the MOMCH the district MCH Manager and the District planning cell is very poor.                                                            |   |
|     | Establish a regularly functioning Technical Advisory Committee (TAC) on newborn care.                                                                                                                                                                                                  | Done. Technical Advisory Committee on Newborn and Child Health meets once in two months under the chairmanship of the DDG PHS II. The committee is appointed for a period of two years by the Secretary, Ministry of Health. | Follow up of activities proposed at the TAC has to be expedited. Capacity at the central level for such activities needs improvement.                                                    | 3 |
| 2   | Ensure availability of uniform, updated evidence based technical guidance and direction to improve newborn care                                                                                                                                                                        |                                                                                                                                                                                                                              |                                                                                                                                                                                          |   |
| 2.1 | Adopt internationally accepted current evidence based intervention as per section 4 on NBC and incorporate them in to the programme on a regular basis                                                                                                                                 | Done. New evidence based interventions that are not incorporated in the strategic plan have also been taken up to the programme; e.g.; Regionalizing newborn care, neonatal retrieval                                        | Incorporation is done at the central level, but mechanism for implementation at lower levels is poor.                                                                                    | 3 |
| 2.2 | Develop and implement evidence based essential care service delivery packages to all newborns throughout the country to deliver the above interventions                                                                                                                                | Essential service delivery package is developed.                                                                                                                                                                             | There has to be an ongoing process to maintain the same skill level among the staff to implement the package, which is lacking in the current system.                                    | 3 |
|     |                                                                                                                                                                                                                                                                                        | The Essential Newborn Care service delivery package is introduced throughout the country.                                                                                                                                    |                                                                                                                                                                                          |   |
| 2.3 | Establish a sustainable effective mechanism to update existing circulars, guidelines and protocols and develop new ones based on current evidence, to disseminate and ensure adherence to them at all levels                                                                           | Circulars are developed and disseminated with the introduction of new programmes.                                                                                                                                            | Protocols are not yet developed.                                                                                                                                                         | 3 |
|     |                                                                                                                                                                                                                                                                                        | Newborn care guidelines are developed based on current evidence.                                                                                                                                                             | A sustainable effective mechanism to update the circulars, guidelines and protocols need to be developed.                                                                                |   |
|     |                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                              | Also a mechanism to disseminate and ensure adherence to them at all levels has to be developed.                                                                                          |   |

|     |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                |   |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 2.4 | Update the national health website with neonatal care guidelines and protocols which are newly developed or an updated from time to time with the help of experts and professional bodies. | Neonatal guidelines are uploaded on the FHB website and has handed over to the Ministry of Health website too.                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                |   |
|     |                                                                                                                                                                                            | Also it is made available as a mobile application in android and apple phones                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                |   |
| 3   | <b>Ensure provision of quality essential care to all newborns at institutional and field levels</b>                                                                                        |                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                |   |
| 3.1 | Develop and ensure implementation of standards for essential newborn care                                                                                                                  | Standards for newborn care developed and introduced to the hospitals.                                                                                                                                                                                                                                                                                   | No established mechanism to implement.                                                                                                                                                                                                                                                                                                                                                                         | 3 |
| 3.2 | Develop and implement an appropriate, sustainable, cost effective, comprehensive quality assurance system on neonatal care                                                                 | Under development.                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                | 2 |
| 3.3 | Develop an inbuilt system for regular monitoring of the quality of care                                                                                                                    | Few indicators related to newborn care; early initiation of breastfeeding, availability of an LMC, conduction of Perinatal death audits is regularly monitored in the hospitals.                                                                                                                                                                        | Need to be developed                                                                                                                                                                                                                                                                                                                                                                                           | 1 |
| 3.4 | Train all neonatal care providers at institutional and field levels through pre service and in service training programmes to ensure quality service provision                             | New evidence based practices for newborn care is included into the basic training curriculum of nurses and midwives. They are also incorporated into the medical curriculum by the medical teachers of the respective faculties.                                                                                                                        | Non availability of a mechanism for regular in-service training in the institutions and in the field setting.                                                                                                                                                                                                                                                                                                  | 3 |
|     |                                                                                                                                                                                            | In-service training programmes are conducted to the staff caring for newborns i.e.; LR, PN ward, Neonatal Units, LMC. Has not achieved 100% coverage in training. National coverage is about 40%, but variable across the districts. Research has shown that knowledge on evidence bases practices on ENC are satisfactory, but the practice is not so. | In-service training for field staff has not happened in an organized manner. A field training manual is under development.                                                                                                                                                                                                                                                                                     |   |
| 3.5 | Introduce newborn care quality indicators into the MIS and monitor them.                                                                                                                   | Some quality indicators are introduced but not monitored.                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                | 2 |
| 3.6 | Strengthen linkages between NBH and maternal and child health and other relevant services to ensure quality of life of the newborn                                                         | Work closely with the maternal and child health programmes.                                                                                                                                                                                                                                                                                             | Linkages with the some other services need to improve; Bio medical engineering services (development of specifications for neonatal equipment, equipment needs assessment, distribution of equipment based on norms and levels of neonatal care), Medical supplies division (purchase of essential drugs for neonatal care, essential commodities), Epidemiology unit, Information Directorate of the MoH, HEB | 3 |
| 4   | <b>Improve the quality of care provision for high risk newborns</b>                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                |   |
| 4.1 | Develop and ensure implementation of standards for high risk newborn care                                                                                                                  | Some standards for care of the high risk newborn are developed and introduced to the hospitals (Management of pre term and LBW neonate, Management of neonatal infections, Management of birth trauma, and Management of congenital anomalies). Others need to be developed.                                                                            | Implementation mechanism is still under development.                                                                                                                                                                                                                                                                                                                                                           | 2 |

