NATIONAL EMERGENCY OBSTETRIC AND NEONATAL CARE NEEDS ASSESSMENT

PROVINCIAL REPORT

CENTRAL PROVINCE

2012

Family Health Bureau

unicef

UNFPA

World Health Organization

NATIONAL EMERGENCY OBSTETRIC AND NEONATAL CARE NEEDS ASSESSMENT

PROVINCIAL REPORT

CENTRAL PROVINCE
2012

Family Health Bureau

unicef

UNFPA

World Health Organization

National Emergency Obstetric and Neonatal Care Needs Assessment,
Provincial Report - Central Province 2012
Published in January 2014 by
Family Health Bureau,
Ministry of Health,
231, De Saram Place,
Colombo 10,
Sri Lanka
Web site: www.familyhealth.gov.lk

Printed by Lazergraphic (PVT) Ltd

ISBN: 978-955-1503-18-5

This report is dedicated to

The mothers in Sri Lanka

and

those who care for them;

past present and future

Emergency Obstetric and Neonatal Care Needs Assessment Research team

Dr. Lalini Rajapaksa	Public Health Specialist
Dr. Lakshman Senanayake	Consultant Obstetrician and Gyneacologists
Dr. Chandani Galwaduge	National Programme officer UNFPA
Dr. Dhammica Rowel	Consultant Community Physician
Dr. Nilmini Hemachandra	Consultant Community Physician
Dr. Padmal de Silva	Senior Registrar, Community Medicine

CORE GROUP

1.	Dr. Terrance de Silva	Deputy Director General/ Medical Services
2.	Dr. L. Siyabalagoda	Deputy Director General / Public Health Services
3.	Dr. S. A. K. Gamage	Director/ Medical Services
4.	Dr. S. Sathumugan	Director/ Tertiary /Care Services
5.	Dr. Deepthi Perera	Director/Maternal and Child Health
6.	Prof. Lalini Rajapaksha	Public Health Specialist
7.	Dr. Lakshman Senanayake	Consultant Obstetric & Gynaecologist
8.	Dr. Medha Weerasekera	Consultant Paediatrician
9.	Dr. A. L. A. L Padmasri	RDHS/ Gampaha
10.	Dr. Chithramalee de Silva	Deputy Director/ Maternal and child Health
11.	Dr. C.I. Gunasekara	Deputy Director/ Castle Street Hospital for Women
12.	Dr. Nilmini Hemachandra	Consultant Community Physician, FHB
13.	Dr. Dhammica Rowel	Consultant Community Physician, FHB
14.	Dr. Kapila Jayarathne	Consultant Community Physician, FHB
15.	Dr. Nirosha Lansakara	Consultant Community Physician, FHB
16.	Dr. Padmal de Silva	Senior Registrar/ Community Medicine
17.	Dr. Chandani Galwaduge	National Programme Officer, UNFPA
18.	Dr. Anoma Jayathilake	National Professional Officer, WHO
19.	Dr. Nishamani Karawita	National Health Officer, UNICEF
20.	Dr. Ananda Ranathunga	President, SLCOG (2011)
21.	Dr. Hemantha Perera	President, SLCOG (2012)
22.	Dr. Deepthi Samarage	President, Sri Lanka College of Pediatricians (2011)
23.	Dr. Piyasena Samarakoon	Senior Assistant Secretary, Ministry of Health
24.	Dr. Lakshmi Somathunga	DDG/ MS I
25.	Dr. R. Balasooriya	D/TCS
26.	Dr. L. Panapitiya	D/MS
27.	Dr. P. Atapattu	D/TCS
28.	Dr. K. Wickramasinghe	D/CSHW
29.	Prof. Hemantha Senanayake	President, SLCOG (2013)
30.	Prof. Asvini Fernando	President, Sri Lanka College of Pediatricians(2012)
31.	Dr. Sri Lal de Silva	President, Sri Lanka College of Pediatricians (2013)
32.	Dr. Deepika Attygalle	Health and Nutrition Specialist, UNICEF (since 2013)

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 effective, 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.

ACKNOWLEDGEMENTS

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. Terrrance 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.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

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
AISO	Accessibility Index for a Specialist Obstetrician
AMBU	Artificial Manual Breathing Unit
AMDD	Averting Maternal Death and Disability Program
BB	Blood Bank
BEmONC	Basic Emergency Obstetric and Neonatal Care
BH	Base Hospital
BHT	Bed Head Tickets
BT/CT	Bleeding Time/ Clotting Time
CEmONC	Comprehensive Emergency Obstetric and Neonatal Care
CS	Cesarean Section
CSSD	Central Sterile Supply Department
CTG	Cardiotocography
DGH	District General Hospital
DH	Divisional Hospital
DMPA	Depot Medroxy Progesterone Acetate
ECG	Electrocardiography
ECP	Emergency Contraceptive Pills
EmOC	Emergency Obstetric Care
EmONC	Emergency Obstetric and Neonatal Care
FFP	Fresh Frozen Plasma
FHB	Family Health Bureau
FP	Family Planning
H 830	Monthly Maternity Statistics
HO	House Officer
ICU	Intensive Care Unit
IUD	Intra Uterine Device
IUGR	Intra Uterine Growth Retardation
IV	Intra venous
LMC	Lactation Management Centre
LR	Labour room
LRT	Ligation and Resection of Tubes
LSCS	Lower Segment Cesarean Section
MBC	Mother Baby Centre
MgSO4	Magnesium Sulphate
MI	Myocardial Infarction

