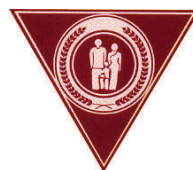


NATIONAL EMERGENCY OBSTETRIC AND NEONATAL CARE NEEDS ASSESSMENT

COUNTRY REPORT 2012



Family Health Bureau



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This report is dedicated to

**The mothers in Sri Lanka
and
those who care for them;
past present and future**

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Message from the Minister of Health



As a country, Sri Lanka is moving from lower middle income country to middle income country under the guidance of the Development Policy Framework of the Government of Sri Lanka, Mahinda Chinthana Vision for the Future. The objective of the government is to provide highest attainable standard of health for every human being that includes provision of access to timely acceptable health care of appropriate quality. Sri Lanka is always considered a role model as a middle income country that has successfully reduced maternal, infant and child mortality to levels comparable with those of developed countries. I am informed that further improvements in health status need more stringent attention in provision of quality health care. Also it is important to focus on patient's rights, patient satisfaction, while providing high quality of health services.

Each year, the government of Sri Lanka spends billions of rupees for the development of health services in the country. The benefits of this should reach every corner of the country. Therefore, the findings of this kind of surveys will help to fine tune the health system to get maximum benefits of the investment. This will help the health planners to identify the institutions that need to be developed based on scientific evidence ensuring the availability and accessibility of quality health services.

I wish that the recommendations of this report will help to ensure high quality maternal and newborn health services throughout the country.

Maithripala Sirisena

Minister of Health,
Sri Lanka

Message from the Secretary to Ministry of Health



We are at a point in time when, the health service of the country is moving from a focus on coverage to quality and whole health system is gearing to implement the quality assurance mechanism at various levels. Maternal care services, one of the best services within the health system has already achieved universal coverage for most of evidence based interventions implemented through preventive and curative health services. Reflecting on the effective intervention coverage, Sri Lanka reports the best maternal mortality ratio, neonatal mortality rate and infant mortality rate in the region. Further, our maternal care programme has been recognized globally as being a highly effective system at a relatively low cost.

In order to sustain the already achieved satisfactory indicators and to ensure universal access to quality maternal and newborn services, consideration of the epidemiological data, fertility pattern, cost effectiveness, maximizing utilization of available resources, as well as the health seeking behavior and the expectation of the people has become an integral part of national, provincial and district level planning.

As such, in depth investigations on the current situation such as the EmONC needs assessment survey are needed to help the planning process. Therefore, I recommend that the findings of this document be used for policy making and planning at all levels. All stakeholders in maternal and neonatal health need to work together to maximize the use of the findings of the EmONC survey and ensure implementation of the recommendations of the report for the betterment of mothers and their newborns in this country.

Dr. Y.D. Nihal Jayathilaka

Secretary,
Ministry of Health,
Sri Lanka

Message from the Director General of Health Services



Despite Sri Lanka's achievements in the reduction of maternal mortality, neonatal mortality and infant mortality, there is much to be done in areas related to quality of service, management practices within hospitals, commitment of health staff, teamwork and leadership as well as attention given to client needs and their aspirations. Further reduction in maternal and neonatal mortality and morbidity will depend on addressing these issues. However, considering the current situation in Sri Lanka, universal answers will not always be cost beneficial, feasible or effective. As such, in depth and comprehensive analysis at institution, district and provincial level is necessary to help identify points for intervention.

This Emergency Obstetric and Neonatal Care Needs Assessment survey report has given a detailed description on availability, accessibility and utilization of maternal and neonatal health services together with the availability and distribution of human resources, drugs, equipment, infrastructure facilities and supportive services. This National report together with the Provincial reports would therefore be useful to identify deficiencies and inequities in distribution of resources and services and would contribute towards our efforts to further improve services for mothers in Sri Lanka and their newborn babies.

Dr. P.G. Mahipala,
Director General of Health Services
Ministry of Health,
Sri Lanka

FOREWORD

Improving the quality of maternal and newborn care services in the country is now receiving our attention with the view of further reducing the maternal and newborn mortality rates in Sri Lanka. As such, I see the Emergency Obstetric and Neonatal Care Needs Assessment Survey as a timely exercise.

In this study, we try to look at the facilities available for emergency obstetric and neonatal care and identify the gaps and deficiencies in existing services in government hospitals. It covers all the major hospitals providing comprehensive emergency obstetric and neonatal care services and a sample of divisional hospitals covering all the districts in the country.

I wish to take this opportunity to thank Sri Lanka College of Obstetrics and Gynecology and Sri Lanka College of Community Physicians for their valuable contribution.

I salute Dr Lalini Rajapaksa, the head of the research team and the other expert members of the team for coordinating and managing the complex tasks in a highly professional manner. I thank Dr. Nilmini Hemachandra and Dr Dammika Rowel, the two Consultant Community Physicians of the Family Health Bureau who are in charge of Maternal Care and Intranatal and Newborn Care respectively for spearheading this task.

Further, I hereby acknowledge with great appreciation the assistance extended by UNFPA, UNICEF and WHO, both in terms of their technical inputs and vital financial support.

This report also identifies the progress achieved since the last assessment which was done nearly thirteen years back, and I believe the findings of this study would be used as input for future planning and rational resource allocation.

Dr. Deepthi Perera

Director Maternal and Child Care
Family Health Bureau,
Ministry of Health
Colombo, Sri Lanka.

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

Dr. Ravindra Ruberu, former Secretary to Ministry of Health and Dr. Ajith Mendis, former Director General of Health Services provided invaluable guidance and administrative support to the initial activities of the EmONC needs assessment survey. Thereafter, Dr. Y.D. Nihal Jayathilake, the Secretary to Ministry of Health together with Dr. P.G. Mahipala, Director General of Health Services continued to provide leadership and guidance to this survey.

Dr. Terrance de Silva, former Deputy Director General (Medical Services) was a great strength during the initial stages of the assessment. The administrative support provided by Dr. Piyasena Samarakoon, former Acting DDG MS and the current DDG MS I, Dr. Lakshmi Somathunga is much appreciated. Dr. R.R.L.L.R. Siyambalagoda, Deputy Director General (Public Health Services) provided boundless support at all stages of the EmONC assessment and was a pillar of strength in resolving many challenges in the completion of the assessment.

The support and cooperation extended by Dr. Deepthi Perera, Director/MCH and Dr. Chithramalee de Silva Deputy Director/ MCH, particularly in resolving implementation and logistical issues throughout the assessment has been most valuable.

The key role played by the members of the National Core Group on the EmONC needs assessment survey in providing guidance at crucial stages of the assessment such as conceptualization, planning and implementation is greatly acknowledged.

The support extended by all Provincial Directors of Health Services and Regional Directors of Health Services in releasing Medical Officers of Health and providing them logistical support during this process has been of immense help to the successful completion of the assessment.

The dedication and commitment of Medical Officers of Maternal Child Health and Medical Officers Public Health in coordinating the assessment within the district is most appreciated, without which this assessment would not have been feasible.

The heads of institutions, matrons, sisters in charge, specialist obstetricians, specialist pediatricians, pharmacists, administrative and health staff in the selected institutions had been very responsive and most helpful during the data collection process. Through the diligence and commitment of the data collection teams comprising of medical officers from within the district (facility assessment) and institutions (prospective morbidity data collection) this assessment would not have been meaningful.

Appreciation is extended to Sri Lanka College of Obstetricians and Gynaecologists (SLCOG) and Sri Lanka College of Pediatricians (SLCP) for their unwavering support towards this assessment. Past presidents of SLCOG Dr. Sarath Amarasekera, Dr. Ananda Ranathunga and Dr. Hemantha Perera and the president of SLCOG Prof. Hemantha Senanayake are acknowledged for their technical expertise and productive comments.

Past presidents of SLCP Dr. Kalyani Guruge, Dr. Deepthi Samarage, and Prof. Ashvini Fernando and the president of SLCP Dr. Srilal de Silva are also acknowledged for their technical support at all times.

Development partners of the Ministry of Health, UNFPA, UNICEF and WHO provided their technical support and guidance with generous sponsorship all the stages of the assessment.

Deep appreciation and commendations are due to:

- Consultant pediatricians, Dr Medha Weerasekera and Dr Sandya Bandara made invaluable contributions by developing the newborn care modules for data collection.
- Specialist Obstetricians Dr Hemantha Perera and Dr Kapila Gunawardena gave their technical inputs to adapt the AMDD modules to suit the country context
- Dr. Kapila Jayaratne, Consultant Community Physician, Family Health Bureau and the in-charge of maternal mortality and morbidity surveillance, provided the maternal mortality data base for 2009 and 2010 for the analysis.
- Dr. Pamoda Madarasinghe, Dr. Duleepa Baranage and Dr. Indiwari Liyanage, research assistants for the EmONC needs assessment survey mixed their youth and creativity in all the stages of the assessment. Adaptation of the modules, maintaining the databases, data entry as well as data cleaning, coordinating with the hospitals, getting missing data made their life miserable, though they never complained.
- Dr. Shanika Senanayake and Dr. Samantha Jayasinghe, medical officers working in the maternal care unit of the Family Health Bureau. They were “the emergency team” that dealt with all the emergencies throughout the assessment.
- Dr. Nishamanie Karawita, former Health Officer, UNICEF was a great team player and provided valuable comments in improving the assessment. Her contribution in mobilizing funds is admirable.
- Dr. Anoma Jayathilake, National Professional Officer, WHO country office, Sri Lanka has been with the study team throughout and provided highly technical, balanced, politically and environmentally sound comments and constructive criticism throughout the assessment. Her support in crucial issues related to the assessment is commendable.
- Dr. Saramma Mathai, former programme coordinator at the Asia Pacific Regional office of UNFPA was instrumental in conducting the preliminary meetings and motivating the FHB, SLCOG, WHO, UNICEF and UNFPA to take up the EmONC assessment.

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 ABBREVIATION

24*7	24 hours a day, every day of a week
AISH	Accessibility Index for a Specialist Hospitals
AISU	Accessibility Index for a Specialist Unit
AIVOG	Accessibility Index for a Specialist Obstetrician
AMBU	Artificial Manual Breathing Unit
AMDD	Averting Maternal Death and Disability Program
BEmONC	Basic Emergency Obstetric and Neonatal Care
BH	Base Hospital
BHT	Bed Head Tickets
BTS	Blood Transfusion Services
CEmONC	Comprehensive Emergency Obstetric and Neonatal Care
CP	Central province
CPAP	Continuous Positive Airway pressure
CS	Cesarean Section
CSHW	Castle Street Hospital for Women
CTG	Cardiotocography
DGH	District General Hospital
DGHS	Director General of Health Services
DH	Divisional Hospital
DMH	De Soyza Maternity Hospitals
DMPA	Depot Medroxy Progesterone Acetate
DOCFR	Direct Obstetric Case Fatality Rate
ECP	Emergency Contraceptive Pills
EmOC	Emergency Obstetric Care
EmONC	Emergency Obstetric and Neonatal Care
EP	Eastern province
FHB	Family Health Bureau
FHS	Fetal Heart Sounds
FP	Family Planning
H 830	Monthly Maternal Statistics
HDU	High Dependency Unit
HO	House Officer
ICD	International Classification of Disease
ICU	Intensive Care Unit
IMMR	Indoor Morbidity and Mortality Register
IRDS	Infant Respiratory Distress Syndrome
IUD	Intra Uterine Device
IV	Intra venous

LMC	Lactation Management centre
LRT	Ligation and Resection of Tubes
MBC	Mother baby Centres
MCH	Maternal and Child Health
MD	Maternal Deaths
MgSO ₄	Magnesium Sulphate
MI	Myocardial Infarction
MIS	Management Information system
MMR	Maternal Mortality Ratio
MO	Medical Officer
MoH	Ministry of Health
MOH	Medical Officer of Health
MOMCH	Medical Officer/ Maternal and Child Health
MSI	Maternal Severity Index
MW	Mid Wife
NBTS	National Blood Transfusion Services
NCP	North Central Province
NICU	Neonatal Intensive Care Unit
NMI	Net Migration Index
NO	Nursing Officer
NP	Northern Province
NR	Neonatal Resuscitation
NWP	North Western province
OCP	Oral Contraceptive Pills
P_ID	Proportion of Indirect Deaths
PGH	Provincial General Hospital
PIH	Pregnancy Induced Hypertension
PPH	Post Partum Haemorrhage
PSSL	Perinatal Society of Sri Lanka
RDHS	Regional Director of Health Services
RG	Register General
RHMIS	Reproductive Health Management Information System
SAP	Sabaragamuwa province
SCBU	Special Care Baby Unit
SD	Standard Deviation
SDF	SAARC Development Fund
SHO	Senior House Officer
SLCOG	Sri Lanka College of Obstetricians and Gynaecologists
SLCP	Sri Lanka College of Paediatrics
SMOR	Severe Maternal Outcome Rate

SOPs	Standard Operational protocols
SP	Southern province
SR	Senior Registrar
SWOT	Strengths, Weaknesses, Opportunities and Treats
TH	Teaching Hospital
TSR	Total cesarean section Rate
UK	United Kingdom
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UP	Uva Province
USA	United States of America
WB	World Bank
WHO	World Health Organization
WLTC	Women with Life Threatening Conditions
WP	Western province

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Antenatal clinic – Courtesy of Dr. Anoma Jayathilake

Chapter 1

Background

Childbirth is a joyous and a central event in the lives of families in all cultures and societies. Most pregnant women will give birth safely to a baby that is alive and well, but the event is also a time for anxiety and concern because of the small but indisputable risk to both mother and child. Ensuring the health and safety of the mother and the baby is a social responsibility and is a fundamental human right which is iterated in many international treaties and is articulated in the Millennium Development Goals.

When a woman dies in childbirth it is usually the result of a cascade of breakdowns in her interactions with the health system. It may be due to delays in seeking care, which in turn may be due to lack of knowledge or the woman's inability to act on her concerns or medical advice, often due to circumstances beyond her control. The latter is a fact that escapes the attention of health care workers more often than not. Delay in accessing appropriate services especially in geographically unfavorable areas may contribute to death and is worsened by the lack of prior planning for events related to birth. The final and saddest episode in the cascade of events in such an eventuality is the inability or failure of the health system to provide adequate, effective and timely care.

Prevention of maternal deaths was accepted as a priority, early in the development of health services in the country and Sri Lanka has achieved much in

terms of reducing maternal and infant mortality. The decline in mortality up to recent low levels and the many factors contributing to these including socio political, economic as well as health service factors have been discussed in detail in many publications and orations (Meegama 1969; Rodrigo 1987; Seneviratne and Rajapaksa 2000; De Silva 2001; Pathmanathan et al 2003; MoH & UNICEF 2003; Rajapaksa 2011; Attygalle 2011).

However, the favourable national maternal mortality statistics hide regional and sectoral differences. These differentials have narrowed much over time but are still observed and are noteworthy. Further reduction of MMR may need modification of national strategies and /or the use of alternate strategies to address specific issues at district and sectoral levels.

The relative importance of the individual causes of maternal mortality has changed over time. Although 60% of maternal deaths are still due to direct causes, indirect causes account for an increasing proportion of mortality (FHB 2009 & 2010). Thus the identification and investigation of co-morbidities as well as the use of multidisciplinary care teams to manage such conditions are of prime importance. The significant number of deaths of pregnant mothers due to suicide and violence indicate the need for vigilance on the part of care providers to recognize women who are at risk. Addressing these emerging issues in an effective manner requires rethinking and reorientation of current services for pregnant women.

Although a high risk approach was adopted in the earlier phases of evolution of maternity care, currently, it is well recognized that risk factors while identifying groups of women who may be at increased risk of a complication, does not necessarily predict an individual woman who is likely to develop a complication. In addition this approach induces a sense of complacency towards the majority of so called 'low risk' women who are likely to account for a larger number of complications by virtue of the size of the group. The important fact is, that these complications can be effectively treated if high quality emergency obstetric care is available and accessible to all those who need them. This means that, further improvements in maternal and perinatal outcomes in Sri Lanka will largely depend on improving the capacity of the health system to respond effectively and in a timely manner to obstetric and new born emergencies and complications. This would need the reduction in disparities in availability and accessibility as well as improving the quality of care.

In Sri Lanka, historically, the status of maternal care has been tracked mainly by using a health impact indicator, the maternal mortality ratio. Outcome indicators such as use of antenatal care, coverage of immunisation with tetanus toxoid and skilled attendance at birth have been added on. However, these outcome indicators do not capture the quality of provision of care in totality and do not align well with the impact indicator used. Furthermore, with decreasing numbers of maternal death, near universal coverage of antenatal care, immunisation and skilled attendance at birth, these traditional indicators alone, have become inadequate to monitor short term progress in care and to capture changes that are necessary to further fine tune the interventions and services.

In more recent times, indicators of health systems outputs or process indicators have been promoted and there has been publications such as the "UN guidelines for monitoring the availability and use of obstetric services" (1997) and "Monitoring Emergency Obstetric Care: A handbook" (WHO 2009). These indicators have the advantage of being appropriate for use both nationally and sub nationally

and have an important role to play in the monitoring of maternal care provision in the country.

An assessment using these indicators was last carried out nearly 10 years ago. Therefore, the current Emergency Obstetric and Neonatal Care (EmONC) needs assessment was planned to examine the ability of the different grades of health institutions at regional and national level to provide necessary life-saving care to pregnant women and their newborns. The findings may also serve as a point of reference against which future progress can be measured.

1.1 Objectives of the assessment

The objectives of the assessment were as follow:

1.1.1 General objective

Describe the current availability, geographical distribution, level of utilization and selected aspects of quality of EmONC services in the country.

1.1.2 Specific objectives

To describe by district, province and the country;

1. The availability and geographic distribution of comprehensive and basic Emergency Obstetric care facilities in terms of provision of signal functions and indicators of EmONC
2. Selected care practices
3. Maternal mortality and morbidity patterns
4. Resources for emergency obstetric care i.e.
 - Infrastructure, equipment and essential drugs
 - Human resources
5. Describe institution based family planning services
6. Neonatal care services and morbidity pattern



Antenatal ward – Courtesy of Dr. Anoma Jayathilake

Chapter 2

Methodology

2.1 Planning the assessment

The Family Health Bureau (FHB) is the lead institution within the Ministry of Health, responsible for the current assessment. A core group, co-chaired by the Deputy Directors General Public Health Services and Medical Services was appointed by the Secretary, Ministry of Health, to facilitate, approve and monitor all activities related to the assessment. The core group included representation from the Provincial medical administration, Administrators of hospitals, Sri Lanka College of Obstetricians and Gynaecologists (SLCOG), Sri Lanka College of Paediatricians (SLCP), Perinatal Society of Sri Lanka (PSSL), WHO, UNFPA, UNICEF and the Family Health Bureau.

2.2 Sampling

2.2.1 Sampling of institutions

Only government health institutions were included in the assessment. The assessment was carried out in all districts of the country. All government hospitals categorized as Teaching Hospitals (TH), Provincial General Hospitals (PGH), District General Hospitals (DGH) and Base Hospitals (BH) were included. Government health care institutions below the level of a base hospital where deliveries occurred were sampled as described below.

The number of institutions below the level of a base hospital sampled per district depended on the percentage of deliveries performed in these

institutions out of the total in the district. All districts in the country were divided into 3 strata based on the percentage of births in the institutions below the level of a base hospital as given below:

- First stratum >30%
- Second stratum ≥ 15% - 30%
- Third stratum <15%

Four institutions were selected from the first stratum, two from the second and one from the third. From each district the required number of institutions was selected on the probability proportional to the number of deliveries per institution.

A total of 33 TH/PGH/DGH, 64 BH and 46 divisional hospitals (total of 143) were selected into the sample. The list of institutions selected for study is given in table 1, Annex I.

2.2.2 Sampling for morbidity data collection and assessment of knowledge

Morbidity data were collected prospectively for a period of 4 weeks from all obstetric units and from the NICUs and SCBUs in the selected institutions.

Knowledge was assessed among three categories of care providers i.e. midwives, nursing officers in obstetric units, labour rooms and the first contact medical officers in the units (Intern House Officers / Medical Officers). The data collection tool was administered to all staff members in the above categories who were present on the day the assessment teams visited a given unit.

2.3 Instruments for data collection

It was decided that the generic modules developed by the Averting Maternal Death and Disability Program (AMDD) at Columbia University and its partners (including UNICEF, UNFPA, WHO, Care and Save the Children) be used for the assessment. This set of documents refer to EmONC services, the added “N” emphasizing the fact that information on emergency services for newborns as well as for mothers is included. This report therefore uses the term EmONC.

This set of instruments have been developed based on the experiences gained through the conduct of facility-based assessments of the availability, utilization and quality of emergency obstetric and newborn care (EmONC) in over 50 countries in Africa, Asia and Latin America. The modules use various data collection methods including interviews, extraction of information (data) from records and registers, and observation.

These modules were adapted to suit the Sri Lankan context. Instruments that were available locally for evaluation of obstetric practice were also examined and used where appropriate. The AMDD generic module on knowledge was not used. A special module was developed for this purpose which specifically addressed applied knowledge required to deal with common obstetric emergencies.

A neonatal module was developed to help identify current availability as well as needs. Neonatal care services in the country are in the process of being organised. The information collected has been planned with a view to providing inputs in to this process.

The adapted tools were discussed in detail with a wider group of stake holders consisting of technical experts from the College of Obstetricians and Gynaecologists (SLCOG) and College of Paediatricians (SLCP), Perinatal Society of Sri Lanka specialists in the Family Health Bureau, representatives from the Ministry of Health and Provincial Health Administration. Modifications were made during the consultative process and consensus reached. The core group approved the finalized set of tools.

The list of data collection modules used in the survey is given below:

- Module 1: Identification of Facility and Infrastructure: covers background information on the facility - including size/capacity, overall infrastructure, transport & communication.
- Module 2: Human resources: signal functions the staff provide, staffing situation 24 hours a day 7 days a week.
- Module 3: Essential drugs, equipment & supplies.
- Module 4: Facility case summary: these data include deliveries, obstetric complications, caesarean deliveries, maternal deaths & intrapartum stillbirths.
- Module 5: EmONC signal functions & other important services.
- Module 6: Partograph review.

Module 7: Assessment of health provider knowledge.

Module 8: Review of 10 BHTs per unit where delivery was by caesarean section.

In addition to the above modules the following tools were developed specifically for the current survey:

- A module on institution based family planning services,
- Checklist for assessment of labour rooms, post natal wards, SCBU/NICU and a tool for collection of morbidity data from bed head tickets,
- Formats for qualitative data collection on the management of the last averted maternal death and a severe neonatal morbidity,
- Formats to obtain comments from the specialist obstetricians and specialist paediatricians / neonatologists on how to improve the current maternal mortality review process and the perinatal mortality conference,

- Format for collection of data on place of delivery from each PHM area for a specified period of 3 months (quarter of the year).

The data collector's manual provided by AMDD was modified to suit the local survey.

Since there is a well-established national maternal death review process in place, no attempt was made to collect information on maternal deaths during field data collection. Data from the Maternal Mortality Data Base maintained in the FHB was used for analysis. Deaths that had occurred in 2009 and 2010 were analysed in detail.

2.4 Pilot test

A pilot test was carried out in the Kalutara district. All institutions included in the sample for the district were included. The pilot test also examined the feasibility of obtaining morbidity data from different sources and methods viz. from admission and discharge registers, Bed Head Tickets (BHT)s of in-ward patients and from BHTs at discharge, both prospectively and retrospectively. It was seen that the most feasible method for collection of morbidity data was prospectively at the time of discharge from the hospital. It was found that the best method of getting an accurate diagnosis and information on co-morbidities was to entrust data collection to a medical officer working in the ward.

The pilot test also showed that it would need a team of 3 persons working for 3 days to complete the data collection in a large District General Hospital with 2 specialist units, 1-2 days in a Base Hospital and 1 day in the Divisional Hospitals. However, it was noted that the time taken would also depend on patient volumes and distances that have to be travelled by the teams.

The pilot study highlighted the fact that the teams involved in data collection needed to be given full time duty leave to carry out the survey and transport within the district. The data collectors has to be authorized by the Regional Director of Health Services.

Basic analysis of data from the pilot survey and comments obtained from the data collectors were

presented to the core group. Based on this, modifications were made in the methodology and approval of the core group was obtained for these changes.

2.5 Data collection

In a given district, the Regional Director of Health Services together with the Medical Officer of Maternal and Child Health (MOMCH) were responsible for data collection from the institutions included in the sample. Two to three data collection teams were selected per district depending on the number and size of institutions in the sample. Each team comprised of 3 persons selected from senior Medical Officers of Health (MOH), MOs public health and MOs planning who had experience in Obstetrics and Paediatrics. All data collectors were trained in the use of the modules.

- The modules were administered by the data collection teams who visited each selected health facility.
- Morbidity data was collected from all institutions prospectively for a period of 4 weeks. Information was collected at time of discharge by a medical officer attached to the unit who was designated by the specialist obstetrician or paediatrician for this purpose. The nursing sister in charge of the ward was responsible for ensuring that information from all discharged patients were included and was given a specially designed check list for the purpose.
- Comments on the maternal death review and the perinatal mortality conference were obtained from the specialist anonymously and confidentially and collected in a sealed envelope into a sealed box.
- In addition the specialist were requested to carry out a SWOT analysis of the last "near miss" and submit their comments in a similar manner.

A summary of sources of data for each of the modules is given in table 2 Annex I.

2.6 Organizing data collection

The research team was invited to make a presentation on the National EmONC Assessment to all Regional Directors of Health Services and Directors of teaching hospitals at a meeting organised by the Ministry of Health and chaired by the Director General of Health Services (DGHS). The objective of the presentation was to sensitize key personnel and to seek cooperation for data collection activities in districts and in institutions. In addition circular directives were issued by the Director General of Health Services to the provincial, district and institutional administration in order to facilitate the process.

An initial visit was made to all districts by prior appointment at which the RDHS, MOMCH, Consultant Community Physicians, MO Planning were met. Details of the assessment were discussed; administrative approval and support for data collection within the district were sought. Consensus was obtained on the number of data collection teams and the team members identified. Administrative arrangements and logistic arrangements for data collection in the district were discussed. Facilitated by the RDHS, a date for visiting all the institutions in the district was agreed upon and a date and venue for the training program in the district agreed upon.

At the meeting with hospital staff, the purpose and the survey methodology was explained to all stakeholders and the team of data collectors assigned to the institution were introduced. A medical officer was appointed to act as the institutional coordinator and each specialist identified a MO who would be responsible for collecting morbidity data. Logistics of data collection within the institution were discussed. A one day training program was carried out in each district.

2.7 Data entry and analysis

All data entry forms were checked for completeness and an attempt was made to obtain any missing data from the districts/institutions concerned. Data were entered using Epi data and Excel formats. Ten per cent of all entries were cross checked by a second person.

The classification of health institutions published by the Ministry of Health was used in the analysis (Ministry of Health, 2010). At the time of data collection it was noted that some of the institutions had been upgraded from the classification used in the sampling. In addition to this a functional classification based on availability of specialist services was also used.

The data were analysed according to the EmONC indicators described in the manual “Monitoring Emergency Obstetric Care: A handbook” (WHO 2009).

2.7.1 Signal functions

The term Emergency Obstetric Care refers to the provision of a list of life saving services or signal functions which defines a health facility in respect of its ability to treat obstetric and newborn emergencies. Signal functions used to classify a facility are given below (Box 2.1).

Box 2.1: List of Signal Functions

EmONC Signal Functions

1. Administer parenteral antibiotics
2. Administer uterotonic drugs (i.e. parenteral oxytocin)
3. Administer parenteral anticonvulsants for pre eclampsia and eclampsia (i.e. magnesium sulphate)
4. Manually remove the placenta
5. Remove retained products
6. Perform assisted vaginal delivery (e.g. vacuum extraction , forceps delivery)
7. Perform basic neonatal resuscitation (e.g. with bag and mask)
8. Perform surgery (e.g. caesarean section)
9. Perform blood transfusion

2.7.2 Classification of health institutions by EmONC status

A basic emergency obstetric care facility (BEmONC) is one in which functions 1 – 7 are performed while a comprehensive obstetric care facility (CEmONC) is one in which all functions 1 – 9 are performed .

In Sri Lanka, removal of retained products (signal function 5) is not recommended in institutions where there are no specialist obstetric services. Institutions that provide signal functions 1-7 excluding signal function 5 are referred to in the current analysis as a modified BEmONC facility.

The first EmOC needs assessment carried out in the year 2000, examined the provision of the first 4 basic signal functions in addition. In the present study this was also examined for purposes of comparison.

According to the reference “Monitoring Emergency Obstetric Care: A handbook” (WHO 2009) an

institution is classified as BEmONC or CEmONC based on providing the signal functions in the three months preceding the assessment. Data collected through direct inquiry is used for this classification.

It is noted that there may be many reasons for not performing a function in the stipulated period such as policy decisions on service provision, (for example in Sri Lanka, removal of retained products of conception is performed only in institutions where there are specialists in obstetrics) absence of cases needing specific services, lack of persons, skills or infrastructure necessary for the performance of a particular function. Therefore, the present analysis used a set of objective criteria that was agreed upon by the core group as necessary for the provision of each signal function to identify institutions that are “potentially able to provide signal functions”. The set of criteria are given in Box 2.2.

Box 2.2: Criteria considered as necessary for the provision of signal functions

1. Drugs
 - a. at least one parenteral antibiotic
 - b. at least one parenteral uterotonic drug
 - c. Magnesium sulphate /parenteral anticonvulsants
 - d. Pethidine
 - e. Adrenaline
2. Equipment (in working order)
 - a. Vacuum extractor / forceps
 - b. Neonatal AMBU bag (Artificial Manual Breathing Unit)
3. Personnel
 - a. At least one specialist obstetrician
 - b. At least one MO blood bank
 - c. At least one MO trained in anaesthesia
 - d. House officers / Medical officers
 - e. Nursing officers
 - f. Midwives
4. Infrastructure
 - a. Electricity
 - b. Continuous water supply
 - c. Functional operating theatre
 - d. Functional blood bank
- 5 Training issues not being given as a reason for not providing the following services in data collection format 5B
 - a. Manual removal of placenta
 - b. Assisted vaginal deliveries
 - c. Neonatal resuscitation

The conditions were used to categorise the institutions on their potential ability to perform signal functions 1-9. The institutions that fulfilled the criteria given (box 2.3) are referred to in the analysis as being “potentially able to provide the signal functions”.

Emergency functions should be available for patients on a 24*7 basis i.e. throughout the day every day of

the week. Therefore, the ability of institutions to provide services 24*7 were examined based on the set of minimum criteria given below (Box 2.3). The emphasis was on the ability to provide surgical, anaesthetic and blood transfusion services on a 24*7 basis. The institutions that fulfilled the criteria are referred to as “institutions able to provide CEmONC functions on a 24*7 basis” in the analysis.

Box 2.3: Minimum criteria used in classifying an institution as capable of providing signal functions 24*7

1. Administration of parenteral antibiotics
 - a. availability of parenteral antibiotics
 - b. trained staff capable of administering parenteral antibiotics: medical officers and nursing officers with basic training
2. Administration of uterotonic drugs
 - a. availability of uterotonic drugs
 - b. trained staff capable of administering uterotonic drugs: medical officers and nursing officers with basic training
3. Administration of parenteral anticonvulsants
 - a. availability of parenteral anticonvulsants
 - i. Availability of Magnesium Sulphate
 - b. trained staff capable of administering parenteral anticonvulsants: medical officers and nursing officers with basic training
4. Performing manual removal of placenta
 - a. availability of pethidine
 - b. trained staff capable of performing manual removal
 - i. medical officers with basic qualifications
 - ii. training issues not mentioned as reason for not performing the activity in data collection format 5B
5. Performing removal of retained products:
 - a. this function is recommended to be performed where there is a specialist obstetrician present in Sri Lanka
6. Performing assisted vaginal deliveries
 - a. Availability of vacuum extractors or forceps
 - b. Trained staff capable of performing assisted vaginal deliveries
 - i. medical officers with basic qualifications
 - ii. training issues not mentioned as reason for not performing the activity in format 5B
7. Performing basic neonatal resuscitation (NR)
 - a. availability of a neonatal resuscitation area in the LR
 - b. Availability of neonatal AMBU bag
 - c. trained staff capable of performing neonatal resuscitation
 - i. nursing staff in LR / PNS trained on NR
 - ii. OR mid wife trained on NR
 - iii. OR medical staff trained on NR
8. Performing emergency obstetric surgeries
 - a. Functional / operational operating theatre
 - b. Electricity
 - c. Functional generator
 - d. continuous source of water
 - e. At least two specialist obstetricians
 - f. Two or more persons trained in anesthesia MO or specialist
9. Performing blood transfusions
 - a. Functional blood bank
 - b. At least three MOs Blood Transfusion service
 - c. Electricity
 - d. Functional generator (absolute necessity)
 - e. continuous source of water

In addition to the above the following facilities were considered as essential in the provision of continuous EmONC services.

1. 24*7 availability of electricity
 - a. Primary source of electricity to be obtained from the national grid
 - b. Continuous electricity supply
 - c. Electricity to be available at time of interview
 - d. Functional backup generator to be available
 - e. Days without electricity during the past month to be 'zero'
2. 24*7 availability of water supply
 - a. Primary source of water to be obtained from piped water
 - b. Continuous water supply
 - c. Adequacy of the water supply
 - d. Days without water during the past month to be 'zero'

3. 24*7 availability of communication facilities
 - a. Availability of land phones in the facility
 - b. Communication facility to be available 24*7

The analysis thus described each institution under 3 scenarios of provision of signal functions namely:

- Provided the function in the three months prior to survey
- Potentially able to provide the function
- Are able to provide the functions on a 24*7 basis

2.7.3 Indicators used in the study and their calculation

The indicators used and their minimum acceptable level are given in table 2.1. The indicators were defined and calculated as per guidelines given in the manual quoted above and the details of calculation are given in Annex II.

Table 2.1 Indicators and their minimum acceptable levels

Indicator	Minimum acceptable level
Availability of EmONC	Five EmONC facilities per 500,000 population out of which at least one should provide comprehensive care.
Geographic distribution of EmONC facilities	No standard set
Proportion of all births in basic and comprehensive EmONC facilities	No standard set Long term objective is 100% of births to take place in a facility that can deal with emergencies.
"Met need" for EmONC	Goal is that 100% of women with a complication will receive EmONC
Caesarean sections as a % of all births	5-15% is the recommended
Direct obstetric case fatality rate	Maximum acceptable level less than 1%
Intrapartum and very early neonatal death rate	No standard set
Proportion of deaths due to indirect causes in EmONC facilities	No standard set

Indicators one and two were calculated based on all three scenarios of provision of signal functions given above. The study used a sample of 46 institutions below the level of a base hospital. The institutions sampled accounted for nearly 45% of births in this type of health facility. The findings from the sample are extrapolated to estimate the number of institutions below the level of a Base Hospital that may be classified as having provided modified BEmONC services in the three months prior to survey and institutions that have the potential ability to provide modified BEmONC functions. Reasons for not being able to provide each signal functions was examined.

The classification of institutions on the ability to provide services on a 24*7 basis is confined to institutions that are able to provide CEmONC services.

The district population published by the Department of Census and Statistics based on the census 2012 was used for indicators which required the total population as the denominator (Date of census is given as the 20th March 2012). The number of births registered for the year 2011 obtained from the Registrar General by “place of occurrence of birth” was used when indicators required the number of births per district as the denominator. The number of births by “place of occurrence” was preferred over the number of births by “place of usual residence” since the indicators examine the services provided by the institutions in a district. Where appropriate the number of deliveries occurring in government hospitals obtained from the RDHS is used. The number of maternal deaths per district and causes of death for the year 2009 & 2010 were obtained from the Family Health Bureau as this was the last two years for which maternal death reviews had been completed.

2.7.4 Other analysis

The morbidity rates were estimated based on the sample by level of institution; namely TH/PGH, DGH, BH with specialist obstetricians, BH upgraded but without specialists, institutions below the level of BHs. National morbidity rates are calculated based on weighted averages.

Resources available for provision of EmONC services are described in terms of infrastructure, human resources, drugs and equipment.

A set of indicators similar to what is described for Emergency Obstetric care is not available for Neonatal care services. Current availability of services, infrastructure, human resources and neonatal morbidity are described in this report. The provincial reports describe services at an institutional level and by district.

The response to the attempt to collect qualitative data on a “near miss” and improvements to the current maternal mortality and perinatal mortality investigation procedures was not successful. This data is not presented in the report due to the high non response rate.

A provincial analysis based on the broad framework agreed upon by the core group was presented and discussed in two provinces, one with teaching hospitals and the other without. The objective was to obtain feedback on how best to present the data collected so that it would be useful for provincial administrators and clinicians. The format of the final Provincial reports and the national report were discussed at the core group and consensus obtained.

The national report was presented at a wide stakeholder meeting and feedback especially on recommendations discussed. The inputs from the meeting and subsequent discussions with stakeholders are incorporated in the report.

The meeting was chaired by the Secretary, Ministry of Health and the following were represented; Director General of Health Services, Deputy Directors General (namely, Public Health Services I & II, Medical Services I & II, Education Training and Research, Planning, Laboratory Services); Directors, (namely, Maternal and Child Health, Medical Services, Tertiary Care Services, Medical Supplies Division, National Blood Transfusion Services); Provincial Directors of Health Services, Regional Directors of Health Services, Directors of Hospitals (TH, PGH, DGH, BH); Sri Lanka College of Obstetricians and Gynaecologists, Sri Lanka College of Paediatricians, Perinatal Society of Sri Lanka, Development Partners (UNFPA, UNICEF, WHO, WB), Deputy Director/ MCH, and Consultant Community Physicians from the Family Health Bureau.



Labour room- TH Kandy- Courtesy of Dr. Kapila Gunawardhana

Chapter 3

Indicators of Emergency Obstetric Care

A package of interventions required to treat the seven major direct obstetric complications is collectively known as Emergency Obstetric Care (EmOC). The current assessment is based on the set of indicators described in “Monitoring Emergency Obstetric Care: A handbook” (WHO 2009), and these indicators are described in chapter 2 section 2.7.3. They are calculated using information gathered from health facilities for the assessment and population data published by the government.

A set of tools have been developed by AMDD and its UN partners to help countries to examine Emergency Obstetric Care (EmOC) needs in terms of availability, utilization and quality of services. The current needs assessment refers to EmONC services, the added “N” emphasizing that the assessment collected information on services for newborns as well as mothers. This report therefore uses the term EmONC.

Classification of health institutions provided by the Ministry of Health is used in the analysis and presentation of data (Ministry of Health 2010). However, it is noted that specialist obstetricians were not available in some of the institutions that had been upgraded and listed as Base Hospitals. The analysis therefore examines Base Hospitals as those with and without specialist obstetricians. Furthermore, the analysis also used a functional classification based on whether the institution had one or more specialist obstetricians.

This chapter presents the findings on each of the Emergency Obstetric and Neonatal Care (EmONC) indicators by district, province and for the country.

3.1 Selected characteristics of the districts and provinces

District data on geographic extent, population and births used in the calculation of indicators are described in table 3.1.

Table 3.1: Selected characteristics of districts and provinces

Province	District	Population enumerated in census 2012	Geographical extent in km ²	Total Births registered in the district in 2011 (RG)	Total births in the government hospitals in 2011 (H 830)
Western province		5837294	3684	99292	86022
	Colombo	2323826	699	54888	45251
	Gampaha	2298588	1387	27457	24055
	Kalutara	1214880	1598	16947	16716
Central province		2556774	5704	50196	48585
	Kandy	1368216	1940	29331	27199
	Matale	482348	1993	10465	10415
	Nuwara Eliya	706210	1771	10400	10971
Southern province		2465626	5544	42196	41446
	Galle	1059046	1652	20838	18911
	Matara	810703	1283	12268	13097
	Hambantota	595877	2609	9090	9438
Northern province		1060023	8884	20016	17196
	Jaffna	583071	1025	9949	8800
	Killinochchi	112872	1279	3319	2390
	Mannar	99063	1996	1482	1474
	Vavuniya	172789	1967	4190	3961
	Mullativu	92228	2617	1076	571
Eastern province		1547377	9996	33147	32304
	Batticaloa	525186	2854	9743	9102
	Ampara	645825	4415	14371	15120
	Trincomalee	376366	2727	9033	8082
North Western province		2372185	7888	39885	39804
	Kurunegala	1611407	4816	25428	25280
	Puttalam	760778	3072	14457	14524
North Central province		1259421	10472	23353	23414
	Anuradhapura	855562	7179	15855	15874
	Polonnaruwa	403859	3293	7498	7540
Uva province		1259419	8500	23680	23872
	Badulla	811225	2861	16548	16620
	Monaragala	448194	5639	7132	7252
Sabaragamuwa province		1919478	4968	31650	30741
	Ratnapura	1082299	3275	21260	20165
	Kegalle	837179	1693	10390	10576
Sri Lanka		20,277,597	65,610	363,415	343,384

Table 3.1 shows that the total births reported from government hospitals in the country is 20,031 less than that reported by the Registrar General (RG) i.e. 94.5% of births in the country have occurred in government institutions. The proportion of home deliveries reported by the Family Health Bureau based on data from field midwives is 0.1% (478 deliveries in 2011, RHMIS). It could therefore be assumed that the overwhelming majority of the 20031 births occurred in the private sector.

The majority of births in the non-government sector is seen in the Western province (13,270) and a large proportion (73%) of these births occur in the Colombo district. This is in keeping with the relatively larger number of private hospital facilities seen in the Province and in the Colombo district.

In the Northern Province the RG recorded an excess of 2820 births, most of the excess was in the districts of Kilinochchi (929) and Mullativu (505), i.e. the RGs data was 1.4 and 1.8 times the births recorded in the government institutions respectively. On inquiry from the RG (personal communication) it was revealed that some of the births that had taken place in earlier years had been registered during 2011.

In two provinces, namely, Uva and North Central Provinces, the births in government institutions exceed the number reported by the RG by 192 and 61 respectively. Since the RG data used in the analysis is by place of occurrence of births, this discrepancy suggests, likely errors in routine reporting of hospital data.

Table 3.2 shows the percentage of births in 2011 in the country by category of hospital. The majority of births out of those occurring in government institutions have taken place in Teaching Hospitals and in Provincial General Hospitals (40%) a further 26% and 29% taking place in District General Hospitals and Base Hospitals respectively. It is noteworthy that only 18909 (5.5%) of deliveries have taken place in institutions below the level of a Base Hospital.

It is seen that in the districts of Nuwara Eliya (24%), Mannar (22%), Mullativu (19%), Anuradhapura (16%), Batticaloa (14%) and Monaragala (11%) the percentage delivering in smaller institutions below the level of a BH is relatively high.

Table 3.2: Distribution of births in government institutions by type of hospital and district -2011

Province	District	Total reported deliveries in Gov. Hospitals (2011)	Type of Institution							
			Teaching Hospitals / PGH		District General Hospitals		Base Hospitals		Divisional Hospitals	
		No.	No.	%	No.	%	No.	%	No.	%
Western province		86022	46655	54.2	19428	22.6	18781	21.8	1158	1.3
	Colombo	45251	37329	82.5	0	0.0	7184	15.9	738	1.6
	Gampaha	24055	9326	38.8	10720	44.6	3888	16.2	121	0.5
	Kalutara	16716	0	0.0	8708	52.1	7709	46.1	299	1.8
Central province		48585	21211	43.7	15312	31.5	7428	15.3	4634	9.5
	Kandy	27199	21211	78.0	4216	15.5	92	0.3	1680	6.2
	Matale	10415	0	0.0	5891	56.6	4163	40.0	361	3.5
	Nuwara Eliya	10971	0	0.0	5205	47.4	3173	28.9	2593	23.6
Southern province		41446	12343	29.8	15465	37.3	11371	27.4	2267	5.5
	Galle	18911	12343	65.3	0	0.0	6049	32.0	519	2.7
	Matara	13097	0	0.0	9977	76.2	2039	15.6	1081	8.3
	Hambantota	9438	0	0.0	5488	58.1	3283	34.8	667	7.1
Northern province		17196	6992	40.7	7613	44.3	1504	8.7	1087	6.3
	Jaffna	8800	6992	79.5	0	0.0	1293	14.7	515	5.9
	Killinochchi	2390	0	0.0	2213	92.6	62	2.6	115	4.8
	Mannar	1474	0	0.0	1155	78.4	0	0.0	319	21.6
	Vavuniya	3961	0	0.0	3785	95.6	149	3.8	27	0.7
	Mullativu	571	0	0.0	460	80.6	0	0.0	111	19.4
Eastern province		32304	6536	20.2	7853	24.3	15675	48.5	2240	6.9
	Batticaloa	9102	6536	71.8	0	0.0	1282	14.1	1284	14.1
	Ampara	5467	0	0.0	3882	71.0	1451	26.5	134	2.5
	Kalmunai	9653	0	0.0	0	0.0	9398	97.4	255	2.6
	Trincomalee	8082	0	0.0	3971	49.1	3544	43.9	567	7.0
North Western province		39804	13318	33.5	5226	13.1	19282	48.4	1979	5.0
	Kurunegala	25280	13318	52.7	0	0.0	10647	42.1	1316	5.2
	Puttalam	14524	0	0.0	5226	36.0	8635	59.5	663	4.6
North Central province		23414	11658	49.8	6958	29.7	2004	8.6	2794	11.9
	Anuradhapura	15874	11658	73.4	0	0.0	1719	10.8	2497	15.7
	Polonnaruwa	7540	0	0.0	6958	92.3	285	3.8	297	3.9
Uva province		23872	7927	33.2	5560	23.3	8440	35.4	1945	8.1
	Badulla	16620	7927	47.7	0	0.0	7522	45.3	1171	7.0
	Monaragala	7252	0	0.0	5560	76.7	918	12.7	774	10.7
Sabaragamuwa province		30741	9414	30.6	5684	18.5	14838	48.3	805	2.6
	Ratnapura	20165	9414	46.7	0	0.0	10159	50.4	592	2.9
	Kegalle	10576	0	0.0	5684	53.7	4679	44.2	213	2.0
Sri Lanka		343,384	136054	39.6	89099	25.9	99323	28.9	18909	5.5

Table 3.3: Distribution of births in government hospitals by functional classification and district-2011

Province / District	Total deliveries in the government hospitals in 2011	Functional type									
		More than one unit		One unit with 2 specialist Obstetrician		One unit with one specialist Obstetrician		Upgraded to BH without a specialist services		Divisional hospital	
	No.	No.	%	No.	%	No.	%	No.	%	No.	%
Western province	86022	84598	98.3	0	0.0	242	0.3	24	0.0	1158	1.3
Colombo	45251	44271	97.8	0	0.0	242	0.5	0	0.0	738	1.6
Gampaha	24055	23920	99.4	0	0.0	0	0.0	14	0.1	121	0.5
Kalutara	16716	16407	98.2	0	0.0	0	0.0	10	0.1	299	1.8
Central province	48585	31318	64.5	5205	10.7	7261	14.9	167	0.3	4634	9.5
Kandy	27199	25427	93.5	0	0.0	0	0.0	92	0.3	1680	6.2
Matale	10415	5891	56.6	0	0.0	4088	39.3	75	0.7	361	3.5
Nuwara Eliya	10971	0	0.0	5205	47.4	3173	28.9	0	0.0	2593	23.6
Southern province	41446	26279	63.4	8407	20.3	3833	9.2	660	1.6	2267	5.5
Galle	18911	16302	86.2	0	0.0	2090	11.1	0	0.0	519	2.7
Matara	13097	9977	76.2	0	0.0	1743	13.3	296	2.3	1081	8.3
Hambantota	9438	0	0.0	8407	89.1	0	0.0	364	3.9	667	7.1
Northern province	17196	10777	62.7	0	0.0	4801	27.9	531	3.1	1087	6.3
Jaffna	8800	6992	79.5	0	0.0	973	11.1	320	3.6	515	5.9
Killinochchi	2390	0	0.0	0	0.0	2213	92.6	62	2.6	115	4.8
Mannar	1474	0	0.0	0	0.0	1155	78.4	0	0.0	319	21.6
Vavuniya	3961	3785	95.6	0	0.0	0	0.0	149	3.8	27	0.7
Mullativu	571	0	0.0	0	0.0	460	80.6	0	0.0	111	19.4
Eastern province	32304	14389	44.5	0	0.0	15042	46.6	633	2.0	2240	6.9
Batticaloa	9102	6536	71.8	0	0.0	1007	11.1	275	3.0	1284	14.1
Ampara	5467	3882	71.0	0	0.0	1344	24.6	107	2.0	134	2.5
Kalmunai	9653	0	0.0	0	0.0	9147	94.8	251	2.6	255	2.6
Trincomalee	8082	3971	49.1	0	0.0	3544	43.9	0	0.0	567	7.0
North Western province	39804	23874	60.0	6412	16.1	6936	17.4	604	1.5	1979	5.0
Kurunegala	25280	18648	73.8	0	0.0	4713	18.6	604	2.4	1316	5.2
Puttalam	14524	5226	36.0	6412	44.1	2223	15.3	0	0.0	663	4.6
North Central province	23414	11658	49.8	6958	29.7	1295	5.5	709	3.0	2794	11.9
Anuradhapura	15874	11658	73.4	0	0.0	1054	6.6	665	4.2	2497	15.7
Polonnaruwa	7540	0	0.0	6958	92.3	241	3.2	44	0.6	297	3.9
Uva province	23872	7927	33.2	5560	23.3	6985	29.3	1455	6.1	1944	8.1
Badulla	16620	7927	47.7	0	0.0	6985	42.0	537	3.2	1170	7.0
Monaragala	7252	0	0.0	5560	76.7	0	0.0	918	12.7	774	10.7
Sabaragamuwa province	30741	15098	49.1	6188	20.1	8468	27.5	182	0.6	805	2.6
Ratnapura	20165	9414	46.7	6188	30.7	3829	19.0	142	0.7	592	2.9
Kegalle	10576	5684	53.7	0	0.0	4639	43.9	40	0.4	213	2.0
Sri Lanka	343,384	225918	65.8	38730	11.3	54863	16.0	4965	1.4	18908	5.5

Table 3.3 highlights the fact that 93.1% of deliveries in government institutions take place in hospitals where specialist services are available, 66% in the larger hospitals where there are more than one unit and nearly 77% in institutions where there is more than one specialist obstetrician. It is noted that, 11.3% (38730) of women deliver in hospitals where one maternity unit is shared by two specialists. A further 16% (54863) deliver in institutions that have only one specialist obstetrician.

3.2 Institutions included in the present study

One hundred and forty three institutions were selected for study as described in section 2.2. Of the 143 institutions selected in to the sample, one tertiary care institution did not provide data. Thus the analysis presented in this chapter is based on data from 142 institutions.

Table 3.4: Percentage of births in the institutions included in the analysis

	Specialist Unit		Non specialist unit		
	TH/PGH/DGH	BH with specialist services	Upgraded as BH no specialist services	Institutions below the level of a base hospital	Total
No. of Hospitals with maternity beds	33	38	26	506	603
No. Included in the analysis	32	38	26	46	142
Percentage of hospitals	96.9	100	100	4.6	23.5
Total births in government hospitals 2011 (H830)	225154	93422	3612	18059	341158
No. of births in hospitals included in the analysis	221277	93422	3612	6164	324475
Percentage of births in hospitals included in the analysis	98.3	100	100	34.1	95.1
	99.1%		45.1%		

Table 3.4 shows that the institutions included in the analysis accounted for 89% of the births in the country and 95% of births in government hospitals. It is important to note that these institutions accounted for 99% of births in hospitals where specialist services are available and 45% of births in non-specialist institutions. Of the 506 hospitals below the level of a base hospital, 151 institutions did not report a single birth per month in the year 2011, while a further 114 reported less than 12 deliveries during the year (Table 3 Annex I).

3.3 Provision of signal functions and EmONC services

The list of functions called ‘signal functions’ given in box 2.1 was used to classify institutions included in the assessment as having basic or comprehensive emergency obstetric and neonatal care (EmONC) services. As described in detail in section 2.7.2 each institution was classified under 3 scenarios of provision of signal functions namely:

- Provided the function in the three months prior to survey,
- Potentially able to provide the function
- Able to provide the function on a 24*7 basis.

Annex III tables 1-9 describe each institution included in the study by district and province based on whether each signal function was provided in the three months prior to survey. Data collected through direct inquiry was used for this purpose. In addition, each institution in the study was described in terms of facilities (manpower, drugs, equipment and infrastructure) necessary to provide each signal function (criteria given in Box 2.2) and this information is presented in tables 10-18 in Annex III. The information presented in tables 10-18 (Annex III), were used to classify institutions as being potentially able to provide signal functions and as being able to provide signal functions on a 24*7 basis. The criteria used for the classification of institutions based on the ability to provide signal functions on a 24*7 basis is given in box 2.3 in chapter 2. Institutions potentially capable of providing signal functions and those able to provide services on a 24*7 basis are summarised by district and province

in tables 19-27 and tables 28-36 respectively of Annex III.

Basic and Comprehensive emergency obstetric care (EmONC) services

A health institution that provides the first seven signal functions is called a basic EmONC facility (BEmONC). An institution that provides all nine signal functions is called a Comprehensive EmONC facility (CEmONC). In the present analysis the term Comprehensive EmONC (CEmONC) is applied to those institutions that are potentially able to provide all nine signal functions.

In Sri Lanka, the signal function of evacuation of retained products of conception (signal function 5) is provided only in institutions which have specialist services. As such no institution can be classified as providing BEmONC care as defined in the international literature (WHO 2009). Therefore, the current analysis also describes the institutions in terms of provision of signal functions 1-7 excluding signal function 5 and such institutions are referred to as those providing modified BEmONC services (Section 2.7.2).

The first EmONC needs assessment carried out in the year 2000, examined the provision of the first 4 basic signal functions. Therefore in the present study too, this was examined for purposes of comparison.

The study used a sample of 46 institutions below the level of a base hospital and estimates are used for this type of institution in the calculation of indicators. The estimates have to be interpreted with caution since they are based on small numbers and there is a wide variation in the number of births per institution in the type of hospital sampled.

3.4 Availability of EmONC services (Indicator 1)

The first indicator examines the availability of EmONC services in terms of the population. Tables 3.5 – 3.8 describe this indicator according to the three scenarios described above by district, province and for the country.

The accepted minimum level for availability of EmONC services advocated by WHO is five EmONC

facilities for every 500,000 population, at least one of which should provide comprehensive care (WHO 2009).

3.4.1: Availability of EmONC services: assessment based on institutions that provided signal functions in the 3 months preceding survey

Table 3.5 shows the calculation of indicator one based on services provided during the 3 months prior to survey.

It shows that the country as a whole and most of the districts have one or more institutions that have provided all nine signal functions in the three months preceding the survey. At national level where the minimum expected number of such facilities are 41 (based on the standard of at least 1 CEmONC per 500 000 population) Sri Lanka has 50 facilities giving a rate of 1.23 facilities per 500,000 population that provided all nine signal functions.

The availability of institutions that actually provided all nine signal functions varied from 0.61 per 500 000 population in the Southern Province to 3.55 per 500 000 population in the Eastern Province.

It is seen that 9 districts fail to meet the internationally defined criterion of 1 CEmONC facility per 500 000 population if we take the institutions that provided services in the three months preceding the survey. The district variation of this indicator is high, varying from 0.47 facilities in Galle to 5.42, 5.31 and 5.04 per 500 000 population in the Trincomalee, Mullaitivu and Mannar districts respectively. It must be noted that the districts of Mullaitivu and Mannar have low population numbers and this indicator needs to be considered together with the area to be covered by a single institution.

Table 3.5: Availability of EmONC facilities by district and province based on services provided during the 3 months prior to survey

Province	District	Population in 2012	Institutions which have provided all nine signal functions	No of institutions estimated to have provided modified BEmONC services	Number of institutions estimated to have provided first 4 functions only	Availability of institutions that have provided modified BEmONC services per 500,000 population	Availability of institutions that have provided the first 4 signal functions only per 500,000 population	Institutions that have provided all 9 signal functions per 500,000 population
	Colombo	2323826	4	0	0	0.0	0.0	0.86
	Gampaha	2298588	4	1	0	0.2	0.0	0.87
	Kalutara	1214880	3	1	0	0.4	0.0	1.23
Western Province		5837294	11	2	0	0.17	0.0	0.94
	Kandy	1368216	3	2	1	0.7	0.4	1.09
	Matale	482348	2	1	0	1.0	0.0	2.07
	Nuwara Eliya	706210	2	1	1	0.7	0.7	1.42
Central Province		2556774	7	4	2	0.8	0.4	1.37
	Galle	1059046	1	1	1	0.4	0.5	0.47
	Matara	810703	0	1	0	0.6	0.0	0.00
	Hambantota	595877	1	2	0	1.7	0.0	0.84
Southern Province		2465626	2	4	1	0.8	0.2	0.61
	Jaffna	583071	2	1	1	0.8	0.8	1.72
	Killinochchi	112872	0	0	0	0.0	0.0	0.00
	Mannar	99063	1	0	0	0.0	0.0	5.04
	Vavuniya	172789	1	0	0	0.0	0.0	2.83
	Mullativu	92228	1	0	0	0.0	0.0	5.42
Northern Province		1060023	5	1	1	0.5	0.5	2.36
	Batticaloa	525186	1	1	1	1.0	1.0	0.95
	Ampara	645825	6	1	1	0.8	0.8	4.64
	Trincomalee	376366	4	1	0	1.3	0.0	5.31
Eastern Province		1547377	11	3	2	1.0	0.6	3.55
	Kurunegala	1611407	1	2	2	0.6	0.6	0.31
	Puttalam	760778	2	1	0	0.7	0.0	1.30
North Western Province		2372185	3	3	2	0.6	0.4	0.63
	Anuradhapura	855562	1	2	2	1.2	1.2	0.58
	Polonnaruwa	403859	1	0	0	0.0	0.0	1.24
North Central Province		1259421	2	2	2	0.8	0.8	0.79
	Badulla	811225	3	1	2	0.6	1.2	1.85
	Monaragala	448194	1	1	0	1.1	0.0	1.12
Uva Province		1259419	4	2	2	0.8	0.8	1.59
	Ratnapura	1082299	4	1	1	0.5	0.5	1.85
	Kegalle	837179	1	1	1	0.6	0.6	1.79
Sabaragamuwa Province		1919478	5	2	2	0.5	0.5	1.82
Sri Lanka		20277597	50	23	16	0.6	0.4	1.23

Modified BEmONC refers to provision of signal functions 1-7 excluding function 5

Note: Modified BEmONC services and institutions providing the first 4 signal functions are estimates and have been corrected to the nearest integer.

Of the institutions studied, the signal functions 1, 2,3,4,6 and 7 alone, were provided by 3 institutions (modified BEmONC services) in the 3 months preceding data collection. Two of these three were base hospitals that had been upgraded but were without a specialist Obstetrician at the time of survey. Only one institution out of the 46 institutions below the level of a base hospital that were sampled, could be classified as having provided modified BEmONC services. As such the estimates provided for modified B-EmNOC services and institutions providing the first four functions have to be interpreted with caution.

The present study estimated that modified BEmONC services were provided by 23 institutions giving a rate of 0.6 institutions per 500 000 population and that the first four functions only were provided by 16 institutions giving a rate of 0.4 per 500 000 population.

The previous EmOC surveys carried out in 2001 (7 provinces) and 2002-2003 (Northern and Eastern Provinces) when taken together, there were 1.26 CEmOC facilities and 0.94 BEmOC facilities per 500 000 population, giving an overall rate of 2.2 EmOC facilities per 500,000 population and a further 79 institutions providing the first 4 signal functions giving an overall rate of 2.32 per 500 000 population. In the earlier survey the indicator was calculated based on the provision of signal functions in the

three months prior to survey and is comparable with data presented in table 3.5. It is noted that Badulla was the only district that met the criterion of one CEmOC facility and 4 BEmOC facilities in the earlier survey. In comparison to the findings of the earlier survey the number of institutions providing EmONC per 500 000 population has decreased marginally (institutions that provided all 9 signal functions from 1.26 to 1.23 per 500 000 and modified BEmONC from 0.94 to 0.88 per 500 000 population). In the current survey, the availability of first four functions were estimated as 0.4 per 500 000 population compared to 2.32 per 500 000 population in the previous survey.

3.4.2: Availability of EmONC facilities based on the potential ability of institutions to provide signal functions

Institutions potentially able to provide signal functions were determined based on the set of criteria described in box 2.2 and are given in tables 10-18 in Annex III and are summarised in tables 19-27 (Annex III).

It was seen that all institutions where specialist obstetricians were available, except two institutions where operating theatre facilities were not available at the time of survey, had the potential ability to provide all nine signal functions. Table 3.6 (a) shows

Table 3.6 (a): Number of non specialist institutions sampled that had the potential ability to provide signal functions 1-7

	Signal function	Upgraded as BH no specialist services (sample n=26)		Institutions below the level of base Hospitals (sample n=46)	
		Number able to provide function	Percentage	Number able to provide function	Percentage
1	Administering of parental antibiotics	26	100.0	45	97.8
2	Administering uterotonic drugs	26	100.0	44	95.7
3	Administering of parenteral anticonvulsants	11	42.3	10	22.2
4	Manual removal of placenta	23	88.5	21	47.7
5	Removal of retained products	0	0.0	0	0.0
6	Assisted vaginal delivery	9	34.6	10	21.7
7	Neonatal Resuscitation	24	92.3	39	84.8

the number of non specialist institutions that had the ability to provide the first 7 signal function.

It is seen that out of the base hospitals that have been upgraded but did not have specialist services at the time of survey, only 42% fulfilled the criteria necessary to administer parenteral anticonvulsants

available only in 9% and 33% respectively of the smaller institutions. It is heartening to note that only a small proportion of institutions have given lack of training as a reason for the inability to provide specific functions.

Table 3.6 (b): Availability of resources for signal functions in hospitals with no specialist services

Resources	Upgraded as BH no specialist services (sample n=26)		Institutions below the level of base Hospitals (sample n=46)	
At least one parenteral antibiotic	26	100.0	45	97.8
At least one parenteral uterotonic drug	26	100.0	44	95.7
Magnesium Sulphate	11	42.3	10	21.7
Pethidine	23	88.5	21	45.7
Vacuum Extractor	10	38.5	4	8.7
Forceps	13	50.0	15	32.6
Neonatal AMBU bag	25	96.2	42	91.3
Medical officers	26	100.0	46	100.0
Nursing officers	25	96.2	41	89.1
Midwives	26	100.0	45	97.8
Lack of training given as reason for inability to provide services				
Manual removal of the placenta	1	3.8	3	6.5
Assisted Vaginal Deliveries	9	34.6	15	32.6
Neonatal Resuscitation	1	3.8	3	6.5

and 35% to perform assisted vaginal deliveries. Of the smaller institutions sampled, only 22% had the ability to administer parenteral anticonvulsants. The criteria necessary to perform manual removal of placenta (52%) and perform assisted vaginal deliveries (52%) was available in more than 50% of institutions. It is noted that 8% of base hospitals without specialist services as well as 15% of the smaller institutions did not have the facilities necessary to carry out neonatal resuscitation.

Table 3.6 (b) shows the details of the infrastructure and manpower that were available for the performance of signal functions. It is seen that Magnesium Sulphate was available only in 42% of Base Hospitals without specialists and in 22% of the smaller institutions. Vacuum extractors and forceps were

Among the institutions without specialist services, there were no institutions that were identified as potentially able to provide the first 7 functions. However, there were six hospitals that were classified as being potentially able to provide the modified BEmONC (first seven functions excluding function 5) services. Three of these were base hospitals that have been upgraded but did not have specialized services at the time of the survey, while the other 3 were institutions below the level of a BH. Estimates of hospitals that are potentially able to provide modified BEmONC are based on the above findings and are presented in table 3.7.

Table 3.7 shows the calculation of indicator one based on institutions that are potentially able to provide the signal functions.

Table 3.7: Availability of EmONC facilities by district and province based on the potential ability of institutions for providing signal functions

Province	District	Population in 2012	* Facilities which are potentially able to provide Modified BEmONC services	Facilities which are potentially able to provide CEmONC services	Institutions that have the potential ability to provide Modified BEmONC services per 500,000 population	Institutions that have the potential ability to provide CEmONC services per 500,000 population	Institutions with modified BEmONC + CEmONC services per 500 000 population
	Colombo	2323826	1	6	0.2	1.29	1.49
	Gampaha	2298588	2	4	0.4	0.87	1.27
	Kalutara	1214880	1	3	0.4	1.23	1.63
Western Province		5837294	4	13	0.3	1.11	1.41
	Kandy	1368216	3	4	1.1	1.46	2.56
	Matale	482348	1	2	1.0	2.07	3.07
	Nuwara Eliya	706210	2	3	1.4	2.12	3.52
Central Province		2556774	6	9	1.2	1.76	2.96
	Galle	1059046	2	3	1.0	1.42	2.42
	Matara	810703	1	2	0.6	1.23	1.63
	Hambantota	595877	1	2	0.8	1.68	2.48
Southern Province		2465626	4	7	0.8	1.42	2.22
	Jaffna	583071	2	2	1.7	1.72	3.42
	Killinochchi	112872	0	1	0.0	4.43	4.43
	Mannar	99063	1	1	5.0	5.04	10.09
	Vavuniya	172789	2	1	5.8	2.89	8.68
	Mullativu	92228	0	1	0.0	5.42	5.42
Northern Province		1060023	5	6	2.6	2.83	5.43
	Batticaloa	525186	1	1	1.0	0.95	1.95
	Ampara	645825	2	6	1.5	4.64	6.14
	Trincomalee	376366	1	4	1.3	5.31	6.61
Eastern Province		1547377	4	11	1.3	3.55	4.85
	Kurunegala	1611407	2	4	0.6	1.24	1.84
	Puttalam	760778	1	3	0.7	1.97	2.67
North Western Province		2372185	3	7	0.6	1.48	2.08
	Anuradhapura	855562	3	2	1.6	1.17	2.77
	Polonnaruwa	403859	1	1	1.2	1.24	2.44
North Central Province		1259421	4	3	1.6	1.19	2.79
	Badulla	811225	2	3	1.2	1.85	3.05
	Monaragala	448194	1	1	1.1	1.12	2.22
Uva Province		1259419	3	4	1.2	1.59	2.79
	Ratnapura	1082299	2	4	0.9	1.85	2.75
	Kegalle	837179	2	3	1.2	1.79	2.99
Sabaragamuwa Province		1919478	4	7	1.0	1.82	2.82
Sri Lanka		20277597	36	67	0.88	1.65	2.53

*modified BEmONC refers to provision of signal functions 1-7 excluding function 5

Note: Modified BEmONC services are estimates

Table 3.7 shows that when the institutions were assessed on their ability to provide the signal functions based on the objective criteria given in Box 2.2 (Chapter 2), 67 hospitals in Sri Lanka were classified as being able to provide all nine signal functions giving a rate of 1.65 institutions per 500 000 population that are potentially able to provide Comprehensive EmONC services. The Eastern and Northern provinces have 3.55 and 2.83 institutions per 500 000 population respectively and that all districts other than Gampaha and Batticaloa have more than one institution per 500 000 population.

Trincomalee, Mullativu and Mannar districts have over 5 institutions per 500 000 population that are potentially able to provide CEmONC services, while Ampara and Killinochchi come close to this overall standard. This should however be interpreted with

caution since these districts have low populations at present.

Estimates indicate that the country has 0.88 institutions per 500 000 population that are able to provide modified BEmONC services. This varied from 2.6 per 500 000 population in the Northern Province to 0.3 institutions per 500 000 population in the Western Province.

It is estimated that the Vavuniya district has 5.8 institutions per 500 000 population that are able to provide modified BEmONC services while Mannar has 5.0 institutions per 500,000 population. However, it must be noted that the districts have only one institution each and the inflation of the indicator is due to low population in the areas.

Figure 3.1: Availability of CEmONC and modified BEmONC facilities by district based on institutions that are potentially able to provide signal functions

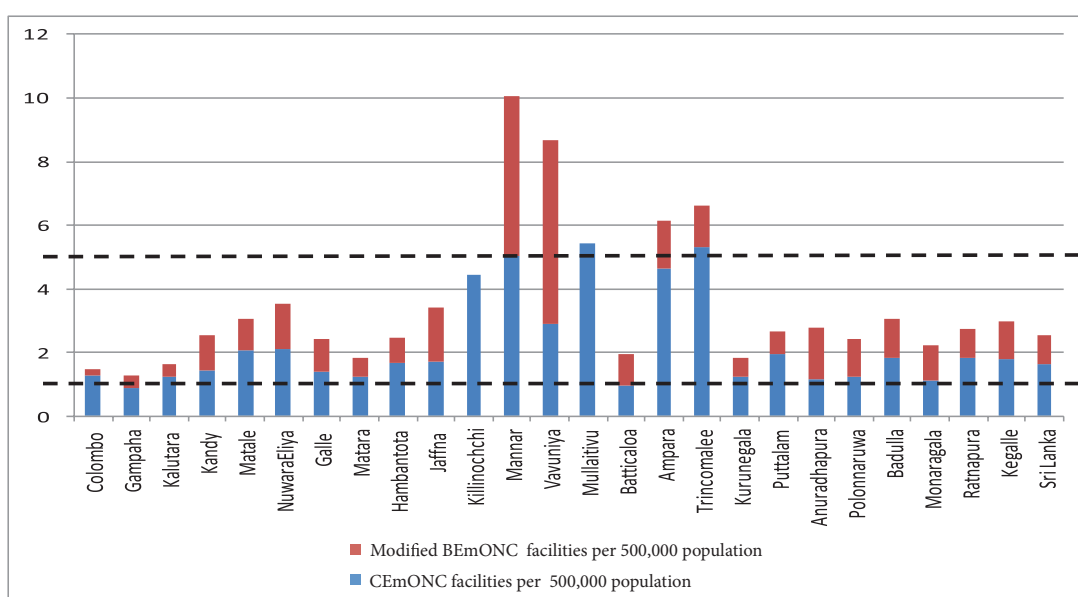


Figure 3.1 shows the availability of institutions potentially able to provide CEmONC services and modified BEmONC services per 500 000 population by district. Although the level of this indicator is high in some of the districts of the Northern and Eastern provinces this is due to low population densities in these districts.

3.4.3: Availability of CEmONC facilities based on institutions able to provide the signal functions on a 24*7 basis

Emergency functions have to be available for patients on a 24*7 basis for the EmONC services to be effective enough to save mother's lives. The ability of each CEmONC institution to provide signal functions on a 24*7 basis were determined as explained in section 2.7.1. The analysis was confined to institutions that had the ability to provide CEmONC services since the institutions able to provide modified BEmONC services are estimates based on small numbers. Tables 19-27 in Annex III describe the ability of individual institutions to provide signal functions on a 24*7 basis by district and province.

Table 3.8 shows the calculation of indicator one based on CEmONC institutions that are able to provide the signal functions on a 24*7 basis.

When the indicator is estimated based on an institution being able to provide all nine signal functions on a 24*7 basis, it is seen that 19 of the districts and the country as a whole have less than 1 institution per 500 000 population.

However, it must be noted that the institutions that are not capable of CEmONC services on a 24*7 basis are capable of providing modified BEmONC services on a 24*7 basis.

Colombo, Kandy, Matale, Trincomalee, Polonnaruwa and Monaragala districts have one or more comprehensive emergency obstetric care facilities per 500 000 population that can provide services on a 24*7 basis (Table 3.8) while Matara, Killinochchi, Mannar, Vavuniya and Mullaitivu have no 24*7 CEmONC facilities. Kurunegala, Ratnapura and Anuradhapura have 0.31, 0.46 and 0.58 facilities per 500 000 population respectively. Of the three districts, Mannar, Mullaitivu and Trincomalee that met the standard for EmONC care (5 facilities per 500 000 population, of which 1 facility has to be a CEmONC facility) only Trincomalee continues to do so when 24*7 capability is examined.

Table 3.8: Availability of institutions that are able to provide CEmONC services on a 24*7 basis by district and province

District / Province	Population in 2012	Facilities which are able to provide 24*7 CEmONC services	Able to provide 24*7 CEmONC if BB services are upgraded	24*7 C - EmONC Facilities per 500,000 population	24*7 EmONC Facilities per 500,000 after improving BB services
Colombo	2323826	5	5	1.08	1.08
Gampaha	2298588	4	4	0.87	0.87
Kalutara	1214880	2	3	0.82	1.23
Western Province	5837294	11	12	0.94	1.03
Kandy	1368216	4	4	1.46	1.46
Matale	482348	1	1	1.03	1.04
Nuwara Eliya	706210	1	1	0.71	0.71
Central Province	2556774	6	6	1.71	1.17
Galle	1059046	2	2	0.94	0.94
Matara	810703	0	1	0.00	0.62
Hambantota	595877	1	2	0.84	1.68
Southern Province	2465626	3	5	0.61	1.01
Jaffna	583071	1	1	0.85	0.86
Killinochchi	112872	0	0	0.00	0.00
Mannar	99063	0	0	0.00	0.00
Vavuniya	172789	0	1	0.00	2.89
Mullativu	92228	0	0	0.00	0.00
Northern Province	1060023	1	2	0.47	0.94
Batticaloa	525186	1	1	0.95	0.95
Ampara	645825	1	1	0.77	0.77
Trincomalee	376366	1	1	1.33	1.33
Eastern Province	1547377	3	3	0.96	0.97
Kurunegala	1611407	1	2	0.31	0.62
Puttalam	760778	1	2	0.66	1.31
North Western Province	2372185	2	4	0.42	0.84
Anuradhapura	855562	1	1	0.58	0.58
Polonnaruwa	403859	1	1	1.24	1.24
North Central Province	1259421	2	2	0.79	0.79
Badulla	811225	1	1	0.62	0.62
Monaragala	448194	1	1	1.12	1.12
Uva Province	1259419	2	2	0.79	0.79
Ratnapura	1082299	1	2	0.46	0.92
Kegalle	837179	1	1	0.60	0.60
Sabaragamuwa Province	1919478	2	3	0.52	0.78
Sri Lanka	20277597	32	39	0.79	0.96

The provinces that are worse off in this respect are the North Western Province (0.42/500 000 population) Northern Province (0.47/500 000 population), Sabaragamuwa (0.52/500 000 population) and the Southern Province (0.61/500 000 population).

When reasons for not being able to provide 24*7 CEmONC services were examined, it is seen that institutions fail to meet the criterion for 24*7 services due to gaps in human resources, mainly because of stations with a single specialist Obstetrician. It was seen that 7 institutions (in seven districts namely, Kalutara, Matara, Hambantota, Vavuniya, Kurunegala, Puttalam and Ratnapura) failed to meet the criteria because the stipulated minimum number of MOs Blood Transfusion Service (BTS) were not available although more than one specialist Obstetrician was available. However, it is noted that the signal function of “giving a blood transfusion” is available 24*7 through other MOs carrying out the cross matching of blood. Therefore table 3.8 and figure 3.2 present the calculation of the indicator with and without taking into consideration the minimum number of MOs BTS. It is seen that if the requirement for MOs BTS is met the districts of Kalutara, Hambantota, Vavuniya and Puttalam have over one 24*7 CEmONC institution per 500 000 population while Matara, Kurunegala and Ratnapura continue to have less than one facility per 500 000 population that are capable of providing 24*7 CEmONC services.

Figure 3.2 illustrates the discrepancy in CEmONC facilities per 500 000 population per district when the 24*7 capability is examined.

Figure 3.3. on page 31 maps the distribution per 500 000 population of institutions that (a) provided Comprehensive EmONC services in the three months preceding the survey, (b) are potentially able to provide CEmONC services (c) are able to provide CEmONC services on a 24*7 basis and (d) are able to provide 24*7 services if the blood bank services are upgraded or the criterion is ignored.

3.5 Geographic distribution of EmONC facilities (Indicator 2)

This indicator describes the average land area per facility and provides some indication about access within a district /province. This is a crude indicator of access in that it does not provide any information on the spread of institutions within the district.

Table 3.9 and 3.10 describes indicator two according to the three ways in which indicator 1 was examined, i.e. based on institutions that provided EmONC services in the 3 months preceding the survey, institutions that have the potential ability to provide EmONC services and those that are able to provide 24*7 CEmONC services.

Figure 3.2: Facilities that have the potential ability to provide CEmONC services and those able to provide 24*7 CEmONC services

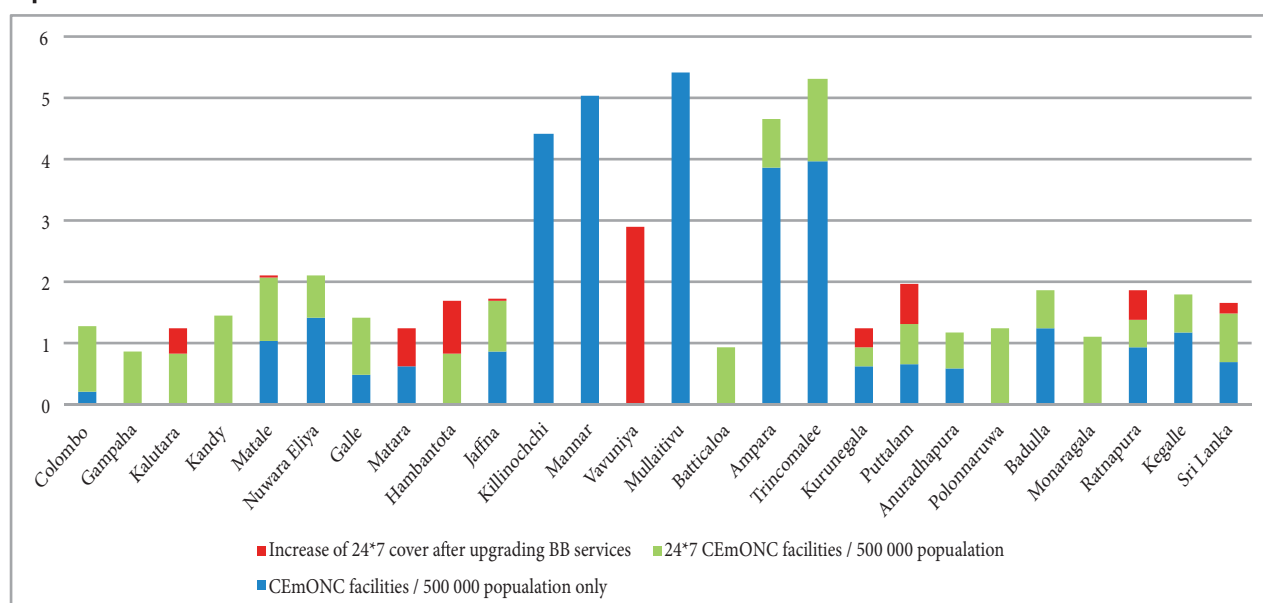


Figure 3.3: Facilities per 500 000 population of CEmONC services by provision of services, potential ability to provide services and the ability to provide services 24*7

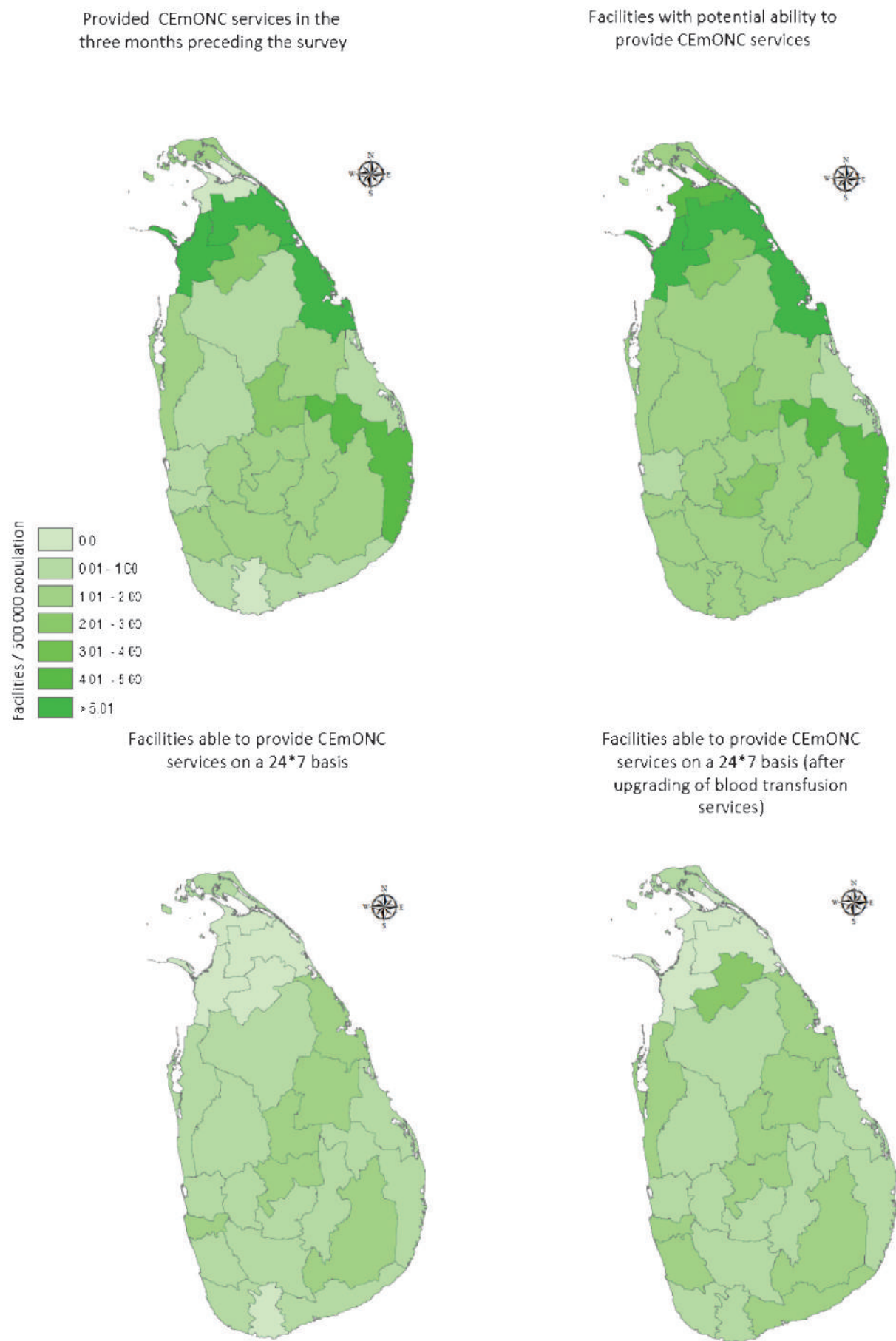


Table 3.9: Land area in sq.km. per institution providing modified BEmONC and CEmONC services based on service provision in the 3 months prior to survey and ability to provide services by district and province

Province	District	Geographic Extent km ²	According to the service provision during last 3 months			According to the ability to provide modified BEmONC +CEmONC services		
			Area per modified B-EmONC Facility (km ²)	Area per C-EmONC Facility (km ²)	Area per EmONC Facility (km ²) (CEmONC + modified B EmONC)	Area per Modified B-EmONC Facility (km ²)	Area per C-EmONC Facility (km ²)	Area per EmONC Facility (km ²) (C_EmONC + modified B EmONC)
	Colombo	699	0	175	175	699	117	100
	Gampaha	1387	1387	347	277	694	347	231
	Kalutara	1598	1598	533	400	1598	533	400
Western Province		3684	1842	335	283	921	283	217
	Kandy	1940	970	647	388	647	485	277
	Matale	1993	1993	997	664	1993	997	664
	Nuwara Eliya	1741	1741	871	580	871	580	348
Central Province		5704	1426	815	519	951	634	380
	Galle	1652	1652	1652	826	826	551	330
	Matara	1283	1283	0	1283	1283	642	428
	Hambantota	2609	1304	2609	870	2609	1305	870
Southern Province		5544	1386	2772	924	1386	792	504
	Jaffna	1025	1025	513	342	513	513	256
	Killinochchi	1279	0	0	0	0	1279	1279
	Mannar	1996	0	1996	1996	1996	1996	998
	Vavuniya	1967	0	1967	1967	984	1967	656
	Mullativu	2617	0	2617	2617	0	2617	2617
Northern Province		8884	8884	1777	1777	1777	1481	808
	Batticaloa	2854	2854	2854	1427	2854	2854	1427
	Ampara	4415	4415	736	631	2208	736	552
	Trincomalee	2727	2727	682	545	2727	682	545
Eastern Province		9996	3332	909	714	2499	909	666
	Kurunegala	4816	2408	4816	1605	2408	1204	803
	Puttalam	3072	3072	1536	1024	3072	1024	768
North Western Province		7888	2629	2629	1315	2629	1127	789
	Anuradhapura	7179	3590	7179	2393	2393	3590	1436
	Polonnaruwa	3293	0	3293	3293	3293	3293	1647
North Central Province		10472	5236	5236	2618	2618	3491	1496
	Badulla	2861	2861	954	715	1431	954	572
	Monaragala	5639	5639	5639	2820	5639	5639	2820
Uva Province		8500	4250	2125	1417	2833	2125	1214
	Ratnapura	3275	3275	819	655	1638	819	546
	Kegalle	1693	1693	1693	847	847	564	339
Sabaragamuwa Province		4968	2484	994	710	1242	710	452
Sri Lanka		65610	2853	1312	899	1823	979	637

In calculating the indicator, institutions providing modified BEmONC and CEmONC both were used. The value of the indicator is presented separately for each type of service as well as together as EmONC services per district. In interpretation of the values it must be noted that the modified BEmONC is based on estimates and that it is not equivalent to the BEmONC indicator described by WHO.

When estimates are based on the hospitals that provided the service in the three months prior to the survey are taken in to account, the national average per modified BEmONC institutions is 2853 sq.km. and for CEmONC services the area is 1312 sq.km. The area served is reduced to 1823 sq.km. and 979 sq.km. respectively when institutions that are potentially able to provide modified BEmONC and CEmONC services are examined.

When institutions that have the potential ability to provide CEmONC are considered, it is seen that the land area covered by an institution varies from 117 km² in the Colombo district to 5639 km² in Monaragala and the national average is 979 km². When institutions that have the ability to provide modified BEmONC services and CEmONC services are considered together, it is seen that the area ranges from 100 sq.km in Colombo to 2820 in Moneragala. (Table 3.9).