|     |                                                                                                                                                                                                      |                                                                                  |                                                                                                                                                                                                                              |   |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 4.2 | Develop and ensure implementation of guidelines and protocols to manage high risk (premature, low birth weight, IUGR, congenital abnormalities etc) and sick newborns (with septicemia, jaundice et) | Guidelines are developed.                                                        | Implementation is in progress.                                                                                                                                                                                               | 3 |
| 4.3 | To develop and ensure implementation of management guidelines and protocols for resuscitation, ventilation and care for high risk newborns.                                                          | Guidelines are developed.                                                        | Implementation is in progress.                                                                                                                                                                                               | 3 |
| 4.4 | Ensure establishment of 'Kangaroo mother care' at the centers providing specialized care and in the domiciliary setting.                                                                             | Done.                                                                            | But practice of KMC is not universal.<br>Staff lacks confidence and leadership to initiate KMC in some hospitals.<br>Knowledge and skill to provide KMC has not introduced to the field setting.                             | 3 |
| 4.5 | Establishment of programmatic linkages with maternal, child health and other relevant services to ensure quality of life of the newborn                                                              | Done                                                                             |                                                                                                                                                                                                                              | 3 |
| 5   | <b>Improve knowledge, skills and competencies of health staff on essential and advanced newborn care</b>                                                                                             |                                                                                  |                                                                                                                                                                                                                              |   |
| 5.1 | Introduce the training programme on Essential Newborn Care based on the adapted WHO training module to all institutions providing maternity care.                                                    | Done but not achieved 100% coverage among staff providing neonatal care          | Regular staff turnover and no mechanism to regularly conduct training in the institutions                                                                                                                                    | 2 |
| 5.2 | Train field staff to provide essential/routine newborn care in the domiciliary setting.                                                                                                              | Done only in 4 districts                                                         | Need to develop a training module and start a programme                                                                                                                                                                      | 2 |
| 5.3 | Establish Neonatal Basic/Advanced Life Support training as a mandatory training for all the institutional health staff caring for newborns.                                                          | Identified as a mandatory training                                               | Regular training programmes are conducted in some centers. There is no official compulsion to be trained.<br>There is no regular mechanism for training and re training and ensuring essential skill levels among the staff. | 3 |
| 5.4 | Train field staff to support the mothers in domiciliary care of the newborns who are discharged following special/intensive care.                                                                    | The training manual is still under development.                                  | No training manual for this component                                                                                                                                                                                        | 2 |
| 5.5 | Regular in-service advanced newborn care training for the health staff working in neonatal intensive care units (NICU) and special care baby units (SCBU).                                           | Training programmes are conducted but not in a regular organized manner.         | Need to have regular training programmes at standard centers.                                                                                                                                                                | 2 |
| 5.6 | Develop an inbuilt system for in-service skills assessment and improvement of the capacity of health personnel working in newborn care.                                                              | Need to develop a system                                                         | No system                                                                                                                                                                                                                    | 1 |
| 5.7 | Incorporate the new concepts of newborn care provision to the basic midwifery, nursing, post basic nursing, undergraduate medical and postgraduate medical curricula                                 | Done about five years before                                                     | There is no regular mechanism for this process.                                                                                                                                                                              | 2 |
| 6   | <b>Strengthen the infrastructure for provision of basic and advanced newborn care</b>                                                                                                                |                                                                                  |                                                                                                                                                                                                                              |   |
| 6.1 | Provide appropriate facilities at newborn corners (in Labour Room and Operating Theatre) and neonatal stabilization units in institutions providing maternity care                                   | Facilities have been provided, but not based on needs and on a needs assessment. | No master planning for the institutions                                                                                                                                                                                      | 2 |
| 6.2 | Provide facilities according to national guidelines in the special care baby units in all the institutions providing specialized care                                                                | Facilities have been provided, but not based on needs and on a needs assessment. |                                                                                                                                                                                                                              | 2 |