MLT	Medical Laboratory Technician
MO	Medical Officer
MOH	Medical Officer of Health
MOMCH	Medical Officer/ Maternal and Child Health
ND	Normal Delivery
NICU	Neonatal Intensive Care Unit
NO	Nursing Officer
NR	Neonatal Resuscitation
OT	Operation Theatre
PCV	Pack Cell Volume
PGH	Provincial General Hospital
PHM	Public Health Midwife
PHO	Paediatric House Officer
PIH	Pregnancy Induced Hypertension
PPH	Post Partum Haemorrhage
PNS	Post Natal Side
RDHS	Regional Director of Health Services
RG	Register General
RMSD	Regional Medical Supplies Division
SCBU	Special Care Baby Unit
SHO	Senior House Officer
SLCOG	Sri Lanka College of Obstetricians and Gynaecologists
SLCP	Sri Lanka College of Paediatrics
TH	Teaching Hospital
VOG	Visiting Obstetrician and Gynaecologist
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Chapter 1

Background

Sri Lanka has achieved much in terms of reducing maternal and infant mortality. The decline in mortality, trends in cause specific mortality and the factors contributing to these have been well documented. However, these favourable national statistics hide regional and sectoral differences. The differentials in maternal mortality have narrowed over time but are still observed.

It is well known 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. These complications can be treated successfully if high quality, emergency obstetric care is available and accessible to the women who need them. Further improvements in maternal and infant mortality in Sri Lanka will largely depend on the capacity of the health system to respond to obstetric and new born emergencies and complications. Thus, the strengthening of Emergency Obstetric and Newborn Care (EmONC) services and reducing disparities in availability and accessibility of these services are of importance.

Historically, the status of maternal care has been tracked mainly 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. 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 regionally, but In Sri Lanka, these have been under used in routine monitoring of maternal care up to date. With decreasing maternal mortality and 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 this scenario, national and regional EmONC care indicators have an important role to play in the monitoring of maternal care provision in the country. Such an assessment was last carried out nearly 10 years ago.

Therefore, the current 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 newborn and also to serve as a benchmark against which future progress can be measured.

This report presents the data for the Central province collected as part of the national survey. The findings would be useful in improving the services in the province.

1.1 Objectives of the assessment

The objectives of the assessment were as follows:

1.1.1 General objective

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

1.1.2 Specific objectives

To describe by district and province;

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 and training
5. Describe institution based family planning services
6. Neonatal care services and morbidity pattern

Chapter 2

Methodology

The Central Province consists of three districts: Kandy, Matale and Nuwara Eliya. It is surrounded by the Uva, Sabaragamuwa, North Western, North Central and Eastern provinces.

2.1.1 Sampling

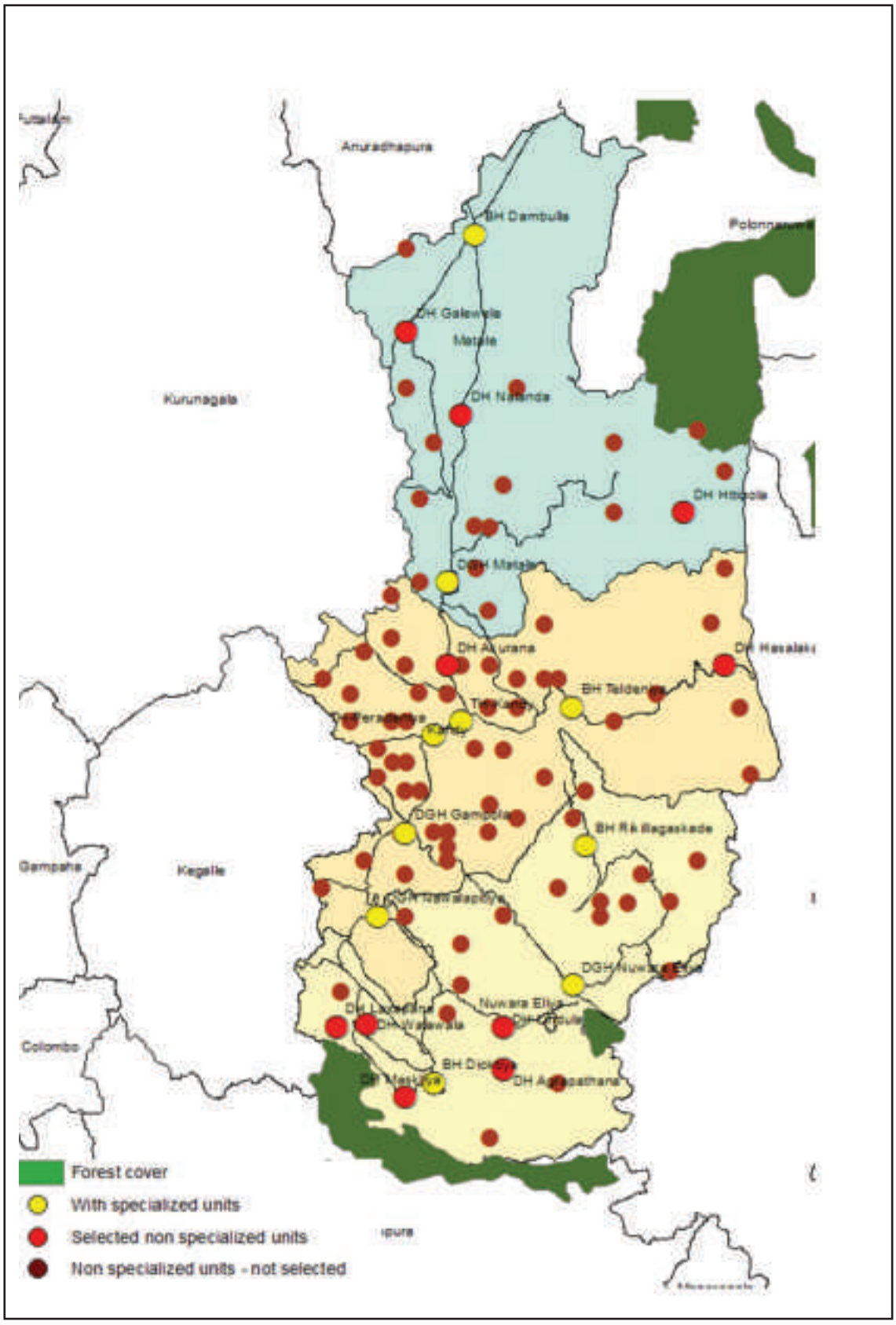
The EmONC assessment was carried out in all districts. Within a district all hospitals where specialist obstetric services are expected to be available were included in the sample; (i.e. base hospitals and above). Other institutions where deliveries occur but were below the level of a base hospital were sampled. 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. The required number of smaller institutions per district was selected probability proportional to the number of deliveries in each institution.