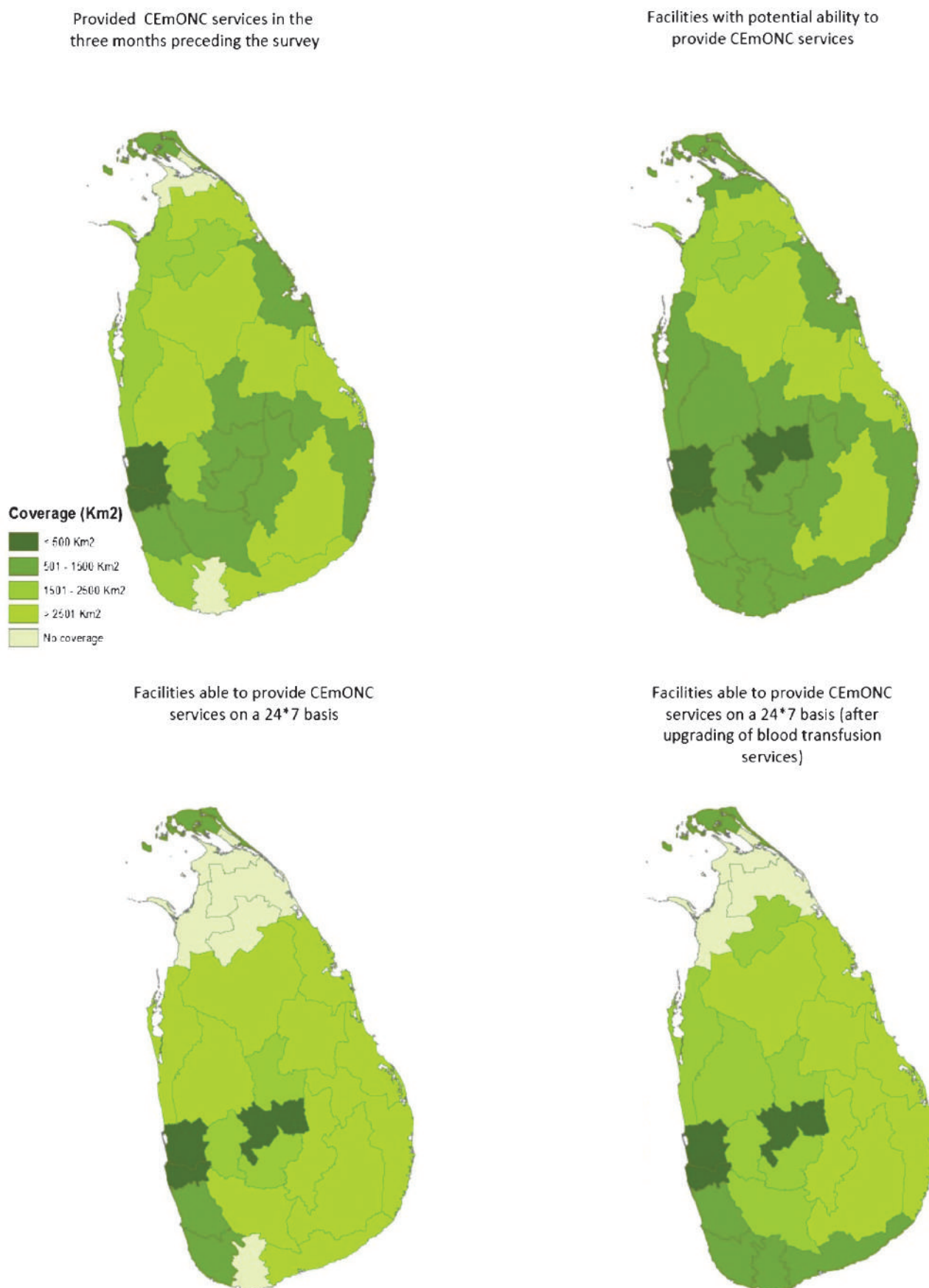
Table 3.10 shows that the national average for the area covered by CEmONC facilities capable of providing 24*7 services is 2050 sq. km. and the variation ranges from 140 km. in the Colombo district to 5639 sq.km. in the Moneragala district. The districts of Killinochchi, Mannar and Mullativu do not have a single institution that is able to provide CEmONC services on a 24*7 basis. However, if the minimum number of MOs BTS. is met for all institutions, the national average for the area per 24*7 EmONC services is 1682 sq.km.

Table 3.10: Land area in sq. km. per institution able to provide 24*7 CEmONC services by district and province

Province	District	Geographic Extent km ²	Area per 24*7 C-EmONC Facility(km ²)	Area per 24*7 C-EmONC Facility(km ²) after improving BB services
	Colombo	699	140	140
	Gampaha	1387	347	347
	Kalutara	1598	799	533
Western Province		3684	335	307
	Kandy	1940	485	485
	Matale	1993	1993	1993
	Nuwara Eliya	1741	1741	1741
Central Province		5704	951	951
	Galle	1652	826	826
	Matara	1283	NA	1283
	Hambantota	2609	2609	1305
Southern Province		5544	1848	1109
	Jaffna	1025	1025	1025
	Killinochchi	1279	NA	NA
	Mannar	1996	NA	NA
	Vavuniya	1967	NA	1967
	Mullativu	2617	NA	NA
Northern Province		8884	8884	4442
	Batticaloa	2854	2854	2854
	Ampara	4415	4415	4415
	Trincomalee	2727	2727	2727
Eastern Province		9996	3332	3332
	Kurunegala	4816	4816	2408
	Puttalam	3072	3072	1536
North Western Province		7888	3944	1972
	Anuradhapura	7179	7179	7179
	Polonnaruwa	3293	3293	3293
North Central Province		10472	5236	5236
	Badulla	2861	2861	2861
	Monaragala	5639	5639	5639
Uva Province		8500	4250	4250
	Ratnapura	3275	3275	1638
	Kegalle	1693	1693	1693
Sabaragamuwa Province		4968	2484	1656
Sri Lanka		65610	2050	1682

NA not applicable since there are no institutions providing CEmONC services on a 24*7 basis

Figure 3.4: Land area in sq. km. per institution that have provided services, potentially able to provide CEmONC services, and able to provide 24*7 CEmONC services by district and province



Utilization of EmONC facilities

Indicators 3, 4 and 5 are on utilization of the available EmONC facilities. They examine if the EmONC services serve a reasonable proportion of women and if the women with complications receive the services. Caesarean sections as a proportion of all births are considered as utilization of a lifesaving intervention.

The calculation of indicators 3 and 4 are based only on the institutions that have the ability to provide comprehensive EmONC services. Institutions with modified BEmONC services are not included in the calculation of these indicators because extrapolation may lead to error due to the wide variation in the number of births and the prevalence of morbidity observed in this category of institution.

3.6 Proportion of births in EmONC facilities (Indicator 3)

This is a very crude indicator of utilization of EmONC services by pregnant women. The optimum long term goal must be to ensure that all women deliver in a place where emergency services are available. The indicator is calculated as the proportion of all births in a district that takes place in EmONC facilities. The calculation in this survey is based on births in institutions that have the ability to provide CEmONC services. The denominator is the births registered in the district regardless of where the birth takes place.

There is no internationally advocated minimum requirement for this indicator and it has to be decided in consultation with national stakeholders taking in to consideration the country context.

Table 3.11: Proportion of births occurring in CEmONC facilities by district and province

Province/District	Total Births in the district in 2011 (RG)	Comprehensive EmONC facilities		Comprehensive EmONC facilities		In Comprehensive EmONC facilities (once BB services upgraded)	
		No	%	No	%	No	%
Western province	99292	84864	85.0	81085	82.0	84622	85.0
Colombo	54888	44513	81.0	44271	81.0	44271	81.0
Gampaha	27457	23934	87.0	23934	87.0	23934	87.0
Kalutara	16947	16417	97.0	12880	76.0	16417	97.0
Central province	50196	43784	87.2	36523	73.0	36523	73.0
Kandy	29331	25427	87.0	25427	87.0	25427	87.0
Matale	10465	9979	95.0	5891	56.0	5891	56.0
Nuwara Eliya	10400	8378	80.6	5205	50.0	5205	50.0
Southern province	4 2196	38519	91.0	21790	52.0	34686	82.0
Galle	20838	18392	88.0	16302	78.0	16302	78.0
Matara	12268	11720	96.0	0	0.0	9977	81.0
Hambantota	9090	8407	92.0	5488	60.0	8407	92.0
Northern province	20016	15578	77.8	6992	35.0	10777	54.0
Jaffna	9949	7965	80.0	6992	70.0	6992	70.0
Killinochchi	3319	2213	67.0	0	0.0	0	0.0
Mannar	1482	1155	78.0	0	0.0	0	0.0
Vavuniya	4190	3785	90.0	0	0.0	3785	90.0
Mullativu	1076	460	43.0	0	0.0	0	0.0
Eastern province	33147	28424	86.0	14389	43.0	14389	43.0
Batticaloa	9743	6536	67.0	6536	67.0	6536	67.0
* Ampara	14371	14373	100.0	3882	27.0	3882	27.0
Trincomalee	9033	7515	83.0	3971	44.0	3971	44.0
North Western province	39885	37222	93.0	18544	46.0	30286	76.0
Kurunegala	25428	23361	92.0	13318	52.0	18648	73.0
Puttalam	14457	13861	96.0	5226	36.0	11638	81.0
North Central province	23353	19670	84.0	18616	80.0	18616	80.0
Anuradhapura	15855	12712	80.0	11658	74.0	11658	74.0
Polonnaruwa	7498	6958	93.0	6958	93.0	6958	93.0
Uva province	23680	20472	86.0	13487	57.0	13487	57.0
Badulla	16548	14912	90.0	7927	48.0	7927	48.0
Monaragala	7132	5560	78.0	5560	78.0	5560	78.0
Sabaragamuwa province	31650	29754	94.0	15098	48.0	21286	67.0
Ratnapura	21260	19431	91.0	9414	44.0	15602	73.0
Kegalle	10390	10323	99.4	5684	55.0	5684	55.0
Sri Lanka	363,415	318287	87.6	226524	62.3	264672	72.8

* Ampara district includes data from Kalmunai

Table 3.11 shows that in the country 88% of all births occur in an institution able to provide CEmONC services. In Killinochchi (67%) Batticaloa (67%) and Mullativu (43%) are the three districts where less than 75% of births occur in institutions with CEmONC facilities. The low figures in Mullativu and Killinochchi may be partly due to the fact that the births recorded by the RG in 2011 include births that may have occurred in earlier years. If the indicator is calculated using births in government institutions these proportions increase to 81% and 93% in Mullativu and Killinochchi respectively.

It is seen that (table 3.11 and figures 3.5 and 3.6) when 24*7 functional capability is examined these proportions fall markedly, the national average is only 62%. The districts of Colombo, Gampaha, Kalutara, Kandy, Galle, Polonnaruwa and Monaragala

have more than 75% of deliveries in an institution with 24*7 EmONC facilities.

In the Sabaragamuwa, North Western, Eastern and Northern provinces the proportion delivering in an institution which is capable of providing comprehensive emergency obstetric care on a 24*7 basis is less than 50%.

Once the minimum requirement for MOs BTS is met the average number of births in an institution with 24*7 functional capability increases to 73% nationally, the number of districts that have more than 75% of deliveries in an institution capable of 24*7 EmONC services increase to 11 and only Eastern province remains with less than 50% births in institutions with 24*7 services.

Figure3.5: Percentage births in CEmONC facilities in 2011

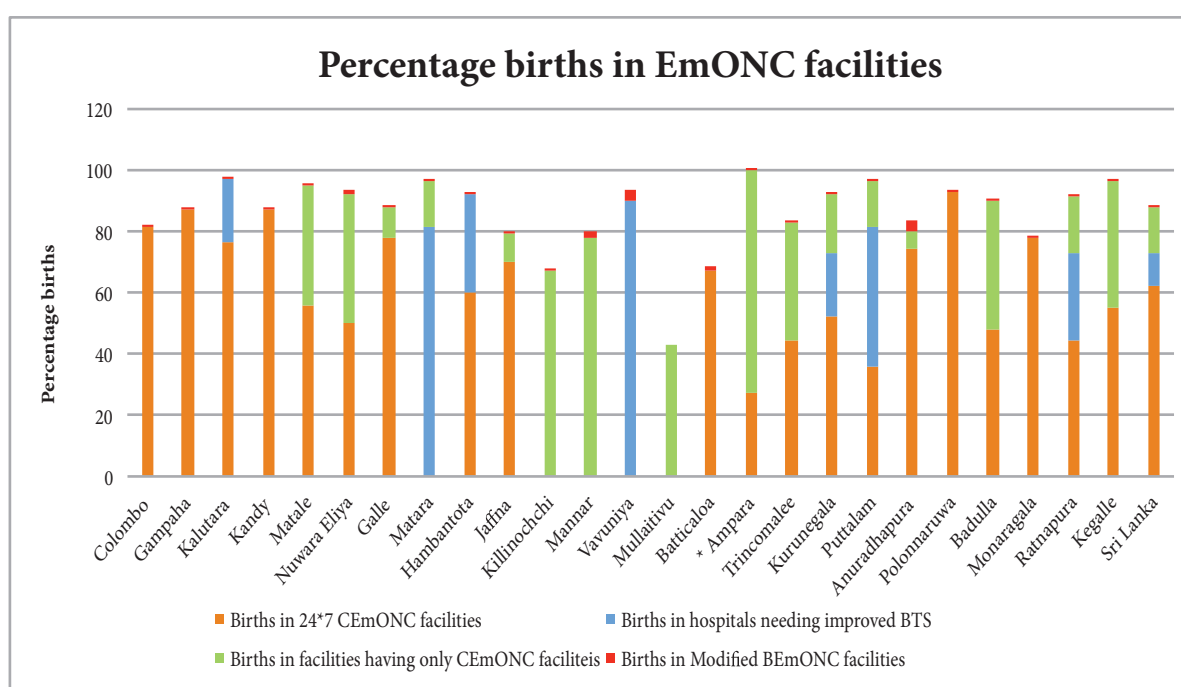
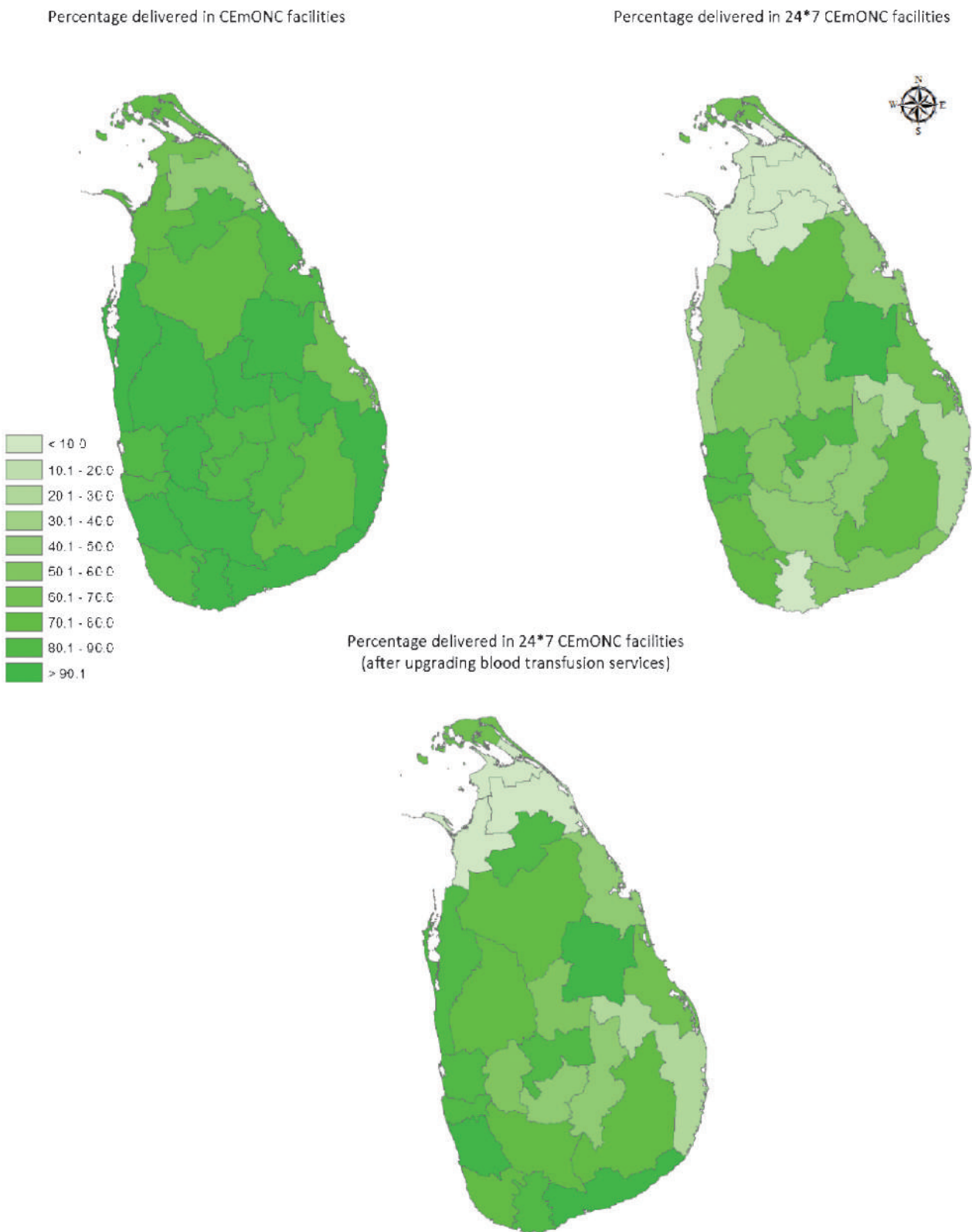


Figure 3.6: Comparison of the proportion of births occurring in facilities with CEmONC services and 24*7 CEmONC services by district and province



3.7 Met need for EmONC care (Indicator 4)

‘Met need’ is the proportion of women with major direct obstetric complications treated in EmONC facilities. It is estimated that about 15% of women develop a direct obstetric complication that may need emergency care. The direct obstetric complications considered in constructing this indicator are: haemorrhage (ante partum and postpartum), prolonged obstructed labour, postpartum sepsis, complications of abortions, severe pre-eclampsia and eclampsia, ectopic pregnancy and ruptured uterus. The minimum acceptable level of this indicator is 100% i.e. all women requiring EmONC care should deliver in an institution with Emergency Obstetric care facilities. Table 3.12 and Figure 3.7 highlight the level of met need in the country and each of the districts.

The estimate based on the above assumption forms the denominator of this indicator. The numerator for this indicator in the present study is the actual

number of women who were diagnosed as having a major direct obstetric complication in the EmONC facilities during the four week prospective survey of morbidity.

There were six institutions that did not provide morbidity data, 3 Teaching Hospitals, 1 District General Hospital and 2 Base Hospitals. The missing data on major direct obstetric complications for these institutions were estimated based on births for that year for each of the above institutions, using the cause specific rates of disease per births for that category of institution.

The direct obstetric morbidity rate in Sri Lanka calculated using the data from the four week prospective survey carried out as part of the assessment is 14.5% (95% CL 14.0% -14.9%).

This indicator has been calculated based only on births in institutions that have the potential ability to provide CEmONC services.

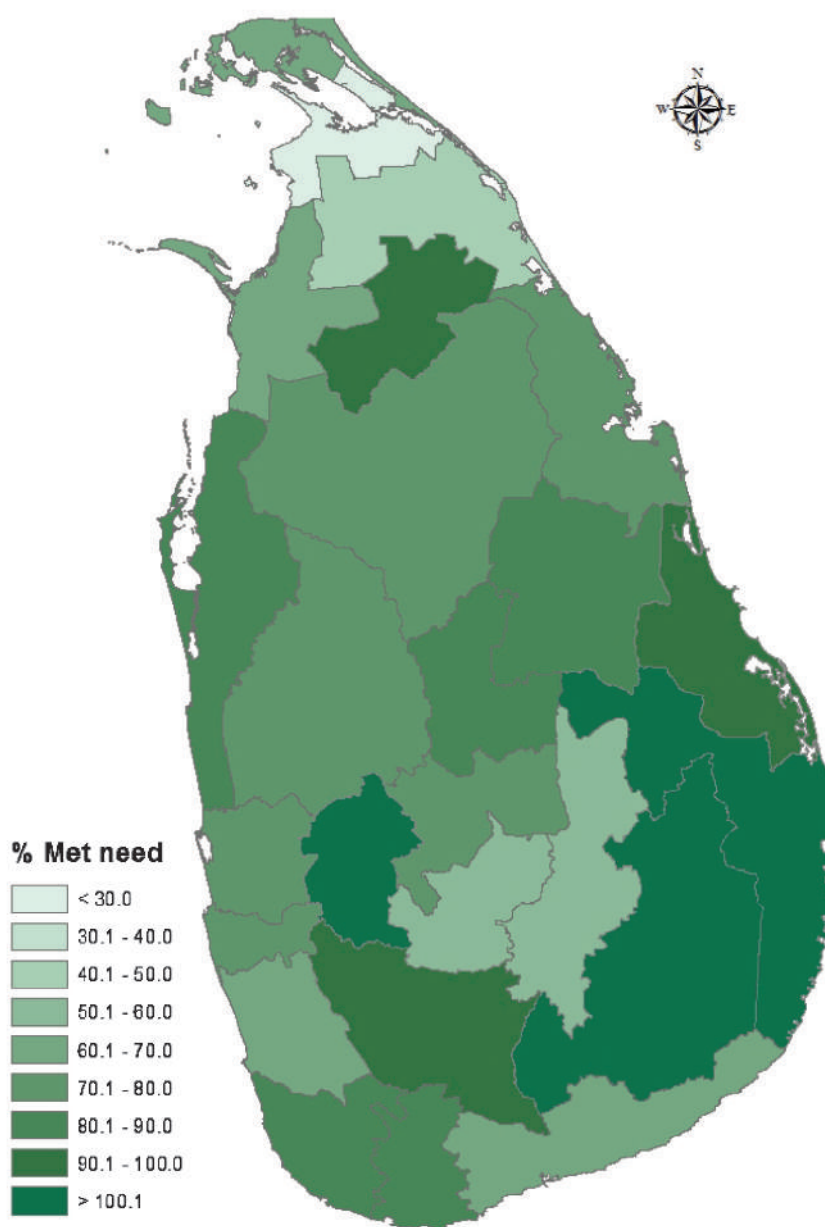
Table 3.12: 'Met need' for CEmONC care by district and province

District	Births in 2011 (RG)	Average No. of births per month	Estimated No. of direct obstetric complications	Direct Obstetric complications observed	Met need
Colombo	54,888	4222	633	500	78.9
Gampaha	27,457	2112	317	237	74.8
Kalutara	16,947	1304	196	121	61.9
Western Province	99,292	7,638	1,146	858	74.9
Kandy	29,331	2256	338	257	75.9
Matale	10,465	805	121	106	87.8
Nuwara Eliya	10,400	800	120	67	55.8
Central Province	50,196	3,861	579	430	74.2
Galle	20,838	1603	240	207	86.1
Matara	12,268	944	142	121	85.5
Hambanthota	9,090	699	105	72	68.6
Southern Province	42,196	3,246	487	400	82.2
Jaffna	9,949	765	115	77	67.1
Killinochchi	3,319	255	38	11	28.7
Mannar	1,482	114	17	11	64.3
Vavuniya	4,190	322	48	44	91.0
Mullativu	1,076	83	12	6	48.3
Northern Province	20,016	1,540	231	149	64.5
Batticaloa	9,743	749	112	105	93.4
Ampara	14,371	1105	166	175	105.5
Trincomalee	9,033	695	104	73	70.0
East ern Province	33,147	2,550	382	353	92.3
Kurunegala	25,428	1956	293	226	77.0
Puttalam	14,457	1112	167	148	88.7
North Western Province	39,885	3,068	460	374	81.3
Anuradhapura	15,855	1220	183	133	72.7
Polonnaruwa	7,498	577	87	74	85.5
North Central Province	23,353	1,796	269	207	76.8
Badulla	16,548	1273	191	96	50.3
Monaragala	7,132	549	82	86	104.5
Uva Province	23,680	1,822	273	182	66.6
Ratnapura	21,260	1635	245	225	91.7
Kegalle	10,390	799	120	175	146.0
Sabaragamuwa Province	31,650	2,435	365	400	109.5
Sri Lanka	363,415	27,955	4,193	3,353	80.0

Table 3.12 (and figure 3.7) shows that almost 80% of persons having a major direct obstetric complication were treated at an institution that has the ability to provide CEmONC services. It is seen that in the districts of Batticaloa, Ampara, Monaragala and Kegalle the percentage of direct obstetric complications seen in CEmONC facilities are in excess of the estimated number suggesting that women with complications from other districts may be delivering in these districts. Killinochchi, Mullativu, Nuwara Eliya and Badulla districts have less than 60% of women with direct obstetric complications delivering in a facility capable of providing CEmONC services.

Met need calculated in this study may be influenced by the fact that in Sri Lanka direct obstetric morbidity is marginally less than 15% (14.5%, 95% CL 14.0% -14.9%) and the recording of obstetric morbidity was only over a four week period. In the Colombo and Kandy districts the met need is lower than expected probably because of the higher number of births in institutions other than government hospitals. In Killinochchi and Mullativu low met need is partly accounted for by the recording of earlier births resulting in an over inflation of the denominator.

Figure 3.7: “Met need” for Comprehensive Emergency Obstetric Care by district

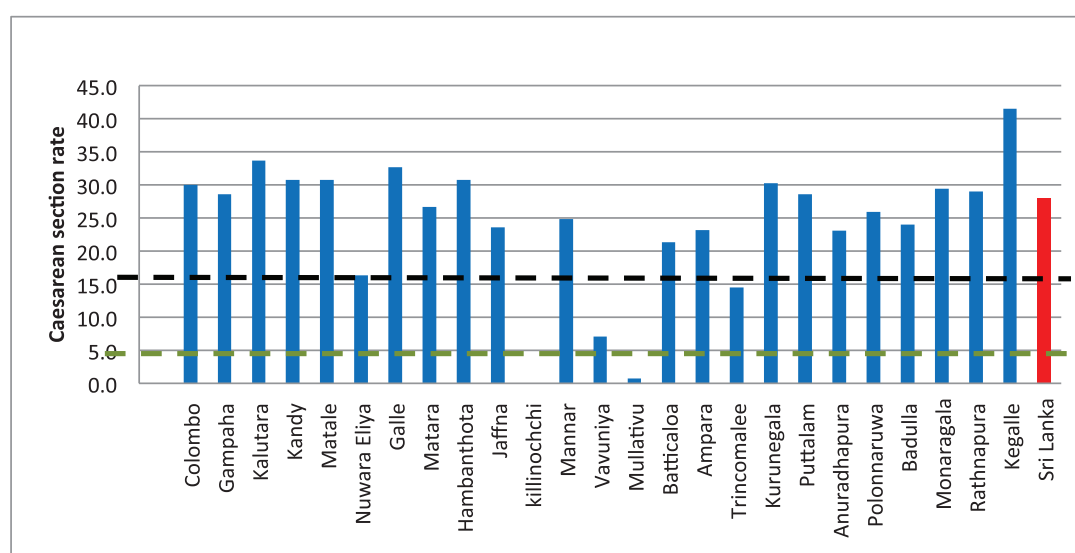


3.8 Caesarean section (CS) as a proportion of all births (Indicator 5)

The proportion of caesarean sections may be considered as an indicator of utilization of a lifesaving EmONC functions. Although literature suggests that both very low and very high rates of caesarean sections may be equally unacceptable, there is no empirical evidence on which to base an optimum proportion and this has provoked much debate. Pending further research based evidence the range of 5 – 15% has been suggested by WHO.

Table 3.13 and figure 3.8 shows the caesarean section rates for the Provinces and the districts. These percentages are based on the registered births in each district. The national caesarean section rate is 27.7%. One district i.e. Mullativu has a section rate less than 5% suggesting inadequacy of services. However, it must be noted that at the time of data collection, the services in this district were in the process of being organised. Only 4 districts; three of them in the Northern province and one in the Eastern province have district section rates below 15%. Fourteen of the districts have rates above 25%. The district variation is demonstrated in Figure 3.8.

Figure 3.8: Caesarean section as proportion of births registered in each district



(* Ampara includes details for Kalmunai health administrative area as well)

Five percent and 15% are marked on the graph to indicate the lower and upper threshold values given in the standard

In the present study, data on caesarean sections are available from 4 sources. The proportion of sections by institution is available for 2010 from the routine return H830 and for the quarter preceding data collection from the birth register (H841). It must be noted that information given in the H830 return is based on the birth register. Data was extracted from 10 CS using past records and information is also available from the prospective morbidity survey. The CS data for the quarter preceding data collection extracted from the birth register is used in calculating this indicator.

3.9 Measures of quality of care

Having examined the availability and utilization of EmONC services the next three indicators examine some aspects of the quality of care. Measurement of quality of care is a complex process and the three indicators provide only a very crude measure of this aspect.

In the calculation of these indicators only data from CEmONC facilities have been included. This is because extrapolation of data based on the estimates

Table 3.13: Caesarean section as proportion of births registered in each district and province

Province/District		Number of births per quarter for 2011(RG)	Total caesarean sections performed for quarter from birth register in 2011	Caesarean sections as proportion of all births
Western province		24823	7511	30.3
	Colombo	13722	4123	30.0
	Gampaha	6864	1960	28.6
	Kalutara	4237	1428	33.7
Central province		12549	3491	27.8
	Kandy	7333	2262	30.8
	Matale	2616	806	30.8
	Nuwara Eliya	2600	423	16.3
Southern province		10550	3220	30.5
	Galle	5210	1702	32.7
	Matara	3067	818	26.7
	Hambanthota	2273	700	30.8
Northern province		5005	756	15.1
	Jaffna	2487	588	23.6
	Killinochchi	830	0	0.0
	Mannar	371	92	24.8
	Vavuniya	1048	74	7.1
	Mullativu	269	2	0.7
Eastern province		8287	1679	20.3
	Batticaloa	2436	518	21.3
	Ampara	3593	833	23.2
	Trincomalee	2258	328	14.5
North Western province		9971	2959	29.7
	Kurunegala	6357	1924	30.3
	Puttalam	3614	1035	28.6
North Central province		5839	1400	24.0
	Anuradhapura	3964	915	23.1
	Polonnaruwa	1875	485	25.9
Uva province		5920	1517	25.6
	Badulla	4137	992	24.0
	Monaragala	1783	525	29.4
Sabaragamuwa province		7913	2622	33.1
	Rathnapura	5315	1544	29.0
	Kegalle	2598	1078	41.5
Sri Lanka		90857	25155	27.7

of institutions with modified BEmONC facilities may lead to error due to the wide variation in morbidity and the number of births seen in this type of institution.

3.9.1 Direct obstetric case fatality rate (Indicator 6)

Case fatality rate is an indicator of the quality of care provided in addressing an obstetric emergency. The indicator is defined as the proportion of women admitted to an EmONC facility with major direct obstetric complications, or who develop such complications after admission, and die before discharge. Direct causes of deaths are those 'resulting from obstetric complications of the pregnant state (pregnancy, labour, and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events from any of the above'. The seven main direct causes of maternal death are: haemorrhage, hypertensive diseases, abortion, sepsis or infections, obstructed labour, ectopic pregnancy, embolism, and anaesthesia-related death (WHO 2009).

The last reviewed maternal death data were available for 2010. Therefore the number of women admitted to a facility, potentially able to provide CEmONC services with a major direct obstetric complication needed to be estimated for the year 2010. This was carried out using the morbidity rates calculated for the different levels of institutions for the year 2011 based on the prospective morbidity survey undertaken as part of the current study and the number of births in 2010 reported by government institutions that had the ability to provide CEmONC services.

The maximum acceptable level recommended for this indicator is a case fatality rate less than 1%. Direct obstetric case fatality rate range from approximately 2 to 10 percent in low income countries to 0.06 % in the USA. The level of 1% is suggested as a reasonably acceptable level for low income countries (WHO 2009).

The total number of direct obstetric deaths in the country was only 66 in 2010, the number of deaths per district varying from 0-4. Table 3.14 shows that the case fatality rate for direct obstetric causes is well below the maximum acceptable level in all districts other than in Mannar (1.3%). However it must be noted that the case fatality in Mannar is based on an estimate of 146 direct obstetric complications. In all districts other than in the districts of Nuwara Eliya, Hambantota, Jaffna, Mannar, Batticaloa and Badulla the case fatality rate is less than 0.3 %.

The overall case fatality rate for Sri Lanka is low, however, the goal should be further reduction of the direct obstetric case fatality rate towards the values reported from the developed world.

3.9.2 Intrapartum and very early neonatal death rate (Indicator 7)

This indicator sheds some light on the quality of intrapartum care for foetuses and new-borns delivered in CEmONC facilities. For this indicator early neonatal deaths are defined as neonates born at term, who could not be resuscitated or for whom the resuscitation was not available or who had a specific birth trauma and died within the first 24 hours of life. In the present study information on early neonatal deaths are not available, therefore, the stillbirth rate alone is examined. The numerator is the reported number of still births in facilities able to provide CEmONC services and the denominator is the number of births for the quarter in the same institutions expressed as per 1000 births. Data for the same quarter in 2011 are used. A fresh stillbirth may be considered as an intra-partum death.

The information on stillbirths were obtained from routine registers and appear to have variations in quality. Data on stillbirths were not available from Killinochchi, Mullativu, and Anuradhapura districts.

The still birth rate for the country is 6 per 1000 births,

Table 3.14: Direct obstetric case fatality rate by district and province

District	Direct obstetric deaths 2010	Estimated No. of direct obstetric complications for 2010	Direct obstetric case fatality rate for 2010 (%)
Colombo	3	6559	0.046
Gampaha	1	3397	0.029
Kalutara	3	1506	0.199
Western province	7	11462	0.061
Kandy	3	3381	0.089
Matale	1	1285	0.078
Nuwara Eliya	4	706	0.567
Central province	8	5372	0.149
Galle	4	2572	0.156
Matara	2	1847	0.108
Hambantota	4	621	0.644
Southern province	10	5040	0.198
Jaffna	4	1029	0.389
Killinochchi	0	204	0.000
Mannar	2	146	1.374
Vavuniya	0	622	0.000
Mullativu	0	12	0.000
Northern province	6	2013	0.298
Batticaloa	4	1323	0.302
Ampara	4	2209	0.181
Trincomalee	1	1383	0.072
Eastern province	9	4915	0.183
Kurunegala	4	2941	0.136
Puttalam	4	2107	0.190
North Western province	8	5048	0.158
Anuradhapura	4	1700	0.235
Polonnaruwa	0	955	0.000
North Central province	4	2655	0.151
Badulla	4	1203	0.333
Monaragala	1	1049	0.095
Uva province	5	2252	0.222
Ratnapura	3	2879	0.104
Kegalle	6	2286	0.262
Sabaragamuwa province	9	5165	0.174
Sri Lanka	66	43922	0.151

(* Ampara includes details for Kalmunai health administrative area as well)

Table 3.15: Stillbirth rate per 1000 births by district and province

Province	District	No of births for a quarter in institutions able to provide CEmONC services	Fresh stillbirths >= 2.5 kg		Fresh stillbirths < 2.5 kg		Total fresh stillbirths		Macerated stillbirths		Total stillbirths	
			No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Western province		20086	24	1.2	22	1.1	46	2.3	45	2.2	112	5.6
	Colombo	10058	12	1.2	10	1.0	22	2.2	32	3.2	54	5.4
	Gampaha	6130	8	1.3	9	1.5	17	2.8	13	2.1	30	4.9
	Kalutara	3898	4	1.0	3	0.8	7	1.8	0	0.0	28	7.2
Central province		9776	20	2.0	20	2.0	40	4.1	55	5.6	95	9.7
	Kandy	5245	14	2.7	11	2.1	25	4.8	31	5.9	56	10.7
	Matale	2613	5	1.9	3	1.1	8	3.1	11	4.2	19	7.3
	Nuwara Eliya	1918	1	0.5	6	3.1	7	3.6	13	6.8	20	10.4
Southern province		9262	12	1.3	15	1.6	27	2.9	32	3.5	59	6.4
	Galle	3954	1	0.3	1	0.3	2	0.5	5	1.3	7	1.8
	Matara	3067	10	3.3	11	3.6	21	6.8	15	4.9	36	11.7
	Hambantota	2241	1	0.4	3	1.3	4	1.8	12	5.4	16	7.1
Northern province		3795	10	2.6	13	3.4	23	6.1	10	2.6	33	8.7
	Jaffna	2257	10	4.4	13	5.8	23	10.2	5	2.2	28	12.4
	Killinochchi	502	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Mannar	338	0	0.0	0	0.0	0	0.0	1	3.0	1	3.0
	Vavuniya	457	0	0.0	0	0.0	0	0.0	4	8.8	4	8.8
	Mullativu	241	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Eastern province		5733	5	0.9	6	1.0	11	1.9	15	2.6	26	4.5
	Batticaloa	1237	4	3.2	3	2.4	7	5.7	3	2.4	10	8.1
	* Ampara	3132	1	0.3	2	0.6	3	1.0	4	1.3	7	2.2
	Trincomalee	1364	0	0.0	1	0.7	1	0.7	8	5.9	9	6.6
North Western province		7942	8	1.0	2	0.3	10	1.3	15	1.9	25	3.1
	Kurunegala	4879	1	0.2	2	0.4	3	0.6	15	3.1	18	3.7
	Puttalam	3063	7	2.3	0	0.0	7	2.3	0	0.0	7	2.3
North Central province		4650	5	1.1	1	0.2	6	1.3	1	0.2	7	1.5
	Anuradhapura	2969	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Polonnaruwa	1681	5	3.0	1	0.6	6	3.6	1	0.6	7	4.2
Uva province		4872	17	3.5	5	1.0	22	4.5	22	4.5	44	9.0
	Badulla	3787	14	3.7	4	1.1	18	4.8	15	4.0	33	8.7
	Monaragala	1085	3	2.8	1	0.9	4	3.7	7	6.5	11	10.1
Sabaragamuwa province		7291	9	1.2	7	1.0	16	2.2	19	2.6	40	5.5
	Ratnapura	4805	6	1.2	5	1.0	11	2.3	16	3.3	27	5.6
	Kegalle	2486	3	1.2	2	0.8	5	2.0	3	1.2	13	5.2
Sri Lanka		73407	110	1.5	91	1.2	201	2.7	214	2.9	441	6.0

(* Ampara includes details for Kalmunai health administrative area as well)

Note: 21 still births in Kalutara and 5 in Kegalle were unclassified

range 1.8 per 1000 births in Galle to 12.4 in Jaffna. The still birth rate is seen to be high in Jaffna (12.4/1000 births), Matara, (11.7 per 1000 births) Kandy (10.7 per 1000 births) Nuwara Eliya (10.4 per 1000 births) and Monaragala (10.1 per 1000 births) (Table 3.15)

The fresh stillbirth rate for the country is 2.7 per 1000 births. However, it varies from 10 per 1000 births in Jaffna to 0.6 per 1000 births in the Polonnaruwa district. In Jaffna, Badulla Batticaloa, Polonnaruwa and Kandy (Range 4.4 to 2.7 per 1000 births) the fresh still birth rate in babies over 2.5 kg. is high.

The macerated still birth rate for the country is 2.9 per 1000 births and varies from 0.6% in Polonnaruwa to 8.8% in Vavuniya. It is high in several districts; Vavuniya reporting the highest (8.8 per 1000 births) Nuwara Eliya (6.8 per 1000 births), Moneragala (6.5 per 1000 births) and Kandy (5.9 per 1000 births).

In Kandy, Moneragala and Nuwara Eliya, the macerated still birth rate is higher than the fresh still birth rate while in Matara it is vice versa. Figure 3.9 illustrates this.

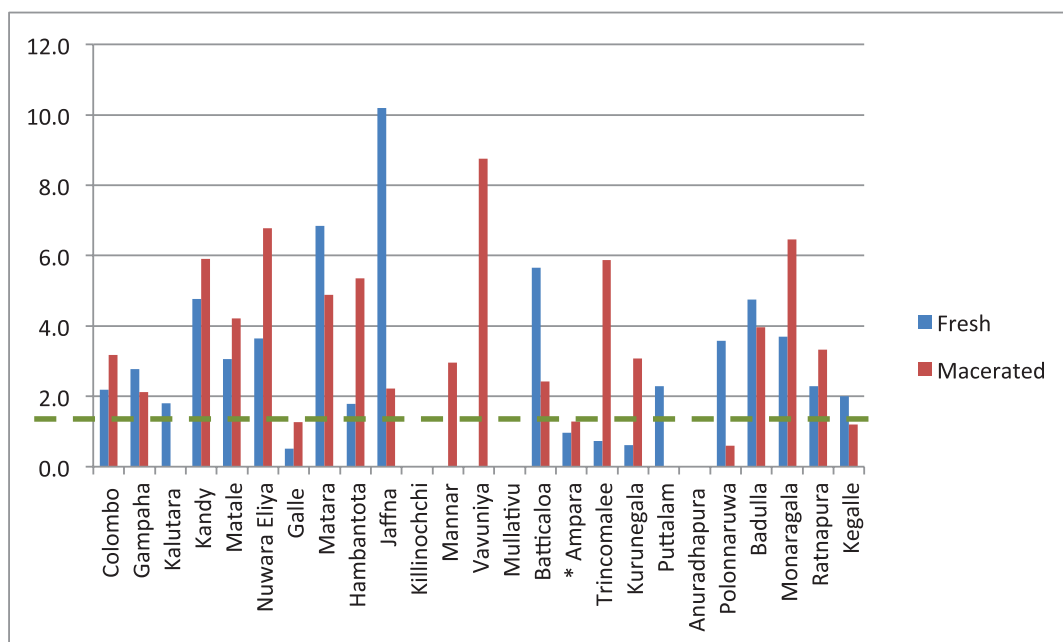
3.9.3 Proportion of deaths due to indirect causes in EmONC facilities (Indicator 8)

With increasing proportions of maternal deaths being attributed to indirect causes of death this is an important indicator. This reflects the shared medical care available for co-morbidities during pregnancy i.e. medical services other than EmONC services that are necessary to make pregnancy safer.

In calculating this indicator, all maternal deaths due to indirect causes in CEmONC facilities within a specified period was taken as the numerator and all maternal deaths in CEmONC facilities during the same period was taken as the denominator. Indirect causes of death results from 'previous existing diseases or diseases that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by the physiological effects of pregnancy'.

There is no accepted standard for this indicator.

Figure 3.9: Fresh and macerated stillbirth rates per 1000 births by district



(* Ampara includes details for Kalmunai health administrative area as well)

Table 3.16: Proportion of deaths due to indirect causes in CEmONC facilities

Province	District	Number of maternal deaths due to indirect causes at EmONC facilities in 2010	Total number of maternal deaths at EmONC facilities in 2010	Proportion of deaths due to indirect causes in 2010
Western province		12	23	52.2
	Colombo	1	5	20.0
	Gampaha	7	9	77.8
	Kalutara	4	9	44.4
Central province		4	11	36.4
	Kandy	4	8	50.0
	Matale	0	1	0.0
	Nuwara Eliya	0	2	0.0
Southern province		4	14	28.6
	Galle	2	6	33.3
	Matara	0	2	0.0
	Hambantota	2	6	33.3
Northern province		1	8	12.5
	Jaffna	1	5	20.0
	Killinochchi	0	0	0.0
	Mannar	0	2	0.0
	Vavuniya	0	1	0.0
	Mullativu	0	0	0.0
Eastern province		3	12	25.0
	Batticaloa	0	4	0.0
	* Ampara	1	5	20.0
	Trincomalee	2	3	66.7
North Western province		3	17	17.6
	Kurunegala	3	12	25.0
	Puttalam	0	5	0.0
North Central province		5	9	55.6
	Anuradhapura	3	7	42.9
	Polonnaruwa	2	2	100.0
Uva province		2	9	22.2
	Badulla	2	6	33.3
	Monaragala	0	3	0.0
Sabaragamuwa province		2	11	18.2
	Ratnapura	1	4	25.0
	Kegalle	1	7	14.3
Sri Lanka		36	114	31.6

The table (3.16) shows that in most provinces the indirect deaths are mostly concentrated in the district that has the PGH. The exceptions are the Western, Southern and the North Central province. The districts of Gampaha, Trincomalee and in Polonnaruwa the proportions of indirect deaths are in excess of 60%.

It is noted that some districts do not have deaths due to indirect causes, probably because they are transferred to units with facilities to deal with pregnancies with medical complications.

3.10 Summary of EmONC indicators 1-8

Table 3.17 and figure 3.10 summarises the EmONC indicators for the country.

Table 3.17: Summary of EmONC indicators 1-8 by district

	Availability of services			Accessibility of services			Utilisation of services			Quality of care				
District	Indicator 1			Indicator 2			Indicator 3			Indicator 4	Indicator 5	Indicator 6	Indicator 7	Indicator 8
	C_EmONC capable / 500000	24*7 C-EmONC capable/ 500000	24*7 C-EmONC capable/ 500000 once BB services upgraded	Area C-EmONC capable facility	Area 24*7 C-EmONC capable facility	Area 24*7 C-EmONC capable facility once BB services upgraded	% Del. in C-EmONC capable facilities	% Del in 24*7 C- EmONC capable facilities	% Del in 24*7 C-EmONC capable facilities once BB services upgraded	Met need of EmONC care	Caesarean section	DOCFR	Total still birth rate	Proportion of deaths due to indirect causes - 2010
Colombo	1.29	1.08	1.08	117	140	140	81	81	81	79.0	30.0	0.046	5.4	20.0
Gampaha	0.87	0.87	0.87	347	347	347	87	87	87	74.8	28.6	0.029	4.9	77.8
Kalutara	1.23	0.82	1.23	533	799	533	97	76	97	61.7	33.7	0.199	7.2	44.4
Kandy	1.46	1.46	1.46	485	485	485	87	87	87	76.0	30.8	0.089	10.7	50.0
Matale	2.07	1.03	1.04	997	1993	1993	95	56	56	87.6	30.8	0.078	7.3	0.0
Nuwara Eliya	2.12	0.71	0.71	590	1771	1741	92	50	50	55.8	16.3	0.567	10.4	0.0
Galle	1.42	0.94	0.94	551	826	826	88	78	78	86.3	32.7	0.156	1.8	33.3
Matara	1.23	0.00	0.62	642	0	1283	96	0	81	85.2	26.7	0.108	11.7	0.0
Hambantota	1.68	0.84	1.68	1305	2609	1305	92	60	92	68.6	30.8	0.644	7.1	33.3
Jaffna	1.72	0.85	0.86	513	1025	1025	79	70	70	67.0	23.6	0.389	12.4	20.0
Killinochchi	4.43	0.00	0.00	1279	0	NA	67	0	0	28.9	0.0	0.000	0.0	0.0
Mannar	5.04	0.00	0.00	1996	0	NA	78	0	0	64.7	24.8	1.374	3.0	0.0
Vavuniya	2.89	0.00	2.89	1967	0	1967	90	0	90	91.7	7.1	0.000	8.8	0.0
Mullativu	5.42	0.00	0.00	2617	0	NA	43	0	0	50.0	0.7	0.000	0.0	0.0
Batticaloa	0.95	0.95	0.95	2854	2854	2854	67	67	67	93.8	21.3	0.302	8.1	0.0
Ampara	4.64	0.77	0.77	736	4415	4415	100	27	27	105.4	23.2	0.181	2.2	20.0
Trincomalee	5.31	1.33	1.33	682	2727	2727	83	44	44	70.2	14.5	0.072	6.6	66.7
Kurunegala	1.24	0.31	0.62	1204	4816	2408	92	52	73	77.1	30.3	0.136	3.7	25.0
Puttalam	1.97	0.66	1.31	1024	3072	1536	96	36	81	88.6	28.6	0.190	2.3	0.0
Anuradhapura	1.17	0.58	0.58	3590	7179	7179	80	74	74	72.7	23.1	0.235	0.0	42.9
Polonnaruwa	1.24	1.24	1.24	3293	3293	3293	93	93	93	85.1	25.9	0.000	4.2	100.0
Badulla	1.85	0.62	0.62	954	2861	2861	90	48	48	50.3	24.0	0.333	8.7	33.3
Monaragala	1.12	1.12	1.12	5639	5639	5639	78	78	78	104.9	29.4	0.095	10.1	0.0
Ratnapura	1.85	0.46	0.92	819	3275	1638	91	44	73	91.8	29.0	0.104	5.6	25.0
Kegalle	1.79	0.6	0.6	564	1693	1693	96	55	55	145.8	41.5	0.263	5.2	14.3
Sri Lanka	1.65	0.79	0.96	979	2050	1682	88	62	73	80.0	27.7	0.151	6.0	31.6

NA – not applicable since there are no institutions providing 24*7 CEmONC services

Figure 3.9 is a summary matrix based on the table above in a visual format which compares the performance of the different districts on a given indicator. The colour codes in each square indicate the level of accomplishment and are divided as given below in descending order of shades.

- Dark green - achievement of the intended goal,
- Next shade - below the intended goal but above the national average
- Next lighter shade - performance below the intended goal and below the national average, but better than the lower benchmark.
- Lightest shade lower than the lower benchmark

The values for each indicator are given in the key below the table. Where there were no standard benchmarks which could be used set nationally or internationally, cut off values were based on expert consensus.

The cut offs for CEmONC facilities per 500,000 population and the 24*7 CEmONC facilities were decided upon based on the fact that the country as a whole does not meet the criteria for 5 EmONC facilities per 500,000 population and that the people's preference appear to be to deliver in a specialist unit that is capable of comprehensive EmONC services. As such the criterion of one CEmONC facility per 500,000 population is considered inappropriate. The current national average is 1.65 CEmONC facilities per 500,000 populations (range 5.42-0.87 per 500,000 population). Considering the current birth rate and the fact that 5 EmONC facilities are advocated internationally for adequate availability, it was decided that 3 CEmONC facilities per 500,000 population should be considered as the immediate goal. Considering the current low availability of 24*7 CEmONC facilities it was decided that there should be at least one institution per 500,000 populations that is capable of 24*7 CEmONC services and should be a goal to work towards in the immediate future.

Figure 3.10: Equity Assessment Matrix of the 8 EmONC indicators

District	CEmONC / 500000	24*7 CEmONC / 500000	24*7 CEmONC / 500000 (after BB)	Area CEmONC facility	Area 24*7 CEmONC facility	Area 24*7 CEmONC facility (after BB)	% Del. in CEmONC facilities	% Del in 24*7 CEmONC facilities	% Del in 24*7 CEmONC facilities (after BB)	Met need of EmONC care	Caesarean section	Direct Obstetric Case Fatality Rate	Total still birth rate	Proportion of indirect MD give year
Colombo	1.29	1.08	1.08	117	140	140	81	81	81	79.0	30.0	0.046	5.4	20.0
Gampaha	0.87	0.87	0.87	347	347	347	87	87	87	74.8	28.6	0.029	4.9	77.8
Kalutara	1.23	0.82	1.23	533	799	533	97	76	97	61.7	33.7	0.199	7.2	44.4
Kandy	1.46	1.46	1.46	485	485	485	87	87	87	76.0	30.8	0.089	10.7	50.0
Matale	2.07	1.03	1.04	997	1993	1993	95	56	56	87.6	30.8	0.078	7.3	0.0
Nuwara Eliya	2.12	0.71	0.71	590	1771	1741	92	50	50	55.8	16.3	0.567	10.4	0.0
Galle	1.42	0.94	0.94	551	826	826	88	78	78	86.3	32.7	0.156	1.8	33.3
Matara	1.23	0.00	0.62	642	NA	1283	96	0	81	85.2	26.7	0.108	11.7	0.0
Hambantota	1.68	0.84	1.68	1305	2609	1305	92	60	92	68.6	30.8	0.644	7.1	33.3
Jaffna	1.72	0.85	0.86	513	1025	1025	79	70	70	67.0	23.6	0.389	12.4	20.0
Killinochchi	4.43	0.00	0.00	1279	NA	NA	67	0	0	28.9	0.0	0.000	0.0	0.0
Mannar	5.04	0.00	0.00	1996	NA	NA	78	0	0	64.7	24.8	1.374	3.0	0.0
Vavuniya	2.89	0.00	2.89	1967	NA	1967	90	0	90	91.7	7.1	0.000	8.8	0.0
Mullativu	5.42	0.00	0.00	2617	NA	NA	43	0	0	50.0	0.7	0.000	0.0	0.0
Batticaloa	0.95	0.95	0.95	2854	2854	2854	67	67	67	93.8	21.3	0.302	8.1	0.0
Ampara	4.64	0.77	0.77	736	4415	4415	100	27	27	105.4	23.2	0.181	2.2	20.0
Trincomalee	5.31	1.33	1.33	682	2727	2727	83	44	44	70.2	14.5	0.072	6.6	66.7
Kurunegala	1.24	0.31	0.62	1204	4816	2408	92	52	73	77.1	30.3	0.136	3.7	25.0
Puttalam	1.97	0.66	1.31	1024	3072	1536	96	36	81	88.6	28.6	0.190	2.3	0.0
Anuradhapura	1.17	0.58	0.58	3590	7179	7179	80	74	74	72.7	23.1	0.235	0.0	42.9
Polonnaruwa	1.24	1.24	1.24	3293	3293	3293	93	93	93	85.1	25.9	0.000	4.2	100.
Badulla	1.85	0.62	0.62	954	2861	2861	90	48	48	50.3	24.0	0.333	8.7	33.3
Monaragala	1.12	1.12	1.12	5639	5639	5639	78	78	78	104.9	29.4	0.095	10.1	0.0
Ratnapura	1.85	0.46	0.92	819	3275	1638	91	44	73	91.8	29.0	0.104	5.6	25.0
Kegalle	1.79	0.60	0.60	564	1693	1693	96	55	55	145.8	41.5	0.263	5.2	14.3
Sri Lanka	1.65	0.79	0.96	979	2050	1682	88	62	73	80.0	27.7	0.151	6.0	31.6
Standard														
	>=3	>=1	>=1	< 500	< 500	< 500	> 75	> 75	> 75	> = 100	5 - 15	< 0.151	< 6	< 25
	3.0 - 1.65	0.8 - 0.9	0.8 - 0.9	501-1500	501-1500	501-1500	74 - 50	74 - 50	74 - 50	99 - 75	15 - 25	.151 - 0.5		25.1 - 50.0
	1.64 - 1.00	< 0.8	< 0.8	1501 - 2500	1501 - 2500	1501 - 2500	49 - 25	49 - 25	49 - 25	74 - 50	> 25.1	0.51-1.0		50.1 - 75.0
	< 0.99	0	0	>2501	>2501	>2501	< 25	< 25	< 25	< 50	< 5.00	> 1.00	> 6	> 75.1

NA not available/not applicable

3.11 New indicators developed in the current study

The analysis presented above shows that indicators one and two has to be examined in the Sri Lankan context. For example, although according to indicator one there is only 1.3 hospitals per 500 000 population providing CEmONC services in the Colombo district, the district is served by 4.3 specialist units per 500 000 population and accessibility is very high as shown by indicator two, each CEmONC institution covering an area of only 117 sq.km on an average.

An example of districts in the other extreme are Mannar and Mullativu, which have one CEmONC facility per district and has 5.04 and 5.42 institutions per 500 000 population respectively. The accessibility indicator (indicator 2) shows a large area covered by each institution; 1996 and 2617 sq/km respectively.

It is also seen that the community preference to deliver in a specialist unit is high and the proportion delivering in such units have been increasing over time. As such aiming to provide 4 BEmONC or modified B-EmNOC facilities per 500 000 population would be of limited value in planning future services. Therefore the current analysis refined indicator two and identified some new indicators to help in planning services for the future. These are presented in sections 3.9-3.12.

3.11.1 Refining indicator 2 (Geographic distribution of EmONC facilities)

Indicator two (as defined in section 3.2) calculated as the average land area covered per facility per district is a crude indicator of access to services and does not identify spatial clustering of institutions.

3.11.1 (a) : Percentage area falling outside a defined buffer zone round CEmONC facilities

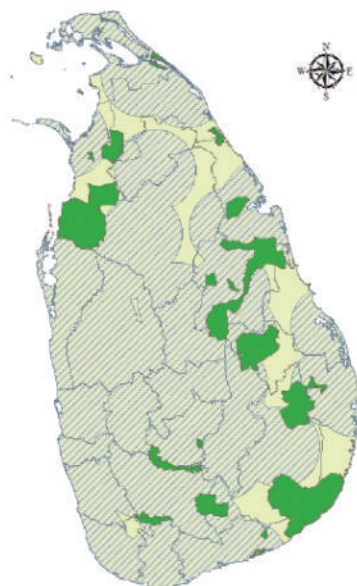
To further refine indicator 2 the current study examined the area falling outside a defined buffer zone round a CEmONC facility. The figure of 30 km. was decided upon as an average distance that could be travelled in 45 minutes to one hour to reach a CEmONC facility using common modes of transport available to a majority of the population.

It must be noted that the actual time from emergency to receiving appropriate services would be more than 45 minutes taking in to consideration the time lags between making the decision to seek care and starting travel as well as time between arrival in an institution and receiving care.

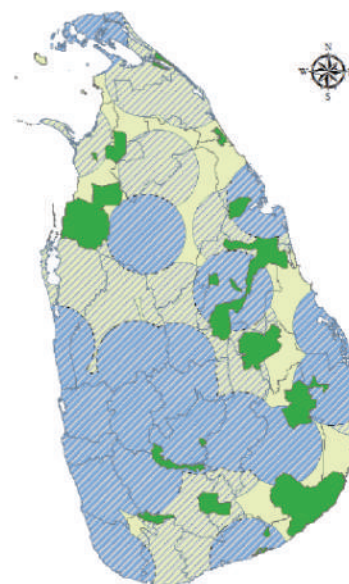
Figure 3.11 shows facilities capable of providing CEmONC services and those with 24*7 cover with buffers of 30 km. radius and the area that is not covered by such services.

Figure 3.11: Facilities capable of providing CEmONC and 24*7 CEmONC care

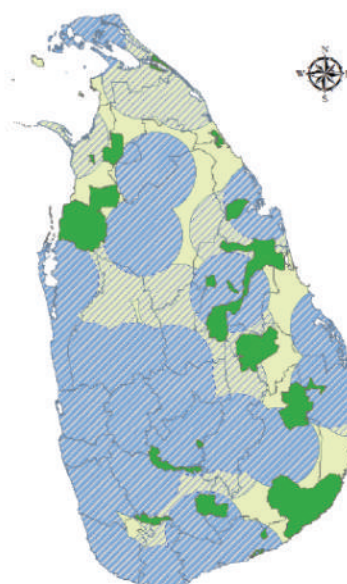
30 km. buffer zone round facilities able to provide CEmONC services



30 km. buffer zone round facilities able to provide 24*7 C-EmONC services



30 km. buffer zone round facilities able to provide 24*7 C-EmONC services - after upgrading blood transfusion services



Forest cover
 C_EmONC coverage
 24*7 coverage once BB services upgraded
 Area not covered

The percentage area falling outside the 30 km. buffer zone shown in figures 3.11 are given in table 3.18.

Table 3.18: Area per district falling outside a 30 km. buffer zone from CEmONC and 24*7 CEmONC facilities

District	Land area without forest cover Km ²	Based on institutions that are potentially able to provide CEmONC services			Based on institutions able to provide 24*7 CEmONC services			Based on institutions able to provide 24*7 CEmONC services (after correction of BTS)		
		Sq. Km outside buffer	% land area outside buffer *	% from total unserved area for the country	Sq. Km outside buffer	% land area outside buffer	% from total unserved area for the country	Sq. Km outside buffer	% land area outside buffer	% from total unserved area for the country
Colombo	679.7	0	0	0	0	0	0	0.0	0.0	0.0
Gampaha	1386	0	0	0	0	0	0	0.0	0.0	0.0
Kalutara	1645.4	37.1	2.3	0.5	37.1	2.3	0.1	37.1	2.3	0.2
Kandy	1924	0	0	0	269.3	14	1	269.3	14.0	1.3
Matale	1925.5	0	0	0	817.6	42.5	3	817.6	39.7	4.1
Nuwara Eliya	1672.1	0	0	0	0	0	0	0.0	0.0	0.0
Galle	1586	142.2	9	1.8	258.3	16.3	1	258.3	16.0	1.3
Matara	1303.7	8.3	0.6	0.1	1110	85.1	4.1	258.4	19.7	1.3
Hambantota	2085.6	175.5	8.4	2.2	850.3	40.8	3.1	175.5	6.7	0.9
Jaffna	991	47.4	4.8	0.6	186.7	18.8	0.7	154.5	15.3	0.8
Kilinochchi	1244.5	155.4	12.5	1.9	1149.6	92.4	4.3	1149.6	91.0	5.7
Mullativu	2608.7	749.3	28.7	9.4	2608.7	100	9.6	1615.8	80.9	8.0
Mannar	1787.3	698.9	39.1	8.7	1787.3	100	6.6	378.8	20.0	1.9
Vavuniya	1896.1	301.5	15.9	3.8	1871.3	98.7	6.9	2574.9	96.0	12.8
Batticaloa	2400.3	941.1	39.2	11.8	1054.2	43.9	3.9	1989.3	44.4	9.9
Ampara	3626.3	1435.3	39.6	18	1868	51.5	6.9	1054.2	42.4	5.2
Trincomalee	2308.1	639.7	27.7	8	1029.3	44.6	3.8	1029.3	38.9	5.1
Kurunegala	4719.1	41.2	0.9	0.5	1816.7	38.5	6.7	1547.7	32.8	7.7
Puttalam	2868.9	37.1	1.3	0.5	2049.9	71.5	7.6	400.1	12.0	2.0
Anuradhapura	6358.3	1156	18.2	14.5	3626.8	57	13.4	2768.5	38.4	13.8
Polonnaruwa	2621.1	176	6.7	2.2	658.4	25.1	2.4	658.4	19.1	3.3
Badulla	2660.5	3.8	0.1	0	940.2	35.3	3.5	940.2	32.7	4.7
Monaragala	4331.3	1245.7	28.8	15.6	1907	44	7.1	1562.4	27.2	7.8
Ratnapura	2977.3	0	0	0	1147.9	38.6	4.2	445.3	13.5	2.2
Kegalle	1630.9	0	0	0	0	0	0	0.0	0.0	0.0
Sri Lanka	59237.7	7991.6	13.5	100	27044.7	45.7	100	20085	30.5	100.0

*In this calculation the forest areas have been left out however, the data on area under agriculture were not available.

Table 3.19: Population without access to CEmONC and 24*7 CEmONC facility cover using a 30 Km buffer zone.

District	Population 2012	Based on institutions that have the potential ability to provide CEmONC services			Based on institutions able to provide 24*7 CEmONC services			Based on institutions able to provide 24*7 C EmONC services after correction of BTS		
		Number not having access to service	% not having access	% from total without access	Number not having access to service	% not having access to service	% from total without service	Number not having access to service	% not having access to service	% from total without access
Colombo	2309809	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Gampaha	2294641	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Kalutara	1217260	8026	0.7	1.4	8026	0.7	0.2	8013	0.7	0.4
Kandy	1369899	0	0.0	0.0	47077	3.4	1.2	47077	3.4	2.3
Matale	482229	0	0.0	0.0	151720	31.5	3.9	138750	28.8	6.7
Nuwara Eliya	706588	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Galle	1058771	29120	2.8	5.0	53748	5.1	1.4	48256	4.6	2.3
Matara	809344	3073	0.4	0.5	680419	84.1	17.4	93161	11.5	4.5
Hambantota	596617	38140	6.4	6.5	309862	51.9	7.9	15829	2.7	0.8
Jaffna	583378	3819	0.7	0.7	33529	5.7	0.9	21817	3.7	1.1
Kilinochchi	112875	5539	4.9	1.0	109297	96.8	2.8	107437	95.2	5.2
Mullativu	91947	21683	23.6	3.7	91947	100.0	2.3	91974	92.9	4.5
Mannar	99051	13914	14.0	2.4	99051	100.0	2.5	10012	5.8	0.5
Vavuniya	171511	8653	5.0	1.5	169792	99.0	4.3	90007	97.9	4.4
Batticaloa	525142	97961	18.7	16.8	105759	20.1	2.7	181723	28.0	8.8
Ampara	648057	66662	10.3	11.4	133543	20.6	3.4	101921	19.4	4.9
Trincomalee	378182	39005	10.3	6.7	85792	22.7	2.2	78572	20.8	3.8
Kurunegala	1610299	7302	0.5	1.3	363687	22.6	9.3	274624	17.1	13.3
Puttalam	759776	10876	1.4	1.9	360626	47.5	9.2	65797	8.7	3.2
Anuradhapura	856232	99477	11.6	17.1	355386	41.5	9.1	293056	34.2	14.2
Polonnaruwa	403335	14599	3.6	2.5	76558	19.0	2.0	63866	15.8	3.1
Badulla	811758	447	0.1	0.1	131806	16.2	3.4	106789	13.2	5.2
Monaragala	448142	114094	25.5	19.6	187075	41.7	4.8	105955	23.6	5.1
Ratnapura	1082277	0	0.0	0.0	359103	33.2	9.2	120721	11.2	5.8
Kegalle	836603	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0
Sri Lanka	20,263,723	582387	2.9	100.00	3913803	19.3	100.0	2065355	10.2	100.0

Table 3.18 show that the area falling outside a 30km. buffer zone round facilities that have the potential ability to provide CEmONC services is 13.5% at the national level. This proportion increases to 45.7% when facilities able to provide CEmONC services on a 24*7 basis are examined. The coverage of 24*7 services improves with only 30.5% of the land area falling outside the buffer zone, once the understaffed blood transfusion services are rectified in the institutions identified.

3.11.1 (b): Percentage population falling outside a defined buffer zone round CEmONC facilities

In interpreting the above indicator it must be noted that there is considerable overlap between areas served by institutions and spill over in to neighbouring districts. Therefore in the current study this was further refined by overlaying the population figures from Census 2012, at Divisional Secretariat level and calculating the population without EmONC cover i.e. population outside the 30 kilometre buffer zone and this is presented in table 3.19.

Since the population density varies between districts a more sensitive indicator for planning purposes may be the percentage population left out of reach of services. It is seen that only 3% of the total population in the country lie outside a 30 km buffer zone from a facility capable of CEmONC services while it increases to 19% when 24*7 capability is considered, and declines to 10.2% when the understaffing of blood transfusion services in the identified institutions are rectified.

The inter district variation is high in both these indicators (3.11.1 (a) and (b)) and would be useful in identifying districts that need to be prioritised for improvements in accessibility. Furthermore they help to identify districts where the available facilities are clustered together and not spread out within the geographical space.

This information could be further refined by calculating the proportion of the population falling outside a predetermined buffer based on average distances to services from human habitations and travel times to reach a facility. However, updated spatial data necessary for such a calculation were not available for the whole country at the time of analysis.

For purposes of prioritisation between districts the following two indicators were developed based on the two given above and are given in tables 3.18 & 3.19.

3.11.1 (c) The land area in a district lying outside the buffer zone as a proportion of the total land area in the country outside the buffer zones. This can be used for prioritisation of districts.

3.11.1 (d) The population in a district lying outside the buffer zone as a proportion of the total population in the country outside the buffer zones. This indicator is the best of the four described for purposes of prioritisation.

3.12 Availability and accessibility

Availability and accessibility have to be examined together for meaningful interpretation and planning. Figures 3.12 and 3.13 identify the districts where both indicators are poor.

A radius of 30 km. corresponds to a square area of 3000 km² approximately. It is seen from the diagram that where institutions capable of providing comprehensive emergency services are concerned there is no district where availability is below 1 facility per 500 000 population and the area served is more than 3000 km².

Figure 3.12: Scatter plot of CEmONC facilities by indicators one and two

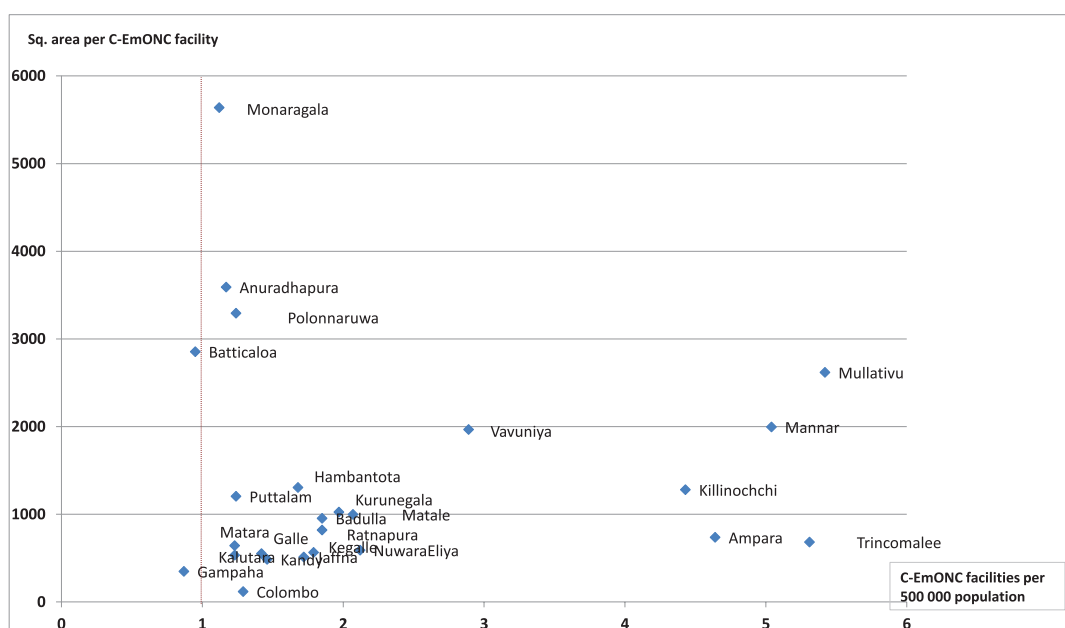


Figure 3.13: Scatter plot of 24*7 CEmONC facilities by indicators one and two

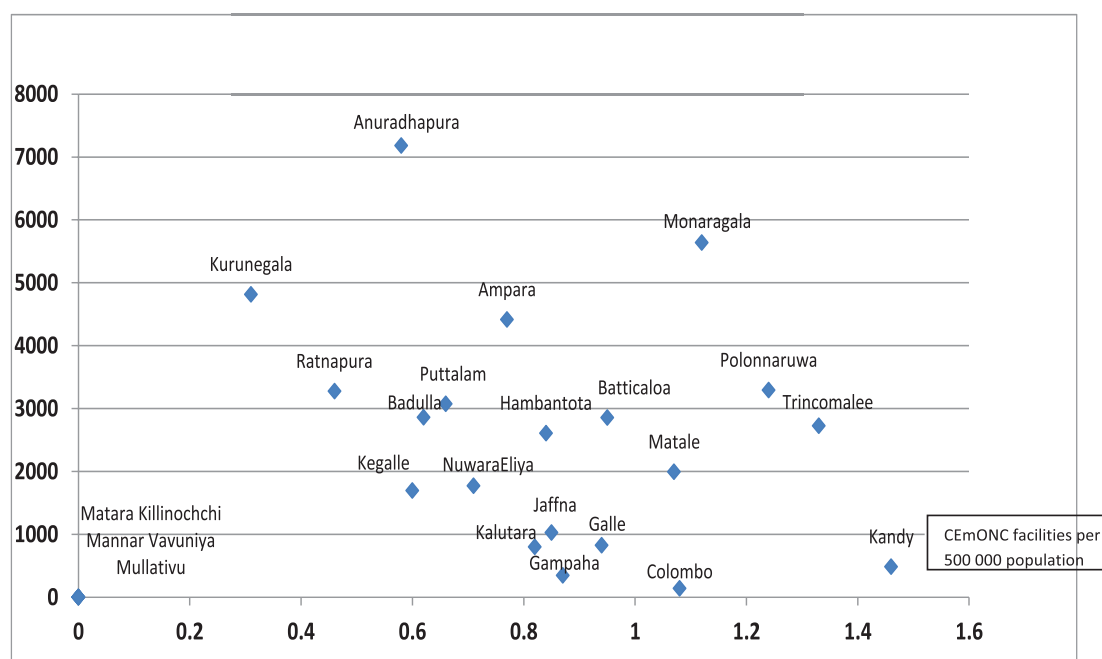


Figure 3.13 highlights that 24*7 CEmONC services are deficient by both indicators in a number of districts. The districts that have less than 1 CEmONC facility providing 24*7 services and have that facility cover an area exceeding 3000 km² are Anuradhapura, Kurunegala, Ampara, Ratnapura and Puttalam. It must be noted that the districts of Matura, killinochchi, Mannar, Mullativu and Vavuniya do not have facilities providing 24*7 CEmONC services.

The figures clearly show the necessity to develop a composite indicator which would examine both accessibility and availability together to distinguish between for e.g. districts such as Monaragala where there is one CEmONC facility per 500,000 serving an area of 5639 sq.km. and Puttalam where the CEmONC facility per 500,000 population is serving an area of 1536 sq.km.

The study developed the following indicators as a composite of indicator one and two to address such issues.

3.13 Composite indices developed in the study

Three composite indices which take into account availability and accessibility were developed in the study to help with prioritisation of districts for planning purposes and are presented in this section.

3.13.1 Accessibility Index for a specialized hospital – (AISH)

The accessibility index for a specialized hospital is a composite index representing the ratio between the average number of deliveries per specialized hospital (numerator) and the population density of a district (denominator).

AISH = Average number of deliveries per specialized hospital / population density of a district

In the spectrum of AISH, lower values represent higher accessibility and higher values represent lower accessibility, (89.7 in Monaragala compared to 2.8 in Colombo)

3.13.2 Accessibility Index for a specialized unit – (AISU)

The accessibility index for a specialized unit is a composite index representing the ratio between the average number of deliveries per specialized unit (numerator) and the population density of a district (denominator).

$$\text{AISU} = \text{Average number of deliveries per specialized unit} / \text{population density of a district}$$

In the spectrum of AISU, lower values represent higher accessibility and higher values represent lower accessibility, (89.7 in Monaragala compared to 0.8 in Colombo)

3.13.3. Accessibility index for a specialist obstetrician (AISO)

The accessibility index for a specialist obstetrician is a composite index between representing the ratio between the average number of deliveries per specialist obstetrician (numerator) and the population density of a district (denominator).

$$\text{AISO} = \text{Average number of deliveries per specialist obstetrician} / \text{population density of a district}$$

In the spectrum of AISO, lower values represent higher accessibility and higher values represent lower accessibility. (44.9 in Monaragala compared to 0.7 in Colombo).

3.14. Ministry of Health norms by district

In addition to the above, the current analysis examined the availability of specialists in the districts per population and area. This is given in Table 3.20. The Ministry of Health norm is to have 300 deliveries per unit per month.

Table 3.20 highlights the fact that the number of units available in the country (117) is sufficient to meet the norm (105) but there is inequity in distribution. The districts of Anuradhapura, Badulla, Monaragala, and Ratnapura do not have the required number of units. The number of specialist units per 500 000 population varies from 6.6 in Trincomalee to 1.1 in Monaragala, The national average being 2.59. The number of specialist obstetricians per 500 000 population varies from 6.6 in Trincomalee to 1.85 in Matara, average for the country being 3.4. The average number of deliveries coming under the care of a specialist obstetrician per month varies from 90 in Mullativu to 345 in Badulla and 341 in Matara, while the national average is 207 per month.

In deciding the cut off value for average number of deliveries per specialist obstetrician the figure of 250 was decided upon taking the national average of 207 in to consideration.

In deciding on a cut off for the average deliveries per specialist hospital 500 (250×2) was decided upon since a minimum of two specialists should be available for the provision of 24*7 CEmONC care. Although many of the TH/PGH type of institution may have more than two specialists, the total number of institutions in this group is small.

Figure 3.14 and the numbers therein are presented so that they can be used to initiate a discussion and national consensus on standards for CEmONC care.

Table 3.20: Specialist obstetricians per district according to Ministry of Health norms

Province	District	Population 2012	Total Births in the district in 2011 (RG)	No. of facilities with specialist care	No of specialist units in the district	No of specialist units required to meet the norm	No of specialist obstetricians available	Specialist units per 50000 population	Specialist obstetricians per 50000 population	Average number of deliveries per specialist obstetrician per month
Western province		5837294	99292	13	35	28	43	3.00	3.68	192
	Colombo	2323826	54888	6	20	15	25	4.30	5.38	183
	Gampaha	2298588	27457	4	9	8	12	1.96	2.61	191
	Kalutara	1214880	16947	3	6	5	6	2.47	2.47	235
Central province		2556774	50196	9	15	14	20	2.93	3.91	209
	Kandy	1368216	29331	4	9	8	13	3.29	4.75	188
	Matale	482348	10465	2	3	3	3	3.11	3.11	291
	Nuwara Eliya	706210	10400	3	3	3	4	2.12	2.83	217
Southern province		2465626	42196	7	11	12	14	2.23	2.84	251
	Galle	1059046	20838	3	6	6	7	2.83	3.30	248
	Matara	810703	12268	2	3	3	3	1.85	1.85	341
	Hambantota	595877	9090	2	2	3	4	1.68	3.36	189
Northern province		1060023	20016	6	9	8	9	4.72	4.25	185
	Jaffna	583071	9949	2	4	3	4	4.29	3.43	207
	Killinochchi	112872	3319	1	1	1	1	4.43	4.43	277
	Mannar	99063	1482	1	1	1	1	5.05	5.05	124
	Vavuniya	172789	4190	1	2	2	2	5.79	5.79	175
	Mullativu	92228	1076	1	1	1	1	5.42	5.42	90
Eastern province		1547377	33147	12	16	10	16	5.17	5.17	173
	Batticaloa	525186	9743	2	4	3	4	3.81	3.81	203
	Ampara	645825	14371	2	3	4	3	5.42	5.42	399
	Kalmunai			4	4		4			
	Trincomalee	376366	9033	4	5	3	5	6.64	6.64	151
North Western province		2372185	39885	7	11	11	13	2.32	2.74	256
	Kurunegala	1611407	25428	4	7	7	8	2.17	2.48	265
	Puttalam	760778	14457	3	4	4	5	2.63	3.29	241
North Central province		1259421	23353	4	5	6	7	1.99	2.78	278
	Anuradhapura	855562	15855	2	3	4	4	1.75	2.34	330
	Polonnaruwa	403859	7498	2	2	2	3	2.48	3.71	208
Uva province		1259419	23680	4	5	7	6	1.99	2.38	329
	Badulla	811225	16548	3	4	5	4	2.47	2.47	345
	Monaragala	448194	7132	1	1	2	2	1.12	2.23	297
Sabaragamuwa province		1919478	31650	7	9	9	10	2.34	2.60	264
	Ratnapura	1082299	21260	4	5	6	6	2.31	2.77	295
	Kegalle	837179	10390	3	4	3	4	2.39	2.39	216
Sri Lanka		20 277 597	343 384	69	117	105	138	2.59	3.40	207

Figure 3.14 summarises some of the indicators important for planning services.

Figure 3.14: Summary of indicators 1 and 2, new indicators and utilisation indicators by district

District	WHO Indicators 1 & 2				New Indicators						Utilization indicators				
	CEmONC / 500000 population	24*7 CEmONC / 500000 population	Area CEmONC facility	Area 24*7 CEMONC facility	Accessibility index for SH	Accessibility index for a SU	Accessibility index for a Consultant Obstetrician	% population outside CEmONC	% population outside 24*7 CEmONC from total without services	% population outside 24*7 CEmONC once BB services upgraded rom total without services	Specialist unit / 500000 population	Specialist Obstetrician / 500 000 population	Average deliveries / Specialist Obstetrician /month	Average deliveries / Specialist hospital /month	Average deliveries / Specialist unit /month
Colombo	1.29	1.08	117	140	2.75	0.83	0.66	0	0.0	0.0	4.3	5.38	183	762	229
Gampaha	0.87	0.87	347	347	4.41	1.84	1.38	0	0.0	0.0	1.96	2.61	191	572	254
Kalutara	1.23	0.82	533	799	7.43	3.72	3.72	0.7	0.2	0.4	2.47	2.47	235	471	235
Kandy	1.46	1.46	485	485	10.40	4.62	3.20	0	1.2	2.3	3.29	4.75	188	611	272
Matale	2.07	1.03	997	1993	21.62	14.41	14.41	0	3.9	6.7	3.11	3.11	291	436	291
Nuwara Eliya	2.12	0.71	590	1771	8.55	8.55	6.41	0	0.0	0.0	2.12	2.83	217	289	289
Galle	1.42	0.94	551	826	10.84	5.42	4.64	2.8	1.4	2.3	2.83	3.30	248	579	289
Matara	1.23	0	642	0	9.71	6.47	6.47	0.4	17.4	4.5	1.85	1.85	341	511	341
Hambantota	1.68	0.84	1305	2609	19.90	19.90	9.95	6.4	7.9	0.8	1.68	3.36	189	379	379
Jaffna	1.72	0.85	513	1025	8.74	4.37	4.37	0.7	0.9	1.1	4.29	3.43	207	415	207
Killinochchi	4.43	0	1279	0	37.61	37.61	37.61	4.9	2.8	5.2	4.43	4.43	277	277	277
Mannar	5.04	0	1996	0	29.86	29.86	29.86	23.6	2.3	4.5	5.05	5.05	124	124	124
Vavuniya	2.89	0	1967	0	47.70	23.85	23.85	14	2.5	0.5	5.79	5.79	175	349	175
Mullativu	5.42	0	2617	0	30.53	30.53	30.53	5	4.3	4.4	5.42	5.42	90	90	90
Batticaloa	0.95	0.95	2854	2854	26.47	13.24	13.24	18.7	2.7	8.8	3.81	3.81	203	406	203
Ampara	4.64	0.77	736	4415	16.37	14.03	14.03	10.3	3.4	4.9	5.42	5.42	171	200	171
Trincomalee	5.31	1.33	682	2727	16.36	13.09	13.09	10.3	2.2	3.8	6.64	6.64	151	188	151
Kurunegala	1.24	0.31	1204	4816	19.00	10.86	9.50	0.5	9.3	13.3	2.17	2.48	265	530	303
Puttalam	1.97	0.66	1024	3072	19.46	14.59	11.67	1.4	9.2	3.2	2.63	3.29	241	402	301
Anuradhapura	1.17	0.58	3590	7179	66.52	44.35	33.26	11.6	9.1	14.2	1.75	2.34	330	661	440
Polonnaruwa	1.24	1.24	3293	3293	30.57	30.57	20.38	3.6	2.0	3.1	2.48	3.71	208	312	312
Badulla	1.85	0.62	954	2861	19.45	14.59	14.59	0.1	3.4	5.2	2.47	2.47	345	460	345
Monaragala	1.12	1.12	5639	5639	89.73	89.73	44.87	25.5	4.8	5.1	1.12	2.23	297	594	594
Ratnapura	1.85	0.46	819	3275	16.08	12.87	10.72	0	9.2	5.8	2.31	2.77	295	443	354
Kegalle	1.79	0.6	564	1693	7.00	5.25	5.25	0	0.0	0.0	2.39	2.39	217	289	216
Sri Lanka	1.65	0.79	979	2050	16.11	9.50	8.52	2.9	19.3	10.2	2.59	3.40	207	415	245
Green	>=3	>=1	< 500	< 1000	< 5	< 5	< 5	0.0	0.0	0.0	>= 3	> 3	<= 250	<= 500	<= 250
Yellow	3.0 - 1.65	- .8 - .9	501- 1000	< 2050	5.1- 10.0	5.1 - 10	5.1 - 10	0.1 - 5.0	0.1 - 5.0	0.1 - 5.0					
Orange	1.64 - 1.00	< 0.8	1001- 1500	> 2050	10.1- 20.0	10.1 - 20.0	10.1 - 20.0	5.1 - 10.0	5.1 - 10.0	5.1 - 10.0					
Red	< 0.99	0	>1501	0	> 20.1	> 20.1	> 20.1	> 10.1	> 10.1	> 10.1	< 3	< 3	>= 251	>= 501	>= 251



*Packet system in labour rooms –DGH Ampara -
Courtesy of Dr. Dhammica Rowel*

Chapter 4

Selected Care Practices

The current assessment did not attempt to examine the many dimensions of quality of obstetric care. No attempt was made to examine clinical care practices and outcome at the level of individual patients. However, selected care practices were inquired into and are described in this chapter.

4.1 Caesarean deliveries

Rates of caesarean section are of concern in both developed and developing countries and have been a topic of much discussion and research. Population based rates are used as an indicator of access to an appropriate lifesaving EmONC procedure. However, there is much debate on the rate and range considered optimum for a country.

In this chapter, data on institution based caesarean section rates are presented. The current assessment did not attempt to examine the correlates of caesarean sections at an individual or ecological level. The variation observed within country, province and district are described as a means of initiating a discussion, research and a process leading to a national consensus on a desirable rate and range appropriate for the conditions prevalent in the different levels of institutions.

In the present assessment data on caesarean sections were gathered from multiple sources.

They were:

- Caesarean section rates for the year 2010 available from the routine return H830, a copy of which is maintained in every institution.
- Information on the mode of delivery documented in the birth register (H841) maintained in obstetric wards, was used to compute section rates for three calendar months preceding the date of data collection in 2011 and were collated for the institution.
- Information extracted from Bed Head Tickets of the last ten consecutive patients who had undergone caesarean section in a given unit.
- Data from the prospective morbidity study, conducted over a period of 4 weeks as a part of the current assessment.

4.1.1 Caesarean section rates in government health institutions

Institutional caesarean section (CS) rates are calculated as the proportion of caesarean deliveries out of the total number of births in the institution. Hospital rates are difficult to interpret and are not comparable between institutions since they depend on many factors such as the ability of the institution to provide 24*7 obstetric surgical care over the period under study, availability of such services in the

neighbouring institutions, the number of emergency transfers received from other hospitals, maternal characteristics, case mix/obstetric morbidity seen in the institution/region, procedures used for intrapartum monitoring of patients etc. It is also influenced by individual preferences as well as the care providers' threshold for deciding on a caesarean delivery for a given indication and client perceptions of safety of the procedure and their expectations. Research has shown that the variation in CS rates persist even after adjustment for maternal and clinical risk factors indicating the complex nature of factors influencing institutional section rates (Bragg, Cromwell, Edozien et al BMJ, 2010).

The two sources of data are comparable, since the birth register is the source of information for the H830 return.

There is a marginal increase (1.1%) in the overall section rate from 2010 to 2011, the maximum increase has been observed in the TH/PGH type of institution. A marginal variation of CS rates is seen between the three categories of hospitals viz. 33.5% for TH/PGH, 31.3% for DGH and 29.1 % for BH. Contrary to the belief that CS rates may be higher in single man stations the findings show that the rates are significantly lower in this functional category of institution.

Table 4.1 presents data on caesarean delivery rates for government hospitals for the years 2010 and 2011.

Figures 4.1 and 4.2 highlight the individual variations seen in institutions even within the same type.