|     |                                                                                                                                                                                                            |                                                                                                                                                                           |                                                                                                                                                                         |   |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 6.3 | Establish at least one functioning Neonatal Intensive Care Unit in each district with all facilities made available according to national guidelines.                                                      | Done, but all facilities may not be available in all the units but distribution of such units provide good coverage.                                                      |                                                                                                                                                                         | 2 |
| 6.4 | Establish and strengthen the mother baby centers including lactation management centers in all the institutions providing specialized care.                                                                | LMCs are available in about 50% of specialist hospitals. MBC are available in about 20% of specialist hospitals.                                                          |                                                                                                                                                                         | 2 |
| 6.5 | Strengthen supportive services such as laboratory services, radiological services, blood bank services for the efficient functioning of the Special Care Baby Units and the Neonatal Intensive Care Units. | As a routine process these units have been strengthened, special attention has not been paid.                                                                             |                                                                                                                                                                         | 2 |
| 6.6 | Develop and function a referral system for specialized care with clear catchments areas                                                                                                                    | Neonatal bed availability system is under development. Referral system will be established with this system.                                                              | System introduced to 17 centers.<br>No regular staff at the central level for trouble shooting and maintenances.<br>Computers and internet facilities are not available | 2 |
| 6.7 | Establish regular needs assessment of essential and advance newborn care facilities in the institutions                                                                                                    | Needs assessment done, but not regular.                                                                                                                                   |                                                                                                                                                                         | 2 |
| 7   | <b>Ensure effective implementation of the Baby Friendly Hospital Initiative</b>                                                                                                                            |                                                                                                                                                                           |                                                                                                                                                                         |   |
| 7.1 | Develop and ensure implementation and monitoring of the Baby Friendly Hospital Initiative.                                                                                                                 | BFHI is now planned to be incorporated to the quality assurance programme and will be linked to the MNH quality assurance.                                                |                                                                                                                                                                         | 1 |
| 7.2 | Train all the staff in maternity and newborn care units in the institutions with the 20 hour WHO/UNICEF Baby Friendly Hospital Initiative training course.                                                 | Consultants and Medical officers are trained in the 20hrs BFHI course. Other staff are trained in the 40hr WHO/UNICEF BF counseling course.                               |                                                                                                                                                                         | 3 |
| 7.3 | Establish a system for internal and external assessment and accreditation on BFHI.                                                                                                                         | BFHI assessment is planned to be incorporated in the MNH quality assurance process.                                                                                       |                                                                                                                                                                         | 2 |
| 7.4 | Establish a formal BFHI implementation and monitoring committee to ensure regular functioning of Baby Friendly Hospital Initiative                                                                         | BFHI implementation committee was amalgamated with the IYCF implementation committee. IYCF strategy was developed and the BFHI strategy is included in the IYCF strategy. |                                                                                                                                                                         | 3 |
| 7.5 | Monitor the Sri Lanka code for promotion, protection and support of breastfeeding and marketing of designated products in collaboration with Infant and Young Child Feeding (IYCF) Programme               | Code monitoring committee is functioning under the chairmanship of the Secretary Ministry of Health.                                                                      |                                                                                                                                                                         | 3 |
| 7.6 | Advocate for the implementation of maternity benefits and lobby for revisions when required.                                                                                                               | Done.                                                                                                                                                                     |                                                                                                                                                                         | 3 |
| 8   | <b>Strengthen the neonatal information system</b>                                                                                                                                                          |                                                                                                                                                                           |                                                                                                                                                                         |   |
| 8.1 | Institutionalize the newborn formats and ensure proper utilization of the formats in all institutions providing care for the newborns.                                                                     | Done                                                                                                                                                                      | No system to evaluate whether they are completed                                                                                                                        | 3 |
| 8.2 | Revise and pilot test the Hospital Maternity and Newborn statistics return (H 830) and introduce it to all the institutions.                                                                               | Done but acceptance was low. Information in this format is included in the eIMMR. Obstetric and neonatal formats will feed into the eIMMR.                                |                                                                                                                                                                         | 2 |
| 8.3 | Strengthen linkages with the vital registration system (Registrar General) to improve the quality of data.                                                                                                 | Not done                                                                                                                                                                  |                                                                                                                                                                         | 1 |
| 8.4 | Introduce GIS package to monitor newborn care facilities and outcomes up to the institutional level.                                                                                                       | Done once with the EmONC survey.                                                                                                                                          |                                                                                                                                                                         | 3 |

|      |                                                                                                                                                                                                                                                    |                                                                                                                                                                 |  |   |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---|
| 8.4  | Introduce GIS package to monitor newborn care facilities and outcomes up to the institutional level.                                                                                                                                               | Done once with the EmONC survey.                                                                                                                                |  | 3 |
| 8.5  | Strengthen collection, analysis and dissemination of newborn data in the routine MIS for MCH/FP                                                                                                                                                    | Included in the routine MIS                                                                                                                                     |  | 3 |
| 8.6  | Periodically publish a report on neonatal morbidity and mortality.                                                                                                                                                                                 | Not achieved                                                                                                                                                    |  | 1 |
| 9    | <b>Ensure availability of evidence based information for improving newborn care</b>                                                                                                                                                                |                                                                                                                                                                 |  |   |
| 9.1  | Carry out collaborative research relevant to newborn care with other relevant partners.                                                                                                                                                            | Done                                                                                                                                                            |  | 3 |
| 9.2  | Encourage and support postgraduate research on newborn care.                                                                                                                                                                                       | Done                                                                                                                                                            |  | 3 |
| 9.3  | Solicit funding for the research activities.                                                                                                                                                                                                       |                                                                                                                                                                 |  |   |
| 9.4  | Carry out costing of the interventions to assess the cost effectiveness and sustainability.                                                                                                                                                        | On going                                                                                                                                                        |  | 2 |
| 10   | <b>Strengthen collaboration and partnership with all stakeholders working towards improving newborn care at all levels</b>                                                                                                                         |                                                                                                                                                                 |  |   |
| 10.1 | Establish a mechanism for horizontal collaboration with programmes such as maternal care, infant and child care, family planning and other relevant programmes                                                                                     | Collaborate through the National Committee on Family Health                                                                                                     |  | 3 |
| 10.2 | Strengthen collaboration with the relevant professional bodies (SLCP, SLCOG and CCP) for the development of newborn care.                                                                                                                          | Has a close collaboration. They are partners in all the activities of the programme and provide clinical inputs to the programme.                               |  | 3 |
| 10.3 | Establish partnerships with governmental, non governmental and private sector authorities for development of Newborn Care Services (e.g.: Labour Department, Ministry of Women and child development, Social services, Development Partners, etc). | Has good partnership with development partners, with the other sectors only collaborate when required.                                                          |  | 3 |
| 11   | <b>Strengthen the Newborn Care Unit of the Family Health Bureau for effective implementation and monitoring of the</b>                                                                                                                             |                                                                                                                                                                 |  |   |
| 11.1 | Upgrade the NBH unit of the Family Health Bureau                                                                                                                                                                                                   | On going                                                                                                                                                        |  | 2 |
| 11.2 | Strengthen technical and managerial capacity of the NBH programme managers                                                                                                                                                                         | On going                                                                                                                                                        |  | 2 |
| 11.3 | Establish a NBH Programme monitoring and coordination mechanism with the central ,provincial, district health authorities, management of the plantation sector, local government and private sector health authorities etc)                        | This is part of the MCH/FP review coordinated by the FHB. But some of the sectors are not included in this monitoring mechanism; Hospitals, private sector etc. |  | 2 |
| 11.4 | Prepare annual operational plans with costing in collaboration with provincial and district authorities and mobilize regular funding (government and other sources) to implement annual plans                                                      | Annual operational plans are prepared with the provinces and districts. Regular funding is mobilized from the GoSL sources for newborn programme.               |  | 3 |
| 11.5 | Establish a web based system to share information, provide guidance and directions to newborn care stakeholders                                                                                                                                    | This is done through the FHB web site.                                                                                                                          |  | 3 |