In the Kandy and Malate districts 8.9% and 7.4% of deliveries respectively occurred in institutions below the level of a base hospital and as such 2 smaller institutions were sampled from each district. In 2008 in Nuwara Eliya 35.6% of births occurred in institutions below the level of a base hospital and 4 smaller institutions were sampled. All government health facilities in the Central Province are shown in figure 01 and those selected in to the sample in table 2.1.

Table 2.1: Hospitals included in the sample

Type of facility	Kandy	Matale	Nuwara Eliya
TH/PGH/DGH	TH Kandy TH Peradeniya TH Gampola DGH Nawalapitiya	DGH Matale	DGH Nuwara Eliya
BH	BH Teldeniya	BH Dambulla BH Hettipola	BH Dickoya BH Rickillagaskada
Divisional	DH Akurana DH Hasalaka	DH Galewela DH Nalanda	DH Lindula DH Watawala DH Maskeliya DH Agrapathana

Figure 1: Government medical institutions in the Central Province



2.1.2 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.

2.2 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 to EmONC services, the added "N" emphasizing the fact that information on emergency services for new-borns as well as 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), 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, 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 obstetrician and specialist paediatricians / neonatologist 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 analyzed in detail.

The methodology of the survey is described in detail in the national report.

2.3 Pilot test

The pilot test of survey procedures was carried out in the Kalutara district. All institutions included in the sample for the district were included in the pilot test. The pilot test also examined the feasibility of obtaining morbidity data from registers, prospectively from admissions and retrospectively from discharge BHTs and prospectively from discharge BHTs. It was seen that the most feasible method for collection of morbidity data was prospectively from discharges and the best method of getting an accurate diagnosis and information on co-morbidities was to entrust the task to a medical officer in the ward.

2.4 Data collection

In a given district, the Medical Officer of Maternal and Child Health (MOMCH) was responsible for collecting the necessary data from all institutions included in the sample. The Regional Director of Health services (RDHS) facilitated the process by arranging and authorising transport for the teams of data collectors and authorising duty leave for data collection.

Two to three data collection teams were selected per district depending on the number and size of institutions. Each team comprise of 3 persons selected from among senior Medical Officers of Health (MOH), MO/public health and MO/planning. Persons with experience in Obstetrics and Paediatrics were recruited as data collectors and all data collectors were trained in the use of the modules.

Morbidity data was collected from all institutions prospectively for one month. All discharges from a unit over a period of 4 weeks from the date of commencement were collected. This was carried out by a medical officer attached to the unit and designated by the specialist obstetrician or paediatrician for this purpose. The nursing sister in charge of the ward was responsible for ensuring that all discharges were included in the forms and was given a specially designed check list for the purpose.

2.5. 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).

2.5.1 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

2.5.2 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 2.2 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 uterotonoc 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 specialists
9. Performing blood transfusions
    a. Functional blood bank
    b. At least three MO – Blood transfusion servie
    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.

2.5.3 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 I.

Table 2.1 Indicators and their minimum acceptable levels

Indicator	Minimum acceptable level
Availability of EmO NC	**Five EmO NC** facilities per 500000 population out of which at least **one should provide comprehensive care.**
Geographic distribution of EmO NC facilities	No standard set
Proportion of all births in Basic and Comprehensive EmO NC 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 EmO NC	Goal is that 100% of women with a complication will receive EmO NC
Caesarean sections as a % of all births	5-15% is the recommended rate in the WH O hand book in 1985
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 function 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.

2.75 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. This report describes the current availability of resources, infrastructure, human resources and neonatal morbidity at an institutional and district level.

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.

Chapter 3

Indicators of Emergency Obstetric Care

3.1 Selected characteristics of the Central Province

Selected characteristics of the Central Province are described in table 3.1. It is noted that the total births reported by the Registrar General (RG) as occurring in the district for the year 2011 is 1951 more than those reported from government institutions by the Regional Director of Health Services (RDHS). Note that the RGs data is reported by place of birth. Hospital data records an excess of births in Nuwara Eliya while the reverse is observed in the other two districts.

Table 3.2 gives the classification of hospitals by type of facility. It is noted that some institutions have been upgraded since the selection of the sample. However, specialist services were not available in some of the institutions upgraded to BH, at the time of survey. The new terminology is used in the presentation of results.

Table 3.1: Selected characteristics of the Central Province

Characteristic	Kandy	Matale	Nuwara Eliya	Central province
Population in 2012	1368216	482348	706210	2556774
Geographic extent in km^2	1940	1993	1771	5704
Total deliveries in government hospitals in 2011 (H830)	27199	10415	10971	48585
Total births In the district 2011 (RG)	29331	10465	10400	50196

Table 3.2: Classification at time of survey of hospitals included in the sample

Type of facility	Kandy	Matale	NuwaraEliya
TH/PGH/DGH	TH Kandy TH Peradeniya TH Gampola DGH Nawalapitiya	DGH Matale	DGH NuwaraEliya
BH	BH Teldeniya	BH Dambulla BH Hettipola	BH Dickoya BH Rickillagaskada
Divisional	DH Akurana DH Hasalaka	DH Galewela DH Nalanda	DH Lindula DH Watawala DH Maskeliya DH Agrapathana

Table 3.3 describes the functional classification used in the analysis and the colour coding used in the table to distinguish between the categories is carried throughout the analysis.