Table 4.1: Caesarean section rates of hospitals: by type and functional category - 2010 & 2011

Type of institution	Based on H 830 return - 2010			Based on birth register 2011		
	Total births	Number of sections	Section rate	Total births	Number of sections	Section rate
TH / PGH	120430	40337	33.5	27297	9826	36.0
DGH	80207	25144	31.3	21013	6651	31.7
BH	84196	24476	29.1	22864	6830	29.9
>=2 units	204851	68193	33.3	48996	17071	34.8
1 Unit 2 specialist obstetricians	35207	9833	27.9	9100	2854	31.4
1 Unit 1 specialist obstetrician	44775	11931	26.6	13078	3382	25.9
Sri Lanka	284833	89957	31.6	71174	23307	32.7

Figure 4.1: Distribution of caesarean section rates of individual institutions by type of hospital

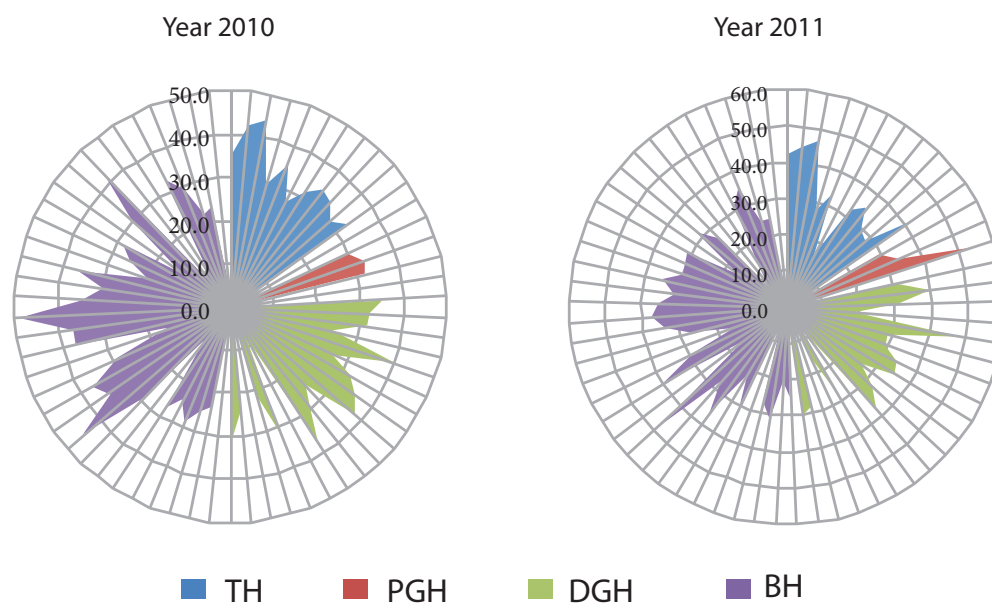
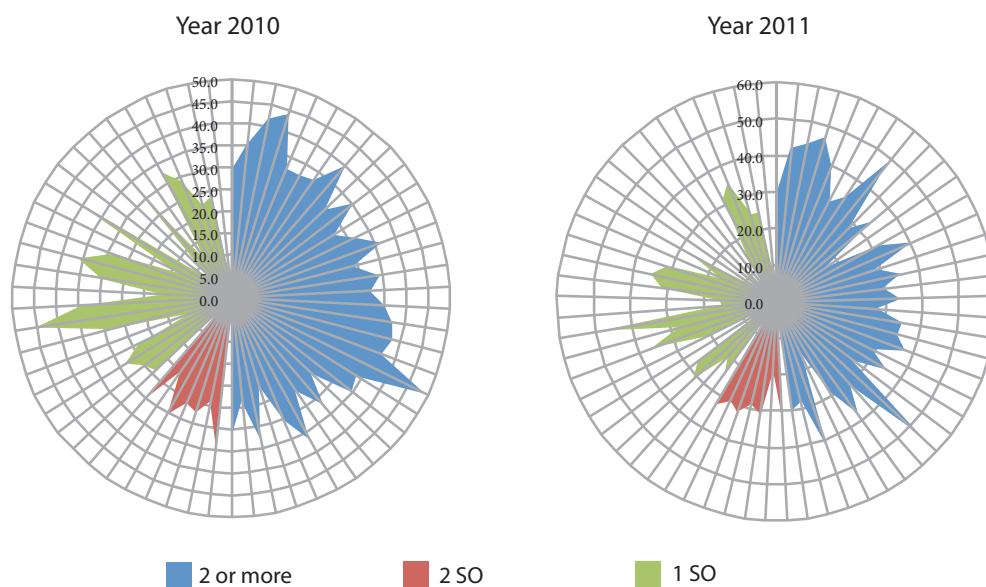


Figure 4.2: Distribution of caesarean section rates of individual institutions by functional classification



It is seen that there is a wide variation of CS rate between individual units/ hospitals, with few having rates as low as 5-15% and few as high as 45-55%.

Table 4.2 and figures 4.3 and 4.4 summarizes the variation presented above by type of institution.

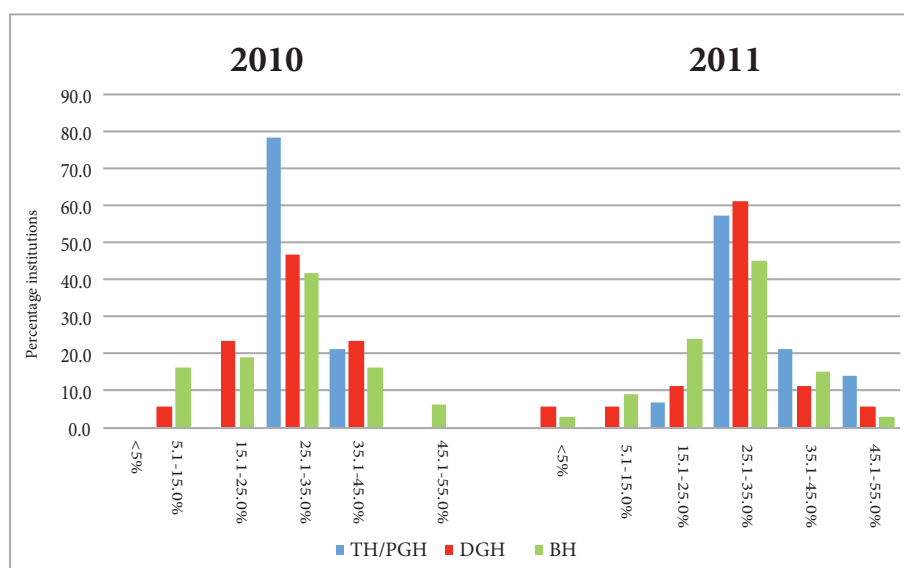
Table 4.2: Caesarean section rates by type of institution and functional classification

Institutional caesarean section rate	TH/PGH	DGH	BH	Institutions with 2 or more specialist obstetricians	Institutions with one specialist obstetrician
No. of Institutions	14	18	38	39	31
Percentage of CS 2010 (H830)					
<5%	0	0	0	0	0
5.1-15.0%	0	1	5	0	6
15.1-25.0%	0	4	6	5	5
25.1-35.0%	11	8	13	23	9
35.1-45.0%	3	4	5	10	2
45.1-55.0%	0	0	2	1	1
Total	14	17	31	39	23
No. of institutions not performed CS	0	1	7	0	*8
No. of institutions with No information	0	0	0	0	0
Percentage of CS in 2011 (quarter data)					
<5%	0	1	1	0	2
5.1-15.0%	0	1	3	0	4
15.1-25.0%	1	2	8	3	8
25.1-35.0%	8	11	15	25	9
35.1-45.0%	3	2	5	8	2
45.1-55.0%	2	1	1	3	1
Total	14	18	33	39	26
CS not performed	0	0	**5	0	5

*7 institutions (BH) did not have a specialist obstetrician and one (DGH) was not functioning in 2010.

** 5 of the above 7 institutions (BH) did not have CS data for the quarter preceding data collection in 2011 and the DGH was functional

Figure 4.3 Percentage of institutions by caesarean section rates in different categories of institutions



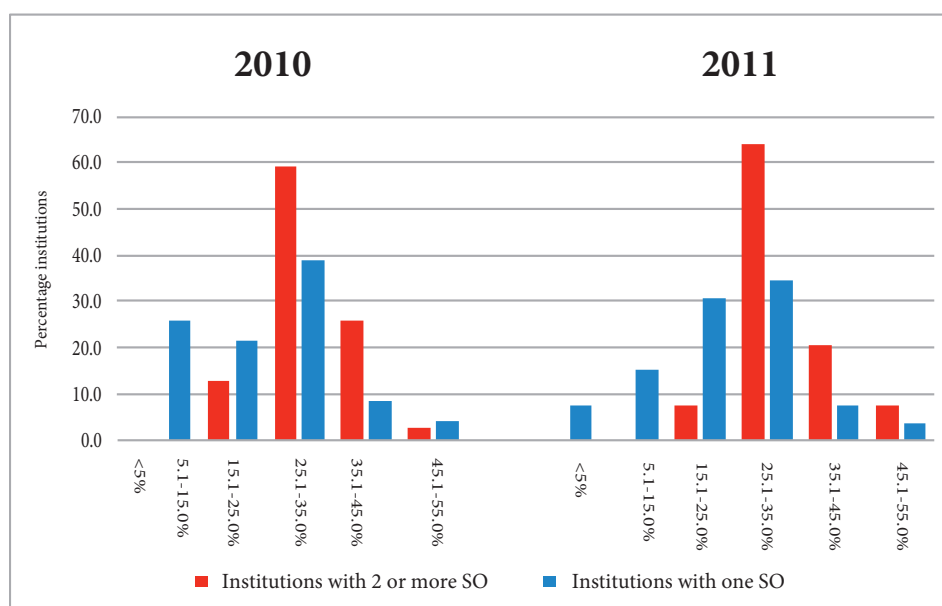
All institutions of the TH/PGH type had section rates exceeding 25% in 2010 but it is seen that one institution had moved to the lower category in 2011, while 2 (14%) institutions have moved to rates in the range of 46% -55%. In 2011, 36% of institutions of this type reported section rates exceeding 35%.

Compared to TH/PGH type, the percentage of District General Hospitals (DGH) having a section rate above 25% in 2011 was 78%, with 11% having rates between 16-25% and 6% having rates below 5%.

In the case of Base Hospitals (BH) only 64% had CS rates above 25% in 2011 and the balance was distributed more widely with 24% having rates between 15-25% and another 12% between 05-15%.

The modal value in all 3 categories is between 25.1% and 35%. The very low values of below 5% seen in one DGH and one BH were due to a local situation prevalent during this particular quarter rather than a general trend.

Figure 4.4 Percentage of institutions by caesarean section rates according to functional classification



When caesarean section rates are examined by the functional classification used in the study, the most striking feature observed is the high level of variation of rates observed in stations with a single specialist obstetrician probably a reflection of individual practice as well as local circumstances such as the population access and travel times to higher level institutions.

In respect of institutional section rates, it is interesting to note that the sample score card for a Maternity Dashboard published by the RCOG, for a London tertiary referral centre serving a high risk and diverse population has set a CS rate of 23% as a goal and the upper threshold as 25%. (<http://www.rcog.org.uk/womens-health/clinical-guidance/maternity-dashboard-clinical-performance-and-governance-score-card>).

Percentile distribution of caesarean section rates 2010 and 2011

Percentile values of the institutional caesarean section rates for the country may be used as a benchmark to

compare trends and as a guideline in deciding appropriate optimum values for the different levels of institutions and are presented in table 4.3.

Table 4.3: Percentile distribution of caesarean section rates for 2010 and 2011

	2010	2011
25 th Percentile	24.675	25.275
50 th Percentile	30.400	30.200
75 th Percentile	35.000	34.975

It is seen that section rates of 25%, 30% and 35% can be considered as the 25th 50th and 75th percentiles respectively (Table 4.3).

Table 4.4 describes the rates by percentiles according to the type of hospital and the functional classification used. These figures may serve as a benchmark in monitoring future CS rates.

Table 4.4: Distribution of section rates by percentile according to type of institution and functional classification

Institutional caesarean section rate	TH/PGH	DGH	BH	Institutions with 2 or more specialist obstetricians	Institutions with one specialist obstetrician
No. of institutions	14	18	38	39	31
Percentage of CS 2010 (H830)					
Less than 25 th percentile	0	4	11	4	11
25 th to 50 th percentile	3	3	10	10	6
50 th to 75 th percentile	7	5	3	12	3
Above the 75 th percentile	4	5	7	13	3
Total	14	17	31	39	23
No. of institutions not performed CS	0	1	7	0	*8
No. of institutions with No information	0	0	0	0	0
Percentage of CS in 2011 (data for a quarter)					
Less than 25 th percentile	1	4	12	3	14
25 th to 50 th percentile	4	5	6	11	4
50 th to 75 th percentile	4	5	8	13	4
Above the 75 th percentile	5	4	7	12	4
Total	14	18	33	39	26
CS not performed	0	0	**5	0	5

*7 institutions (BH) did not have a specialist obstetrician and one (DGH) was not functioning in 2010.

** 5 of the above 7 institutions (BH) did not have CS data for the quarter preceding data collection in 2011 and the DGH was functional

Figure 4.5: Percentage of institutions by caesarean section rates based on percentile distribution in different categories of institutions

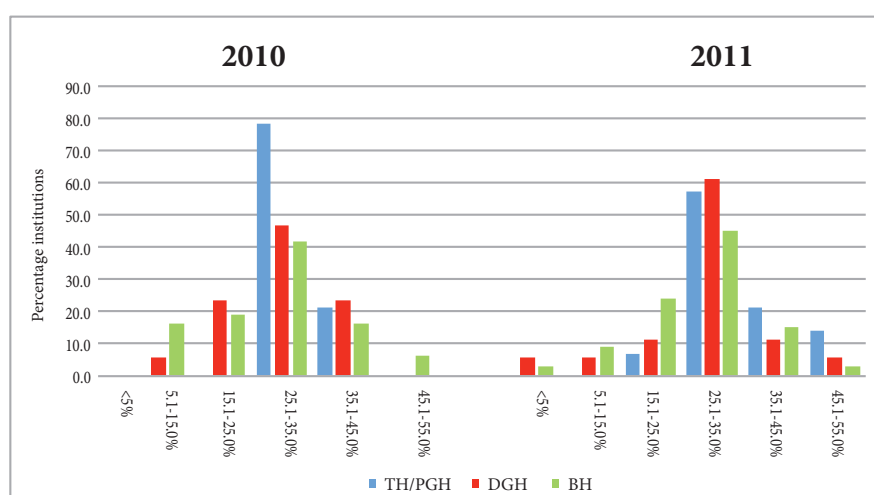


Figure 4.6: Percentage of institutions by caesarean section rates by functional classification and based on the percentile distribution

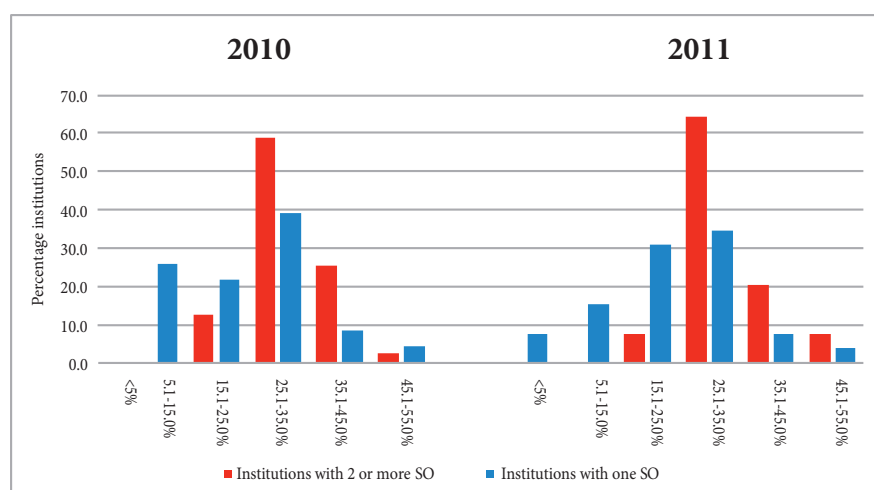
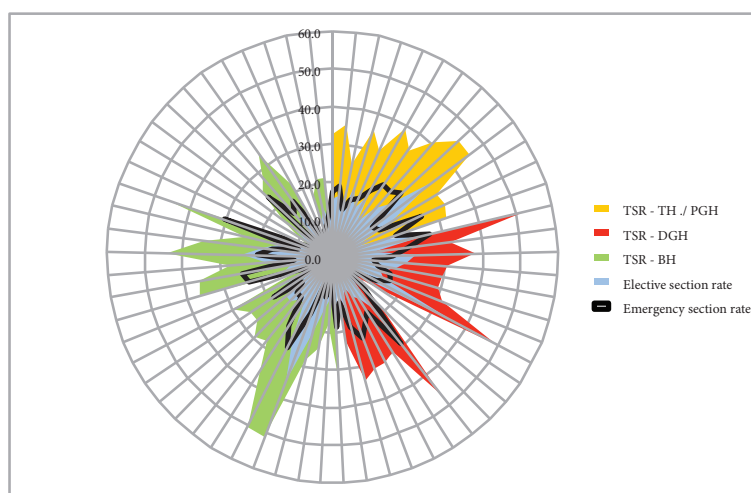


Table 4.4 shows that in 2010, the percentage of institutions above the 50th centile (CS rate of 30%) in TH/PGH, DGH and BH respectively are 79%, 59% and 32% respectively compared to 64%, 50% and 45% in 2011. This shows that there has been a marked increase in the proportion of base hospitals with higher rates. When the shift is examined by the functional classification it is seen that 64% of institutions with 2 or more specialist obstetricians have had section rates above the 50th centile (CS rates of 30%) in 2010 and this has remained the same in 2011. In the institutions with a single specialist obstetrician the proportion of institutions with rates over the 50th centile (CS rates of 30%) has increased from 26% in 2010 to 31% in 2011.

4.1.2 Elective caesarean sections

The prospective morbidity data collected over a period of four weeks provided information on the proportion of caesarean sections performed as an elective/emergency. Figure 4.7 shows the wide variation in the elective section rates in individual institutions as well as the variation in the proportion of elective sections compared to the emergency section rate and the total section rate (TSR). It is also seen that within each type the CS rates both elective and total vary greatly with a few institutions having high values.

Figure 4.7: Caesarean section rate per 100 births and elective and emergency section rates per 100 births by institution



*Note TSR – total caesarean section rate

The elective and emergency section rates calculated based on the total number of births during the same period are presented in table 4.5. The calculations are based on data for 4 weeks and needs to be interpreted with some caution.

Table 4.5 shows that the elective section rates increase with increasing hierarchy of institutions. It is also observed that in the Base Hospitals the elective rate per 100 deliveries exceeds the rate for emergency sections. In institutions where there is only one specialist obstetrician the elective rate is higher than

Table 4.5: Caesarean sections per 100 deliveries by type of section

Type of caesarean section	*Type of institution					National	**National survey UK
	TH/PGH	DGH	BH	Two or more specialist obstetrician	One specialist obstetrician		
Elective CS per 100 deliveries	16.10	15.10	14.60	15.67	13.95	14.8	9.3
Emergency CS per 100 deliveries	19.20	16.40	14.10	17.89	11.91	16.1	14.5
Total CS per 100 deliveries	35.30	31.4	28.7	33.56	25.85	31.0	23.8
Elective CS rate as % of total CS rate	45.7	48.0	50.9	46.7	54.0	47.7	40

*Calculations based on 4 weeks prospective data

**based on a national survey of 147 726 caesarean sections (Bragg, Cromwell, Edozien et al BMJ, 2010)

the emergency CS rate, however the elective CS rate is lowest in these institutions compared to institutions with more than one specialist obstetrician.

Although the Sri Lankan rates given in table 4.5 are based on data for four weeks compared to the UK national survey where data were collected for a 12 month period and reasons for CS rates may vary between the two countries, it is seen that in all levels of hospitals the total caesarean section rates as well as the elective sections per 100 deliveries exceed the rates seen in UK.

The emergency section rates seen in TH/PGH and DGH exceed the UK figures and are most likely to be due to differences in obstetric morbidity. The emergency section rates are 1.1 times the UK rate (1.3 and 1.1 times in TH/PGH and DGH respectively}. Compared to this it is interesting to note that the elective section rate in Sri Lanka is 1.6 times higher

than the UK rate (1.8, 1.6 and 1.5 times in TH/PGH, DGH and BH respectively).

Table 4.6 shows the number of institutions by the elective CS rates.

Two thirds of the TH/PGHs have elective section rates exceeding 15%, while the majority of DGH and BH have elective section rates in the range of 5%-15%. Approximately 35% and 34% of DGH and BH respectively, have elective CS rates over 15%. It is seen that 35% of institutions with a single specialist obstetrician have elective CS rates exceeding 15%, compared to 49% institutions with more than one specialist.

Table 4.7 examines the proportion of electives out of the total CS performed in different levels of institution.

Table 4.6: Number of institutions by elective sections rate and by type

Elective caesarean section rate	TH/PGH	DGH	BH	Institutions with 2 or more specialist obstetricians	Institutions with one specialist obstetrician
No. of institutions	14	18	38	39	31
< 5 %	0	1	4	0	5
5.1 – 15.0 %	4	10	17	18	12
15.1 – 25.0 %	7	4	10	14	7
➤ 25.1 %	1	2	1	3	2
Total	12	17	32	35	26
No information	2	1	2	4	1
No CS performed	0	0	4	0	4

Table 4.7: Number of institutions by the proportion of elective sections and by type

Proportion of elective caesarean sections	TH/PGH	DGH	BH	Institutions with 2 or more specialist obstetricians	Institutions with one specialist obstetrician
No. of institutions	14	18	38	39	31
<20%	0	0	1	0	1
20-30%	1	1	2	3	1
31-40%	1	4	5	3	7
41-50%	7	6	6	14	5
51-60%	2	4	8	10	4
>60	1	2	10	4	9
Total	12	17	32	34	27
No information	2	1	2	5	0
No CS performed	0	0	4	0	4

*Data from prospective morbidity survey (information was not available for TH Mahamodara, PGH Kurunegala, PGH Anuradhapura, BH Balapitiya and BH Muthur)

Figure 4.8: Percentage of institutions by the proportion of elective sections according to type of hospital and functional classification

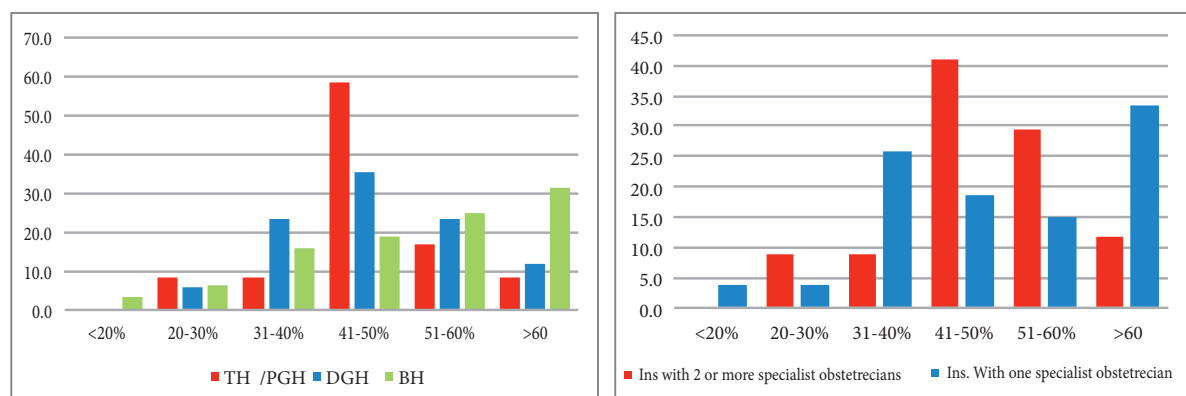


Table 4.7 showed that in 25%, 35% and 56% of institutions in the categories TH/PGH, DGH and BH have more than 50% of their CS deliveries carried out as elective procedures. In a majority of TH/PGH (58%) and DGH (35%) the proportion of electives is in the range of 41-50% while only 19% of the base hospitals have a similar proportion of electives. One of the reasons for a comparatively lower elective CS (in relation to emergency CS) in TH and PGH may be because of the high number of emergencies transferred from other hospitals.

It is interesting to note that in single specialist stations the proportion of institutions where elective sections exceed 50% is 48% compared to 41% in the institutions with two or more specialist obstetricians. This is possibly the reason for the pattern observed in the base hospitals. It may be that the proportion of elective CS is higher because emergencies needing caesarean sections are more likely to be transferred out of these institutions particularly since surgical services are not available on a 24/7 basis. An alternative explanation may be that the procedure is used as a “prophylactic” step to prevent an emergency.

It is most likely that both these factors contribute to the picture seen.

4.1.3 Indications for sections

A total of 963 caesarean sections were reviewed and the findings are presented collated at the national level.

Information on indications for caesarean sections was obtained from the ten caesarean section bed head tickets per unit that were perused. The data gathered is based on the condition recorded on the BHT as the indication for CS and objective criteria for diagnosis of the condition were not looked into. Where there was lack of clarity, information given in the rest of the BHT was taken in to consideration. Where further clarification was needed a member of the surgical team listed in the BHT was consulted.

Of the 963 BHTs studied, 3.9% did not have an indication mentioned, 57.2% had a single indications mentioned and 38.9% had multiple indications.

The indications for caesarean sections are presented in tables 4.8.

Three commonest indications for CS were previous uterine scar, foetal distress, failed induction. These three accounted for nearly 64.2 % of the caesarean sections. In 32.2% of caesarean sections a previous uterine scar was the stated indication and in 96% of these, the previous uterine scar was due to a previous caesarean section. Foetal distress accounted for nearly 20%. Failed induction was the indication given for 10 % of the caesarean sections. Complications of labour, such as cephalopelvic disproportion / dystocia/ failure to progress/ failed vacuum extraction or forceps accounted for nearly 9% of cases.

Table 4.8: Indications for caesarean section from the perusal of 10 BHTT per unit

*Some cases had more than one indication

Indication	No	%
No of LSCS Reviewed	963	
Previous caesarean section	310	32.2
Foetal distress	194	20.1
Failed induction	100	10.4
Cephalopelvic disproportion/dystocia/ failure to progress/ failed vacuum extraction or forceps	85	8.8
Any other obstetric complication	87	9.0
Breech	48	5.0
Pre-eclampsia/ Eclampsia	51	5.3
Suspected foetal growth impairment	29	3.0
Any other foetal indication	33	3.4
Other mal-presentations	23	2.4
Any other maternal medical complication	38	3.9
Subfertility	21	2.2
Multiple pregnancy	17	1.8
Gestational age 41 completed weeks or more	16	1.7
Elderly mother	20	2.1
Suspected/imminent uterine rupture	0	0.0
Previous uterine surgery	14	1.5
Large baby	15	1.6
Elderly primi	14	1.5
Maternal request	6	0.6
Other	37	3.8

Direct obstetric complications other than eclampsia / pre eclampsia accounted for 9% of sections. Breech presentation was the indication for nearly 5% of the CS and hypertensive diseases of pregnancy for another 5% of sections. Contrary to the common belief that client demand is a factor contributing to increasing rates of caesarean sections, in this analysis of 963 CS there were only 6 cases (0.6%) which listed this as an indication. However, it needs to be noted that this may not be documented on the BHT as an indication and that the data presented excludes information from the private sector. Note that the non state sector accounted for only 5.5% of births in the country in 2011.

4.1.4. Use of partographs among women having an emergency caesarean section

The data from the 10 CS per unit were further analysed to examine the use of partographs among 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 is not possible to assess whether the partograph was used in a comprehensive manner in reaching the decision to do the CS. Partograph use was further examined for the different indications for emergency caesarean section after excluding patients transferred from other institutions. The findings are presented in table 4.9.

Table 4.9: Comparison of indications for caesarean section by partograph use

	Emergency sections N = 401 *		Having a partograph	
	No	%	No.	%
Suspected foetal growth impairment	9	2.2	1	11.1
Foetal distress	152	37.9	74	48.7
Pre-eclampsia/ Eclampsia	28	7.0	4	14.3
Gestational age 41 completed weeks or more	4	1.0	0	0.0
3 rd trimester vaginal bleeding	2	0.5	1	50.0
Cephalopelvic disproportion/dystocia/ failure to progress/ failed vacuum extraction or forceps	66	16.5	50	75.8
Multiple pregnancy	8	2.0	2	25.0
Suspected/imminent uterine rupture	0	0.0	0	0.0
Previous caesarean section	57	14.2	8	14.0
Failed induction	78	19.5	44	56.4
Tubal ligation/sterilization	1	0.2	1	100.0
Maternal request	0	0.0	0	0.0
Any other obstetric complication	39	9.7	11	28.2
Any other foetal indication	20	5.0	10	50.0
Any other maternal medical complication	11	2.7	3	27.3
Large baby	2	0.5	1	50.0
Elderly primi	1	0.2	1	100.0
Subfertility	4	1.0	0	0.0
Elderly mother	5	1.2	0	0.0
Breech	6	1.5	0	0.0
Other malpresentations	13	3.2	8	61.5

(* Total sections which were not transferred and had undergone an emergency section)

Table 4.9 shows that in 88% of the emergency sections (excluding transfers) were due to four indications; foetal distress, failed induction, complications of labour (cephalopelvic disproportion / dystocia / failure to progress/ failed vacuum extraction or forceps) and a previous caesarean section. A partograph has been maintained in 76% of patients where cephalopelvic disproportion/dystocia/ failure to progress/ failed vacuum extraction or forceps were listed as the indication for section and in 56% of women where the indication was failed induction. Among those having an emergency section for foetal distress and previous CS only 49% and 14% respectively had a partograph maintained. None of the breech presentations that had emergency CS had a partograph.

4.1.5 Caesarean sections on patients transferred from other hospitals

At national level 6.5% of CS deliveries were on patients transferred from other hospitals (mostly as emergencies) and these may be considered as high risk surgeries. It is seen that in the Base Hospitals 6.8% of the sections have been on transfer patients while in TH/PGH this proportion is marginally lower being 6.6%. In the DGHs the proportion is 6.1%.

4.1.6 Selected care practices related to caesarean deliveries

Audit in to the process of caesarean deliveries were beyond the scope and objectives of the current assessment. However, a few selected care practices were looked into and are presented in this section.

Table 4.10 and 4.11 describe selected aspects of care provision for caesarean sections based on the 10 BHTs per unit perused. It is seen that the degree of completeness of recording of information on caesarean sections varied for the different areas in which information was sought and in the different types of institutions. The percentage of BHTs where the information sought was missing is indicated in the table under each section.

Table 4.10: Service provision for caesarean sections by type of institution

	TH / PGH		DGH		BH		National	
	No.	%	No.	%	No.	%	No.	%
No. of CS reviewed	363		246		354		963	
Percentage of sections for patients transferred from other institutions	24	6.6	15	6.1	24	6.8	63	6.5
Decision making for CS								
<i>Specialist Obstetrician</i>	312	86.0	233	94.7	334	94.4	879	91.3
<i>Senior Registrar</i>	18	5.0	0	0.0	0	0.0	18	1.9
<i>Registrar</i>	12	3.3	0	0.0	0	0.0	12	1.2
<i>Senior House Officer</i>	16	4.4	9	3.7	11	3.1	36	3.7
<i>Not stated</i>	5	1.4	4	1.6	9	2.5	18	1.9
Type of CS performed								
<i>Emergency</i>	177	48.8	124	50.4	149	42.1	450	46.7
<i>Elective</i>	176	48.5	103	41.9	194	54.8	473	49.1
<i>Not stated</i>	10	2.8	19	7.7	11	3.1	40	4.2
Type of anaesthesia used								
<i>General</i>	6	1.7	8	3.3	4	1.1	18	1.9
<i>Spinal</i>	343	94.5	224	91.1	347	98.0	914	94.9
<i>Epidural</i>	2	0.6	0	0.0	0	0.0	2	0.2
<i>Not stated</i>	12	3.3	14	5.7	3	0.8	29	3.0
Person who performed the section								
<i>Specialist Obstetrician</i>	26	7.2	25	10.2	40	11.3	91	9.4
<i>Senior Registrar</i>	15	4.1	0	0.0	0	0.0	15	1.6
<i>Registrar</i>	19	5.2	0	0.0	0	0.0	19	2.0
<i>Senior House Officer</i>	292	80.4	215	87.4	312	88.1	819	85.0
<i>Not stated</i>	11	3.0	6	2.4	2	0.6	19	2.0
Implementation of antacid prophylaxis policy	220	60.6	200	81.3	229	64.7	649	67.4
<i>Administration of prophylactic antibiotics</i>	288	79.3	194	78.9	274	77.4	756	78.5
<i>No. of patients undergoing LRT after the CS</i>	53	14.6	27	11.0	53	15.0	133	13.8
Average stay at the hospitals								
Mean	4.0		3.6		3.4		3.7	
Median	4.0		3.0		3.0		3.0	
Mode	3.0		3.0		3.0		3.0	
SD	1.7		1.2		1.2		1.4	
Range	2 - 9 days		2 - 9 days		2 - 9 days		2 - 9 days	

Table 4.11: Service provision for caesarean sections by the functional classification of institutions

	2 or more units		One unit 2 Specialist Obstetricians		One unit 1 Specialist Obstetrician		National	
	No.	%	No.	%	No.	%	No.	%
No. of CS reviewed	653		60		250		963	
Percentage of sections for patients transferred from other institutions	36	5.5	2	3.3	25	10.0	63	6.5
Decision making for CS								
<i>Specialist Obstetrician</i>	591	90.5	55	91.7	233	93.2	879	91.3
<i>Senior Registrar</i>	18	2.8	0	0.0	0	0.0	18	1.9
<i>Registrar</i>	12	1.8	0	0.0	0	0.0	12	1.2
<i>Senior House Officer</i>	23	3.5	3	5.0	10	4.0	36	3.7
<i>Not stated</i>	9	1.4	2	3.3	7	2.8	18	1.9
Type of CS performed								
<i>Emergency</i>	322	49.3	38	63.3	90	36.0	450	46.7
<i>Elective</i>	310	47.5	22	36.7	141	56.4	473	49.1
<i>Not stated</i>	21	3.2	0	0.0	19	7.6	40	4.2
Type of anaesthesia used								
<i>General</i>	13	2.0	1	1.7	4	1.6	18	1.9
<i>Spinal</i>	621	95.1	58	96.7	235	94.0	914	94.9
<i>Epidural</i>	2	0.3	0	0.0	0	0.0	2	0.2
<i>Not stated</i>	17	2.6	1	1.7	11	4.4	29	3.0
Person who performed the section								
<i>Specialist Obstetrician</i>	31	4.7	2	3.3	58	23.2	91	9.4
<i>Senior Registrar</i>	15	2.3	0	0.0	0	0.0	15	1.6
<i>Registrar</i>	19	2.9	0	0.0	0	0.0	19	2.0
<i>Senior House Officer</i>	571	87.4	58	96.7	190	76.0	819	85.0
<i>Not stated</i>	17	2.6	0	0.0	2	0.8	19	2.0
Implementation of antacid prophylaxis policy								
<i>Administration of prophylactic antibiotics</i>	454	69.5	52	86.7	143	57.2	649	67.4
<i>No. of patients undergoing LRT after the CS</i>	514	78.7	43	71.7	199	79.6	756	78.5
<i>No. of patients undergoing LRT after the CS</i>	94	14.4	9	15.0	30	12.0	133	13.8
Average stay at the hospitals								
Mean	3.8		3.6		3.3		3.7	
Median	4.0		3.0		3.0		3.0	
Mode	4.0		3.0		3.0		3.0	
SD	1.4		1.4		1.2		1.4	
Range	2 - 9 days		2 - 9 days		2 - 8 days		2 - 9 days	

Table 4.10 shows that at national level 4% of the BHTs did not document whether the CS was elective or not, 3% did not indicate the type of anaesthesia used and in 2% the information on the person who performed the section was not available.

Responsibility of making the medical decision

It is encouraging to find that at national level the medical decision to do CS was taken by specialist in 91% of the patients with a further 1.9% being taken by Senior Registrars. However, in 3.7% instances it is noted that the decision had been taken by a Senior House Officer. The lowest rate of specialist decision making (87%) was seen in TH/PGH in contrast to 95% and 94% in the DGH and BH respectively. This observation is possibly due to the presence of post graduate trainees in Obstetrics and Gynaecology in the capacity of Senior Registrars and Registrars in TH/PGHs.

Who does the caesarean sections?

Table 4.10 shows that at national level, Senior House Officers perform the CS in 85 % of instances, the rate being higher in Base Hospitals (90%). Nationally specialist are performing around 9% of the caesarean sections, the highest being in BH (11%). It was surprising to note that in TH and PGH only 9% of the sections were done by Senior Registrars and Registrars highlighting a concern from the point of skills development within the postgraduate training programme. When examined according to the functional classification it is seen that the percentage of CS done by Senior House Officers is lowest in institutions with one specialist. The findings highlight the need for addressing roles and responsibilities of different levels of staff as well as issues of accountability.

Type of anaesthesia used

At national level 95 % of caesarean sections have been conducted under spinal anaesthesia with a further 0.2% done under epidural. This healthy trend was seen uniformly in all three categories of hospitals with only less than 1-3% done under general anaesthesia.

Anti-acid prophylaxis

At national level 67% of women who had a CS had anti acid prophylaxis. This is seen to be highest in DGH (81%) followed by 64% in BH and 61% in TH/PGH. The lower proportions observed in the TH/PGH may be related to the higher proportion of emergency caesarean sections observed. When this is examined by functional classification it is seen that the lowest proportions are seen in single specialist stations (57%). Complacency in this area with a majority of women not getting anti acid prophylaxis is of concern as a failed spinal leading to the use of general anaesthesia is always a possibility in any patient.

Use of prophylactic antibiotics, associated LRT and duration of stay

Use of prophylactic antibiotics is high in all types of institutions, nearly 80% in BH, 79% and 72% in TH/PGH and DGH respectively. It is noted that at national level nearly 14% of women have undergone an LRT with the CS. The median and modal stay in hospital after a CS is highest in TH/PGH (4 days), while it is 3 days in all the others categories, possibly a reflection of the more complicated nature of cases seen in the apex institutions.

4.2 Use of Partograph

The use of the partograph provides some insights in to the practices of monitoring of labour and may be considered as being indicative of quality of intra natal care. In each unit data was collected from five partographs attached to bed head tickets of post natal patients in the ward on the day of the visit for data collection. The number of bed head tickets that had to be perused to identify 5 partographs was used as an indicator of the use of partograph in the unit but this information was not available for all the institutions. In the institutions where this information was available 85% of the BHTs perused had a partograph. Table 4.12 shows the use of the partograph by type of institution.

It is seen that the proportion of specialist institutions using a partograph is 91% while only 42% of non-specialist institutions use a partograph. The proportion of institutions using a partograph is highest in the DGHs being 94%, while TH/PGH and BH with specialist the use is 87% and 90% respectively. In the institutions below the level of a base hospital only 35% of institutions use a partograph. This is a

matter for concern as one of the main advantages in using the partograph is to identify the need for intervention early. This is most useful in the non-specialist hospitals where transfer at the appropriate time to the specialist hospital is of paramount importance.

It is seen that the recording of temperature, blood pressure, maternal pulse and foetal heart sounds are highest in the divisional level institutions. Recording of contractions is poor in all levels of institutions and varies from 62% - 79%. Findings of vaginal examinations (99%-89%) and foetal heart sounds (96%-100%) are the parameters that have been recorded in the most number of partographs while the descent of the head (48% to 75%) and the drawing of an alert line (47%- 63%) are poor.

Taking in to consideration that information was collected on the recording of parameters at least once on the partograph, it is seen that the overall quality of recording on the partograph is unsatisfactory. These findings suggest that the overall quality of monitoring of labour using the partograph has room for much improvement.

Table 4.12: Use of partograph by type of institution

	TH/PGH*		DGH		BH Functioning		All specialist		BH Upgraded		DH		All non specialist	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
No of hospitals	14		18		38		70		26		46		72	
No. of hospitals that use partographs	13	92.9	17	94.4	34	89.5	64	91.4	14	53.8	16	34.8	30	41.7
Number of partographs reviewed	182		102		177		461		70		65		135	
Temperature recorded at least once	110	60.4	54	52.9	119	67.2	283	61.4	42	60.0	56	86.2	98	72.6
Blood pressure recorded at least once	155	85.2	81	79.4	144	81.4	380	82.4	62	88.6	62	95.4	124	91.9
Maternal pulse recorded at least once	155	85.2	79	77.5	147	83.1	381	82.6	58	82.9	62	95.4	120	88.9
Foetal heart sounds recorded at least once	182	100.0	98	96.1	174	98.3	454	98.5	70	100.0	65	100.0	135	100.0
Contractions recorded at least once	136	74.7	78	76.5	110	62.1	324	70.3	55	78.6	50	76.9	105	77.8
Vaginal Ex. findings recorded at least once	175	96.2	101	99.0	168	94.9	444	96.3	62	88.6	62	95.4	124	91.9
Descent of the head recorded at least once	109	59.9	76	74.5	95	53.7	280	60.7	51	72.9	31	47.7	82	60.7
State of membranes mentioned	132	72.5	84	82.4	126	71.2	342	74.2	50	71.4	40	61.5	90	66.7
Alert line drawn	109	59.9	64	62.7	100	56.5	273	59.2	33	47.1	31	47.7	64	47.4
Time of delivery filled in	160	87.9	75	73.5	136	76.8	371	80.5	58	82.9	53	81.5	111	82.2
Findings marked else where in the BHT	76	41.8	74	72.5	108	61.0	258	56.0	32	45.7	39	60.0	71	52.6

4.3 Management of labour

4.3.1 Induction of labour

Table 4.13: Induction of labour by type of institution

	TH / PGH		DGH		Functional BH		Non-functional BH		Divisional Hospitals		Sri Lanka	
Total BHT's Examined in Obstetric wards	9506		7098		8928		1009		748		27289	
Documented details of labour	4949	68.9	3934	74.1	4991	77.6	328	95.6	169	60.4	14371	73.5
Labour - spontaneous	2273	45.9	2223	56.5	2693	54.0	300	91.5	168	99.4	7657	53.3
Labour - induced	2676	54.1	1711	43.5	2298	46.0	28	8.5	1	0.6	6714	46.7
Synto	2054	76.8	1239	72.4	1962	85.4	27	96.4	1	100.0	5283	78.7
prostaglandin	189	7.1	167	9.8	100	4.4	1	3.6	0	0.0	457	6.8
Synto + PG	260	9.7	150	8.8	127	5.5	0	0.0	0	0.0	537	8.0
Other	165	6.2	155	9.1	109	4.7	0	0.0	0	0.0	429	6.4

Table 4.13 indicates that nationally, labour is induced in 47% of patients and in the TH/PGH group it is 54%. Syntocinon is the most commonly used drug for induction (79%), methods/drugs other than Syntocinon and prostaglandins being used in 6% -9% of cases.

4.3.2 Selected practices related to labour

Table 4.15 describes the proportion of different types of institutions that use a selected practice related to labour. In some questions more than one response is possible and is indicated in the table.

Table 4.14: Induction of labour by functional classification

	2 or more units		One unit 2 specialist obstetricians		One unit 1 specialist obstetrician		Non functional BH		Divisional Hospitals		Sri Lanka	
Total BHT's Examined in Obstetric wards	16498		3343		5691		1009		748		27289	
Documented details of labour	8816	70.1	1900	78.5	3158	80.5	328	95.6	169	60.4	14371	73.5
Labour - spontaneous	4356	49.4	1092	57.5	1741	55.1	300	91.5	168	99.4	7657	53.3
Labour - induced	4460	50.6	808	42.5	1417	44.9	28	8.5	1	0.6	6714	46.7
Syntocinon	3483	78.1	594	73.5	1178	83.1	27	96.4	1	100.0	5283	78.7
prostaglandin	289	6.5	88	10.9	79	5.6	1	3.6	0	0.0	457	6.8
Synto + PG	378	8.5	59	7.3	100	7.1	0	0.0	0	0.0	537	8.0
Other	302	6.8	67	8.3	60	4.2	0	0.0	0	0.0	429	6.4

Table 4.14 shows that the induction rates are not different between institutions where there is one specialist obstetrician and where there are two specialist obstetricians or more. In the larger institutions where there are more than one unit the induction rates are higher.

Table 4.15: Selected practices related to labour by type of hospital

Type of hospital	TH/PGH		DGH		BH functioning		BH upgraded		Divisional Hospitals	
No. of Institutions	14		18		38		26		46	
No of Units	41		28		45		26		46	
Episiotomy	No	%	No	%	No	%	No	%	No	%
The current policy of the unit regarding application of episiotomy*										
Perform Episiotomy on all primies	33	80.5	21	75.0	35	77.8	17	65.4	20	43.5
Perform episiotomy on all multies	8	19.5	2	7.1	2	4.4	2	7.7	6	13.0
Perform episiotomy on selected primies	2	4.9	7	25.0	8	17.8	3	11.5	9	19.6
Perform episiotomy on selected multies	29	70.7	21	75.0	29	64.4	17	65.4	23	50.0
Local ansthesia to perform epis	25	61.0	15	53.6	21	46.7	6	23.1	13	28.3
Local ansthesia to suture	32	78.0	21	75.0	44	97.8	21	80.8	39	84.8
The person who performs the episiotomy*										
HO/MO	23	56.1	13	46.4	14	31.1	7	26.9	12	26.1
Nursing officer	34	82.9	20	71.4	34	75.6	14	53.8	17	37.0
Midwife	12	29.3	12	42.9	16	35.6	11	42.3	27	58.7
The person who suture the episiotomy*										
HO/MO	41	100.0	28	100.0	45	100.0	22	84.6	35	76.1
Nursing officer	0	0.0	0	0.0	0	0.0	2	7.7	4	8.7
Midwife	3	7.3	2	7.1	7	15.6	6	23.1	11	23.9
Pain relief										
The pain relief policy for normal vaginal delivery	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Epidural	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Pethidine	2	4.9	1	3.6	2	4.4	0	0.0	0	0.0
None	39	95.1	27	96.4	0	0.0	26	100.0	46	100.0
Active management of thirdstage of labour										
A clear policy on active management of third stage of labour is available	38	92.7	26	92.9	37	82.2	16	61.5	24	52.2
A written document giving policy / flow chart/ is displayed	17	41.5	13	46.4	11	24.4	2	7.7	2	4.3
Oxytocin is given immediately after the delivery	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
To all the cases	33	80.5	21	75.0	33	73.3	19	73.1	22	47.8
To selected cases	6	14.6	9	32.1	6	13.3	5	19.2	20	43.5
* More than one answer										

*more than one response possible

Table 4.15 shows that some “task shifts” have taken place in the practices related to episiotomy. The policy on application of episiotomy varies widely. The percentage institutions which perform episiotomy on all primipara, increases with increasing hierarchy of institution (80% in TH/PGH). The percentage of institutions which use local anaesthesia to perform episiotomy gradually decreases from TH/PGH (61%) to Divisional Hospitals (28.3%). The use of local anaesthesia to suture episiotomies is highest in Base Hospitals (97.8%). In all other type of institutions 20-25% of episiotomies are sutured without a local anaesthesia. It is observed that in nearly 33% of non specialist institutions episiotomies were sutured by nurses and midwives. This practice was noted in 7-15% of specialist institutions as well. It must be noted that this is a function assigned to medical

officers and that midwifery curricula for nurses and midwives do not include this skill.

The practice of pain relief during labour was noted to be unsatisfactory in all types of institutions. Only 5 obstetric units in the country reported the use of pethidine for pain relief during labour and none reported the use of epidural anaesthesia.

Active management of the third stage of labour is also variable and is not noted in institutions without specialist services. Only 80% of TH/PGH reported that Oxytocins are given immediately after delivery in all cases and the percentage gradually decreases according to the type of hospitals (DGH 75%, BH 73% and DH 48%).

Table 4.16: Availability of guide lines and protocols by type of institution

Guideline	Type of the Institution					Functional type			
	Teaching Hospital	Provincial General Hospital	District General Hospital	Base Hospital	Divisional Hospital	More than one unit	One unit with 2 specialist	One unit with one specialist	Upgraded to BH without a VOG
No. of Institutions	11	3	18	64	47	33	5	33	26
HSDP National guidelines on obstetric care	6	0	5	10	3	12	0	7	4
Labour room management guide	10	3	14	32	7	24	7	21	9
Pregnancy, child birth, postpartum and newborn care guide	9	2	9	16	5	20	3	11	4
Guidelines for the management of HIV infection in pregnancy in Sri Lanka	6	0	2	6	1	10	0	3	1
National guideline for the prevention and management of malaria in pregnancy	0	0	1	4	1	0	0	4	1
Guidelines on immunization against tetanus	3	0	0	6	6	3	0	3	2
Management of tuberculosis during pregnancy	0	0	2	2	2	2	0	2	0
Neonatal advanced life support protocol (wall chart)	6	0	9	11	1	12	4	8	2
Breast feeding booklets	9	1	12	36	16	18	7	20	16
Breast feeding flash cards	6	1	8	32	15	14	4	17	13

	50% or more institutions have the document
	49%-25% institutions have the document
	Less than 25% of the institutions have the document

4.4 Availability of guidelines and protocols for EmONC

A list of ten guidelines and protocols relevant to EmONC services which had been developed by the Ministry of Health in collaboration with the relevant professionals, specific disease control programs within the MoH and professional organizations and disseminated /distributed to hospitals was agreed upon. Information was collected on the physical availability of these in the wards and labour rooms.

It is seen that most of the guidelines (7/10) are available in more than 50% of the Teaching Hospitals. The National Guidelines on Obstetric Care, Labour Room Management Guide, Pregnancy, Child Birth, Postpartum and Newborn Care guide, Guidelines on STI and HIV, Neonatal advanced life support protocol, Breast feeding guidelines and Breast feeding flash cards were available in most of the teaching hospitals. However, guidelines on Malaria in pregnancy, TB in pregnancy and Immunisation against Tetanus were not available in most of the teaching hospitals. Malaria and Tetanus in pregnancy are uncommon conditions, and this is the very reason that these documents should be available for reference and guidance when the need arises. Since all Obstetric

Units conduct antenatal clinics it is important that the guideline on immunisation against tetanus be available in all units.

In the three PGHs none had the National Guidelines on Obstetric Care, Guidelines on HIV, Malaria, TB, and neonatal tetanus. However, more than 50% of the hospitals had Guidelines on HIV and the guideline on Pregnancy, Childbirth, Postpartum and the New-born care.

In the DGHs of the 10 guidelines assessed 4 were available in more than 50% of the institutions. These were Labour room management guide, Pregnancy, Childbirth, Postpartum and New born Care guide, Neonatal advanced life support protocol and the Breast feeding booklet.

In the case of Base Hospitals only 3 guidelines were available in more than 50% of the institutions. These were the Labour room management guide, Breast feeding booklets and breast feeding flash cards.

A paucity of guidelines was observed in the Divisional hospitals as a group. None of the guidelines were available in more than 50% of the institutions sampled. The Breast feeding booklets and Breast

feeding Flash cards were the only ones available in 49%-25% of the institutions. These non-specialist hospitals are the first point of access particularly to vulnerable populations such as women living in geographically difficult areas and estate populations. Guidelines related to EmNOC especially the National Guidelines on Obstetric Care would provide the essential guidance in the initial management of emergency situations.

In general, the availability of guidelines decreased from Teaching Hospitals to Divisional level institutions. The labour room management guide, breast feeding booklet and breast feeding flash cards were the most commonly available guidelines.



Postnatal ward- Courtesy of Dr. Dhammica Rowel

Chapter 5

Maternal mortality and morbidity

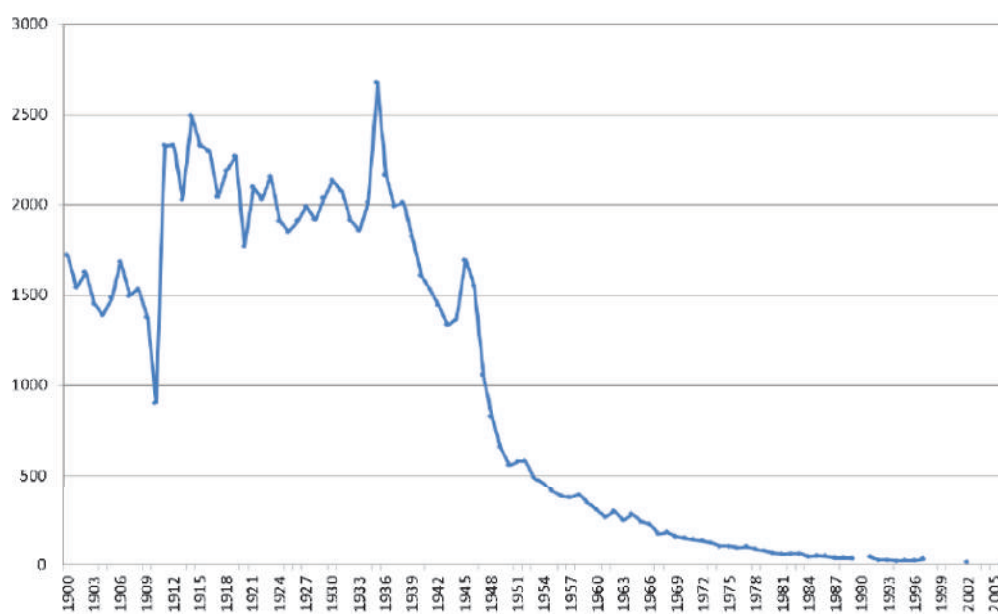
Information on maternal deaths was limited to the data available from the maternal mortality data base maintained at the FHB. Data for the period 2001 to 2010 was used to examine trends and those for the years 2009 and 2010 were analysed in detail. Morbidity data were collected prospectively for a period of four weeks from each unit in hospital included in the sample.

5.1 Maternal mortality

5.1.1 Trends in maternal mortality

Sri Lanka's achievement in reducing maternal mortality depicted in figure 5.1 has been one of the impressive aspects of its success in human development. As such this presentation on maternal mortality is begun by revisiting an old and familiar graph with pride.

Figure 5.1: Trends in maternal mortality 1900-2006 per 100 000 live births



Source of data: Registrar General.

A key contributor to the reduction in maternal mortality was the very early recognition and addressing the need for equitable access to health care and education especially that of women along with the state assuming responsibility for the provision of these services free of charge within a welfare system. This ideology can be traced back to ancient and medieval times when services were provided under the patronage of the King (Fernando 1996; Uragoda 1987). In more recent times it predates independence and can be traced back to the introduction of the elective principle as early as 1912, when “educated Ceylonese” were given the vote and universal franchise was granted in 1931 (Myrdal 1968).

Professionalization of midwifery, registration of maternal deaths and use of information on maternal deaths for high level advocacy resulted in the establishment and rapid expansion of field as well as institutional services for pregnant women. Reduction in infectious and parasitic diseases such as Malaria and helminthiasis, introduction of antibiotics, improvements in general health of the people, increasing access to institutional care especially to the rural poor and active efforts to increase utilization of both field and institutional services were contributory factors in the next phase.

In the subsequent period there was expansion of secondary and tertiary level institutions with specialized care leading to increasing utilization of

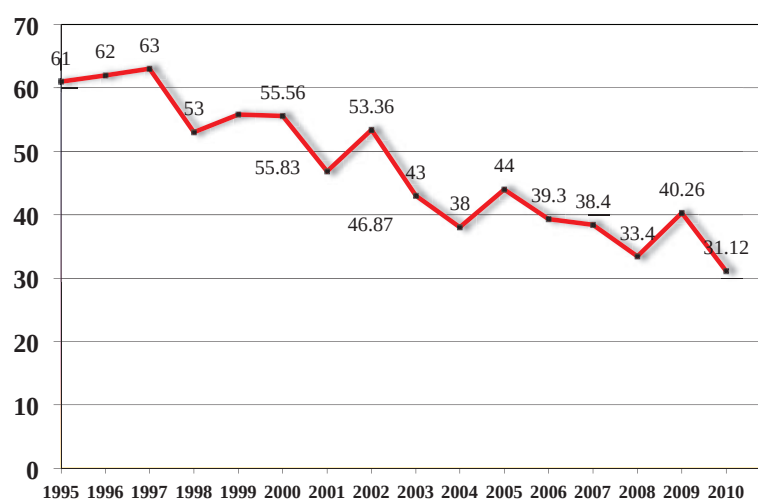
these specialized services by women, widened availability of blood and blood products, surgical interventions and improvements in transfer facilities. Surveillance of maternal deaths, monitoring systems that tracked the implementation of services and identified achievements, gaps and continued supportive supervision led to improvements in quality. Targeted interventions for especially vulnerable groups, declining fertility and increasing access to specialized services and emergency care are considered important contributors in the last few decades.

An important and key feature of the maternity care in Sri Lanka from its inception to date has been the strong and complementary nature of the links between institutional and field services.

The recent past

The data on maternal mortality from the maternal death surveillance system of the FHB have been used to examine the trends in maternal mortality in Sri Lanka for the 16 year period 1995-2010 and are presented in figure 5.2. The maternal mortality ratio calculated based on the FHB data is higher than the figure reported by the RG (Bandutilaka 1996, Rodrigo Fernando, Senanayaka et al 1996) and as such the data values given in the figures 5.1 and 5.2 are not identical since they are not from the same source. However, it is seen that the declining trend in MMR has continued over the period 1995-2010.

Figure 5.2: Trends in maternal mortality Sri Lanka 1995-2010 per 100,000 live births



Source: Maternal mortality data base, FHB

Figure 5.2 shows the decline in maternal mortality in the country over the past 16 years. It is seen that the maternal mortality has halved from 1996 (62 per 100,000 live births) to 2010 (31 per 100,000 live births).

**Table 5.1: Time to halve the maternal mortality ratio
1973 - 2010**

Year	MMR per 100,000 live births	Time taken to approximately halve (years)
*1973	121	8
*1981	58	11
*1992	27	14
**1996-2010	62-31	16

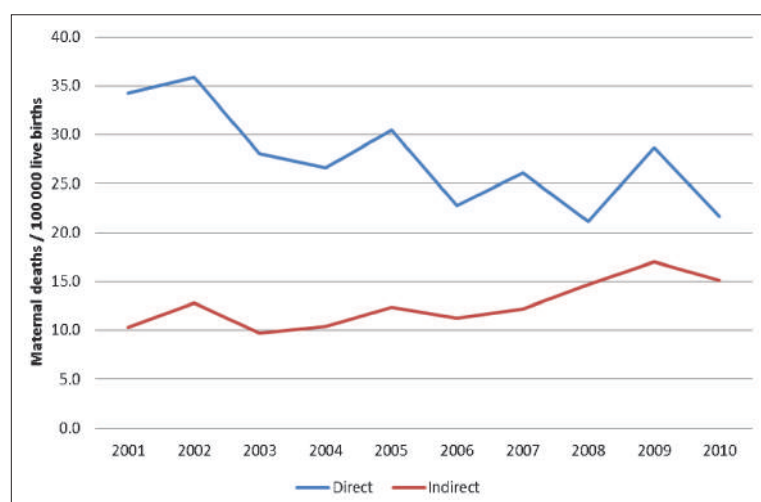
*Data from RG, **data from the FHB data base

Over the past 40 years the time taken to halve the Maternal Mortality Ratio in Sri Lanka has

progressively increased (Table 5.1). This is an anticipated phenomenon and is a result of multiple factors. Changing patterns of morbidity, where easily preventable morbidities have been replaced by conditions which cannot be prevented but needs emergency interventions. Some of these morbid conditions depend on costly and sophisticated critical care interventions and very highly skilled human resources. Similar trends have been observed in other countries that have reached low maternal mortality ratios (World Bank, 2003).

Figure 5.3 shows that while the direct maternal mortality ratios show a declining trend, the maternal mortality ratio due to indirect causes shows an upward trend.

Figure 5.3: Trends in Direct and indirect maternal death ratios



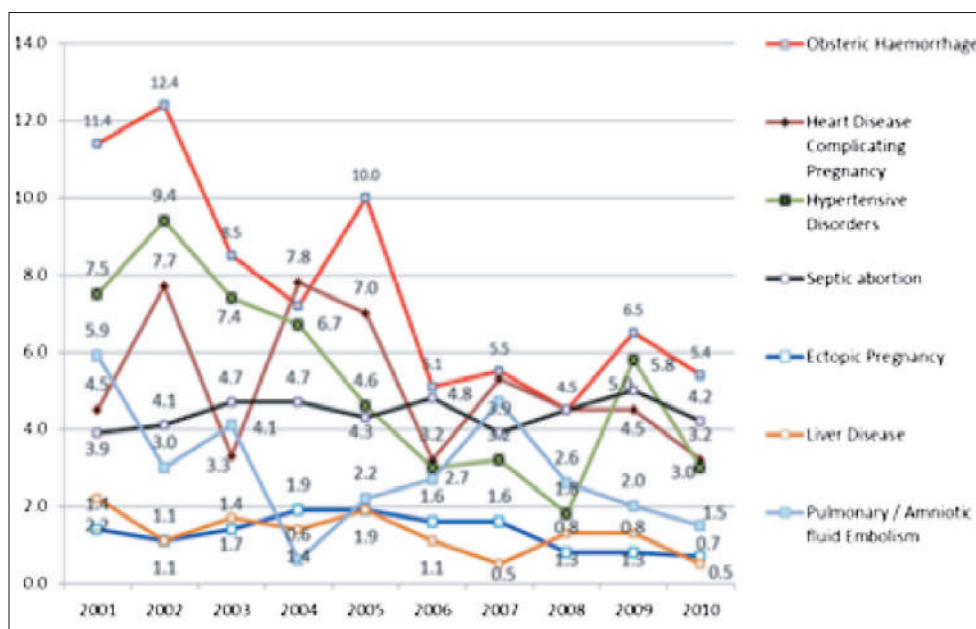
Trends in cause specific MMR

Figure 5.4 shows the cause specific maternal mortality ratios.

5.1.2: District differentials in Maternal Mortality 2001-2010

Figure 5.5 shows the differences in maternal mortality in each district during the period 2001-2010. Since

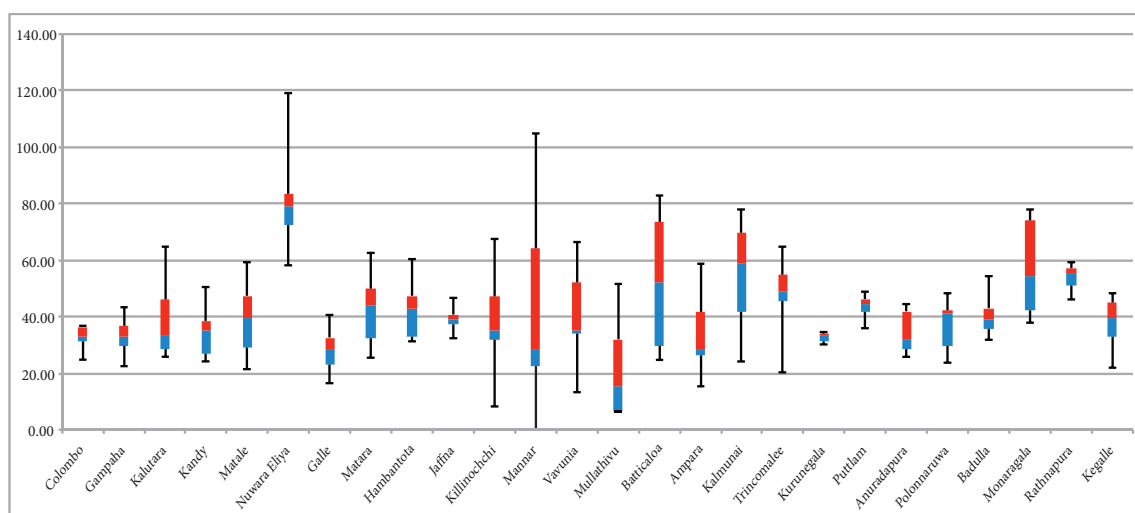
Figure 5.4: Cause specific maternal mortality ratio 2001 - 2010



It is seen that the mortality ratios due to PIH and PPH has declined over the period 2001-2010, however the MMR due to septic abortion has consistently remained approximately the same throughout the period. The ratios for the other causes show much fluctuation probably due to the small numbers of deaths in these categories.

the number of deaths per district is small and wide fluctuations in ratios can occur on account of a single death, 3 year moving averages were used. The box plot (figure 5.5) shows the mean, quartiles and the range of MMR in the three year averages for each district during the specified period of time.

Figure 5.5: Within district differences in MMR – 2001 – 2010



In the districts of Nuwara Eliya, Moneragala and Ratnapura the lowest values during the period exceed the highest value seen in Colombo. The districts in the Northern Province excluding Jaffna show a wide range in MMR. A similar pattern is seen in all districts in the Eastern Province. The wide range observed may be partly due to the relatively small number of deaths, fluctuation in number of deaths and changing population sizes and number of births registered. It may also be related to improvement in reporting seen in these two provinces in more recent years.

Figure 5.6 shows the difference between the highest district MMR and the lowest district MMR in a given year. In this computation too, 3 year moving averages have been used to overcome the wide fluctuation in values observed in the district ratios.

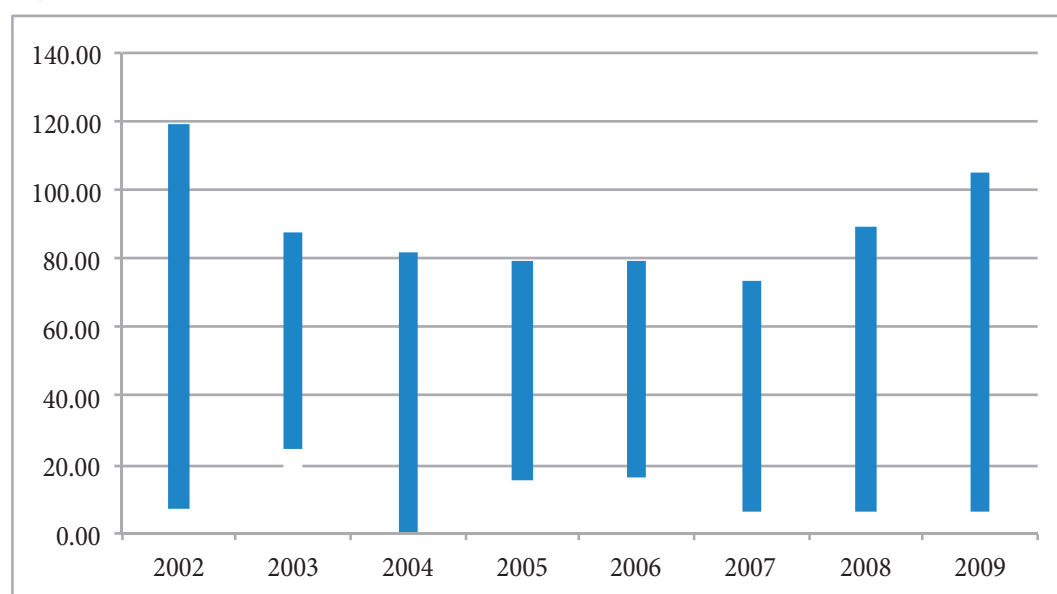
A progressive reduction in the differences in MMR between the districts has been a key feature of MMR decline in Sri Lanka (Rodrigo 1987, Attygala 2011). Figure 5.6 suggests a reversal of this trend in recent years (2008 and 2009) and may partly be due to increased reporting from the re-organised services in some districts of the Northern and Eastern provinces. This trend needs close observation.

5.1.3 Maternal mortality in 2009 and 2010

Data for the years 2009 and 2010 available in the maternal mortality data base maintained at the FHB, were studied in detail.

In 2009-2010 the maternal mortality ratio in Sri Lanka was 38.6 / 100 000 live births while MMR related to direct causes was 23.3 / 100 000 live births and indirect MMR was 14.6 / 100 000 live births.

Figure 5.6: Between district differences in MMR from 2001 – 2010



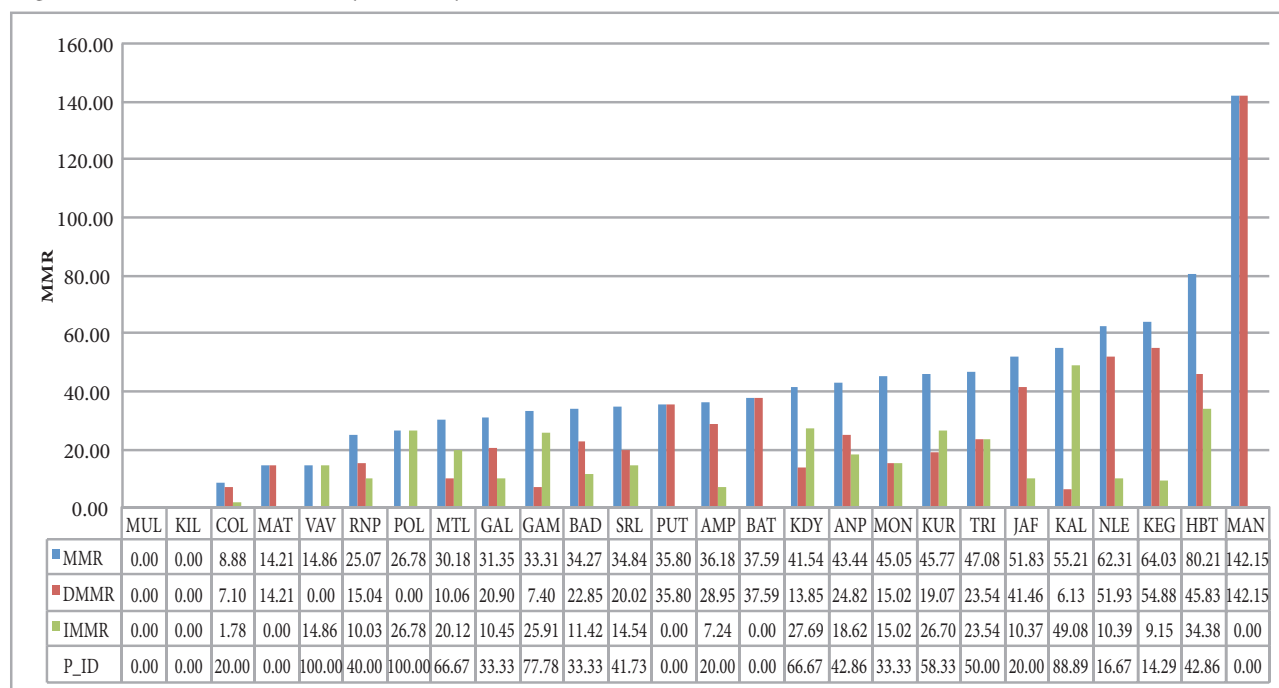
Inter district differentials in maternal mortality 2009 and 2010

The data presented in table 5.2 and figures 5.7 are based on the district of usual residence of the deceased.

Table 5.2: Inter district differentials in maternal mortality 2009-2010

	Total births 2009 / 10	Total maternal deaths	MMR	Direct maternal deaths	Direct maternal mortality ratio	Indirect maternal deaths	Indirect maternal mortality ratio
Colombo	114008	23	20.2	16	14.0	7	6.1
Gampaha	52183	18	34.5	7	13.4	11	21.1
Kalutara	33889	13	38.4	5	14.8	8	23.6
Kandy	60203	23	38.2	8	13.3	15	24.9
Matale	20399	10	49.0	5	24.5	5	24.5
Nuwara Eliya	20444	17	83.2	14	68.5	2	9.8
Galle	39863	10	25.1	6	15.1	4	10.0
Matara	28842	9	31.2	7	24.3	2	6.9
Hambantota	18465	13	70.4	9	48.7	4	21.7
Jaffna	16975	11	64.8	7	41.2	4	23.6
Mannar	2786	4	143.6	2	71.8	2	71.8
Vavuniya	9721	5	51.4	4	41.1	1	10.3
Mullativu	5485	0	0.0	0	0.0	0	0.0
Killinochchi	8479	0	0.0	0	0.0	0	0.0
Ampara	27955	9	32.2	6	21.5	3	10.7
Batticaloa	21749	6	27.6	5	23.0	1	4.6
Trincomalee	17747	12	67.6	7	39.4	5	28.2
Kurunegala	52967	25	47.2	13	24.5	12	22.7
Puttalam	28941	14	48.4	12	41.5	2	6.9
Anuradhapura	32608	13	39.9	7	21.5	6	18.4
Polonnaruwa	14907	8	53.7	5	33.5	3	20.1
Badulla	35601	10	28.1	6	16.9	4	11.2
Monaragala	13790	8	58.0	3	21.8	1	7.3
Ratnapura	41160	14	34.0	10	24.3	4	9.7
Kegalle	22241	11	49.5	9	40.5	2	9.0
Sri Lanka	741408	286	38.6	173	23.3	108	14.6

Figure 5.7: Maternal Mortality Ratio by district for 2009 and 2010



P_ID denotes the proportion of indirect maternal deaths

In the current scenario in Sri Lanka, district mortality ratios need to be interpreted with caution since ratios may show wide fluctuations from year to year due to the small numbers of deaths observed. However, the district ratios together with other data may be used to identify districts that need special attention. Figure 5.7 identifies Mannar as an outlier. It is important to recognize that the ratio is based on a relatively small number (4) of deaths over the two year period.

It is noted that the three districts Mannar, Hambantota, and Nuwara Eliya accounted for nearly 12% of the maternal deaths in 2009-2010, while they accounted for only 6% of the births in the country. It is seen that 8 districts have a MMR over 50 per 100 000 births compared to the national ratio of 39 per 100 000 live births. These districts are Vavuniya, Polonnaruwa, Moneragala, Jaffna, Trincomalee, Hambantota, Nuwara Eliya and Mannar.

The Direct maternal mortality in Sri Lanka is 23.3 per 100 000 live births. Compared to this, the districts of Kegalle, Vavuniya, Jaffna, Puttalam, Hambantota, Nuwara Eliya and Mannar have ratios varying from 40.5 – 71.8 per 100 000 live births.

The indirect maternal mortality ratio for the two years 2009-2010 is 14.6 per 100 000 births. Matale, Kandy, Trincomalee and Mannar have ratios varying from 24.5-71.8 per 100 000 births. It is seen that except in the districts of Gampaha, Kalutara, and Kandy in all other districts the direct maternal mortality ratio is higher than the indirect ratio. The ratio direct to indirect is high in Vavuniya (4) Kegalle (4.5) , Batticaloa (5), Puttalam (6.9), and Nuwara Eliya (7).

Description of Maternal Deaths 2009-2010

Maternal characteristics

Table 5.3: Characteristics of women experiencing maternal mortality

	Direct N = 174		Indirect N = 110		Total* N = 284	
	No.	%	No.	%	No.	%
Age distribution						
Less than 20 yrs.	13	7.5	5	4.5	18	6.3
21 - 40 yrs.	150	86.2	101	91.8	251	88.4
Above 40 yrs.	11	6.3	4	3.6	15	5.3
Ethnicity						
Sinhalese	120	69.0	83	75.5	203	71.5
Tamil	36	20.7	11	10.0	47	16.5
Moor	15	8.6	16	14.5	31	10.9
Other	2	1.1	0	0.0	2	0.7
No information	1	0.6	0	0.0	1	0.4
Civil status - single	12	6.9	2	1.8	14	4.9
Parity						
Primi	60	34.5	42	38.2	102	35.9
2 nd	42	24.1	30	27.3	72	25.4
3 rd	38	21.8	19	17.3	57	20.1
4 th	19	10.9	8	7.3	27	9.5
5 th and later	14	8.0	10	9.1	24	8.5
No information	1	0.6	1	0.9	2	0.7

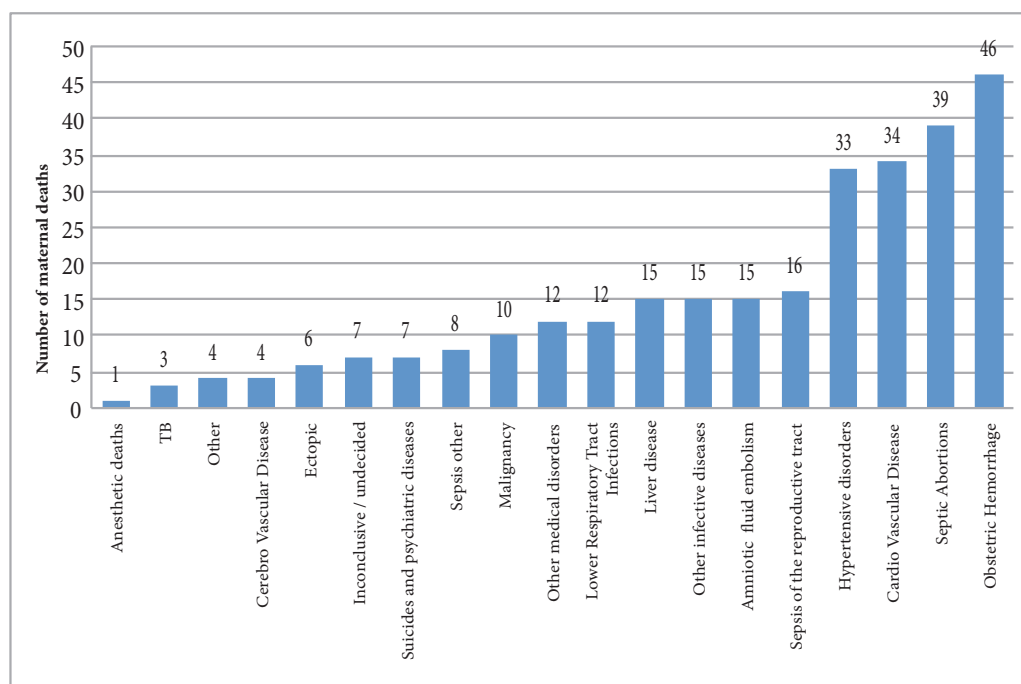
* During the period 2009-2010, the cause of death was reported as inconclusive in three women

Table 5.3 shows that the proportion of women experiencing a death due to direct obstetric causes compared to those dying of an indirect cause is higher among women in the extremes of reproductive life (below the age of 20 years and over the age of above 40 years), those of Tamil ethnicity and single women. It is also seen that in women of parity 3 and above, the proportion with deaths from direct obstetric causes is higher compared to indirect deaths.

Causes of maternal mortality

Causes of maternal mortality for the year 2009/2010 are given in figure 5.4. Obstetric haemorrhage and septic abortions and PIH still account for 41% of deaths.

Figure 5.8: Causes of maternal mortality 2009 & 2010



Selected service factors

Table 5.4 examines the maternal deaths in relation to the place of residence of the woman. Maternal mortality ratios were calculated for women living within a 30 km. buffer zone from institutions that are able to provide 24*7 CEmONC services and for those living outside such a zone.

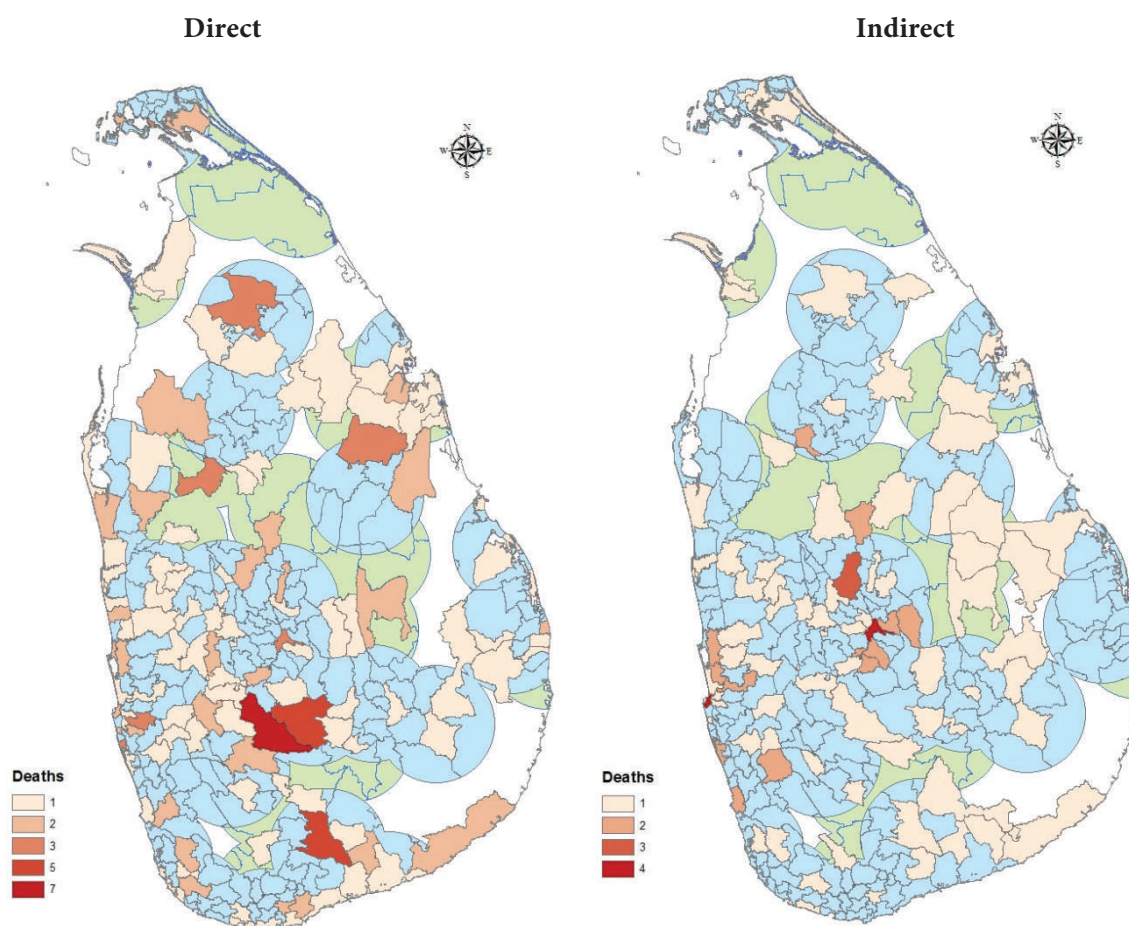
Table 5.4: MMR of women living within a 30 km. buffer zone of an institution able to provide 24*7 CEmONC services compared to those living outside the buffer zone by District

	Av. Births registered	Births within 30 km. buffer zone	Births outside the buffer zone	Average maternal deaths 2009-2010 within buffer zone	Average maternal deaths 2009-2010 outside buffer zone	Average MMR 2009-2010	Average MMR within buffer zone 2009-2010	Average MMR outside buffer zone 2009-2010
Colombo	57004	57004	0	12	0	21.05	21.05	0.00
Gampaha	26092	26092	0	9	0	34.49	34.49	0.00
Kalutara	16945	16325	620	7	0	41.31	42.88	0.00
Kandy	30102	29067	1035	11	1	39.87	37.84	96.65
Matale	10200	7265	2935	3	3	58.83	41.29	102.23
Nuwara Eliya	10222	10222	0	9	0	88.05	88.05	0.00
Galle	19932	19023	908	5	0	25.09	26.28	0.00
Matara	14421	12761	1660	4	1	34.67	31.35	60.23
Hambantota	9233	8987	245	5	2	75.82	55.64	814.87
Jaffna	8488	8170	318	5	1	70.69	61.20	314.85
Mannar	1393	100	1293	0	2	143.58	0.00	154.68
Vavuniya	4861	4577	284	2	1	61.72	43.70	352.32
Mullativu	2743	58	2684	0	0	0.00	0.00	0.00
Killinochchi	4240	204	4036	0	0	0.00	0.00	0.00
Ampara	13978	10058	3919	3	2	35.77	29.83	51.03
Batticaloa	10875	8764	2111	3	1	36.78	34.23	47.38
Trincomalee	8874	7030	1843	5	1	67.62	71.12	54.25
Kurunegala	26484	17419	9065	9	4	49.09	51.67	44.13
Puttalam	14471	12180	2291	4	4	55.28	32.84	174.61
Anuradhapura	16304	13524	2780	4	3	42.93	29.58	107.91
Polonnaruwa	7454	6808	646	4	1	67.08	58.76	154.84
Badulla	17801	15459	2342	4	2	33.71	25.88	85.41
Monaragala	6895	5264	1631	3	2	72.52	56.99	122.66
Ratnapura	20580	18284	2296	6	2	38.87	32.82	87.11
Kegalle	11121	11121	0	6	0	53.95	53.95	0.00
Sri Lanka	370704	332253	38451	117	27	38.85	35.21	70.22

The table shows that the MMR in women living in areas that fall outside the 30 km zone of an institution able to provide 24*7 CEmONC services is, twice that for women living in the areas within the buffer zone highlighting the importance of access to 24*7 CEmONC services for the population. This difference is clearly seen in the districts where accesses to such services are difficult.

The figure 5.9 maps the Divisional Secretariat area (DS division) of residence of women experiencing direct and indirect maternal deaths in the years 2009 and 2010. The map is based on numbers of deaths and not the MMR and the area in blue shows the area covered by a 30 km buffer around institutions providing 24*7 CEmONC services.

Figure 5.9 Direct and Indirect maternal deaths by DS division of residence in 2009 & 2010



**Area in blue represents the area covered by a 30 km. buffer around institutions able to provide 24*7 CEmONC services and area in green the 30 km buffer around institutions able to provide CEmONC care*

Table 5.5 (a) and (b) describes the distribution of maternal deaths in 2009 and 2010 by the type of institution where death occurred.

Table 5.5 (a): Distribution of maternal deaths by place of death (2009 & 2010)

	Maternal deaths				Total	
	2009		2010			
	No.	%	No.	%	No.	%
TH	82	51.3	58	45.7	140	48.8
PGH	3	1.9	3	2.4	6	2.1
DGH	34	21.3	28	22.0	62	21.6
BH	21	13.1	17	13.4	38	13.2
DH	3	1.9	5	3.9	8	2.8
Private hospital .	2	1.3	1	0.8	3	1.0
Home	6	3.8	7	5.5	13	4.5
On admission	2	1.3	2	1.6	4	1.4
Transit	6	3.8	5	3.9	11	3.8
NI	1	0.6	1	0.8	2	0.7
	160	100.0	127	100.0	287	100.0

Table 5.5 (b): Distribution of maternal deaths by place of death (2009 & 2010)

	Maternal deaths				Total	
	2009		2010			
	No.	%	No.	%	No.	%
24*7 CEmONC facilities	133	83.1	97	76.4	230	80.1
CEmONC facilities	5	3.1	8	6.3	13	4.5
Non CEmONC facilities	7	4.4	7	5.5	14	4.9
On transit	6	3.8	5	3.9	11	3.8
On admission	2	1.3	2	1.6	4	1.4
Home	6	3.8	7	5.5	13	4.5
No Information	1	0.6	1	0.8	2	0.7
Total	160	100.0	127	100.0	287	100.0

It is seen that an overwhelming proportion of deaths take place in TH/PGH type of institutions (51% of deaths compared to 40% of deliveries in TH/PGH) and in institutions where CEmONC services are available on a 24*7 basis. This is to be expected since emergencies as well as complicated cases from the lower levels of institutions are expected to be directed to such institutions. Around 5% of the deaths take place in institutions where CEmONC facilities are not available. The proportion of deaths occurring at home and on admission (6%) is far in excess of the proportion of home deliveries (0.1%) (Tables 5.5 (a) and (b)).

Causes of death in those who died at home or in transit

In the mothers who died at home, 4 cases each were due to septic abortions and suicides, while there were 2 malignancies and one case each of hypertensive disease, pneumonia and viral myocarditis.

The women who died of septic abortions, hypertensive disease, pneumonia and viral myocarditis are usually symptomatic, and often provide an adequate window of opportunity to treat leading to a good outcome if they had accessed health institutions early.

The four cases of suicide and the one death following postpartum depression emphasize the importance of attention to psychosocial problems during this period. The women who died at home following septic abortions highlight the importance of improving the attitudes of services providers in negating stigmatization within health care and in the community towards women following a septic abortion. It is important to sensitize the public and families on the preventability of deaths due to such conditions emphasizing the need for accessing health care early.

In the women who died in transit three cases were due to septic abortion, there were two cases each of ectopic pregnancy, heart disease and obstetric haemorrhage and a case each of hypertensive disease and rupture of an appendicular mass. Two deaths that took place at home as well as in transit from home to hospital were outside the 30 km buffer from a CEmONC facility.

MMR by institution where death occurred

Table 5.6a - C describe the maternal deaths by type of institution where death occurred.