## ANNEXURE 2

*Real time distances from level 1 / 2 / 3 neonatal care facilities to level 3 / 3+ facilities*

| Grade I Hospital      | Hospital Grade III + |                                            |               |                                  | Grade III Hospital |               |               |               |          |               |                  |                |               |                |                  |           |                                     |                                |               |              |                        |               |                  |              |
|-----------------------|----------------------|--------------------------------------------|---------------|----------------------------------|--------------------|---------------|---------------|---------------|----------|---------------|------------------|----------------|---------------|----------------|------------------|-----------|-------------------------------------|--------------------------------|---------------|--------------|------------------------|---------------|------------------|--------------|
|                       | TH Jaffna            | Sirimawo Bandaranayake children's Hospital | TH Karapitiya | Lady Riggway children's Hospital | DGH Badulla        | TH Batticaloa | DGH Ratnapura | TH Kurunegala | TH Kandy | TH Peradeniya | DGH Nuwara Eliya | DGH Hambantota | TH Mahamodara | TH Anuradapura | DGH Pollonnaruwa | TH Ragama | TH Castle Street Hospital for women | TH De Soyza Maternity Hospital | TH Kalubowila | DGH Kalutara | TH Sri Jayawardanapura | BH Diyatalawa | BH Mahiyanganaya | DGH Monagala |
| BH Wellimada          | 427                  | 105                                        | 236           | 212                              | 30                 | 191           | 124           | 144           | 101      | 105           | 29               | 149            | 240           | 246            | 171              | 202       | 212                                 | 212                            | 205           | 190          | 206                    | 23            | 163              | 87           |
| BH Bibile             | 386                  | 118                                        | 174           | 250                              | 61                 | 101           | 206           | 156           | 113      | 117           | 105              | 161            | 279           | 207            | 125              | 218       | 251                                 | 250                            | 255           | 290          | 233                    | 98            | 38               | 38           |
| BH Siyambalanduwa     | 447                  | 179                                        | 261           | 323                              | 86                 | 127           | 194           | 217           | 174      | 178           | 166              | 149            | 266           | 268            | 187              | 279       | 322                                 | 324                            | 315           | 278          | 315                    | 109           | 99               | 31           |
| BH Kinniya            | 244                  | 188                                        | 369           | 270                              | 259                | 123           | 296           | 166           | 180      | 178           | 278              | 359            | 373           | 117            | 103              | 246       | 272                                 | 270                            | 276           | 310          | 279                    | 287           | 190              | 237          |
| BH Samanthurai        | 420                  | 214                                        | 327           | 346                              | 156                | 59            | 259           | 252           | 210      | 214           | 201              | 214            | 332           | 245            | 140              | 315       | 347                                 | 346                            | 381           | 343          | 380                    | 193           | 121              | 96           |
| BH Akkareipaththu     | 426                  | 223                                        | 325           | 355                              | 162                | 66            | 256           | 259           | 217      | 221           | 208              | 211            | 328           | 263            | 160              | 323       | 386                                 | 355                            | 379           | 341          | 378                    | 202           | 142              | 94           |
| BH Dehiyaththakandiya | 329                  | 123                                        | 354           | 260                              | 96                 | 100           | 235           | 156           | 116      | 123           | 130              | 242            | 359           | 150            | 45               | 236       | 261                                 | 260                            | 265           | 300          | 269                    | 135           | 43               | 118          |
| BH Muthur             | 257                  | 202                                        | 384           | 285                              | 248                | 112           | 311           | 180           | 194      | 193           | 247              | 349            | 388           | 131            | 118              | 261       | 286                                 | 285                            | 290           | 325          | 294                    | 275           | 159              | 226          |
| BH Valachchenai       | 333                  | 207                                        | 382           | 303                              | 170                | 34            | 316           | 199           | 204      | 208           | 196              | 271            | 389           | 169            | 64               | 279       | 304                                 | 303                            | 308           | 400          | 312                    | 208           | 115              | 148          |
| BH Maha oya           | 355                  | 147                                        | 323           | 269                              | 109                | 52            | 255           | 165           | 143      | 147           | 134              | 210            | 328           | 176            | 72               | 245       | 271                                 | 269                            | 274           | 339          | 278                    | 147           | 54               | 87           |
| BH Point pedro        | 30                   | 334                                        | 491           | 401                              | 389                | 363           | 417           | 300           | 326      | 325           | 423              | 543            | 494           | 190            | 279              | 367       | 402                                 | 401                            | 406           | 432          | 410                    | 431           | 338              | 420          |
| BH Thelippalai        | 19                   | 348                                        | 504           | 415                              | 403                | 377           | 431           | 314           | 340      | 338           | 437              | 557            | 508           | 204            | 292              | 381       | 416                                 | 415                            | 420           | 446          | 424                    | 445           | 351              | 434          |
| BH Chavakachcheri     | 18                   | 326                                        | 482           | 394                              | 380                | 355           | 409           | 291           | 318      | 316           | 414              | 535            | 486           | 182            | 270              | 359       | 395                                 | 394                            | 399           | 423          | 403                    | 423           | 329              | 412          |
| BH Kayts              | 21                   | 360                                        | 547           | 427                              | 414                | 389           | 443           | 325           | 352      | 350           | 448              | 569            | 551           | 216            | 304              | 393       | 428                                 | 427                            | 432           | 489          | 436                    | 458           | 363              | 446          |
| BH Cheddikulam        | 155                  | 200                                        | 376           | 255                              | 254                | 248           | 283           | 165           | 192      | 190           | 288              | 409            | 379           | 56             | 144              | 233       | 257                                 | 255                            | 261           | 317          | 265                    | 297           | 203              | 286          |