Table 3.3: Classification of hospitals included in the sample by functional nature

Functional classification	Kandy	Matale	NuwaraEliya
Hospitals with specialized units			
More than one Obstetric unit	TH Kandy TH Peradeniya TH Gampola DGH Nawalapitiya	DGH Matale	
One unit with two specialist obstetricians		BH Dambulla	DGH Nuwara Eliya
One unit with one specialist obstetrician			BH Dickoya BH Rickillagaskada
Hospitals without specialized units			
Upgraded hospitals without a specialist obstetrician at the time of the survey	BH Teldeniya	BH Hettipola	
Divisional level/non specialist units	DH Akurana DH Hasalaka	DH Galewela DH Nalanda	DH Lindula DH Watawala DH Maskeliya DH Agrapathana

Table 3.4: Distribution of births by district, type of hospital and by functional category of hospital

	Kandy		Matale		Nuwara Eliya		Central Province	
Total registered births (RG 2011)	29331		10465		10400		50196	
Total reported deliveries in government institutions (H830, 2011)	27199		10415		10971		48585	
Based on the type of facility								
TH / PGH / DGH	25427	93.5	5891	56.6	5205	47.4	36523	75.2
BH	92	0.3	4163	40.0	3173	28.9	7428	15.3
Divisional Hospital	1680	6.2	361	3.5	2593	23.6	4634	9.5
Based on the functional category of hospital								
More than one specialized unit	25427	93.5	5891	56.6	0	0	31318	64.5
One unit with two specialist obstetrician	0	0.0	0	0.0	5205	47.4	5205	10.7
One unit with one specialist obstetrician	0	0.0	4088	39.3	3173	28.9	7261	14.9
Upgraded units with no specialist obstetrician at time of survey	92	0.3	75	0.7	0	0.0	167	0.3
Divisional level non specialized hospital	1680	6.2	361	3.5	2593	23.6	4634	9.5

The table shows that only 6.5% and 4.2% of deliveries take place in institutions without specialist services in the districts of Kandy and Matale respectively. In Nuwara Eliya district 24% of deliveries take place in institutions without specialist services.

Table 3.5 shows that the sample for the Central province accounted for 94% of the deliveries in 2011. The non specialist institutions sampled accounted for 41% of deliveries in this type of institutions in the province.

3.2 Provision of signal functions

A list of functions that can save lives of women in an obstetric emergency called 'signal functions' have been identified by WHO and partners. The provision of these functions during the three months prior to the survey is used to classify institutions as having basic or comprehensive emergency obstetric and neonatal care functions.

Table 3.5: Percentage of Births in the sampled institutions (2011)

	Kandy			Matale			Nuwara Eliya			Central Province		
	Specialized institutions	Non specialist Institutions	District	Specialized institutions	Non specialist Institutions	District	Specialized institutions	Non specialist Institutions	District	Specialized institutions	Non specialist Institutions	Province
No. of institutions in the district	4	47	51	2	19	21	3	24	27	9	90	99
No. of births in 2011	25427	1772	27199	9979	436	10415	8378	2593	10971	43784	4801	48585
No. of institutions in the sample	4	3	7	2	3	5	3	4	7	9	10	19
No. of births in 2011 in the sampled institutions	25427	359	25786	9979	264	10243	8378	1361	9739	43784	1984	45768
Percentage coverage of births by the sample	100	20.3	94.8	100	60.6	98.3	100	52.5	88.8	100	41.3	94.2

Table 3.6 describes the provision of signal functions in the sampled institutions in the province. It is noted that in Sri Lanka, removal of retained products is not recommended in institutions where there are no specialist obstetric services.

Table 3.6: Provision of signal functions in the 3 months preceding the survey by institution and district

Hospital	Kandy							Matale					Nuwara Eliya						
	TH KANDY	PERADENIYA	TH GAMPOLA	NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	BH HETTIPOLA	DH GALEWELA	DH NALANDA	NUWARAELIYA	BH DICKOYA	RIKILAGASKADA	DH MASKELIYA	DH LINDULA	WATAWALA	AGARAPATHALA
Administering 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																			

Signal function performed during the three months preceding survey
Signal function not performed during the three months preceding survey
0 Signal function not performed due to absence of cases needing the service
Not relevant

It is seen from table 3.6 that 3 institutions in Kandy, 2 in Matale and 2 in Nuwara Eliya have provided all 9 signal functions during the 3 months prior to the survey and be considered as C-EmONC facilities. There are no other institutions in the Province that have provided the first 7 functions i.e. there are no institutions that could be considered as B-EmONC facilities. There is one institution in Nuwara Eliya (DH Watawala) that has provided the first four functions.

Further to the above, the availability of facilities for the provision of signal functions was examined and is given in table 3.7. Based on this table, the institutions that are capable of providing the signal functions are described in table 3.8.

Table 3.7: Availability of facilities for provision of signal functions

	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	F101	F102	F103	F104	F105	F101	F102	F103	F104	F105	F106	F107
At least one parenteral antibiotic	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
At least one parenteral uterotonic drug	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Magnesium sulphate	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pethidine	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Vaccuum 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	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Nurisng 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	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● **Available**

● **Not Available**

● **Not relevant**

The table shows that there are 2 institutions in Matale and two in the Nuwara Eliya district where there is no continuous supply of water, one of which in latter district is in an institution where there is a functional operating theatre. It is noted that seven institutions in the Province did not have Magnesium Sulphate. Two upgraded institutions did not have specialist obstetricians.

Table 3.8 shows that 4 hospitals in Kandy, two in Matale and 3 in Nuwara Eliya have the facilities necessary to provide all 9 signal functions. There are no institutions in addition to these that are able to provide the first seven functions. There are two institutions in Matale that are capable of providing the first 4 functions alone.