Table 5.6 (a) MMR by type of institution where death occurred

Category	Maternal deaths in 2009 & 2010	Average no of maternal deaths for 2009 & 2010	Estimated births in government hospitals	Estimated MMR
TH / PGH	146	73	138782	52.6
DGH	62	31	90886	34.1
BH	38	19	101315	18.7
DH	8	4	19288	20.7
Total	254	127	350271	36.2

(There were 4 deaths on admission, 11 deaths in between hospitals, 3 deaths in private hospitals 13 home deaths and 2 with no information for the years 2009 and 2010)

Table 5.6 (b) MMR by institution where death occurred by EmONC category

Category	Maternal deaths 2009 & 2010	Average maternal deaths 2009/2010	Estimated births in government hospitals	Estimated MMR
Able to provide 24 * 7 CEmONC services	230	115	269981	42.6
CEmONC facilities	10	5	54690	9.1
Non – CEmONC facilities	14	7	25600	27.3
Total	254	127	350271	36.2

(There were 4 deaths on admission, 11 deaths in between hospitals, 3 deaths in private hospitals 13 home deaths and 2 with no information for the years 2009 and 2010)

The highest maternal mortality ratios are recorded in the TH/PGH type of hospitals and those with CEmONC facilities on a 24*7 basis. This is a reflection of the very ill patients seen in these institutions. It is noteworthy that the maternal mortality ratio is three times as high in the institutions that do not have CEmONC facilities compared to those with CEmONC services. This may partly be due to women accessing these services late or a failure in recognizing the need to transfer to a higher level of care.

The causes of death of the 14 women who died in institutions without CEmONC services are listed below:

Amniotic fluid embolism (1)
 Aspiration of food (epilepsy) (1)
 Heart disease (2)
 Hypertensive disease (1)
 Inconclusive (1)
 Obstetric Haemorrhage (1)
 Puerperal sepsis (3)
 Pulmonary fibrosis (1)
 Rupture of Renal artery aneurism (1)
 Rupture of Aortic artery aneurism (1)
 TB (1)

In conditions such as rupture of aneurysm (2) and amniotic fluid aspiration (1) instituting assistance and transferring the patient within the brief window of opportunity available to save the life of the woman may have posed a challenge for this level of institution. However, concern must be expressed on the failure to detect the need to transfer patients who had Pulmonary fibrosis (1), TB (1) and heart disease (2).

Whether there were delays in detection and appropriate management in the deaths (3) due to puperal sepsis and obstetric haemorrhage (1) are also matters for concern. The necessity to improve skills of healthcare providers in these institutions which cater to a small but vulnerable group of women has been highlighted elsewhere.

Table 5.6 (c) MMR by institution where death occurred by functional category

Category	MD 2009 & 2010	Average MD for 2009&2010	Estimated births in government hospitals	Estimated MMR
More than one unit	211	110.5	230449	47.9
One unit with 2 specialist obstetricians	27	13.5	39507	34.1
One unit with one specialist obstetrician	11	5.5	55963	9.8
Non specialized hospitals	5	2.5	24352	10.3
Total government hospitals	254	127	350271	36.2

(There were 4 deaths on admission, 11 deaths in between hospitals, 3 deaths in private hospitals 13 home deaths and 2 with no information for the years 2009 and 2010)

It is important to note that the MMR is higher where one unit is shared by two specialist obstetricians compared to where there is one unit with one specialist. It is noted that in institutions where there

is a single specialist obstetrician the MMR is similar to that of institutions without specialized services (table 5.6 (c)). These differences may reflect differences in type of cases seen and transfer patterns of patients.

MMR by hospital of first admission

Table 5.7 (a) MMR by type of hospital of first admission

Category	MD 2009 & 2010	Average MD for the period	Estimated births in government hospitals	Estimated MMR
TH / PGH	91	45.5	138782	32.8
DGH	56	28	90886	30.8
BH	62	31	101315	30.6
DH	48	24	19288	124.4
Total	257	128.5	350271	36.7

(* there were 23 home deaths, 5 deaths at private hospitals and 2 deaths with no information)

Table 5.7 (b) MMR by EmONC status of hospital of first admission

Category	MD 2009 & 2010	Average MD for the period	Estimated births in government hospitals	Estimated MMR
24 * 7 CEmONC facilities	174	87	269981	32.2
CEmONC facilities	24	12	54690	21.9
Non EmONC facilities	59	29.5	25600	115.2
Total government hospitals	257	128.5	350271	36.7

(* there were 23 home deaths, 5 deaths at private hospitals and 2 deaths with no information)

Table 5.7 (c) MMR by hospital of first admission by functional classification

Category	MD 2009 & 2010	Average MD	Estimated births in government hospitals	Estimated MMR
More than one unit	155	78.5	230449	34.1
One unit with 2 specialist obstetricians	32	16	39507	40.5
One unit with one specialist obstetrician	11	5.5	55963	9.8
Non specialized hospitals	59	29.5	24352	121.1
Total government hospitals	257	128.5	350271	36.7

(* there were 23 home deaths, 5 deaths at private hospitals and 2 deaths with no information)

Tables 5.7 (a) to (c) show that higher maternal mortality is observed among women who have been first admitted for delivery to a unit where specialist services are not available. A detailed review of these deaths is necessary to plan actions to avert these deaths. The MMR is higher for women admitted to institutions where two specialist obstetrician share a unit compared to institutions with more than one

unit and where there is a single unit with one specialist obstetrician. This underscores the importance of identifying difficulties in service provision under these circumstances.

Table 5.8 shows the comparison between direct and indirect deaths by time and place of death.

Table 5.8: Distribution of maternal deaths based on the time of death and place of death

	Direct		Indirect		Total	
	N = 174		N = 110		N = 284	
	No.	%	No.	%	No.	%
<i>Time of death</i>						
Ante natal	56	32.2	53	48.2	109	38.4
Intra natal	7	4.0	1	0.9	8	2.8
Post natal	109	62.6	56	50.9	165	58.1
No information	2	1.1	0	0.0	2	0.7
<i>Place of death</i>						
Home	8	4.6	6	5.5	14	4.9
In between	8	4.6	3	2.7	11	3.9
On admission	2	1.1	4	3.6	6	2.1
No information	1	0.6	0	0.0	1	0.4
Hospital	155	89.1	99	90.0	254	89.4
<i>Able to provide 24*7 CEmONC services</i>	140	90.3	88	88.9	228	89.8
<i>CEmONC facility</i>	9	5.8	4	4.0	13	5.1
<i>Non EmONC facility</i>	6	3.9	7	7.1	13	5.1
<i>TH/PGH</i>	78	50.3	67	67.7	145	57.1
<i>DGH</i>	45	29.0	16	16.2	61	24.0
<i>BH</i>	28	18.1	10	10.1	38	15.0
<i>DH</i>	2	1.3	5	5.0	7	2.7
<i>Private hospitals</i>	2	1.3	1	1.0	3	1.2
<i>Time of Delivery</i>						
During weekdays	113	64.9	72	65.5	185	65.1
During weekends /Public holidays	54	31.0	32	29.1	86	30.3
No information	7	4.0	6	5.5	13	4.6

(There were three deaths in 2009 and 2010 where information was not available or inconclusive)

It is seen that indirect deaths are commoner in the antenatal period while the opposite is true for direct deaths. As could be expected the proportion of maternal deaths due to indirect causes are more than those due to direct causes in TH/PGH type institutions. There is no difference between direct and indirect causes of death in respect of the day of the week when deaths take place. If births and maternal deaths are assumed to be equally distributed among the days of the week, the proportion of deaths occurring during weekends and public holidays should be the same as the proportion of public

holidays and weekends during the given period. The proportion of public holidays and weekends during 2009-2010 was 35.3% marginally higher than the proportion of deaths during weekend and public holidays (30.3%) showing that there is no evidence to suggest that mortality is increased during weekends and public holidays.

Table 5.9 describes the deaths by the type of institution where death took place and the type of institution where the patient was first admitted.

Table 5.9 (a): Maternal deaths by place of first admission vs. place of death by type of hospital

Place of first admission	Place of death											
	TH/PGH		DGH		BH		DH		Transit		Home	
TH/PGH	91	62.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
DGH	6	4.1	49	79.0	1	2.6	0	0.0	0	0.0	0	0.0
BH	20	13.7	5	8.1	34	89.5	0	0.0	3	27.3	0	0.0
DH	27	18.5	7	11.3	3	7.9	8	100.0	3	27.3	0	0.0
Home	0	0.0	0	0.0	0	0.0	0	0.0	5	45.5	13	100.0
Total	146	100.0	62	100.0	38	100.0	8	100.0	11	100.0	13	100.0

Of the 146 deaths reported from TH/PGH type institutions 62% had been admitted to the same type of institution. This means that 38% of deaths occurring in this type of institution have been transferred from a lower level of institution. In TH/PGHs the proportion of deaths in patients first admitted to DHs is seen to be higher than those from BHs and DGHs. This may be influenced by the distance from DH to TH/PGH as well as delays in recognition of emergencies, care prior to transfer such as stabilization and preparation of patient for transfer etc. and needs detailed study.

Of the 62 women who were first admitted to a BH 55% had died in the same type of institution compared to 17% (8/48) women first admitted to DHs an indication of the transfers from the units with no specialist services.

Table 5.9 (b) shows that of the 230 women who died in an institution that is able to provide all 9 signal functions nearly 3/4th were first admitted to an institution of the same type. It is important to note that out of 60 women admitted to institutions where there were no Comprehensive EmONC services 14, (23.3%) had died in an institution of the same level. The causes of death in these 14 women were presented earlier.

The findings presented in tables 5.9 (a) and (b) highlight the need to explore in detail the pathways of care, processes leading to death and problems encountered in service provision. This is essential if further reductions in maternal mortality are to be achieved. Such details are unlikely to be revealed in a non-confidential inquiry into maternal deaths.

Table 5.9 (b): Maternal deaths by place of first admission vs. place of death by EmONC status

Place of first admission	Place of death											
	24_7 C_EmONC capable		C_EmONC capable		Non C_EmONC		On admission		Transit		Home	
24_7 C_EmONC capable	173	75.2	1	7.7	0	0.0	0	0.0	0	0.0	0	0.0
C_EmONC capable	16	7.0	9	69.2	0	0.0	0	0.0	3	27.3	0	0.0
Non EmONC	40	17.4	3	23.1	14	100.0	0	0.0	3	27.3	0	0.0
Home	0	0	0	0.0	0	0.0	4	100.0	5	45.5	13	100.0
Total	230	100.0	13	100.0	14	100.0	4	100.0	11	100.0	13	100.0

(There were two deaths where information was not available. The total in the table above include deaths on admission also)

Transfer of patients experiencing a maternal death

Table 5.10 (a): Distribution of transfers by type of institution of origin and final destination

Institution of origin	Institution of final destination								Total
	TH/PGH		DGH		BH		Transit		
TH/PGH	9	100.0	0	0.0	0	0.0	0	0.0	9
DGH	6	66.7	2	22.2	1	11.1	0	0.0	9
BH	20	64.5	5	16.1	3	9.7	3	9.7	31
DH	27	67.5	7	17.5	3	7.5	3	7.5	40
Private Hospitals	2	66.7	1	33.3	0	0.0	0	0.0	3
Total	64	69.6	15	16.3	7	7.6	6	6.5	92

Of the 262 (2009 & 2010) women dying in government hospitals, 92 (35%) have been transferred from the institution of first admission and Table 5.10 (a) and (b) show the pattern of transfer. It is important to note that that 7% of women (6/92) transferred from one institution to another had died in transit. It is seen that of the women first admitted to DGH, BH, and DH type of institutions 32.5%- 35.5% had died in the same type of institution.

from a non EmONC facility. Although these percentages are influenced by the condition of the patient on admission to the institution of origin as well as the type of morbidity seen, it is important to study in detail the care received to stabilize the patient prior to transfer and the medical assistance received during transit with a view to minimizing such events.

Table 5.10 (b): Distribution of transfers by EmONC status of institution of origin and final destination

Institution of origin	Institution of final destination						Total
	24*7 CEmONC facilities		CEmONC facilities		Death on transit		
	No	%	No	%	No	%	
24*7 CEmONC facilities	27	96	1	4	0	0	28
CEmONC facilities	16	84	0	0	3	16	19
Non EmONC facilities	40	89	2	4	3	7	45
Total transferred	83	90	3	3	6	7	92

It is noted that 10% of transfers from BHs and 8% from DHs have died in transit while 16% transferred from a CEmONC facility had died compared to 7%

Table 5.10(b) show that the majority of women (84%-89%) first admitted to a CEmONC facility or a non EmONC facility has died in a 24*7 CEmONC facility.

Table 5.10 (c) Pattern of delay according to the three delay model in maternal deaths transferred from non EmONC facilities

Delay	No	Percentage
No delay	9	20.0
D1	8	17.8
D3	14	31.1
D1 & D2	3	6.7
D1 & D3	7	15.6
D1, D2 & D3	2	4.4
No information	2	4.4
Total transferred from non-EmONC facilities	45	100.0

Table 5.10 (c) shows that no delay had occurred in only 20% of women out of the maternal deaths that were transferred. Institutional delays by itself was noted in 31% of deaths where a transfer had taken place and if institutional delays in combination with other delays are taken into account this proportion increases to 51%.

Maternal deaths according to the three delays model

The type of delay as documented in the maternal mortality data base maintained at the FHB was used in this analysis. No data were available to assess the contribution made by the delay to the deaths. Information on delays was missing in 20 (8%) cases of maternal death.

The “Three Delays” model defines D1 as delay in deciding to seek appropriate medical help for an obstetric emergency; D2 delay in reaching an appropriate obstetric facility; and D3 as delay in receiving adequate care when a facility is reached.

Table 5.11 highlight the fact that irrespective of the type of institution of first admission of a maternal death, some delay (delay 1, 2, or 3) has been observed in over 2/3rd of maternal deaths, the proportion with delay in deaths due to direct causes is marginally higher (69%) than in those due to indirect causes (63%).

Table 5.11 Comparison of direct and indirect maternal deaths by place of first admission and by delay

	Direct				In-direct				Total			
	With delay	%	No delay	%	With delay	%	No delay	%	With delay	%	No delay	%
24*7 CEmONC care facilities	87	69.6	38	30.4	50	60.2	33	39.8	137	65.9	71	34.1
CEmONC facilities	4	44.4	5	55.6	4	100.0	0	0.0	8	61.5	5	38.5
Non EmONC facilities	5	83.3	1	16.7	5	71.4	2	28.6	10	76.9	3	23.1
Total	96	68.6	44	31.4	59	62.8	35	37.2	155	66.2	79	33.8

Table 5.12 (a): Type of delay by institution of first care

	No delay	D1	D2	D3	D1 & D2	D1 & D3	D2 & D3	D1 & D2 & D3	No information	Total
Institution of 1st care										
24*7 CEmONC capable	57	38 37.6	3 3.0	29 28.7	6 5.9	20 19.8	2 2.0	3 3.0	16	174
CEmONC capable	8	8 44.4	0 0.0	7 38.9	0 0.0	3 16.7	0 0.0	0 0.0	2	28
Non CEmONC	14	12 27.3	0 0.0	16 36.4	3 6.8	11 25.0	0 0.0	2 4.5	2	60
TH/PGH	32	23 45.1	1 2.0	15 29.4	3 5.9	7 13.7	0 0.0	2 3.9	8	91
DGH	17	10 30.3	2 6.1	9 27.3	3 9.1	8 24.2	0 0.0	1 3.0	6	56
BH	17	13 32.5	0 0.0	14 35.0	0 0.0	11 27.5	2 5.0	0 0.0	5	62
DH	11	12 33.3	0 0.0	11 30.6	3 8.3	8 22.2	0 0.0	2 5.6	1	48
Private hospital	2	1 33.3	0 0.0	2 66.7	0 0.0	0 0.0	0 0.0	0 0.0	0	5

Note: 5 deaths during transfer

Table 5.12 (a) examines the delays at the institution of first admission. No delays were noted in 33% and 35% of deaths first admitted to an institution with 24*7 CEmONC services and to TH/PGH institution respectively.

It is very important to note that first delay was observed in nearly 38% and 45% of deaths on first admission to a 24*7 CEmONC facility and a TH/PGH respectively. This identifies an area for intervention through education of women and the community.

It is encouraging to note that once the decision is made the delay in reaching a facility is very low, a reflection of the wide network of health care institutions in the country.

The third delay was observed in isolation in nearly 30% of the cases of death. Delay three (D3) is seen in all categories of institutions, the highest proportions of delay three by itself is seen in BH and in institutions with CEmONC services, the lowest being in institutions without specialist services.

Table 5.12(b): Type of delay by institution of death

Institute of death	No delay	D1	D2	D3	D1&D2	D1&D3	D2&D3	D1&D2&D3	No information	Total
24*7CEmONC	71	50 36.0	3 2.2	45 32.4	8 5.8	28 20.1	2 1.4	3 2.2	20	230
CEmONC	5	2 25.0	0 0.0	3 37.5	0 0.0	2 25.0	0 0.0	1 12.5	0	13
Non EmONC	3	5 45.5	0 0.0	2 18.2	0 0.0	4 36.4	0 0.0	0 0.0	0	14
TH/PGH	48	33 38.4	1 1.2	29 33.7	6 7.0	14 16.3	1 1.2	2 2.3	12	146
DGH	16	12 30.8	2 5.1	11 28.2	2 5.1	10 25.6	0 0.0	2 5.1	7	62
BH	11	7 26.9	0 0.0	9 34.6	0 0.0	9 34.6	1 3.8	0 0.0	1	38
DH	2	5 83.3	0 0.0	0 0.0	0 0.0	1 16.7	0 0.0	0 0.0	0	8
Private hospital	2	0	0	1	0	0	0	0	0	3

When delays are examined by the type of institution where death took place, it is seen that the first delay is very high. Here too nearly a third experience institutional delays. These are two points for action.

It is important to examine the type of delay by the cause of death so as to plan specific preventive measures. Tables 5.13 and 5.14 present this data for direct and indirect maternal deaths respectively.

Table 5.13 Details of delay according to cause of death (Direct Maternal Deaths)

	No delay	D1	D2	D3	D1 & D2	D1 & D3	D2&D3	D1,D2,D3	No information	Total with delay	Total
Amniotic Fluid Embolism	10	1	0	2	0	0	0	0	1	3	3
Anaesthetic drug related death	0	0	0	1	0	0	0	0	0	1	1
DIC due to IUD	0	0	0	1	0	0	0	0	0	1	1
Ectopic pregnancy	0	2	0	2	0	0	0	1	1	5	6
HELLP Syndrome	6	2	0	1	0	0	0	0	0	3	9
Hypertensive Disorder	6	6	1	1	1	6	1	0	0	16	22
Liver Disease	3	2	0	0	0	0	0	0	3	2	8
Obstetric Haemorrhage	13	5	0	18	1	2	0	3	4	29	46
Peri partum Cardiomyopathy	0	1	0	0	0	0	0	0	0	1	1
Postpartum Depression	0	0	0	1	0	0	0	0	0	1	1
Puerperal Sepsis	2	2	1	3	0	1	0	0	0	7	9
Pulmonary Embolism	1	0	0	0	0	0	0	0	0	0	1
Septic Abortion	3	20	0	0	3	7	0	0	6	30	39
Septicaemia	1	3	0	4	0	1	0	0	0	8	9
Suicide	0	1	0	0	0	1	0	0	0	2	2
Uterine Inversion	0	0	0	1	0	0	0	0	1	1	2
Unascertained	2	0	0	1	0	0	0	0	0	1	3
Total	47	45	2	36	5	18	1	4	16	111	174

It is seen that in 18 out of 46 (39%) deaths due to obstetric haemorrhage recorded institutional delays by itself. This increases to 23 (46%) where institutional delays occurred together with other delays (D1 and D2). This identifies an important point for intervention by way of strengthening and improving the care provided in managing PPH and may help in preventing a large number of maternal deaths.

In deaths due to septic abortions, the main delay has been a delay in reaching services (D1). Out of the total deaths due to septic abortions (20/39) in 51% the delay was of the first type. This increased to 77% (30/39) if D1 is considered with other types of delays as well. This is related to the fact that an induced abortion is often carried out in Sri Lanka as an illegal procedure under unsafe conditions. It is therefore important to prevent unwanted pregnancies and decriminalize the abortion seeker. Studies have

recorded (Arambepola, 2009) that post abortion care of such patients especially in respect of attitudes of staff can be much improved. Education of the public about the risks of induced abortions and changes in perceptions of the community regarding treatment in hospital as well as attitudinal changes among care providers are essential if this delay is to be reduced.

In the 22 deaths due to hypertensive disease a delay has been recorded in 16 (16/22). It is important to ensure early recognition of women at risk of developing hypertensive disease and complications of the condition. Protocols in the management of hypertensive illness must be available and adhered to, at all levels of institutions. It was noted in chapter 3 (table 3.6 (b)) that magnesium sulphate was not available in 46% of institutions below the level of a base hospital.

Delay 3 was observed in 3 cases of puperal sepsis an eminently preventable and a treatable condition. In a country where institutional deliveries have reached 99.9% (478 home deliveries in 2011, amounting to 0.1%, RHMS) this needs to be viewed with concern. It is important not to be complacent about sepsis as a contributor to maternal morbidity and mortality as a “thing of the past”.

Delay 3 was also seen in two deaths due to ectopic pregnancy among a total of 6 deaths. Strengthening the services at the first contact point (OPD/PCU), gynaecology and surgical services in maintaining a high degree of suspicion is essential for early detection and intervention in these cases.

Table 5.14: Details of delay according to cause of death (Indirect Maternal Deaths)

	No delay	D1	D2	D3	D1 & D2	D1 & D3	D2&D3	D1,D2,D3	No information	Total with delay	Total
Acute Glomerular Nephritis	0	1	0	0	0	0	0	0	0	1	1
Aspiration of Food-Epilepsy	0	1	0	0	0	0	0	0	0	1	1
AV Malformation-ICH	1	0	0	0	0	0	0	0	0	0	1
Abscess	0	0	0	1	0	0	0	0	1	1	2
Chicken pox	0	1	0	0	0	0	0	0	0	1	1
Diabetes Mellitus	0	1	0	0	0	1	0	0	0	2	2
Rupture of an aneurism	5	1	0	1	0	0	0	0	0	2	7
Encephalitis	1	0	0	0	0	0	0	0	0	0	1
Epilepsy	1	0	0	0	0	0	0	0	0	0	1
Falciparum Malaria	0	0	0	1	0	0	0	0	0	1	1
H-Influenza A	0	0	0	1	0	0	0	0	0	1	1
H1N1 infection	1	2	1	0	0	1	0	0	1	4	6
Heart disease	7	6	0	8	1	5	0	1	1	21	29
Hepatitis	1	3	0	1	0	0	0	0	0	4	5
ITP	0	0	0	1	0	0	0	0	0	1	1
Leptospirosis	0	1	0	0	0	1	0	0	0	2	2
Liver Disease	2	0	0	0	0	0	0	0	0	0	2
Lung Abscess	0	1	0	0	0	0	0	0	0	1	1
Malignancy	7	0	0	1	0	0	1	0	0	2	9
Myocardial Infarction	1	0	0	0	0	1	0	0	0	1	2
Organophosphate poisoning	0	0	0	0	0	1	0	0	0	1	1
Pneumonia	4	3	0	2	0	3	0	0	0	8	12
Pulmonary Fibrosis	0	0	0	0	0	1	0	0	0	1	1
Ruptured appendicular mass	0	1	0	0	0	0	0	0	0	1	1
Septicaemia	0	0	0	0	1	0	0	0	0	1	1
SLE	1	1	0	0	0	0	0	0	0	1	2
Suicide	1	0	0	1	0	2	0	0	0	3	4
Thyrotoxic problem	0	1	0	0	1	0	0	0	0	2	2
Tuberculosis	1	0	0	0	0	1	0	0	1	1	3
Unascertained	0	0	0	1	1	0	0	0	0	2	2
Ventricular Myxoma	1	0	0	0	0	0	0	0	0	0	1
Viral Myocarditis	2	0	0	0	0	0	0	0	2	0	4
Total	37	24	1	19	4	17	1	1	6	67	110

Heart disease is the largest contributor to indirect maternal deaths. It is seen that 8 out of the 29 deaths (28%) had institutional delays alone and 45% of deaths due to heart disease were noted to have institutional delay alone or with other delays.

It is noteworthy that the majority of sections in both direct (44%) and indirect (33%) obstetric deaths the CS have been done by the specialist obstetrician compared to the finding that the usual practice is that only 9% of sections are performed by the specialist

Outcome of pregnancy

Table 5.15: Outcome of pregnancy by broad category of maternal death

Outcome of pregnancy	Direct		Indirect		Total	
	No.	%	No.	%	No.	%
Abortions	21	12.1	6	5.5	27	9.5
Assisted Vaginal Delivery	5	2.9	1	0.9	6	2.1
home delivery	2	1.2	0	0.0	2	0.7
LSCS - Elective	28	16.1	24	21.8	52	18.3
LSCS - Emergency	23	13.2	10	9.1	33	11.6
No data available	25	14.4	20	18.2	45	15.8
not delivered	16	9.2	32	29.1	48	16.9
Unassisted vaginal delivery	54	31.0	17	15.5	71	25.0
Total	174	100.0	110	100.0	284	100.0

In a majority of maternal deaths the outcome of pregnancy was an unassisted vaginal delivery while in 16% it was an elective CS and in a further 13% an emergency CS. In 12% an abortion was the outcome.

(Table 4.9). However, it must be noted that, in 26% of direct obstetric mortality and in 38% of indirect obstetric mortality the CS has been done by the SHO.

Table 5.16: Person performing the emergency sections

	Direct		Indirect		Total	
	No	%	No	%	No	%
<i>Performing the section</i>						
Specialist Obstetrician	19	44.2	7	33.3	26	40.6
Senior Registrar	1	2.3	0	0.0	1	1.6
Registrar	0	0.0	0	0.0	0	0.0
SHO	11	25.6	8	38.1	19	29.7
Not stated	12	27.9	6	28.6	18	28.1
<i>Anaesthesia</i>						
Epidural	0	0.0	0	0.0	0	0.0
Failed spinal	0	0.0	0	0.0	0	0.0
General Anaesthesia	25	58.1	12	57.1	37	57.8
Spinal	10	23.3	3	14.3	13	20.3
No information	8	18.6	6	28.6	14	21.9
Total	43	100.0	21	100.0	64	100.0

5.2 Maternal morbidity

Data on maternal mortality was collected prospectively from the discharge head tickets over a period of four weeks. This information was collected using a modified format based on the morbidity formats of the AMDD group.

The format included sections on outcome of admission, reason for admission, mode of delivery, information on labour, complications of labour, obstetric complications, pregnancy outcome and foetal outcome. The section on obstetric complications was further categorized into haemorrhage, infection, hypertension and co-morbidities.

In addition to collecting this information from the obstetric units a separate format was prepared for extracting information from the gynaecological units on ectopic pregnancies, abortions and the outcome of admission.

Data on morbidity were not available from five institutions (two TH/PGHs, one DGH, two BHs) included in the sample.

5.2.1 Delivery pattern

It is seen that out of the total deliveries in government institutions 69% have had normal vaginal deliveries. Nationally 31% were caesarean sections, more than half of these (52%) being elective sections. This figure is an estimate of the institutional section rate for the country based on the sample of discharges analysed for the morbidity survey. The estimated figure of 31% is close to the caesarean section rate of 32.7% for government hospitals in the country based on the birth register (Table 4.1) and provides evidence supporting adequacy and representativeness of the sample used in the morbidity survey.

Table 5.17: Delivery patterns by type of hospital

	TH / PGH		DGH		Functional BH		Upgraded BH without specialist services		Divisional Hospitals		Sri Lanka	
Total BHT's Examined in Obstetric wards	9506		7098		8928		1009		748		27289	
Total del out of all obstetric discharges	7183	75.6	5312	74.8	6429	72.0	343	34.0	280	37.4	19547	71.6
Vaginal deliveries (as % of total del)	4647	64.7	3642	68.6	4586	71.3	339	98.8	280	100.0	13494	69.0
Total CS (as % of total del)	2536	35.3	1670	31.4	1843	28.7	4	1.2	0	0.0	6053	31.0
Vacuum (as % of total vaginal del)	106	2.3	38	1.0	76	1.7	0	0.0	0	0.0	220	1.6
Forceps (as % of total vaginal del)	109	2.3	31	0.9	32	0.7	2	0.6	0	0.0	174	1.3
Cephalic (as % of total vaginal del)	4080	87.8	3372	92.6	4192	91.4	284	83.8	218	77.9	12146	90.0
Breech (as % of total vaginal del)	49	1.1	36	1.0	52	1.1	2	0.6	3	1.1	142	1.1
CS - Elective (as % of total sections)	1159	45.7	801	48.0	938	50.9	0	0.0	0	0.0	2898	47.9
CS - Emergency (as % of total sections)	1377	54.3	869	52.0	905	49.1	4	100.0	0	0.0	3155	52.1

5.2.2 Complications of pregnancy and labour

Table 5.18: Complications of pregnancy and labour by type of hospital

	TH/PGH		DGH		Functional BH		Non Functional BH		DH		Sri Lanka	
	Sampled no %		Sampled no %		Sampled no %		Sampled no %		Sampled no %		Weighted no and average	
Births 2011	111363 (81.7%)		83873 (94.1%)		83483 (94.8%)		2863 (59%)		4288 (23.2%)		336820	
Complications of labour	721	10.0	597	11.2	712	11.1	33	15.4	37	13.0	2483	10.9
Prolonged / Obstructed labour	104	1.4	71	1.3	74	1.2	10	4.7	6	2.1	324	1.4
Lack of progress	246	3.4	200	3.8	261	4.1	10	4.7	7	2.5	836	3.7
Retained placenta	65	0.9	51	1.0	57	0.9	4	1.9	10	3.5	244	1.1
Tears	122	1.7	115	2.2	164	2.6	4	1.9	7	2.5	481	2.1
Cord prolapse	13	0.2	13	0.2	9	0.1	0	0.0	1	0.4	44	0.2
Shoulder dystocia	6	0.1	10	0.2	4	0.1	0	0.0	0	0.0	22	0.1
Other	165	2.3	137	2.6	143	2.2	5	2.3	6	2.1	533	2.3
Haemorrhage	152	2.1	154	2.9	126	2.0	8	3.7	5	1.8	518	2.3
Placenta previa	43	0.6	28	0.5	33	0.5	1	0.5	1	0.4	123	0.5
Accreta/increta/percreta placenta	0	0.0	5	0.1	4	0.1	0	0.0	0	0.0	10	0.0
Abruptio placenta	19	0.3	14	0.3	9	0.1	0	0.0	0	0.0	48	0.2
Ruptured uterus	1	0.0	2	0.0	1	0.0	0	0.0	0	0.0	4	0.0
Postpartum haemorrhage	65	0.9	73	1.4	65	1.0	3	1.4	3	1.1	244	1.1
Other obstetric haemorrhage	24	0.3	32	0.6	14	0.2	4	1.9	1	0.4	89	0.4
Infection	148	2.1	125	2.4	106	1.6	12	5.6	13	4.6	502	2.2
Abortion related infection	5	0.1	7	0.1	2	0.0	2	0.9	3	1.1	32	0.1
Post-Partum sepsis	29	0.4	22	0.4	26	0.4	1	0.5	1	0.4	92	0.4
Pyelonephritis	39	0.5	8	0.2	10	0.2	0	0.0	2	0.7	75	0.3
Influenza-like illness (viral fevers)	31	0.4	45	0.8	16	0.2	5	2.3	4	1.4	128	0.6
Other systemic infections/sepsis	44	0.6	43	0.8	52	0.8	4	1.9	3	1.1	174	0.8
Hypertension	664	9.2	361	6.8	469	7.3	29	13.6	12	4.2	1792	7.9
Chronic hypertension	49	0.7	27	0.5	51	0.8	1	0.5	1	0.4	148	0.7
PIH other than eclampsia	564	7.9	322	6.1	395	6.1	26	12.1	10	3.5	1536	6.7
Eclampsia	51	0.7	12	0.2	23	0.4	2	0.9	1	0.4	107	0.5
Ectopic pregnancies	53	0.7	30	0.6	53	0.8	1	0.5	1	0.4	159	0.7
Total abortions *	836	11.6	695	13.1	1120	17.4	74	34.6	63	22.1	3340	14.6
Severe direct Obstetric complication rate	14.5 (13.8 - 15.15)		13.4 (12.7 - 14.3)		13.8 (13.0 - 14.6)		24.4 (21.0 - 28.1)		17.0 (15.1 - 19.0)		14.5 (14.0 -14.9)	

* includes abortion related infections

Of the births studied, the morbidity due to abortion was 15%, there were 11% who had some complication of labour and a further 8% had hypertension. Nationally, the severe direct obstetric complication rate was 14.5% (95% CL 14.0%-14.9%). The direct obstetric complications included in this indicator are: haemorrhage (ante partum and postpartum), prolonged and obstructed labour, postpartum sepsis,

complications of abortion, severe pre-eclampsia and eclampsia, ectopic pregnancy and ruptured uterus. It is important to note that Base Hospitals where there were no specialists and divisional hospitals had morbidity rates of 24% and 17% respectively. It is also important to note that the morbidity due to abortions is high in these two types of institutions and is a major contributor to the morbidity pattern.

5.2.3 Co-morbidities

Table 5.19 Co morbidities by type of institutions

	TH/PGH		DGH		Functional BH		Non Functional BH		DH		Sri Lanka Total Weighted average	
	Sampled no %		Sampled no %		Sampled no %		Sampled no %		Sampled no %			
	111363 (81.7%)		83873 (94.1%)		83483 (94.8%)		2863 (59%)		4288 (23.2%)		336820	
Severe Anemia	50	0.7	67	1.3	53	0.8	4	1.9	1	0.4	199	0.9
Heart disease	168	2.3	87	1.6	80	1.2	2	0.9	0	0.0	386	1.7
Lung disease	77	1.1	58	1.1	52	0.8	3	1.4	1	0.4	220	1.0
Renal disease	19	0.3	21	0.4	5	0.1	0	0.0	0	0.0	51	0.2
Hepatic disease	19	0.3	3	0.1	3	0.0	0	0.0	0	0.0	30	0.1
Gestational diabetes	425	5.9	151	2.8	200	3.1	6	2.8	0	0.0	902	4.0
Diabetes prior to pregnancy	69	1.0	38	0.7	50	0.8	0	0.0	0	0.0	178	0.8
Impaired Glucose Tolerance	35	0.5	27	0.5	34	0.5	0	0.0	1	0.4	112	0.5

Gestational diabetes and heart disease were the common co-morbidities observed and as could be expected co-morbid conditions are seen more often in the larger hospitals mainly TH/PGH and a few in the DGHs.

institutions. The diagnosis documented in the bed head ticket was taken as the reason for the transfer. The number and percentage of cases with direct obstetric complications are presented here with the total number who were transferred and type of institution.

5.3 Transfer of patients between institutions

Table 5.20 below represents the summarized information from the 4 week prospective survey in relation to the patients that were transferred between

Table 5.20: Pattern of morbidity in transferred patients with direct obstetric complications based on the 4 week prospective survey

	Number of institutions	Number of patients transferred during the 4 weeks	Cases with direct obstetric complications out of the total transferred	
			No	%
TH/PGH	14	53	7	13.2
DGH	18	61	4	6.6
BH Functional	35	369	40	10.8
BH non-functional	26	347	35	10.1
Divisional	47	319	41	12.8
Total where data were available	140	1149	127	11.1

On average 11% of the transferred patients have had documented direct obstetric complications. This implies that 89% of the transfers were for reasons other than direct obstetric complications or that documentation in relation to the transfers are poor. An alternative possibility is that patients may have been transferred in anticipation of a possible complication rather than waiting for complications to be evident.

The percentage of direct obstetric complications out of the total transferred could be expected to become less with increasing hierarchy of institutions. There is no obvious pattern observed. This may be due to the

Information on the place of usual transfer was obtained from the head of the institution and the average time taken to reach the destination was obtained based on recall from the ambulance staff. This information is summarized in tables 5.21 and 5.22. The tables describe the usual pattern of transfer between the different types of hospitals that was practiced at the time of the survey.

It is evident that transfers occur from non-specialized to specialized and from specialized to larger specialized hospitals. In addition it was seen that the transfers are directed to the nearest available or the most easily accessible specialized hospital. As could

Table 5.21: Pattern of transfers: based on the usual institution of transfer

Transferring institutions	Number of institutions	Receiving institutions			
		TH/PGH N = 14	DGH N = 18	BH – functional N = 35	BH – Non functional
Divisional Hospitals	47	14	24	9	0
BH – non functional	26	9	13	4	0
BH – functional	35	23	12	0	0
DGH	18	16	2	0	0
Total	126	62	51	13	0

small number of transfers documented, or possibly indicate gaps in availability of facilities needed for emergency even at higher levels of institution which may be occurring episodically.

be expected there were no transfers occurring from divisional hospitals to the base hospitals that were not functioning at time of survey. The transfer pattern based on the usual institution of destination is mapped in figure 5.11.

Table 5.22: Pattern of transfers: based on the average time taken for transfer

	% births @ national level	Number	< 30 min	31 – 60 min	61 – 90 min	91-120 min	'>121 min
Divisional Hospitals	5.6	47	28	12	4	2	1
BH – Non-functional	1.4	26	8	11	4	0	3
BH – Functional	27.5	35	11	18	5	0	1
DGH	25.9	18	1	7	4	1	5
TH/PGH *	39.6	14	1	0	0	2	3
Total	100.0	140	49	48	17	5	13

(* 8 TH stations were didn't have transfers as they were end stations)

The pattern of transfers needs to be considered in relation to the geographic location of the institution, the terrain and the road network in proximity to the institution. Figure 5.10 shows the wide variation in the road network that is observed. The time taken to reach the destination hospital in an emergency is also dependent on other factors such as time taken to prepare and initiate the transfer process, availability of an ambulance, condition of the roads as well as the emergency reception procedures at the receiving station. Documented evidence is not available on any of these factors and as such the following assumptions were made:

- Transfers will be initiated within 15 minutes of the decision to transfer
- A suitable vehicle will be available at the time of the decision
- A minimum distance of 30 Km will be covered within 60 minutes from the decision of the transfer

Based on the above assumptions and the information available in table 5.22 it was estimated that only 85% of the divisional hospitals would be able to transfer patients to the destination institution within one hour. Similarly, only 73% of the transfers from non-functional base hospitals could reach their destination within one hour. It is of note that 6.9% of the total births in government hospitals occurred in these hospitals accounting for nearly 23873 of deliveries in 2011 and had the potential to generate 3581 complications per year.

The base hospitals that were functional at the time of survey accounted for 27.5% of the births in 2011. It was seen that nearly 83% of the transfers from these institutions would reach their destination within one hour while in District General Hospitals where 25.9% of the births occur, only 56% of the transfers would reach their destination institution within one hour. Transfers from TH / PGH type of institution where nearly 40% of the births occur only 62.5 % of the transfers would reach their destination within one hour.

Figure 5.10 Type of hospital and the road network of Sri Lanka

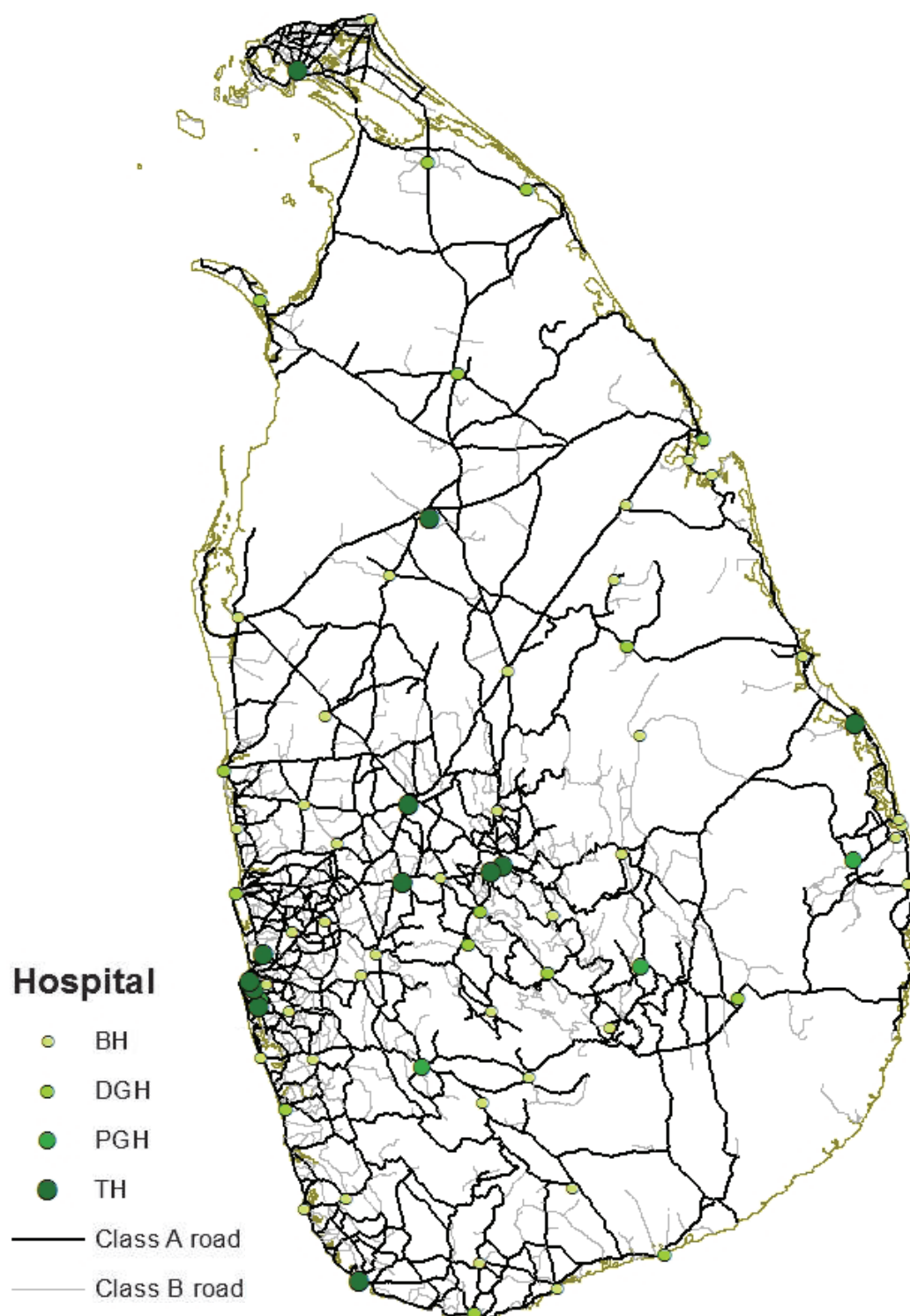
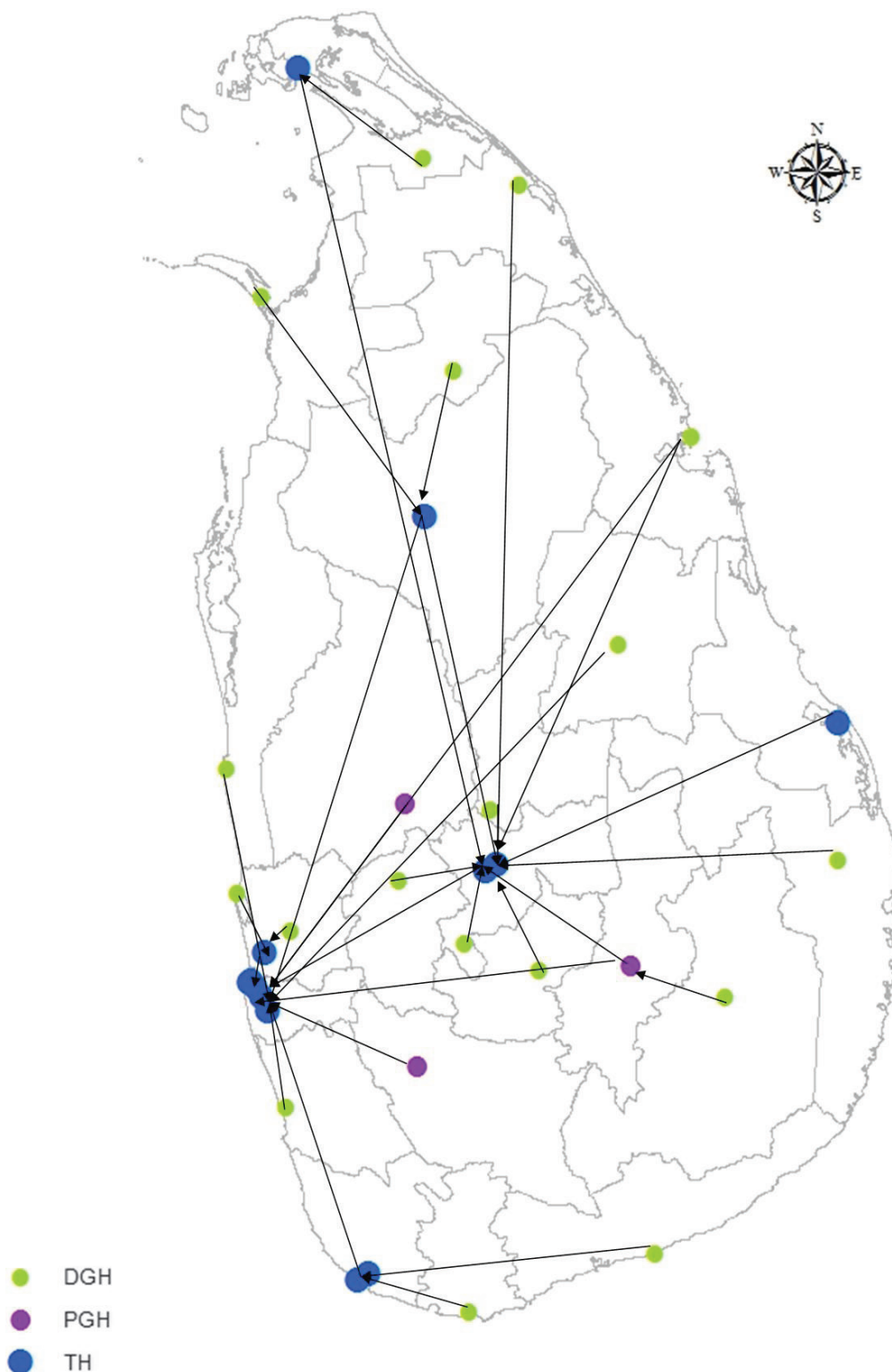


Figure 5.11 Pattern of transfers in Sri Lanka by district – based on usual place of transfer



It is clear from figure 5.10 that majority of government hospitals are situated with access to class A roads and the hospital network is linked by a good network of roads. Further, it is also noteworthy that clearly clusters of hospitals are seen in relation to patient transfers; the teaching hospitals, Anuradhapura, Mahamodhara, Kandy, the Colombo group (CSHW

and DMH) of hospitals and Colombo South Teaching hospital being the major receiving stations. Bypassing of referral facilities are observed in the North and Eastern provinces of the country. This may change with the on-going further development of the TH Anuradhapura and TH Batticaloa.



Theatre- TH Kandy - Courtesy of Dr. Kapila Gunawardhana

Chapter 6

Resources for EMOC - Infrastructure

Institutional services for pregnant women are provided through a graded network of 603 hospitals spread throughout the country which have specially identified maternity wards. This comprises 12 Teaching Hospitals, 3 Provincial General Hospitals, 18 District General Hospitals, 64 Base Hospitals and 506 Divisional Hospitals (MoH, 2010). Services of at least one specialist obstetrician, is expected to be available in all institutions from Base Hospital upwards, although, at the time of survey, specialist services were not available in 26 of the newly upgraded Base Hospitals. The infrastructure of these institutions has a significant influence on the provision of quality obstetric and neonatal care. This chapter summarizes the infrastructure resource distribution in the country at the time of survey, while the findings on resources available at

institutional level are given in the provincial reports. The source of information used for each table is indicated. Many of the tables are self-explanatory.

In the absence of norms/standards on infrastructure based on services, workload and type of institution the findings of this survey are presented so that they may be used as a guide for developing these nationally.

6.1 Facility profile

This section describes the facility profile by type of institution. The information presented in table 6.1 was obtained from the heads of the institutions. Of the institutions included in the survey, information was not available from one teaching hospital and two divisional hospitals.

Table 6.1: Summary of services for maternal care available by type of institution

	TH/PGH		DGH		BH with Specialist Obstetrician		BH without Specialist Obstetrician		Divisional Hospitals	
	No	%	No	%	No	%	No	%	No	%
No. of Institutions	14		18		38		26		46	
Total Bed strength of the hospitals	14825		9410		10410		2976		2934	
No. of maternity units	41		29		45		25		46	
No. of labour rooms	28		21		38		25		46	
Total beds dedicated for maternity care	2540		1436		1963		409		518*	
Blood transfusion service `	14	100.0	18	100.0	37	97.4	6	23.1	0	0.0
Laboratory service	14	100.0	18	100.0	38	100.0	22	84.6	18	39.1
Antenatal clinic	14	100.0	18	100.0	38	100.0	26	100.0	44	95.7
Post natal clinic	14	100.0	18	100.0	38	100.0	24	92.3	41	89.1
Family planning clinic	14	100.0	15	83.3	28	73.7	18	69.2	24	52.2
Well baby clinic	14	100.0	15	83.3	31	81.6	17	65.4	24	52.2
Health education unit	13	92.9	17	94.4	34	89.5	15	57.7	13	28.3
Infection control unit	14	100.0	17	94.4	36	94.7	11	42.3	8	17.4

It is noted that all TH/PGHs had all the services that were inquired into except one institution where a health education unit was not available.

Of the 18 DGHs, three did not have hospital based family planning clinics. Well baby clinics were not functioning in three DGHs. A health education unit was not available in one DGH and infection control units were present in 17/18 DGHs.

Of the 38 BHs with specialist services, one Base Hospital did not have a functioning blood bank, at the time of survey, however this has been rectified since. Ten hospitals of this type did not have family planning clinics while well baby clinics were conducted in 31/38 (82%) institutions. Two institutions did not have infection control units while a health education unit was not available in 4 institutions.

All except two of the upgraded BHs without specialists, conducted antenatal clinics and post natal clinics. Blood transfusion service had been established only in 6 (23%) institutions and 31% had no family planning services.

Many of the services except antenatal and postnatal clinics were not available in a high proportion of the DHs sampled. Nearly 48% of the Divisional Hospitals had no FP or well-baby clinics.

Table 6.2 provides a summary of the institutional profiles in terms of facilities necessary for the provision of EmONC services. The criteria used in the classification of EmONC services have been described in chapter 2. Information necessary were obtained from the heads of institutions and personnel in charge of obstetric wards, labour rooms and operating theatres.

Table 6.2: Summary of institutional profile by type of institution

Facilities	TH/PGH		DGH		BH		BH Upgraded		DH	
	No.	%	No.	%	No.	%	No.	%	No.	%
	14		18		38		26		46	
Comprehensive EmONC status	14	100.0	18	100.0	35	92.1				
Modified Basic EmONC status	0	0.0	0	0.0	3	7.9	3	11.5	3	6.5
24/7 Comprehensive EmONC status	14	100.0	13	72.2	5	13.2				
Institutions with 24*7 electricity	13	92.9	17	94.4	31	81.6	15	57.7	15	32.6
Institutions with 24*7 water supply	10	71.4	15	83.3	25	65.8	14	53.8	33	71.7
Institutions with 24*7 Transport	10	71.4	12	66.7	9	23.7	4	15.4	6	13.0
Institutions with 24*7 Communication	14	100.0	16	88.9	24	63.2	24	92.3	32	69.6
Availability of a functional theatre	14	100.0	18	100.0	35	92.1	4	15.4		
Availability of a functional blood bank	14	100.0	18	100.0	35	92.1	5	19.2		
24*7 obstetric surgical cover	14	100.0	13	72.2	9	23.7				
24*7 Anaesthetic cover	14	100.0	13	72.2	28	73.7	1	3.8		
24*7 Blood transfusion service cover	14	100.0	10	55.6	14	36.8				
Dedicated Obstetric theatre	11	78.6	0	0.0	0	0.0	0	0.0		
Direct dialling facility in the LR	4	28.6	0	0.0	0	0.0	1	3.8	0	0

It is noted that 7% of TH/PGHs, 6% of DGHs and 18% of BHs with specialist services and 43% of upgraded BHs without specialist reported that they do not have 24*7 power supply. This is a constraint for provision of quality services. 29% of TH/PGHs, 16.7% of DGHs and 35% of BHs with specialist services seem to have interrupted water services which are not conducive to the practice of aseptic precautions.

It is noted that functioning theatres were not available in 3 BHs, at the time of survey. This has been rectified since. A functioning blood bank was available in 100% of DGHs and in 92% of Base Hospitals with specialists. However, only 55.6% of DGHs and 36.8%

of BHs are able to provide this service on a 24*7 basis as defined in the study (Chapter 2).

6.1.1 Labour room

Tables 6.3 (a) to 6.3 (c) provides a summary of the labour room infrastructure facilities available by type of hospital. Data on labour room infrastructure facilities was collected based on the requirements listed in the Labour Room Management Guide (FHB, 2007). It is expected that each of the items listed in column one be available in all institutions. Details of individual institutions are presented in the provincial reports.

Table 6.3 (a) Summary of labour room facilities by type of institution - infrastructure

INSTITUTION	TH/PGH		DGH		BH with a Specialist Obstetrician		BH without a Specialist Obstetrician		Divisional Hospital	
Number of institutions	14		18		38		25		47	
Institutions with no information	0		0		1		1		2	
Water Supply										
Continuous water supply	14	100.0	18	100.0	37	100.0	22	91.7	44	97.8
Elbow or foot operated tap for hand washing	10	71.4	9	50.0	16	43.2	9	37.5	6	13.3
Electricity and Illumination										
Generator / separate generator supply	11	78.6	13	72.2	22	59.5	12	50.0	27	60.0
Emergency lamps	13	92.9	9	50.0	20	54.1	11	45.8	26	57.8
Communication										
Direct telephone line to labour room	5	35.7	5	27.8	8	21.6	1	4.2	2	4.4
Intercom facilities	12	85.7	13	72.2	32	86.5	8	33.3	14	31.1
Alarm for emergencies	2	14.3	4	22.2	3	8.1	0	0.0	3	6.7
Ventilation										
AC the temperature maintained at 25°C	10	71.4	14	77.8	21	56.8	5	20.8	2	4.4
Exhaust fan	7	50.0	5	27.8	10	27.0	6	25.0	8	17.8
Presence of windows above 1.2m	12	85.7	14	77.8	28	75.7	16	66.7	26	57.8

It is noted that 29%, 50% and 67% of labour rooms in the TH /PGHs, DGHs and BHs with specialist respectively, do not have a water supply with elbow or foot operated taps. This is an accepted requirement for ensuring prevention of infection in labour rooms.

It is also noted that 7% of labour rooms in TH/PGHs and labour rooms of 50% of DGHs and 46% of BHs where specialist services are available and nearly 50% of labour rooms in the other two categories of

hospitals do not have functioning emergency lamps. This is a necessary piece of equipment taking in to consideration interruptions in power supply noted in the earlier table.

In the area of communication it is noted that only 36% of TH/PGHs and 28% of DGHs and 22% of Base Hospitals have a direct dedicated telephone line in the labour room. This appears to be a simple intervention that would minimize delays in service provision.

Table 6.3(b) Summary of labour room facilities by type of institution - infrastructure

INSTITUTION	TH/PGH		DGH		BH with Specialist Obstetrician		BH without a Specialist Obstetrician		Divisional Hospital	
Number of institutions	14		18		38		25		47	
Institutions with no information	0		0		1		1		2	
Washing bay										
Separate room for washing instruments	11	78.6	12	66.7	19	51.4	5	20.8	9	20.0
Steel/fiberglass sink	9	64.3	10	55.6	20	54.1	10	41.7	11	24.4
Racks	9	64.3	6	33.3	13	35.1	5	20.8	9	20.0
Separate entrance from outside	9	64.3	11	61.1	17	45.9	8	33.3	6	13.3
Toilet Facilities										
Separate toilets for labour room	11	78.6	16	88.9	22	59.5	15	62.5	21	46.7
Other requirements										
Separate trolleys for labour room	12	85.7	15	83.3	26	70.3	19	79.2	20	44.4
Place for temporary storage of dirty linen etc.	13	92.9	18	100.0	26	70.3	11	45.8	14	31.1
Use of colour card system for waste disposal	14	100.0	11	61.1	24	64.9	10	41.7	11	24.4
Notice board outside the labour room	12	85.7	17	94.4	31	83.8	7	29.2	10	22.2
On call doctor's information displayed in LR	11	78.6	15	83.3	25	67.6	9	37.5	9	20.0
Newborn care area										
Resuscitaire	12	85.7	15	83.3	33	89.2	11	45.8	11	24.4
Sink with water supply	10	71.4	13	72.2	22	59.5	11	45.8	22	48.9

A separate room for washing of linen and soiled equipment was not available in 21% of TH/PGHs, 33% of DGHs and 49% of BHs with specialists. This is a matter for concern when it is noted that even where it was available, 36-65% of institutions in different categories had no separate entrance, presumably entering through the labour room! Although almost all the TH/PGHs and DGHs have separate place for temporary storage of dirty clothes, 30% of the BHs with specialists do not have such place.

Toilets for patients were available specifically for the labour room only in 78.6% of TH/PGHs, 89% of DGHs and 60% of BHs with specialists. This is a basic need ensuring dignity and privacy of patients in labour and efforts to ensure such facilities in all institutions needs to be made.

Use of separate trolleys for labour rooms enhances infection prevention. However, 15-30% of labour rooms in institutions with specialists do not practice this. It is noted that all the TH/PGHs use the colour coding system for waste disposal and 30% each of DHs and BHs do not practice colour coding for the waste disposal systems.

Displaying information of women in the labour room is an important strategy to alleviate fears of family members. However, 2 THs, one DGH and 7 BHs did not have such a display system and the practice is very low in institutions without specialists.

Quick access to the contact details of "on call" staff is essential to prevent delays in emergencies. It is noted that details of the "on call" staff is displayed in the labour rooms only in 79%, 83%, 68% respectively of TH/PGHs, DGHs and BHs. The percentage was 35% in upgraded BHs without specialist obstetricians and 20% in Divisional level hospitals.

Table 6.3(c) Summary of labour room facilities by type of institution - infrastructure

INSTITUTION	TH/PGH		DGH		BH with Specialist Obstetrician		BH without a Specialist Obstetrician		Divisional Hospital	
Number of institutions	14		18		38		25		47	
Institutions with no information	0		0		1		1		2	
Furniture and General Items										
Delivery beds with stirrups	13	92.9	17	94.4	34	91.9	18	75.0	31	68.9
Spot lamps (movable)	14	100.0	18	100.0	36	97.3	22	91.7	45	100.0
Wall clock	14	100.0	18	100.0	36	97.3	24	100.0	44	97.8
Oxygen cylinder stands and regulators	14	100.0	17	94.4	37	100.0	23	95.8	39	86.7
Refrigerators	14	100.0	17	94.4	33	89.2	19	79.2	31	68.9
Neonatal suckers	14	100.0	16	88.9	35	94.6	22	91.7	37	82.2
Equipment (functioning)										
Delivery sets	14	100.0	18	100.0	37	100.0	24	100.0	43	95.6
Pinard foetal stethoscope	14	100.0	17	94.4	36	97.3	24	100.0	40	88.9
Doppler (Foetal heart detector)	12	85.7	12	66.7	29	78.4	14	58.3	18	40.0
CTG machine	14	100.0	18	100.0	35	94.6	11	45.8	10	22.2
Vacuum extractor	14	100.0	18	100.0	34	91.9	8	33.3	1	2.2
Wrigley’s forceps	14	100.0	18	100.0	35	94.6	12	50.0	14	31.1
Infant weighing scale	11	78.6	16	88.9	31	83.8	23	95.8	41	91.1
Infant Magill’s laryngoscope	14	100.0	18	100.0	33	89.2	14	58.3	19	42.2
Wall thermometer	4	28.6	6	33.3	3	8.1	3	12.5	3	6.7
Surgical consumables										
Cord clamps/Sterile Threads	14	100.0	18	100.0	35	94.6	20	83.3	39	86.7
Neonatal Ambu bags	14	100.0	18	100.0	37	100.0	24	100.0	39	86.7
Neonatal sucker tubes	14	100.0	16	88.9	36	97.3	20	83.3	37	82.2
Naso-gastric tubes	14	100.0	18	100.0	37	100.0	19	79.2	29	64.4
Endo tracheal tubes	14	100.0	17	94.4	34	91.9	11	45.8	15	33.3
Flexible stiletto(for ET tube)	12	85.7	16	88.9	26	70.3	9	37.5	5	11.1
IV cannulas (adequate amounts)	14	100.0	18	100.0	36	97.3	22	91.7	43	95.6
Disposable syringes (adequate amounts)	14	100.0	17	94.4	34	91.9	24	100.0	44	97.8
Drugs for neonatal care										
Adrenaline	14	100.0	18	100.0	37	100.0	23	95.8	40	88.9
Naloxone	14	100.0	17	94.4	35	94.6	6	25.0	5	11.1
Vitamin K	14	100.0	18	100.0	36	97.3	18	75.0	28	62.2
Normal Saline	14	100.0	18	100.0	37	100.0	23	95.8	45	100.0

It is noted that basic facilities such as beds with stirrups, spot lamps, oxygen delivery equipment are available in the majority (95%-100%) of the institutions with specialists. It is noted that delivery sets, CTG machines, forceps delivery sets and vacuum extractors are available in nearly all (92-

100%) labour rooms. Although the majority of institutions reported availability of disposable equipment, it is a matter for concern that 6% of DGHs, 9% of BHs with specialist services reported the non-availability of some commonly used disposable items at the time of survey.

It is a matter for concern that in 11.1% of DGHs, 5.4% of BHs with specialists, 8% of BHs without specialists and 18% of divisional hospitals, the labour rooms did not have neonatal suction facilities. This needs to be available in all labour rooms as clearing of airways by suction is essential in many unexpected emergency situations. However, most of the equipment and drugs required for neonatal emergencies were available in nearly all the hospitals.

Table 6.3 (a) to (c) shows that even in the TH/PGH category of hospitals all the conditions set out in the Labour Room Management guide are not available. It is seen that the proportion of institutions having the facilities decrease from TH/PGHs to Base Hospitals (functional).

6.1.2 Operating theatre

A functioning operating theatre is an absolutely essential facility to provide comprehensive emergency obstetric care. The information on the theatre facilities were obtained from the officer in charge of the theatre in each institution and are presented in table 6.4.

At the time of survey operating theatre facilities were available in all institutions where specialist services were available except in three institutions. Operating Theatres have been established in these institutions since the assessment. It is observed that some institutions faced difficulties in getting theatre time for obstetric emergencies leading to some delays. Providing immediate access is a challenge in most hospitals where the operating theatres are shared by many specialities. Immediate access to operating theatre facilities is often a matter of life and death for the baby or the mother or both in an emergency situation. It is noted that 29% of TH/PGHs, 22% of

DGHs and nearly 44% of Base Hospitals reported a delay of more than 20 minutes for emergency obstetric surgery in the two months preceding the survey due to operating theatre not being available. It is noted that 78% of the TH/PGHs, 27% of DGHs and 18% of Base hospitals have dedicated obstetric operating theatres. In this context it is important to note that 54%, 52% and 49% of CSs carried out in these institutions respectively are emergencies.

In the hospitals where this facility is not available access is achieved by interrupting either a gynaecological list or a surgical lists and it is noted that in base hospitals the surgical list are interrupted in 90% of the instances. Such a situation may influence the decision to intervene surgically in an obstetric emergency. It is also noted that in 57% of hospitals a casualty list has to be interrupted to access the operating theatre for obstetric emergencies during off hours.

While it is positive to find that nearly all operating theatres had functioning tables and adjustable lights. Nearly 29% of TH/PGHs, 22% of DGHs and 16% of BHs did not have shadowless lamps. This is a constraint in crucial emergency surgeries such as internal iliac artery ligations.

Delays in surgical intervention for obstetric emergencies were noted during the three months preceding the survey in 14% of TH/PGHs and have been attributed to faulty equipment. The DGHs and BHs recorded delay in 11% and 26% of cases respectively and the reasons were multiple.

Most institutions use the packet system for surgical instrument and this is a healthy trend. The deficiencies in electricity supply, water supply and communication facilities were observed at all levels of institutions.

Table 6.4: Theatre facilities by type of institution

	TH/PGH		DGH		BH Functioning		BH upgraded	
No. of institution	14		18		38		26	
Availability of a theatre complex	14	100.0	18	100.0	38	100.0	8	30.8
Availability of functioning theatre	14	100.0	18	100.0	35	92.1	3	11.5
Separate operating theatre only for obstetric patients	11	78.6	5	27.8	7	18.4	0	0.0
When separate Obstetric theatre is not available								
Arrangement during working hours								
Interrupt the Surgical list	3	100.0	13	100.0	25	89.3		
Interrupt the Gynae list	3	100.0	9	69.2	14	50.0		
Arrangement during off hours								
Theatre is freely available	2	66.7	5	38.5	11	39.3		
disturb a casualty list .	1	33.3	8	61.5	16	57.1		
During the past two months a delay of > 20 mins from the time of request due to the OT being occupied by another surgery	4	28.6	4	22.2	7	43.8		
Equipments and Supplies								
Availability of an operating table	14	100.0	18	100.0	35	100.0	3	7.9
Availability of adjustable light	14	100.0	17	94.4	32	84.2	3	7.9
The light is shadow less	10	71.4	14	77.8	27	84.4	3	7.9
Requested for additional linen during the past three months	9	64.3	11	61.1	20	74.1	3	7.9
Use separate packs (laparotomy packs, LSCS packs) for surgeries	14	100.0	18	100.0	32	84.2	1	2.6
No. of hospitals rported that an emergency obs surgery was delayed during last three months	2	14.3	2	11.1	10	26.3	0	0.0
Reasons for delay								
Lack of staff			✓		✓			
Lack of equipment			✓		✓			
Lack of water and electricity facilities			✓		✓			
Lack of linen			✓		✓			
Lack on anaesthetic drugs or gases			✓		✓			
Malfunctioning of equipments, A/C	✓		✓		✓			
Infrastructure								
Days without electricity during last one month	2	14.3	1	5.6	6	15.8	0	0.0
Separate generator for the theatre	3	21.4	4	22.2	8	21.1	1	3.8
Dedicated staff for generator	6	42.9	9	50.0	17	44.7	1	3.8
Continous supply of water	14	100.0	17	94.4	31	81.6	5	19.2
Days without water during last one month	3	21.4	1	5.6	6	15.8	0	0.0
Direct telephone line to the theatre	6	42.9	7	38.9	13	34.2	0	0.0
Direct dialing facility in the theatre	4	28.6	3	16.7	4	10.5	1	3.8
Cell phones	13	92.9	16	88.9	29	76.3	4	15.4
Resuscitator at the newborn corner of the OT	12	85.7	15	83.3	30	78.9	1	3.8

6.1.3 Blood Transfusion Services

The ability to provide blood transfusion is one of the signal functions that differentiate between BEmONC and CEMONC services. It is a lifesaving intervention in an emergency and timely and safe blood transfusion services should be available 24*7 every day of the year. The information on blood transfusion services were obtained from the medical officer- in charge of the blood bank in each institution.

Blood transfusion facilities were available in all hospitals with specialist services with the exception of one BH at the time of the survey although a consultant obstetrician was working in the institution.

In almost all institutions cross matching of blood was carried out by a MO blood transfusion service during

working hours. However, after normal working hours, in 21.4% of TH/PGHs 44.4% of District General Hospitals, and 35.1% of Base Hospitals, the cross matching was carried out by a MO other than MO/NBTS. Often this function is served by an intern medical officer and this is an unsatisfactory situation where the ward MO/HO is called away from the obstetric unit during an emergency to attend to this function. In this context it is also important to note that in the six months period preceding the survey twenty mismatched transfusions were reported.

It was noted that blood products including cryoprecipitate were available in all TH/PGHs. However, in DGHs only 66.7% of the hospitals had platelets and cryoprecipitate. Platelets were available only in 32% of BHs with specialists while 51% of these institutions had cryoprecipitate. While

Table 6.5: Blood transfusion services by type of institution

	TH/PGH		DGH		BH with a Specialist Obstetrician		BH without a Specialist Obstetrician	
	No	%	No.	%	No.	%	No.	%
No. of institutions	14		18		38		26	
BLOOD TRANSFUSIONS SERVICE								
Availability of a blood bank	14	100	18	100	37	97.4	6	23.1
Mismatch transfusions recorded during the past six months	10		7		3		0	
Instances of septicaemia following blood transfusions recorded during the past six months	0		0		0		0	
Availability of blood products at the time of the survey								
Whole blood	14	100.0	18	100.0	37	100.0	6	100.0
Platelets	14	100.0	12	66.7	12	32.4	1	16.7
FFP	14	100.0	18	100.0	29	78.4	6	100.0
Cryoprecipitate	14	100.0	12	66.7	19	51.4	2	33.3
O negative blood in stock	14	100.0	16	88.9	31	83.8	1	16.7
O positive blood in stock	14	100.0	17	94.4	33	89.2	4	66.7
Cross Matching								
Cross matching of blood during normal working hours - Blood bank MO	14	100.0	18	100.0	36	97.3	6	100.0
Cross matching of blood during normal working hours - Intern HO/MO	0	0.0	0	0.0	1	2.7	0	0.0
Cross matching of blood after normal working hours – Blood bank MO	11	78.6	10	55.6	21	56.8	3	50.0
Cross matching of blood after normal working hours - Intern HO/MO	3	21.4	8	44.4	13	35.1	0	0.0

accepting that all blood banks may not have facilities to harvest platelets, it should be available at least in DGHs where nearly 26% of the deliveries take place. Disseminated Intravascular coagulation being a complication of many obstetric emergencies the importance of having platelets and cryoprecipitate available early and easily needs to be iterated.

6.1.4 Laboratory Services

Following information on laboratory services were obtained from the Medical officer- in charge of the laboratory or chief MLT.

Almost all the institutions where specialist services are available have laboratory services with essential testing facilities. While this service is available 24*7 in all TH/PGHs and in DGHs, in BHs with specialists it is available only in 62% of institutions. The situation is worse in non-specialist hospitals, where a functioning laboratory was available only in 39% of the institutions sampled.

In the TH /PGHs and DGHs most of the tests are available both during and after working hours. However, in BHs with specialists some tests such as, serum electrolytes, blood culture and urine culture are available in only 48%, 29% and 51% of hospitals respectively, even during working hours.

Table 6.6. Availability of laboratory services by type of Institution

	TH/PGH		DGH		BH with specialist		BH without specialist		DH	
	No.	%	No.	%	No.	%	No.	%	No.	%
No. of Institutions	14		18		38		26		46	
A functioning laboratory is available	14	100.0	18	100.0	37	97.4	22	84.6	18	39
Laboratory facilities available for 24/7	14	100.0	18	100.0	23	62.2	5	22.7	3	17
During normal workin hours										
Haemoglobin	14	100.0	18	100.0	37	100.0	22	100.0	14	78
WBC/DC	14	100.0	18	100.0	37	100.0	22	100.0	18	100
Platelets	14	100.0	18	100.0	37	100.0	22	100.0	18	100
PCV	14	100.0	18	100.0	37	100.0	20	90.9	10	56
Blood urea	14	100.0	18	100.0	37	100.0	12	54.5	1	6
Blood sugar	14	100.0	18	100.0	37	100.0	17	77.3	9	50
Bilirubin	14	100.0	18	100.0	27	73.0	10	45.5	0	0
Electrolytes	14	100.0	18	100.0	18	48.6	3	13.6	2	11
Blood culture & ABST	14	100.0	15	83.3	11	29.7	1	4.5	0	0
Urine culture & ABST	14	100.0	15	83.3	17	45.9	1	4.5	0	0
BT / CT	14	100.0	18	100.0	37	100.0	19	86.4	10	56
Urine bile	14	100.0	18	100.0	33	89.2	12	54.5	9	50
ECG	14	100.0	18	100.0	37	100.0	15	68.2	14	78
X ray	14	100.0	18	100.0	37	100.0	9	40.9	3	17
After normal working hours										
Haemoglobin	14	100.0	17	94.4	20	52.6	4	18.2	0	0
WBC/DC	14	100.0	17	94.4	21	55.3	4	18.2	0	0
Platelets	14	100.0	17	94.4	22	57.9	4	18.2	0	0
PCV	14	100.0	17	94.4	22	57.9	5	22.7	1	6
Blood urea	14	100.0	16	88.9	19	50.0	3	13.6	0	0
Blood sugar	14	100.0	16	88.9	21	55.3	3	13.6	1	6
Bilirubin	14	100.0	15	83.3	13	34.2	4	18.2	2	11
Electrolytes	13	92.9	14	77.8	11	28.9	2	9.1	2	11
Blood culture & ABST	4	28.6	6	33.3	5	13.2	1	4.5	2	11
Urine culture & ABST	3	21.4	6	33.3	2	5.3	1	4.5	2	11
BT / CT	14	100.0	18	100.0	17	44.7	2	9.1	0	0
Urine bile	9	64.3	15	83.3	14	36.8	4	18.2	2	11
ECG	14	100.0	18	100.0	16	42.1	3	13.6	2	11
X ray	14	100.0	13	72.2	17	44.7	4	18.2	2	11

Supportive laboratory facilities are crucial in the management of the critically ill patient and the unavailability may even lead to avoidable transfers of such patients. The information available shows that there is much space for improvement in the provision of laboratory services particularly during “after hours” and especially in the base hospitals.

X-ray and ECG facilities were available in all hospitals with specialists during normal working hours and

TH/PGHs and in DGHs these were available after working hours. However, ECG facilities were available only in 42% of BHs with specialists after normal working hours. While X-ray facilities are available after hours in all TH/PGHs it is available only in 72% of DGHs and 44.4% of BHs.

The ability to carry out these investigations may be crucial in some emergency situations and may even be lifesaving.

Table 6.7: Infection control facilities in labour rooms by type of institution

	TH/PGH			DGH			BH with a specialist			BH without a specialist			Divisional Hospitals		
No. of Institutions	14			18			38			25			46		
	Available	Not available	Not responded	Available	Not available	Not responded	Available	Not available	Not responded	Available	Not available	Not responded	Available	Not available	Not responded
Soap	13	1	0	17	0	1	37	1	0	22	1	2	41	3	2
Antiseptics	14	0	0	17	0	1	36	2	0	18	5	2	31	12	3
Gloves	12	2	0	16	2	0	36	3	0	22	2	1	42	2	2
Heavy duty gloves	7	7	0	8	10	0	14	22	2	10	12	3	13	30	3
Non-sterile protective clothing	13	1	0	12	6	0	32	6	0	14	9	2	21	20	5
Bleach or bleaching powder	13	1	0	15	3	0	27	11	0	13	10	2	22	20	4
Prepared disinfection solution	14	0	0	17	1	0	31	7	0	14	9	2	23	17	6
Covered contaminated waste trash bin	14	0	0	16	4	0	30	8	0	20	3	2	28	14	4
Puncture proof sharps container	12	2	0	15	3	0	31	6	1	20	3	2	34	8	4
Protective equipment for HIV	8	6	0	12	6	0	11	25	2	7	15	3	6	34	6
Chlorhexidine	12	2	0	9	7	2	21	16	1	7	16	2	16	26	4
Ethanol (70%)	11	3	0	11	7	0	21	16	1	5	19	1	12	31	3
Povidone iodine	13	2	0	17	0	1	31	6	1	14	10	1	28	14	4
Hand rub	12	1	1	14	1	3	20	12	6	4	10	11	4	24	18

6.1.5 Facilities for infection control

The information in table 6.7 was collected from the sister or nursing officer in charge of labour rooms and the inquiry refers to the day of collection of data.

Table 6.7 shows that there are many deficiencies in what should be available even in the highest category of institutions. It is also seen that the divisional hospitals are more deprived than the others.

Lack of protective equipment for HIV is evident in all categories of hospitals.

6.2: Drugs for EmONC services

The information in tables 6.8a to 6.8b was collected from the officer in-charge of the drug stores of the institution and the inquiry refers to the day of collection of data.

Availability of antibiotics in every category of hospitals appears to be satisfactory.

Table 6.8 (a): Availability of essential drugs by type of institution

	TH/PGH		DGH		BH Functioning		BH upgraded		Divisional Hospitals	
	No	%	No	%	No	%	No	%	No	%
No. of institutions	14		18		38		26		46*	
ANTIBIOTICS										
Amoxicillin	14	100.0	18	100.0	38	100.0	26	100.0	38	82.6
Ampicillin	14	100.0	18	100.0	38	100.0	25	96.2	36	78.3
Benzyl Penicillin	14	100.0	17	94.4	38	100.0	25	96.2	34	73.9
Cefalexin	14	100.0	17	94.4	38	100.0	25	96.2	36	78.3
Cefotaxime	14	100.0	17	94.4	35	92.1	14	53.8	6	13.0
Ceftriaxone	14	100.0	18	100.0	36	94.7	17	65.4	4	8.7
Cefuroxime	14	100.0	18	100.0	38	100.0	19	73.1	25	54.3
Cloxacillin	12	85.7	18	100.0	38	100.0	25	96.2	37	80.4
Phenoxymethyl penicillin	14	100.0	18	100.0	37	97.4	25	96.2	37	80.4
Erythromycin	12	85.7	17	94.4	36	94.7	23	88.5	34	73.9
Gentamicin	14	100.0	18	100.0	38	100.0	26	100.0	32	69.6
Metronidazole	14	100.0	17	94.4	37	97.4	26	100.0	38	82.6
ANTICONVULSANTS										
Magnesium sulphate (injection)	14	100.0	18	100.0	35	92.1	12	46.2	9	19.6
Diazepam (injection)	14	100.0	18	100.0	37	97.4	25	96.2	37	80.4
Phenobarbital	14	100.0	17	94.4	36	94.7	24	92.3	31	67.4
Phenytoin	12	85.7	17	94.4	34	89.5	23	88.5	31	67.4
ANTIHYPERTENSIVES										
Hydralazine	13	92.9	18	100.0	36	94.7	12	46.2	8	17.4
Labetalol	8	57.1	4	22.2	10	26.3	2	7.7	0	0.0
Methyldopa	14	100.0	17	94.4	32	84.2	21	80.8	24	52.2
Nifedipine	14	100.0	18	100.0	37	97.4	26	100.0	37	80.4
OXYTOCICS										
Ergometrine	14	100.0	17	94.4	37	97.4	24	92.3	35	76.1
Oxytocin	14	100.0	18	100.0	37	97.4	24	92.3	33	71.7
Oxytocin + Ergometrine	1	7.1	3	16.7	2	5.3	2	7.7	3	6.5
EMERGENCY DRUGS										
Adrenaline (Epinephrine)	14	100.0	18	100.0	37	97.4	26	100.0	36	78.3
Atropine sulphate	14	100.0	18	100.0	38	100.0	26	100.0	33	71.7
Calcium gluconate	13	92.9	17	94.4	35	92.1	14	53.8	10	21.7
Digoxin	12	85.7	16	88.9	33	86.8	25	96.2	25	54.3
Ephedrine	13	92.9	17	94.4	33	86.8	3	11.5	6	13.0
Furosemide	14	100.0	18	100.0	38	100.0	26	100.0	36	78.3
Hydrocortisone	14	100.0	18	100.0	38	100.0	25	96.2	38	82.6
Naloxone	13	92.9	18	100.0	36	94.7	11	42.3	4	8.7
Promethazine	14	100.0	18	100.0	38	100.0	23	88.5	37	80.4
ANALGESICS										
Morphine	14	100.0	18	100.0	37	97.4	22	84.6	16	34.8
Pethidine	14	100.0	18	100.0	38	100.0	23	88.5	21	45.7
TOCOLYTICS										
Nifedipine	14	100.0	18	100.0	35	92.1	26	100.0	38	82.6
Salbutamol	14	100.0	17	94.4	36	94.7	26	100.0	38	82.6

Magnesium sulphate, an essential lifesaving drug in the management of eclampsia is available in all TH/PGHs, DGHs and in the majority of BHs with specialists. It was not available in 3 BHs where specialist services were available and in non-specialist hospitals the situation was poor i.e.; in more than 50 per cent of the upgraded BHs and 80% of divisional hospitals it was not available.

Most anti-hypertensive drugs are available in all hospitals but labetalol is available only in less than 50% of hospitals.

Common oxytocics namely ergometrine and syntocinon are available in all hospitals up to base hospital level, but only in 70% of the divisional hospitals. A small but significant number of patients deliver in these institutions and ensuring the availability of oxytocics is essential.

Availability of emergency drugs appears to be satisfactory with nearly all hospitals having the full complement of emergency drugs.

It is noted that none of the institutions studied had the complete range of contraceptives available in the National Family Planning Programme.

Availability of antiretroviral drugs and antimalarial drugs was low. This may be because anti-retroviral treatment is usually managed by the National STD and AIDS Control Programme through district STD clinics.

Sri Lanka is in the stage of eliminating Malaria and only a few cases of indigenous infection are reported per year. However, a high level of vigilance should be maintained and when required the drugs necessary can be obtained from the regional Anti-Malaria Campaign offices on a 24*7 basis. It is necessary for all units to have information on how to obtain these including contact details, as time may be of essence in the management of some of these cases.

Table 6.8 (b): Availability of essential drugs by type of institution

	TH/PGH		DGH		BH Functioning		BH upgraded		Divisional Hospitals	
	No	%	No	%	No	%	No	%	No	%
No. of institutions	14		18		38		26		46*	
STEROIDS										
Betamethasone	12	85.7	13	72.2	24	63.2	19	73.1	15	32.6
Dexamethasone	13	92.9	17	94.4	38	100.0	25	96.2	35	76.1
Prednisolone	14	100.0	17	94.4	37	97.4	24	92.3	36	78.3
IV FLUIDS										
Dextrose	14	100.0	18	100.0	37	97.4	26	100.0	38	82.6
Normal saline	14	100.0	18	100.0	38	100.0	26	100.0	38	82.6
Ringer's lactate	11	78.6	16	88.9	27	71.1	19	73.1	15	32.6
Starch	13	92.9	15	83.3	30	78.9	11	42.3	6	13.0
ANTIMALARIALS										
Chloroquine	10	71.4	16	88.9	24	63.2	11	42.3	10	21.7
Quinine Dihydrochloride	10	71.4	9	50.0	9	23.7	3	11.5	2	4.3
ANTIRETROVIRALS										
Nevirapine	0	0.0	0	0.0	1	2.6	0	0.0	0	0.0
Lamivudine	2	14.3	0	0.0	2	5.3	0	0.0	0	0.0
Zidovudine	3	21.4	2	11.1	2	5.3	0	0.0	0	0.0
Efavirenz	2	14.3	0	0.0	1	2.6	0	0.0	0	0.0
CONTRACEPTIVES										
Pills	12	85.7	12	66.7	25	65.8	13	50.0	17	37.0
Condoms	13	92.9	12	66.7	25	65.8	15	57.7	15	32.6
DMPA	11	78.6	14	77.8	24	63.2	13	50.0	18	39.1
IUD	12	85.7	12	66.7	22	57.9	14	53.8	16	34.8
Implants	4	28.6	4	22.2	8	21.1	6	23.1	2	4.3
Emergency pills	0	0.0	0	0.0	3	7.9	3	11.5	1	2.2
OTHER										
Vitamin K	14	100.0	15	83.3	36	94.7	22	84.6	17	37.0
Heparin	13	92.9	17	94.4	34	89.5	12	46.2	3	6.5
Sodium citrate	13	92.9	13	72.2	25	65.8	0	0.0	5	10.9
Anti Rho (D) Immune Globulin / Rhogum	14	100.0	17	94.4	36	94.7	8	30.8	2	4.3
Insulin – soluble	14	100.0	17	94.4	38	100.0	25	96.2	32	69.6
Vitamin A mega dose	14	100.0	13	72.2	31	81.6	15	57.7	22	47.8
Ranitidine	14	100.0	17	94.4	35	92.1	25	96.2	34	73.9

Table 6.8 (c): Availability of essential drugs by type of institution (including stock outs)

	TH/PGH		DGH		BH with specialist		BH without sepecialist		Divisional Hospitals	
	No	%	No	%	No	%	No	%	No	%
No. of institutions	14		18		38		26		46	
Availability of an indoor pharmacy/drugstore	14	100.0	18	100.0	38	100.0	26	100.0	36	78.3
Accessible 24/7	2	14.3	8	44.4	11	28.9	5	19.2	11	23.9
Availability of a drug inventory	14	100.0	18	100.0	38	100.0	24	92.3	38	82.6
Drug inventory is updated	12	85.7	15	83.3	34	89.5	23	88.5	33	71.7
Ordering drugs										
Order at fixed time: annually or quaterly	9	64.3	14	77.8	30	78.9	23	88.5	34	73.9
Order when drug reach "reorder level"	12	85.7	7	38.9	18	47.4	7	26.9	11	23.9
Order when ever drugs ran out	3	21.4	3	16.7	6	15.8	3	11.5	6	13.0
Never order	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Availability of a buffer stock at pharmacy for these drugs										
OXYTOCIN	13	92.9	16	88.9	29	76.3	21	80.8	29	63.0
MGS04	13	92.9	14	77.8	29	76.3	15	57.7	8	17.4
HYDRLAZINE	12	85.7	17	94.4	29	76.3	11	42.3	7	15.2
NIFIDIPINE	13	92.9	15	83.3	34	89.5	23	88.5	33	71.7
PLASMA EXPANDERS	13	92.9	13	72.2	21	55.3	15	57.7	9	19.6
Availability of a qualified pharmacist 24 hours a day	4	28.6	11	61.1	15	39.5	10	38.5	8	17.4
Availability of a 'First-expiry-First-out' system for issuing drugs	14	100.0	18	100.0	37	97.4	26	100.0	35	76.1
The drug distribution register have columns for:Date of manufacture & date of expiry	5	35.7	9	50.0	8	21.1	6	23.1	13	28.3
The drugs arranged according to 'First in First out' basis	12	85.7	16	88.9	33	86.8	25	96.2	34	73.9
Drugs protected from moisture, heat or infestation	10	71.4	11	61.1	24	63.2	15	57.7	26	56.5
Drugs that require refrigeration stored in a functioning refrigerator	14	100.0	15	83.3	38	100.0	24	92.3	34	73.9
Availability of a at least one functioning refrigerator	14	100.0	15	83.3	36	94.7	24	92.3	33	71.7

Although almost all the institutions have indoor pharmacy or drug store functioning during working hours, in a majority they were not accessible 24*7, which iterates the importance of having adequate stocks in the wards.

While most of the hospitals seem to follow the prescribed procedure in ordering drugs, it is noted that nearly 21% of TH/PGHs and 15% of DGHs and 15% of BHs with specialist services have indicated that they order drugs “whenever the drugs run out”. This practice needs to be discouraged.

It was noted that nearly 15% of the drug inventories were not updated. Percentage of institutions which maintain a buffer stock of life saving drugs used in obstetric care is seen to gradually decrease from TH/PGHs to lower levels of hospitals. However it is noted that more than 50% of institutions maintained buffer stocks of drugs inquired into. More than 80% of the hospitals follow good practices such as arranging drugs according to expiry dates. However, there is room for improvements in ordering and stocking of drugs in most institutions.

6.3. Equipment profile

This section describes the adequacy of selected equipment in relation to the number of deliveries and number of sections performed per day by institution, district and province. Number of deliveries is taken as a proxy measurement of the number of maternity patients needing care in the unit. The average number of deliveries per machine per day is presented as a measure of adequacy of resources needed for providing care. However, it must be noted that the morbidity survey showed that nationally only 72% of all discharges from the units studied were for delivery, the variation of this proportion between types of institutions where specialists were available was 4% (76% in TH/PGHs, to 72% in BHs).