| BH Mawanella          | 337                  | 20                                         | 195           | 112                              | 139                | 207           | 111           | 38            | 26       | 20            | 87               | 244            | 199           | 151            | 168              | 80        | 113                                 | 112                            | 117           | 134          | 95                     | 129           | 104              | 203          |
| BH Karawanella        | 361                  | 68                                         | 152           | 65                               | 164                | 255           | 59            | 63            | 74       | 69            | 108              | 195            | 156           | 170            | 206              | 55        | 62                                  | 65                             | 69            | 82           | 63                     | 157           | 152              | 213          |
| BH Balangoda          | 465                  | 131                                        | 168           | 145                              | 84                 | 253           | 54            | 166           | 136      | 132           | 88               | 111            | 172           | 273            | 225              | 141       | 143                                 | 145                            | 136           | 122          | 136                    | 50            | 135              | 109          |
| BH Kahawaththa        | 451                  | 157                                        | 144           | 143                              | 110                | 292           | 26            | 152           | 162      | 157           | 113              | 106            | 148           | 259            | 250              | 153       | 142                                 | 144                            | 135           | 98           | 134                    | 75            | 161              | 148          |
| BH Kalawana           | 435                  | 142                                        | 104           | 103                              | 149                | 333           | 31            | 137           | 148      | 143           | 153              | 147            | 108           | 244            | 280              | 113       | 102                                 | 104                            | 95            | 58           | 95                     | 115           | 200              | 189          |
| BH Warakapola         | 335                  | 53                                         | 161           | 77                               | 189                | 254           | 86            | 36            | 59       | 54            | 120              | 222            | 165           | 143            | 179              | 46        | 79                                  | 77                             | 83            | 102          | 60                     | 175           | 151              | 236          |
| BH Dambadeniya        | 321                  | 75                                         | 172           | 73                               | 187                | 262           | 106           | 32            | 78       | 75            | 134              | 242            | 176           | 129            | 165              | 49        | 75                                  | 73                             | 79            | 114          | 82                     | 185           | 145              | 221          |
| BH Galgamuwa          | 237                  | 109                                        | 258           | 169                              | 219                | 214           | 185           | 68            | 112      | 109           | 182              | 373            | 262           | 45             | 118              | 135       | 170                                 | 169                            | 174           | 199          | 178                    | 258           | 168              | 250          |
| BH Marawila           | 345                  | 112                                        | 179           | 58                               | 225                | 322           | 150           | 69            | 115      | 112           | 180              | 292            | 182           | 151            | 225              | 48        | 60                                  | 58                             | 64            | 120          | 68                     | 230           | 182              | 258          |
| BH Theldeniya         | 336                  | 32                                         | 255           | 166                              | 103                | 155           | 162           | 62            | 25       | 31            | 108              | 245            | 259           | 157            | 136              | 142       | 167                                 | 166                            | 171           | 185          | 175                    | 142           | 52               | 128          |
| BH Kamburupitiya      | 536                  | 258                                        | 56            | 164                              | 192                | 312           | 132           | 247           | 264      | 258           | 213              | 81             | 60            | 344            | 336              | 174       | 163                                 | 165                            | 156           | 119          | 156                    | 175           | 243              | 168          |
| BH Walasmulla         | 573                  | 226                                        | 76            | 184                              | 167                | 288           | 111           | 267           | 231      | 226           | 189              | 60             | 80            | 364            | 312              | 195       | 183                                 | 185                            | 176           | 139          | 176                    | 151           | 219              | 144          |
| BH Thissamaharama     | 502                  | 237                                        | 147           | 255                              | 120                | 217           | 128           | 254           | 232      | 237           | 148              | 27             | 151           | 323            | 242              | 266       | 254                                 | 256                            | 247           | 210          | 247                    | 101           | 154              | 85           |
| BH Deniyaya           | 535                  | 225                                        | 84            | 163                              | 177                | 297           | 99            | 236           | 230      | 226           | 188              | 95             | 89            | 343            | 321              | 173       | 162                                 | 164                            | 155           | 117          | 154                    | 150           | 228              | 153          |
| BH Udugama            | 497                  | 185                                        | 38            | 91                               | 240                | 360           | 110           | 208           | 225      | 219           | 231              | 119            | 33            | 305            | 385              | 135       | 124                                 | 126                            | 117           | 80           | 117                    | 193           | 292              | 217          |
| BH Thabuththegama     | 281                  | 126                                        | 276           | 186                              | 209                | 204           | 203           | 85            | 129      | 126           | 220              | 364            | 280           | 27             | 107              | 153       | 188                                 | 187                            | 192           | 217          | 196                    | 248           | 158              | 241          |
| BH Medirigiriya       | 276                  | 154                                        | 328           | 229                              | 170                | 126           | 255           | 124           | 114      | 144           | 205              | 316            | 332           | 97             | 30               | 205       | 230                                 | 229                            | 234           | 269          | 238                    | 209           | 121              | 197          |
| BH Mulleriyawa        | 400                  | 107                                        | 119           | 9                                | 227                | 341           | 89            | 111           | 114      | 108           | 164              | 232            | 123           | 209            | 245              | 20        | 8                                   | 10                             | 12            | 60           | 8                      | 193           | 205              | 291          |