Emergency functions should be available for patients on a 24*7 basis. Based on criteria given in Box 2.3, the ability of institutions to provide EmONC services on a 24*7 basis was examined. This is shown in table 3.9.

Table 3.8: Institutions capable of providing signal functions by district

	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
Adminsistering 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																			

Capable of performing the function
Not capable of performing the function
Not relevant

Table 3.9: Ability to provide signal functions 24*7

	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
Adminsistering 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																			

Capable of performing the function 24*7
Not capable of performing the function 24*7
Not relevant

Table 3.9 shows that all 4 hospitals that are capable of providing CEmONC services in the Kandy district are able to provide 24*7 services. There is one institution in Matale and two in Nuwara Eliya that can provide 24*7 EmONC services. There are 2 institutions in Matale and 1 in Nuwara Eliya that can provide the first 4 functions alone.

3.3 Availability of EmONC services (Indicator 1)

The first indicator examines the availability of EmONC services in terms of the population.

Table 3. 10 (a) : Availability of EmONC facilities by district based on services provided during the 3 months prior to survey

	Kandy	Matale	Nuwara Eliya	Central Province
Population in 2012	*1368216*	*482348*	*706210*	*2556774*
Geographic extent in km ^{2}	1940	1993	1771	5704
Institutions which have provided all nine signal functions	*3*	*2*	*2*	*7*
Institutions estimated to have provided modified BEmONC services	*2*	*1*	*1*	*4*
Institutions estimated to have provided first 4 functions only	*1*	*0*	*1*	*2*
Availability of institutions that have provided modified BEmONC services per 500,000 population	*0.7*	*1.0*	*0.7*	*0.8*
Availability of institutions that have provided the first 4 signal functions only per 500,000 population	*0.4*	*0.0*	*0.7*	*0.4*
Availability of institutions that have provided all nine signal functions per 500,000 population	*1.09*	*2.07*	*1.42*	*1.37*
Area per modified B-EmONC facility (km ^{2})	*970*	*1993*	*1771*	*1426*
Area per C-EmONC facility (km ^{2})	*647*	*997*	*871*	*815*
Area per EmONC facility (km ^{2}) (CEmONC + Modified BEmONC)	*388*	*664*	*580*	*519*

Table 3.10 (b): Availability of EmONC facilities by district based on the potential ability of institutions for providing signal functions

	Kandy	Matale	Nuwara Eliya	Central Province
Population in 2012	*1368216*	*482348*	*706210*	*2556774*
Geographic extent in km^2	1940	1993	1771	5704
Facilities which are able to provide modified BEmONC services	*3*	*1*	*2*	*6*
Facilities which are potentially able to provide C-EmOC services	*4*	*2*	*3*	*9*
Modified BEmONC facilities per 500,000 population	*1.0*	*0.6*	*0.8*	*1.2*
Institutions that have the potential ability to provide CEmONC services 500, 000 population	*1.42*	*1.23*	*1.68*	*1.76*
Institutions with modified BEmONC + CEmONC facilities per 500,000 population	*2.42*	*1.63*	*2.48*	*2.96*
Area per modified BEmONC facility (km^2)	*647*	*1993*	*871*	*951*
Area per CEmONC facility (km^2)	*485*	*997*	*580*	*634*
Area per EmONC facility (km^2) (CEmONC + Modified BEmONC)	*277*	*664*	*348*	*380*

Table 3.10 (c): Availability of institutions that are able to provide CEmONC services on a 24*7 basis by district

	Kandy	Matale	Nuwara Eliya	Central Province
Population in 2012	*1368216*	*482348*	*706210*	*2556774*
Geographic extent in km^2	1940	1993	1771	5704
Facilities which are able to provide 24*7 CEmONC services	*4*	*1*	*1*	*6*
24*7 CEmONC facilities per 500,000 population	*1.46*	*1.03*	*0.71*	*1.71*
24*7 CEmONC facilities after improving blood bank services	*1.46*	*1.03*	*0.71*	*1.71*
Area per 24*7 CEmONC facility (km^2)	*485*	*1993*	*1741*	*951*

The accepted minimum level for availability of EmONC services is; five EmONC facilities, for every 500,000 population, at least one of which should provide comprehensive care. The province and all 3 districts fall short of the standard in terms of the total number of EmONC institutions required. However, all 3 districts and the province exceed the requirement of 1 CEmONC facility per 500,000 population.

When the ability to provide 24*7 services is examined, it is seen that Nuwara Eliya cannot meet the requirement for CEmONC facilities.

3.4 Geographic distribution of EmONC facilities (Indicator 2)

This indicates if the EmONC facilities are reasonably distributed within the specified geographic area or sub region of the country. The area served per facility is a crude indicator of access to care. Average distances to services and travel times would be more meaningful and could be estimated using Geographic Information Systems.

It is seen that the area per facility is smallest in the Kandy district and highest in the Matale district.

3.5 Utilization of EmONC facilities

Indicators 3 and 4 are on utilisation of the available EmOC facilities. They examine if the EmOC services serve a reasonable proportion of women and if the women who need the services i.e. those with complications receive the services.

3.5.1 Proportion of births in EmONC facilities (Indicator 3)

This is a very crude indicator of utilisation 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 an area that takes place in EmONC facilities. The denominator is the estimated live births in the area regardless of where the birth takes place. In the current analysis the indicator is calculated using RGs data.

Table 3.11, shows the proportion of deliveries occurring in EmONC facilities range from 80.6% in Nuwara Eliya to 86.7% in the Kandy district when the RGs data is taken as the denominator.

When the proportion of births in 24*7 comprehensive EmONC facilities are examined the proportions in Matale and Nuwara Eliya decline to 57% and 47% respectively.

The optimum long term goal must be to ensure that all women deliver in a place where emergency services are available. There is no internationally advocated minimum requirement for this indicator. This has to be developed in consultation with stakeholders nationally.