Tables 6.10 (a) to 6.10 (c) describe the adequacy of resources in respect of USS, CTG and Doppler machines by institution and grouped by type of hospital.

Table 6.10 (a): Average daily use of USS, CTG machines and Doppler machines in TH/PGHs

Institution	No. of Deliveries per USS machine per day	No. of Deliveries per CTG machine per day	No. of Deliveries per Doppler machine per day
PGH Badulla	10.86	10.86	10.86
TH Kandy	9.8	29.8	7.4
TH Peradeniya	9.2	9.2	9.2
TH Gampola	11.6	11.6	11.6
PGH Ratnapura	12.9	6.45	0
TH Anuradhapura	10.65	16.0	32.0
TH Castle Street	8.87	4.03	14.78
TH De Soyza	4.98	3.11	3.11
TH Colombo South	5.61	4.49	5.61
TH Colombo North	3.0	6.39	12.78
TH Mahamodara	11.27	8.45	11.27
PGH Kurunegala	12.16	4.56	9.12
TH Jaffna	9.6	3.2	0
TH Batticaloa	17.91	17.91	5.97

Table 6.10 (b): Average daily use of USS, CTG machines and Doppler machines in DGHs

Institution	No. of Deliveries per USS machine per day	No. of Deliveries per CTG machine per day	No. of Deliveries per Doppler machine per day
DGH Monaragala	7.62	7.62	15.23
DGH Nawalapitiya	2.6	10.2	10.2
DGH Matale	16.1	16.1	16.1
DGH Nuwara Eliya	7.1	4.8	14.3
DGH Kegalle	15.57	7.79	15.57
DGH Polonnaruwa	19.06	19.06	19.06
DGH Gampaha	7.51	5.01	15.02
DGH Negambo	14.35	14.35	14.35
DGH Kalutara	11.93	7.95	11.93
DGH Matara	27.33	5.47	13.67
DGH Hambanthota	15.04	5.01	15.04
DGH Chilaw	14.32	0.00	2.51
DGH Kilinochchi	6.1	3.0	0
DGH Mannar	3.2	1.6	3.2
DGH Vavuniya	3.5	2.6	5.2
DGH Mullativu	1.3	0.3	0.6
DGH Ampara	5.32	5.32	10.64
DGH Trincomalee	10.88	10.88	0.00

Table 6.10 (c): Average daily use of USS, CTG and Doppler machines in BHs with specialist obstetricians.

Institution	No. of Deliveries per USS machine per day	No. of Deliveries per CTG machine per day	No. of Deliveries per Doppler machine per day
BH Diyathalawa	10.86	5.43	10.86
BH Mahiyanganaya	8.28	8.28	8.28
BH Dambulla	11.2	11.2	5.6
BH Dickoya	7.7	0	3.8
BH Rikillagaskada	1	0	1
BH Embilipitiya	8.45	0	8.48
BH Kahawatta	3.23	0.00	1.62
BH Balangoda	7.26	0	0
BH Mawanella	6.97	3.49	0
BH Karawanella	5.74	5.74	5.74
BH Thabuththegama	2.89	2.89	2.89
BH Medirigiriya	0.66	0.66	0.66
BH Awissawella	3.09	12.34	6.17
BH Homagama	6.68	6.68	6.68
BH Mulleriyawa	0	0.33	0.66
BH Wathupitiwala	10.61	5.31	10.61
BH Panadura	5.7	3.8	11.4
BH Horana	9.69	3.23	0
BH Balapitiya	10.85	5.42	10.85
BH Elpitiya	5.73	5.73	5.73
BH Kamburupitiya	4.78	4.78	0
BH Tangalle	8	8	8
BH Kuliypitiya	7.30	4.87	14.60
BH Nikaweratiya	2.6	10.4	10.4
BH Dambadeniya	2.51	0	2.51
BH Puttalam	17.57	17.57	0.00
BH Marawila	3.05	6.09	6.09
BH Point Pedro	2.4	0.6	2.4
BH Telipalai	0.3	0.3	0.3
BH Valachchenai	2.75	1.38	0.00
BH Dehiattakandiya	3.68	1.84	1.84
BH Kalmunai North	10.36	3.45	5.18
BH Kalmunai South	7.72	2.57	3.86
BH Samanthurai	0.60	0.40	1.21
BH Akkaraipattu	5.78	5.78	0.00
BH Kanthalai	1.10	0.27	1.10
BH Muthur	1.77	0.88	0.00
BH Kinniya	0.68	1.37	0.00

Table 6.10 (d): Average daily use of labour room beds and delivery sets in TH/PGHs

Institution	No. of Deliveries per LR bed per day	No. of deliveries per delivery set per day
PGH Badulla	1.45	0.99
TH Kandy	1.2	0.5
TH Peradeniya	1.3	1.0
TH Gampola	1.9	1.0
PGH Ratnapura	1.43	0.99
TH Anuradhapura	2.46	1.28
TH Castle Street	1.23	0.7
TH De Soyza	0.86	0.33
TH Colombo South	1.02	0.75
TH Colombo North	1.22	0.64
TH Mahamodara	1.47	0.59
PGH Kurunegala	1.74	0.91
TH Jaffna	1.3	0.8
TH Batticaloa	1.49	0.6

Table 6.10 (e): Average daily use of labour room beds and delivery sets in DGHs

Institution	No. of Deliveries per LR bed per day	No. of deliveries per delivery set per day
DGH Monaragala	1.69	0.73
DGH Nawalapitiya	1.0	0.6
DGH Malate	1.8	1.3
DGH Nuwaraeliya	1.3	0.7
DGH Kegalle	1.20	0.62
DGH Polonnaruwa	2.38	0.64
DGH Gampaha	1.37	0.56
DGH Negambo	1.43	0.32
DGH Kaluthara	2.98	0.6
DGH Matara	1.71	0.68
DGH Hambanthota	1.88	1.07
DGH Chilaw	0.63	0.19
DGH Kilinochchi	1.2	0.7
DGH Mannar	0.6	0.4
DGH Vavuniya	1.0	0.2
DGH Mullativu	0.4	0.2
DGH Ampara	2.13	0.59
DGH Trincomalee	2.72	0.73

Table 6.10 (f): Average daily use of labour room beds and delivery sets in BHs with specialist obstetrician.

Institution	No. of Deliveries per LR bed per day	No. of deliveries per delivery set per day
BH Diyathalawa	1.09	1.09
BH Mahiyanganaya	0.69	0.83
BH Dambulla	1.9	0.5
BH Dickoya	1.3	0.4
BH Rikillagaskada	0.3	0.1
BH Embilipitiya	2.83	0.94
BH Kahawatta	0.54	0.32
BH Balangoda	3.63	0.48
BH Mawanella	2.74	0.7
BH Karawanella	1.43	0.29
BH Thabuththegama	0.48	0.19
BH Medirigiriya	0.22	0.13
BH Awissawella	1.37	0.77
BH Homagama	0.83	0.35
BH Mulleriyawa	0.33	0.03
BH Wathupitiwala	1.33	0.53
BH Panadura	1.63	0.46
BH Horana	1.62	0.42
BH Balapitiya	1.08	0.54
BH Elpitiya	0.64	0.57
BH Kamburupitiya	0.6	0.48
BH Tangalle	0.8	0.8
BH Kuliyaipitiya	1.83	0.37
BH Nikaweratiya	0.8	0.69
BH Dambadeniya	0.63	0.19
BH Puttalam	1.03	0.88
BH Marawila	0.76	0.55
BH Point Pedro	0.6	0.3
BH Telipalai	0.1	0.1
BH Valachchenai	2.75	0.39
BH Dehiattakandiya	0.53	0.46
BH Kalmunai North	1.73	0.69
BH Kalmunai South	1.10	0.39
BH Samanthurai	0.30	0.20
BH Akkaraipattu	0.83	0.36
BH Kanthalai	0.37	0.11
BH Muthur	0.44	0.35
BH Kinniya	0.34	0.14

The three tables above present the wide variation seen between individual institutions in the average daily use of these instruments. The findings may be used to identify workload based norms and standards for availability of equipment based on type of institution.

Tables 6.10 (d) to (f) describe the situation in respect of labour room beds and delivery sets.

The tables 6.10d to 6.10f shows that in the majority of institutions the numbers of labour room beds appear to be adequate. The BH Balangoda has an average of 4 deliveries per bed per day, while the BHs Valachchanai (2.75), Embilipitiya (2.83), Mawanella (2.74) and DGH Trincomalee (2.72) average nearly 3 deliveries per labour room bed per day.

The number of deliveries per delivery set per day was calculated by dividing the average number of deliveries per day by the total number of delivery sets available. A value above one indicates that the average number of deliveries exceed the number of delivery sets available. Ideally the number of delivery sets per labour room should be three times the average number of deliveries per day (sterilization, use, in stocks). Therefore, if the value of the indicator is 0.33

or below, it indicates the availability of the ideal number of delivery sets or more.

It is seen that in 3 TH/PGHs the number of delivery sets exceeds 1 and in 3 others, the indicator is nearly 1 (0.91-.99). There is only one institution where the number of delivery sets is three times the average number of deliveries. Out of the DGHs in two institutions the value of the indicator is more than one, while 3 institutions have values less than 0.33. Among the BHs the situation appears better in that only one institution has a value over 1 indicating that the average number of deliveries per day exceeds the sets available, while 12 institutions have values less than 0.33 indicating the ideal number or more sets per delivery.

It is important to note that although the overwhelming majority of institutions have less than one delivery per delivery set per day only a small proportion of institutions have the value of the indicator as 0.33 or less, i.e. the ideal number. Such a situation may compromise the quality of care provided.

Table 6.10 (g) summarizes the findings of the tables above and provides averages by type of institution and functional classification.

Table 6.10 (g): Distribution of selected equipment and their use by type of institution according to their utilization

	TH	PGH	DGH	BH	2 or more units	2 specialist obstetricians in 1 unit	1 specialist obstetrician in 1 unit
No of deliveries per USS per day	17.1	12.0	9.3	4.6	11.9	9.1	4.7
No of deliveries per CTG machine per day	11.2	7.0	6.4	4.5	8.7	6.8	4.1
No of deliveries per Doppler per day	16.1	0.0	13.5	6.0	0.0	13.7	6.4
No of deliveries per bed per day	1.3	1.6	1.5	0.8	1.4	1.5	0.9
No of deliveries per delivery set per day	0.7	1.0	0.6	0.4	0.7	0.6	0.5

Table 6.10 (h): Distribution of selected equipment and their use by district

District	No. of deliveries per USS per day	No. of deliveries per CTG machine per day	No. of deliveries per doppler per day per month	No. of deliveries per bed per day*	No. of deliveries per delivery pack per day*
Colombo	24.8	8.3	24.8	1.1	0.6
Gampaha	11.0	6.6	13.2	1.2	0.5
Kalutara	9.2	5.1	15.3	1.7	0.4
Kandy	7.5	14.9	8.3	1.2	0.6
Matale	26.6	26.6	13.3	2.4	1.2
Nuwara eliya	7.5	10.0	7.5	1.0	0.4
Galle	10.4	7.4	17.3	1.2	0.6
Matara	17.9	5.1	12.0	1.2	0.6
Hambanthota	8.6	4.3	6.5	1.0	0.6
Jaffna	6.0	1.9	4.0	0.8	0.5
killinochchi	3.3	2.2	0.0	0.7	0.3
Mannar	4.0	2.0	4.0	0.4	0.2
Vavuniya	2.7	2.2	3.6	0.6	0.2
Mullativu	0.8	0.3	0.5	0.3	0.2
Batticaloa	8.3	6.2	6.2	1.2	0.6
Ampara	5.0	3.7	3.7	0.9	0.4
Kalmunai	4.4	2.6	4.4	0.9	0.4
Trincomalee	3.3	2.0	16.4	1.0	0.4
Kurunegala	6.9	5.8	9.9	1.3	0.6
Puttalam	19.9	19.9	39.8	0.9	0.7
Anuradhapura	10.9	14.5	21.8	1.6	0.9
Polonnaruwa	10.3	20.7	10.3	1.4	0.5
Badulla	9.1	9.1	11.4	1.1	0.9
Monaragala	3.4	5.4	9.9	1.0	0.6
Rathnapura	9.2	13.8	13.8	1.5	0.7
Kegalle	7.2	4.8	9.7	0.9	0.5
Sri Lanka	9.2	7.9	11.1	1.1	0.5

Table 6.10 (h) shows the utilization of equipment averaged for the district. In the absence of standards/ norms for equipment based on the work load of a unit it is difficult to comment on the above table. However, the wide inter-district variation is observed and may be related to the type of institution seen and

the proportion of deliveries in each type of institution within the district.

Tables 6.11 (a) to (e) describe the facilities available for caesarean sections in individual institutions according to type and the district differentials.

Table 6.11 (a): Average daily use of theatre facilities in TH/PGHs for caesarean section

Institution	No. of CS per theatre per day	No. of CS per theatre table per day	No. of CS per LSCS set per day
PGH Badulla	6.5	3.2	1.3
TH Kandy	7.96	2.66	0.8
TH Peradeniya	8.48	2.83	1.27
TH Gampola	4.58	1.53	1.14
PGH Ratnapura	8.97	2.24	1.00
TH Anuradhapura	4.63	3.09	0.93
TH Castle Street	3.62	1.81	1.4
TH De Soysa	1.35	0.58	0.3
TH Colombo South	2.34	1.17	1.0
TH Colombo North	4.11	0.82	0.7
TH Mahamodara	4.6	1.53	0.33
PGH Kurunegala	12.5	1.8	0.74
TH Jaffna	6.3	2.1	1.1
TH Batticaloa	5.8	5.8	1.15

It is seen that CSs per operating theatre per day in TH/PGHs varies from nearly 13 in PGH Kurunegala to 1.35 at the De Soysa Hospital for Women in Colombo. In 50% of the hospitals in the TH/PGHs, the number of CS per LSCS sets per day is more than one suggesting inadequacy of this essential resource.

Table 6.11 (b) : Average daily use of theatre facilities in DGHs for caesarean section

Institution	No. of CS per theatre per day	No. of CS per theatre table per day	No. of CS per LSCS set per day
DGH Monaragala	3.6	1.2	0.52
DGH Nawalapitiya	2.05	0.68	0.82
DGH Malate	2.53	0.84	1.27
DGH Nuwaraeliya	2.76	0.92	0.55
DGH Kegalle	3.54	1.77	1.42
DGH Polonnaruwa	5.39	1.8	0.77
DGH Gampaha	2.28	0.76	0.5
DGH Negambo	5.3	2.65	0.7
DGH Kalutara	4.23	2.12	1.1
DGH Matara	12.99	4.33	1.08
DGH Hambanthota	5.14	1.29	0.56
DGH Chilaw	5.60	1.10	0.56
DGH Kilinochchi	0.4	0.38	0.1
DGH Mannar	1.0	0.34	0.3
DGH Vavuniya	0.4	0.16	0.1
DGH Mullativu	0	0	0
DGH Ampara	3.0	3.0	0.43
DGH Trincomalee	2.60	0.50	0.66

Table 6.11 (b) shows that CSs per operating theatre per day varies from nearly 13 per day in DGH Matara to 2 in DGH Nawalapitiya. In the DGHs, Kilinochchi, Mannar, Vavuniya and Mulativu have one or less CS per day per operating theatre, probably because in many of the districts the health care facilities were being re-organised during the period of data

collection and the low proportion of births delivered by caesarean section.

In four institutions, DGHs Matara, Kalutara, Kegalle and Matale, the number of CSs exceed the number of LSCS sets per day. Only 3 institutions (Vavuniya, Mannar and Kilinochchi) have a value below 0.33 the ideal number.

Table 6.11 (c) : Average daily use of theatre facilities in BHs with specialist Obstetrician for caesarean section

Institution	No. of CS per theatre per day	No. of CS per theatre table per day	No. of CS per LSCS set per day
BH Diyathalawa	2.9	1	0.33
BH Mahiyanganaya	1.7	1.7	0.5
BH Dambulla	1.94	0.65	0.56
BH Dickoya	1.94	0.97	0.65
BH Rikillagaskada	0.91	0.91	0.23
BH Embilipitiya	5.39	2.69	1.08
BH Kahawatta	0.47	0.47	0.16
BH Balangoda	2.8	0.7	0.4
BH Mawanella	1.88	1.88	0.31
BH Karawanella	3.01	1	0.38
BH Thabuththegama	0.9	0.9	0.45
BH Medirigiriya	0	0	0
BH Awissawella	1.83	0.61	0.9
BH Homagama	1.11	0.55	0.4
BH Mulleriyawa	0.12	0.12	0
BH Wathupitiwala	1.84	0.61	0.3
BH Panadura	3.97	1.98	0.8
BH Horana	3.69	1.23	0.7
BH Balapitiya	3.43	1.14	0.34
BH Elpitiya	1.93	1.93	1.08
BH Kamburupitiya	1.82	1.82	0.3
BH Tangalle	2.63	1.32	0.53
BH Kuliyaipitiya	4.70	1.60	1.60
BH Nikaweratiya	3.5	1.7	0.87
BH Dambadeniya	0.7	0.4	0.36
BH Puttalam	4.60	1.50	0.90
BH Marawila	1.30	0.70	0.80
BH Point Pedro	0.2	0.07	0.1
BH Telipalai	0	0	0
BH Valachchenai	0.00	0.00	0.00
BH Dehiattakandiya	0.60	0.60	0.20
BH Kalmunai North	2.10	1.10	0.42
BH Kalmunai South	2.00	1.00	0.49
BH Samanthurai	0.00	0.00	0.00
BH Akkaraipattu	1.60	0.50	0.53
BH Kanthalai	0.70	0.20	0.05
BH Muthur	0.30	0.30	0.09
BH Kinniya	0.34	0.34	0.01

It is noted that Embilipitiya (5.4) had the highest number of sections per operating theatre followed by Kuliypitiya (4.7) and Puttalam (4.6) among the BHs where specialist obstetricians were available. Three institutions in this group have more than one LSCS per CS sets per day, while 8 institutions have less than 0.33 indicating that they have the ideal number or more sets available.

The average number of CSs per day per type of hospital is seen to decrease with the level of institution from TH to BH and with the functional hierarchy being highest in institutions with more than one specialist obstetrician and lowest being where a single specialist obstetrician is available. The table suggests that CS packs per day are inadequate to meet the work load in all types of institutions.

Table 6.11 (d): Average daily use of theatre facilities for caesarean sections by type and functional classification of institutions

	Type of the Institution				Functional type		
	Teaching Hospital	Provincial General Hospital	District General Hospital	Base Hospital	More than one unit	One unit with 2 specialist Obstetricians	One unit with one specialist Obstetrician
Number of CS performed/Quater 2011	7270	2513	7219	6849	17525	2032	4294
No. of CS per theatre per day	8.08	5.58	3.08	1.71	4.53	3.23	1.47
No. of CS per operation table per day	3.11	1.75	1.23	0.80	1.68	1.41	0.72
No. of CS per LSCS pack per day	0.84	0.90	0.72	0.47	0.83	0.58	0.39

Table 6.11 (e): Average daily use of theatre facilities for caesarean section by province and district

Province/ District		Total caesarean sections performed for quarter from birth register in 2011	CS / Theatre / day	CS / Operating table / day	CS / LSCS pack / day
Western province		7511	3.1	1.2	0.8
	Colombo	4123	2.9	1.3	1.1
	Gampaha	1960	3.1	0.9	0.5
	Kalutara	1428	4.0	1.8	0.9
Central province		3491	3.3	1.2	0.8
	Kandy	2262	5.0	1.7	1.0
	Matale	806	2.2	0.8	0.8
	Nuwara Eliya	423	1.7	0.9	0.4
Southern province		3220	4.5	2.0	0.6
	Galle	1702	6.3	2.7	0.7
	Matara	818	4.5	2.3	0.5
	Hambanthota	700	2.6	1.1	0.8
Northern province		756	0.9	0.4	0.3
	Jaffna	588	2.2	0.9	0.7
	Killinochchi	0	0.0	0.0	0.0
	Mannar	92	1.0	0.3	0.3
	Vavuniya	74	0.3	0.1	0.1
	Mullativu	2	0.0	0.0	0.0
Eastern province		1679	0.9	0.9	0.4
	Batticaloa	518	5.8	2.9	0.8
	Ampara	833	1.2	0.8	0.4
	Trincomalee	328	0.3	0.5	0.4
North Western province		2959	4.7	1.4	0.8
	Kurunegala	1924	5.3	1.5	0.8
	Puttalam	1035	3.8	1.2	0.8
North Central province		1400	3.9	2.2	0.8
	Anuradhapura	915	3.4	2.5	0.9
	Polonnaruwa	485	5.4	1.8	0.8
Uva province		1517	4.3	1.8	0.7
	Badulla	992	3.7	1.8	0.7
	Monaragala	525	5.8	1.9	0.8
Sabaragamuwa province		2622	3.6	1.5	0.7
	Rathnapura	1544	4.4	1.6	0.7
	Kegalle	1078	3.0	1.5	0.6
Sri Lanka		25155	2.8	1.3	0.7



Blood Bank _ TH Kandy - Courtesy of Dr. Kapila Gunawardhana

Chapter 7

Human Resources for EmONC

Professionally qualified and skilled human resources are a prerequisite for the provision of high quality health care which in turn is an important determinant of health outcomes of the population. Quality performance depends on a combination of factors; availability of a sufficient number of trained personnel /professionals and their being competent, productive and responsive to patient needs.

The present assessment examined the distribution of human resources for obstetric care namely, specialist obstetricians, *medical officers* and midwifery staff; the term medical officer includes all MOs, SHOs and registrars but not senior registrars and intern house officers and the term *midwifery staff* includes midwives and midwifery trained nurses. Opportunities for in-service training in relevant areas and some aspects of knowledge among selected providers were examined. The findings are presented in this chapter.

7.1 Workload

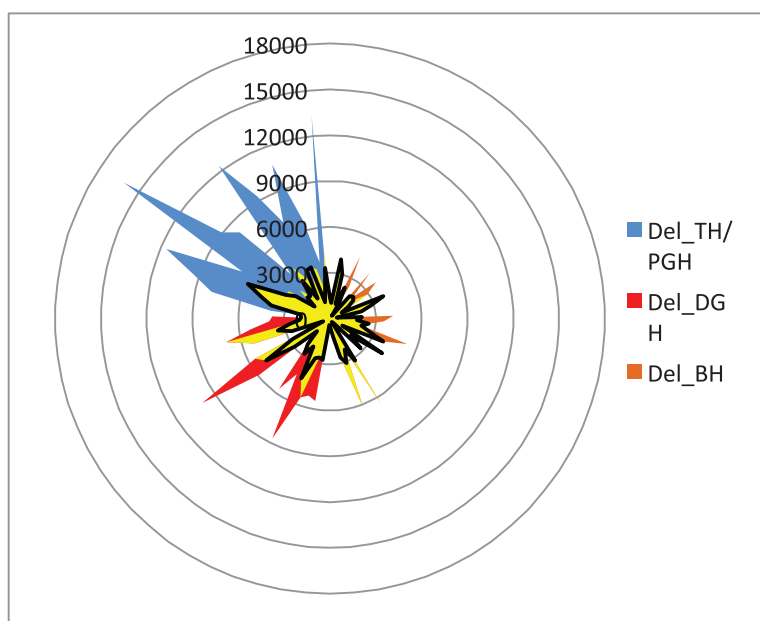
In the absence of documented staffing norms/ standards for the country for the different categories of staff working in obstetric units and labour rooms, it is difficult to comment on the work load. The exception was the number of deliveries per obstetric

unit that is given in the Labour Room Guide (FHB 2007). However, since the distribution of human resources and work load of the different categories is an important determinant of quality of care, the situation prevalent at the time of survey is described with a view to highlighting the variations in the work burden observed between categories of institutions, within each category as well as between districts. The findings may help in formulating guidelines and establishing norms for the different categories of institutions and staff.

The data are analysed by institution and summarised for type of institution and on a district basis. Figure 7.1 shows the number of deliveries per institution, unit and specialist obstetrician and highlights the wide variation between categories of institutions as well as between institutions within each category.

The work load of a unit is dependent on many factors, such as geographic location in relation to other health institutions, easy accessibility in terms of transportation, availability of facilities as well as the duration of service availability in the particular institution and in the neighbouring institutions and perceptions of the community regarding the institution and other factors which influence personal preferences.

Figure 7.1: Deliveries per institution unit and VOG by category of hospital



7.1.1: Work load of different categories of care providers

7.1.1 (a) Variation among individual hospitals in different types of institutions

The work load per institution has been calculated by dividing the number of births in the institution by the number of staff of the selected category serving in the obstetric units and labour rooms of that institution. The number of deliveries conducted under the supervision of one specialist obstetrician over a given time period would give an indication of the workload of a unit. However, in the University units where there is more than one specialist obstetrician per unit, the proxy measure may lead to an under estimation of the workload per unit.

Tables 7.1 (a)-(c) show the variation in work load in relation to normal deliveries in the individual institutions in the different types of hospitals and the key to the tables is given below.

The cut off values used for stratifying the workload and its' colour coding were decided upon based on the following:

According to the Labour Room Management Guide published by the Family Health Bureau

(2007), 300 deliveries per month is considered as the norm for an obstetric unit and this may be considered a proxy for the number of deliveries per obstetrician per month. The World Health Report (2005), also gives the reference number of deliveries per year as 3600 which is equivalent to the 300 deliveries per month per unit.

The national averages for deliveries per month based on the data from the current assessment are 216 per obstetrician, 68 per MO obstetrics and 9 per midwife.

The norm described in the World Health Report, 2005, gives the number of medical officers required for the reference number of deliveries (3600 per year/300 per month) as 3 part time MOs and the number of midwives as 20. This is equivalent to 100 deliveries per MO per month and 15 deliveries per midwife. These values have to be examined in relation to roles and responsibilities of the different categories of staff expected in the local scenario keeping in mind that WHO recommendations are a generalisation applicable to countries with a wide variation in service availability. Therefore in the present analysis 4 MOs per 300 deliveries per month, i.e. 75 deliveries per MO per month, were used taking into consideration the workloads noted.

The cut off values used in this analysis and the data are presented so that they may serve as a basis for deriving staffing norms based on types of institution as well as work load of institutions.

Key to tables 7.1(a) (b) and (c)

No. of Deliveries per specialist obstetrician per month	No. of deliveries per MO- obstetrics * per month	No. of deliveries per midwifery staff** per month
<150	<30	<5
150-200	30-45	5 to 10
200+	45+	10+
250+	60+	15+
300+	75+	20+
No staff	No staff	No staff

* includes MOs, SHOs and registrars but not senior registrars and intern house officers

**includes midwifery trained nurse and midwife

Table 7.1 (a): Work load of selected categories of care providers for normal deliveries in TH and PGH by institution

TH/PGH	No. of deliveries per specialist obstetrician per month	No. of deliveries per MO- obstetrics per month	No. of deliveries per midwifery staff* per month
PGH Badulla	330.29	82.57	20.64
TH Kandy	298.97	74.74	14.95
TH Peradeniya	93.26	79.94	6.74
TH Gampola	175.67	50.19	11.33
PGH Ratnapura	392.25	98.06	10.75
TH Anuradhapura	323.83	121.44	8.52
TH Castle Street	224.72	43.49	9.36
TH De Soysa	151.47	26.11	5.57
TH Colombo South	170.58	56.86	7.34
TH Colombo North	129.53	59.78	9.96
TH Mahamodara	257.15	85.72	6.68
PGH Kurunegala	277.46	61.66	9.17
TH Jaffna	291.33	48.56	9.10
TH Batticaloa	181.56	22.69	4.70
National Average	235.57	65.13	9.63

The group, “Teaching Hospitals” includes institutions with University units where there are a number of specialist obstetricians as well as institutions where a unit has a single specialist obstetrician. This is a limitation that has to be considered when examining averages for this category. Table 7.1(a) shows that the number of deliveries per specialist obstetrician shows a wide variation between institutions, ranging from

93 per month to 392 per month. The average for this group of hospitals is less than the national average.

The PGHs Ratnapura, Badulla and the TH Anuradhapura have heavy workloads exceeding the MoH norm of 300 deliveries per month per unit. TH Mahamodara, TH Kandy, TH Jaffna and PGH Kurunegala exceed the average for this group of

hospitals but are within the MoH norm. It is observed that the TH Kandy and TH Jaffna are very close to the national norm. The low averages seen for deliveries per specialist obstetrician in THs De Soyza Hospital for women, Colombo North, Colombo South and Peradeniya are probably due to the availability of more than one specialist obstetrician in University units.

In the calculation of workload of MOs, intern house officers are not included. It is noted that the average workload of medical officers in this category exceeds the national average. The workload per MO obstetrics varies from 23 per month to 122 per month while the variation in workload for midwifery staff is from 5-21 deliveries per month. The TH Anuradhapura and PGH Ratnapura, PGH Badulla and TH Mahamodara the work load for Medical Officers in obstetric units is high compared to other institutions in this category

and the TH Kandy and PGH Kurunegala exceed the national average. It must be noted that all institutions/units in this category have varying numbers of intern medical officers in addition to the MOs included in the calculation.

The workload of midwives exceeds the WHO norm only in one institution and that the majority of institutions are below the national average.

It is noted that the workloads of all three selected categories of staff are high in PGH Badulla, while in TH Anuradhapura and PGH Ratnapura two categories of staff (specialist and non specialist medical staff) exceed the upper cut off value used in the analysis i.e. 300 deliveries per specialist obstetrician/unit per month and 75 deliveries per MO per month.

Table 7.1 (b): Work load of selected categories of care providers for normal deliveries in DGH by institution

DGH	No. of deliveries per specialist obstetrician per month	No. of deliveries per MO-obstetrics per month	No. of deliveries per midwifery staff*per month
DGH Monaragala	231.67	77.22	11.58
DGH Nawalapitiya	155.54	51.85	8.64
DGH Malate	245.46	81.82	7.44
DGH NuwaraEliya	216.88	108.44	19.72
DGH Kegalle	236.83	78.94	5.71
DGH Polonnaruwa	289.92	82.83	15.26
DGH Gampaha	228.46	65.27	8.16
DGH Negombo	218.21	62.35	9.92
DGH Kalutara	362.83	90.71	10.22
DGH Matara	415.71	103.93	15.40
DGH Hambanthota	228.67	91.47	11.15
DGH Chilaw	217.75	87.10	13.20
DGH Kilinochchi	184.42	61.47	14.19
DGH Mannar	96.25	32.08	4.18
DGH Vavuniya	157.71	52.57	9.01
DGH Mullativu	38.33	38.33	6.39
DGH Ampara	161.75	80.88	8.09
DGH Trincomalee	165.46	47.27	9.73
National Average	214.0	71.92	10.44

\ Among the District General Hospitals the workload per specialist obstetrician / per unit based on the number of deliveries varies from 38 to 415. The DGH Matara and DGH Kalutara exceed the MoH norm, with the DGH Matara recording the highest work load for a specialist obstetrician in the country. DGH Polonnaruwa exceeds the national average. DGH Mannar and Mullativu show a work load of less than 100 per specialist obstetrician.

The workload per MO varies from 32 – 108, with 10 of the 18 institutions having workloads exceeding the upper cut off value used in the study.

The workload of midwives exceeds the WHO norm in 3 institutions and the national average in 5 more institutions (table 7.1(b)).

The DGHs Matara and Kalutara exceed the upper cut off value used for both categories of medical staff.

Table 7.1(c): Work load of selected categories of care providers for normal deliveries in BH by institution

BH	No. of deliveries per specialist per month	No. of deliveries per MO- obstetrics per month	No. of deliveries per midwifery staff*per month
BH Diyathalawa	251.83	62.96	8.99
BH Mahiyangana	330.25	82.56	16.51
BH Dambulla	340.67	85.17	9.21
BH Dickoya	232.92	58.23	33.27
BH Rickillagaskade	31.50	10.50	1.43
BH Embilipitiya	257.83	85.94	15.17
BH Kahawatta	98.25	24.56	4.91
BH Balangoda	220.83	55.21	12.99
BH Mawanella	212.08	26.51	5.44
BH Karawanella	174.50	29.08	6.02
BH Thabuththegama	87.83	29.28	5.86
BH Medirigiriya	20.08	10.04	1.54
BH Awissawella	187.71	53.63	8.94
BH Homagama	101.54	40.62	6.35
BH Mulleriyawa	20.17	5.04	3.36
BH Wathupitiwala	161.42	46.12	6.87
BH Panadura	173.42	57.81	7.88
BH Horana	147.38	73.69	12.82
BH Balapitiya	164.96	82.48	11.38
BH Elpitiya	174.17	29.03	8.29
BH Kamburupitiya	145.25	36.31	6.60
BH Tangalle	121.63	40.54	6.57
BH Kuliyaipitiya	222.08	148.06	9.87
BH Nikaweratiya	316.42	52.74	8.55
BH Dambadeniya	76.33	12.72	6.36
BH Puttalam	267.17	133.58	21.37
BH Marawila	185.25	46.31	10.90
BH Point Pedro	72.25	36.13	6.02
BH Telipalai	8.83	8.83	1.47
BH Valachchenai	83.67	20.92	10.46
BH Dehiattakandiya	112.00	28.00	8.00
BH Kalmunai North	315.08	105.03	22.51
BH Kalmunai South	234.67	78.22	9.39
BH Samanthurai	36.67	9.17	0.96
BH Akkaraipattu	175.83	35.17	7.03
BH Kanthale	116.67	38.89	5.30
BH Muthur	53.75	26.88	4.89
BH Kinniya	124.92	41.64	12.49
National Average	159.41	48.62	9.10

DGH Matara exceeds the WHO recommended value for midwifery staff indicating high workloads for all staff. The average workload for this group of institutions in respect of medical officers and midwifery staff exceed the national averages.

Table 7.1 (c) shows that among the Base Hospitals the average workload for all categories of staff is lower than or very close to the national average. Deliveries per specialist obstetrician/unit range from 20 per month in Mulleriyawa (an institution which commenced functioning a few months prior to data collection) to 341 per month in Dambulla. BH Telippalai had 9 deliveries and Medirigiriya 20 deliveries per month but at the time of data collection theatres were not functioning in these institutions.

Four base hospitals (11%) namely; Mahiyangana, Dambulla, Nikeweratiya and Kalmunai North exceed the upper cut off of 300 deliveries per specialist obstetrician used.

The workload for medical officers varies from 8-148 per month, eight of the institutions having 75 or more deliveries per MO per month. The Base Hospitals of Kuliyapitiya, Puttalam and Kalmunai North have very high workloads exceeding 100 deliveries. The upper cut off value is exceeded in two institutions and the national average in one.

The workload of midwifery staff range from 1 delivery per month to 33 per month, 3 institutions BHs Dickoya, Kalmunai North, and Puttalam exceed the upper cut off value.

It should be noted that in the BH Kalmunai North, the work load of all three categories of staff exceed the highest cut-off used in the study. In the BHs Puttalam, Dambulla and Mahiyangana two categories of staff exceed the highest cut-off value used in the study.

The information given in table 7.1 a-c is summarised in table 7.2 and figure 7.2

Table 7.2: Work load for deliveries of selected categories of staff by type of institution

Work load	TH/PGH	DGH	BH	≥ 2 SO	1 SO
No. of Institutions	14	18	38	39	31
Consultant Obstetricians					
< 150 deliveries per month	2	2	18	5	17
150 to 200 deliveries per month	4	5	8	12	5
200+ to 250 deliveries per month	1	8	5	10	4
250+ to 300 deliveries per month	4	1	3	7	1
>300 deliveries per month	3	2	4	5	4
Consultant neonatologist/paediatrician					
< 150 deliveries per month	0	1	13	2	12
150 to 200 deliveries per month	1	2	7	6	4
200+ to 250 deliveries per month	1	4	5	6	4
250+ to 300 deliveries per month	2	8	1	9	2
>300 deliveries per month	10	2	8	16	4
MO- Obs					
< 30 deliveries per month	2	0	14	2	14
30+ to 60 deliveries per month	5	5	14	13	11
60+ to 90 deliveries per month	5	9	7	16	5
90+ to 120 deliveries per month	1	4	1	5	1
>120 deliveries per month	1	0	2	3	0
Midwifery staff					
< 5 deliveries per month	1	1	7	1	8
5+ to 10 deliveries per month	9	9	20	23	15
10+ to 15 deliveries per month	3	5	6	9	5
15+ to 20 deliveries per month	0	3	2	4	1
>20 deliveries per month	1	0	3	2	2

*midwifery trained nurse and midwife

Figure 7.2: Percentage of institutions in each category of institution by workload



When the upper cut off of over 300 deliveries is considered it is seen that 21 % of teaching hospitals, 11% of DGH, and 10.5% of BHs experience the heaviest workloads. If 200 deliveries per specialist obstetrician/unit are considered as an approximation to the national average (216 per specialist obstetrician) it is seen that 57%, 61%, 32% of the TH/PGH, DGH and BH respectively exceed this value (table 7.2).

If a delivery frequency of less than 150 per unit is considered as “under utilisation” it was found that 14% of Teaching Hospitals, 11% of DGHs and 47% of

Base Hospitals experience this low rate. It appears that “underutilisation” is seen in nearly half of the Base Hospitals. Some of the Base Hospitals are recently opened units and this may account for the high proportion of hospitals having low utilisation rates. An improved network of Base Hospitals providing 24*7 care will increase utilisation of this category of institutions and also access to CEmONC services to a majority of the population. This is likely to reduce the pressure on the higher levels of institutions, especially the DGHs.

Table 7.3: Work load for deliveries of selected categories of staff by District and Province

Province / District	No.of deliveries in specialist units in 2011	Specialist Obstetricians		SHO/ Obstetric		Midwifery staff*	
		No.of specialist obstetricians	Average no. of deliveries per month	No.of SHO/obstetric	Average no. of deliveries per month	No.of midwifery qualified staff	Average no. of deliveries per month
Western province	84840	39	181	141	50	666	11
Colombo	44513	21	177	88	42	437	8
Gampaha	23920	12	166	35	57	155	13
Kalutara	16407	6	228	18	76	74	18
Central province	43784	20	182	53	69	407	9
Kandy	25427	13	163	32	66	253	8
Matale	9979	3	277	10	83	103	8
Nuwara Eliya	8378	4	175	11	63	51	14
Southern province	38519	14	229	45	71	185	17
Galle	18392	7	219	22	70	104	15
Matara	11720	3	326	12	81	34	29
Hambantota	8407	4	175	11	64	47	15
Northern province	15578	9	144	28	46	72	18
Jaffna	7965	4	166	15	44	23	29
Killinochchi	2213	1	184	3	61	3	61
Mannar	1155	1	96	3	32	35	3
Vavuniya	3785	2	158	6	53	7	45
Mullativu	460	1	38	1	38	4	10
Eastern province	29431	16	153	51	48	336	7
Batticaloa	7543	4	157	15	42	124	5
Ampara	5226	3	145	8	54	33	13
Kalmunai	9147	4	191	14	54	102	7
Trincomalee	7515	5	125	14	45	77	8
North Western province	37222	13	239	49	63	375	8
Kurunegala	23361	8	243	36	54	103	19
Puttalam	13861	5	231	13	89	272	4
North Central province	19911	6	277	20	83	199	8
Anuradhapura	12712	3	353	11	96	148	7
Polonnaruwa	7199	3	200	9	67	51	12
Uva province	20472	6	284	19	90	150	11
Badulla	14912	4	311	14	89	110	11
Monaragala	5560	2	232	5	93	40	12
Sabaragamuwa province	29754	10	248	44	56	425	6
Ratnapura	19431	6	270	22	74	274	6
Kegalle	10323	4	215	22	39	151	6
Sri Lanka	319511	133	200	450	59	2815	9

*midwifery qualified nurses and midwives

Table 7.3 shows the variation seen between provinces and districts in workload of the different categories of personnel. In the districts of Anuradhapura, Badulla and Matara the average number of births per obstetrician exceed the MoH norm. The districts of Mannar, Mullativu, Trincomalee and Ampara, on an average have less than 150 deliveries per consultant obstetrician.

It is seen that all in districts in the Sabaragamuwa, Uva, North Central and North Western provinces as well as the districts of Galle, Matara and Kalutara the average number of deliveries per specialist obstetrician is more than the national average (200 per specialist obstetrician).

The average workload per MO obstetric unit per month varies from 96 in Anuradhapura to 32 in Mannar. The national average is 59 per MO/month, however in Anuradhapura and Moneragala it is as high as 96 and 93.

The average number of deliveries per midwife per month varies widely between districts, the range being 61 in Killinochchi to 3 in Mannar.

7.1.2 Work load for caesarean sections

Tables 7.4-7.6 show the variation in work load for caesarean sections by district and province, by category of institution and category of staff. These rates are also partly accounted for by the wide variation in caesarean section rates between institutions and districts.

Table 7.4: Workload for caesarean sections by district

Province	District	Number of CS performed/Quarter 2011	Human resource					CS/MO Blood Bank per month
			CS/ specialist obstetrician per month	CS/specialist. anaesthetist per month	CS/specialist. Paediatrician per month	CS/MO Obstetrics per month	CS/MO anaesthesia per month	
Western province		6417	53.48	93	76.39	15.28	11.5	29..30
	Colombo	3006	45.55	71.57	100.20	11.39	13.01	38.54
	Gampaha	1960	54.44	108.89	59.39	19.22	9.33	20.42
	Kalutara	1451	80.61	161.22	59.39	19.22	9.33	20.42
Central province		3523	61.82	88.01	65.34	21.41	11.22	28.09
	Kandy	2262	58.00	53.86	68.55	23.56	7.94	26.93
	Matale	806	89.56	134.33	89.56	26.87	16.79	38.38
	Nuwara Eliya	455	37.92	75.83	37.92	13.79	8.92	18.96
Southern province		3220	76.67	153.33	119.26	23.85	17.89	46.67
	Galle	1702	81.05	189.11	189.11	25.79	28.37	37.82
	Matara	818	90.89	136.33	90.89	22.72	12.98	90.89
	Hambanthota	700	58.33	116.67	58.33	21.21	12.28	46.67
Northern province		790	20.8	50.27	16.57	6.37	5.64	18.75
	Jaffna	588	49.90	196.00	39.20	13.07	8.17	39.20
	Killinochchi	34	11.33	0.00	0.00	3.78	11.33	11.33
	Mannar	92	30.67	30.67	30.67	10.22	6.13	30.67
	Vavuniya	74	12.33	24.67	12.33	4.11	2.24	12.33
	Mullativu	2	0.67	0.00	0.67	0.67	0.33	0.22
Eastern province		1679	34.98	79.95	43.05	8.48	6.29	14.73
	Batticaloa	518	43.17	172.67	43.17	6.17	9.09	28.78
	Ampara	324	36.00	36.00	36.00	13.50	5.68	9.82
	Kalmunai	509	42.42	169.67	56.56	11.31	5.14	15.42
	Trincomalee	328	21.87	54.67	36.44	7.29	6.07	10.93
North Western province		2959	75.87	123.29	109.59	21.44	11.88	35.23
	Kurunegala	1924	80.17	128.27	128.27	19.43	10.69	30.54
	Puttalam	1035	69.00	115.00	86.25	26.54	15.00	49.29
North Central province		1400	66.67	93.33	77.78	23.33	11.11	27.45
	Anuradhapura	915	76.25	101.67	101.67	27.73	9.24	30.50
	Polonnaruwa	485	53.89	80.83	53.89	17.96	17.96	23.10
Uva province		1320	73.3	73.3	62.9	25.9	9.8	36.7
	Badulla	992	82.70	82.70	66.10	30.10	11.80	41.30
	Monaragala	328	54.70	54.70	54.70	18.20	6.40	27.30
Sabaragamuwa province		2636	87.87	175.73	87.87	20.92	12.38	41.84
	Ratnapura	1558	86.56	173.11	103.87	23.61	12.08	37.10
	Kegalle	1078	89.83	179.67	71.87	17.97	12.83	29.90
Sri Lanka		23944	59.12	99.77	72.56	17.35	11.10	30.82

The highest workload for a specialist obstetrician respect of CS is seen in the Matara district (91 per specialist obstetrician per month). The low number of Caesarean Sections per specialist obstetrician seen in the Northern Province and especially in the districts of Mullativu and Kilinochchi are probably due to the fact that resettlement of the population and reorganisation of services were ongoing in these areas at the time of data collection and prior to it.

Although the national average per specialist anaesthetist is 100 Caesarean Sections per month, there are seven districts (Ratnapura, Kegalle, Batticaloa, Kalmunai, Jaffna, Galle and Kalutara) where the work load per month exceeds 150 CS per specialist anaesthetist per month.

The workload per MO obstetrics varies from 4 CS per month in Vavuniya to 30 in Badulla (excluding the districts of Mullativu and Killinochchi). The workloads of MO anaesthesia and blood bank are more equitably distributed.

Table 7.5 shows that the work load of CSs per specialist obstetrician in BHs is lower than in the other two categories of institutions. The workloads of medical officers in obstetrics are highest in DGHs. The workload of MOs anaesthesia and Blood Bank are more equitably distributed.

Table 7.5: Workload for caesarean sections for different grades of medical officers by type of institution

		Type of Institution			Functional category	
		TH / PGH	DGH	BH	Two or More Specialist Obstetricians	with one cSpecialist Obstetrician
Human Resources	Number of caesareans per quarter / 2011	10588	6704	6849	20743	3398
	CS/specialist obstetrician per month	67.9	67.7	47.6	67.8	36.5
	CS/specialist anaesthetist per month	103.8	117.6	91.3	109.8	75.5
	CS/specialist paediatrician per month	110.3	69.8	57.1	88.6	43.6
	CS/MO obstetrics per month	17.6	23.0	14.1	20.2	9.7
	CS/MO anaesthesia per month	10.0	11.3	11.5	11.5	9.5
	CS/MO Blood Bank per month	31.5	28.3	28.5	32.9	21.0

Table 7.6: Institutions by work load for caesarean sections of selected categories of staff

Workload	TH/PGH	DGH	BH	>=2 Specialist Obstetric ians	1 Specialist Obstetric ian
No. of Institutions	14	18	38	39	31
<u>Specialist Obstetricians</u>					
< 30 CS per month	1	3	14	2	16
30 + to 60 CS per month	4	4	14	13	9
60 + to 90 CS per month	3	8	7	15	3
90 + to 120 CS per month	5	2	3	7	3
> 120 CS per month	1	1	0	2	0
<u>Specialist Anesthetists</u>					
< 60 CS per month	2	6	22	5	25
60 + to 120 CS per month	4	2	13	13	6
120 + to 180 CS per month	2	7	3	12	0
180 + to 240 CS per month	4	2	0	6	0
240 + to 300 CS per month	1	1	0	2	0
> 300 CS per month	1	0	0	1	0
<u>Specialist Pediatrician</u>					
< 30 CS per month	0	2	10	1	11
30 + to 60 CS per month	2	4	12	9	9
60 + to 90 CS per month	2	8	5	12	3
90 + to 120 CS per month	4	2	4	7	3
> 120 CS per month	6	1	3	10	0
<u>MO - OBS</u>					
No Caesarean sections	0	0	5	0	5
< 15 CS per month	3	5	18	7	19
15 - 30 CS per month	7	8	13	21	7
30 + to 45 CS per month	4	5	1	10	1
45 + CS per month	0	0	1	1	0
<u>MO - Anesthesia</u>					
< 5 CS per month	2	2	13	3	14
5 + to 10 CS per month	7	4	6	12	5
10 + to 15 CS per month	2	10	10	15	7
15+ to 20 CS per month	0	0	4	3	1
> 20 CS per month	3	2	5	6	4
<u>MO - Blood Bank</u>					
< 15 CS per month	0	5	12	3	14
15 - 30 CS per month	7	3	14	14	10
30 + to 45 CS per month	4	7	5	11	5
45 + to 60 CS per month	1	2	4	5	2
> 60 CS per month	2	1	3	6	0

Table 7.6 shows that the proportion of Teaching Hospitals and Provincial General Hospitals that have more than 90 caesarean sections per month per specialist obstetrician is higher than in the other categories. When medical officers in obstetric wards are considered the proportion of institutions having more than 30 sections per month per MO are more among the District General Hospitals. This suggests an increased workload among medical officers in some of the DGHs.

7.2 In-service training profile

Continuing professional development of care providers is an integral component of quality assurance in health care provision and in-service training which helps them to sustain and update knowledge and skills forms an important method of achieving quality enhancement. Individual data on in-service training received during the 5 years preceding the assessment was sought from Medical Officers, Nursing Officers and Midwives working in obstetric units and labour rooms. Intern medical officers were excluded from the sample. Information was collected based on a list of programs relevant to the provision of obstetric services developed and conduct by the FHB in collaboration with the relevant professional organisations. The programs that were

inquired about were: Essential New Born Care, Basic Neonatal Life Support, Advanced Neonatal Life Support, Lactation Management, Baby Friendly Hospital Initiative, Labour Room Management and Infection Control.

In addition to this, medical officers were asked about opportunities to work as an intern house officer in obstetrics, and paediatrics. They were also asked about training they may have had in blood transfusion procedures including blood grouping and matching.

The data were analysed by category of staff and by district and province and collated nationally. Details of training for each district are given in the provincial reports and this chapter presents the collated national data. In this analysis when at least 60% of staff in a given category has been trained in a particular program, coverage was considered as adequate and 40% or less was considered as inadequate.

7.2.1 Training profile of Medical officers

Information was collected from 615 medical officers serving in all categories of government institutions included in the study and the findings are summarised in table 7.7- 7.8

Table 7.7: Experience prior to current appointment of MOs By province

	Western Province		Central Province		Southern Province		Northern Province		Eastern Province		North Western Province		North Central Province		Uva Province		Sabaragamuwa Province		Sri Lanka	
Sample size	149		104		77		42		91		33		43		26		50		615	
Training	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Internship in Obstetrics	80	54	82	78.8	50	65	20	47.6	64	70	23	70	26	60	26	100.0	27	54	398	64.7
Internship in Pediatrics	70	47	52	50.0	29	38	18	42.9	32	35	12	36	19	44	20	76.9	19	38	271	44.1
Blood Transfusion Procedures	36	24	28	26.9	16	21	5	11.9	7	8	2	6	4	9	7	26.9	9	18	114	18.5

	< 40% trained	40-59% trained	≥60% Trained
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*excluding intern medical officers

Internship in Obstetrics and Paediatrics

At national level 65% of the Medical Officers which include MOs and SHOs working in the maternity wards have had an opportunity for a six months internship in Obstetrics. It is seen that in 7 out of 9 provinces more than 60% medical officers had received internship experience in obstetrics. The highest proportion was in the Uva province (100%) and the lowest (48%) in the Northern Province.

In the institutions where there are no specialists this proportion is 50.7%. Although the percentage of deliveries in this category of institutions is small (7% nationally, 18908 births in 2011) this may account for nearly 2830 (at 15%) emergencies annually and the initial management of these emergencies is under the leadership of this officer. In the institutions where there is only one specialist, the proportion is 41%. These findings highlight the need for exploring modalities for ensuring obstetric experience prior to an appointment to institutions where there are no specialist services in obstetrics.

At national level 44.1% of Medical Officers have had an opportunity to have an internship in Paediatrics. Only one province (Uva) has more than 60% of medical officers who have undergone internship training in Paediatrics, the proportion varying from 77% in Uva to 35% in the Eastern Province. Here too this training would be much more important in the non specialist institutions and it is important to note

that in non specialist institutions this proportion is only 44.0%.

Training in blood bank procedures

This is a training program arranged “in house” by the MO Blood Transfusion Services (BTS) when new house officers are appointed to wards and is mainly targeted for intern house officers. Nationally 20.3% of MOs working in obstetric units had received training in blood transfusion procedures. The highest proportion of 31.2% was seen in the Uva provinces and the lowest (1.0%) in the North Western Province. These percentages have been calculated excluding institutions below the level of Base Hospitals since BTS are not available in this type of hospital. It must be noted that intern medical officers in service at the time of the survey who may have been included in the training programs are not included in this calculation. It is also noted that the percentage with training in blood bank procedures is less than the proportion of MO/SHOs who have had internship training in obstetrics. This may however be an under representation of the proportion of personnel with training in blood transfusion procedures.

In-service training of medical officers

In this group the training programmes that were looked at were Essential New Born Care, Neonatal Life Support, Basic and Advanced, Lactation Management, Baby Friendly Hospital Initiative, LabourRoom Management and infection control.

Table 7.8: In-service training of medical officers by province

	WP	CP	SP	NP	EP	NWP	NCP	UP	SAP	Sri Lanka
Sample size	149	104	77	42	91	33	43	26	50	615
Essential New Born Care	59 40.0	47 45.2	25 32.0	18 42.9	32 35.0	5 15.0	19 44.0	25 96.2	6 12.0	236 38.4
Neonatal Life Support - Basic	89 60.0	65 62.5	37 48.0	12 28.6	38 42.0	12 36.0	21 49.0	26 100.0	11 22.0	311 50.6
Neonatal Life support - Advanced	58 39.0	44 42.3	27 35.0	20 47.6	14 15.0	4 12.0	12 28.0	24 92.3	6 12.0	209 34.0
Lactation management	42 28.0	41 39.4	22 29.0	16 38.1	16 18.0	8 24.0	12 28.0	14 53.8	3 6.0	174 28.3
Baby friendly Hospital Initiative	25 17.0	26 25.0	10 13.0	12 28.6	3 3.0	6 18.0	6 14.0	6 23.1	2 4.0	96 15.6
Labour Room Management	60 40.0	51 49.0	22 29.0	5 11.9	32 35.0	10 30.0	14 33.0	23 88.5	21 42.0	238 38.7
Infection control	22 15.0	25 24.0	8 10.0	0 0.0	4 4.0	12 36.0	14 33.0	0 0.0	4 8.0	89 14.5

	< 40% trained	40-59% trained	≥60% Trained
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At national level coverage of medical officers ranged from 38% for Essential New Born Care to 15% for Baby Friendly Hospital Initiative.

At provincial level nearly all the provinces have a large number of MOs who have not undergone in-service training with the exception of the Uva province. Uva has achieved “adequate level of training for 4 out of the 7 programs inquired into. Apart from the training in basic neonatal life support most of the other programmes have not been available to most MOs in most of the provinces (Table 7.2).

7.2.2 In-service training profile of nursing officers

Nursing officers present in the wards and labour room at the time of data collection were given the tool for data collection. The data is presented for the provinces.

Table 7.9 shows that in most provinces the in service training is poor. In the Western and Sabaragamuwa, provinces none of the training programs have achieved a coverage of over 40% in the sample studied. The Uva province has achieved over 60% coverage in two programs (Lactation Management and Labour Room Management) and 40-59% coverage in Infection Control and Neonatal Life Support and is the only province with coverage of over 60% in any training program. Labour Room Management is the program that has the highest coverage nationally with 38% of the sample being trained in it, followed by Neonatal Life Support 36% and Lactation Management 35%.

Table 7.9: In-service training of nursing officers

	Western Province		Central Province		Southern Province		Northern Province		Eastern Province		North Western Province		North Central Province		Uva Province		Sabaragamuwa Province		Sri Lanka	
Number to be trained	1367		529		734		164		405		232		303		182		445		4261	
Training	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Essential New Born Care	400	29	159	30	275	38	62	38	149	37	34	15	124	41	72	40	43	10	1318	30
Neonatal Life Support	524	38	170	32	308	42	47	29	166	41	37	16	119	39	85	47	111	25	1567	36
Lactation Management	506	37	160	30	223	30	63	38	139	34	94	41	116	38	115	63	87	20	1503	35
Baby Friendly hospital Initiative	187	14	52	10	10	1	19	12	16	4	24	10	66	22	0	0	2	0	336	9
Labor Room Management	115	33	115	48	79	21	45	51	58	50	49	52	65	45	58	95	33	23	617	38
Infection Control	165	12	127	24	28	4	32	20	60	15	75	32	85	28	79	43	29	7	680	16

	< 40% trained	40-59% trained	≥60% Trained
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7.2.3 In-service training profile of midwives

Midwives present in the wards and labour room at the time of data collection were given the tool for data collection. The data is presented for the provinces (table 7.10).

Table 7.10: In-service training of midwives

	WP		CP		SP		NP		EP		NWP		NCP		UP		SAP		Sri Lanka	
Number to be trained	329		163		231		100		204		105		91		81		150		1454	
Training	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Essential New Born Care	112	34	29	18	61	26	28	28	102	50	10	10	15	16	17	28	10	7	384	26
Neonatal Life Support	150	46	29	18	52	23	47	47	76	37	13	12	16	18	21	34	42	28	446	31
Lactation Management	201	61	56	34	132	57	64	64	89	44	58	55	36	40	45	74	55	37	736	51
Baby Friendly hospital Initiative	75	23	20	12	1	0	38	38	2	1	4	4	7	8	5	8	5	3	157	11
Labor Room Management	79	24	44	27	88	38	19	19	108	53	35	33	26	29	52	85	41	27	492	34
Infection Control	41	12	14	10	2	1	43	43	21	10	27	26	1	1	34	56	1	1	187	13

	< 40% trained		40-59% trained		≥60% Trained
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It is seen that most of the training programs have not reached the sample of midwives studied in most provinces. The baby friendly hospital initiative has reached less than 40% in all provinces. Lactation management programme shows the most coverage nationally with 3 provinces achieving over 60% or more coverage and a further four provinces achieving 40-59% coverage.

7.3 Knowledge among selected categories of care providers

7.3.1 Sample

Knowledge and related practices among selected categories of institutional care providers was assessed using a self administered questionnaire. The targeted providers were Midwives, midwifery trained Nursing Officers and House Officers/ Medical officers working in the wards and the labour rooms in obstetric units, considering them as the first persons likely to come in to contact with an emergency situation in the management of a woman in labour or an emergency. These categories of staff, present on duty at the time of data collection were given the questionnaires and

requested to answer individually without discussion. However, since this activity had to be carried out without disturbing the functioning of the unit it was not feasible to administer the questionnaires under conditions of an academic examination. The completed questionnaires were collected by the ward sister/nurse-in-charge at the end of the shift.

7.3.2 Questionnaire

The questionnaire consisted of theoretical questions as well as questions based on a set of six case scenarios on common obstetric emergencies as well as routine management of labour namely; PPH, PIH, sudden collapse, heart disease, active management of the third stage of labour and monitoring of labour.

The instrument was designed to test different areas of knowledge and practices such as:

1. Theoretical Knowledge e.g. List causes
2. Basic steps in managing an emergency e.g. Start an infusion/ start on Magnesium Sulphate (Mg SO₄) in eclampsia

3. Tendency to be thoughtful and proactive .e.g. Informing the operating theatre and anaesthetist of “possible” need for intervention in a patient with postpartum collapse before the decision to operate
4. Influence of personal attitudes in decision making in the absence of documented guide lines e.g. Informing the next level officer /informing the consultant obstetrician
5. Thinking of and responding to rare but near fatal situations e.g. inversion of uterus

7.3.3 Analysis

The data were analysed by category of staff and are presented at the national level. District and provincial analysis was not attempted because of relatively small sample sizes. Data were checked for completeness and analysed using SPSS. Each correct answer was given one mark and percentages were calculated based on the total marks that could be obtained. The

percentage of marks obtained for each component of the questionnaire is also calculated using the same method. The questions on enumeration of causes are presented as the number and percentage of persons with correct responses.

7.3.4 Results

The analysis is based on a sample of 1182 care providers: 445 midwives, 439 midwifery trained nursing officers and 298 medical officers selected randomly.

Table 7.11: The number of respondents in each category

Category of staff	No. Responded
Midwives	445
Midwifery trained nursing officers	439
Medical officers	298
Total	1182

7.3.4.1 Institutional midwives

Table 7.12: Causes given by midwives for each condition

	3 correct responses		2 Correct responses		1 correct responses		No correct answers	
N=445	No.	%	No.	%	No.	%	No	%
PPH Causes	331	74.4	88	19.8	14	3.1	12	2.7
PIH affecting Organs	182	40.9	199	44.7	50	11.2	14	3.1
Causes for sudden collapse	176	39.6	172	38.7	84	18.9	13	2.9
Symptoms of heart disease	169	38.0	204	45.8	53	11.9	19	4.3

Answering the question on the causes of PPH, 74% of the midwives gave 3 causes (expected no. of causes) and a further 40 % mentioned 2 causes. However with the question on PIH it was only 40 % who gave 3 correct responses with a further 19.8 % providing two correct responses. Only 40% and 38% respectively could give 3 causes for sudden collapse and symptoms of heart disease and it is noteworthy that 3-4% of midwives did not provide a single correct answer for any of the questions (Table 7.12).

While 42% of the sampled midwives gave retained products as a cause of PPH, only 29%, 32.2% 33.5%,

36.2% gave retained placenta, multiparity, multiple pregnancy and tears in the genital tract as causes for PPH respectively. It is noteworthy that uterine atonia one of the common causes which needs uterine massage and oxytocics were given as a cause by only 21% and trauma/tears were mentioned by only 36%. Retained placenta and retained products were mentioned by less than half the midwives. It is important to note that less than half of the midwives have given any one of the causes. These findings point to gaps in knowledge that may negatively influence an effective and timely response in an emergency.

Table 7.13: Frequency distribution of the causes of PPH as given by midwives

Cause of PPH	Number	Percentage
Retained products	187	42.0
Tears in the genital tract	161	36.2
Multiple pregnancy	149	33.5
Multiparity	146	32.8
Retained placenta	131	29.4
Anaemia	120	27.0
Uterine atonia	94	21.1
PIH	39	8.8
Placental abnormalities	33	7.4
Coagulopathy	20	4.5
Fibroids complicating pregnancy	13	2.9
Polyhydroamnios	6	1.3
Abruptioplacentae	6	1.3
Instrumental delivery	4	0.9
Past Section	2	0.4
Other causes	72	16.2

Table 7.14: Frequency distribution of the organs affected by severe PIH (Responses from midwives)

Organs Affected by PIH	Number	Percentage
Brain	382	85.8
Kidney	313	70.3
Liver	171	38.4
Lungs	71	16.0
Eye	40	9.0
Clotting system	1	0.2

Table 7.15: Frequency distribution of the causes for sudden collapse after delivery (Responses from midwives)

Causes for sudden collapse after delivery	Number	Percentage
PPH	408	91.7
Uterine inversion	139	31.2
Severe PIH	120	27.0
Uterine Rupture	99	22.2
heart diseases including MI	70	15.7
Amnioticfluid embolism	43	9.7
Vasovagal Shock	37	8.3
Anaphylaxis	21	4.7
Thromboembolism	9	2.0
Septiceamia	8	1.8
Ruptured liver	1	0.2

Table 7.16: Frequency distribution of the Symptoms of severe heart disease (Responses from midwives)

Symptoms of severe heart disease	Number	Percentage
Shortness of breath	353	79.3
Tiredness	189	42.5
Palpitations	125	28.1
Oedema	94	21.1
Cyanosis	71	16.0
Exercise intolerance	68	15.3
Chest pain	53	11.9
Orthopnea	8	1.8
Cough	6	1.3
Haemoptysis	1	0.2

Although 79% of the respondents identified breathlessness as a symptom of heart disease it is important to note that only 1.8%, 1.3 % and 0.25 considered orthopnoea, cough and haemoptysis respectively as signs of severe heart disease. While accepting that these are uncommon presentations in routine obstetric practice, care providers need to be aware of the significance of these symptoms if they are to identify conditions such as postpartum onset of pulmonary oedema which may occur in patients with heart disease.

Some of the findings on the answers to questions on clinical scenarios are given below.

- In managing a PPH 98% mentioned that they would examine and massage the uterus and 79% would bring the emergency trolley to the bedside as a first response, a proactive step. However, on the question of informing the nursing officer immediately, only 88% answered in the affirmative. The balance 12 % who did not opt to inform is a matter for concern. Whether it indicates that there is lack of clarity in what is officially expected or is due to reluctance at individual level is not clear.
- On managing eclampsia, while 95% agreed to manage the patient in the left lateral position

and 50% said that they would insert a mouth gag. Surprisingly only 62% disagreed with the statement that “she be managed in a bed at the end of the ward as only that one is a bed with bars”!!

- In response to the question on post partum collapse, 90% have given correct responses however the balance 10% had agreed with the statement “give her a glass of water to drink”.

Table 7.17: Marks obtained by the midwives for each component

Marks	PPH	PIH	Sudden collapse	Heart disease	Active Management of 3 rd stage	Monitoring of labour
Mean	79.9	77.7	82.3	81.6	53.8	66.2
Median	87.5	80.0	87.5	88.8	57.1	60.0
Mode	87.5	80.0	87.5	88.8	42.8	60.0
SD	16.6	14.6	14.8	17.2	20.5	24.8
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	100	100	100	100	100	100
Marks						
≥90.0	22.9	34.6	23.8	19.3	2.2	17.1
70.0-89.9	54.2	49.2	60.4	61.3	30.1	30.3
50.0-79.9	20.4	13.7	13.9	15.3	24.3	31.2
<50	2.5	2.5	1.8	4.0	43.4	21.3

Table 7.17 shows that knowledge on labour, active management of the third stage of labour and monitoring of labour, is at a lower level relative to that of PPH and PIH. It is noted that the range of marks varied from zero to hundred.

Table 7.18: Summary of marks obtained by the midwives

Marks range	Frequency	Percentage
≥90	14	3.1
80-89	132	29.7
70-79	199	44.7
60-69	61	13.7
50-59	30	6.7
<50	9	2.0
Total	445	100

It is seen that nearly 77% of participants have scored over 70% and 98% of participants scoring over 50% marks, suggesting that overall knowledge in the areas tested is good.

7.3.4.2 Nursing officers

Table 7.19: Causes given by nursing officers for each condition

	4 correct responses		3 correct responses		2 Correct responses		1 correct responses		No correct responses	
N=439	No	%	No.	%	No.	%	No.	%	No	%
PPH Causes	313	71.3	105	23.9	15	3.4	4	0.9	2	0.5
PIH affecting Organs	86	19.6	261	59.5	69	15.7	19	4.3	4	0.9
Causes for sudden collapse	119	27.1	135	30.8	117	26.7	58	13.2	10	2.3
Symptoms of heart disease	107	24.4	185	42.1	113	25.7	24	5.5	10	2.3

In response to the question on causes of common obstetric emergencies, Nursing Officers were expected to list four causes for each condition. It is seen that, 71% of the sample were able to list 4 correct causes of PPH and a further 23 % gave 3 causes. However, only 19% gave 4 correct responses

in the case of PIH, with a further 60% giving three correct responses. On the questions on postpartum collapse and heart failure it was only 25% who gave 4 correct responses with a further 30-40% giving only 3 responses.

**Table 7.20: Frequency distribution of the causes of PPH
(Responses by nursing officers)**

Cause of PPH	Number	Percentage
Multiparity	226	51.5
Retained placenta	189	43.1
Multiple pregnancy	174	39.6
Tears in the genital tract	160	36.4
Anaemia	156	35.5
Retained products	140	31.9
Uterine atonia	131	29.8
PIH	94	21.4
Coagulopathy	73	16.6
Placental abnormalities	70	15.9
Fibroids complicating pregnancy	39	8.9
Polyhydramnios	31	7.1
Abruptioplacenta	14	3.2
Past Section	9	2.1
Instrumental delivery	7	1.6
Other causes	88	20.0

Of the nursing officers who responded to the questionnaire, 43%, 39%, 17% and 36% listed retained placenta, multiple pregnancy, coagulopathy and tears in the genital tract respectively as causes of PPH. Common cause of uterine atonia was mentioned only by 30%. Tears / trauma to the genital tract had

not been given as a reason by the vast majority (64%). Although a majority of persons were able to give four correct responses, the omission of common conditions that need to be thought by a majority is a cause for concern.

**Table 7.21: Frequency distribution of the organs affected
by severe PIH (Responses from nursing officers)**

Organs Affected by PIH	Number	Percentage
Brain	422	96.1
Kidney	384	87.5
Liver	273	62.2
Lungs	133	30.3
Clotting system	1	0.2
Eye	61	13.9

Table 7.22: Frequency distribution of the causes for sudden collapse after delivery (Responses from nursing officers)

Causes for sudden collapse after delivery	Number	Percentage
PPH	410	93.4
Uterine inversion	179	40.8
Uterine Rupture	123	28.0
Amnioticfluid embolism	120	27.3
Heart diseases including MI	99	22.6
Severe PIH	74	16.9
Vasovagal Shock	67	15.3
Anaphylaxis	60	13.7
Thromboembolism	28	6.4
Septiceamia	12	2.7

Ninety three percent of Nursing Officers gave PPH as a cause of sudden collapse after delivery. However, uterine inversion and uterine rupture were given only by 40.8%, 28% and 13.7% of respondents respectively indicating the need to make them aware of rare but critical conditions needing immediate and specific responses (table 7.22).

for cross matching indicating a common and good practice which goes beyond what is considered and documented as their “duty”.

- A matter for concern is the fact that only 40% agreed that the response “if vital biological parameters are normal will wait for 15 minutes and review”, was a wrong practice.

Table 7.23: Frequency distribution of the symptoms of severe heart disease (Responses from nursing officers)

Symptoms of severe heart disease	Number	Percentage
Shortness of breath	371	84.5
Palpitations	199	45.3
Tiredness	195	44.4
Oedema	193	44.0
Cyanosis	106	24.1
Chest pain	84	19.1
Exercise intolerance	60	13.7
orthopnoea	17	3.9
Cough	4	0.9
Haemoptysis	2	0.5

Table 7.23 shows that among the nursing officers only 4% considered orthopnoea as a sign they needed to take note of as a symptom of severe heart disease.

Some of the findings on the answers to questions on clinical scenarios are given below.

- On the management of PPH 87.5% of the nursing officers agreed that they would call the HO/SHO immediately and take a blood sample

- Seventy four percent of respondents indicated that they would inform the middle level of medical officers i.e. SHO/Registrar at the same time as the HO in case of a PPH. This indicates a good practice in an emergency that has the potential to deteriorate rapidly. However it is noteworthy that 25% would follow the common hierarchical system and not inform the next level simultaneously, a practice that needs to be avoided in an emergency situation. This

highlights the necessity for clear instructions and guidelines.

- On the question on eclampsia 97% mentioned that they would inform the HO immediately. early 90% said that they would catheterize and insert a Foley catheter and start to maintain a urine output chart while awaiting the HO, a proactive and a useful step.

- Nearly all answered the question on active management of labour correctly but on progress of labor there seems to be confusion with only 43% considering “good FHS as indicating good progress” as a false statement.

Table 7.24: Marks obtained by the nursing officers for each component

Marks	PPH	PIH	Sudden collapse	Heart disease	Active Management of 3 rd stage	Monitoring of labour
Mean	81.4	84.4	75.9	76.3	59.6	63.9
Median	77.7	90.9	77.8	81.8	57.1	60.0
Mode	88.9	90.9	77.8	81.8	71.4	60.0
SD	14.1	12.5	17.4	15.8	21.9	24.2
Minimum	11.1	0.0	0.0	0.0	0.0	0.0
Maximum	100.00	100.0	100.0	100.0	100.0	100.0
Marks						
≥90.0	16.2	52.6	14.1	25.3	5.0	13.4
70.0-89.9	63.8	39.4	49.9	53.1	39.6	28.5
50.0-69.9	17.5	6.2	29.4	17.5	23.9	33.9
>50	2.5	1.8	6.6	4.1	31.4	24.1

- In dealing with a collapsed patient nearly 75% of the nursing officers said that they would request permission from the HO to start an IV infusion at the time of informing about the emergency situation. Another proactive and good practice in an emergency.

It is seen that the mean as well as the modal marks for active management of the third stage of labour and monitoring of labour are lower relative to the other areas examined. It is also noteworthy that the range of marks scored in 5 of the 6 components extends from 0-100.

Table 7.25: Summary of marks obtained by the nursing officers

Marks range	Frequency	Percentage	Cumulative percentage
≥90	16	3.6	3.6
80-89	124	28.2	31.9
70-79	202	46.0	77.9
60-69	78	17.8	95.7
50-59	8	1.8	97.5
<50	11	2.5	100.0
Total	439	100	

The summary marks (table 7.25) show that 77% of nursing officers have scored over 70%.

7.3.4.3 Medical officers

Table 7.26: Causes given by medical officers for each condition

	5 correct responses		4 correct responses		3 correct responses		2 Correct responses		1 correct responses		No responses/n ot responded	
N=298	No	%	No	%	No.	%	No.	%	No	%	No	%
PPH Causes	165	55.4	88	29.5	37	12.1	3	1.0	0	0.0	5	1.7
PIH affecting Organs	35	11.7	188	63.1	72	24.2	1	0.3	0	0.0	2	0.7
Causes for sudden collapse	85	28.5	106	35.6	66	22.1	25	8.4	8	2.7	8	2.7
Symptoms of heart disease	62	20.8	137	46.0	69	23.2	19	6.4	5	1.7	6	2.0

Answering the question on causes of PPH, 55% of the Medical Officers taking part in the assessment mentioned 5 causes as expected, with a further 30% mentioning four correct causes. In the other 3 areas tested viz. PIH, sudden collapse and heart disease, 5 correct responses have been given by only 12%, 29% and 21% respectively. On the question on PIH, only

12% mentioned 5 organs affected by PIH (expected) with a further 60% mentioning four correct responses. Only 30% named 5 causes (expected) of sudden postpartum collapse with only 20% naming 5 symptoms (expected) seen in heart disease in pregnancy. It is noted that 35% and 46% mentioned 4 correct responses respectively.

**Table 7.27: Frequency distribution of the causes of PPH
(Responses by medical officers)**

Cause of PPH (n=298)	Number	Percentage
Multiparity	211	70.8
Multiple pregnancy	175	58.7
Uterine Atonia	134	45.0
Coagulopathy	93	31.2
PIH	85	28.5
Placental abnormalities	80	26.8
Retained placenta	68	22.8
Fibroids complicating pregnancy	68	22.8
Anaemia	67	22.5
Tears in the genital tract	60	20.1
Polyhydroamnios	51	17.1
Retained products	44	14.8
Instrumental delivery	31	10.4
Past caesarean section	9	3.0
Abruptioplacentae	7	2.3
Other causes	111	37.2

Looking in to the responses given on causes of PPH it is of interest to note that 55% of the medical officers did not list atonic uterus as a cause, although multiparity and multiple pregnancy two commonly documented causes of atony were given by 71% and 59% participants respectively. “Tears in genital tract (20.1%), retained placenta (22.8%) and abruption (2.3%)” were mentioned by a relatively low number

of participants. Coagulopathy was mentioned by only 31 %, and polyhydramnios by 17%.

Regarding the organs affected in PIH 99% mentioned brain, kidney and liver as common organs affected but only 6.4% mentioned the clotting system, a possible explanation being that they may not have considered the clotting system as an organ.

**Table 7.28: Frequency distribution of the organs affected
by severe PIH (Responses from medical officers)**

Organs affected by PIH	Number	Percentage
Brain	297	99.7
Liver	291	97.7
Kidney	281	94.3
Lungs	188	63.1
Clotting system	19	6.4
Eye	60	20.1

**Table 7.29: Frequency distribution of the causes for sudden collapse after delivery
(Responses from medical officers)**

Causes for sudden collapse after delivery	Number	Percentage
PPH	267	89.6
Amniotic fluid embolism	153	51.3
Uterine inversion	125	41.9
heart diseases including MI	124	41.6
Uterine Rupture	113	37.9
Thromboembolism	98	32.9
Vasovagal Shock	79	26.5
Severe PIH	71	23.8
Anaphylaxis	53	17.8
Septiceamia	20	6.7

On causes of sudden post partum collapse nearly 90% mentioned PPH while 50% mentioned amniotic fluid embolism but only 40% mentioned uterine rupture or inversion and only 17% considered anaphylaxis to a drug, indicating the necessity of

of cardiac failure, which if detected and treated effectively would be life saving.

Some of the findings on the answers to questions on clinical scenarios are given below:

**Table 7.30: Frequency distribution of the Symptoms of severe heart disease
(Responses from medical officers)**

Symptoms of severe heart disease	Number	Percentage
Shortness of breath	250	83.9
Palpitations	204	68.5
Chest pain	201	67.4
Oedema	150	50.3
Exercise intolerance	95	31.9
orthopnoea	92	30.9
Tiredness	71	23.8
Cyanosis	28	9.4%
Haemoptysis	13	4.4
Cough	3	1.0

strengthening the awareness and knowledge of these uncommon but life threatening conditions which need focused, active and immediate responses from the Medical Officers providing care during emergencies.

Responding to the question on symptoms of heart disease, more than 80% of medical officers mentioned breathlessness, 50% oedema but only 30% mentioned orthopnoea, a symptom indicating an advanced state

- 72% of medical Officers in the sample would suspect and not give ergometrine when the scenario suggested an inversion.
- 64% of respondents would manage the basic steps of attending to a PPH and would not leave the patient to clerk a new patient. While this finding is reassuring in general, it is a cause for concern that 36% may leave the patient to attend to a routine duty.

- 54% of medical officers responding to a PPH with normal vital signs indicated that they would call the specialist obstetrician immediately. It is noteworthy that 46% did not appear to consider it as an appropriate response.
- 98% would inform the specialist obstetrician about an eclampsia patient immediately and 90% would start Magnesium Sulphate but only 46% indicated that they would start antibiotics in the presence of evidence of aspiration.
- With a post partum collapse 95% of the participants would inform the specialist obstetrician as well as the operating theatre and anaesthetist, a proactive step and a good practice.
- In a patient with heart failure 90% would inform the specialist obstetrician and 95% would inform the ICU and only 86% would administer Frusemide. However, the finding that 5% would inform the ICU but not the specialist obstetrician raises a concern.
- More than 70% answered the questions on active management and monitoring of labour correctly.

Table 7.31: Marks obtained by the medical officers for each component

Marks	PPH	PIH	Sudden collapse	Heart disease	Active Management of 3 rd stage	Monitoring of labour
Mean	78.2	68.7	73.3	70.8	73.5	80.0
Median	80.0	72.7	80.0	72.7	71.4	80.0
Mode	80.0	72.7	80.0	72.7	85.7	100
SD	16.6	11.9	17.0	14.4	20.0	23.1
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	100.0	100.0	100.0	100.0	100.0	100.0
Marks						
≥90	36.5	5.4	26.8	9.0	15.1	42.8
70-89	46.2	48.8	48.2	56.9	59.5	31.1
50-79	14.0	39.8	18.7	28.1	12.7	16.4
>50	3.3	6.0	6.4	6.0	12.7	9.7

Table 7.31 shows that on PIH and heart disease the proportions obtaining 90% of marks or more was less than the other areas.

Table 7.32: Summary of marks obtained by the medical officers

Marks range	Frequency	Percentage	Cumulative percentage
≥90	2	0.7	0.7
80-89	64	21.5	22.1
70-79	150	50.3	72.5
60-69	61	20.5	93.0
50-59	15	5.0	98.0
<50	6	2.0	100.0
Total	298	100.0	

When considering the overall scores with nearly 72% of participants scoring over 70% and 100% of participants scoring over 50% marks the knowledge

and practices in general are satisfactory in the areas tested but it is important to fill the specific gaps described earlier (Table 7.32).



Emergency Transport - Courtesy of Dr. Anoma Jayathilake

Chapter 8

Preferences for place of delivery

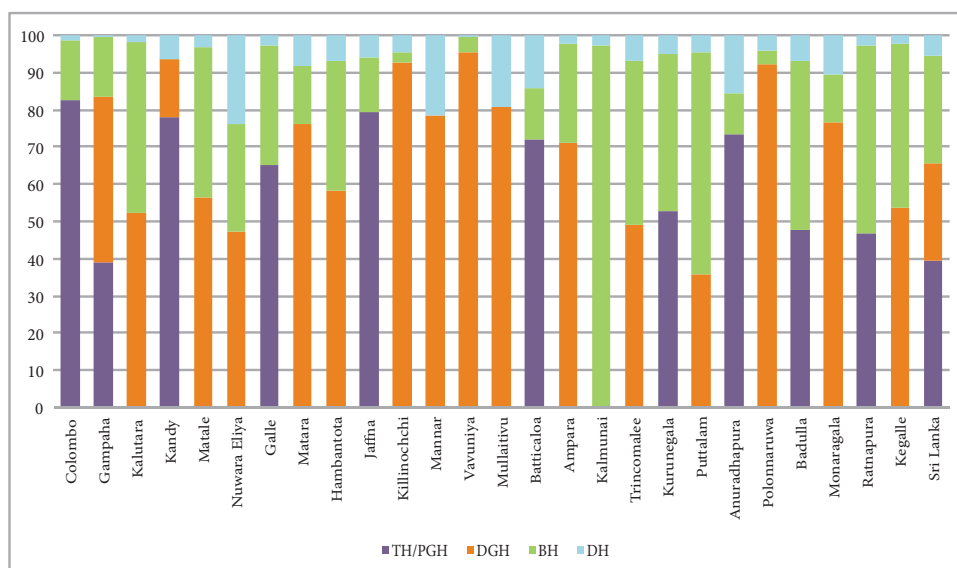
In planning services it is important to examine women's preferences for place of delivery. It is known that for a variety of reasons women temporarily move out of their district of residence for giving birth and it is important to examine this aspect in relation to service provision. The present study collected information on the place of delivery for all births documented in their records by a midwife for a specified period of 3 months (quarter of the year in 2011). This chapter describes the preferences women have shown in choosing the place of delivery based on the field data collected together with data on births in government institutions for the year 2011.

8.1 Preferences for type of institution

Examination of published data shows that over time, births have gradually shifted from the smaller hospitals to higher level institutions. Changes in classification / grading and nomenclature of institutions make it difficult to examine these shifts by type of institution over the last decade; however it is clearly seen that there has been a gradual decline in births in institutions below the level of a base hospital. The Annual Health Bulletin 2003 notes that 18% of births in government hospitals occurred in institutions below the level of a base hospital. This proportion has gradually declined to 16% in 2005, 12% in 2007, to 5.4% in 2011.

Figure 8.1 and 8.2 are graphic presentations of data in tables 3.2 and 3.3.

Figure 8.1: Distribution of births in government institutions by type of hospital and district - 2011



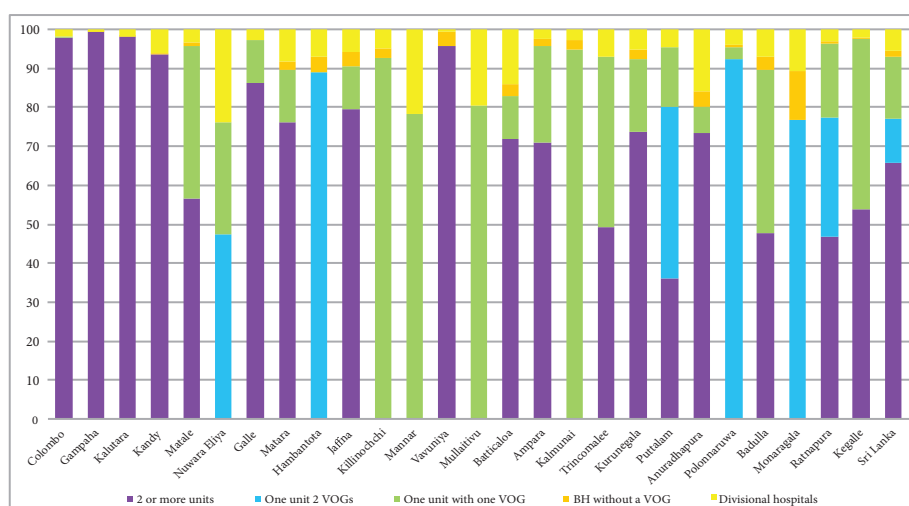
Of the total 343384 births that took place in the country during 2011, nearly 40% took place in 15 TH/PGH with a further 26% taking place in 18 District General hospitals. Only 29% of births took place in the 64 base hospitals spread throughout the country. It is noteworthy that only 5.4% of births have taken place in institutions below the level of a base hospital.

In 2011, the highest proportion of births occurred in Teaching Hospitals and Provincial General Hospitals with the exception of the Ratnapura district where the births in Base Hospitals (50%) is marginally higher than in the TH/PGH type (47%) of institutions.

services. These institutions comprise of a few base hospitals, some of which have been upgraded but where a specialist obstetrician has not been appointed and hospitals below this level. The births in non specialist hospitals appear to be commoner in certain district such as Nuwara Eliya (23.6%), Moneragala (22.7%), and Mannar (21.6 %) Mullativu (19.4%), Anuradhapura (15.7%) and Batticaloa (14.4%)

Although the proportion of women delivering in institutions without specialist services is low, it amounts to 23873 of deliveries annually. This small but vulnerable group of women have the potential to generate 3581 complications per year and it is

Figure 8.2: Distribution of births in government hospitals by functional classification and district - 2011



When births are examined by functional classification of institutions used in the study, it is seen that at national level 93.1 % of births occurred in hospitals where a specialist obstetrician is available. It is also noted that the preference is for larger institutions with more than one obstetric unit in districts where such facilities are available. This means that nearly 77% births occur in institutions with more than one specialist which are able to provide specialist services 24/7. The exception to this is the Trincomalee district where there is a marginally higher proportion of births in institutions with a single unit with one specialist obstetrician(49%) compared to the larger institution with more than one unit (44%). This may be related to the travel times from home to institutions.

Of the total births in government institutions only 6.9% of births occur in hospitals without specialist

important that they have access to quality emergency obstetric services when the need arises. Therefore it is important to strengthen facilities and skills available in these institutions so that they do not become the weak link in the national chain providing EmONC.

It is noted that nearly 38730 (11.3%) deliver in hospitals where one maternity unit is shared by two specialist obstetricians. This may not be the ideal conditions for providing good quality care, leading to operational constraints and accountability issues. A further 16% (54863) deliver in institutions that have only one specialist obstetrician. Both are situations where optimum conditions for provision of quality specialist services may not be available. Correction of these two situations through effective administrative responses will improve services to nearly 27% (93593) of women.

8.2 Movement of women between districts for delivery

It is known that recording of births by midwives may not be complete and this may be due to many reasons. Table 8.1 examines the completeness of the field data based on the births reported by the Registrar General. It is important to note that the field data was collected

for a quarter in 2011 and relate to the number of women who had delivered in that quarter while the data from the RG are births registered. The analysis uses information from all Medical Officer of Health units in the country except the Kalpitiya MOH area in Puttalam District and Kotawehera MOH are in the Kurunegala District.