| Grade II Hospital |                  |                 |            |                  |             |             |                 |             |            |                |                 |             |                  |             |             |             |            |                 |            |             |               |             |             |             |             |                               |                |             |                  |           |  |
|-------------------|------------------|-----------------|------------|------------------|-------------|-------------|-----------------|-------------|------------|----------------|-----------------|-------------|------------------|-------------|-------------|-------------|------------|-----------------|------------|-------------|---------------|-------------|-------------|-------------|-------------|-------------------------------|----------------|-------------|------------------|-----------|--|
| DGH Ampara        | BH Kalmunaya AMH | DGH Trincomalee | DGH Mannar | DGH Killinochchi | DGH Mulathi | DGH Vavniya | BH Embilipitiya | DGH Kegalle | DGH Chilaw | BH Kuliapitiya | BH Nikaweratiya | BH Puttalam | DGH Nawalapitiya | DGH Gampola | DGH Mathale | BH Dambulla | BH Dickoya | BH Rikilagakada | DGH Matara | BH Elpitiya | BH Balapitiya | BH Tangalle | BH Padawiya | DGH Gampaha | DGH Negambo | Kethumathi Maternity Hospital | BH Awissawella | BH Homagama | BH Wathupitiwala | BH Horana |  |
| 170               | 201              | 283             | 350        | 363              | 358         | 289         | 132             | 126         | 214        | 183            | 184             | 229         | 83               | 87          | 124         | 184         | 70         | 70              | 203        | 194         | 217           | 173         | 323         | 187         | 190         | 191                           | 138            | 187         | 150              | 172       |  |
| 82                | 103              | 216             | 308        | 321              | 316         | 248         | 154             | 151         | 227        | 194            | 217             | 271         | 150              | 134         | 136         | 142         | 152        | 83              | 223        | 277         | 295           | 194         | 281         | 204         | 227         | 315                           | 214            | 250         | 194              | 256       |  |
| 59                | 85               | 284             | 378        | 392              | 367         | 318         | 161             | 228         | 288        | 255            | 278             | 333         | 211              | 195         | 197         | 204         | 168        | 144             | 211        | 264         | 282           | 181         | 342         | 264         | 288         | 303                           | 234            | 308         | 254              | 243       |  |
| 188               | 160              | 19              | 185        | 179              | 130         | 106         | 352             | 198         | 239        | 214            | 190             | 191         | 223              | 208         | 151         | 102         | 261        | 208             | 422        | 340         | 350           | 392         | 99          | 237         | 236         | 295                           | 256            | 270         | 230              | 294       |  |
| 17                | 9                | 194             | 346        | 356              | 307         | 283         | 207             | 247         | 323        | 308            | 281             | 335         | 244              | 229         | 207         | 208         | 234        | 179             | 277        | 330         | 348           | 247         | 275         | 300         | 323         | 368                           | 310            | 374         | 290              | 309       |  |
| 27                | 24               | 202             | 366        | 362              | 312         | 288         | 205             | 256         | 344        | 299            | 303             | 357         | 255              | 239         | 241         | 228         | 232        | 188             | 275        | 328         | 346           | 245         | 281         | 309         | 332         | 367                           | 297            | 372         | 229              | 307       |  |
| 121               | 124              | 157             | 251        | 264              | 259         | 191         | 234             | 159         | 218        | 204            | 177             | 231         | 175              | 160         | 128         | 102         | 177        | 108             | 304        | 357         | 375           | 274         | 218         | 226         | 226         | 284                           | 213            | 259         | 219              | 252       |  |
| 177               | 149              | 33              | 198        | 192              | 143         | 119         | 340             | 212         | 254        | 229            | 204             | 205         | 238              | 222         | 165         | 117         | 275        | 225             | 411        | 354         | 364           | 381         | 112         | 251         | 251         | 309                           | 270            | 284         | 244              | 309       |  |
| 100               | 72               | 108             | 274        | 269              | 219         | 195         | 264             | 225         | 269        | 247            | 220             | 234         | 240              | 225         | 172         | 134         | 241        | 172             | 332        | 385         | 403           | 302         | 188         | 270         | 270         | 328                           | 289            | 303         | 263              | 327       |  |
| 62                | 65               | 168             | 278        | 291              | 279         | 218         | 198             | 181         | 256        | 242            | 214             | 268         | 179              | 164         | 139         | 139         | 181        | 112             | 272        | 326         | 344           | 243         | 247         | 233         | 235         | 364                           | 244            | 279         | 223              | 282       |  |
| 412               | 65               | 233             | 125        | 60               | 111         | 134         | 535             | 333         | 318        | 309            | 269             | 265         | 369              | 354         | 297         | 240         | 407        | 355             | 521        | 461         | 471           | 576         | 159         | 358         | 365         | 416                           | 377            | 391         | 351              | 415       |  |
| 426               | 414              | 229             | 131        | 74               | 125         | 148         | 549             | 347         | 332        | 323            | 283             | 278         | 385              | 368         | 311         | 254         | 421        | 369             | 535        | 475         | 485           | 589         | 173         | 372         | 378         | 430                           | 391            | 405         | 365              | 429       |  |
| 404               | 392              | 206             | 106        | 52               | 125         | 125         | 527             | 325         | 311        | 300            | 261             | 259         | 361              | 346         | 289         | 231         | 399        | 346             | 512        | 452         | 462           | 567         | 151         | 349         | 358         | 408                           | 368            | 382         | 342              | 407       |  |
| 438               | 426              | 259             | 139        | 86               | 139         | 160         | 561             | 359         | 345        | 334            | 295             | 292         | 395              | 380         | 323         | 265         | 433        | 380             | 578        | 518         | 528           | 601         | 185         | 383         | 399         | 473                           | 402            | 468         | 376              | 441       |  |
| 278               | 291              | 111             | 61         | 105              | 100         | 34          | 401             | 199         | 173        | 175            | 135             | 120         | 235              | 220         | 163         | 105         | 273        | 220             | 406        | 346         | 356           | 442         | 80          | 223         | 219         | 301                           | 243            | 276         | 217              | 281       |  |