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

	Kandy		Matale		Nuwara Eliya		Central province	
	No	*%*	*No*	*%*	*No*	*%*	*No*	*%*
Total births in the district in 2011	*29311*	*100.0*	*10465*	*100.0*	*10400*	*100.0*	*50196*	*100.0*
In CEmNOC facilities	*25427*	*87.0*	*9979*	*95.0*	*8378*	*80.6*	*43784*	*87.2*
*In 24*7 CEmONC facilities*	*25427*	*87.0*	*5891*	*56.0*	*5205*	*50.0*	*36523*	*73.0*
*In 24*7 CEmONC facilities once blood bank services upgraded*	*25427*	*87.0*	*5891*	*56.0*	*5205*	*50.0*	*39523*	*73.0*

3.5.2 Met need for EmONC care (Indicator 4)

'Met need' is the proportion of women with major direct obstetric complications treated at 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 post-partum), prolonged obstructed labour, postpartum sepsis, complications of abortions, severe pre-eclampsia and eclampsia, ectopic pregnancy and ruptured uterus.

The estimate based on this 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 one month prospective survey of morbidity.

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

The proportion of caesarean sections 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 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% is advocated by WHO. The threshold suggested by the RCOG is 25%.

In the present study data on caesarean sections are available from 4 sources. The proportion of sections by institution is available for 2010 from routine registers and for the quarter preceding data collection. Data was extracted from 10 CS using past records and information is also available from the prospective morbidity survey.

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

	Kandy	***Matale***	***Nuwara Eliya***	***Central Province***
Births in 2011 (RG)	***29331***	***10465***	***10400***	***50196***
Average number of registered births per month (RG)	*2256*	*805*	*800*	*3861*
Estimated number of direct obstetric complications	*338*	*121*	*120*	*579*
Direct obstetric complications observed	*257*	*106*	*67*	*430*
'Met need' of CEmONC care (%)	*75.9*	*87.8*	*55.8*	*74.2*

The minimum acceptable level of this indicator is 100% i.e. all women requiring EmONC care should receive such care. The table above (3.12) shows that 74.2% of women in the province who need services have received them. In the Kandy district this percentage is low. This likely to be due to the fact that births occurring in private institutions are reflected in the denominator but not in the numerator. On the other hand in the Nuwara Eliya district the low met need may reflect difficulties in accessing services.

Table 3.13 shows the caesarean section rates for the province and the districts. The section rates for Kandy and Matale are 37% and 33 % respectively. The rate in the Nuwara Eliya district is about half of the rate in the other two districts. These percentages are based on the registered births in each district.

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

	Kandy	*Matale*	*Nuwara Eliya*	*Central Province*
Number of births per quarter for 2011 (based on RG data)	*7333*	*2616*	*2600*	*12549*
Total caesarean sections performed for quarter from birth register in 2011	*2262*	*806*	*423*	*3491*
Caesarean section as proportion of all births – based on RG data(%)	*30.8*	*30.8*	*16.3*	*27.8*

3.7 Measures of quality of services

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

3.7.1 Direct obstetric case fatality rate (Indicator 6)

Case fatality rate is an indicator of the quality of care 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'. This was calculated as detailed in annex I.

The maximum acceptable level recommended for this indicator is a case fatality rate less than 1%. Table 3.14 shows that the case fatality rate for direct obstetric causes is well below the maximum acceptable level in both districts and the province as a whole. It is noteworthy that the highest case fatality rates are observed in the Nuwara Eliya district. However, without information on the condition of women on arrival at the facility it cannot be inferred that the higher rate indicates poor quality of care.

Without information on the condition of women on arrival at the facility it cannot be inferred that the higher rate indicates poor quality of care.

3.7.2 Intrapartum and very early neonatal death rate (Indictor 7)

This indicator sheds light on the quality of intrapartum care for foetuses and new-borns delivered in EmONC facilities. 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 intra-partum death rate is calculated. The numerator is the reported number of still births in EmONC facilities 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.

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

	Kandy	*Matale*	*Nuwara Eliya*	*Central province*
	No	*No*	*No*	*No*
Direct Obstetric deaths in 2010	*3*	*1*	*4*	*8*
Estimated number of direct obstetric complications for 2010	*3381*	*1285*	*706*	*5372*
Direct obstetric case fatality rate for 2010 (%)	*0.089*	*0.078*	*0.567*	*0.149*

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

	Kandy		*Matale*		*Nuwara Eliya*		*Central province*	
	No	*rate*	*No*	*rate*	*No*	*rate*	*No*	*rate*
No of births	*5245*		*2613*		*1918*		*9776*	
Fresh still births >=2.5 Kg	*14*	*2.7*	*5*	*1.9*	*1*	*0.5*	*20*	*2.0*
Fresh still births < 2.5 Kg	*11*	*2.1*	*3*	*1.1*	*6*	*3.1*	*20*	*2.0*
Total fresh still births	*25*	*4.8*	*8*	*3.1*	*7*	*3.6*	*40*	*4.1*
Macerated still births	*31*	*5.9*	*11*	*4.2*	*13*	*6.8*	*55*	*5.6*
Total still births	*56*	*10.7*	*19*	*7.3*	*20*	*10.4*	*95*	*9.7*

(* no information was available from BH Rickillagaskada for the quarter)

The rate of fresh still births in the province is 4.1%. In all districts the macerated still birth rates are higher than the fresh still birth rates. This difference is most marked in the Nuwara Eliya district suggesting limitations in accessing services.

3.7.3 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 EmONC facilities within a specified period was taken as the numerator and all maternal deaths in EmONC 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'.

The absence of deaths due to indirect causes in Matale and Nuwara Eliya may be a chance occurrence. It is more likely that such cases were transferred to the Teaching hospitals in Kandy. Nearly 50% of the deaths in the Kandy district has been due to indirect causes.