Table 8.1: Calculation of percentage completeness of the data reported from the field

District	Births 2011 (RG)	Births per Quarter estimated from RG data	Deliveries in govt. hospitals	Deliveries in private hospitals	Total deliveries reported by MOH	% completeness
Colombo	54,888	13722	11136	145	11281	82.2
Gampaha	27,457	6864	5689	662	6351	92.5
Kalutara	16,947	4237	4269	158	4427	104.5
Western Province	99,292	24823	21094	965	22059	88.9
Kandy	29,331	7333	5949	131	6080	82.9
Matale	10,465	2616	2293	23	2316	88.5
Nuwara Eliya	10,400	2600	2926	19	2945	113.3
Central Province	50,196	12549	11168	173	11341	90.4
Galle	20,838	5210	4687	0	4687	90.0
Matara	12,268	3067	3298	27	3325	108.4
Hambanthota	9,090	2273	2150	3	2153	94.7
Southern Province	42,196	10549	10135	30	10165	96.4
Jaffna	9,949	2487	2666	0	2666	107.2
Killinochchi	3,319	830	643	0	643	77.5
Mannar	1,482	371	356	0	356	96.1
Vavuniya	4,190	1048	856	4	860	82.1
Mullativu	1,076	269	272	0	272	101.1
Northern Province	20,016	5004	4793	4	4797	95.9
Batticaloa	9,743	2436	2208	2	2210	90.7
Ampara	14,371	3593	3312	4	3316	92.3
Trincomalee	9,033	2258	1800	5	1805	79.9
Eastern Province	33,147	8287	7320	11	7331	88.5
Kurunegala	25,428	6357	5594	51	5645	88.8
Puttalam	14,457	3614	2858	50	2908	80.5
N Western province	39,885	9971	8452	101	8553	85.8
Anuradhapura	15,855	3964	4180	1	4181	105.5
Polonnaruwa	7,498	1875	2375	0	2375	126.7
N Central Province	23,353	5838	6555	1	6556	112.3
Badulla	16,548	4137	3569	7	3576	86.4
Monaragala	7,132	1783	1651	1	1652	92.7
Uva Province	23,680	5920	5220	8	5228	88.3
Ratnapura	21,260	5315	4276	23	4299	80.9
Kegalle	10,390	2598	2721	4	2725	104.9
Sab.Province	31,650	7913	6997	27	7024	88.8
Sri Lanka	363,415	90854	80,377	1,300	81677	89.9

Although the data from the field refers to women who delivered during a quarter and the RG data to births, it is unlikely that this factor accounts for the differences in numbers observed between the two sources. Since the percentage of twin births (0.89%) and multiple births (0.01%) (Medical Statistician 2010) is very low, a comparison of the data from the two sources may be used to examine completeness of field data.

The completeness of information ranges from 84.1 in Trincomalee to 137.2 in Polonnaruwa, the figure for the country being 90% (Table 8.1). Field midwives may under record births taking place in the private

sector and births occurring to women in urban areas. This is confirmed by the high predominance of reporting of women delivering in government institutions by the midwives (98.4%) as shown in table 8.2.. This is nearly 4% more than the figure of 94.5 % reported in table 3.1 for the country based on data from the government institutions and the Registrar General. In recording births, the field midwives are also more likely to under record births that may have occurred outside their district. However, it is unlikely that women going to a particular district / districts for delivery are preferentially excluded in recording by the midwife and as such may not bias the analysis.

Table 8.2: Place of delivery reported in field data

District	No of deliveries reported from the field	No of deliveries in Government hospitals		No of deliveries at home		No of deliveries in a Private hospital	
		No.	%	No.	%	No.	%
Colombo	8004	7859	98.2	0	0.0	145	1.8
Gampaha	8106	7439	91.8	0	0.0	667	8.2
Kalutara	4853	4692	96.7	0	0.0	161	3.3
Kandy	5213	5082	97.5	0	0.0	131	2.5
Matale	2102	2079	98.9	0	0.0	23	1.1
Nuwara Eliya	3700	3678	99.4	3	0.1	19	0.5
Galle	4364	4364	100.0	0	0.0	0	0.0
Matara	3220	3193	99.2	0	0.0	27	0.8
Hambantota	2612	2609	99.9	0	0.0	3	0.1
Jaffna	2541	2541	100.0	0	0.0	0	0.0
Killinochchi	530	530	100.0	0	0.0	0	0.0
Mannar	384	384	100.0	0	0.0	0	0.0
Vavuniya	657	650	98.9	3	0.5	4	0.6
Mullativu	593	593	100.0	0	0.0	0	0.0
Batticaloa	2233	2231	99.9	0	0.0	2	0.1
Ampara	3297	3291	99.8	2	0.1	4	0.1
Trincomalee	1848	1837	99.4	6	0.3	5	0.3
Kurunegala	6325	6273	99.2	0	0.0	52	0.8
Puttalam	2856	2804	98.2	2	0.1	50	1.8
Anuradhapura	4162	4159	99.9	0	0.0	3	0.1
Polonnaruwa	2545	2545	100.0	0	0.0	0	0.0
Badulla	3158	3147	99.7	3	0.1	8	0.3
Monaragala	2187	2186	100.0	0	0.0	1	0.0
Ratnapura	4200	4175	99.4	1	0.0	24	0.6
Kegalle	3405	3401	99.9	0	0.0	4	0.1
Sri Lanka	83095	81742	98.4	20	0.02	1346	1.6

Table 8.2 suggests that mothers in the Gampaha district ranks first among those preferring private services (8.2%), followed by Kalutara (3.3%). This picture is most likely due to the fact that the data collected under-represent deliveries in private institutions in Colombo, Kandy and other districts having high urban populations and a large number of private hospital beds.

Based on table 8.3, the net “migration” index was calculated for each district. Net migration rate in this instance is the difference between people who come in to a district to deliver and those who go out of the district, during a given period of time presented as per 1000 deliveries reported to have occurred in the district. A positive value represents more people entering the area than leaving it, while a negative

Table 8.3: Deliveries occurring in government hospitals by district

	Colombo	Gampaha	Kalutara	Kandy	Matale	Nuwara Eliya	Galle	Matara	Hambanthota	Jaffna	Killinochchi	Mannar	Vavuniya	Mullativu	Batticaloa	Ampara	Trincomalee	Kurunegala	Puttlam	Anuradhapura	Polonnaruwa	Badulla	Monaragala	Rathnapura	Kegalle
Colombo	7785		72					1													1				
Gampaha	1960	5390	2	8	2	3	2	1										46		6	1	1		3	14
Kalutara	550	2	4052	1		2	65	2	1				1			1		1		3		3	1	5	2
Kandy	12	9	3	4714	71	5	3	3	1	1			2			3	1	40	1	6	12	172	4	1	18
Matale	13	5	1	77	1710	3	2	1	1				3			2	1	70		16	9	150	4	6	5
Nuwara eliya	6	10	1	803	2	2817	2	4		1								3		2	2	23	1	1	
Galle	14	2	67	1			4231	34	5									1				3	1	3	2
Matara	10	5	4		1		294	2709	52									59		2	1	1	3	49	3
Hambanthota	11						75	459	1889									4		3			21	147	
Jaffna	1									2527	3	3	3	2									1		1
killinochchi										66	461		3												
Mannar												351	24							9					
Vavuniya	1			1						6		1	639							2					
Mullativu	1									64	178	1	78	270	1										
Batticaloa															2201	30									
Ampara	4			12			2	3	1							3169		3		1	16	36	38	4	2
Trincomalee	3	1		16		1	2				1		1		4	2	1748	6		49	2				1
Kurunegala	28	55	1	32	81	1	5	2	1							1	1	5303	387	305	8	3	2	8	49
Puttalam	17	188	2	1	1					1					1			112	2470	7					4
Anuradhapura	2			1	230			1					101					46		3761	17				
Polonnaruwa	3			1	192			3								32	3			5	2305			1	
Badulla	4	1		7	2	91	2	2	5						1	4		2		1		3000	14	9	2
Monaragala	5								188							67						172	1558	196	
Rathnapura	294	1	64	3	1	3	2	12	6				1			1		3		2	1	4	4	3771	2
Kegalle	420	20		271				2																71	2617

* a column shows the numbers and district of origin of persons giving birth in that district
a row indicates the number moving out of a district and the district in which the delivery took place

Table 8.3 is based only on deliveries reported in the field data as taking place in government institutions. The column in respect of a district shows the numbers and district of origin of persons giving birth in that district, where as a row indicates the number moving out of a district and the district in which the delivery took place. The diagonal therefore represents the numbers living in the district who have also given birth in a government institution within the same district.

It is seen that all districts have people going to adjacent districts for delivery. While in some of the districts the influx and efflux balances itself, some of the districts demonstrate a noteworthy shift from this.

value means that more people are leaving than entering it. This is an indication of the net effect of “migration” of mothers to and from a district to the total reported deliveries of the district.

NMI = (mothers going out of the district to deliver) – (mothers from other districts coming in to deliver) Number of mothers reported to have delivered in the district

The NMI for districts are presented in table 8.4

Table 8.5 summarises the key findings of table 8.4.

Table 8. 4: Deliveries occurring within the district, going out and coming in to the district

District	Deliveries in government hospitals	Delivering within the district		Going outside the district to deliver		Coming in to the district to deliver		Net migration per delivery	Net “migration” Index – NMI*per 1000 deliveries
		No.	%	No.	%	No.	%		
Colombo	8004	7785	97.3	74	0.9	3359	42.0	0.41	410
Gampaha	8106	5390	66.5	2049	25.3	299	3.7	-0.22	-220
Kalutara	4853	4052	83.5	640	13.2	217	4.5	-0.09	-90
Kandy	5213	4714	90.4	368	7.1	1235	23.7	0.17	170
Matale	2102	1710	81.4	369	17.6	583	27.7	0.10	100
Nuwara Eliya	3700	2817	76.1	861	23.3	109	2.9	-0.20	-200
Galle	4364	4231	97.0	133	3.0	456	10.4	0.07	70
Matara	3220	2709	84.1	484	15.0	530	16.5	0.01	10
Hambantota	2612	1889	72.3	720	27.6	261	10.0	-0.18	-180
Jaffna	2541	2527	99.4	14	0.6	139	5.5	0.05	50
Killinochchi	530	461	87.0	69	13.0	182	34.3	0.21	210
Mannar	384	351	91.4	33	8.6	5	1.3	-0.07	-70
Vavuniya	657	639	97.3	11	1.7	217	33.0	0.31	310
Mullativu	593	270	45.5	323	54.5	2	0.3	-0.54	-540
Batticaloa	2233	2201	98.6	30	1.3	7	0.3	-0.01	-10
Ampara	3297	3169	96.1	122	3.7	143	4.3	0.01	10
Trincomalee	1848	1748	94.6	89	4.8	52	2.8	-0.02	-20
Kurunegala	6325	5303	83.8	970	15.3	350	5.5	-0.10	-100
Puttalam	2856	2470	86.5	334	11.7	388	13.6	0.02	20
Anuradhapura	4162	3761	90.4	398	9.6	419	10.1	0.01	10
Polonnaruwa	2545	2305	90.6	240	9.4	70	2.8	-0.07	-70
Badulla	3158	3000	95.0	147	4.7	569	18.0	0.13	130
Monaragala	2187	1558	71.2	628	28.7	93	4.3	-0.24	-240
Ratnapura	4200	3771	89.8	404	9.6	505	12.0	0.02	20
Kegalle	3405	2617	76.9	784	23.0	104	3.1	-0.20	-200
Sri Lanka	83095	71448	86.0	10294	12.4	10294	12.4	0.00	0

*Net “migration” Index – NMI

Table 8.5: Place of preference for delivery by district

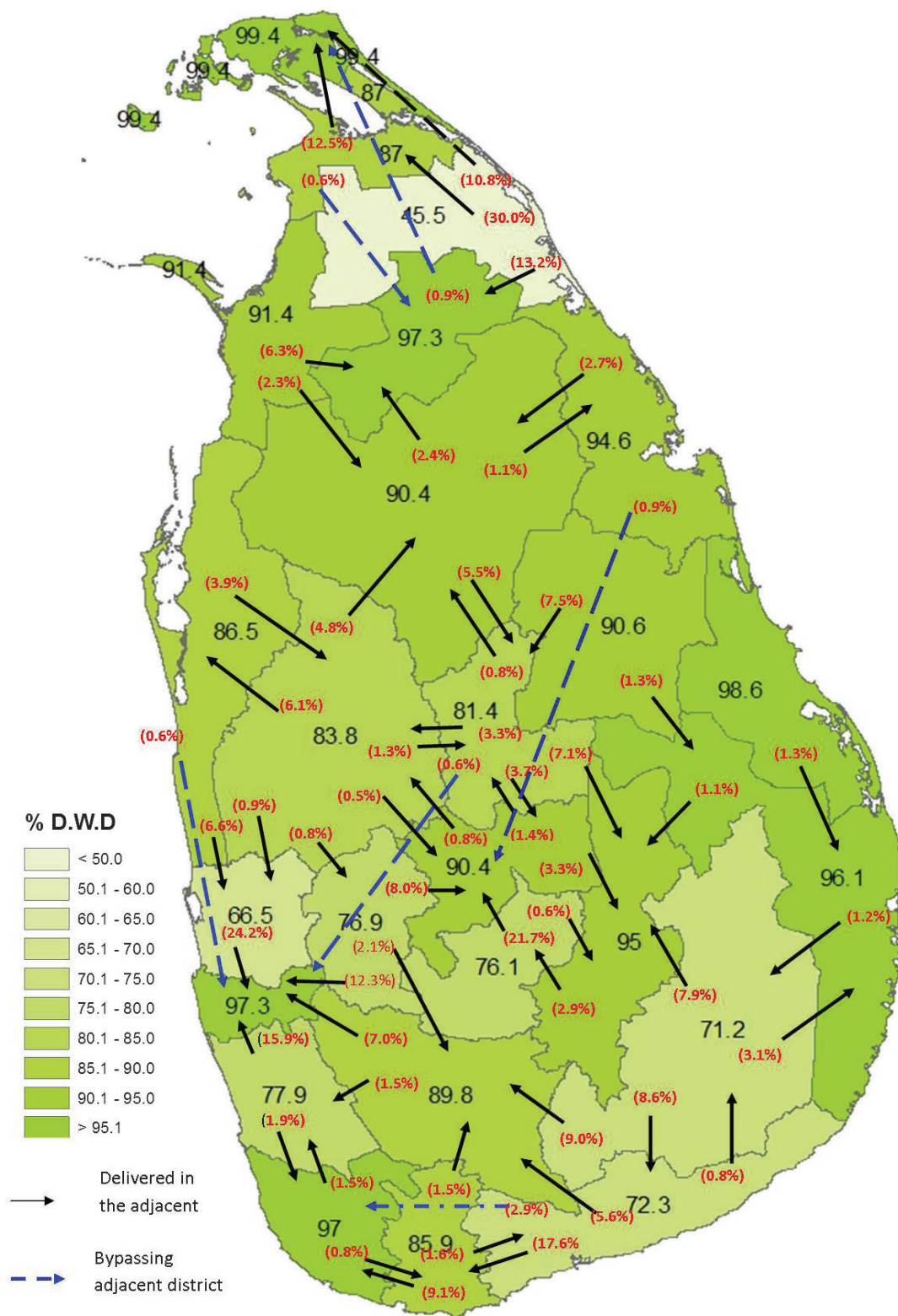
Mothers from other districts coming into deliver per 1000 deliveries in the district		Mothers going out of the district to deliver per 1000 deliveries in the district	
District	NMI	District	NMI
<i>Colombo</i>	<i>410</i>	<i>Mullativu</i>	<i>-540</i>
<i>Vavuniya</i>	<i>310</i>	<i>Monaragala</i>	<i>-240</i>
<i>Killinochchi</i>	<i>210</i>	<i>Gampaha</i>	<i>-220</i>
<i>Kandy</i>	<i>170</i>	<i>Nuwara Eliya</i>	<i>-200</i>
<i>Badulla</i>	<i>130</i>	<i>Kegalle</i>	<i>-200</i>
<i>Matale</i>	<i>100</i>	<i>Hambantota</i>	<i>-180</i>
<i>Galle</i>	<i>70</i>	<i>Kurunegala</i>	<i>-100</i>
<i>Jaffna</i>	<i>50</i>	<i>Kalutara</i>	<i>-90</i>
		<i>Mannar</i>	<i>-70</i>
		<i>Polonnaruwa</i>	<i>-70</i>

Colombo has the highest net in migration index and Mullativu the highest out migration.

The present survey did not examine the reasons for movement away from the district of usual residence. It may be for a variety of reasons; personal as well as related to perceptions regarding services. It may be that in some areas the closest institution or the institution most accessible in terms of public transportation is across a district boundary. Spatial information necessary for such an analysis was unavailable.

The figure 8.3 maps the movement of women between districts. The proportions of women living in the district who have delivered in a government institution within the same district are given in black. The figures in red indicate the movement depicted by the arrow. It is seen that nearly a quarter of women from Gampaha district deliver in the Colombo District, with 15% and 12% of women from Kalutara and Kegalle respectively doing so. Twenty two percent of women in Nuwara Eliya deliver in Kandy and 30% and 13% from Mullativu deliver in Killinochchi and Vavuniya respectively while with another 11% going to Jaffna.

Figure 8.3: Distribution of place of delivery and within district migration for delivery





*High Dependency Unit – TH Kandy
Courtesy of Dr. Kapila Gunawardhana*

Chapter 9

Family planning services in government hospitals

In the present survey a special module was developed to examine functioning of the existing institution based family planning services. Data were collected with the intention of identifying ways of improving the services. Tables 9.1-9.4 present

information on the different aspects of services and are mostly self-explanatory; however a few important findings are discussed in the text. Details of individual institutions in the study sample are given in the provincial reports.

Table 9.1: Family planning clinics by type of institutions

Institution	TH/PGH		DGH		BH with specialist Obstetrician		BH without Specialist Obstetrician		Divisional Hospitals	
No. of institutions	14		18		38		26		46	
Family Planning Clinic	No.	%	No.	%	No.	%	No.	%	No.	%
Availability of a functioning family Planning clinic	14	100	15	83.3	28	73.7	18	69.2	24	52.2
Frequency of the FP clinic										
Daily	9	64.3	2	13.3	3	10.7	1	5.6	1	4.2
Weekly	5	35.7	10	66.6	15	53.6	11	61.1	14	58.3
Two weekly	0	0.0	3	20.0	9	32.1	5	27.8	5	20.8
Monthly	0	0.0	0	0.0	1	3.6	1	5.6	4	16.7
Persons who conduct the FP clinic										
Specialist Obstetrician	5	35.7	11	73.3	9	32.1	0	0.0	0	0.0
MO	11	78.6	8	53.3	15	53.6	15	83.3	18	75.0
NO	4	28.6	3	20.0	7	25.0	4	22.2	8	33.3
Contraceptive methods available in the FP clinic										
Oral contraceptive pills	14	100.0	11	78.6	24	85.7	15	83.3	20	83.3
Condoms	14	100.0	13	92.9	20	71.4	14	77.8	18	75.0
DMPA	14	100.0	11	78.6	22	78.6	15	83.3	22	91.7
Intra Uterine Devices(IUD)	14	100.0	15	100.0	28	100.0	16	88.9	18	75.0
Implants	8	57.1	6	42.9	12	42.9	4	22.2	3	12.5
Availability of Emergency Contraceptive Pills (ECP)	3	23.1	0	0.0	0	0.0	0	0.0	1	4.2
Person who inserts IUDs in the clinic										
MO	12	92.3	15	100.0	28	100.0	17	94.4	17	70.8
NO	2	15.4	0	0.0	3	10.7	1	5.6	1	4.2
Person who inserts IUDs have had trained on it	12	85.7	12	85.7	28	100.0	13	81.3	14	77.8
Trained person inserts implants	8	100.0	6	100.0	12	100.0	4	100.0	3	100.0

It is noted that all institutions do not have a functioning family planning clinic. The percentage of institutions having a regularly functioning clinic decreases with the decline in the hierarchical level of institution, 100% of the TH/PGH having a clinic and only 52% of the smaller institutions reporting a regular family planning clinic. Regular family planning clinics were not found in 17% of DGH, 26% of f BH with a specialist Obstetrician, 31% of upgraded BH without a Specialist Obstetrician and 48% of lower level institutions.

This is a trend that needs to be changed by strengthening institutions at the lower end of the hierarchy because family planning is a service that should be available in an institution closer to the client's home and provided with the least expense to both client and state. General circular No. 01-05/2010 issued by the Director General of Health Services iterates the importance of having a family planning clinic in every health institution and stricter implementation of this would address this anomaly.

The frequency of clinics also decreased according to the institutional hierarchical level. It was noted that clinics were held daily mostly in TH/PGH (64.3%) whereas in all other types of institutions it was less than 15%. The majority of institutions other than TH/PGH conducted weekly clinics. This is probably related to staffing availability and prioritisation. However, provision of these services on a more frequent basis would contribute towards client convenience, improved utilisation of services and reduction in unmet need.

In the DGHs the involvement of the specialist obstetrician in the family planning clinic was recorded to be 79% whereas in TH/PGH and BH it was only about 30%. It is noted that MO involvement

varies from 79% to 53% and is highest in BHs without a specialist obstetrician. In nearly a third to a fourth of the institutions a nurse is reported as conducting the clinic.

It is expected that the family planning clinics should be able to offer a client the range of methods available within the state health system. All methods except implants were available in all TG/PGH with implants being available in only 57% of these institutions.

All DGHs and BHs where specialist services were available had IUDs while the other commodities were available in varying proportions of institutions. In DGHs implants were not available in 57%, DMPA in 21%, and OCPs in 21% of institutions. In Base Hospitals implants were not available in the majority (57%), DMPA in 21%, and OCPs in 14%. In institutions below the level of a BH, implants were not available in 87% and OCPs in 17%.

Although ECPs are not considered as a method of contraception, their availability should be ensured for use when needed in situations such as in condom failure. It was not available in 77% of TH/PGH and not available at all in DGHs and BHs and in all except one of the divisional hospitals sampled.

It is essential that all clinics have a person trained in insertion of IUDs. It is noted that around 15% of institutions do not meet this requirement. It is noted that the number of institutions where implants are available and where personnel for insertion of implants are available match. For a comprehensive family planning service, it should be ensured that implants as well as trained personnel for insertion are both available in all institutions at least up to the level of a base hospital.

Table 9.2: Family planning services by type of institutions

INSTITUTION	TH/PGH		DGH		BH Functioning		BH Upgraded		DH	
No. of Institutions	14		18		38		26		46	
FAMILY PLANNING SERVICES	No	%	No	%	No	%	No	%	No	%
Provision of <u>FP counseling</u> for post partum and post abortion patients before discharge from the ward	13	92.9	17	94.4	33	86.8	18	69.2	37	80.4
Provision of <u>FP services</u> to post partum and post abortion patients before discharge from the ward	10	71.4	9	50.0	26	68.4	8	30.8	17	37.0
Availability of dedicated theatre time for permanent FP methods (Sterilization)	7	50.0	6	33.3	13	34.2	1	3.8	2	4.3
Availability of a trained doctor who can perform ligation and resection of tubes (LRT)	11	78.6	14	77.8	31	81.6	1	3.8	3	6.5
Availability of a trained doctor who can perform vasectomy	2	14.3	4	22.2	7	18.4	1	3.8	0	0.0
No. of post partum LRT was done in your facility during the last 6 months	915		1426		1750		0		80	

Table 9.2 describes the family planning services provided by the institutions. It is seen that the majority of institutions have stated that they provide family planning counselling. In contrast the proportion of institutions providing service to postpartum and post abortion women before discharge from a ward are much less. It ranges from 71% in TH/PGHs, 68% in BHs, 50% in DGHs and 31% and 37% in upgraded BHs and hospitals below the level of BHs respectively. These percentages amount to a large a number of women who leave hospital with information but without services being provided.

Permanent methods of FP

Health institutions have a major role to play in the provision of permanent methods of family planning. The proportion of institutions with dedicated theatre time for permanent methods of family planning is very low ranging from 50% in TH/PGHs to approximately 33% in DGHs and BHs. This is a constraint that needs an administrative response. A

trained person capable of performing LRT is available in more than 78% of institutions up to the level of a BH. However, the proportion of institutions where a doctor trained in vasectomy is available ranges from 22 % in DGHs to 14% in TH/PGHs.

Post partum LRT

It is noted that over a period of 6 months only 4091 postpartum LRTs had been performed in the specialist institutions and 80 in the 46 sampled non specialist institutions sampled. Although there is no information available on the number or proportion of women needing postpartum LRTs or a method of estimating this, the total number of LRTs performed appears to be relatively small.

However, it is interesting to note that when the proportion of LRTs in each type of hospital is compared to the proportion of deliveries in the types of hospitals, the BHs appear to perform more postpartum LRTs compared to the other types of institutions (Table 9.3).

Table 9.3: Comparison of proportion of deliveries and postpartum LRT by type of institution

Type of institution	% of deliveries	% postpartum LRT
TH/PGH	37	22
DGH	26	35
BH with specialist services	27	43

Table 9.4: Family planning logistics and documentation

INSTITUTION	TH/PGH		DGH		BH Functioning		BH Upgraded		DH	
No. of Institutions	14		18		38		26		46	
LOGISTICS AND DOCUMENTATION										
Had shortages of contraceptives during the last 6 months	4	28.6	5	27.8	7	18.4	2	7.7	5	10.9
Shortaged Family Planning commodity										
Pills	2	14.3	0	0.0	1	2.6	0	0.0	2	4.3
Condoms	3	21.4	0	0.0	2	5.3	0	0.0	2	4.3
DMPA	2	14.3	1	5.6	2	5.3	2	7.7	4	8.7
IUD	1	7.1	2	11.1	0	0.0	0	0.0	1	2.2
Implants	6	42.9	4	22.2	3	7.9	2	7.7	1	2.2
ECP	1	7.1	0	0.0	1	2.6	0	0.0	0	0.0
Availability of the monthly contraceptive stock return/request (H 1158)	8	57.1	8	44.4	17	44.7	13	50.0	16	34.8
Regularly send the monthly return (H 1200 A) to MOH	10	71.4	8	44.4	22	57.9	16	61.5	24	52.2
Any methods of following up the clients	7	50.0	4	22.2	12	31.6	7	26.9	10	21.7

Table 9.4 describes the availability of contraceptives in the 6 month period prior to the survey. It is seen that all commodities have been in short supply in varying proportions of institutions, the shortages in supplies range from 8% in upgraded BHs to 29% in TH/PGHs.

Record keeping appears poor, with only a proportion of institutions reporting a monthly contraceptive stock return /request. This varies from 58% in TH/PGHs to 35% in institutions below the level of a BHs. Proportion of institutions reporting to MOH on services provided (H 1200 A) also varies from 71% in TH/PGHs to 44% in DGHs. It is important to note

that this has a negative impact on reported numbers of new acceptors.

In all types of institutions the availability of a procedure for follow-up is poor, only 50% of institutions in the TH/PGH category had a system. In DGHs and institutions below the level of a base hospital only 22% reported that they had a system for follow-up.

The data suggests that an in-depth assessment and a plan for improvement of institutional family planning services in the country as a whole is pertinent.



*Neonatal Intensive Care Unit - DGH Monaragala
Courtesy of Dr. Dhammica Rowel*

Chapter 10

Neonatal care services

10.1 Facilities for neonatal care

10.1.1 Essential and advanced neonatal care

Neonatal care services in the country are in the process of being organised. This chapter describes the current status with a view to providing inputs in to this process. All hospitals providing maternity care services in the country are expected to provide essential newborn care which includes immediate newborn care, keeping the newborn warm, support in breastfeeding, basic resuscitation, early identification and referral for high risk conditions have to be provided by all the hospitals with maternity services.

Specialised care for new-borns is provided at two levels; Special Care Baby Units (SCBU) and the Neonatal Intensive Care Units (NICU). According to the MoH guidelines for the provision of services for neonates, (Building and Other Guidelines for NICU, SCBU and MBCs FHB, 2007) there should be a NICU or a SCBU per hospital where specialised services are available and in places where there is a NICU, the SCBU should be incorporated into NICU. The Mother Baby Centre (MBC) is an integral component of NICU and SCBU. Though the Lactation

Management Centre (LMC) is an essential component of the MBC, in this document it is evaluated as a separate unit as it provides a specific and important service for all new-borns in the institution and in the area.

10.1.2 Norms for neonatal units in Sri Lanka

A norm for Neonatal Intensive Care Units in the country has not been set. The norm for SCBU, LMC and MBC is that every institution with specialist services for mothers should have a SCBU, MBC and LMC (Neonatal Intensive Care Unit, Special Care Baby Unit, Mother Baby Centre Guideline, FHB, 2007). This entails that all Base Hospitals and institutions above this level have SCBU, MBC and LMC services. In institutions where there is a NICU the SCBU would be incorporated in the NICU. In this report therefore institutions with a NICU are also reported as having a SCBU.

Special Care Baby Units

Table 10.1 describes the proportion of births that occurred in institutions with SCBU facilities in 2011 out of all deliveries taking place in government institutions.

Table 10.1: Distribution of deliveries in government institutions with and without SCBU by district

Province/District	Total reported births in govt hospitals (2011)	*No of deliveries in hospitals with SCBU facilities		No of deliveries in specialist hospitals without SCBU		No of deliveries in hospitals below BHs	
		No	%	No	%	No	%
Western Province	86022	84598	98.3	268	0.3	1156	1.3
Colombo	45251	44271	97.8	242	0.5	738	1.6
Gampaha	24055	23920	99.4	16	0.1	119	0.5
Kalutara	16716	16407	98.2	10	0.1	299	1.8
Central Province	48585	40611	83.6	3339	6.9	4635	9.5
Kandy	27199	25427	93.5	91	0.3	1681	6.2
Matale	10415	9979	95.8	75	0.7	361	3.5
Nuwara Eliya	10971	5205	47.4	3173	28.9	2593	23.6
Southern Province	41446	36635	88.4	2544	6.1	2267	5.5
Galle	18911	16302	86.2	2090	11.1	519	2.7
Matara	13097	11720	89.5	296	2.3	1081	8.3
Hambanthota	9438	8613	91.3	158	1.7	667	7.1
Northern Province	17196	14294	83.1	1815	10.6	1087	6.3
Jaffna	8800	6992	79.5	1293	14.7	515	5.9
Killinochchi	2390	2213	92.6	62	2.6	115	4.8
Mannar	1474	1155	78.4	0	0.0	319	21.6
Vavuniya	3961	3934	99.3	0	0.0	27	0.7
Mullativu	571	0	0.0	460	80.6	111	19.4
Eastern Province	32304	24496	75.8	5565	17.2	2243	6.9
Batticaloa	9102	6536	71.8	1279	14.1	1287	14.1
Ampara	5467	3882	71.0	1451	26.5	134	2.5
Kalmunai	9653	8707	90.2	691	7.2	255	2.6
Trincomalee	8082	5371	66.5	2144	26.5	567	7.0
North Western Province	39804	37223	93.5	603	1.5	1978	5.0
Kurunegala	25280	23362	92.4	603	2.4	1315	5.2
Puttalam	14524	13861	95.4	0	0.0	663	4.6
North Central Province	23414	19670	84.0	767	3.3	2977	12.7
Anuradhapura	15874	12712	80.1	482	3.0	2680	16.9
Polonnaruwa	7540	6958	92.3	285	3.8	297	3.9
Uva Province	23872	20471	85.8	1455	6.1	1946	8.2
Badulla	16620	14911	89.7	537	3.2	1172	7.1
Monaragala	7252	5560	76.7	918	12.7	774	10.7
Sabaragamuwa Province	30741	29754	96.8	182	0.6	805	2.6
Rathnapura	20165	19431	96.4	142	0.7	592	2.9
Kegalle	10576	10323	97.6	40	0.4	213	2.0
Sri Lanka	343384	307752	89.6	16538	4.8	19094	5.6

*Refers to Base hospitals and above where specialist facilities should be available

*Special Care Baby Units available along with the Neonatal Intensive Care Units are also included in this tabulation.

Overall in the country 89.6% of deliveries occur in hospitals with SCBU facilities. In the districts of Nuwara Eliya (29%), Mullathivu (81%), Ampara (27%), and Trincomalee (26%), the proportion of deliveries occurring in specialist hospitals without SCBU facilities is high.

This graph also illustrates the fact that when the SCBU facilities in the recently upgraded BHs are set up all the districts would have more than 75% of the deliveries occurring in hospitals with SCBU facilities. At the time of the survey SCBU facilities were being developed in the Nuwara Eliya Districts (BH Dickoya and Rickillagaskade) and in the Mullativu District (DGH Mullativu).

Figure 10.1: Births in different types of Hospitals

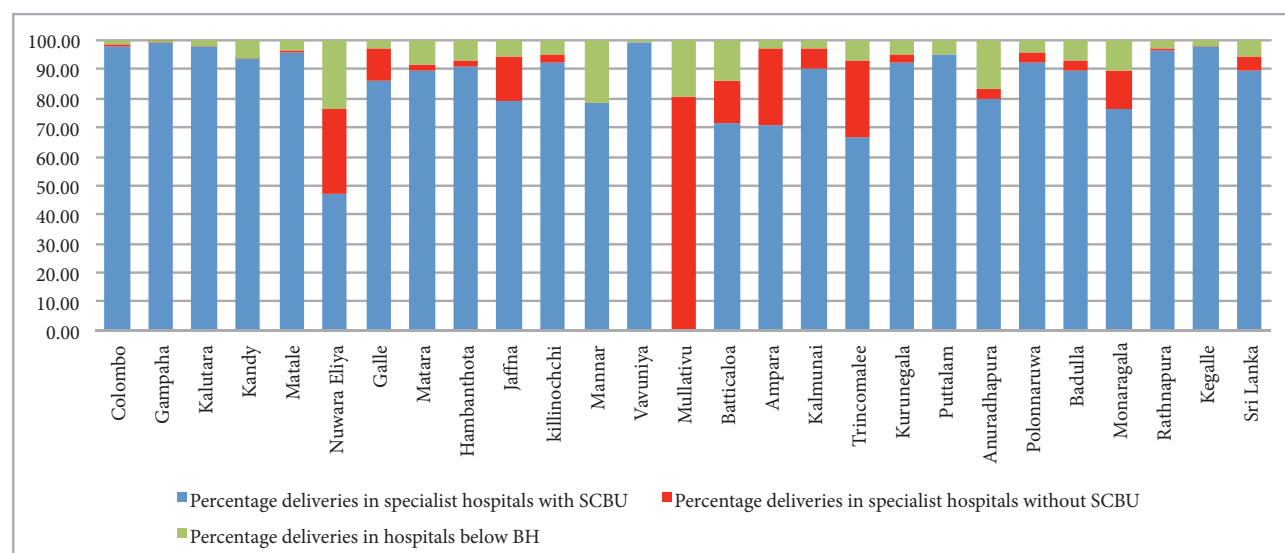


Table 10.2: Distribution of SCBUs in different types of hospitals by district

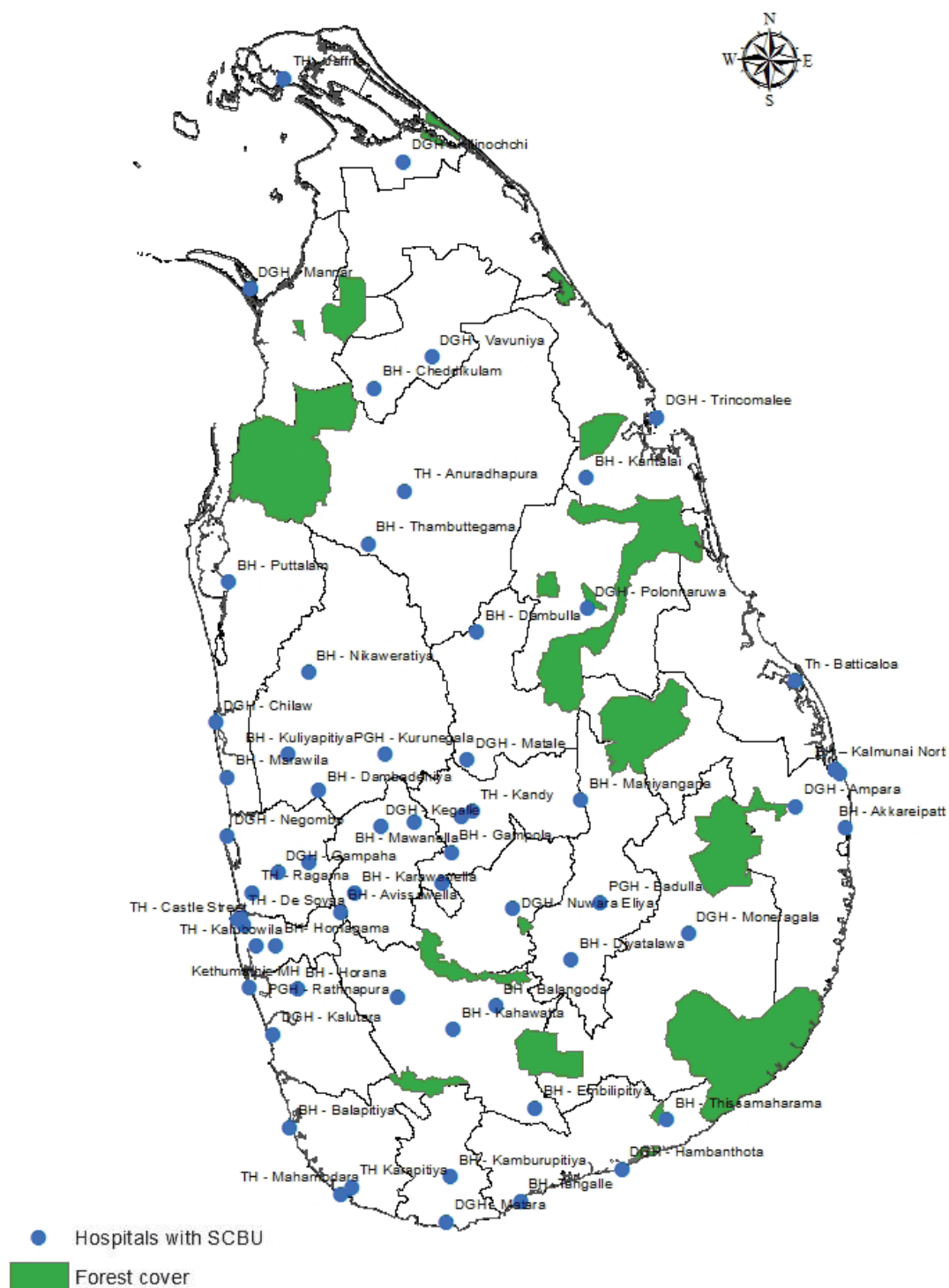
Province/District	Teaching and Provincial General Hospitals		District General Hospitals		Base Hospitals	
	No of THs and PGHs	No of SCBUs	No of DGHs	No of SCBUs	No of BHs	No of SCBUs
	No	No	No	No	No	No
Western	5	6	3	3	9	5
Colombo	4	4	0	0	2	2
Gampaha	1	2	2	2	3	1
Kalutara	0	0	1	1	4	2
Central	4	4	3	3	5	1
Kandy	4	4	1	1	1	0
Matale	0	0	1	1	1	1
Nuwara Eliya	0	0	1	1	2	0
Southern	2	2	2	2	7	4
Galle	2	2	0	0	2	1
Matara	0	0	1	1	2	1
Hambanthota	0	0	1	1	3	2
Northern	1	1	4	3	6	1
Jaffna	1	1	0	0	4	0
Killinochchi	0	0	1	1	1	0
Mannar	0	0	1	1	0	0
Vavuniya	0	0	1	1	1	1
Mullativu	0	0	1	0	0	0
Eastern	1	1	2	2	12	4
Batticaloa	1	1	0	0	1	0
Ampara	0	0	1	1	2	0
Kalmunai	0	0	0	0	5	3
Trincomalee	0	0	1	1	4	1
North Western	1	1	1	1	7	5
Kurunegala	1	1	0	0	5	3
Puttalam	0	0	1	1	2	2
North Central	1	1	1	1	5	1
Anuradhapura	1	1	0	0	3	1
Polonnaruwa	0	0	1	1	2	0
Uva	1	1	1	1	6	2
Badulla	1	1	0	0	3	2
Monaragala	0	0	1	1	3	0
Sabaragamuwa	1	1	1	1	7	5
Rathnapura	1	1	0	0	4	3
Kegalle	0	0	1	1	3	2
Sri Lanka	17	18	18	17	64	28

**Special Care Baby Units available along with the Neonatal Intensive Care Units are also included in this tabulation.*

SCBU facilities are available in all the THs. In North Colombo TH there are two SCBUs. All the DGHs have SCBU facilities except in Mullativu. The SCBU in Mullativu was under construction at the time of

the survey. The table 10.2 also show that only 44% of the base hospitals have SCBU facilities. The majority of BHs without SCBU facilities are institutions that have been recently upgraded.

Figure 10.2: Distribution of SCBU throughout the country



Mother Baby Centres and Lactation Management Centres

Table 10.3: Distribution of deliveries in government institutions with MBC and LMC by district

Province/ District	Total reported deliveries in Gov. Hospitals (2011)	No of births in Hospitals with a Mother Baby Centre		No of births in Hospitals with Lactation Management Centre	
		No	%	No	%
Western	86022	43019	50.01	72801	84.63
Colombo	45251	16180	35.70	37957	83.80
Gampaha	24055	14594	60.67	18437	76.65
Kalutara	16716	12245	73.25	16407	98.15
Central	48585	12606	25.95	23369	48.10
Kandy	27199	6715	24.69	17478	64.26
Matale	10415	5891	56.56	5891	56.56
Nuwara Eliya	10971	0	0.00	0	0.00
Southern	41446	9977	24.07	31767	76.65
Galle	18911	0	0.00	16302	86.20
Matara	13097	9977	76.18	9977	76.18
Hambanthota	9438	0	0.00	5488	58.15
Northern	17196	0	0.00	0	0.00
Jaffna	8800	0	0.00	0	0.00
Killinochchi	2390	0	0.00	0	0.00
Mannar	1474	0	0.00	0	0.00
Vavuniya	3961	0	0.00	0	0.00
Mullativu	571	0	0.00	0	0.00
Eastern	32304	13133	40.65	9352	28.95
Batticaloa	9102	6536	71.81	6536	71.81
Ampara	5467	0	0.00	0	0.00
Kalmunai	9653	6597	68.34	2816	29.17
Trincomalee	8082	0	0.00	0	0.00
North Western	39804	0	0.00	28757	72.25
Kurunegala	25280	0	0.00	22445	88.79
Puttalam	14524	0	0.00	6312	43.46
North Central	23414	18616	79.51	18616	79.51
Anuradhapura	15874	11658	73.44	11658	73.44
Polonnaruwa	7540	6958	92.28	6958	92.28
Uva	23872	8582	35.95	8582	35.95
Badulla	16620	3022	18.18	3022	18.18
Monaragala	7252	5560	76.67	5560	76.67
Sabaragamuwa	30741	15602	50.75	9414	30.62
Rathnapura	20165	15602	77.37	9414	46.68
Kegalle	10576	0	0.00	0	0.00
Sri Lanka	343384	121535	35.39	202658	59.02

There are 13 districts in the country without a single MBU in the specialist hospitals. Similarly there are 9 districts in the country without a single LMC in the specialist hospitals. Although MBC and LMC are

essential elements of a specialized hospital providing maternal and newborn care services, their distribution is at an unsatisfactory level. This is illustrated in figure 10.3

Figure 10.3: Proportion of births in hospitals with MBC and LMC facilities

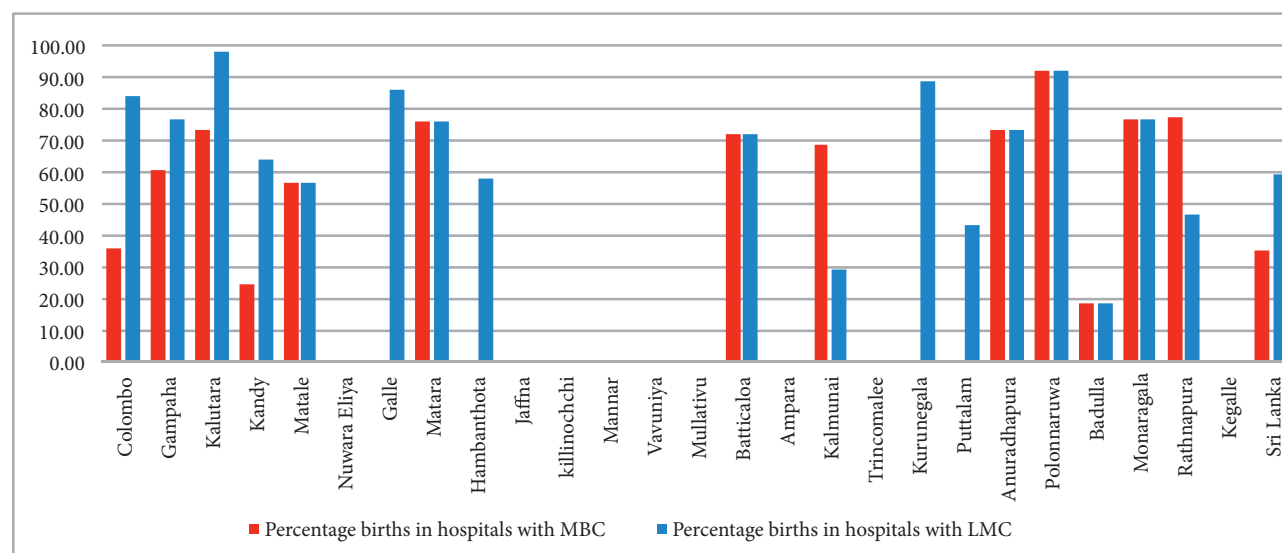


Table 10.4: Distribution of MBCs and LMCs in different types of hospitals by district

Province/District	TH / PGH			DGH			BH		
	No of THs and PGHs	No of MBCs	No of LMCs	No of DGHs	No of MBCs	No of LMCs	No of BHs	No of MBCs	No of LMCs
	No	No	No	No	No	No	No	No	No
Western	5	1	5	3	3	2	9	2	4
Colombo	4	1	4	0	0	0	2	0	1
Gampaha	1	0	1	2	2	1	3	1	1
Kalutara	0	0	0	1	1	1	4	1	2
Central	4	1	3	3	1	1	5	0	0
Kandy	4	1	3	1	0	0	1	0	0
Matale	0	0	0	1	1	1	1	0	0
Nuwara Eliya	0	0	0	1	0	0	2	0	0
Southern	2	0	1	2	1	2	7	0	1
Galle	2	0	1	0	0	0	2	0	1
Matara	0	0	0	1	1	1	2	0	0
Hambanthota	0	0	0	1	0	1	3	0	0
Northern	1	0	0	4	0	0	6	0	0
Jaffna	1	0	0	0	0	0	4	0	0
Killinochchi	0	0	0	1	0	0	1	0	0
Mannar	0	0	0	1	0	0	0	0	0
Vavuniya	0	0	0	1	0	0	1	0	0
Mullativu	0	0	0	1	0	0	0	0	0
Eastern	1	1	1	2	0	0	12	2	1
Batticaloa	1	1	1	0	0	0	1	0	0
Ampara	0	0	0	1	0	0	2	0	0
Kalmunai	0	0	0	0	0	0	5	2	1
Trincomalee	0	0	0	1	0	0	4	0	0
North Western	1	0	1	1	0	0	7	0	3
Kurunegala	1	0	1	0	0	0	5	0	2
Puttalam	0	0	0	1	0	0	2	0	1
North Central	1	1	1	1	1	1	5	0	0
Anuradhapura	1	1	1	0	0	0	3	0	0
Polonnaruwa	0	0	0	1	1	1	2	0	0
Uva	1	0	1	1	1	1	6	1	1
Badulla	1	0	1	0	0	0	3	1	1
Monaragala	0	0	0	1	1	1	3	0	0
Sabaragamuwa	1	1	1	1	0	0	7	2	0
Rathnapura	1	1	1	0	0	0	4	2	0
Kegalle	0	0	0	1	0	0	3	0	0
Sri Lanka	17	5	14	18	7	7	64	7	10

Out of the institutions catering specialized maternal and new-born services, only 18 hospitals (18.2%) had MBCs and only 31 (31.3%) had LMCs. In the 17 TH/PGH types of institutions, LMCs were available in 14 (82%) while MBCs were available only in 5 (29%). In the DGHs MBCs were available in 39% and LMCs in 50% of the institutions. Majority of the base hospitals did not have either MBCs or LMCs, the percentage with this service being only 11% and 16% suggesting that services were unavailable even in BHs with specialist services.

Facilities for Neonatal Intensive Care

There is no national norm decided upon for NICU facilities. In the present study we examined the availability of NICU based on the assumption that there should be NICUs in all TH/PGH and in the districts where there is no TH/PGH the DGH should have a NICU. This ensures that each district will have at least one NICU.

Table 10.5: Distribution of deliveries in government institutions with NICU by district

District	Total reported deliveries in Gov. Hospitals (2011)	No of Births in Hospitals with NICU facilities	
		No	%
Western	86022	56969	66
Colombo	45251	33452	73.9
Gampaha	24055	14809	61.6
Kalutara	16716	8708	52.1
Central	48585	21694	44.7
Kandy	27199	21694	79.8
Matale	10415	0	0.0
Nuwara eliya	10971	0	0.0
Southern	41446	27808	67.1
Galle	18911	12343	65.3
Matara	13097	9977	76.2
Hambanthota	9438	5488	58.1
Nothern	17196	10777	62.7
Jaffna	8800	6992	79.5
killinochchi	2390	0	0.0
Mannar	1474	0	0.0
Vavuniya	3961	3785	95.6
Mullativu	571	0	0.0
Eastern	32304	17205	53.3
Batticaloa	9102	6536	71.8
Ampara	5467	3882	71.0
Kalmunai	9653	2816	29.2
Trincomalee	8082	3971	49.1
North Western	39804	18544	46.6
Kurunegala	25280	13318	52.7
Puttalam	14524	5226	36.0
North Central	23414	18616	79.5
Anuradhapura	15874	11658	73.4
Polonnaruwa	7540	6958	92.3
Uva	23872	7927	33.2
Badulla	16620	7927	47.7
Monaragala	7252	0	0.0
Sabaragamuwa	30741	21286	69.2
Rathnapura	20165	15602	77.4
Kegalle	10576	5684	53.7
Sri Lanka	343384	200826	58.5

Table 10.5 shows that 58.5% of all births in the country occur in institutions with NICU facilities. There are 6 districts in the country without this facility; Matale, Nuwara Eliya, Mannar, Killinochchi, Mullativu and Monaragala. It should be noted that although there are no NICU facilities in these districts, all of these districts except Mullathivu has SCBU facilities.

It is observed that in districts with NICU facilities most of the births occur in hospitals with such facilities and in the other districts most of the births occur in hospitals with SCBU facilities. It is noteworthy that in the districts of Nuwara Eliya, Mannar and Mullativu more than 20% of the deliveries occur in institutions below the level of a base hospital and in the districts of Batticaloa, Anuradhapura and Monaragala more than 10% of the deliveries occur in the Divisional Hospitals or institutions below that level.

Figure 10.4: Proportion of births by functional category of hospitals in districts

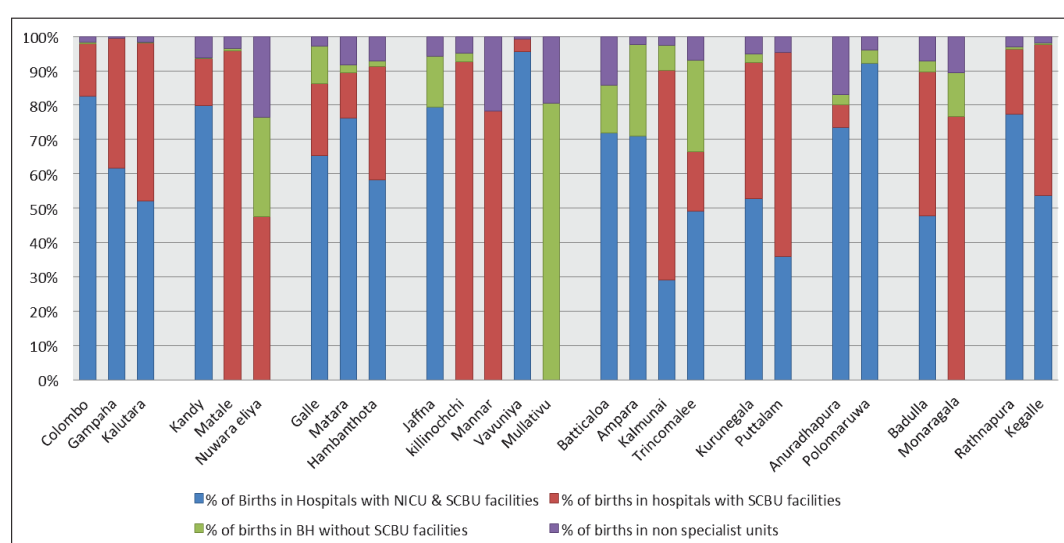


Table 10.6: Distribution of NICUs in different types of hospitals by district

Province/District	Teaching and Provincial General Hospitals		District General Hospitals		Base Hospitals	
	No of THs and PGHs	No of NICU and SCBUs	No of DGHs	No of NICU and SCBUs	No of BHs	No of NICU and SCBUs
	No	No	No	No	No	No
Western	5	6	3	2	9	0
Colombo	4	4	0	0	2	0
Gampaha	1	2	2	1	3	0
Kalutara	0	0	1	1	4	0
Central	4	3	3	1	5	0
Kandy	4	3	1	1	1	0
Matale	0	0	1	0	1	0
Nuwara Eliya	0	0	1	0	2	0
Southern	2	2	2	2	7	0
Galle	2	2	0	0	2	0
Matara	0	0	1	1	2	0
Hambanthota	0	0	1	1	3	0
Northern	1	1	4	1	6	0
Jaffna	1	1	0	0	4	0
Killinochchi	0	0	1	0	1	0
Mannar	0	0	1	0	0	0
Vavuniya	0	0	1	1	1	0
Mullativu	0	0	1	0	0	0
Eastern	1	1	2	2	12	1
Batticaloa	1	1	0	0	1	0
Ampara	0	0	1	1	2	0
Kalmunai	0	0	0	0	5	1
Trincomalee	0	0	1	1	4	0
North Western	1	1	1	1	7	0
Kurunegala	1	1	0	0	5	0
Puttalam	0	0	1	1	2	0
North Central	1	1	1	1	5	0
Anuradhapura	1	1	0	0	3	0
Polonnaruwa	0	0	1	1	2	0
Uva	1	1	1	0	6	0
Badulla	1	1	0	0	3	0
Monaragala	0	0	1	0	3	0
Sabaragamuwa	1	1	1	1	7	1
Rathnapura	1	1	0	0	4	1
Kegalle	0	0	1	1	3	0
Sri Lanka	17	17	18	11	64	2

NICU, 7 districts Matale, Nuwara Eliya, Moneragala, Kilinochchi, Mannar and Mulativu which do not have TH/PGHs, the DGHs should have NICU facilities. Currently these districts have only SCBU facilities. It must be noted that the number of deliveries in the three districts of the Northern Province without NICU facilities were only 4435 in the year 2011. It is noted that two BHs, the BH Embilipitiya and BH Kalmunai South have NICU facilities.

[illegible]

Table 10.7 summarises the neonatal care facilities in the country by district

Table 10.7: Summary of neonatal care facilities in the country by district

Province/District	Norm for NICU	No of NICUs available	Norm for SCBU	No of SCBUs available	Norm for MBC	No of MBCs available	Norm for LMCs	No of LMCs available
Western	6	8	18	16	18	6	18	11
Colombo	4	4	7	8	7	1	7	5
Gampaha	1	3	6	5	6	3	6	3
Kalutara	1	1	5	3	5	2	5	3
Central	6	4	11	8	11	1	11	4
Kandy	4	4	6	5	6	1	6	3
Matale	1	0	2	2	2	1	2	1
Nuwara Eliya	1	0	3	1	3	0	3	0
Southern	4	4	11	7	11	1	11	4
Galle	2	2	4	2	4	0	4	2
Matara	1	1	3	2	3	1	3	1
Hambanthota	1	1	4	3	4	0	4	1
Northern	5	2	11	5	11	0	11	0
Jaffna	1	1	5	1	5	0	5	0
Killinochchi	1	0	2	1	2	0	2	0
Mannar	1	0	1	1	1	0	1	0
Vavuniya	1	1	2	2	2	0	2	0
Mullativu	1	0	1	0	1	0	1	0
Eastern	3	4	15	7	15	3	15	2
Batticaloa	1	1	3	1	3	1	3	1
Ampara	1	1	3	1	3	0	3	0
Kalmunai *	0	1	5	3	5	2	5	1
Trincomalee	1	1	4	2	4	0	4	0
North Western	2	2	9	7	9	0	9	4
Kurunegala	1	1	6	4	6	0	6	3
Puttalam	1	1	3	3	3	0	3	1
North Central	2	2	7	3	7	2	7	2
Anuradhapura	1	1	4	2	4	1	4	1
Polonnaruwa	1	1	3	1	3	1	3	1
Uva	2	1	8	4	8	2	8	3
Badulla	1	1	4	3	4	1	4	2
Monaragala	1	0	4	1	4	1	4	1
Sabaragamuwa	2	3	9	7	9	3	9	1
Rathnapura	1	2	5	4	5	3	5	1
Kegalle	1	1	4	3	4	0	4	0
Sri Lanka	32	30	99	61	99	18	99	31

(* the health administrative area of Kalmunai is considered as part of the Ampara district)

10.2 Indicators of Neonatal care

Although the guidelines published by WHO and partners do not provide indicators for neonatal care, the present analysis also looked at availability of services in terms of population and coverage of services. Several indicators were examined to assess neonatal care services in the country and these are presented in the following section.

Indicator 1: Availability of neonatal care services (SCBU and NICU)

Availability of services was examined in terms of population based on the standard given for Emergency Obstetric and Neonatal Care, the premise being that there should be at least five neonatal care facilities for a population of 500 000, of which at least one should be a NICU and the other four SCBUs. Since a SCBU is incorporated in to a NICU in institutions where there is a NICU, such institutions are included under both SCBU and NICU in the calculation of indices. The availability of NICU / SCBU facilities per 500 000 population are given in table 10.8 below.

Table 10.8 Availability of NICU/SCBU per 500,000 populations by district and province

Province/District	Population	SCBU	NICU	SCBU / 500 000	NICU / 500 000	Neonatal care facilities per 500 000
Western Province	5837294	14	8	1.2	0.7	1.9
Colombo	2323826	6	4	1.3	0.9	2.2
Gampaha	2298588	5	3	1.1	0.7	1.7
Kalutara	1214880	3	1	1.2	0.4	1.6
Central Province	2556774	8	4	1.6	0.8	2.3
Kandy	1368216	5	4	1.8	1.5	3.3
Matale	482348	2	0	2.1	0.0	2.1
Nuwara Eliya	706210	1	0	0.7	0.0	0.7
Southern Province	2465626	8	4	1.6	0.8	2.4
Galle	1059046	3	2	1.4	0.9	2.4
Matara	810703	2	1	1.2	0.6	1.9
Hambanthota	595877	3	1	2.5	0.8	3.4
Northern Province	1060023	5	2	2.4	0.9	3.3
Jaffna	583071	1	1	0.9	0.9	1.7
Killinochchi	112872	1	0	4.4	0.0	4.4
Mannar	99063	1	0	5.0	0.0	5.0
Vavuniya	172789	2	1	5.8	2.9	8.7
Mullativu	92228	0	0	0.0	0.0	0.0
Eastern Province	1547377	7	4	2.3	1.3	3.6
Batticaloa	525186	1	1	1.0	1.0	1.9
Ampara	645825	4	2	3.1	1.5	4.6
Trincomalee	376366	2	1	2.7	1.3	4.0
North Western Province	2372185	7	2	1.5	0.4	1.9
Kurunegala	1611407	4	1	1.2	0.3	1.6
Puttalam	760778	3	1	2.0	0.7	2.6
North Central Province	1259421	3	2	1.2	0.8	2.0
Anuradhapura	855562	2	1	1.2	0.6	1.8
Polonnaruwa	403859	1	1	1.2	1.2	2.5
Uva Province	1259419	4	1	1.6	0.4	2.0
Badulla	811225	3	1	1.8	0.6	2.5
Monaragala	448194	1	0	1.1	0.0	1.1
Sabaragamuwa Province	1919478	7	3	1.8	0.8	2.6
Rathnapura	1082299	4	2	1.8	0.9	2.8
Kegalle	837179	3	1	1.8	0.6	2.4
Sri Lanka	20277597	63	30	1.6	0.7	2.3

On an average the country has 2.3 neonatal care facilities per 500 000 population. The country has 1.6 SCBUs per 500 000 population and less than one NICU per 500 000 population. Districts where 4 or more neonatal care facilities per 500 000 population are available are the districts where the population density is low. The district of Mulativu did not have any neonatal care facilities at the time of the survey and Nuwara Eliya had 0.7 facilities per 500 000 population.

It is important that facilities for sick neonates should be available on a 24*7 basis. Therefore the ability of institutions with NICU and SCBU facilities to provide these services on a 24*7 basis were assessed based on a set of criteria agreed upon through a consultative process and approved by the core group (Refer to Annex with 24*7 criteria). It is seen that the inability of institutions to provide 24*7 NICU/SCBU care is due mainly to the inadequacy in the number of medical officers appointed to or designated as MOs to these units (table 10.9 and figure 10.6).

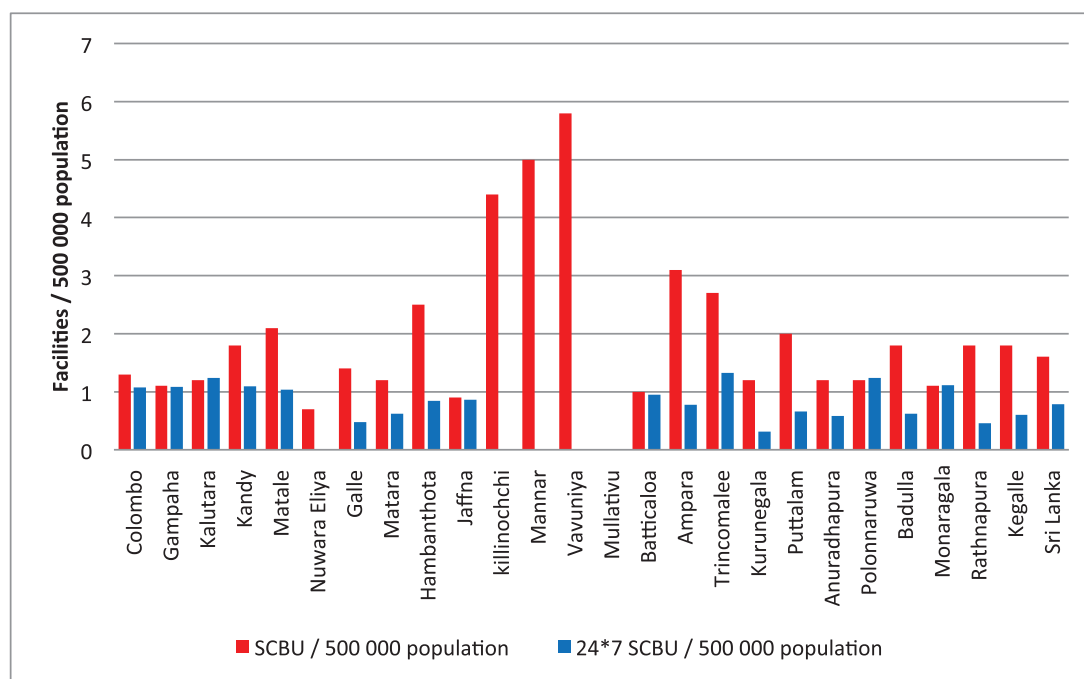
Table 10.9 Availability of 24*7 NICU/SCBU per 500,000 populations by district and province

Province	District	No of NICUs available	NICU per 500,000 population		24/7 NICU per 500,000 population		No of SCBU available	SCBU per 500,000 population		24/7 SCBU per 500,000 population	
			≥ 1	< 1	≥ 1	< 1		≥ 1	< 1	≥ 1	< 1
Western Province		8					16				
	Colombo	4					8				
	Gampaha	3					5				
	Kalutara	1					3				
Central Province		4					8				
	Kandy	4					5				
	Matale	0					2				
	Nuwara Eliya	0					1			NEM	
Southern Province		4					7				
	Galle	2					2				
	Matara	1					2				
	Hambanthota	1			NEM		3				
Northern Province		2					4				
	Jaffna	1					1				
	Killinochchi	0					1			No Paediatrician	
	Mannar	0					1			No MO SCBU	
	Vavuniya	1			No MO NICU		1			No MO SCBU	
	Mullativu	0					0				
Eastern Province		4					8				
	Batticaloa	1			No MO NICU		1				
	Ampara	1			No MO NICU		2				
	Kalmunai	1			No MO NICU		3				
	Trincomalee	1			No MO NICU		2				
North Western Province		2					7				
	Kurunegala	1					4				
	Puttalam	1					3				
North Central Province		2					3				
	Anuradhapura	1					2				
	Polonnaruwa	1			NEM		1				
Uva Province		1					4				
	Badulla	1					3				
	Monaragala	0					1				
Sabaragamuwa Province		3					7				
	Rathnapura	2					4				
	Kegalle	1			NEM		3				
Sri Lanka		30					64				

*All the institutions with NICU also have SCBUs. These SCBUs are calculated as separate units in this calculation

	Available		Not available		Not applicable
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Figure 10.6: Distribution of SCBU / 500 000 population and 24*7 SCBU / 500 000 population by district



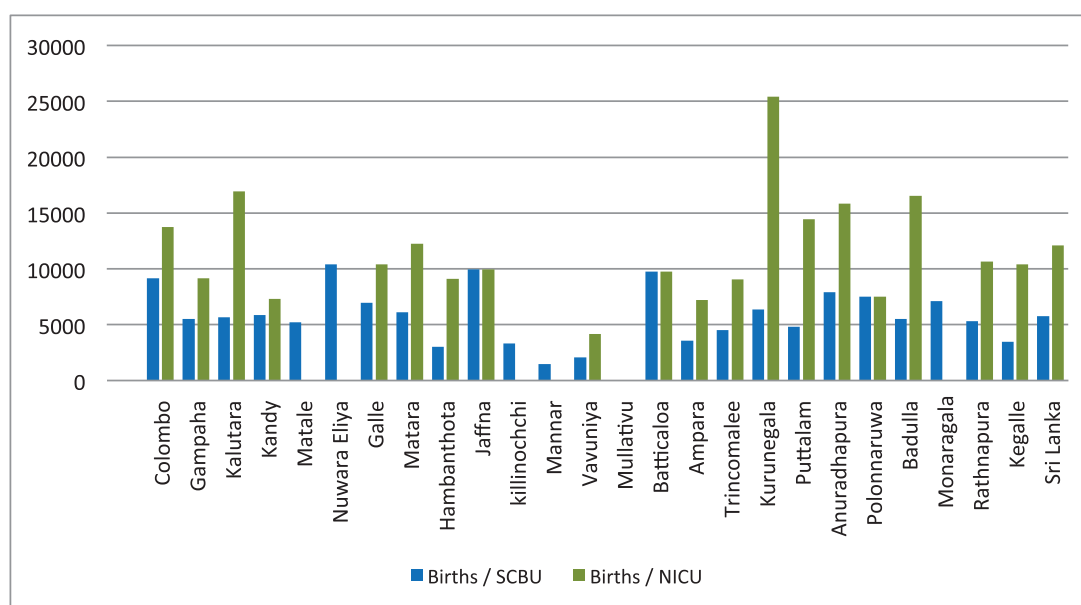
Most of the districts (19/26) in the country have more than 1 SCBU facility per 500,000 population. However, once the 24*7 criteria is applied the number of districts having at least one SCBU / 500 000 population drops to 8 districts.

The availability of neonatal care facilities were further analysed based on number of births per neonatal care facility and presented in table 10.10 and figure 10.8. In calculating this indicator the total number of births registered for each of the districts for the year 2011 as reported by the Registrar General's Department of Sri Lanka have been used.

Table 10.10: Average number of births per NICU / SCBU facilities by district

Province/District	Total Births registered in the district in 2011 (RG)	Hospitals with SCBU	Hospitals with NICU	Births/ SCBU	Births / NICU
Western Province	99292	14	8	7092	12412
Colombo	54888	6	4	9148	13722
Gampaha	27457	5	3	5491	9152
Kalutara	16947	3	1	5649	16947
Central Province	50196	8	4	6275	12549
Kandy	29331	5	4	5866	7333
Matale	10465	2	0	5233	NA
Nuwara Eliya	10400	1	0	10400	NA
Southern Province	42196	8	4	5275	10549
Galle	20838	3	2	6946	10419
Matara	12268	2	1	6134	12268
Hambanthota	9090	3	1	3030	9090
Northern Province	20016	5	2	4003	10008
Jaffna	9949	1	1	9949	9949
Killinochchi	3319	1	0	3319	NA
Mannar	1482	1	0	1482	NA
Vavuniya	4190	2	1	2095	4190
Mullativu	1076	0	0	NA	NA
Eastern Province	33147	7	4	4735	8287
Batticaloa	9743	1	1	9743	9743
Ampara	14371	4	2	3593	7186
Trincomalee	9033	2	1	4517	9033
North Western Province	39885	7	2	5698	19943
Kurunegala	25428	4	1	6357	25428
Puttalam	14457	3	1	4819	14457
North Central Province	23353	3	2	7784	11677
Anuradhapura	15855	2	1	7928	15855
Polonnaruwa	7498	1	1	7498	7498
Uva Province	23680	4	1	5920	23680
Badulla	16548	3	1	5516	16548
Monaragala	7132	1	0	7132	NA
Sabaragamuwa Province	31650	7	3	4521	10550
Rathnapura	21260	4	2	5315	10630
Kegalle	10390	3	1	3463	10390
Sri Lanka	363415	63	30	5768	12114

Figure 10.7: Distribution of NICU and SCBU facilities by district by average number of births per facility



It is assumed that 15% of all births are likely to need SCBU care and 3% are likely to need NICU care (FHB, PSSSL and CECB, 2007). This assumption was arrived at through a consultative process where consideration was also given to the Report of the Neonatal Intensive Care Services Review Group (2003) where it is said that “approximately 10% of babies require some form of specialist support at birth with 1-3% of this requiring Neonatal Intensive Care”.

On an average for every 5 768 births there is a SCBU facility and for 12 114 births there is a NICU facility in the country. It is noted that the national average is approximately 72 and 30 SCBU and NICU admissions per month respectively. However, the number of

births per SCBU and NICU show marked district variation ranging from no facilities to 10 400 births for a single facility as reported in Nuwara Eliya for a SCBU and 25 428 births for a NICU in the Kurunegala district.

Indicator 2: Geographic distribution of neonatal care facilities

This indicator describes the average land area per facility and provides some indication about access within a district /province. This is a crude indicator of access in that it does not provide any information on the spread of institutions within the district. This information by district is presented in table 10.11 below.

Table 10.11: Land area (km²) / facility providing specialized neonatal care by district and province

Province/District	Total land area in km ²	Hospitals with SCBU	Hospitals with NICU	Area in km ² / SCBU	Area in km ² / NICU
Western Province	3684	14	8	263.1	460.5
Colombo	699	6	4	116.5	174.8
Gampaha	1387	5	3	277.4	462.3
Kalutara	1598	3	1	532.7	1598.0
Central Province	5704	8	4	713.0	1426.0
Kandy	1940	5	4	388.0	485.0
Matale	1993	2	0	996.5	NA
Nuwara Eliya	1741	1	0	1741.0	NA
Southern Province	5544	8	4	693.0	1386.0
Galle	1652	3	2	550.7	826.0
Matara	1283	2	1	641.5	1283.0
Hambanthota	2609	3	1	869.7	2609.0
Northern Province	8884	5	2	1776.8	4442.0
Jaffna	1025	1	1	1025.0	1025.0
Killinochchi	1279	1	0	1279.0	NA
Mannar	1996	1	0	1996.0	NA
Vavuniya	1967	2	1	983.5	1967.0
Mullativu	2617	0	0	NA	NA
Eastern Province	9996	7	4	1428.0	2499.0
Batticaloa	2854	1	1	2854.0	2854.0
Ampara	4415	4	2	1103.8	2207.5
Trincomalee	2727	2	1	1363.5	2727.0
North Western Province	7888	7	2	1126.9	3944.0
Kurunegala	4816	4	1	1204.0	4816.0
Puttalam	3072	3	1	1024.0	3072.0
North Central Province	10472	3	2	3490.7	5236.0
Anuradhapura	7179	2	1	3589.5	7179.0
Polonnaruwa	3293	1	1	3293.0	3293.0
Uva Province	8500	4	1	2125.0	8500.0
Badulla	2861	3	1	953.7	2861.0
Monaragala	5639	1	0	5639.0	NA
Sabaragamuwa Province	4968	7	3	709.7	1656.0
Rathnapura	3275	4	2	818.8	1637.5
Kegalle	1693	3	1	564.3	1693.0
Sri Lanka	65610	63	30	1041.4	2187.0

On average for every 1041 km² there is a SCBU while for every 2187 km² there is a NICU facility in Sri Lanka. This ranges from a minimum of 116.5 km² in the Colombo district to a maximum of 5639 km² for the Monaragala district for SCBU facilities. There was one district where (Mullativu) SCBU facilities were not available at time of survey. The area per NICU facility ranges from a minimum of 174.8 km² for Colombo to a maximum of 7179 km² for that of Anuradhapura district.

Indicator 3: Utilisation of neonatal care facilities

An indicator 3 is on the utilization of the available neonatal care facilities. Indicator 3 examines if the neonatal care services serve a reasonable proportion of births.

Proportion of births in specialised neonatal care facilities

This is a very crude indicator of utilisation of neonatal care services by the neonates. The optimum long term goal must be to ensure that all children are delivered in a place where SCBU services are available, since one of the functions of a SCBU would be to stabilize and transfer those needing NICU services. The indicator is calculated as the proportion of all births in a district that takes place in facilities having specialized neonatal care services. The calculation is based on births in institutions that have the ability to provide services. The denominator is the births registered in the district regardless of where the birth takes place.

There is no internationally advocated minimum requirement for this indicator and it has to be decided upon in consultation with national stakeholders taking in to consideration the country context.

Table 10.12: Percentage of deliveries occurring in institutions with NICU and SCBU

Province/District	Total Births registered in the district in 2011 (RG)	No of deliveries in hospitals with SCBU facilities	No of deliveries in hospitals with NICU facilities	Percentage of deliveries in SCBU	Percentage of deliveries in NICU
Western Province	99292	84598	56969	85.2	57.4
Colombo	54888	44271	33452	80.7	60.9
Gampaha	27457	23920	14809	87.1	53.9
Kalutara	16947	16407	8708	96.8	51.4
Central Province	50196	40611	21694	80.9	43.2
Kandy	29331	25427	21694	86.7	74.0
Matale	10465	9979	0	95.4	0.0
Nuwara Eliya	10400	5205	0	50.0	0.0
Southern Province	42196	36635	27808	86.8	65.9
Galle	20838	16302	12343	78.2	59.2
Matara	12268	11720	9977	95.5	81.3
Hambanthota	9090	8613	5488	94.8	60.4
Northern Province	20016	14294	10777	71.4	53.8
Jaffna	9949	6992	6992	70.3	70.3
Killinochchi	3319	2213	0	66.7	0.0
Mannar	1482	1155	0	77.9	0.0
Vavuniya	4190	3934	3785	93.9	90.3
Mullativu	1076	0	0	0.0	0.0
Eastern Province	33147	24496	17205	73.9	51.9
Batticaloa	9743	6536	6536	67.1	67.1
Ampara	14371	3882	3882	27.0	27.0
Trincomalee	9033	5371	3971	59.5	44.0
North Western Province	39885	37223	18544	93.3	46.5
Kurunegala	25428	23362	13318	91.9	52.4
Puttalam	14457	13861	5226	95.9	36.1
North Central Province	23353	19670	18616	84.2	79.7
Anuradhapura	15855	12712	11658	80.2	73.5
Polonnaruwa	7498	6958	6958	92.8	92.8
Uva Province	23680	20471	7927	86.4	33.5
Badulla	16548	14911	7927	90.1	47.9
Monaragala	7132	5560	0	78.0	0.0
Sabaragamuwa Province	31650	29754	21286	94.0	67.3
Rathnapura	21260	19431	15602	91.4	73.4
Kegalle	10390	10323	5684	99.4	54.7
Sri Lanka	363415	307752	200826	84.7	55.3

On average 85 % of all births in the country occur in an institution with SCBU facilities while 55% of the births occur in a facility having a NICU. It was seen that only 93% of births in the country occur in hospitals without a specialist obstetrician. If it is assumed that these institutions also have a specialist paediatrician, around 8% of neonates are born where SCBU care should be available but where services are not available. The 55% of births occurring in institutions with NICU services may be considered a high percentage.

Indicator 4: Distance from SCBU to NICU facilities

This indicator is presented in figures 10.9 and 10.10. The figures examines the distances from institutions where there should be SCBUs but where they were not available to functioning SCBUs (fig 10.9) and the distance from NICUs to institutions that should have SCBU facilities (fig. 10.10).

All hospitals BH and above should have SCBUs. However some of the newly upgraded BHs did not have SCBUs at the time of survey. Figure 10.9 shows the distances from functioning SCBUs to hospitals that currently do not have such facilities. It is seen that the institutions that are currently without SCBU facilities are within a 40 km. radius from a functioning SCBU.

Figures 10.10 shows the distance from functioning NICU to hospitals that currently have SCBUs and functions as BHs without SCBU facilities. It is seen that all of the hospitals with SCBU facilities lie within a 50km rading from a functioning NICUs.

Figure 10.9: Distribution of hospitals where SCBU facilities should be available and functioning facilities.

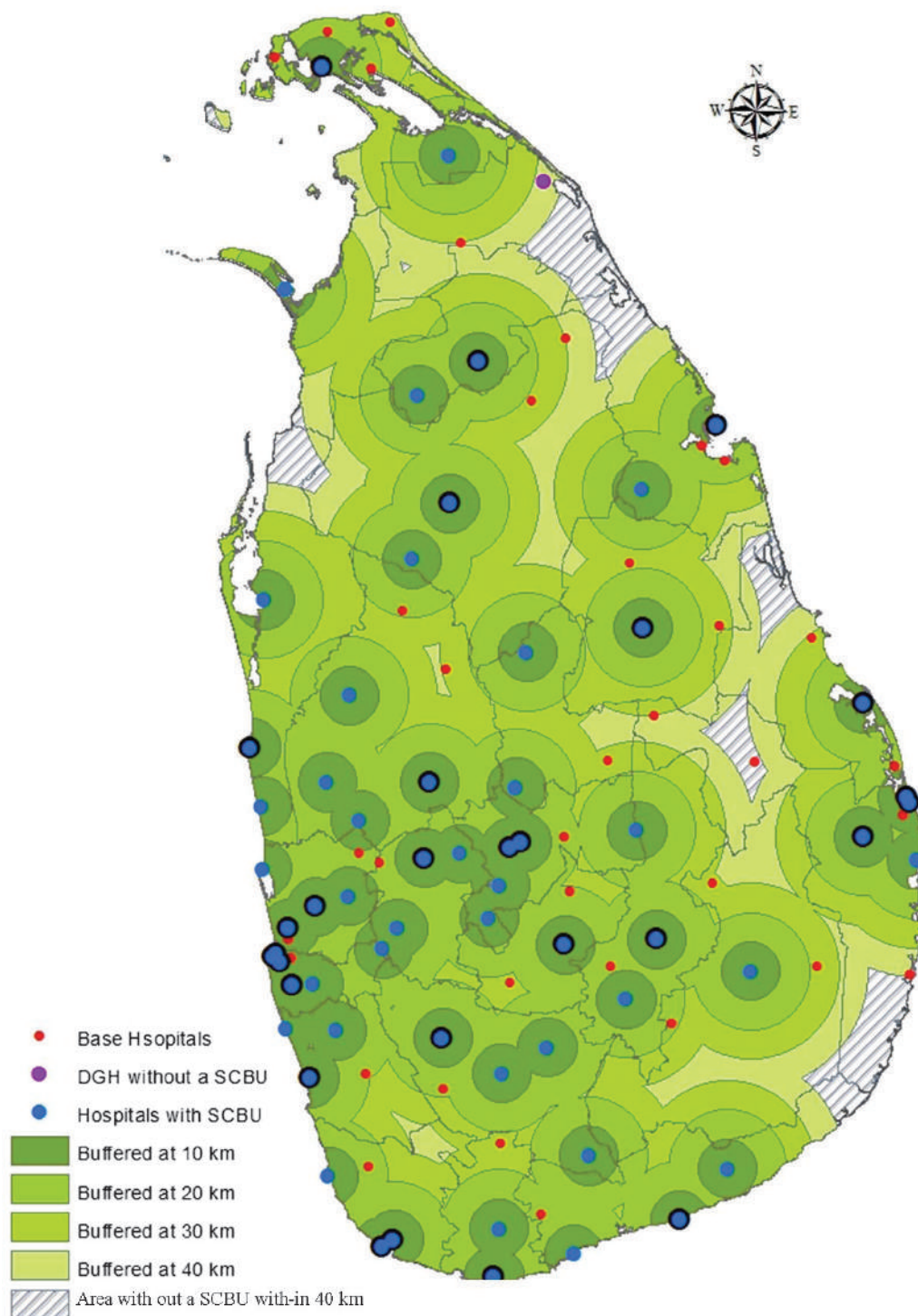
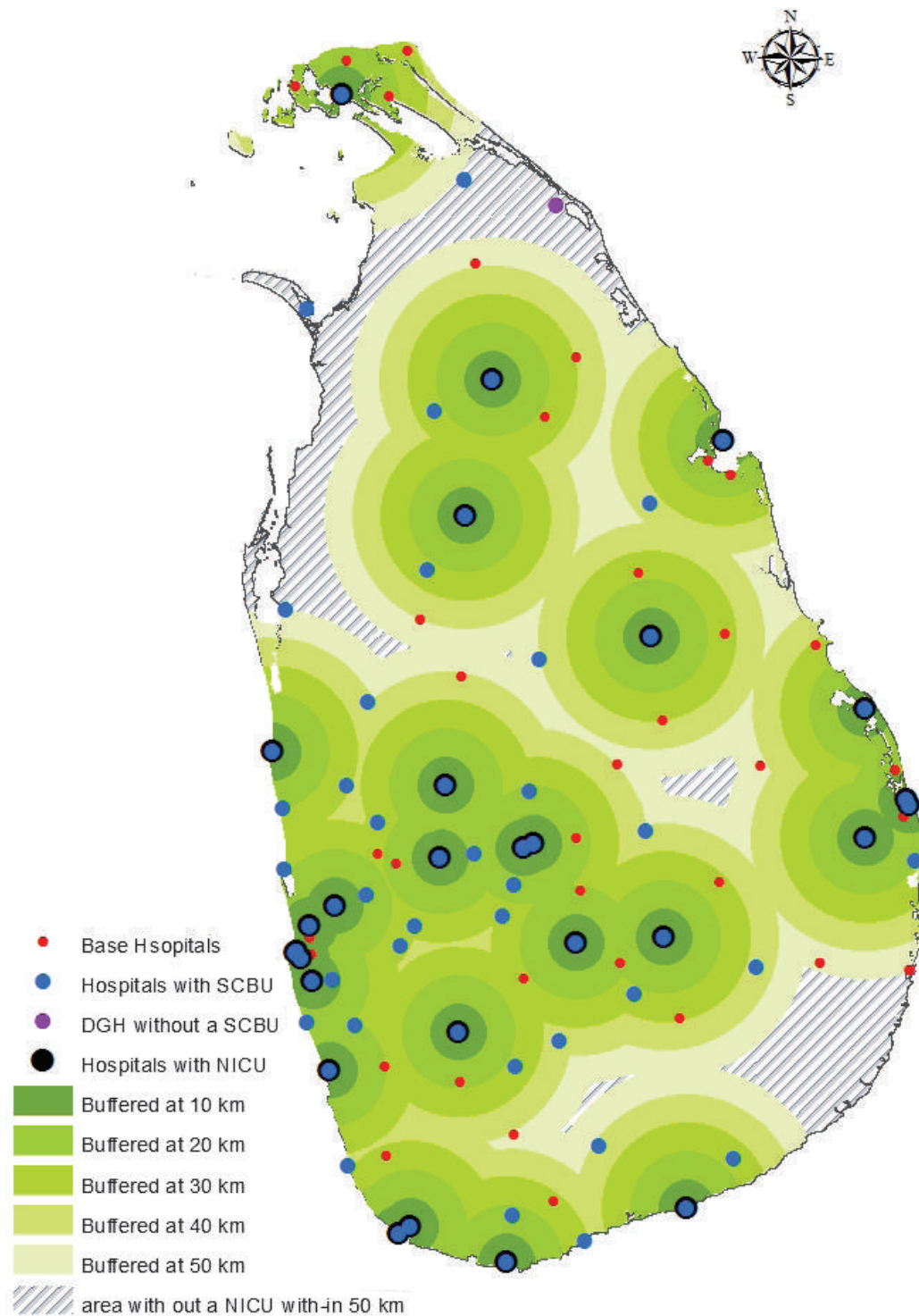


Figure10.10: Distances from currently functioning NICUs to institutions that should have SCBU facilities



10.3 Neonatal morbidity

Where ever there are NICUs, a SCBU is incorporated into it. Therefore the morbidity data from institutions with NICUs also includes the admissions needing SCBU care.

10.4 Interventions carried out in NICUs and SCBUs and selected care practices

10.4.1: Interventions carried out in NICUs and SCBUs

Table 10.13: Morbidity in institutions with NICU and SCBU

Reason for admission	NICU / SCBU *		SCBU		Total	
	No.	%	No.	%	No.	%
Total tickets reviewed	1761		1169		2930	
Birth Asphyxia	105	6.0	32	2.7	137	4.7
Meconium aspiration	90	5.1	26	2.2	116	4.0
Septicaemia	318	18.1	189	16.2	507	17.3
Hypoglycaemia	94	5.3	72	6.2	166	5.7
Jaundice	352	20.0	226	19.3	578	19.7
IRDS	212	12.0	40	3.4	252	8.6
Congenital Pneumonia	33	1.9	19	1.6	52	1.8
Meningitis	49	2.8	31	2.7	80	2.7
PPHN	12	0.7	1	0.1	13	0.4
IVH/PVH	7	0.4	1	0.1	8	0.3
NEC	29	1.6	12	1.0	41	1.4
Other	630	35.8	404	34.6	1034	35.3

*Data not available from two teaching hospitals

Table 10.13 shows that Jaundice and septicaemia are the two conditions for which neonates have been admitted for special care. It is also seen that the admissions to the two types of facilities are similar except for a few morbidities. IRDS is the main condition for which there is an excess of admissions to NICUs, birth asphyxia, meconium aspiration and septicaemia being the other conditions where there is a clear increase in admissions to NICUs. The pattern observed is mainly to be influenced by the fact that data was not available from two apex institutions.

The interventions carried out in SCBUs and NICUs were collected during the four week prospective data collection. Table 10.14 describes this information.

The table 10.14 shows that ventilation, nasal CPAP and cardiopulmonary resuscitation is commoner in the NICUs compared to the SCBUs. The use of surfactant, inotropes, anticonvulsants and blood products are more in the NICUs and these reflect the morbidity as well as facilities available in these.