| 246               | 220              | 206             | 252        | 273              | 268         | 199         | 190             | 13          | 105        | 67             | 81              | 126         | 42               | 27          | 63          | 91          | 85         | 72              | 225        | 166         | 176           | 256         | 232         | 65          | 79          | 128                           | 71             | 96          | 55               | 109       |  |
| 281               | 269              | 278             | 271        | 297              | 292         | 224         | 138             | 40          | 102        | 74             | 100             | 145         | 52               | 62          | 112         | 129         | 70         | 111             | 182        | 123         | 132           | 204         | 256         | 45          | 72          | 76                            | 19             | 54          | 33               | 58        |  |
| 190               | 215              | 342             | 374        | 401              | 395         | 327         | 58              | 144         | 203        | 178            | 204             | 249         | 99               | 114         | 161         | 238         | 54         | 151             | 128        | 125         | 148           | 99          | 360         | 131         | 162         | 123                           | 94             | 122         | 123              | 104       |  |
| 230               | 255              | 367             | 360        | 386              | 381         | 313         | 49              | 129         | 191        | 164            | 190             | 234         | 124              | 139         | 201         | 218         | 80         | 177             | 119        | 101         | 124           | 90          | 346         | 117         | 180         | 123                           | 80             | 128         | 109              | 81        |  |
| 271               | 296              | 308             | 345        | 371              | 366         | 298         | 101             | 114         | 176        | 148            | 174             | 219         | 126              | 138         | 186         | 203         | 119        | 185             | 134        | 61          | 84            | 131         | 330         | 102         | 140         | 83                            | 64             | 88          | 93               | 58        |  |
| 280               | 268              | 251             | 244        | 271              | 265         | 197         | 165             | 22          | 75         | 41             | 74              | 119         | 78               | 60          | 95          | 103         | 99         | 109             | 191        | 131         | 141           | 227         | 230         | 31          | 44          | 87                            | 46             | 63          | 21               | 73        |  |
| 258               | 261              | 237             | 230        | 257              | 252         | 183         | 185             | 36          | 55         | 21             | 60              | 105         | 87               | 74          | 88          | 89          | 119        | 109             | 203        | 143         | 153           | 238         | 216         | 40          | 40          | 98                            | 66             | 73          | 33               | 85        |  |
| 251               | 252              | 153             | 146        | 173              | 168         | 99          | 264             | 101         | 86         | 77             | 37              | 56          | 149              | 128         | 107         | 70          | 191        | 143             | 288        | 229         | 239           | 324         | 132         | 126         | 132         | 184                           | 145            | 159         | 119              | 183       |  |
| 295               | 298              | 259             | 241        | 278              | 273         | 205         | 273             | 81          | 21         | 31             | 71              | 75          | 132              | 119         | 126         | 134         | 163        | 146             | 209        | 149         | 159           | 245         | 238         | 46          | 22          | 104                           | 85             | 79          | 55               | 100       |  |
| 165               | 168              | 194             | 259        | 272              | 267         | 199         | 238             | 67          | 132        | 100            | 102             | 146         | 72               | 56          | 36          | 84          | 114        | 50              | 285        | 226         | 235           | 278         | 232         | 120         | 132         | 180                           | 122            | 157         | 110              | 160       |  |
| 249               | 275              | 428             | 445        | 472              | 466         | 398         | 58              | 226         | 244        | 231            | 271             | 297         | 218              | 260         | 299         | 354         | 173        | 274             | 20         | 82          | 91            | 35          | 431         | 178         | 201         | 144                           | 183            | 149         | 192              | 140       |  |
| 225               | 250              | 403             | 466        | 508              | 503         | 435         | 34              | 233         | 265        | 252            | 292             | 318         | 193              | 208         | 255         | 329         | 149        | 249             | 36         | 103         | 112           | 23          | 468         | 199         | 222         | 165                           | 183            | 170         | 213              | 161       |  |
| 166               | 191              | 333             | 425        | 438              | 433         | 365         | 64              | 231         | 293        | 265            | 291             | 388         | 199              | 214         | 255         | 259         | 154        | 202             | 105        | 173         | 182           | 68          | 398         | 219         | 292         | 235                           | 181            | 240         | 210              | 200       |  |
| 234               | 259              | 413             | 444        | 471              | 465         | 397         | 44              | 214         | 243        | 229            | 274             | 296         | 193              | 208         | 286         | 338         | 148        | 259             | 71         | 87          | 105           | 65          | 430         | 177         | 199         | 143                           | 164            | 148         | 191              | 123       |  |
| 298               | 323              | 413             | 406        | 433              | 427         | 359         | 103             | 187         | 205        | 192            | 232             | 258         | 182              | 221         | 260         | 265         | 197        | 270             | 63         | 35          | 48            | 73          | 392         | 139         | 162         | 105                           | 118            | 110         | 153              | 101       |  |
| 241               | 242              | 135             | 128        | 154              | 149         | 81          | 282             | 119         | 104        | 94             | 55              | 64          | 167              | 146         | 104         | 60          | 209        | 161             | 306        | 247         | 256           | 342         | 113         | 143         | 150         | 202                           | 163            | 176         | 136              | 201       |  |
| 173               | 164              | 95              | 199        | 212              | 207         | 139         | 308             | 157         | 198        | 179            | 148             | 163         | 189              | 173         | 117         | 61          | 226        | 182             | 378        | 298         | 308           | 348         | 165         | 195         | 195         | 253                           | 214            | 228         | 188              | 253       |  |
| 372               | 322              | 317             | 303        | 333              | 328         | 260         | 214             | 74          | 83         | 88             | 127             | 136         | 108              | 110         | 149         | 168         | 125        | 158             | 149        | 89          | 99            | 185         | 295         | 26          | 39          | 46                            | 37             | 20          | 42               | 41        |  |