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

	Kandy	*Matale*	*Nuwara Eliya*	*Central Province*
	No.	*No.*	*No.*	*No.*
Number of maternal deaths due to indirect causes at CEmONC facilities in 2010	*4*	*0*	*0*	*4*
Total number maternal deaths at CEmONC facilities in 2010	*8*	*1*	*2*	*11*
Proportion of deaths due to indirect causes in 2010	*50.0*	*-*	*-*	*36.4*

3.8 Summary of EmONC indicators 1-8

Table 3.17 and figure 3.1 summarises the EmONC indicators for the province.

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.

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

District	Availability of services Indicator 1			Accessibility of services Indicator 2			Utilisation of services					Quality of care		
							Indicator 3			Indicator 4	Indicator 5	Indicator 6	Indicator 7	Indicator 8
	C_EmONC capable / 500000 population	24*7 C_EmONC capable/ 500000 population	24*7 C_EmONC capable/ 500000 population once BB services upgraded	Area C_EmONC capable facility km^2	Area 24*7 C_EMONC capable facility km^2	Area 24*7 C_EMONC capable facility once BB services upgraded km^2	% Deliveries in CEmONC capable facilities	% Deliveries n 24*7 C_EmONC capable facilities	% Deliveries in 24*7 C_EmONC capable facilities once BB services upgraded	Met need of EmONC care	Caesarean Section Rate	Direct Obstetric Case Fatality Rate	Total still birth rate	Proportion of deaths due to indirect causes - 2010
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	1771	92	50	50	55.8	16.3	0.567	10.4	0.0
Sri Lanka	**1.65**	**0.79**	**0.96**	**979**	**2050**	**1682**	**88**	**62**	**73**	**80.0**	**27.4**	**0.151**	**6**	**31.6**

Figure 3.1 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 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 3.1: Equity Assessment Matrix of the 8 EmONC indicators

District	CEmONC / 500000 population	24*7 CEmONC / 500000 population	24*7 CEmONC / 500000 population after BB services upgraded)	Area CEmONC facility km^2	Area 24*7 CEMONC facility km^2	Area 24*7 CEMONC facility after BB services upgraded) km^2	% Deliveries in CEmONC facilities	% Deliveries in 24*7 CEmONC facilities	% Deliveries 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
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	1771	92	50	50	55.8	16.3	0.567	10.4	0.0
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	>250 1	>250 1	>250 1	< 25	< 25	< 25	< 50	< 5.00	> 1.00	> 6	> 75.1

NA not available/not applicable

3.9 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. 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-EmONC 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.

3.9.1 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.

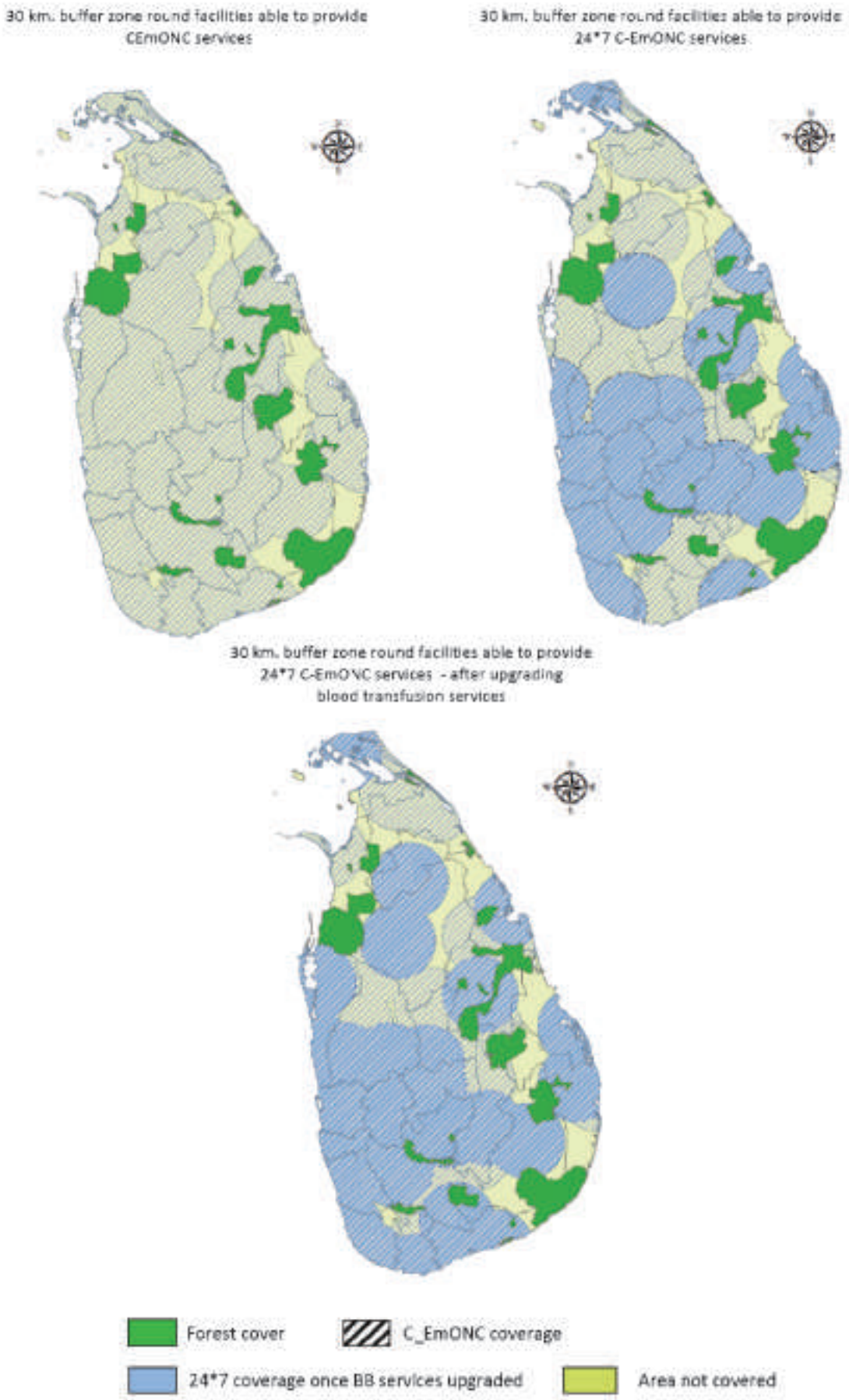
3.9.1 (a): Percentage area falling outside a defined buffer zone round CEmONC facilities