Table 10.14: Interventions carried out in NICU and SCBU

Intervention	NICU / SCBU		SCBU		Total	
	No.	%	No.	%	No.	%
Ventilation	132	7.5	26	2.2	158	5.4
Nasal CPAP	100	5.7	15	1.3	115	3.9
Cardio-pulmonary resuscitation	120	6.8	43	3.7	163	5.6
Use of phototherapy in the first 24 hours	38	2.2	49	4.2	87	3.0
Exchange transfusion	11	0.6	4	0.3	15	0.5
Any surgery	16	0.9	6	0.5	22	0.8
Surfactant administration	42	2.4	6	0.5	48	1.6
Use of any inotropes	154	8.7	9	0.8	163	5.6
Use of anticonvulsants	107	6.1	36	3.1	143	4.9
Use of therapeutic intravenous antibiotics	954	54.2	635	54.3	1589	54.2
Use of steroids to treat refractory hypoglycaemia	10	0.6	13	1.1	23	0.8
Use of Glycogen	3	0.2	1	0.1	4	0.1
Use of 12.5% Dextrose	56	3.2	97	8.3	153	5.2
Use of any blood products	155	8.8	46	3.9	201	6.9
Use of UAC, UVC, Arterial/Long lines	105	6.0	24	2.1	129	4.4
Other	183	10.4	120	10.3	303	10.3

*Data not available from two teaching hospitals

10.4.2: Selected care Practices in the Neonatal Units

Tables 10.15 – 10.18 indicate the extent of use of some of the routine but important practices in neonatal care by district.

Use of the Neonatal Examination Format

Neonatal Examination Format (H1162) is the Bed Head Ticket of the new-born. At birth, irrespective of the place of birth (labour room / operating theatre) a Newborn Examination Format is initiated and is attached to the mother's BHT. Details of the new-

born related to the birth and the events surrounding the birth, a brief obstetric history, and details of resuscitation if relevant, new-born examination findings, findings of observation of breastfeeding, a discharge check list and a follow up plan if relevant is included in it.

It is mandatory that all the new-borns are examined by a Medical Officer prior to discharge from the hospital and recorded in the Neonatal Examination Format and the Child Health Development Record. Instances when abnormalities are detected necessary referral/action will be taken.

Table10.15: Use of Neonatal Examination Formats by the type of hospitals in the districts

District	TH	PGH	DGH	BH		
Monaragala						
Badulla						
Batticaloa						
Ampara						
Kalmunai						
Trincomalee						
Mannar						
Vavuniya						
Killinochchi						
Jaffna						
Mullativu						
Ratnapura						
Kegalle						
Kurunegala						
Puttalam						
Kandy						
Matale						
Nuwara Eliya						
Matara						
Hambantota						
Galle						
Polonnaruwa						
Anuradhapura						
Gampaha						
Colombo						
Kalutara						
	Not Applicable	>90%	50-89%	25-49%	<25%	NR

It is seen that there is satisfactory use of the Neonatal Examination Format in all Teaching Hospitals other than in TH Jaffna. Use of the format is low in the PGHs except in the Ratnapura district. It is noted that in the majority of the DGHs use of the format was satisfactory compared to the other type of

institutions while use was low in the majority of Base Hospitals. Overall, usage of the Neonatal Examination Format appears unsatisfactory. The survey did not explore the reasons for low use and these needs to be inquired into.

Neonatal examination prior to discharge

Table 10.16: Hospitals practicing Neonatal Examination before discharge by the type of hospital in the districts

District	TH	PGH	DGH	BH
Monaragala				
Badulla				
Batticaloa				
Ampara				
Kalmunai				
Trincomalee				
Mannar				
Vavuniya				
Killinochchi				
Jaffna				
Mullativu				
Ratnapura				
Kegalle				
Kurunegala				
Puttalam				
Kandy				
Matale				
Nuwara Eliya				
Matara				
Hambantota				
Galle				
Polonnaruwa				
Anuradhapura				
Gampaha				
Colombo				
Kalutara				

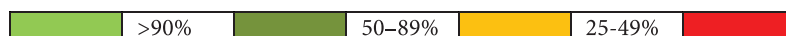
NA	>90%	50-89%	25-49%	<25%	NR
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This practice is very satisfactory in hospitals in almost all the districts in the country.

Table 10.17 describes the proportion of institutions within the different types of institutions having positive practices.

Table 10.17: Use of new born formats, neonatal follow up and selected care practices at transfer by type of hospital

	Type of Institution			
	Teaching Hospitals	Provincial General Hospitals	District General Hospitals	Base Hospitals
Record keeping				
Use the neonatal examination format				
Use NICU/SCBU history record sheet				
Neonatal follow up				
Neonatal examination by MO before discharge				
Referrals for the necessary conditions (eye, ENT)				
Clinic follow up plan				
Use neonatal transfer forms				
Practices in transferring newborns				
Ensure service availability at receiving end				
Inform the receiving end				
Accompanied by a responsible person				



The neonatal follow up practices and the practices related to transfer of new-borns are satisfactory in the all types of institutions.

Readiness for neonatal resuscitation

The neonatal resuscitation trolley, its availability and its contents were used as a proxy for measuring of readiness for neonatal resuscitation. This was assessed for each institution and is summarized and presented by type of hospital and by institutions having SCBUs and NICUs in table 10.20.

Table 10.18: Readiness for neonatal resuscitation by the type of hospital and NICUs and SCBUs

	THs and PGHs		DGHs		BHs (Functioning)		Institutions with NICUs and SCBUs		Institutions with SCBUs	
	No	%	No	%	No	%	No	%	No	%
NEONATAL RESUSCITATION TROLLEY	n=17		n=17		n=26		n=29		n= 29	
Neonatal Ambu (ventilatory) bag (250ml) with reservoir and O2 masks	17	100.0	16	94.1	24	92.3	29	100.0	29	100.0
Infant laryngoscope with spare bulb & batteries/Straight blade	17	100.0	16	94.1	21	80.8	29	100.0	27	93.1
Endotracheal tubes- 2.5, 3.0, 3.5 with introducer stilette	16	94.1	16	94.1	23	88.5	28	96.6	29	100.0
Straight suction catheter with thumb port- FG 5,6,8,10	11	64.7	9	52.9	14	53.8	18	62.1	19	65.5
Feeding tube – 5,6,7,8,	17	100.0	15	88.2	22	84.6	28	96.6	27	93.1
Emergency tray with					0	0.0				
syringes 1,2,5,10 ml	16	94.1	16	94.1	25	96.2	27	93.1	29	100.0
Cannula 23,25 G	16	94.1	12	70.6	18	69.2	25	86.2	20	69.0
Umbilical catheterization pack	9	52.9	7	41.2	9	34.6	15	51.7	11	37.9
Blood sample bottles, culture bottles	15	88.2	13	76.5	20	76.9	27	93.1	22	75.9
Drugs					0	0.0				
Adrenaline	17	100.0	16	94.1	25	96.2	29	100.0	29	100.0
Nalaxone	12	70.6	11	64.7	12	46.2	19	65.5	18	62.1
N.Saline	16	94.1	16	94.1	25	96.2	28	96.6	29	100.0
8.4% Na HCO3	16	94.1	16	94.1	24	92.3	27	93.1	29	100.0
10% dextrose	12	70.6	11	64.7	17	65.4	21	72.4	20	69.0
Distilled water	16	94.1	16	94.1	25	96.2	28	96.6	29	100.0

Table 10.18 shows that readiness for neonatal resuscitation as shown by the availability of equipment and drugs that should be available on the neonatal resuscitation trolley needs to be improved in all levels of institutions. The proportion of institutions with facilities is seen to decrease from TH & PGH to Base Hospitals.

10.5 Infrastructure facilities

Incubators and ventilators

The incubator and ventilator are two pieces of equipment that are essential for specialized neonatal care. The availability of incubators and ventilators and their utilization are presented in tables 10.19 and 10.20 for NICU and SCBU respectively. The number of deliveries requiring NICU care was estimated as 3% of deliveries.

Table 10.19: Estimated number of patients per ventilator and incubator by district

Province/ District	Total reported deliveries in Gov. Hospitals (2011)	Total reported deliveries for one month in Gov. Hospitals (2011)	Estimated No of deliveries requiring NICU care/month	Total No of ventilators in the Hospitals in the District	Total No of NICU patients per ventilator/month	Total No of incubators in the Hospitals in the District	Total No of NICU patients per incubator/month
Western	86022	7169	215	33	7	121	2
Colombo	45251	3771	113	19	6	65	2
Gampaha	24055	2005	60	8	8	23	3
Kalutara	16716	1393	42	6	7	33	1
Central	48585	4049	121	12	10	59	2
Kandy	27199	2267	68	10	7	36	2
Matale	10415	868	26	1	26	17	2
Nuwara Eliya	10971	914	27	1	27	6	5
Southern	41446	3454	104	16	6	46	2
Galle	18911	1576	47	12	4	22	2
Matara	13097	1091	33	3	11	11	3
Hambanthota	9438	787	24	1	24	13	2
Northern	17196	1433	43	9	5	21	2
Jaffna	8800	733	22	3	7	6	4
Killinochchi	2390	199	6	1	6	4	1
Mannar	1474	123	4	0		1	4
Vavuniya	3961	330	10	5	2	10	1
Mullativu	571	48	1	0			
Eastern	32304	2692	81	13	6	57	1
Batticaloa	9102	759	23	4	6	18	1
Ampara	5467	456	14	3	5	10	1
Kalmunai	9653	804	24	5	5	19	1
Trincomalee	8082	674	20	2	10	8	3
North Western	39804	3317	100	9	11	40	2
Kurunegala	25280	2107	63	7	9	30	2
Puttalam	14524	1210	36	2	18	10	4
North Central	23414	1951	59	3	20	38	2
Anuradhapura	15874	1323	40	1	40	22	2
Polonnaruwa	7540	628	19	2	9	16	1
Uva	23872	1989	60	5	12	16	4
Badulla	16620	1385	42	4	10	10	4
Monaragala	7252	604	18	1	18	6	3
Sabaragamuwa	30741	2562	77	8	10	46	2
Rathnapura	20165	1680	50	6	8	28	2
Kegalle	10576	881	26	2	13	18	1
Sri Lanka	343384	28615	858	108	8	444	2

Table 10.19 shows that on average there are 2 patients per incubator per month when the whole country is considered. However, this figure varies from 5 per incubator per month to 1 in many of the districts.

There are 8 NICU patients per ventilator in the country. The number varies from 40 patients per ventilator in Anuradhapura to 2 in Vavuniya.

Table 10.20: Availability of incubators for estimated number of SCBU patients

Province/District	Total reported deliveries in Gov. Hospitals (2011)	Total reported deliveries for one month in Gov. Hospitals (2011)	Estimated No of deliveries requiring SCBU care/month	Total No of incubators in the Hospitals in the District	Total No of SCBU patients per incubator /month
Western	86022	7169	1075	121	9
Colombo	45251	3771	566	65	9
Gampaha	24055	2005	301	23	13
Kalutara	16716	1393	209	33	6
Central	48585	4049	607	59	10
Kandy	27199	2267	340	36	9
Matale	10415	868	130	17	8
Nuwara Eliya	10971	914	137	6	23
Southern	41446	3454	518	46	11
Galle	18911	1576	236	22	11
Matara	13097	1091	164	11	15
Hambanthota	9438	787	118	13	9
Northern	17196	1433	215	21	10
Jaffna	8800	733	110	6	18
Killinochchi	2390	199	30	4	7
Mannar	1474	123	18	1	18
Vavuniya	3961	330	50	10	5
Mullativu	571	48	7		
Eastern	32304	2692	404	57	7
Batticaloa	9102	759	114	18	6
Ampara	5467	456	68	10	7
Kalmunai	9653	804	121	19	6
Trincomalee	8082	674	101	8	13
North Western	39804	3317	498	40	12
Kurunegala	25280	2107	316	30	11
Puttalam	14524	1210	182	10	18
North Central	23414	1951	293	38	8
Anuradhapura	15874	1323	198	22	9
Polonnaruwa	7540	628	94	16	6
Uva	23872	1989	298	16	19
Badulla	16620	1385	208	10	21
Monaragala	7252	604	91	6	15
Sabaragamuwa	30741	2562	384	46	8
Rathnapura	20165	1680	252	28	9
Kegalle	10576	881	132	18	7
Sri Lanka	343384	28615	4292	444	10

Table 10.20 show the average number of births per month per incubator in SCBUs by district. The adequacy of the incubators and ventilators cannot be commented upon since this would depend on the type of morbidities encountered in each level of institution. The tables 10.19 and 10.20 highlight the variation in resources between districts and highlight the need to develop norms for equipment based on patient load and type of institution. The data gathered will be useful in this process.

Facilities for infection control

All SCBUs and NICUs should have infrastructure facilities for infection control. The availability of these facilities by the type of hospital and NICUs and SCBUs are presented in table 10.21

Facilities for infection control and the infection control practices are observed to be better in THs and PGHs as opposed to the DGHs and BHs. Across all types of hospitals the isolation facilities, disposable towels, hand washing facilities and availability of hand rub solutions needs improvement.

Registers, formats and management protocols

Availability of protocols for the management of common neonatal problems hypoglycaemia, birth asphyxia, septic baby, meconium aspiration syndrome, persistent pulmonary HT and IRDS, the registers that should be available in the units and printed formats that are necessary for the documentation of selected activities of the unit were inquired into. The findings are presented by type of institution in table 10.22.

Table 10.21: Availability of facilities for infection control by the type of hospital and NICUs and SCBUs

	THs and PGHs		DGHs		BHs (Functioning)		Institutions with NICUs and SCBUs		Institutions with SCBUs	
	No	%	No	%	No	%	No	%	No	%
FACILITIES FOR INFECTION PREVENTION	n=17		n=17		n=26		n=29		n= 29	
Soap	17	100.0	15	88.2	25	96.2	29	100.0	28	96.6
Elbow taps	13	76.5	13	76.5	15	57.7	25	86.2	19	65.5
Running water	17	100.0	16	94.1	24	92.3	29	100.0	28	96.6
Hand rub solutions	15	88.2	16	94.1	17	65.4	27	93.1	22	75.9
Gloves	15	88.2	12	70.6	22	84.6	25	86.2	25	86.2
Isolation facilities	10	58.8	5	29.4	13	50.0	14	48.3	14	48.3
Disposable towels (single use)	12	70.6	10	58.8	12	46.2	20	69.0	15	51.7
Hand washing facility available at the entrance	11	64.7	9	52.9	13	50.0	19	65.5	13	44.8
A hand rub solution bottle per each section	12	70.6	16	94.1	13	50.0	27	93.1	18	62.1
The hand washing/ hand rub practice satisfactory	16	94.1	11	64.7	16	61.5	24	82.8	20	69.0

Table 10.22: Availability of registers, formats and management protocols by type of institution

	THs and PGHs		DGHs		BHs (Functioning)		Institutions with NICUs and SCBUs		Institutions with SCBUs	
	No	%	No	%	No	%	No	%	No	%
Registers and Formats	n=17		n=17		n=26		n=29		n= 29	
NICU/SCBU register	15	88.2	12	70.6	19	73.1	22	75.9	26	89.7
Neonatal transfer form	15	88.2	13	76.5	19	73.1	24	82.8	23	79.3
Neonatal diagnosis card	15	88.2	12	70.6	19	73.1	24	82.8	24	82.8
Neonatal monthly return	12	70.6	8	47.1	12	46.2	16	55.2	16	55.2
Discharge register	15	88.2	11	64.7	22	84.6	22	75.9	25	86.2
Death register	16	94.1	12	70.6	21	80.8	26	89.7	25	86.2
Statistics file	15	88.2	9	52.9	13	50.0	23	79.3	17	58.6
Correspondence Book/ File	12	70.6	7	41.2	11	42.3	19	65.5	13	44.8
Perinatal conference minutes file	7	41.2	4	23.5	7	26.9	10	34.5	9	31.0
Neonatal Drug Doses Book	17	100.0	15	88.2	18	69.2	29	100.0	23	79.3
Management Protocols										
Hypoglycaemia	8	47.1	4	23.5	11	42.3	13	44.8	11	37.9
Birth asphyxia	7	41.2	5	29.4	11	42.3	13	44.8	11	37.9
Septic baby	6	35.3	3	17.6	10	38.5	12	41.4	10	34.5
Meconium Aspiration Syndrome	7	41.2	3	17.6	9	34.6	12	41.4	9	31.0
Persistent pulmonary HT	6	35.3	2	11.8	7	26.9	11	37.9	7	24.1
IRDS	7	41.2	2	11.8	8	30.8	11	37.9	8	27.6

The availability of management protocols are seen to be poor across all types of institutions. The availability varied from 35%-47% for the different protocols in TH/PGH type of institutions. The availability of these were particularly poor in DGHs, varying from 12%-29% according to type of protocol while in the BHs the variation was from 27%-42%. The availability of protocols was in general lower in institutions with SCBUs only compared to those with NICU and SCBU.

The perinatal conference files were available in 41% of TH/PGH, 24% DGH and 27% in BH suggesting that the activity may not be a regular occurrence in a majority of institutions irrespective of type of institution.

10.6 Essential drugs

The availability of essential drugs according to the type of hospital and NICUs and SCBUs are presented in table 10.23.

It is seen that the availability of most drugs are satisfactory in all types of institutions. Availability of 10% dextrose varied from 59% in DGHs to 65% in TH/PGH type of institution while the availability of nebulisation solutions varied from 69% in BHs to 59% in TH/PGHs. Digoxin availability decreased with type of institution varying from 65% in TH/PGHs to 39% in BHs, probably a reflection of the types of morbidities encountered. Sildenafil was available in only 2 of the TH/PGH but were also available in 2 each of the DGHs and BHs. Glucagon was available 3 TH/PGH, 1 DGH and 2BH. Surfactant could be purchased locally only in 41% of TH/PGHs, 35% of DGHs and 27% of BHs. It appears that the types of morbidities and level of management that can be implemented by the different types of institutions need to be defined and drugs and equipment necessary for the functions be identified.

Table 10.23: Availability of essential drugs according to the type of hospital and NICUs and SCBUs

	THs and PGHs		DGHs		BHs (Functioning)		Institutions with NICUs and SCBUs		Institutions with SCBUs	
	No	%	No	%	No	%	No	%	No	%
Drugs available in the NICU/SCBU	n=17		n=17		n=26		n=29		n= 29	
Gentamycin	17	100.0	16	94.1	25	96.2	29	100.0	29	100.0
3G Cephalosporins	15	88.2	8	47.1	20	76.9	21	72.4	21	72.4
Metronidazole	17	100.0	16	94.1	24	92.3	29	100.0	28	96.6
Cloxacillin (PO/IV)	17	100.0	16	94.1	24	92.3	28	96.6	27	93.1
Aminophillin	17	100.0	16	94.1	25	96.2	29	100.0	29	100.0
Adrenaline	17	100.0	16	94.1	25	96.2	29	100.0	29	100.0
Frusemide	17	100.0	16	94.1	24	92.3	29	100.0	28	96.6
5% Dextroxe	16	94.1	16	94.1	24	92.3	29	100.0	28	96.6
10%Dextroxe	11	64.7	10	58.8	16	61.5	19	65.5	19	65.5
Nebulisation solutions - Ipravent	10	58.8	11	64.7	18	69.2	17	58.6	21	72.4
Hydrocortizone	17	100.0	16	94.1	25	96.2	29	100.0	29	100.0
Dexamethazone	17	100.0	16	94.1	20	76.9	28	96.6	25	86.2
Dopamin	17	100.0	14	82.4	19	73.1	29	100.0	22	75.9
Dobutamin	17	100.0	13	76.5	19	73.1	28	96.6	21	72.4
Digoxine	11	64.7	10	58.8	10	38.5	19	65.5	13	44.8
Phenobarbitone (PO)	16	94.1	16	94.1	21	80.8	27	93.1	26	89.7
Phenobarbitone (IV)	16	94.1	16	94.1	23	88.5	29	100.0	27	93.1
MgSO4	14	82.4	11	64.7	11	42.3	22	75.9	13	44.8
Sildenafil	2	11.8	2	11.8	2	7.7	5	17.2	1	3.4
Glucagon	3	17.6	1	5.9	2	7.7	4	13.8	3	10.3
NaHCO3	17	100.0	16	94.1	23	88.5	29	100.0	28	96.6
KCl	17	100.0	16	94.1	23	88.5	29	100.0	29	100.0
Having a surfactant vial in stock	13	76.5	12	70.6	11	42.3	24	82.8	21	72.4
Ability to local purchase surfactant	7	41.2	6	35.3	7	26.9	14	48.3	7	24.1

10.7 Human Resource for Neonatal Care

10.7.1 Workload

Neonatal Care is provided by specialist neonatologist or specialist paediatricians, medical officers in the NICU/SCBU and the nursing officers in the NICU/SCBU. Specialist neonatologists are available in a few stations and in the others, specialist paediatricians are appointed to the post of neonatologist. In the hospitals without carder position for a neonatologist, the specialist paediatricians in the hospitals provide services for the neonates as well. For the specialist

neonatologists and the specialist paediatricians in neonatologists positions, in their absence covering up is done by other specialist paediatricians in the hospital.

With regard to medical officers, most of the hospitals have designated medical officers for the NICU/SCBU. In the hospitals without designated officers, the medical officers attached to the Paediatric Wards carry out the functions of the MO NICU/SCBU. The tables 10.24 – 10.26 demonstrate the human resource availability at TH & PGH, DGH and BH levels respectively.

Table 10.24: Distribution of Consultants and MOs in NICU and SCBU - TH and PGH

Province/ District	Teaching and Provincial General Hospitals					
	No of THs and PGHs in the District/Province	No of NICU and SCBUs available	No of SCBUs available	No of Consultant Neonatologists available	No of Consultant Paediatricians in Neonatologists positions available	Units with 6 or more MO NICU
	No	No	No	No	No	No
Western	5	6	0	2	5	6
Colombo	4	4	0	2	4	4
Gampaha	1	2	0	0	1	2
Kalutara	0	0	0	0	0	0
Central	4	3	1	1	4	3
Kandy	4	3	1	1	4	3
Matale	0	0	0	0	0	0
Nuwara Eliya	0	0	0	0	0	0
Southern	2	2	0	1	1	2
Galle	2	2	0	1	1	2
Matara	0	0	0	0	0	0
Hambanthota	0	0	0	0	0	0
Northern	1	1	0	0	0	1
Jaffna	1	1	0	0	0	1
Killinochchi	0	0	0	0	0	0
Mannar	0	0	0	0	0	0
Vavuniya	0	0	0	0	0	0
Mullativu	0	0	0	0	0	0
Eastern	1	1	0	0	0	0
Batticaloa	1	1	0	0	0	0
Ampara	0	0	0	0	0	0
Kalmunai	0	0	0	0	0	0
Trincomalee	0	0	0	0	0	0
North Western	1	1	0	0	1	1
Kurunegala	1	1	0	0	1	1
Puttalam	0	0	0	0	0	0
North Central	1	1	0	0	1	1
Anuradhapura	1	1	0	0	1	1
Polonnaruwa	0	0	0	0	0	0
Uva	1	1	0	0	1	1
Badulla	1	1	0	0	1	1
Monaragala	0	0	0	0	0	0
Sabaragamuwa	1	1	0	0	1	1
Rathnapura	1	1	0	0	1	1
Kegalle	0	0	0	0	0	0
Sri Lanka	17	17	1	4	14	15

specialist neonatologists are stationed at 4 NICUs at CSHW, DMH, TH Kandy and TH Mahamodara. Other NICUs in THs and PGHs are manned by specialist paediatricians designated as neonatologists. TH Jaffna and TH Batticaloa did not have designated

position for neonatologists though they have NICUs. It is important to note that out of 17 TH only 15 had 6 or more MOs, the minimum cadre required to provide uninterrupted services.

Table 10.25: Distribution of Consultants and MOs in SCBU by district in the DGHs

Province/ District	District General Hospitals							
	No of DGHs in the District/Province	No of NICU and SCBUs available	No of SCBUs available	No of Consultant Paediatricians in Neonatologists positions available	Stations with 2 Consultant Paediatricians	Stations with 1 Consultant Paediatricians	Stations with 6 or more MO NICU	Stations with 3-5 MO NICU/SCBU
	No	No	No	No	No	No	No	No
Western	3	2	0	2	1	0	3	0
Colombo	0	0	0	0	0	0	0	0
Gampaha	2	1	0	1	1	0	2	0
Kalutara	1	1	0	1	0	0	1	0
Central	3	1	2	0	3	0	1	1
Kandy	1	1	0	0	1	0	0	1
Matale	1	0	1	0	1	0	1	0
Nuwara Eliya	1	0	1	0	1	0	0	0
Southern	2	2	0	1	1	0	1	1
Galle	0	0	0	0	0	0	0	0
Matara	1	1	0	1	0	0	1	0
Hambanthota	1	1	0	0	1	0	0	1
Northern	4	1	2	0	1	2	0	1
Jaffna	0	0	0	0	0	0	0	0
Killinochchi	1	0	1	0	0	0	0	0
Mannar	1	0	1	0	0	1	0	1
Vavuniya	1	1	0	0	1	0	0	0
Mullativu	1	0	0	0	0	1	0	0
Eastern	2	2	0	0	2	0	0	2
Batticaloa	0	0	0	0	0	0	0	0
Ampara	1	1	0	0	1	0	0	1
Kalmunai	0	0	0	0	0	0	0	0
Trincomalee	1	1	0	0	1	0	0	1
North Western	1	1	0	0	1	0	1	0
Kurunegala	0	0	0	0	0	0	0	0
Puttalam	1	1	0	0	1	0	1	0
North Central	1	1	0	1	0	0	0	1
Anuradhapura	0	0	0	0	0	0	0	0
Polonnaruwa	1	1	0	1	0	0	0	1
Uva	1	0	1	0	1	0	0	1
Badulla	0	0	0	0	0	0	0	0
Monaragala	1	0	1	0	1	0	0	1
Sabaragamuwa	1	1	0	1	0	0	0	1
Rathnapura	0	0	0	0	0	0	0	0
Kegalle	1	1	0	1	0	0	0	1
Sri Lanka	15	11	6	6	10	2	6	8

In the NICU/SCBUs in the DGHs 6 of them (Nawalapitiya, Hambantota, Vavuniya, Ampara, Trincomalee, and Puttalam) do not have designated

neonatologists or designated paediatricians. In the 15 DGHs with NICU/SCBU, only 6 hospitals have 6 or more MOs.

Table 10.26: Distribution of Consultants and MOs in SCBU by district in the BHs

Province	Province/District	Base Hospitals							
		No of BHs in the District/Province	No of BHs recently upgraded	No of NICU and SCBUs available	No of SCBUs available	Stations with 2 Consultant Paediatricians	Stations with 1 Consultant Paediatricians	Stations with no Consultant Paediatricians	Stations with 3 -5 MO NICU/SCBU
		No	No	No	No		No	No	No
Western Province		9	4	0	5	5	1	3	4
	Colombo	3	1	0	2	2	1	0	1
	Gampaha	3	2	0	1	1	0	2	1
	Kalutara	3	1	0	2	2	0	1	2
Central Province		4	1	0	1	0	3	2	0
	Kandy	1	1	0	0	0	0	1	0
	Matale	2	1	0	1	0	1	1	0
	Nuwara Eliya	2	0	0	0	0	2	0	0
Southern Province		7	4	0	4	0	6	0	2
	Galle	2	1	0	1	0	2	0	1
	Matara	2	1	0	1	0	2	0	1
	Hambanthota	3	2	0	2	0	2	0	0
Northern Province		6	4	0	1	0	3	3	0
	Jaffna	4	2	0	0	0	3	1	0
	Killinochchi	1	1	0	0	0	0	1	0
	Mannar	0	0	0	0	0	0	0	0
	Vavuniya	1	1	0	1	0	0	1	0
	Mullativu	0	0	0	0	0	0	0	0
Eastern Province		12	4	1	3	0	5	7	1
	Batticaloa	2	2	0	0	0	0	2	0
	Ampara	2	1	0	0	0	1	1	0
	Kalmunai	5	1	1	2	0	3	2	1
	Trincomalee	3	0	0	1	0	1	2	0
North Western Province		7	2	0	5	1	4	2	0
	Kurunegala	5	2	0	3	1	2	2	0
	Puttalam	2	0	0	2	0	2	0	0
North Central Province		5	3	0	1	0	2	3	0
	Anuradhapura	3	2	0	1	0	1	2	0
	Polonnaruwa	2	1	0	0	0	1	1	0
Uva Province		6	4	0	2	0	2	4	0
	Badulla	3	1	0	2	0	2	1	0
	Monaragala	3	3	0	0	0	0	3	0
Sabaragamuwa Province		7	2	1	4	0	6	1	0
	Rathnapura	4	1	1	2	0	3	1	0
	Kegalle	3	1	0	2	0	3	0	0
Sri Lanka		63	28	2	26	6	26	25	7

Only Embilipitiya and Kalmunai BHs have NICU but do not have designated Paediatricians as Neonatologists.

Table 10.27: Workload of specialists and MOs for deliveries and caesarean sections by district/province

Province	District	Total Registered Births	Total reported deliveries in Gov. Hospitals (2011)	Total No of Caesarean Sections in Govt Hospitals	No of Neonatologists/Pediatricians in Neonatal Care	No of deliveries per Neonatologist/Paediatrician in Neonatal Care	No of cesarean sections per Neonatologist/Paediatrician in Neonatal Care	No of MO NICU/SCBU and MO Paediatrics	No of deliveries per MO NICU/SCBU and MO Paediatrics	No of cesarean sections per MO NICU/SCBU and MO Paediatrics
		No	No							
Western province		99292	86022	6417	32	2688	201	125	688	51
	Colombo	54888	45251	3006	16	2828	188	69	656	44
	Gampaha	27457	24055	1960	10	2406	196	37	650	53
	Kalutara	16947	16716	1451	6	2786	242	19	880	76
Central province		50196	48585	3523	16	3037	220	43	1130	82
	Kandy	29331	27199	2262	9	3022	251	35	777	65
	Matale	10465	10415	806	3	3472	269	6	1736	134
	Nuwara eliya	10400	10971	455	4	2743	114	2	5486	228
Southern province		42196	41446	2930	13	3188	225	39	1063	75
	Galle	20838	18911	897	5	3782	179	17	1112	53
	Matara	12268	13097	1333	4	3274	333	15	873	89
	Hambanthota	9090	9438	700	4	2360	175	7	1348	100
Nothern province		20016	17196	790	9	1911	88	9	1911	88
	Jaffna	9949	8800	588	5	1760	118	6	1467	98
	killinochchi	3319	2390	34	0			0		
	Mannar	1482	1474	92	1	1474	92	3	491	31
	Vavuniya	4190	3961	74	2	1981	37	0		
	Mullativu	1076	571	2	1	571	2	0		
Eastern province		33147	32304	1679	11	2937	153	16	2019	105
	Batticaloa	9743	9102	518	2	4551	259	4	2276	130
	Ampara	14371	5467	324	3	1822	108	4	1367	81
	Kalmunai		9653	509	3	3218	170	4	2413	127
	Trincomalee	9033	8082	328	3	2694	109	4	2021	82
North Western province		39885	39804	2959	10	3980	296	18	2211	164
	Kurunegala	25428	25280	1924	6	4213	321	11	2298	175
	Puttalam	14457	14524	1035	4	3631	259	7	2075	148
North Central province		23353	23414	1400	6	3902	233	12	1951	117
	Anuradhapura	15855	15874	915	3	5291	305	7	2268	131
	Polonnaruwa	7498	7540	485	3	2513	162	5	1508	97
Uva province		23680	23872	1320	6	3979	220	29	823	46
	Badulla	16548	16620	992	4	4155	248	24	693	41
	Monaragala	7132	7252	328	2	3626	164	5	1450	66
Sabaragamuwa province		31650	30741	2636	10	3074	264	14	2196	188
	Rathnapura	21260	20165	1558	5	4033	312	10	2017	156
	Kegalle	10390	10576	1078	5	2115	216	4	2644	270
Sri Lanka		363415	343384	23654	107	3209	221	305	1126	78

** Only the specialist paediatricians holding position of Neonatologist, specialist paediatricians covering up for neonatologist and in hospitals without Neonatologist the specialist paediatricians providing neonatal care are included in this calculation.

Workload of medical personnel providing neonatal care for deliveries and caesarean sections

The workload of specialist and MOs for deliveries and caesarean sections by district/province are presented in table 10.27 below.

Table 10.27 highlights the wide variation seen between districts in respect of the workload of consultants and medical officers providing care for neonates. The workload in respect of caesarean sections is partly a function of the variability observed in the caesarean section rates seen between districts.

Workload of medical personnel providing care for neonates needing special care

The distribution of workload of specialists, MOs and NOs for the care of Neonates requiring Special Care by district/province is presented in table 10.28.

Table 10.28 highlights the wide variation seen between districts for the different categories of staff providing care for sick neonates. The table highlights the need to develop staffing norms based on work load as well as type and hierarchy of institutions and the type of morbidities dealt with.

Table 10.28: Distribution of workload of specialists MOs and NOs for the care of neonates requiring special care by district/province

Province/District	Estimated number of newborns needing Special Care (15% Of births)/month	No of Consultant Neonatologists and Paediatricians	NICU/SCBU admission per Neonatologist/Paediatrician/month	No of MO NICU/SCBU	NICU/SCBU admission per MO NICU/SCBU/month	No of nurses at NICU/SCBU	NICU/SCBU admission per NICU/SCBU Nursing Officer/month
Western	1241	32	39	125	10	330	4
Colombo	686	16	43	69	10	194	4
Gampaha	343	10	34	37	9	80	4
Kalutara	212	6	35	19	11	56	4
Central	627	16	39	43	15	145	4
Kandy	367	9	41	35	10	118	3
Matale	131	3	44	6	22	16	8
Nuwara eliya	130	4	33	2	65	11	12
Southern	527	13	41	39	14	126	4
Galle	260	5	52	17	15	73	4
Matara	153	4	38	15	10	28	5
Hambanthota	114	4	29	7	16	25	5
Northern	250	9	28	9	28	27	9
Jaffna	124	5	25	6	21	10	12
Killinochchi	41	0		0		5	8
Mannar	19	1	19	3	6	2	10
Vavuniya	52	2	26	0		10	5
Mullativu	13	1	13	0		0	
Eastern	414	11	38	16	26	71	6
Batticaloa	122	2	61	4	31	15	8
Ampara	180	3	60	4	45	16	11
Kalmuani	0	3	0	4	0	28	0
Trincomalee	113	3	38	4	28	12	9
North Western	499	10	50	18	28	48	10
Kurunegala	318	6	53	11	29	27	12
Puttalam	181	4	45	7	26	21	9
North Central	292	6	49	12	24	32	9
Anuradhapura	198	3	66	7	28	20	10
Polonnaruwa	94	3	31	5	19	12	8
Uva	296	6	49	29	10	59	5
Badulla	207	4	52	24	9	42	5
Monaragala	89	2	45	5	18	17	5
Sabaragamuwa	396	10	40	14	28	119	3
Rathnapura	266	5	53	10	27	77	3
Kegalle	130	5	26	4	33	42	3
Sri Lanka	4543	107	42	305	15	957	5

 Not applicable

10.7.2 Selected aspect of knowledge among MOs and NOs working in NICUs and SCBUs

An assessment of selected aspects of knowledge was carried out in a sample of medical and nursing officers working in SCBUs and NICUs. A self-administered instrument was developed by a panel of experts and was pre tested prior to field application.

All first contact care medical officers and nursing officers present on the day of data collection in these units were administered the tools. The findings are summarised in this section, tables 10.29-10.32. Details of responses given are presented in annex IV and may be used to identify particular areas within a section that needs improvement.

Table 10.29: Selected aspect of knowledge among NOs working in NICU and SCBU

Knowledge area	Nursing Officers (N=235)	
	Frequency *	Percentage *
Infection control		
<50	1	0.4
50-79	15	6.4
80-100	219	93.2
Cord care		
<50	19	8.1
50-79	78	33.2
80-100	138	58.7
Thermal regulation		
<50	5	2.1
50-79	56	23.8
80-100	174	74.0
Breast feeding		
<50	4	1.7
50-79	70	29.8
80-100	161	68.5
Care for sick newborn		
<50	28	11.9
50-79	123	52.3
80-100	84	35.7
Initiation of breathing and resuscitation		
<50	10	4.3
50-79	208	88.5
80-100	17	7.2
Birth Asphyxia		
<50	28	11.9
50-79	153	65.1
80-100	54	23.0
BCG and eye care		
<50	144	61.3
50-79	75	31.9
80-100	16	6.8
Management of mild newborn illnesses		
<50	9	3.8
50-79	84	35.7
80-100	142	60.4
Care for preterm and LBW babies		
<50	9	3.8
50-79	84	35.7
80-100	142	60.4

It is important to note that a significant number of nursing officers had poor knowledge (less than 50% marks) on cord care (8%), care of the sick new born (12%), birth asphyxia (12%) and BCG and eye care (61%). It is of concern that nearly 30% have average knowledge on breast feeding. Nearly 36% demonstrated average knowledge in the areas of management of mild newborn illness and care for preterm and LBW babies.

Table 10.30 is a summary of marks obtained by the nursing officers for the different sections of the questionnaire. The fact that there were NOS who did not get a single correct answer in 6 of the 10 areas in which knowledge was tested is of concern. The minimum mark was low in all areas other than on infection control. BCG and eye care, breathing and resuscitation and birth asphyxia are areas with low means. Improvement of knowledge in the latter two areas appears particularly important considering the pattern of morbidity reported from SCBUs and NICUs.

Table 10.30: Summary of marks obtained by NOs on the knowledge questionnaire

	Infection control	Cord care	Thermal regulation	Breast feeding	Care for a sick newborn	breathing and resuscitation	Birth asphyxia	BCG and eye care	Management of new born illnesses	Care for preterm and LBW babies
Mean	94.5	87.3	85.8	82.0	70.9	68.5	69.5	55.8	82.4	82.4
Median	100.0	100.0	87.5	81.25	71.4	68.4	71.5	50.0	87.5	87.5
Mode	100.0	100.0	87.5	81.25	71.4	73.7	78.6	50.0	87.5	87.5
Std. Deviation	8.6	17.0	12.1	10.1	18.5	11.2	16.4	22.7	16.2	16.2
Minimum	50.0	25.0	37.5	37.5	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	100.0	100.0	100.0	100.0	100.0	89.5	100.0	100.0	100.0	100.00

Table 10.31: Selected aspect of knowledge among first contact MOs working in NICU and SCBU

Knowledge area	Medical Officers (N=196)	
	Frequency	Percentage
Infection control		
<50	0	0.0
50-79	14	7.1
80-100	182	92.9
Cord care		
<50	2	1.0
50-79	84	42.9
80-100	110	56.1
Thermal regulation		
<50	0	0.0
50-79	37	18.9
80-100	159	81.1
Breast feeding		
<50	1	0.5
50-79	71	36.2
80-100	124	63.3
Care for sick newborn		
<50	4	2.0
50-79	63	32.1
80-100	129	65.8
Initiation of breathing and resuscitation		
<50	0	0.0
50-79	28	14.3
80-100	168	85.7
Birth Asphyxia		
<50	20	10.2
50-79	147	75.0
80-100	29	14.8
BCG and eye care		
<50	17	8.7
50-79	124	63.3
80-100	55	28.1
Management of mild newborn illnesses		
<50	4	2.0
50-79	32	16.3
80-100	160	81.6
Care for preterm and LBW babies		
<50	28	14.3
50-79	119	60.7
80-100	49	25.0

First contact Medical officers demonstrate a poor level of knowledge in relation to birth asphyxia (10.2), BCG and eye care (8.7) and care for preterm and LBW babies (14.3). On cord care, breast feeding and care for sick new-borns most appear to have an average level of knowledge.

Table 10.32: Summary of the knowledge- Medical officers in the NICU/PBU

	Infection control	Cord care	Thermal regulation	Breast feeding	Care for a sick newborn	Initiation of breathing and resuscitation	Birth asphyxia	BCG and eye care	Management of new born illnesses	Care for preterm and LBW babies
Mean	94.0	87.5	87.0	82.1	83.1	85.1	66.7	71.3	89.1	66.3
Median	100.0	100.0	87.5	81.25	85.7	84.2	71.5	75.0	87.5	75.0
Mode	100.0	100.0	87.5	81.25	85.71	84.2	71.4	75.0	100.0	75.0
Std. Deviation	8.8	16.1	10.9	12.1	13.8	9.3	16.1	25.4	15.6	28.1
Minimum	50.0	.00	50.0	43.75	42.86	52.6	.00	.00	.00	.00
Maximum	100.0	100.0	100.0	100.00	100.00	100.00	92.7	100.0	100.00	100.00

Low mean marks are observed in the areas of birth asphyxia and care of the preterm and low birth weight babies. It is also a concern that the minimum mark obtained in the areas of cord care, birth asphyxia, BCG and eye care, management of new born illness and care for preterm and LBW babies are zero.

Considering the basic nature of knowledge inquired into and that these were medical and nursing officers working in specialised units needing specific training, the need to improve knowledge is seen in all areas other than in the areas of infection control. There appear to be important gaps in knowledge among both groups in most areas tested.



*Kangaroo Mother care – De Soyza Maternity Hospital for
Courtesy of Dr. Dhammica Rowel*

Chapter 11

Key findings from the survey

Institutional services for pregnant women are provided through a graded network of 603 hospitals spread throughout the country which have specially identified maternity wards. This comprises 12 Teaching Hospitals, 3 Provincial General Hospitals, 18 District General Hospitals, 64 Base Hospitals and 506 Divisional Hospitals (MoH 2010).

The EmONC assessment was carried out in all government health institutions up to the level of base hospitals and in a sample of 46 lower level institutions. The hospitals which were included in the assessment recorded ninety five percent of all births that occurred in government institutions in 2011. The study yielded information in many areas related to emergency obstetric and neonatal care services that could be used by planners at district, provincial and national levels as well as by professionals working towards improving the quality of services for mothers and newborns. The provincial reports give a detailed description of each institution studied.

The assessment examined the indicators as per population at district and provincial level. However, it must be noted that in Sri Lanka, the services in a given geographic area are not limited to those living in that area. This is borne out by the information on inter-district movement for delivery as shown by the net migration index presented in Chapter 8.

11.1 Distribution of births between health institutions

1. It was seen that 94.5% of births reported by the Registrar General (363,415) in 2011, occurred in government health institutions. The remaining 20031 births can be assumed to have occurred in the private sector, since the proportion of home deliveries is reported to be around 0.1% of all deliveries, (FHB field data).
2. The overwhelming majority of women, who deliver in government institutions, do so in an institution where specialist services are available (93.1 %). It was also noted that their preference was for larger institutions with more than one obstetric unit, in districts where such facilities are available. This means that nearly 77% births occur in institutions with more than one specialist.
3. The highest proportion of births (40%) took place in 15 TH/PGH with a further 26% taking place in 18 District General Hospitals. Only 29% of births occurred in the 64 Base Hospitals which are spread throughout the country.

4. It was noted that, 11.3% (38730) of all births take place in hospitals where one maternity unit is shared by two specialists. Another 16% (54863) births take place in institutions that have only one specialist. Both are situations where optimum conditions for provision of quality specialist services may not be fulfilled.
5. Of the total births in government institutions only 6.9% of births occur in hospitals without specialist services. These institutions comprise of Base Hospitals that have been upgraded but where a specialist had not been appointed at the time of survey (accounting for 4965 deliveries) and hospitals below this level. Although this percentage is low, it amounts to 23873 deliveries annually and has the potential to generate 3581 complications per year.
6. Births in non-specialist hospitals are relatively higher in certain districts such as Nuwara Eliya (23.6%), Mannar (21.6%), Mullativu (19.4%), Anuradhapura (15.7%), Batticaloa (14.1%) and Monaragala (10.7%).
7. It is important to note that there was a wide variation in the number of births per year, in the institutions below the level of a Base Hospitals. Of the 506 institutions in this category, 151 did not have a single birth in 2011, while 114 hospitals had less than 1 delivery per month and 159 had 1-5 deliveries per month, i.e. a total of 424 institutions having 5 or less deliveries per month (Annex I table 2).

11.2 Availability and accessibility of EmONC services

The study examined availability and accessibility of services based on (i) reported provision of signal functions in the three months preceding the survey, (ii) potential ability to provide the signal functions based on objective criteria necessary to provide the function and (iii) on the ability of institutions to provide signal functions on a 24*7 basis.

Institutions that had the potential ability to provide signal functions (CEmONC) and those able to provide the signal functions on a 24*7 basis (24*7 CEmONC) were used in the calculation of all other indices. Availability and accessibility assessed using this classification of institutions is presented below.

11.2.1. Institutions that have the potential ability to provide signal functions

1. Services of at least one specialist obstetrician are expected to be available in all institutions from Base Hospital upwards. However at the time of survey specialist services were not available in 26 of the newly upgraded Base Hospitals.
2. It was seen that 67 hospitals in Sri Lanka were classified as being potentially able to provide all nine signal functions. All institutions where specialist obstetricians were available had the ability to provide CEmONC services except three institutions where at the time of survey the operating theatres were not functioning. This gives a rate of 1.65 institutions per 500,000 population nationally.
3. All districts other than Gampaha and Batticaloa have more than one CEmONC institution per 500,000 population. Trincomalee, Mullativu and Mannar districts have over 5 institutions per 500,000 population that are potentially able to provide CEmONC services, while Ampara and Killinochchi come close to this. It must be noted that in Mannar (5.04) and Mullativu (5.42) and Killinochchi (4.43) there is over inflation of the indicator due to small population numbers.
4. It was estimated that there were 0.88 facilities per 500 000 population which are able to provide modified basic EmONC (modified BEmONC) services in the country. (for definition of modified BEmONC services please refer chapter 2 section 7.2)

The internationally advocated standard for availability of EmONC is, 5 facilities per 500 000 population of which at least one should provide CEmONC services. If this standard is used, it would appear that the country as a whole and the majority of districts are unable to meet the requirement. This is mainly because of the paucity of modified BEmONC services.

However, given the preference of women to deliver in an institution with specialist services, the appropriateness of the standard in the Sri Lankan setting is limited. It is also necessary to consider the fact that some of the institutions in Sri Lanka have multiple units.

The crude birth rate for 2011 was 17.9 per 1000 population. This means that a 500 000 population would result in approximately 747 births per month requiring 2.5 units per 500,000 population.

5. There are 117 specialist maternity units (2.6 units per 500 000 population) where services of one or more specialist obstetricians are available. This varies from 1.12 units per 500,000 population in Monaragala to 6.64 in Trincomalee.
6. There are 3.4 specialists per 500,000 population in the country, the range being 1.68 per 500,000 population in Hambantota to 6.64 in Trincomalee.
7. Nationally, the average number of births per unit and specialist obstetrician was 245 and 207 per month respectively and this is well within the norm of 300 deliveries per unit given in the World Health Report 2005 and stipulated by the Ministry of Health.

However, the clustering of units in institutions also means that accessibility to the population may be limited. Therefore, it is important to examine how these institutions are distributed in geographic space. Indicator 2 examined this aspect. This indicator calculated as defined in the literature, gives the

average land area per institution and is a very crude indicator.

8. The national average was 979 km² per institution that have the potential ability to provide CEmONC services and it varies from 117 km² in the Colombo district to 5639 km² in Monaragala.
9. However, the study refined this indicator and examined the proportion of the population falling outside of a 30 km buffer zone from a CEmONC institution. Only 3% of the total population in the country lie outside a 30 km buffer zone from a facility able to provide CEmONC services.
10. Nearly 68% of the population lying outside the buffer zone nationally was seen in Monaragala (25.5%), Mullativu (23.6%) and Batticaloa (18.7%). This means improving accessibility in these three districts would considerably reduce the overall population of the country lying outside a 30 km buffer from an institution able to provide CEmONC services.

11.2.2. Availability and accessibility of CEmONC services on a 24*7 basis

1. When the indicator is estimated based on an institution being able to provide all nine signal functions on a 24*7 basis, it was seen that 19 of the districts and the country as a whole have less than 1 institution per 500 000 population.
2. The provinces that are poorly served in this respect are the North Western Province (0.42/500,000 population) Northern Province (0.47/500,000 population), Sabaragamuwa (0.52/500,000 population) and the Southern Province (0.61/500,000 population).

3. Colombo, Kandy, Matale, Trincomalee, Polonnaruwa and Monaragala are the only districts that have one or more comprehensive emergency obstetric care facilities per 500 000 population that can provide services on a 24*7 basis.
4. The districts of Matara, Killinochchi, Mannar, Vavuniya and Mullativu have no 24*7 CEmONC facilities. Kurunegala, Ratnapura and Anuradhapura have 0.31, 0.46 and 0.58 facilities per 500,000 population respectively (Table 3.8).
5. The majority of institutions were unable to provide services on a 24*7 basis because only one specialist obstetrician was available.
6. It was also noted that there were 7 institutions in the districts of Kalutara, Matara, Hambantota, Vavuniya, Kurunegala, Puttalam and Ratnapura where specialist services were available 24*7 but did not fulfil the minimum stipulated number of MOs Blood Transfusion Services. It must be noted that the signal function of “providing blood transfusion” in these institutions is met through the provision of these services by other medical officers in the institution.
7. Once this criterion is fulfilled the districts of Kalutara, Hambantota, Vavuniya and Puttalam will have over one 24*7 CEmONC institution per 500,000 population while Matara, Kurunegala and Ratnapura continue to have less than one facility per 500 000 population that are capable of providing 24*7 CEmONC services (Figure 3.3).
8. However, it must be noted that the facilities that are not capable of CEmONC services on a 24*7 basis are capable of providing modified BEmONC services on a 24*7 basis.
9. Nationally, the percentage population falling outside a 30km buffer zone from a facility capable of providing 24*7 services was

19.3%. This decreases to 10.2% when MO blood transfusion services have been rectified.

10. However, when the population of a district lying outside the buffer zone is taken as a percentage of the total population not having this service, Anuradhapura (14.2%), Kurunegala (13.3%), Batticaloa (8.8%), Ratnapura (5.08%), Badulla (5.2%), Killinochchi (5.2%) have the highest proportions. Attention to these 6 districts would reduce the national proportion by more than half. This calculation is based on institutions able to provide 24*7 CEmONC services after than correction of blood transfusion services.

11.2.3. Combined indicators

Availability and accessibility have to be considered together in planning services. The accessibility index for a specialised hospital, specialised unit and a specialist obstetrician takes into consideration the population as well as the area to be covered. A lower numerical figure for these indicators means better accessibility.

1. The accessibility index for a specialist hospital was highest in Moneragala (89.7) and Anuradhapura (66.5) districts compared to 2.8 in Colombo. In all districts other than Jaffna (8.74) in the Northern Province the indicator varies from 37.6 to 29.8.
2. Accessibility to a specialist obstetrician varies from 0.66 in Colombo to 44.87 in Moneragala, 37.61 in Killinochchi, 33.26 in Anuradhapura, 29.86 Mannar, 23.85 in Vavuniya.

This shows that Moneragala, Anuradhapura, Killinochchi and Vavuniya have limitations in access to institutions as well as to specialists and needs priority attention.

11.2.4. Districts in the Northern Province

1. The study shows that districts of Killinochchi, Mannar and Mullativu in the Northern Province need special strategies for improving EmONC services. The districts are relatively sparsely populated and as such when availability per 500 000 population is considered they have an adequate number of institutions providing CEmONC services. However, these institutions serve a large geographic area resulting in limited accessibility. Furthermore, Killinochchi, Mannar and Mullativu are hospitals where a single specialist obstetrician was stationed and therefore were unable to provide 24*7 services. Vavuniya is able to meet the criteria for 24*7 services if the minimum requirements of BTS personnel are met.
2. When work load is considered it was seen that DGH Killinochchi had an average of 184 deliveries per specialist obstetrician per month and that this was marginally more than that seen in DGH Vavuniya (157 deliveries per specialist obstetrician per month) while in DGHs Mannar and Mullativu the number of deliveries per specialist obstetrician per month was 96 and 38 respectively. It may be necessary to think outside the normal framework of service provision and have special arrangements to ensure that this small but vulnerable population groups receive 24*7 CEmONC services.

11.3. Utilisation of EmONC facilities (indicators 3, 4 and 5)

The indicators 3 and 4 were calculated only for institutions providing CEmONC services since the modified BEmONC facilities were estimates per district and extrapolation from the sample may lead to error due to the wide variation in the number of births and the prevalence of morbidity seen in this type of institution. Total number of births registered by the RG per district is used as the denominator.

11.3.1. Proportion of births in EmONC facilities (Indicator 3)

1. Nationally, 88% of women deliver in a CEmONC facility. In Killinochchi (67%) Batticaloa (67%) and Mullativu (43%) are the three districts where less than 75% of births occur in institutions with CEmONC facilities. The low figures in Mullativu and Killinochchi may be partly due to the fact that the births recorded by the RG in 2011 include births that may have occurred in earlier years. If the indicator is calculated using births in government institutions this proportion increase to 81% and 93% in Mullativu and Killinochchi respectively.
2. However, nationally this percentage falls to 62% when deliveries in hospitals with 24*7 CEmONC services are considered but increases to 73% if the minimum requirement for MOs BTS is met.

11.3.2. Met need for EmONC care (Indicator 4)

1. Nationally, 80% of women with a major direct obstetric complication are seen in a hospital with CEmONC services. All districts other than Killinochchi, Mullativu, Badulla and Nuwara Eliya the proportion was more than 60%. The goal has to be for all women with a complication to be seen in a hospital providing CEmONC services.
2. In this context the findings of the morbidity survey should be taken note of. This showed that the BHs that were upgraded but did not have specialist obstetricians at the time of survey had a (severe obstetric complication) morbidity rate of 24.4% (CL 21.0%-28.1%, n=2863) and that the institutions below this level that were sampled had a morbidity rate of 17.0% (CL 15.1%-19.0%, n=4288). The data suggests that a proportion of complications mostly those related to abortion, are being managed in the non-specialist institutions.

11.3.3. District caesarean section rates (indicator 5)

The proportion of caesarean sections per district may be considered as an indicator of utilisation of a lifesaving EmONC function. Although literature suggests that both very low and very high rates of caesarean sections may be equally unacceptable, there is no empirical evidence on which to base an optimum proportion and this has provoked much debate. Pending further research based evidence the range of 5 – 15% has been suggested by WHO as the lower and upper cut off values for the indicator.

1. The national caesarean section rate is 27.7%. In the 17 districts studied in 2001, the rate was 13.7%.
2. In the current survey, one district i.e. Mullativu has a section rate less than 5% suggesting inadequacy of services. However, it must be noted that at the time of data collection, the services in this district were in the process of being re-organised. Only 4 districts; three of them in the Northern province and one in the Eastern province had district section rates below 15%. Fourteen of the districts have rates above 25%.

11.4 Measures of quality of service (indicators 6-8)

The two mortality indicators, namely the direct obstetric case fatality rate and the proportion of deaths due to indirect causes in EmONC facilities is of limited use as a quality of care indicator at district level because of the relatively low numbers of maternal deaths.

11.4.1. Direct obstetric case fatality rate (Indicator 6)

1. The national rate (0.151%) as well as the rate for most of the districts was well below the threshold given internationally (less than 1%), except in one district (Mannar) where services were in the process of being

reorganised at the time of the survey. Therefore, at the relatively low levels of maternal mortality in the country, it is necessary to use other indicators of quality of care such as the severe maternal morbidity ratio.

11.4.2. Intrapartum and very early neonatal death rate (Indicator 7)

In the present study information on early neonatal deaths were not available, therefore, the stillbirth rate alone was analysed. Information on still births was obtained from routinely reported data and a variation in quality of reporting was observed.

1. The still birth rate for the country was 6/1000 births, compared to this the rate was seen to be high in Jaffna (12.4 per 1000 births), Matara, (11.7 per 1000 births) Kandy (10.7 per 1000 births), Nuwara Eliya (10.4 per 1000 births) and Monaragala (10.1 per 1000 births).
2. The fresh stillbirth rate for the country was 2.7 per 1000 births. However in Jaffna (10.2 per 1000 births), Matara (6.8 per 1000 births) and in Batticaloa (5.7 per 1000 births) it was relatively higher.
3. The macerated still birth rate for the country was 2.9 per 1000 births. It was high in several districts; Vavuniya reporting the highest (8.8 per 1000 births) Nuwara Eliya (6.8 per 1000 births), Moneragala (6.5 per 1000 births) and Kandy (5.9 per 1000 births).

11.4.3. Proportion of deaths due to indirect causes in EmONC facilities (Indicator 8)

1. Nationally 32% of maternal deaths occurring in EmONC facilities have been due to indirect causes. This varied from 0 in some districts to 100 per cent in others. In most provinces the indirect deaths are mostly concentrated in the district that has the PGH. It was noted that some districts did not

have deaths due to indirect causes, probably because they are transferred to units which have facilities to manage pregnancies with medical complications.

11.5 Selected care practices

Although the current assessment did not attempt to study quality of obstetric care or to examine clinical practice, a few selected care practices were inquired into.

11.5.1a. Institutional caesarean section rates

The present survey examined institutional CS rates and the results are presented in chapter 4.

1. A marginal variation of CS rates was seen between the three categories of hospitals viz. 33.5% for TH/PGH, 31.3% for DGH and 29.1 % for BH. Contrary to the belief that CS rates may be higher in single man stations the findings show that the rates are significantly lower in this functional category of institution.
2. There was a wide variation of CS rate between individual units/ hospitals, with few having rates as low as 5-15% and few as high as 45-55%.
3. It was seen that section rates of 25%, 30% and 35% are the 25th, 50th and 75th percentiles of the distribution of institutional section rates. This means that 75% of institutions have a section rate exceeding 25% and one fourth of institutions have a CS rate exceeding 35%.
4. The elective section rates increase with increasing hierarchy of institutions. It was also observed that in the Base Hospitals the elective rate per 100 deliveries exceeds the rate for emergency sections. In institutions where there was only one specialist obstetrician the elective rate was higher than the emergency CS rate, however the elective

CS rate was lowest in these institutions compared to institutions with more than one specialist obstetrician.

5. Comparing the data from the current survey with a national survey of CS in the UK, it is interesting to note that in every type of hospitals in Sri Lanka, the total caesarean section rates as well as the elective sections per 100 deliveries exceed the rates seen in UK. The emergency section rates are 1.1 times the UK rate while the elective section rate in Sri Lanka is 1.6 times higher than the UK rate. It must be noted that the data for the current survey is from the 4 weeks prospective survey compared to the UK national survey which collected data over a year.

11.5.1b. Indications for caesarean section

1. The single most common indication for caesarean sections was a previous caesarean section (32%), foetal distress (20%), failed induction (10%) lack of progress of labour (9%) were the next common.
2. Contrary to the common belief that client demand is a factor contributing to increasing rates of caesarean sections, in this analysis of 963 CSs there were only 6 cases (0.6%) which listed this as an indication.
3. Among emergency sections (excluding transfers) 88% were due to four indications; foetal distress, failed induction, complications of labour (cephalopelvic disproportion/ dystocia/ failure to progress/ failed vacuum extraction or forceps) and a previous caesarean section.
4. A partogram has been maintained in 76% of patients where cephalopelvic disproportion/ dystocia/ failure to progress/ failed vacuum extraction or forceps were listed as the indication for section and in 56% of women where the indication was failed induction.

Among those having an emergency section for foetal distress only 49% had a partogram maintained.

11.5.1c. Caesarean sections on patients transferred from other hospitals

1. The contribution made by transferred patients to institutional CS rates appears to be marginal. At national level 6.5% of CS deliveries were on patients transferred from other hospitals (mostly as emergencies) and these may be considered as high risk surgeries. It is important to note that in Base Hospitals 6.8% of the sections have been on transfer patients while in TH/PGH this proportion is marginally lower being 6.6%. In the DGHs the proportion is 6.1%.

11.5.1d. Selected care practices related to caesarean deliveries

1. It is encouraging to note that at national level the medical decision to perform CS was taken by specialist in 91% of the patients with a further 1.9% being taken by Senior Registrars.
2. At the national level, Senior House Officers perform the C.S. in 85 % of instances, the rate being relatively higher in Base Hospitals (90%). Nationally specialist obstetricians are performing around 9% of the caesarean sections, the highest being in BH (11%).
3. It was noted that in TH and PGH only 9% of the sections were performed by Senior Registrars and Registrars highlighting a concern from the point of skills development within the postgraduate training programme. When examined according to the functional classification it was seen that the percentage of CS done by Senior House Officers was lowest in one man stations.
4. At national level 95 % of caesarean sections have been conducted under spinal

anaesthesia with a further 0.2% done under epidural. This healthy trend was seen uniformly in all three categories of hospitals with only less than 1-3% done under general anaesthesia.

5. At national level 67% of women who had a CS had anti acid prophylaxis. Complacency in this area with a majority of women not getting anti acid prophylaxis is of concern as a failed spinal leading to the use of general anaesthesia is always a possibility in any patient.
6. Use of prophylactic antibiotics was high in all types of institutions, nearly 80% in BH, 79% and 72% in TH/PGH and DGH respectively.
7. At national level nearly 14% of women have undergone an LRT with the CS.
8. The median and modal stay in hospital after a CS is highest in TH/PGH (4 days), while it is 3 days in all the others categories, possibly a reflection of the more complicated nature of cases seen in the apex institutions.

11.5.2. Use of partogram

1. It is seen that the proportion of specialist institutions using a partograph is 91% while only 42% of non-specialist institutions use a partograph. This is a matter for concern as one of the main advantages in using the partogram is to identify early the need for intervention. This is most useful in the non-specialist hospitals.
2. 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.
3. It was seen that the overall quality of recording on the partograph was unsatisfactory. These findings suggest that

the overall quality of monitoring of labour using the partograph has room for much improvement.

11.5.3. Management of labour

1. Nationally, labour was induced in 47% of patients. It varied from 54% in TH/PGH to 44% in DGH and 46% in BHs where specialists were available. Syntocinon is the most commonly used drug for induction (79%). The induction rates are not different between institutions where there is one specialist obstetrician and where there are two or more specialist obstetricians.
2. The policy on application of episiotomy varies widely. The percentage of institutions which performs episiotomy on all primipara increases with the hierarchy of the institution, being 80% in TH/PGH.
3. The percentage of institutions which use local anaesthesia to perform episiotomy gradually decreases from TH/PGH (61.0%) to Divisional Hospitals (28.3%).
4. It is noted that there is a wide variation in the use of local anaesthesia to suture episiotomy.
5. It is observed that in nearly 33% of non-specialist institutions episiotomies were sutured by nurses and midwives. This practice was noted in 7-15% of specialist institutions as well. It must be noted that this is a function assigned to medical officers and that midwifery curricula for nurses and midwives do not include this skill.
6. The practice of pain relief during labour is not satisfactory in all levels of institutions. Only 5 obstetric units in the country reported the use of pethidine for pain relief during labour and none reported the use of epidural anaesthesia.
7. Although a majority of hospitals (of all types) indicated that there was a clear policy on

active management of the 3rd stage of labour, less than half these institutions had a written document/guideline.

8. Only in 80% of TH/PGH Oxytocins is given immediately after delivery for all the cases and the percentage gradually decreases between the level of hospitals; DGH 75%, BH 73% and DH 48%.

11.5.4. Availability of guidelines and protocols

Of the ten guideline/protocols related to EmONC where physical availability was checked, the availability of guidelines was highest in TH/PGHs. The national guideline on obstetric care (HSDP) was available in less than 25% of the PGHs, BHs and lower level of institutions. In general, the availability of guidelines decreased from Teaching Hospitals to lower level institutions and a paucity of guidelines was observed in the Divisional hospitals as a group.

11.6. Maternal Mortality and Morbidity

11.6.1. Maternal Mortality

1. Although maternal mortality has been declining, the maternal death rate due to septic abortion has remained the same and the proportion of deaths due to indirect causes is increasing.
2. In 2009-2010 the maternal mortality ratio in Sri Lanka was 38.6 / 100 000 live births while MMR related to direct causes was 23.3 / 100 000 live births and indirect MMR was 14.6 / 100 000 live births.
3. The difference between districts with the highest and lowest MMR appears to have increased in 2008 and 2009 (moving averages) and this needs close observation.
4. Eight districts recorded a MMR over 50 per 100,000 births compared to the national ratio of 39 per 100,000 live births. It is noted that the three districts Mannar, Hambantota,

and Nuwara Eliya accounted for nearly 12% of the maternal deaths in 2009-2010, while they accounted for only 6% of the births in the country.

5. The MMR in women living in areas that fall outside the 30 km zone of an institution able to provide 24*7 CEmONC services is, twice that for women living in the areas within the buffer zone highlighting the importance of access to 24*7 CEmONC services for the population.
6. It is seen that the overwhelming majority of deaths take place in TH/PGH type of institutions (51% of deaths compared to 40% of deliveries in TH/PGH) and in institutions where CEmONC services are available on a 24*7 basis. This is to be expected since emergencies as well as complicated cases from the lower levels of institutions are expected to be directed to such institutions.
7. Highest maternal mortality is observed among women who have been first admitted for delivery to a unit where specialist services are not available. This may be influenced by the underlying social factors, distance from DH to TH/PGH as well as delays in recognition of emergencies, care prior to transfer such as stabilization and preparation of patient for transfer etc. A detailed review of these deaths is necessary to plan action to avert these deaths.
8. It is seen that indirect deaths are commoner in the antenatal period while the opposite is true for direct deaths.
9. Contrary to common belief, there is no evidence to suggest that maternal mortality is increased during weekends and public holidays.
10. Deaths due to haemorrhage is still the largest contributor to maternal deaths and it is seen that in 39% of these deaths, delay 3 has been

identified, this proportion increases to 50% when delay three in combination with other delays is considered.

11. Irrespective of the type of institution of first admission of a maternal death, some delay(delay 1, 2, or 3) has been observed in over 2/3rd of maternal deaths, the proportion with delay in deaths due to direct causes is marginally higher (69%) than in those due to indirect causes (63%).
12. Delay three (D3) is seen in all categories of institutions, the highest proportions of delay three by itself is seen in BH and in institutions with CEmONC services, the lowest being in institutions without specialist services.
13. The maternal mortality analysis highlights the need for detailed study of the pathways of care in women who die as well as in near misses, processes leading to death and problems encountered in service provision. A comprehensive and accurate analysis of this nature is unlikely to happen outside a confidential inquiry in to these cases.

11.6.2 Maternal Morbidity

1. The direct obstetric morbidity rate for the country is estimated to be 14.5% (CL 14.0%-14.9%). It is important to note that the rate in BHs where there was no specialist obstetrician, it was 24.4% (CL 21.0%-28.1%) and in the institutions below this level it was 17.0% (CL 15.1%-19.0%).
2. It is also important to note that the morbidity due to abortions is high in non specialist institutions and is a major contributor to the morbidity pattern.
3. The rate of co-morbidities was 9.2%, the highest rate being for gestational diabetes (4%) with 0.8% having diabetes prior to pregnancy and 0.5% showing impaired glucose tolerance.

11.6.3. Transfer of patients between institutions

1. On average 11% of the transferred patients have had documented direct obstetric complications. This implies that in 89% of the transfers were for reasons other than direct obstetric complications or that documentation in relation to the transfers are poor. An alternative possibility is that patients may have been transferred in anticipation of a possible complication rather than waiting for complications to be evident.
2. It is noted that clusters of hospitals are seen in relation to patient transfers; the teaching hospitals, Anuradhapura, Mahamodhara, Kandy, Colombo group (CSHW and DMH) of hospitals and Colombo South Teaching hospital being the major receiving stations. By-passing of referral facilities are observed in the North and Eastern provinces of the country. This may change with the on-going further development of the TH Anuradhapura and TH Batticaloa.

11.7 Resources for EmONC- Infrastructure

Most of the institutions have gaps in infrastructure and equipment availability. There is also a wide variation in the availability of infrastructure resources between institutions of the same type as well as between and within districts.

11.7.1. General

1. All the institutions with specialist had laboratory service, blood transfusion services (except in one BH), antenatal clinic and post natal clinic. Three DGHs and 10 BHs with a specialist obstetrician do not conduct regular family planning clinics. Health education units and infection control units are available in most of the institutions with specialist Obstetricians.
2. Nearly half of the DHs do not conduct family planning clinics though 96% of DHs conduct antenatal clinics.

3. It was noted that 24*7 electricity and water supplies were not ensured even in some of the larger institutions.
4. It is noted that functioning theatres were not available in 3 BHs, at the time of survey. This has been rectified since.
5. A functioning blood bank was available in 100% of DGHs and in 92% of Base Hospitals with specialists. However, only 55.6% of DGHs and 36.8% of BHs are able to provide this service on a 24*7 basis as defined in the study

11.7.2. Labour Room

6. It is noted that 29%, 50% and 67% of labour rooms in the TH /PGHs, DGHs and BHs where specialist services are available respectively, do not have a water supply with elbow or foot operated taps. This is an accepted requirement for ensuring prevention of infection in labour rooms.
7. Labour rooms of 50% of DGH and 46% of BHs where specialist services are available and nearly 50% of labour rooms in the other two categories of hospitals do not have functioning emergency lamps. This is a necessary piece of equipment taking in to consideration interruptions in power supply noted earlier.
8. A separate room for washing of linen and soiled equipment was not available in 21% of TH/PGHs, 33% of DGHs and 49% of BHs with specialists.
9. Separate toilet for the labor rooms was available only in 78.6% of TH/PGHs, 89% of DGHs and 60% of BHs with specialists. This is a basic need ensuring dignity and privacy of patients in labour and efforts to ensure such facilities in all institutions needs to be made.

10. Use of separate trolleys for labour rooms enhances infection prevention. However, 15-30% of labour rooms in institution where specialists are available do not practice this.
11. It is noted that all the TH/PGHs use the colour coding system for waste disposal and 30% each of DHs and BHs do not practice colour coding for waste disposal system.
12. Displaying information on women in the labour room is an important strategy to alleviate fears of family members. However, 2 THs, one DGH and 7 BHs did not have such a display system and the practice is very low in institutions without specialists.
13. Quick access to the contact details of “on call” staff is essential to prevent delays in emergencies. It is noted that details of the “on call” staff were displayed in the labour rooms only in 79%, 83%, 68% respectively of TH/PGHs, DGHs and BHs. The percentage was 35% in upgraded BHs without specialist obstetricians and 20% in Divisional level hospitals.
14. It is noted that basic facilities such as beds with stirrups, spot lamps, oxygen delivery equipment are available in the majority (95%-100%) of the institutions with specialists. It is noted that delivery sets, CTG machines, forceps delivery sets and vacuum extractors were available in nearly all (92-100%) labour rooms. However, Doppler foetal heart sound detectors, were not available in 2 THs, 6 DGHs and 9 BHs.
2. It is observed that some institutions faced difficulties in getting theatre time for obstetric emergencies leading to some delays. It is noted that 29% of TH/PGH, 22% of DGH and nearly 44% of Base Hospitals reported a delay of more than 20 minutes for emergency obstetric surgery in the two months preceding the survey due to the operating theatre not being available.
3. While it is positive to find that nearly all operating theatres had functioning tables and adjustable lights, nearly 29% of TH/PGHs, 22% of DGHs and 16% of BHs did not have shadow less lamps. This is a constraint in crucial emergency surgeries such as internal iliac artery ligations.
4. It was seen that the packet system is used for necessary surgical instrument in most institutions and this is a healthy trend.
5. The deficiencies in electricity supply, water supply, and communication facilities were observed at all levels of institutions.

11.7.4. Blood Transfusion Services

1. Blood transfusion facilities were available at all hospitals with specialist services with the exception of one BH at the time of the survey although a consultant obstetrician was working in the institution.
2. In almost all institutions cross matching of blood was carried out by a MO blood bank (a person who is specially trained in transfusion procedures) during working hours. However, after normal working hours, in 21.4% of Teaching hospitals, 44.4% of District General Hospitals and 35.1% of Base Hospitals the cross matching was carried out by a MO other than MO/NBTS.
3. in the six months period preceding the survey; twenty mismatch transfusions were reported to have taken place. No cases of

11.7.3 Operating Theatre

1. At the time of survey operating theatre facilities were available in all institutions where specialist services were available except in three institutions. Operating Theatres have been established in these institutions since the assessment.

septicaemia following transfusion were reported.

11.7.5. Laboratory Services

1. Almost all the institutions where specialist services are available have laboratory services with essential testing facilities. While this service is available 24/7 in all TH/PGH and in DGHs, in BHs with specialists it is available only in 62%.

11.7.6. Facilities for infection control

There were many deficiencies in what should be available even in the highest category of institution. It was also seen that the divisional hospitals are more deprived than the others.

11.7.7. Drugs for EmONC services

1. Availability of antibiotics in every category of hospitals appears to be satisfactory.
2. Magnesium sulphate, an essential lifesaving drug in the management of eclampsia was available in all TH/PGH, DGH and in the majority of BH with specialists. It was not available in 3 BHs where specialist services were available and in non-specialist hospitals the situation was poor i.e.; in more than 50 per cent of the upgraded BHs and 80% of divisional hospitals it was not available.
3. Most anti-hypertensive drugs are available in all hospitals but labetalol is available only in less than 50% of hospitals.
4. Common oxytocics namely ergometrine and Syntocinon were available in all hospitals up to base hospital level, but only in 70% of the divisional hospitals. A small but significant number of patients deliver in these institutions and ensuring the availability of oxytocics is essential.

5. Availability of emergency drugs appears to be satisfactory with nearly all hospitals having the full complement of emergency drugs.
6. None of the institutions studied had the complete range of contraceptives available in the National Family Planning Programme.
7. Although almost all the institutions have an indoor pharmacy or a drug store functioning during working hours, the majority of them were not accessible 24*7, which iterates the importance of having adequate stocks in the wards.
8. While most of the hospitals seem to follow the prescribed procedure in ordering, it is noted that nearly 21% of TH/PGHs and 15% of DGHs and 15% of BHs with specialist services have indicated that they order drugs “whenever the drugs run out”. This practice needs to be discouraged.
9. It was noted that in nearly 15% of indoor pharmacies the drug inventories were not updated.
10. Percentage of institutions which maintain a buffer stock of life saving drugs used in obstetric care is seen to gradually decrease from TH/PGH to lower levels of hospitals.

11.7.8. Equipment Profile

1. A wide variation is seen between individual institutions in the average daily use of USS, CTG and Doppler machines (Chapter 6 table 6.10a, 6.10b and 6.10c). The findings may be used to identify workload based norms and standards for availability of equipment based on type of institution.
2. In the majority of institutions the numbers of labour room beds appear to be adequate. BH Balangoda has an average of 4 deliveries per bed per day, while the BHs Valachchenai

(2.75), Embilipitiya (2.83), Mawanella (2.74) and DGH Trincomalee (2.72) average nearly 3 deliveries per labour room bed per day.

3. It is important to note that although the overwhelming majority of institutions have less than one delivery set per delivery per day only a small proportion of institutions have the value of the indicator as 0.33 or less, i.e. the ideal number. Such a situation may compromise the quality of care provided.
4. It is seen that CSs per operating theatre per day varies from nearly 13 in PGH Kurunegala and DGH Matara to 1.35 at the De Soysa Hospital for Women in Colombo.
5. In 50% of the hospitals in TH/PGH group, the number of CS per CS sets per day is more than one suggesting inadequacy of this essential resource. Among DGHs Only 4 institutions, DGHs Matara, Kalutara, Kegalle and Matale that have an adequate number of CS sets per day. Only 3 BHs had an adequate number of CS sets for the average number of sections carried out per day.

11.8 Human resources for EmONC

11.8.1. Work load

There is a wide variation in work load of the different categories of staff between types of institutions and between districts.

1. The average workloads decrease from 236, 214 and 159 deliveries per specialist obstetrician per month in TH/PGH, DGH and BH respectively. When the upper cut off of over 300 deliveries is considered it is seen that 21 % of teaching hospitals, 11% of DGH, and 10.5% of BHs experience the heaviest workloads.
2. If a delivery frequency of less than 150 per unit is considered as “under utilisation” it was found that 14% of Teaching Hospitals,

11% of DGHs and 47% of Base Hospitals experience this low rate. It appears that “underutilisation” is seen in nearly half of the Base Hospitals. Some of the Base Hospitals are recently opened units and this may account for the high proportion of hospitals having low utilisation rates. An improved network of Base Hospitals providing 24*7 care will increase utilisation of this category of institutions and also access to CEmONC services to a majority of the population. This is likely to reduce the pressure on the higher levels of institutions, especially the DGHs.

3. In TH/PGH Group, PGHs Ratnapura, Badulla and the TH Anuradhapura have heavy workloads exceeding the MoH norm of 300 deliveries per month per unit. Among the District General Hospitals the workload per specialist obstetrician / per unit based on the number of deliveries varies from 38 to 415. The DGH Matara and DGH Kalutara exceed the MoH norm, with the DGH Matara recording the highest work load for a specialist obstetrician in the country. In BH group, deliveries per specialist obstetrician/ unit range from 20 per month in Mulleriyawa 341 per month in Dambulla. Four base hospitals (11%) namely; Mahiyangana, Dambulla, Nikeweratiya and Kalmunai North exceed the upper cut off of 300 deliveries per specialist obstetrician used in the study (Figure 7.1 a-c).
4. It is noted that the average workload of medical officers in TH/PGH category exceeds the national average. The workload per MO obstetrics varies from 23 deliveries per month to 122 per month in TH/PGH group. In the DGHs the workload per MO varies from 32 – 108 deliveries per month, with 10 of the 18 institutions having workloads exceeding the upper cut off value used in the study. Among BHs, the workload for medical officers varies from 8-148 deliveries per month, eight of the institutions having 75 or more deliveries per MO per

- month. The Base hospitals of Kuliyaipitiya, Puttalam and Kalmunai North have very high workloads exceeding 100 deliveries per month.
5. In TH/PGHs, the variation in workload for midwifery staff is from 5-21 deliveries per month. The workload of midwives exceeds the WHO norm in 3 institutions and the national average in 5 more institutions in DGH group. In BHs, the workload of midwifery staff range from 1 delivery per month to 33 per month, 3 institutions BHs Dickoya, Kalmunai North, and Puttalam exceed the upper cut off value.
 6. It is noted that the workloads of all three selected categories of staff are high in PGH Badulla, while in TH Anuradhapura and PGH Ratnapura two categories of staff (specialist and non-specialist medical staff) exceed the upper cut off value used in the analysis. The DGHs Matara and Kalutara exceed the upper cut off value used for both categories of medical staff. DGH Matara exceeds the WHO recommended value for midwifery staff indicating high workloads for all staff. It should be noted that in the BH Kalmunai North, the work load of all three categories of staff exceed the highest cut-off used in the study. BHs Puttalam, Dambulla and Mahiyangana two categories of staff exceed the highest cut-off value used in the study.
 7. The highest workload for a specialist obstetrician in respect of CS is seen in the Matara district (91 per specialist obstetrician per month).
 8. Although the national average per specialist anaesthetist is 100 caesarean sections per month, there are seven districts (Ratnapura, Kegalle, Batticaloa, Kalmunai, Jaffna, Galle and Kalutara) where the work load per month exceeds 150 CS per specialist anaesthetist per month.
 9. The workload per MO obstetrics varies from 4 CS per month in Vavuniya to 30 in Badulla (excluding the districts of Mullativu and Killinochchi). The workloads of MO anaesthesia and blood bank are more equitably distributed.

11.8.2. Training

1. At national level 65% of the Medical Officers which include MOs and SHOs working in the maternity wards have had an opportunity for a six months internship in Obstetrics. It is seen that in 7 out of 9 provinces more than 60% medical officers had received internship experience in obstetrics. The highest proportion was in the Uva province (100%) and the lowest (48%) in the Northern Province. In the institutions where there are no specialists this proportion is 50.7%.
2. At national level 44.1% of Medical Officers have had an opportunity to have an internship in Paediatrics. Only one province (Uva) has more than 60% of medical officers who have undergone internship training in Paediatrics, the proportion varying from 77% in Uva to 35% in the Eastern Province. Here too this training would be much more important in the non-specialist institutions and it is important to note that in non-specialist institutions this proportion is only 44.0%.
3. Nationally 20.3% of MOs working in obstetric units had received training in blood transfusion procedures. The highest proportion of 31.2% was seen in the Uva provinces and the lowest (1.0%) in the North Western Province.
4. At national level coverage of medical officers ranged from 38% for Essential New Born Care to 15% for Baby Friendly Hospital Initiative. At provincial level nearly all the provinces have a large number of MOs who have not undergone in-service training with the exception of the Uva province.

5. For nursing officers, in most provinces the in service training is poor. In the Western and Sabaragamuwa provinces none of the training programs have achieved coverage of over 40% in the sample studied. The Uva province has achieved over 60% coverage in two programs (Lactation Management and Labour Room Management).
6. It is seen that most of the training programs have not reached the sample of midwives studied in most provinces. Lactation management programme shows the most coverage nationally with 3 provinces achieving over 60% or more coverage and a further four provinces achieving 40-59% coverage.

11.8.3. Knowledge among selected categories of care providers

Institutional midwives:

1. It is seen that nearly 77% of participants have scored over 70% and 98% of participants scoring over 50% marks, suggesting that overall knowledge in the areas tested are good.
2. The knowledge on labour, active management of the third stage of labour and monitoring of labour, is at a lower level relative to that on PPH and PIH. It is noted that the range of marks varied from zero to hundred.

Nursing officers in obstetric wards:

1. It is seen that 77% of nursing officers have scored over 70%.
2. It is seen that the mean as well as the modal marks for active management of the third stage of labour and monitoring of labour are lower relative to the other areas examined.

Medical officers in obstetric wards:

1. When considering the overall knowledge scores with nearly 72% of participants scoring over 70% and 100% of participants scoring over 50% marks, the knowledge and practices in general were satisfactory in the areas tested but it is important to fill the specific gaps described in Table 7.32.
2. On PIH and heart disease the proportions of MOs obtaining 90% of marks or more was less than the other areas.

11.9 Preference for place of delivery

1. The majority of women deliver within the district of residence and in the larger institutions. It is clear that the migration of women to districts outside the district of residence is dependent on services available / perception of services available within their district. Colombo has the highest in-migration rate, 410 per 1000 deliveries in the district followed by Vavuniya (310 per 1000) and Killinochchi (210 per 1000 deliveries). These have to be addressed in planning and allocation of resources. However it must be noted that strengthening of facilities in the districts that show negative net migration rates may result in decreasing the practice of going outside the district.

11.10 Institutional family planning services

1. It is noted that all institutions do not have a functioning family planning clinic. The percentage of institutions having a regularly functioning clinic decreases with the decline in the hierarchical level of institution. The frequency of clinics also decreased according to the institutional hierarchical level.
2. It was noted that many clinics did not have the range of methods available within the state health system. It was noted that in the 6 months preceding the survey, all commodities

- have been in short supply in varying proportions of institutions, ranging from 8% in upgraded BH to 29% in TH/PGH.
3. Although ECPs are not considered as a method of contraception, they should be available for use when needed. However, it was noted that the overwhelming majority of institutions did not have ECPs. It was not available in 77% of TH/PGH and not available at all in DGH and BH and in all except one of the divisional hospital sampled.
 4. Around 15% of institutions did not have persons trained in IUCD insertion. A trained person capable of performing LRT was available in more than 78% of institutions up to the level of a BH. However, the proportion of institutions where a MO trained in vasectomy was available ranges from 22 % in DGH to 14% in TH/PGH.
 5. It is seen that the majority of institutions have stated that they provide family planning counselling. In contrast the proportion of institutions providing service to postpartum and post abortion women before discharge from a ward were much less ranging from 71% in TH/PGH to 31% in upgraded BH. These percentages amount to a large a number of women who leave hospital with information but without services being provided.
 6. The proportion of institutions with dedicated theatre time for permanent methods of family planning is very low ranging from 50% in TH/PGH to approximately 33% in DGH and BH. The total number of LRTs performed over a period of 6 months appears to be relatively small.
 7. Record keeping appears poor, with only a proportion (58%-35%) of institutions reporting a monthly contraceptive stock return /request.
 8. The proportion of institutions reporting to MOH on services provided (H 1200 A) also varies from 71% in TH/PGH to 44% in DGHs.
 9. In all types of institutions the availability of a procedure for follow-up was poor, varying from 50% in TH/PGH to 22% in BHs.
 10. The data suggests that an in-depth assessment and a plan for improvement of institutional family planning services in the country as a whole is pertinent.

11.11 Neonatal care services

Neonatal care services in the country are in the process of being organised. Specialised care for new-borns is provided at two levels; Special Care Baby Units (SCBU) and the Neonatal Intensive Care Units (NICU). According to the MoH there should be a NICU or SCBU in all hospital where specialised services are available and in places where there is a NICU, the SCBU should be incorporated into the NICU. National norms for NICUs have not been established.

11.11.1.Distribution of neonatal care services

1. Overall in the country 89.6% of deliveries occur in hospitals with SCBU facilities. In the districts of Nuwara Eliya (29%), Mullathivu (81%), Ampara (27%) and Trincomalee (26%), the proportion of deliveries occurring in specialist hospitals without SCBU facilities is high. Once the SCBU facilities in the recently upgraded BHs are set up, all the districts would have more than 75% of the deliveries occurring in hospitals with SCBU facilities.
2. There are 13 districts in the country without a single MBU in the specialist hospitals. Similarly there are 9 districts without a single LMC in the specialist hospitals. Out of the institutions providing specialized maternal and new-born services, only 18 hospitals

(18.2%) had MBCs and only 31 (31.3%) had LMCs. In the 17 TH/PGH types of institutions, LMCs were available in 14 (82%) while MBCs were available only in 5 (29%). In the DGHs MBC were available in 39% and lactation management centres in 50% of the institutions. Majority of the base hospitals did not have either MBCs or LMCs, the percentage with this service being only 11% and 16% respectively.

3. Nearly 59% of all births in the country occur in institutions with NICU facilities. There are 6 districts in the country without this facility; Matale, Nuwara Eliya, Mannar, Killinochchi, Mullativu and Monaragala. It should be noted that although there are no NICU facilities in these districts, all of these districts except Mullativu has SCBU facilities.

11.11.2. Availability and accessibility of services

1. Based on the study assumption that there should be NICUs in all TH/PGH and in the districts where there are no TH/PGH the DGH should have a NICU. The required number of NICU facilities are available at national level. However, wide disparities are present at sub national level, with an excess in Western, Central, Southern and Sabaragamuwa provinces and a deficit in the Northern and Uva provinces.
2. In seven districts namely, Matale, Nuwara Eliya, Moneragala, Kilinochchi, Mannar and Mullativu which do not have TH/PGHs, the DGHs did not have NICU facilities.
3. On an average the country has 2.3 neonatal care facilities per 500 000 population. The country has 1.6 SCUBUs per 500 000 population and less than one NICU per 500 000 population.
4. Most of the districts (19/26) in the country have more than 1 SCBU facility per 500,000 population. However, once the 24*7 criteria

is applied the number of districts having at least one SCBU / 500 000 population drops to 8 districts.

5. On an average for every 5 768 births there is a SCBU facility and for 12 114 births there is a NICU facility in the country. If it is assumed that 15% of all births are likely to need SCBU care and 3% are likely to need NICU care. The national average is approximately 72 and 30 SCBU and NICU admissions per month respectively. However, the number of births per institution show marked district variation ranging from no facilities to 10 400 births for a single facility as reported in Nuwara Eliya for a SCBU and 25 428 births for a NICU in the Kurunegala district.
6. On average for every 1041 km² there is a SCBU while for every 2187 km² there is a NICU facility in Sri Lanka. This ranges from a minimum of 116.5 km² in the Colombo district to a maximum of 5639 km² for the Monaragala district for SCBU facilities. There was one district where (Mullativu) SCBU facilities were not available at time of survey. The area per NICU facility ranges from a minimum of 174.8 km² for Colombo to a maximum of 7179 km² for that of Anuradhapura district.