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## ANNEXURE 3

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The basic infrastructure necessary for setting up such a system based on the Karapitiya / DGH Hambantota experience

The system envisaged is a real time computer based admission and discharge system using the proposed e ticket as the patient / neonatal BHT within a network of neonatal care facilities within the province. This network of hospitals should be equipped with fully functional telemedicine facilities, for the proposed shared care by a team.

### Requirements:

#### Infrastructure

1. High band width data connection (4G Dialogue 6 line fixed) – this usually reaches 20 – 30 Mbps
2. Computer - preferably a core i5 or above
3. Webcam - separate webcam is preferred to the computer mounted webcam. The scope of the webcam differs from auto rotatable type which can be manipulated to suit multiple speakers at the same setting to those fixed.
4. Audio system - it is better to have a audio system with a sound mixer as the computer microphone becomes distorted during the conversation due to surrounding noise.
5. A digital scanner for digitizing the relevant documents
6. Uninterrupted Power Supply (UPS)
7. A separate enclosed room of at least 10 X 12 proportions, tiles and air conditioned, with the necessary desk and seating arrangements

#### Software

1. Google hangouts on air:
  - i. Up to 15 active participants
  - ii. Unlimited passive participants
2. Web server to house the database
3. Different users given different levels of access
4. Database developed in droople / php
5. Ability to share pictures via screen share
6. Ability to share documents via Google
7. If there are limitations in using a common open source platform like this one there are paid platforms that provide better and more comprehensive support systems such as: Citrix online launcher which is a webinar hosting platform and moodle.



### **The process:**

1. All parties should have the necessary equipment
2. Agreeing upon the time and place: first Wednesday
3. Designation of a medical officer the responsibility of maintaining the system, including the record preparation and preparation of the computer based information for transfer
4. Prior preparation for the discussion based on the cases
5. Logging on with Google hangouts on air
6. Discussion based on a previously agreed upon process and guidelines
7. Client details are entered in paperback and then transferred into digital format
8. Each of the clients / patients are entered in a database created in droople
9. Circulated to all the participants prior to the meeting
10. Ability to communicate face to face with each of the participants
11. Ability to share pictures through slide share facility
12. Ability to share files as well containing data, images and videos
13. Conversation recorded as a separate u tube video file, which is only accessible for the group
14. Ability to discuss and take up

### **Empirical cost for one station**

|                                                                |                |
|----------------------------------------------------------------|----------------|
| 1. Laptop – personal use (can use what is already available) – | Rs 150 000.00  |
| 2. 4G internet router and 4G connection                        | Rs. 10000.00   |
| 3. High quality webcam                                         | Rs. 12500.00   |
| 4. Audio system with sound mixer                               | Rs. 10000.00   |
| 5. Maintenance for the 4G internet connection                  | Rs. 2500.00    |
| 6. Server space for hosting the web storage                    | Rs. 5000.00    |
| 7. Miscellanies'                                               | Rs. 15000.00   |
| Total cost for a hospital                                      | Rs. 200 000.00 |

This does not include the cost of preparing the room for the session.