11.11.3. Utilization of neonatal care services

1. On average 85 % of all births in the country occur in an institution with SCBU facilities while 55% of the births occur in a facility having a NICU. It was seen that only 6.9% of births in the country occur in hospitals without a specialist obstetrician. If it is assumed that these institutions also do not have a specialist paediatrician, around 7% of neonates are born where SCBU care should be available but where services are not available. The 55% of births occurring in institutions with NICU services may be considered a high percentage.

11.11.4. Neonatal Morbidity

1. Jaundice and septicaemia are the two leading morbidities for which neonates have been admitted for special care.
2. It is also seen that the admissions to the two types of facilities are similar except for a few morbidities.
3. IRDS is the main condition for which there is an excess of admissions to NICUs, birth asphyxia, meconium aspiration and septicaemia being the other conditions where there is a clear increase in admissions to NICUs compared to SCBUs.

11.11.5. Interventions

1. Ventilation, nasal CPAP and cardiopulmonary resuscitation was commoner in the NICUs compared to the SCBUs.
2. The use of surfactant, inotropes, anticonvulsants and blood products were more in the NICUs and these reflect the morbidity as well as facilities available in these.

11.11.6. Selected care practices

1. Satisfactory use of the Neonatal Examination Format was observed in all Teaching Hospitals other than in TH Jaffna. Use of the format is low in the PGHs except in the Ratnapura district. It is noted that in the majority of the DGHs use of the format was satisfactory compared to the other type of institutions while use was low in the majority of Base Hospitals. Overall, usage of the Neonatal Examination Format appears unsatisfactory.
2. Neonatal examination prior to discharge was practiced at a satisfactory level in almost all the districts in the country.

3. The neonatal follow up practices and the practices related to transfer of new-borns were satisfactory in the all types of institutions.
4. The readiness for neonatal resuscitation as shown by the availability of equipment and drugs that should be available on the neonatal resuscitation trolley needs to be improved in all levels of institutions.

11.11.7. Infrastructure facilities

1. On average there were 2 patients per incubator per month when the whole country is considered. However, this figure varies from 5 per incubator per month to 1 in many of the districts.
2. There were 8 NICU patients per ventilator in the country. The number varies from 40 patients per ventilator in Anuradhapura to 2 in Vavuniya.
3. Facilities for infection control and the infection control practices were observed to be better in THs and PGHs as opposed to the DGHs and BHs. Across all types of hospitals the isolation facilities, disposable towels, hand washing facilities and availability of hand rub solutions were seen to be at a poor level.
4. The availability of management protocols were seen to be poor across all types of institutions. The availability of protocols was in general lower in institutions with SCBUs only, compared to those with NICU and SCBU.
5. It is seen that the availability of most drugs are satisfactory in all types of institutions.

11.11.8. Human resources

1. Specialist neonatologists were stationed at 4 NICUs at CSHW, DMH, TH Kandy and TH

- Mahamodara. Other NICUs in THs and PGHs were manned by specialist paediatrician designated as neonatologists. TH Jaffna and TH Batticaloa did not have designated position for neonatologists though they have NICUs. In the NICU/SCBUs in the DGHs 6 of them (Nawalapitiya, Hambantota, Vavuniya, Ampara, Trincomalee, and Puttalam) do not have designated neonatologists or paediatricians.
2. It is important to note that out of 17 TH only 15 had 6 or more MOs, the minimum cadre required to provide uninterrupted services. In the 15 DGHs with NICU/SCBU, only 6 hospitals have 6 or more MOs.
 3. A wide variation was seen between districts in respect of the workload of specialists and medical officers providing care for neonates.
 4. A significant number of nursing officers had poor knowledge (less than 50% marks) on cord care (8%), care of the sick new born (12%), birth asphyxia (12%) and BCG and eye care (61%). It is of concern that nearly 30% have average knowledge on breast feeding. Nearly 36% demonstrated average knowledge in the areas of management of mild newborn illness and care for preterm and LBW babies.



Courtesy of Dr. Deepthi Perera

Chapter 12

Recommendations

The recommendations presented in this chapter are based on the findings of the assessment. The draft recommendations were presented to the core group and at a national stake holder meeting for discussion.

The nine provincial reports provide detailed information by district and by institution.

12.1 Signal functions

- a) It is recommended that a dialogue is initiated with relevant stakeholders and a policy decision taken as to the signal functions that should be available at the different types of government health facilities.

The following suggestions are presented for initiating a dialog:

- All 9 signal functions must be provided in all institutions which have specialist services (CEmONC) and the aim should be to provide these services 24*7.
- Identify the signal functions that should be available in institutions where specialist services are not available and define BEmONC in the Sri Lankan context. In this respect, it is noted that evacuation of retained products is not expected to be carried out in institutions without specialist services. Consensus is needed on performing assisted

vaginal delivery and manual removal of placenta in such institutions.

12.2 Availability and accessibility

The findings of the survey suggest that internationally recommended standard of 5 EmONC facilities per 500 000 population of which at least one, should provide CEmONC services while the others provide BEmONC services is not appropriate for Sri Lanka. Further, the assessment revealed that 93.1% of deliveries which occur in the government sector health institutions, take place in CEmONC facilities. Therefore, it is important that a standard applicable to the country be agreed upon, taking in to consideration the current birth rate, resource availability and also the people's aspirations and choices regarding type of institution for child birth.

- a) It is recommended that a dialogue be initiated to develop a national standard for availability of EmONC and it is suggested that a minimum of 3 CEmONC facilities per 500,000 population be considered. However, in developing such a standard it is necessary to consider the fact that some of the institutions in Sri Lanka have multiple units totalling up to 117 specialist maternity units in the country.
- b) Availability has to be considered together with accessibility. It is therefore recommended that geographic location of

institutions be such that the total population would fall within a 30 km radius of a 24*7 CEmONC facility.

A time bound plan for achieving the above must be developed and implemented.

12.3 BEmONC facilities

- a) It must be ensured that the signal functions identified as appropriate in the Sri Lankan context for institutions without specialist services are made available in all institutions where women seek care for delivery.
- b) Although only 6.9% births take place in non specialist hospitals, it is important to give due consideration to the high level of direct obstetric morbidity reported from these institutions and the potential to generate nearly 3600 complications per year (from 24000 deliveries).
- c) Special attention must be directed to districts where percentage of deliveries in such institutions is high such as Nuwara Eliya (24%), Mannar (22%), Mullativu (19%), Anuradhapura (16%), Batticaloa (14%) and Monaragala (11%).
- d) It is recommended that Divisional Hospitals for strengthening of maternity services be prioritized taking into consideration the cost effectiveness, utilisation of maternity services and geographic distribution of other institutions in the area.
- e) In order to strengthen services at Divisional Hospitals, it is recommended that norms for infrastructure and human resources profiles for BEmONC institutions be defined utilising the findings of this assessment (Staff - MO/Nurses/Midwifery qualified nurses/

Midwives and their training, Essential drugs, Equipment and infrastructure facilities)

- f) The need for continuing provision of BEmONC services in the 151 Divisional Hospitals where not even a single delivery was reported in 2011 must be reconsidered. In doing so, the underlying social and economical factors such as poverty, road network, and educational status of women need to be looked at carefully.

12.4 CEmONC and 24*7 CEmONC facilities

- a) It is recommended that norms and standards in respect of infrastructure and human resources necessary for provision of CEmONC and 24*7 CEmONC services be developed for the different types of institutions and suitable arrangements be made to ensure that these standards are adhered to.
- b) It must be ensured that all supporting facilities for the provision of 24*7 CEmONC services are available in institutions where there are 2 or more specialist obstetricians.

An additional 83 specialist obstetricians would be needed to make all single specialist obstetrician (31) stations to two specialist obstetrician stations and to appoint two specialist obstetricians to upgraded BHs without specialist (26 stations) so that all such institutions are capable of 24*7 CEmONC services.

- c) Therefore, it is recommended that this be carried out in a phased manner. Priority stations for appointing a second specialist obstetrician needs to be identified taking into account the population and area to be covered so as to maximise 24*7 CEmONC service coverage.

Table 12.1 (a) Institutions suggested for upgrading in the first phase

Institution for appointment of a second specialist obstetrician	Upgraded BHs to be made functional by appointing specialist obstetricians
DGH Killinochchi	BH Tissamaharama
DGH Mannar	BH Bibile
DGH Mullativu	BH Mahaoya
BH Dambulla	BH Padaviya
BH Nikeweratiya	BH Galgamuwa
BH Mahiyangana	BH Potuvil
BH Kantale	BH Wellawaya
BH Dickoya	BH Deniyaya
BH Balangoda	BH Welimada
BH Valachchenai	

- d) It is recommended that the institutions listed in table 12.1 (a) be strengthened in the first phase to provide 24*7 CEmONC services. Figure 12.1 (a) shows that if the above

hospitals are upgraded, nearly the total area /population of the island will fall within 39 km. radius of a 24*7 EmONC facility.

Figure 12.1 (a): 24*7 CEmONC coverage after upgrading of institutions listed in table 12.1 (a)

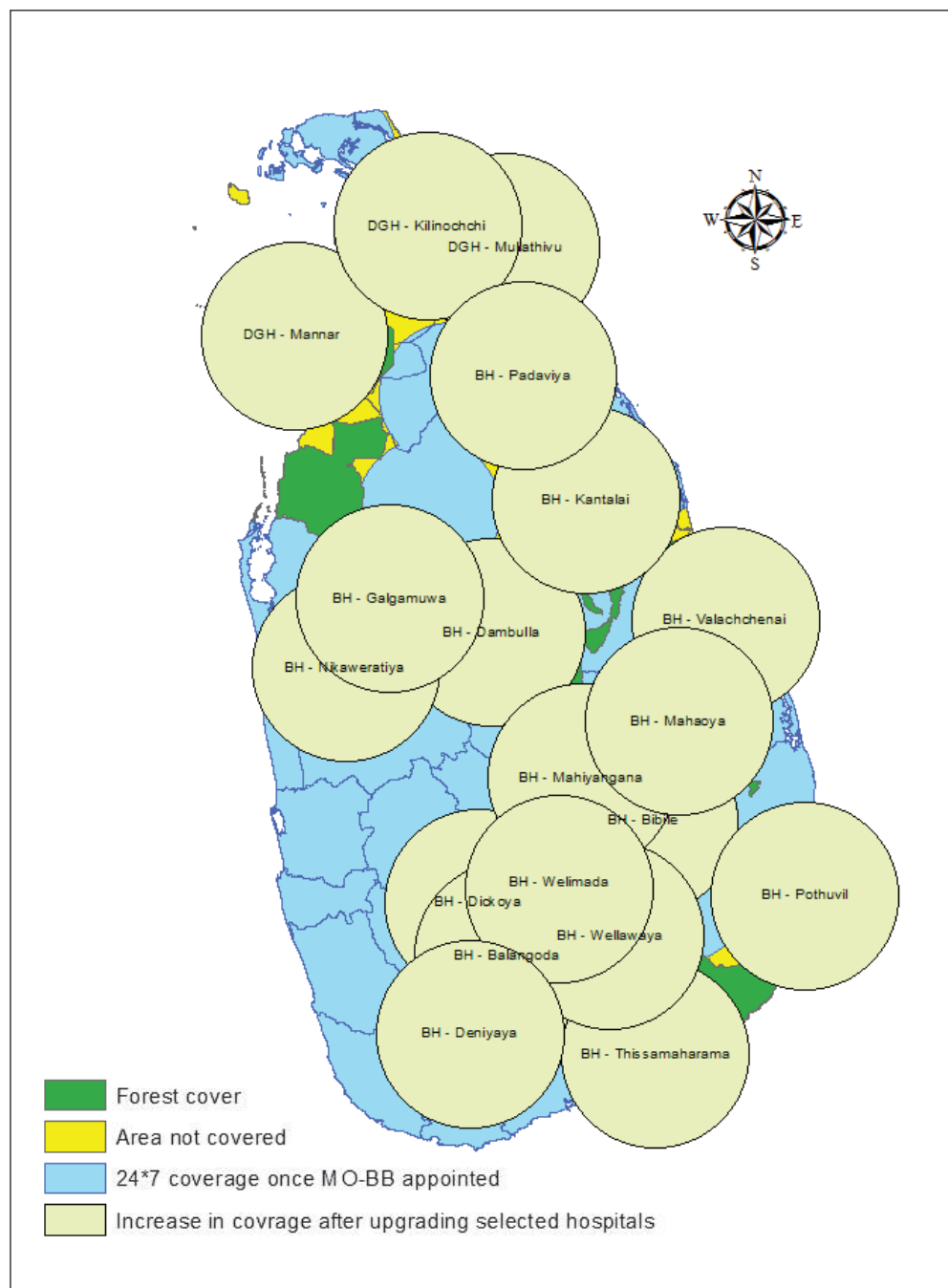
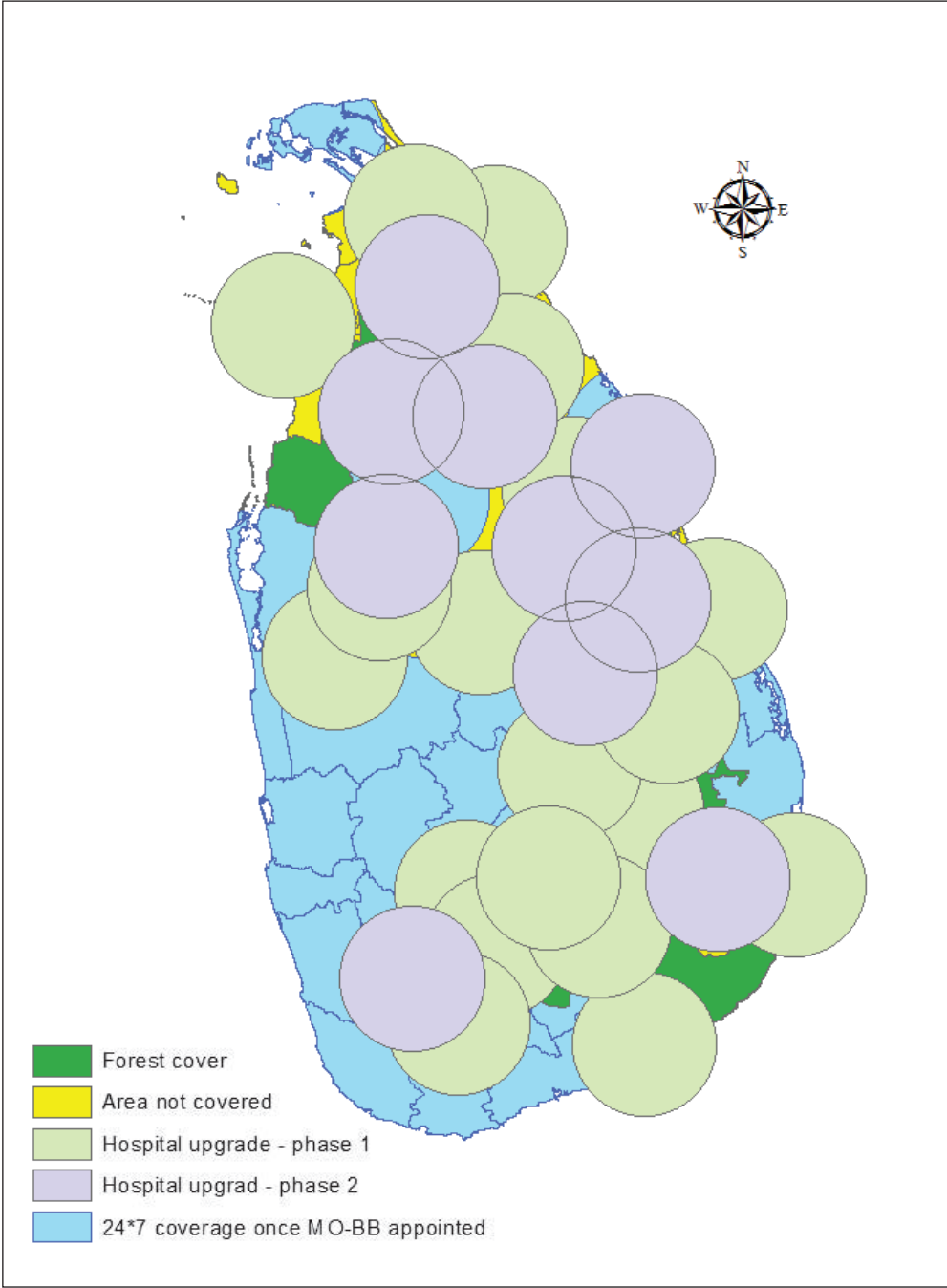


Table 12.1 (b) Institutions suggested for upgrading in the second phase

Institution for appointment of a second specialist obstetrician	Upgraded BHs to be made functional by appointing specialist obstetricians
BH Madirigiriya	BH Kalawana
BH Thambuttegama	BH Kabethigollewa
BH Dehiattakandiya	BH Siyambalanduwa
BH Muttur	BH Mankulam
	BH Cheddikulam
	BH Welikanda

- e). It is recommended that the institutions given in table 12.1 (b) be upgraded in the second phase. Figure 12.1 (b) shows that at the end of phase 2 nearly the total population of the island will fall within a 30 km radius of an institution providing 24*7 CEmONC services.

Figure 12.1 (b): 24*7 CEmONC coverage after upgrading of institutions identified for phase two



- a) Since the provision of 2 specialist obstetricians at each of the above institutions would need 28 additional specialist obstetricians in the first instance, until such numbers are trained the following special arrangements are recommended as interim measures:

- **Clustering of institutions**

It is important to explore the possibility to cluster hospitals in such a way that one or more hospitals provide 24*7 services for the cluster.

A second option is to cluster two hospitals which drain relatively small populations together and appoint three specialist obstetricians. This will need special provisions.

Expert consensus is needed to identify institutions that can be clustered together for such covering up arrangements. A written policy and protocol, in the form of an SOP indicating the exact functional details is essential. Transport and communication facilities necessary between the cluster institutions have to be identified. Pilot testing of the project in one or more districts is recommended.

- **Appointment of Senior Registrars**

Explore the possibility of appointing Senior Registrars (post MD pre Board Certification level) to institutions with a single specialist obstetrician. This needs to be done with the concurrence of SLMC so that the appointed officer is able to perform surgery on his own.

- b) The study identified difficulties in providing care in situations where two specialist obstetricians share one ward. Therefore, it is recommended that establishing two independent units be considered in the situations where the monthly deliveries exceed 300 per month.

12.5 Special critical care facilities

It is recommended that special care for obstetric emergencies be made available at three levels.

- a) It is recommended that every specialist unit have 2-4 high dependency beds for pregnant women who need close monitoring. The number of beds needs to be decided based on the case load. The essential equipment for these needs to be defined and provided. Training of nursing staff for close monitoring of patients at HDU can be arranged within the institution/district or provincial level with an ICU.
- b) In the hospitals with ICU facilities, it is recommended to develop and implement admission criteria for obstetric patients in consultation with obstetricians and the specialist in charge of ICUs.
- c) It is recommended that a suitable (web based) mechanism be developed and implemented to identify the closest available ICU beds at any given time in order to ensure a smooth path way of care for these patients without delay.
- d) Highly specialised multidisciplinary critical care facilities at national level in selected tertiary hospitals.

It is recommended that “highly specialised” maternity care units be established in strategic locations with multidisciplinary support teams for the management of emerging issues such as placenta accrete, liver or renal failure secondary to obstetric emergencies which need sophisticated management modalities. It is suggested that at least one such unit be established initially at national level and to increase the number in a phased manner.

In view of the increasing contribution of cardiovascular disease to obstetric morbidity and mortality and availability of advanced treatment modalities which provides an opportunity to manage

seriously ill cardiac patients, it is recommended that an obstetric unit/s be identified and developed to work in collaboration with National Institute of Cardiology / cardiology units to provide such services.

It is recommended that clearly identified protocols and pathways be developed for emergency transfers.

The organisation of rapid response teams within institutions, to deal with emergencies are recommended. These could be started in the higher level institutions in the first instance.

12.6. Establishment of Norms

- a) The study identified high variability between and within districts in resources, especially human resources. It is recommended that norms to be identified for

- Human Resources
- Drugs
- Equipment
- Infrastructure
- Laboratory facilities

based on the workload, type of institution and level of clinical management implemented at each level. A committee needs to be appointed comprising FHB, MoH and professional colleges to finalise the norms and standards.

- b) Malfunctioning equipment was a main reason given for scarcity of equipment and cancellation of theatre lists. Management of equipment to ensure functionality needs to be focussed on at all levels. This can be monitored at institutional level by developing SOPs, introducing check lists and by delegating the responsibility to relevant staff.
- c) Continuous water supply, electricity supply and communication facilities need to be ensured at all level of facilities.

Human Resources

- a) The study findings highlighted the need for clear definition of roles and responsibilities of different levels of staff as well as issues of accountability. It is recommended that clarity in the roles and responsibilities be established with regard to different aspects of care including the management of specific emergencies by way of developing duty lists, guidelines and flowcharts with these details identified.
- b) Task shifting should be considered where necessary.
- c) It is recommended that these be used to establish a culture of accountability and a mechanism for monitoring within the institutions cross cutting all levels of health care providers.

12.7. Care practices

The data collected on selected practices show that there is much variation in the care practices between institutions.

- a) It is recommended the level of complications that can be managed at each level of institution be defined along with clear instructions for decision making and referrals.
- b) In order to achieve high quality and uniformity in maternity care practices it is recommended that the MoH, SLCOG and other relevant professional colleges initiate discussions and reach a consensus on the clinical standards and thresholds for selected care practices.
- c) It is recommended that steps to be taken to institutionalize the use of the partograph at all levels of hospitals.

- d) It is recommended that guidelines for the management of labour, uncomplicated delivery and common complications and emergencies be developed and implemented as to ensure streamlined, effective and uniform care practice.

Suggested priority topics to be considered for such guidelines are:

- Induction of labour
 - Episiotomy (decision, perform, suturing)
 - Management of uncomplicated labour
 - Pain relief during labour
 - Active management of third stage of labour
 - Management of direct obstetric emergencies (especially PPH, eclampsia and pre-eclampsia)
 - Indications for caesarean sections especially for primipara
 - Common complications; shoulder dystocia, cord prolapse, IUGR
 - Post abortion care
- e) It is recommended that step by step procedures (algorithms/ clinical pathways / flowcharts) be developed summarising the above mentioned guidelines and their use ensured through circular directives. These should identify levels of clinical management that should be implemented at each type of institution with clear guidance on referral to higher levels.
- f) It is recommended that a collection of guidelines on the management of obstetric emergencies in non-specialist hospitals be developed in the form of a hand book and disseminated supported by a circular issued by the MoH. They need to be action oriented and specifically designed considering the resources available in these institutions and should include criteria and guidance on transferring such patients to higher level institutions.

- g) It is recommended that Magnesium Sulphate be available at all levels of hospitals where obstetric care is provided. This needs to be supported by the development of a guideline on stock management and use of Magnesium Sulphate in specialist and non-specialist hospitals and disseminated to all institutions through a MoH Circular.

- h) It is recommended that a clearly defined policy for pain relief and companionship during labour be developed by the FHB in consultation with the SLCOG and College of Anaesthesiologists for different levels of hospitals. This needs to be accompanied by efforts to create a “culture of providing pain relief” in health institutions through a process of sensitisation and capacity development of the staff.

12.8. Quality assurance process

- a) Improvement of quality of EmONC care is a priority. A strategy document on quality improvement identifying key activities be developed by the FHB in collaboration with the Directorate of Health Care Quality and Safety, SLCOG, other professional colleges and with care seeker representation.
- b) It is recommended that systems for monitoring quality of care such as clinical audits, SWOT analysis of near misses, adverse incident reporting, clinical quality circles and tools such as the maternity dashboard be developed. Such systems should be planned and implemented jointly by the FHB and the SLCOG in collaboration with the Directorate of Health Care Quality and Safety.
- c) It is recommended that FHB in collaboration with Directorate of Health Care Quality and Safety and professional colleges reach consensus on clinical quality of care indicators and these be included in the National Quality Assurance Programme. A

set of key indicators also be developed to facilitate the in-house monitoring by heads of institutions (through heads of units meetings) to address the gaps in quality.

- d) Explore the possibility of developing a system of supportive supervision of the hospitals at each level to ensure that the quality assurance measures are being implemented.

12.9. Caesarean Sections

The findings on caesarean sections merit wider discussion at a professional forum.

- a) In order to generate valid evidence for such an exercise, it is recommended that a national in-depth study be conducted on the trends, both health and non-health determinants, care provision and a cost assessment of caesarean deliveries in the country including those in the private sector. The study should also aim to address the reasons for the high variability in CS rates between institutions. It is also recommended to conduct a secondary analysis of the WHO Multi Country Survey on Maternal and Newborn Health.
- b) It is recommended that the findings of such studies be converted in to progressive action by the united efforts and commitment of the SLCOG, FHB and MoH through Technical Advisory Committee on Maternal Health and Family Planning and National Committee on Family Health.

12.10 Maternal Mortality and Morbidity

- a) Obstetric haemorrhage still accounts for a large proportion of the maternal deaths. It is recommended that every effort be made to ensure high quality blood transfusion services including 24*7 cover by a medical officer from the NBTS. As an interim measure an adequately trained and competent, designated MO other than ward HO/MOs be made available.

- b) It is recommended that a culture of a PPH drill in all obstetric units be developed and encouraged through routine skills development activities. Measurements need to be taken to ensure that a “PPH management trolley” be available with necessary drugs, equipment and supplies for immediate response.
- c) It is recommended that the country change to a confidential inquiry into maternal deaths. This should be a well-planned transition from current practice with adequate consultations with relevant stakeholders and learning from the experiences of other countries where successful reviews are conducted.
- d) It is recommended that inquiry in to “near misses” be instituted early. In the current scenario of decreasing mortality this is essential for the identification of points at which service provision may be improved. This is also likely to be less sensitive than inquiry into mortality since the focus is on deaths averted. Data collection on this aspect may be piloted in selected sentinel institutions / districts and scaled up to national level in a phased manner.
- e) The information from the pilot phase may be used to validate/refine the criteria / definitions used in identifying “Severe Maternal Morbidity”.
- f) Once the “near miss” inquiry is established nationally, it is recommended that severe maternal morbidity indicators such as Severe Maternal Outcome Ratio (SMOR), Maternal Severity Index (MSI), prevalence of women with life threatening conditions (WLTC), Maternal Near miss Mortality Ratio, (ratio between maternal near-miss cases and maternal deaths) , be accepted as quality of care indicators at national and subnational level and be reported routinely in addition to the MMR.

12.11. Supportive services for EmONC

- a) It is recommended that public health, health education and infection control units be established in all hospitals with specialist services, defining specific roles and responsibilities.
- b) It is recommended that dedicated obstetric operating theatres based on the case load be established in selected institutions and explore the possibility of having a designated theatre table for obstetric emergencies in other institutions.
- c) It is recommended that 24*7 laboratory services be available in all specialist hospitals. In the interim period it is necessary to consider making available selected investigations necessary for management of emergencies on a 24*7 basis.

12.12. Training

- a) It is recommended that in service-training needs for the different categories of staff be revisited and the training be competency based. Training plans and modules should be agreed upon and prepared nationally, so that irrespective of the training agency, there would be uniformity of messages. The plans and modules need to be revised every 5 years.
- b) The survey noted that use of the partograph and recording of events, both were poor especially in non-specialist institutions. A module that would impart knowledge and skills necessary to monitor labour using the partograph and a plan to improve its utilisation is important. The WHO self-learning module may be used for this purpose. In addition to the obstetric topics, in-service training modules should include the following; family planning, effective communication, basics of counselling and befriending.

- c) In conducting training, the staff should be trained as teams comprising doctors, nurses and midwives and should include emergency drills.
- d) Skills laboratories can be established in the selected hospitals /regional training centres/ districts in order to ensure competency based training. MOMCH or MO/Training at RTC can coordinate the training and mobilize local resources.

The training teams for districts can be trained at national level using the modules developed.

- e) It is recommended that a cluster system be established within a district/province for technical guidance, training, and to ensure clinical management based on nationally identified protocols and guidelines. It is recommended that specialist obstetricians working in the district should lead this process.
- f) The FHB with the professional colleges and quality secretariat need to establish a system for monitoring the quality of training at subnational level.
- g) It is recommended that each hospital / district maintain an easily accessible in-service training profile of its staff and that the district have a fixed pre planned training schedule and a budget enabling institutions to maximise the training opportunities.

12.13. Institution based family planning services

- a) Mortality and morbidity due to septic abortion remains high. Thus, minimising unwanted/ unplanned pregnancies is a priority. Delay in seeking care for septic abortion was noted, as such it is important to decriminalise the abortion seeker and improve the quality of post abortion care especially in the area of interactions with care providers.

- b) It is recommended that the institutional based family planning services be re-organised nationally. The services and the frequency with which they have to be provided by the different types of institutions be identified clearly. Ideally the hospitals with CEmONC facilities should conduct family planning clinics on 7 days a week.
- c) The roles and responsibilities of Obstetric and Gynecology ward staff in providing family planning services have to be clearly identified and circularised.
- d) Dedicated theatre time for the provision of permanent methods have to be identified at institution level.
- e) Stock outs of all family planning commodities were noted, as such it is recommended that stock control procedures be re-organised and re-instituted.
- f) It is recommended that the flow of information from the institution based FP clinics to the national health information system has to be strengthened.
- g) It is recommended that mechanisms for monitoring the implementation of these activities at district level have to be strengthened.
- h) Regular in-service training and updating knowledge on family planning should be made available for institutional staff.
- i) The post- partum IUD insertion to be piloted in selected institutions

This should be arrived through a consultative process that includes all relevant stakeholders.

The following levels are suggested for discussion towards a national consensus:

(1) Basic Neonatal Care (Essential Newborn Care)

It is recommended that basic neonatal care (Essential Newborn Care) is made available in all institutions that provide maternity care.

They should be able to provide the following services;

- Immediate care of the newborn at the time of delivery,
- Thermal care,
- Prevention and control of infections,
- Basic neonatal resuscitation,
- Support for breastfeeding,
- Examination of the newborn,
- Stabilization and provide care for newborns needing special care prior to transfer to a facility that can provide the appropriate level of neonatal care.

(2) Higher levels of care

It is recommended that special care and intensive care for the newborns be categorized under four levels.

Levels I and II would provide special care graded in a hierarchical fashion.

Levels III and III + would provide neonatal intensive care.

12.14 Neonatal care services

12.14.1 Availability and accessibility

- a) It is recommended that a policy decision be made regarding the different levels of neonatal care in the country as well as the services to be provided at each level.

A hierarchical structure is recommended taking in to consideration the fact that provision of highly specialised neonatal care is effective only when an adequate number of cases are managed at a given time. So that the care providers are able to develop their expertise in management. Furthermore, equipment and infrastructure needed for special care

is expensive and the provision of services need highly skilled personnel.

The following levels of care are recommended:

Level I neonatal care (special care)

It is recommended that all base hospitals be provided with Level I neonatal care.

Level II neonatal care (special care)

It is recommended that each district general hospital be provided with facilities for this level of care.

Level III neonatal intensive /critical care

This level would provide neonatal intensive care and would be limited to THs and PGHs. It is recommended that at least one facility is available per province.

Level III + neonatal intensive care

This would be limited to a few (3-4 for the country) special teaching hospitals where highly specialized services would be available such as neonatal cardiac and surgical facilities and the management of babies born with an extreme low birth weight (<1500 gms). or born at around 22-24 weeks of gestation.

It is recommended that the Lady Ridgeway Hospital, Teaching Hospital Karapitiya and Sirimavo Bandaranayake Children's Hospital and the TH Jaffna/Vavauniya/Anuradhapura be considered for a level III + institutions.

- b) It is recommended that the establishment of neonatal intensive care be done in a phased manner with the establishment of one or two Level III + facilities in the first phase.
- c) In deciding on the phasing of development of other levels of care it is recommended that institutions be selected based on the following criteria:

Population (births) as well as the area to be served

Terrain to be covered

Proximity to other facilities/ other level facilities

Time taken for transfer/retrieval between institutions

High neonatal mortality

Social determinants such as poverty, educational level etc

12.14.2. Establishment of Norms

- a) The study identified high variability between and within districts in resources.

It is recommended that norms to be identified for

- Human Resources
- Drugs
- Equipment
- Infrastructure

based on the level of care, workload and the type of institution.

A committee needs to be appointed comprising FHB, MoH and professional colleges to finalise the norms for neonatal care.

- b) Management of equipment to ensure functionality needs to be focused at all levels. This can be monitored at institutional level by developing SOPs, introducing check lists and by delegating the responsibility to relevant staff.
- c) Continuous water supply, electricity supply and communication facilities need to be ensured at all level of facilities.

12.14.3 Human Resource

- a) Study findings clearly demonstrate that it is necessary to identify norms on human resource for the different levels of neonatal care (Level I, II, III or III+) so as to ensure 24*7 services.
- b) It is recommended that Neonatologists are appointed to all the Level III and III+ institutions. It is recommended that human resources necessary to provide 24*7 services be available.
- c) Study findings indicate that some of the institutions cannot provide 24*7 neonatal intensive care due to lack of adequate number of medical officers. Designated medical officers for neonatology has to be appointed to all the level III and III+ institutions and to level II institutions based on workload. Norms for medical officers should be developed taking into consideration the work load, and the need to provide 24*7 service provision by this category of MO.

12.14.3 (b) Training

- a) It is recommended that the training requirements for different categories of personnel be identified according to the categorisation of care levels given above.
- b) Norms/standards for training of the staff involved in neonatal care be established.
- c) District training pools need to be developed and budgetary allocations provided for training.
- d) Training centres to provide such training has to be identified and training should be organised according to a schedule. Already established training programmes for neonatal care such as the Essential Newborn Care Course, Neonatal Advanced Life Support Course, 40 hours Breastfeeding

Counselling Course, Baby Friendly Hospital Initiative Course and the Baby Friendly Hospital Initiative Course for the Administrators have to be regularly conducted according to a set plan so as to cover all the staff caring for newborns.

- e) It is recommended that the in service training module on Care of the Sick Newborn developed under the SDF/ MCH project has be adapted and used for training.

12.14.4 Clinical standards and quality of care

The data collected on selected practices show that there is much variation in the care practices between institutions.

- a) It is recommended the level of management of complications that can be carried out at each level of hospital be defined along with clear instructions for decision making and referrals.
- b) Standards for newborn care have to be introduced. Systems for clinical auditing and quality assurance have to be developed and introduced to all levels of institutions.
- c) It is recommended that guidelines for care of the sick neonate have to be prepared and introduced to the institutions and regular use ensured to achieve quality assurance in clinical care.

Suggested priority topics to be considered for such guidelines are:

Care of normal newborn at birth and beyond
Hypothermia and thermal control
Breastfeeding
Management of LBW babies
Management of hypoglycaemia
Respiratory distress in newborn
Neonatal jaundice

Neonatal sepsis

Emergency triage assessment and treatment

Neonatal transport

- d) It is recommended that step by step procedures (algorithms/ clinical pathways / flowcharts) be developed summarising the above mentioned guidelines and their use ensured through circular directives.
- e) It is recommended that the Neonatal Death Investigation be streamlined including the Perinatal Death Audit. Mechanisms for monitoring follow up actions have to be formalised. .

12.14.5 Referral system

- a) It is recommended that protocols and guidelines be developed for the following:
- Referral
 - Accepting referrals
 - Referral pathways and
 - Retrieval of sick newborns
- b) It is recommended that in-utero transfers be sent to a Level III centre as much as possible. After delivery if no complications are identified they may be transferred back to the hospital of origin.
- c) SOPs should be developed on transfer of newborns.

12.14.6 Neonatal transport system

- a) With the development of the proposed levels of care, it would be essential to establish a well-structured neonatal transport system. It is recommended that a dedicated neonatal transport system be established with trained retrieval teams at designated centres. A centrally located bed management system is recommended linking all the neonatal units in the country.

12.14.7. Mother Baby Centres / Lactation Management Centres

- a) It is recommended that Mother Baby Centers and Lactation Management Centers be established as per current MoH recommendation; i.e. they should be available in all the hospitals providing specialist care: from Base Hospitals upwards i.e. in all institutions providing special care and intensive neonatal care.

12.14.8 Others

- a) The survey findings suggest that pharmacy management could be improved to maximise the effective utilisation of drugs.
- b) Poor documentation practices were encountered at all levels. Entering of diagnosis in BHTs, registers, records and operation notes in the ward and theatres need much improvement. Reporting of still births were poor and this needs immediate attention.
- c) It is recommended to introduce ICD 10th classification into hospital Morbidity and Mortality recording and return system thus allowing international comparisons.
- d) In order to overcome the undue delays in compilation of hospital statistics, it is recommended to introduce electronic IMMR on a phase basis.
- e) Steps should be taken to introduce an obstetric MIS. It may be piloted in one or two districts with a view to cover the whole country later.
- f) It is recommended that information on neonatal deaths within the first 24 hours of life be included in the routine MIS.



Cup Feeding - Courtesy of Dr. Dhammica Rowel

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Annexure I

Table 1: List of Institutions Selected for the Survey

	TH/PGH/DGH	BH	Divisional Hospitals
Western Province			
Colombo	TH - Castle Street TH - De Soysa GH - Sri Jayawardhanapura TH - Colombo South	BH - Avissawella BH - Homagama BH - Mulleriyawa	DH - Piliyandala
Gampaha	TH - Colombo North DGH - Gampaha DGH - Negombo	BH - Watupitiwala BH - Mirigama BH - Kiribathgoda	DH - Minuwangoda
Kaluthara	DGH - Kalutara	BH - Panadura BH - Horana BH - Pimbura	DH - Matugama DH - Beruwala
Central Province			
Kandy	TH - Kandy TH - Peradeniya TH - Gampola DGH - Nawalapitiya	BH - Teldeniya	DH - Akurana DH - Hasalaka
Matale	DGH - Matale	BH - Dambulla BH - Hettipola	DH - Galewela PU - Nalanda
NuwaraEliya	DGH - NuwaraEliya	BH - Dickoya BH - Rikillagaskada	DH - Maskeliya DH - Agapathana DH - Lindula RH - Watawala
Southern Province			
Galle	TH - Mahamodara	BH - Balapitiya BH - Elpitiya	DH - Hiniduma PU - Urugasmanhandiya
Matara	DGH - Matara	BH - Kamburupitiya BH - Deniyaya	PU - Morawaka RH - Urubokka
Hambanthota	DGH - Hambanthota	BH - Tangalle BH - Tissamaharamaya BH - Walasmulla	PU - Sooriyawewa
Northern Province			
Jaffna	TH - Jaffna	BH - Point pedro BH - Telippalai BH - Chavakachcheri BH - Kayts	PU - Chenkanai
Kilinochchi	DGH - Kilinochchi	BH Mulankavil	DH - Akkarayankulam DH - Tharmapuram PU - Voddakachchi
Mannar	DGH - Mannar		DH - Murukkan DH - Thalaimannar PU - Pesalai CD & MH - Nanattan
Vavuniya	DGH - Vavuniya	BH Cheddikulam	CD & MH - Poovarasakulam
Mullativu	DGH - Mullativu		DH - Mankulam PU - Mallavi

	TH/PGH/DGH	BH	Divisional Hospitals
Eastern Province			
Batticaloa	TH - Batticaloa	BH - Valachchenai BH - Kalawanchikudy	RH - Chenkaladi DH - Erawur CM & MH - Kokkadicholai
Ampara	DGH - Ampara	BH - Dehiattakandiya BH - Mahaoya	DH - Padiyathalawa
Kalmunai		BH - Kalmunai - South BH - Kalmunai - North BH - Akkaraipattu BH - Samanthurai BH - Pothuvil	
Tricomalee	DGH - Trincomalee	BH - Kanthalai BH - Muttur BH - Kinniya	RH - Serunuwara PU - Pulmodai
North Western Province			
Kurunegala	PGH - Kurunegala	BH - Kuliapitiya BH - Nikaweratiya BH - Dambadeniya BH - Polpithigama BH - Galgamuwa	DH - Gokarella
Puttalam	DGH - Chilaw	BH - Puttalam BH - Marawila	DH - Kalpitiya RH - Nawagattegama CD & MH - Mampuri
North Central Province			
Anuradhapura	TH - Anuradhapura	BH - Thabuttegama BH - Kebithigollawa BH - Padaviya	DH - Madawachchiya PU - Galnewa
Polonnaruwa	DGH - Polonnaruwa	BH - Medirigiriya BH - Welikanda	DH - Higurakgoda PU - Aralaganwila
Uva Province			
Badulla	PGH - Badulla	BH - Diyathalawa BH - Mahiyangana BH - Welimada	DH - Passara
Monaragala	DGH - Moneragala	BH - Bibile BH - Siyabalanduwa BH - Wellawaya	RH - Dambagalla
Sabaragamuwa Province			
Ratnapura	PGH - Ratnapura	BH - Embilipitiya BH - Kahawatta BH - Balangoda BH - Kalawana	DH - Rakwana PU - Nivithigala
Kegalle	DGH - Kegalle	BH - Karawanella BH - Mawanella BH - Warakapola	DH - Deraniyagala PU - Hemmathagama

Table 2: A summary of sources of data for each of the modules

Module	Data from
MODULE 1: IDENTIFICATION OF FACILITY AND INFRASTRUCTURE	Part A from the person in charge of the institution (Director, Medical Superintendent, Medical office in charge) Part B from the person in charge of the labour room (Ward sister/ Nurse in charge) Part C from the person in charge of the NICU/SCBU (Ward sister/ Nurse in charge) Part D from the person in charge of the Operating Theatre (Ward sister/ Nurse in charge) Part E from the person in charge of ambulance services and the Nursing Officer / Medical officer who accompanied a patient last trip
MODULE 2: HUMAN RESOURCES	Overall staffing situation: officer in charge of the institution or the administrator who works with the payroll. 24-Hour Availability and Staff who provide EmONC Signal Functions & Other Essential Services Section A: person in charge of the maternity ward Section B: person in charge of the paediatric ward, NICU/SCBU Section C: person in charge of the operating theatre, laboratory and the blood bank
MODULE 3: ESSENTIAL DRUGS, EQUIPMENT & SUPPLIES	Section A: from the Pharmacist Section B: from the Ward Sister / Nursing Officer In Charge of the Maternity ward Section C: from the Ward Sister / Nursing Officer In Charge of the NICU/SCBU Section D: from the Ward Sister / Nursing Officer In Charge of the Operating Theatre Section E: from the Head / Laboratory Technician in charge External data collectors / Checked by the institutional coordinator
MODULE 4: FACILITY CASE SUMMARY	External data collector from the registers and returns Part B: from the NICU/SCBU Part A: from the maternity ward

MODULE 4.1, 4.2 AND 4.3 ONE MONTH PROSPECTIVE SURVEY	Module 4.1: From the discharge BHTs from the obstetric ward Identified SHO from the obstetric unit Module 4.2: Summary of Gynecological complications (Gynaecology ward discharges) Identified SHO from the obstetric or gynaecology ward Module 4.3: Summary of Neonatal complications (NICU/SCBU discharges) – MO/PBU or NICU Summary of daily ward admissions, discharges, deliveries and transfers – Obstetric ward, Gyneacology ward and NICU/SCBU Ward sister / In-charge Nursing Officer
MODULE 5: EmONC SIGNAL FUNCTIONS & OTHER IMPORTANT SERVICES	Section A : from the Sister/Nurse in charge and the Medical Officer in the Maternity ward Section B: from the Medical Officer in the maternity ward Section C: from the Paediatric Medical Officer External data collector should complete the check lists through direct observation Section D: from the labour room Section E: from the post natal ward
MODULE 6: PARTOGRAPH REVIEW	External data collector: Select the last five normal deliveries that has a partograph attached
MODULE 7: KNOWLEDGE	Mid wives, Nursing Officers and Medical Officers in Obstetric ward Nursing Officers and Medical Officers at NICU/SCBU
MODULE 8: CESAREAN DELIVERY RECORD REVIEW	External data collector: Select ten cesarean deliveries for review from those in the ward and immediate discharges

Table 3: Frequency distribution of hospitals (below the level of BH) by number of births per month

No. of deliveries per month	No. of health institutions with LR
0	151
<1	114
1 to 5	159
6 to 10	44
11 to 15	16
16 to 20	9
21 to 25	3
26 to 30	2
31 to 35	5
36 to 40	3
Total	506

Annexure2: Calculation of EmONC indicators

Indicator	Description	How it is calculated	
1	Availability of emergency obstetric care: basic and comprehensive care facilities	Numerator	No of facilities in area providing basic or comprehensive EmONC
		Denominator	Population of area ¹ divided by 500 000
2	Geographical distribution of emergency obstetric care facilities	Numerator	No of facilities in area providing basic or comprehensive EmONC
		Denominator	Geographic extent of area in km ²
3	Proportion of all births in emergency obstetric care facilities	Numerator	No. of women giving birth in EmONC facilities in a given period
		Denominator	Total no. of births reported in area for the same period
4	Meeting the need for emergency obstetric care: proportion of women with major direct obstetric complications who are treated in such facilities	Numerator	No. of women with major direct obstetric complications treated at EmONC facilities in a specified period
		Denominator	Expected no. of women with severe direct obstetric complications in area for the same period (15% of reported births in the same area and period)
5	Caesarean section as proportion of all births	Numerator	No. of caesarean sections in EmONC facilities in specified period
		Denominator	Total no. of births reported in area for the same period
6	Direct obstetric case fatality rate	Numerator	No. of maternal deaths due to direct obstetric causes in EmONC facilities in specified period
		Denominator	Estimated no. of women treated for direct obstetric complications in EmONC facilities in same period
7	Still-birth death rate	Numerator	No. of stillbirths in EmONC facilities in specified period
		Denominator	No. of women giving birth in EmONC facilities in same period
8	Proportion of maternal deaths due to indirect causes in emergency obstetric care facilities	Numerator	No. of maternal deaths due to indirect causes in EmONC facilities in specified period
		Denominator	All maternal deaths (direct and indirect) in EmONC facilities in same period

**Table 1: Provision of signal functions by institution and district (during the last 3 months)-
Western Province**

Hospital	Colombo							Gampaha							Kaluthara						
	TH CSHW	TH DMH	TH Colombo South	BH Avissawella	BH Homagama	BH Mulleriyawa	DH Piliyandala	TH Colombo North	DGH Gampaha	DGH Negambo	BH Wathupitiwala	BH Mirigama	BH Kiribathgoda	DH Minuwangoda	DGH Kaluthara	BH Panadura	BH Horana	BH Pimbura	DH Mathugama	DH Beruwala	
	Two or more units	Two or more units	Two or more units	Two or more units	Two or more units	One unit one VOG	MBBS only	Two or more units	Two or more units	Two or more units	Two or more units	No VOG	No VOG	MBBS only	Two or more units	Two or more units	Two or more units	No VOG	MBBS only	MBBS only	
Administering of parenteral antibiotics							0						0	0					0		
Administering of parenteral oxytocins													0	0							
Administering of parenteral anti convulsants							0					0	0	0				0	0	0	
Performing manual removal of placenta							0					0	0						0	0	
Performing assisted vaginal delivery							0						0	0					0	0	
Removal of retained products of conception													0								
Performing neonatal resuscitation					0							0	0	0				0	0	0	
Performing obstetric surgeries													0								
Performing blood transfusions													0								

Data not available for SJP

Table 2: Provision of signal functions in the 3 months preceding the survey by institution and district – Central Province

Hospital	Kandy							Matale					Nuwara Eliya						
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	BH HETIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DG WATAWALA	DH AGARAPATHALA
Classification of institutions by specialist availability	Two or more units	Two units	Two units	Two units	No VOG	MBBS only	MBBS only	Two units	One unit one VOG	No VOG	MBBS only	MBBS only	One unit 2 VOG	One unit one VOG	One unit one VOG	MBBS only	MBBS only	MBBS only	MBBS only
Adminsistering of parenteral antibiotics					0	0						0				0			
Administering of parenteral oxytocins																			
Administering of parenteral anti convulsants				0	0	0				0		0			0	0			0
Performing manual removal of placenta										0		0							
Performing assisted vaginal delivery																			
Removal of retained products of conception																			
Performing neonatal resuscitation										0						0			0
Performing obstetric surgeries																			
Performing blood transfusions																			

**Table 3: Provision of signal functions by institution and district (during the last 3 months)-
Southern province**

Hospital	Galle					Matara					Hambanthota				
	TH MAHAMODARA	BH BALAPITIYA	BH ELPITIYA	DH HINDUMA	PU URAGASMANHANDIYA	DGH MATARA	BH KAMBURUPITIYA	BH DENIYAYA	DH MORAWAKA	RH URUBOKKA	DGH HAMBANTHOTA	BH TANGALLE	BH THISSAMAHARAMA	BH WALASMULLA	PU SOORIYAWEWA
Classification of institutions by specialist availability	Two or more units	Two units	One unit one VOG	MBBS only	MBBS only	Two units	One unit one VOG	No VOG	MBBS only	MBBS only	One unit 2 VOG	One unit 2 VOG	No VOG	No VOG	MBBS only
Administering of parenteral antibiotics					0					0					
Administering of parenteral oxytocins					0						0				
Administering of parenteral anti convulsants				0	0	0	0		0	0	0			0	0
Performing manual removal of placenta				0	0					0					0
Performing assisted vaginal delivery															
Removal of retained products of conception															
Performing neonatal resuscitation					0					0					
Performing obstetric surgeries															
Performing blood transfusions															

**Table 4: Provision of signal functions by institution and district (during the last 3 months)-
Northern Province**

Hospital	Jaffna						Kilinochchi					Mannar				Vavuniya			Mullathivu		
	TH JAFFNA	BH POINT PEDRO	BH THELIPPALAI	BH CHAVAKACHCHERI	BH KAYTS	DH CHANKANAI	DGH KILLINOCHCHI	BH MULANKAVIL	DH AKKARAYANKULAM	THARMAPURAM	PU VODDAKACHCHI	DGH MANNAR	DH MURUKKAN	DH TALAIMANNAR	PU PESALAI	CD NANATTAN	DGH VAVUNIYA	BH CHEDDIKULAM	DH POOVARASANKULUM	DGH MULLATHIVU	DH MALLAVI
Classification of institutions by specialist availability	Two or more units	One unit one VOG	One unit one VOG	No VOG	No VOG	MBBS only	One unit one VOG	No VOG	MBBS only	MBBS only	MBBS only	One unit one VOG	MBBS only	MBBS only	MBBS only	MBBS only	Two or more units	No VOG	MBBS only	One unit one VOG	MBBS only
Administering of parenteral antibiotics											0			0					0		
Administering of parenteral oxytocins											0								0		
Administering of parenteral anti convulsants							0	0		0	0		0	0	0	0		0	0		0
Performing manual removal of placenta					0	0		0			0								0		
Performing assisted vaginal delivery				0	0						0		0	0					0		
Removal of retained products of conception																					
Performing neonatal resuscitation			0	0				0			0								0		
Performing obstetric surgeries																					
Performing blood transfusions																					

Table 5: Provision of signal functions in the 3 months preceding the survey by institution and district- Eastern Province

	Batticaloa District					Ampara District (including Kalmunai)										Trincomalee district					
						Ampara				Kalmunai											
	TH BATTICALOA	BH VALACHCHENAI	BH KALUWANCHIKUDY	RH CHENKALADI	CM-KOKKODICHOLEI	DGH AMPARA	BH DEHIATTAKANDIYA	BH MAHAOYA	DH PADIYATHALAWA		BH SAMANTHURAI	KALMUNAI AMH	KALMUNAI NORTH	BH AKKAREIPATTU	BH POTHUVIL	DGH TRINCOMALEE	BH KANTHALAI	BH MUTUR	BH KINNIYA	BH SERUNUWARA	PU PULMODDAI
Administering of parenteral antibiotics																					
Administering of parenteral oxytocins																					
Ad. of parenteral anti convultants		0	0		0			0													
Performing manual removal of placenta																					
Performing assisted vaginal delivery				0																	0
Removal of retained products																					0
Performing neonatal resuscitation									0											0	
Performing obstetric surgeries																					
Performing blood transfusions																					

Table 6: Provision of signal functions in the 3 months preceding the survey by institution and district - North Western Province

Hospital	Kurunegala							Puttalam					
	PGH KURUNEGALA	BH KULIYAPITIYA	BH NIKAWERATTIYA	BH DAMBADENIYA	BH POLPITHIGAMA	BH GALGAMUWA	DH GOKARELLA	DGH CHILAW	BH PUTTALAM	BH MARAWILA	DH KALPITIYA	RH NAWAGATTEGAMA	PU MAMPURI
<i>Classification of institutions by specialist availability</i>	Two or more units	Two units	One unit one VOG	One unit one VOG	No VOG	No VOG	MBBS only	Two units	One unit 2 VOG	One unit one VOG	MBBS only	MBBS only	MBBS only
Administering of parenteral antibiotics													
Administering of parenteral oxytocins													
Administering of parenteral anti convulsants			0	0	0			0			0		
Performing manual removal of placenta												0	0
Performing assisted vaginal delivery												0	0
Removal of retained products of conception													
Performing neonatal resuscitation							0						
Performing obstetric surgeries													
Performing blood transfusions													

Table 7: Provision of signal functions in the 3 months preceding the survey by institution and district- North Central Province

	Anuradhapura						Polonnaruwa				
Hospital	TH ANURADHAPURA	BH THAMBUGAMMA	BH KEBITIGALLAWA	BH PADAVIYA	DH MADAWACHCHIYA	DH GALNEWA	DGH POLONNARUWA	BH MADIRIGIRIYA	BH WELIKANDA	DH HINGIRAKGODA	PU ARALGANWILA
<i>Classification of institutions by specialist availability</i>											
<i>Administering of parenteral antibiotics</i>					0				0	0	0
<i>Administering of parenteral oxytocins</i>									0		
<i>Administering of parenteral anti convulsants</i>		0	0		0			0	0	0	
<i>Performing manual removal of placenta</i>						0			0		
<i>Performing assisted vaginal delivery</i>				0		0			0		
<i>Removal of retained products of conception</i>											
<i>Performing neonatal resuscitation</i>				0				0	0	0	0
<i>Performing obstetric surgeries</i>											
<i>Performing blood transfusions</i>											

Table 8: Provision of signal functions in the 3 months preceding the survey by institution and district – Uva Province

	Monaragala District					Badulla District				
Hospital	DGH Monaragala	BH Bibile	BH Siyambalanduwa	BH Wellawaya	RH Dambagalle	PGH Badulla	BH Mahiyangana	BH Diyathalawa	BH Welimada	DH Passara
<i>Classification of institutions by specialist availability</i>	One unit 2 VOG	No VOG	No VOG	No VOG	MBBS only	Two units	One unit one VOG	One unit one VOG	No VOG	MBBS only
<i>Administering of parenteral antibiotics</i>										
<i>Administering of uterotonic drugs</i>										
<i>Administering of parenteral anti convulsants</i>		0	0	0	0					
<i>Manual removal of placentae</i>										
<i>Removal of retained products</i>										
<i>Perform assisted vaginal deliveries</i>										
<i>Perform basic neonatal resuscitation</i>					0					
<i>Perform obstetric surgery</i>										
<i>Perform blood transfusions</i>										

**Table 9: Provision of signal functions in the 3 months preceding the survey
by institution and district- Sabaragamuwa Province**

Hospital	Ratnapura district							Kegalle district					
	PGH RATNAPURA	BH EMBILIPITIYA	BH KAHAWATTA	BH BALANGODA	BH KALAWANA	DH RAKWANA	PU NIVITIGALA	DGH KEGALLE	BH MAWANELLA	BH KARAWANELLA	BH WARAKAPOLA	DH DERANIYAGALA	PU HEMMATHAGAMA
Classification of institutions by specialist availability													
Administering of parenteral antibiotics							0						0
Administering of parenteral oxytocins													
Administering of parenteral anti convulsants					0	0	0	0	0			0	0
Performing manual removal of placenta													0
Performing assisted vaginal delivery					0	0						0	0
Removal of retained products of conception													
Performing basic neonatal resuscitation						0	0				0		
Performing obstetric surgeries													
Performing blood transfusions													

Table 10: Availability of facilities for provision of signal functions- Western Province

	Colombo								Gampaha								Kalutara						
	TH CSHW	TH DMH	TH KALUBOWILA	BH AVISSAWELLA	BH HOMAGAMA	BH MULLERIYAWA	DH PILIYANDALA		TH RAGAMA	DGH GAMPAAHA	DGH NEGOMBO	BH WATHUPITTIWALA	BH MIRIGAMA	BH KIRIBATHGODA	DH MINUWANGODA		GH KALUTARA	BH PANADURA	BH HORANA	BH PIMBURA	DH MATHUGAMA	DH BERUWALA	
	L101	L102	L104	L105	L106	L108	L107		B101	B302	B203	B304	B305	B306	B307		A101	A201	A202	A203	A204	A102	
At least one parenteral antibiotic	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
At least one parenteral uterotonic drug	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Magnesium sulphate	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🔴	🟢		🟢	🟢	🟢	🔴	🟢	🟢	
Pethidine	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🔴	🟢	
Adrenaline	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🔴	🟢	
Vacuum Extractor	🟢	🟢	🟢	🟢	🟢	🔴	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🟢	🟢	🟢	
Forceps	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🟢	🟢	
Neonatal Ambu bag	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Neonatal sucker	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🔴	🔴	
At least one Consultant VOG	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🔴	🔴	
At least one MO BB	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🔴	🔴	
At least one MO trained in anaesthesia	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🔴	🔴	
At least two Consultant VOG	🟢	🟢	🟢	🟢	🟢	🔴	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🔴	🔴	
At least three MO BB	🟢	🟢	🟢	🟢	🟢	🔴	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🔴	🔴	🔴	🔴	
At least two or more persons trained in anas	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🔴	🔴	
House officers available	🟢	🟢	🟢	🟢	🟢	🔴	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🟢	🔴	🔴	🔴	
Medical officers	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Nursing officers	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Midwives	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Electricity	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Continuous water	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🔴	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Functional generator	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🟢	🔴	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Functional operating theatre	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🔴	🔴	🔴	🔴	
Functional blood bank	🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🔴	🔴	🔴		🟢	🟢	🔴	🔴	🔴	🔴	
Absence of training issues																							
Manual removal of the placenta	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	
Assisted Vaginal Deliveries	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🟢	🟢	
Neonatal Resuscitation	🟢	🟢	🟢	🟢	🟢	🟢	🟢		🟢	🟢	🟢	🟢	🟢	🟢	🔴		🟢	🟢	🟢	🟢	🟢	🟢	

Table 11: Availability of facilities for provision of signal functions – Central Province

	Kandy							Matale					Nuwara Eliya						
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	BH HETTIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DH WATAWALA	DH AGARAPATHALA
	F101	F102	F103	F104	F105	F106	F107	C101	C102	C103	C104	C105	G101	G102	G103	G104	G105	G106	G107
At least one par. AB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one par. UTD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Magnesium sulphate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pethidine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Adrenaline	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Vacuum Extractor	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Forceps	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Neonatal sucker	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one MO BB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least three MO BB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
House officers available	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Medical officers	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nursing officers	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Midwives	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Electricity	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Continuous water	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional generator	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional operating theatre	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional blood bank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Absence of trainign issues	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Manual removal of the placenta	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Table 12: Availability of facilities for provision of signal functions – Southern Province

	Galle						Matara						Hambanthota				
	TH MAHAMODARA	BH BALAPITIYA	BH ELPITIYA	DH HINIDUMA	PU URAGASMANHANDIYA		DGH MATARA	BH KAMBURUPITIYA	BH DENIYAYA	DH MORAWAKA	RH URUBOKKA		DGH HAMBANTHOTA	BH TANGALLE	BH THISSAMAHARAMA	BH WALASMULLA	PU SOORIYAWEWA
	M101	M102	M103	M104	M105		N101	N102	N103	N104	N105		O101	O102	O103	O104	O105
At least one par. AB	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least one par. UTD	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Magnesium sulphate	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Pethidine	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Adrenaline	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Vacuum Extractor	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Forceps	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Neonatal sucker	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least one MO BB	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least three MO BB	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
House officers available	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Medical officers	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Nursing officers	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Midwives	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Electricity	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Continuous water	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Functional generator	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Functional operating theatre	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Functional blood bank	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Absence of training issues																	
Manual removal of the placenta	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●

Table 13: Availability of facilities for provision of signal functions- Northern province

	Jaffna							Kilinochchi						Mannar						Vavuniya				Mullathivu	
	TH JAFFNA	BH POINT PEDRO	BH THELIPPALAI	BH CHAVAKACHCHERI	BH KAYTS	DH CHANKANAI		DGH KILLINOCHCHI	BH MULANKAVIL	DH AKKARAYANKULAM	DH THARNMAPURAM	PU VODDAKACHCHI		DGH MANNAR	DH MURUKKAN	DH TALAIMANNAR	PU PESALAI	CD NANATTAN		DGH VAVUNIYA	BH CHEDDIKULAM	DH POOVARASANKULUM		DGH MULLATHIVU	DH MALLAVI
	R101	R102	R103	R104	R105	R106		S101	S102	S103	S104	S105		T101	T102	T103	T104	T105		U101	U102	U103		V101	V102
At least one parenteral antibiotic	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least one parenteral uterotonic drug	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Magnesium sulphate	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Pethidine	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Vacuum Extractor	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Forceps	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Neonatal Ambu bag	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Neonatal sucker	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least one Consultant VOG	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least one MO BB	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least one MO trained in anaesthesia	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least two Consultant VOG	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least three MO BB	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
At least two or more persons trained in anas	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
House officers available	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Medical officers	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Nursing officers	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Midwives	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Electricity	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Continuous water	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Functional generator	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Functional operating theatre	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Functional blood bank	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Absence of training issues																									
Manual removal of the placenta	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Assisted Vaginal Deliveries	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●
Neonatal Resuscitation	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●	●		●	●	●		●	●

Table 14: Availability of facilities for provision of signal functions – Eastern province

	Batticaloa					Ampara				Kalmunai					Tricomalee					
	TH BATTICALOA	BH VALACHCHENAI	BH KALUWANCHIKUDY	RH CHENKALADI	CM-KOKKODICHOLEI	DGH AMPARA	BH DEHIATTAKANDIYA	BH MAHAOYA	DH PADIYATHALAWA	BH SAMANTHURAI	KALMUNAI AMH	KALMUNAI NORTH	BH AKKAREIPATTU	BH POTHUVIL	DGH TRINCOMALEE	BH KANTHALAI	BH MUTUR	BH KINNIYA	DH SERUNUWARA	PU PULMODDAI
	W101	W102	W103	W104	W106	X101	X102	X103	X104	Y101	Y102	Y103	Y104	Y105	Z101	Z102	Z103	Z104	Z105	Z106
At least one par. AB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one par. UTD	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Magnesium sulphate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pethidine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Adrenaline	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Vacuum Extractor	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Forceps	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Neonatal sucker	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one MO BB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least three MO BB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
House officers available	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Medical officers	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nursing officers	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Midwives	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Electricity	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Continuous water	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional generator	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional operating theatre	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Functional blood bank	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Absence of trainign issues	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Manual removal of the placenta	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Table 15: Availability of facilities for provision of signal functions- North Western Province

	Kurunegala									Puttalam					
	PGH KURUNEGALA	BH KULYAPITIYA	BH NIKAWERATIYA	BH DAMBADENIYA	BH POLPITHIGAMA	BH GALGAMUWA	DH GOKARELLA			DGH CHILAW	BH PUTTALAM	BH MARAWILA	DH KALPITIYA	RH NAWAGATTEGAMA	PU MAMPURI
	P101	P102	P103	P104	P105	P107	P106			Q101	Q102	Q103	Q104	Q105	Q106
At least one par. AB	●	●	●	●	●	●	●			●	●	●	●	●	●
At least one par. UTD	●	●	●	●	●	●	●			●	●	●	●	●	●
Magnesium sulphate	●	●	●	●	●	●	●			●	●	●	●	●	●
Pethidine	●	●	●	●	●	●	●			●	●	●	●	●	●
Adrenaline	●	●	●	●	●	●	●			●	●	●	●	●	●
Vacuum Extractor	●	●	●	●	●	●	●			●	●	●	●	●	●
Forceps	●	●	●	●	●	●	●			●	●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●	●	●			●	●	●	●	●	●
Neonatal sucker	●	●	●	●	●	●	●			●	●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●	●	●			●	●	●	●	●	●
At least one MO BB	●	●	●	●	●	●	●			●	●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●	●	●			●	●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●	●	●			●	●	●	●	●	●
At least three MO BB	●	●	●	●	●	●	●			●	●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●	●	●			●	●	●	●	●	●
House officers available	●	●	●	●	●	●	●			●	●	●	●	●	●
Medical officers	●	●	●	●	●	●	●			●	●	●	●	●	●
Nurising officers	●	●	●	●	●	●	●			●	●	●	●	●	●
Midwives	●	●	●	●	●	●	●			●	●	●	●	●	●
Electricity	●	●	●	●	●	●	●			●	●	●	●	●	●
Continious water	●	●	●	●	●	●	●			●	●	●	●	●	●
Functional generator	●	●	●	●	●	●	●			●	●	●	●	●	●
Functional operating theatre	●	●	●	●	●	●	●			●	●	●	●	●	●
Functional blood bank	●	●	●	●	●	●	●			●	●	●	●	●	●
Absence of trainign issues															
Manual removal of the placenta	●	●	●	●	●	●	●			●	●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●	●	●			●	●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●	●	●			●	●	●	●	●	●

Table 16: Availability of facilities for provision of signal functions – North Central province

	Anuradhapura						Polonnaruwa				
	TH ANURADHAPURA	BH THAMBUGGAMA	BH KEBITIGALLAWA	BH PADAVIYA	DH MADAWACHCHIYA	DH GALNEWA	DGH POLONNARUWA	BH MADIRIGIRIYA	BH WELIKANDA	DH HINGIRAKGODA	PU ARALGANWILA
	J101	J102	J103	J104	J105	J106	K101	K102	K103	K104	K105
At least one par. AB	●	●	●	●	●	●	●	●	●	●	●
At least one par. UTD	●	●	●	●	●	●	●	●	●	●	●
Magnesium sulphate	●	●	●	●	●	●	●	●	●	●	●
Pethidine	●	●	●	●	●	●	●	●	●	●	●
Adrenaline	●	●	●	●	●	●	●	●	●	●	●
Vacuum Extractor	●	●	●	●	●	●	●	●	●	●	●
Forceps	●	●	●	●	●	●	●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●	●	●	●	●	●	●
Neonatal sucker	●	●	●	●	●	●	●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●	●	●	●	●	●	●
At least one MO BB	●	●	●	●	●	●	●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●	●	●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●	●	●	●	●	●	●
At least three MO BB	●	●	●	●	●	●	●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●	●	●	●	●	●	●
House officers available	●	●	●	●	●	●	●	●	●	●	●
Medical officers	●	●	●	●	●	●	●	●	●	●	●
Nurising officers	●	●	●	●	●	●	●	●	●	●	●
Midwives	●	●	●	●	●	●	●	●	●	●	●
Electricity	●	●	●	●	●	●	●	●	●	●	●
Continious water	●	●	●	●	●	●	●	●	●	●	●
Functional generator	●	●	●	●	●	●	●	●	●	●	●
Functional operating theatre	●	●	●	●	●	●	●	●	●	●	●
Functional blood bank	●	●	●	●	●	●	●	●	●	●	●
Absence of trainign issues	●	●	●	●	●	●	●	●	●	●	●
Manual removal of the placenta	●	●	●	●	●	●	●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●	●	●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●	●	●	●	●	●	●

Table 17: Availability of facilities for provision of signal functions – Uva Province

	Monaragala						Badulla				
	DGH MONARAGALA	BH BIBILE	BH SIYABALANDUWA	BH WELLAWAYA	RH DAMBAGALLA		PGH BADULLA	BH MAHIYANGANAYA	BH DIYATHALAWA	BH WELIMADA	DH PASSARA
	E101	E102	E103	E104	E105		D101	D102	D103	D104	D105
At least one parenteral antibiotic	●	●	●	●	●		●	●	●	●	●
At least one parenteral uterotonic drug	●	●	●	●	●		●	●	●	●	●
Magnesium sulphate	●	●	●	●	●		●	●	●	●	●
Pethidine	●	●	●	●	●		●	●	●	●	●
Vacuum Extractor	●	●	●	●	●		●	●	●	●	●
Forceps	●	●	●	●	●		●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●		●	●	●	●	●
Neonatal sucker	●	●	●	●	●		●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●		●	●	●	●	●
At least one MO BB	●	●	●	●	●		●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●		●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●		●	●	●	●	●
At least three MO BB	●	●	●	●	●		●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●		●	●	●	●	●
House officers available	●	●	●	●	●		●	●	●	●	●
Medical officers	●	●	●	●	●		●	●	●	●	●
Nurising officers	●	●	●	●	●		●	●	●	●	●
Midwives	●	●	●	●	●		●	●	●	●	●
Electricity	●	●	●	●	●		●	●	●	●	●
Continuous water	●	●	●	●	●		●	●	●	●	●
Functional generator	●	●	●	●	●		●	●	●	●	●
Functional operating theatre	●	●	●	●	●		●	●	●	●	●
Functional blood bank	●	●	●	●	●		●	●	●	●	●
Absence of training issues	●	●	●	●	●		●	●	●	●	●
Manual removal of the placenta	●	●	●	●	●		●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●		●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●		●	●	●	●	●

Table 18: Availability of facilities for provision of signal functions- Sabaragamuwa Province

	Ratnapura								Kegalle					
	PGH RATNAPURA	BH EMBILIPITIYA	BH KAHAWATTA	BH BALANGODA	BH KALAWANA	DH RAKWANA	PU NIVITIGALA		DGH KEGALLE	BH MAWANELLA	BH KARAWANELLA	BH WARAKAPOLA	DH DERANIYAGALA	PU HEMMATHAGAMA
	H101	H102	H103	H104	H105	H106	H107		I101	I102	I103	I104	I105	I106
At least one par. AB	●	●	●	●	●	●	●		●	●	●	●	●	●
At least one par. UTD	●	●	●	●	●	●	●		●	●	●	●	●	●
Magnesium sulphate	●	●	●	●	●	●	●		●	●	●	●	●	●
Pethidine	●	●	●	●	●	●	●		●	●	●	●	●	●
Adrenaline	●	●	●	●	●	●	●		●	●	●	●	●	●
Vacuum Extractor	●	●	●	●	●	●	●		●	●	●	●	●	●
Forceps	●	●	●	●	●	●	●		●	●	●	●	●	●
Neonatal Ambu bag	●	●	●	●	●	●	●		●	●	●	●	●	●
Neonatal sucker	●	●	●	●	●	●	●		●	●	●	●	●	●
At least one Consultant VOG	●	●	●	●	●	●	●		●	●	●	●	●	●
At least one MO BB	●	●	●	●	●	●	●		●	●	●	●	●	●
At least one MO trained in anaesthesia	●	●	●	●	●	●	●		●	●	●	●	●	●
At least two Consultant VOG	●	●	●	●	●	●	●		●	●	●	●	●	●
At least three MO BB	●	●	●	●	●	●	●		●	●	●	●	●	●
At least two or more persons trained in anas	●	●	●	●	●	●	●		●	●	●	●	●	●
House officers available	●	●	●	●	●	●	●		●	●	●	●	●	●
Medical officers	●	●	●	●	●	●	●		●	●	●	●	●	●
Nursing officers	●	●	●	●	●	●	●		●	●	●	●	●	●
Midwives	●	●	●	●	●	●	●		●	●	●	●	●	●
Electricity	●	●	●	●	●	●	●		●	●	●	●	●	●
Continuous water	●	●	●	●	●	●	●		●	●	●	●	●	●
Functional generator	●	●	●	●	●	●	●		●	●	●	●	●	●
Functional operating theatre	●	●	●	●	●	●	●		●	●	●	●	●	●
Functional blood bank	●	●	●	●	●	●	●		●	●	●	●	●	●
Absence of training issues	●	●	●	●	●	●	●		●	●	●	●	●	●
Manual removal of the placenta	●	●	●	●	●	●	●		●	●	●	●	●	●
Assisted Vaginal Deliveries	●	●	●	●	●	●	●		●	●	●	●	●	●
Neonatal Resuscitation	●	●	●	●	●	●	●		●	●	●	●	●	●

Table 19: Institutions capable of providing signal functions by district- Western province

	COLOMBO							GAMPAHA							KALUTARA					
	TH CSHW	TH DMH	TH Colombo South	BH Avissawella	BH Homagama	BH Mulleriyawa	DH Piliyandala	TH Colombo North	DGH Gampaha	DGH Negambo	BH Wathupitiwala	BH Mirigama	BH Kiribathgoda	DH Minuwangoda	GH Kalutara	BH Panadura	BH Horana	BH Pimbura	DH Mathugama	DH Beruwala
	Two or more units	Two or more units	Two or more units	Two or more units	Two or more units	One unit one VOG	MBBS only	Two or more units	Two or more units	Two or more units	Two or more units	No VOG	No VOG	MBBS only	Two or more units	Two or more units	Two or more units	No VOG	MBBS only	MBBS only
	L101	L102	L104	L105	L106	L108	L107	B101	B302	B203	B304	B305	B306	B307	A101	A201	A202	A203	A204	A102
Administering of parenteral antibiotics																				
Administering of parenteral oxytocins																				
Administering of parenteral anti convulsants																				
Performing manual removal of placenta																				
Removal of retained products of conception																				
Performing assisted vaginal delivery																				
Performing neonatal resuscitation																				
Performing obstetric surgeries																				
Performing blood transfusions																				

	Kandy							Matale					Nuwara Eliya						
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	BH HETIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DH WATAWALA	DH AGARAPATHALA
UFI	F101	F102	F103	F104	F105	F106	F107	C101	C102	C103	C104	C105	G101	G102	G103	G104	G105	G106	G107
Administering of parenteral antibiotics																			
Administering of parenteral oxytocins																			
Administering of parenteral anti convulsants																			
Performing manual removal of placenta																			
Removal of retained products of conception																			
Performing assisted vaginal delivery																			
Performing neonatal resuscitation																			
Performing obstetric surgeries																			
Performing blood transfusions																			

Table 21: Institutions capable of providing signal functions by district- Southern Province

	GALLE					MATARA					HAMBANTOTA				
	TH MAHAMODARA	BH BALAPITIYA	BH ELPITIYA	DH HINIDUMA	PU URAGASMANHANDIYA	DGH MATARA	BH KAMBURUPITIYA	BH DENIYAYA	DH MORAWAKA	RH URUBOKKA	DGH HAMBANTHOTA	BH TANGALLE	BH THISSAMAHARAMA	BH WALASMULLA	PU SOORIYAWEWA
	M101	M102	M103	M104	M105	N101	N102	N103	N104	N105	O101	O102	O103	O104	O105
Administering of parenteral antibiotics															
Administering of parenteral oxytocins															
Administering of parenteral anti convulsants															
Performing manual removal of placenta															
Removal of retained products of conception															
Performing assisted vaginal delivery															
Performing neonatal resuscitation															
Performing obstetric surgeries															
Performing blood transfusions															

Table 22: Institutions capable of providing signal functions by district – Northern Province

	Jaffna						Kilinochchi					Mannar					Vavuniya			Mullathivu	
	TH JAFFNA	BH POINT PEDRO	BH THELIPPALAI	BH CHAVAKACHCHERI	BH KAYTS	DH CHANKANAI	DGH KILLINOCHCHI	BH MULANKAVIL	DH AKKARAYANKULAM	THARMAPURAM	PU VODDACKACHCHI	DGH MANNAR	DH MURUKKAN	DH TALAIMANNAR	PU PESALAI	CD NANATTAN	DGH VAVUNIYA	BH CHEDDIKULAM	DH POOVARASANKULUM	DGH MULLATHIVU	DH MALLAVI
	R101	R102	R103	R104	R105	R106	S101	S102	S103	S104	S105	T101	T102	T103	T104	T105	U101	U102	U103	V101	V102
Administering of parenteral antibiotics																					
Administering of parenteral oxytocins																					
Administering of parenteral anti convulsants																					
Performing manual removal of placenta																					
Removal of retained products of conception																					
Performing assisted vaginal delivery																					
Performing neonatal resuscitation																					
Performing obstetric surgeries																					
Performing blood transfusions																					

Table 23: Institutions capable of providing signal functions by district – Eastern Province

	Batticaloa District					Ampara District (including Kalmunai)										Trincomalee district					
						Ampara					Kalmunai										
	TH BATTICALOA	BH VALACHCHENAI	BH KALUWANCHIKUDY	RH CHENKALADI	CM-KOKKODICHOLEI	DGH AMPARA	BH DEHIATTAKANDIYA	BH MAHAOYA	DH PADIYATHALAWA		BH SAMANTHURAI	KALMUNAI AMH	KALMUNAI NORTH	BH AKKAREIPATTU	BH POTHUVIL	DGH TRINCOMALEE	BH KANTHALAI	BH MUTUR	BH KINNIYA	BH SERUNUWARA	PU PULMODDAI
Administering of parenteral antibiotics																					
Administering of parenteral oxytocins																					
Ad. of parenteral anti consultants																					
Performing manual removal of placenta																					
Performing assisted vaginal delivery																					
Removal of retained products																					
Performing neonatal resuscitation																					
Performing obstetric surgeries																					
Performing blood transfusions																					

Table 24: Institutions capable of providing signal functions by district- North Western Province

Hospital	Kurunegala								Puttalam					
	PGH KURUNEGALA	BH KULIYAPITIYA	NIKAWERATIYA	DAMBADENIYA	POLPITHIGAMA	BH GALGAMUWA	DH GOKARELLA		DGH CHILAW	BH PUTTALAM	BH MARAWILA	DH KALPITIYA	RH NAWAGATTEGAMA	PU MAMPURI
Classification of institutions by specialist availability	Two or more units	Two units	One unit one VOG	One unit one VOG	No VOG	No VOG	MBBS only		Two units	One unit 2 VOG	One unit one VOG	MBBS only	MBBS only	MBBS only
Administering of parenteral antibiotics														
Administering of parenteral oxytocins														
Administering of parenteral anti convulsants														
Performing manual removal of placenta														
Removal of retained products of conception														
Performing assisted vaginal delivery														
Performing neonatal resuscitation														
Performing obstetric surgeries														
Performing blood transfusions														

Table 27: Institutions capable of providing signal functions by district – Sabaragamuwa Province

Hospital	Ratnapura district							Kegalle district					
	PGH RATNAPURA	BH EMBILIPITIYA	BH KAHAWATTA	BH BALANGODA	BH KALAWANA	DH RAKWANA	PU NIVITIGALA	DGH KEGALLE	BH MAWANELLA	BH KARAWANELLA	BH WARAKAPOLA	DH DERANIYAGALA	PU HEMMATHAGAMA
Classification of institutions by specialist availability													
Administering of parenteral antibiotics													
Administering of parenteral oxytocins													
Administering of parenteral anti convulsants													
Performing manual removal of placenta													
Performing assisted vaginal delivery													
Removal of retained products of conception													
Performing basic neonatal resuscitation													
Performing obstetric surgeries													
Performing blood transfusions													

Table 28: Ability to provide signal functions 24*7 – Western Province

	COLOMBO							GAMPAHA							KALUTARA					
	TH CSHW	TH DMH	TH Colombo South	BH Avissawella	BH Homagama	BH Mulleriyawa	DH Piliyandala	TH Colombo North	DGH Gampaha	DGH Negambo	BH Wathupitiwala	BH Mirigama	BH Kiribathgoda	DH Minuwangoda	GH Kalutara	BH Panadura	BH Horana	BH Pimbura	DH Mathugama	DH Beruwala
	Two or more units	Two or more units	Two or more units	Two or more units	Two or more units	One unit one VOG	MBBS only	Two or more units	Two or more units	Two or more units	Two or more units	No VOG	No VOG	MBBS only	Two or more units	Two or more units	Two or more units	No VOG	MBBS only	MBBS only
	L101	L102	L104	L105	L106	L108	L107	B101	B302	B203	B304	B305	B306	B307	A101	A201	A202	A203	A204	A102
Administering of parenteral antibiotics																				
Administering of parenteral oxytocins																				
Administering of parenteral anti convulsants																				
Performing manual removal of placenta																				
Removal of retained products of conception																				
Performing assisted vaginal delivery																				
Performing neonatal resuscitation																				
Performing obstetric surgeries																				
Performing blood transfussions																				

Table 29: Ability to provide signal functions 24*7 –Central Province

	Kandy							Matale					Nuwara Eliya						
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	BH HETIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DH WATAWALA	DH AGARAPATHALA
UFI	F101	F102	F103	F104	F105	F106	F107	C101	C102	C103	C104	C105	G101	G102	G103	G104	G105	G106	G107
Administering of parenteral antibiotics																			
Administering of parenteral oxytocins																			
Administering of parenteral anti convulsants																			
Performing manual removal of placenta																			
Removal of retained products of conception																			
Performing assisted vaginal delivery																			
Performing neonatal resuscitation																			
Performing obstetric surgeries																			
Performing blood transfusions																			

Table 30: Ability to provide signal functions 24*7 –Southern Province

	GALLE					MATARA					HAMBANTOTA				
	TH MAHAMODARA	BH BALAPITIYA	BH ELPIITYA	DH HINIDUMA	PU URAGASMANHANDIYA	DGH MATARA	BH KAMBURUPITIYA	BH DENIYAYA	DH MORAWAKA	RH URUBOKKA	DGH HAMBANTHOTA	BH TANGALLE	BH THISSAMAHARAMA	BH WALASMULLA	PU SOORIYAWEWA
	M101	M102	M103	M104	M105	N101	N102	N103	N104	N105	O101	O102	O103	O104	O105
Administering of parenteral antibiotics															
Administering of parenteral oxytocins															
Administering of parenteral anti convulsants															
Performing manual removal of placenta															
Removal of retained products of conception															
Performing assisted vaginal delivery															
Performing neonatal resuscitation															
Performing obstetric surgeries															
Performing blood transfusions															

Table 31: Ability to provide signal functions 24*7 Northern Province

	Jaffna						Kilinochi					Mannar					Vavuniya			Mullathivu	
	TH JAFFNA	BH POINT PEDRO	BH THELIPPALAI	BH CHAVAKACHCHERI	BH KAYTS	DH CHANKANAI	DGH KILLINOCHCHI	BH MULANKAVIL	DH AKKARAYANKULAM	THARMAPURAM	PU VODDAKACHCHI	DGH MANNAR	DH MURUKKAN	DH TALAIMANNAR	PU PESALAI	CD NANATTAN	DGH VAVUNIYA	BH CHEDDIKULAM	DH POOVARASANKULUM	DGH MULLATHIVU	DH MALLAVI
	R101	R102	R103	R104	R105	R106	S101	S102	S103	S104	S105	T101	T102	T103	T104	T105	U101	U102	U103	V101	V102
Administering of parenteral antibiotics																					
Administering of parenteral oxytocins																					
Administering of parenteral anti convulsants																					
Performing manual removal of placenta																					
Removal of retained products of conception																					
Performing assisted vaginal delivery																					
Performing neonatal resuscitation																					
Performing obstetric surgeries																					
Performing blood transfusions																					

Table 32: Ability to provide signal functions 24*7 – Eastern province

	Batticaloa District					Ampara District (including Kalmunai)										Trincomalee district					
						Ampara					Kalmunai										
	TH BATTICALOA	BH VALACHCHENAI	BH KALUWANCHIKUDY	RH CHENKALADI	CM-KOKKODICHOLEI	DGH AMPARA	BH DEHIATTAKANDIYA	BH MAHAOYA	DH PADIYATHALAWA		BH SAMANTHURAI	KALMUNAI AMH	KALMUNAI NORTH	BH AKKAREIPATTU	BH POTHUVIL	DGH TRINCOMALEE	BH KANTHALAI	BH MUTUR	BH KINNIYA	BH SERUNUWARA	PU PULMODDAI
Administering of parenteral antibiotics																					
Administering of parenteral oxytocins																					
Ad. of parenteral anti consultants																					
Performing manual removal of placenta																					
Performing assisted vaginal delivery																					
Removal of retained products																					
Performing neonatal resuscitation																					
Performing obstetric surgeries																					
Performing blood transfusions																					

Table 33: Ability to provide signal functions 24*7 – North Western Province

Hospital	Kurunegala							Puttalam					
	PGH KURUNEGALA	BH KULIYAPITTIYA	BH NIKAWERATTIYA	BH DAMBADENIYA	BH POLPITHIGAMA	BH GALGAMUWA	DH GOKARELLA	DGH CHILAW	BH PUTTALAM	BH MARAWILA	DH KALPITTIYA	RH NAWAGATTEGA MA	PU MAMPURI
Classification of institutions by specialist availability	Two or more units	Two units	One unit one VOG	One unit one VOG	No VOG	No VOG	MBBS only	Two units	One unit 2 VOG	One unit one VOG	MBBS only	MBBS only	MBBS only
Administering of parenteral antibiotics													
Administering of parenteral oxytocins													
Administering of parenteral anti convulsants													
Performing manual removal of placenta													
Removal of retained products of conception													
Performing assisted vaginal delivery													
Performing neonatal resuscitation													
Performing obstetric surgeries													
Performing blood transfusions													

Table 34: Ability to provide signal functions 24*7 – North central Province

	Anuradhapura						Polonnaruwa				
	TH ANURADHAPURA	BH THAMBU TTEGAMA	BH KEBITIGOLLAWA	BH PADAVIYA	DH MADAWACHCHIYA	DH GALNEWA	DGH POLONNARUWA	BH MADIRIGIRIYA	BH WELIKANDA	DH HINGIRAKGODA	PU ARALGANWILA
	J101	J102	J103	J104	J105	J106	K101	K102	K103	K104	K105
Administering of parenteral antibiotics											
Administering of parenteral oxytocins											
Administering of parenteral anti convulsants											
Performing manual removal of placenta											
Removal of retained products of conception											
Performing assisted vaginal delivery											
Performing neonatal resuscitation											
Performing obstetric surgeries											
Performing blood transfusions											

Table 35: Ability to provide signal functions 24*7 – Uva Province

	Monaragala					Badulla				
	DGH MONARAGALA	BH BIBILE	BH SIYAMBALANDUWA	BH WELLAWAYA	RH DAMBAGALLE	PGH BADULLA	BH MAHIYANGANAYA	BH DIYATHALAWA	BH WELIMADA	DH PASSARA
Classification of institutions by specialist availability	One unit 2 VOG	No VOG	No VOG	No VOG	MBBS only	Two units	One unit one VOG	One unit one VOG	No VOG	MB BS only
Administering of parenteral antibiotics										
Administering of uterotonic drugs										
Administering of parenteral anti convulsants										
Manual removal of placenta										
Removal of retained products										
Perform assisted vaginal deliveries										
Perform basic neonatal resuscitation										
Perform obstetric surgery										
Perform blood transfusions										

Table 36: Ability to provide signal functions 24*7 – Sabaragamuwa Province

	Ratnapura District							Kegalle District					
	PGH RATNAPURA	BH EMBILIPITIYA	BH KAHAWATTA	BH BALANGODA	BH KALAWANA	DH RAKWANA	PU NIVITIGALA	DGH KEGALLE	BH MAWANELLA	BH KARAWANELLA	BH WARAKAPOLA	DH DERANIYAGALA	PU HEMMATHAGAMA
Administering of parenteral antibiotics													
Administering of parenteral oxytocins													
Administering of parenteral anti convulsants													
Performing manual removal of placenta													
Removal of retained products of conception													
Performing assisted vaginal delivery													
Performing basic neonatal resuscitation													
Performing obstetric surgeries													
Performing blood transfusions													