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 3.2 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 3.2: Facilities capable of providing CEmONC and 24*7 CEmONC care



The percentage area falling outside the 30 km buffer zone shown in figures 3.2 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)		
		Km^2 outside buffer	% land area outside buffer *	% from total unserved area for the country	Km^2 outside buffer	% land area outside buffer	% from total unserved area for the country	Km^2 outside buffer	% land area outside buffer	% from total unserved area for the country
Kandy	1924	0	0	0	269.3	14.0	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	0.0
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.*

The tables show that all the area in the central province falling within a 30km buffer zone round facilities that have the potential ability to provide CEmONC services.

3.9.1 (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.

Table 3. 19: Population without access to CEmONC and 24*7 CEmONC facility cover using a 30 Km buffer zone.

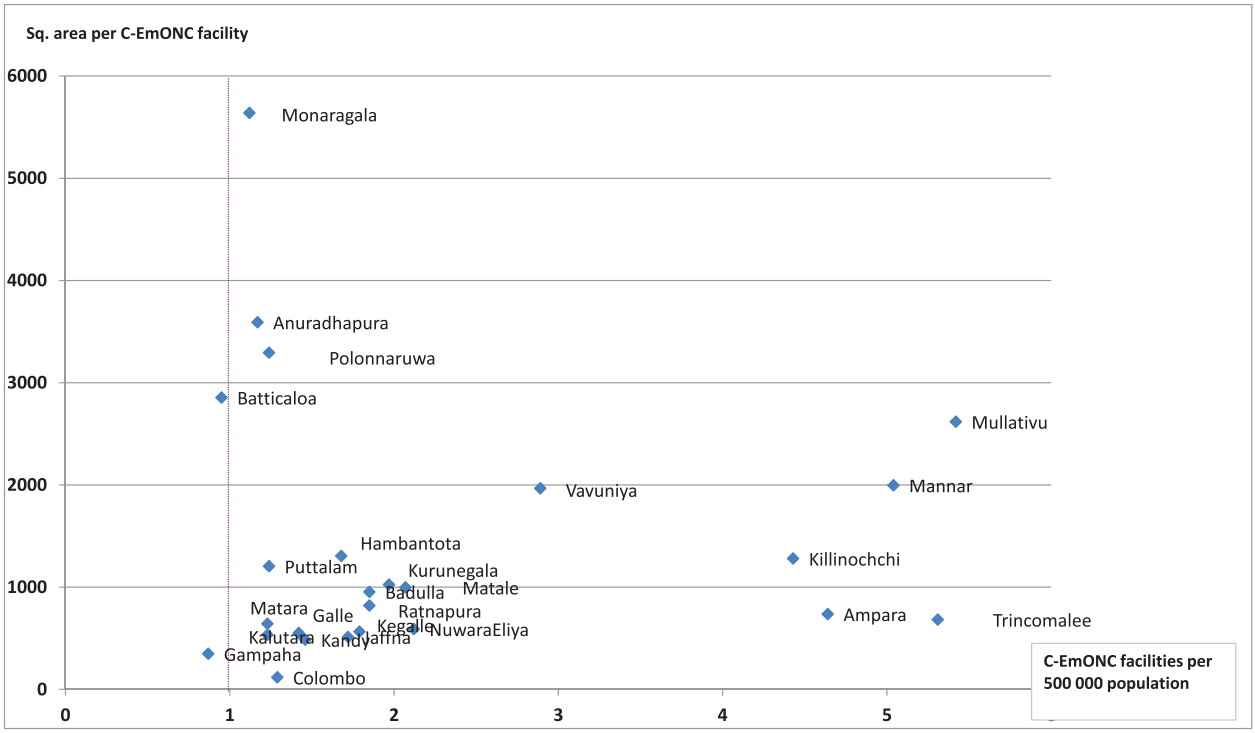
District	Population 2012	Based on institutions that have the potential ability to provide CEmONC services			Based on institutions able to provide 24*7 CEmONC services			Based on institutions able to provide 24*7 CEmONC services after correction of BTS		
		Number not having access to service	% not having 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
Kandy	1369899	0	0	0	47077	3.4	1.2	47077	3.4	2.3
Matale	482229	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
Sri Lanka	**20,263,723**	**582387**	**2.9**	**100**	**3913803**	**19.3**	100.0	**2065355**	**10.2**	**100.0**

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 the total population in the province lie inside a 30 km buffer zone from a facility capable of CEmONC services. When 24*7 capabilities is considered, 2.3% and 6.7% of the population in Kandy and Nuwara Eliya districts respectively, lie outside a 30km buffer zone.

3.10 Availability and accessibility

Availability and accessibility have to be examined together for meaningful interpretation and planning. Figures 3.3 and 3.4 shows the relative position of the district in relation to other districts.

Figure 3.3: Scatter plot of CEmONC facilities by indicators one and two



These indicators would be useful in identifying institutions that need to be prioritised for improvements in accessibility. 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.

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, all three districts approximately 2 institutions per 500,000 population and area served is around 1000 km2.

Figure 3.4: Scatter plot of 24*7 CEmONC facilities by indicators one and two

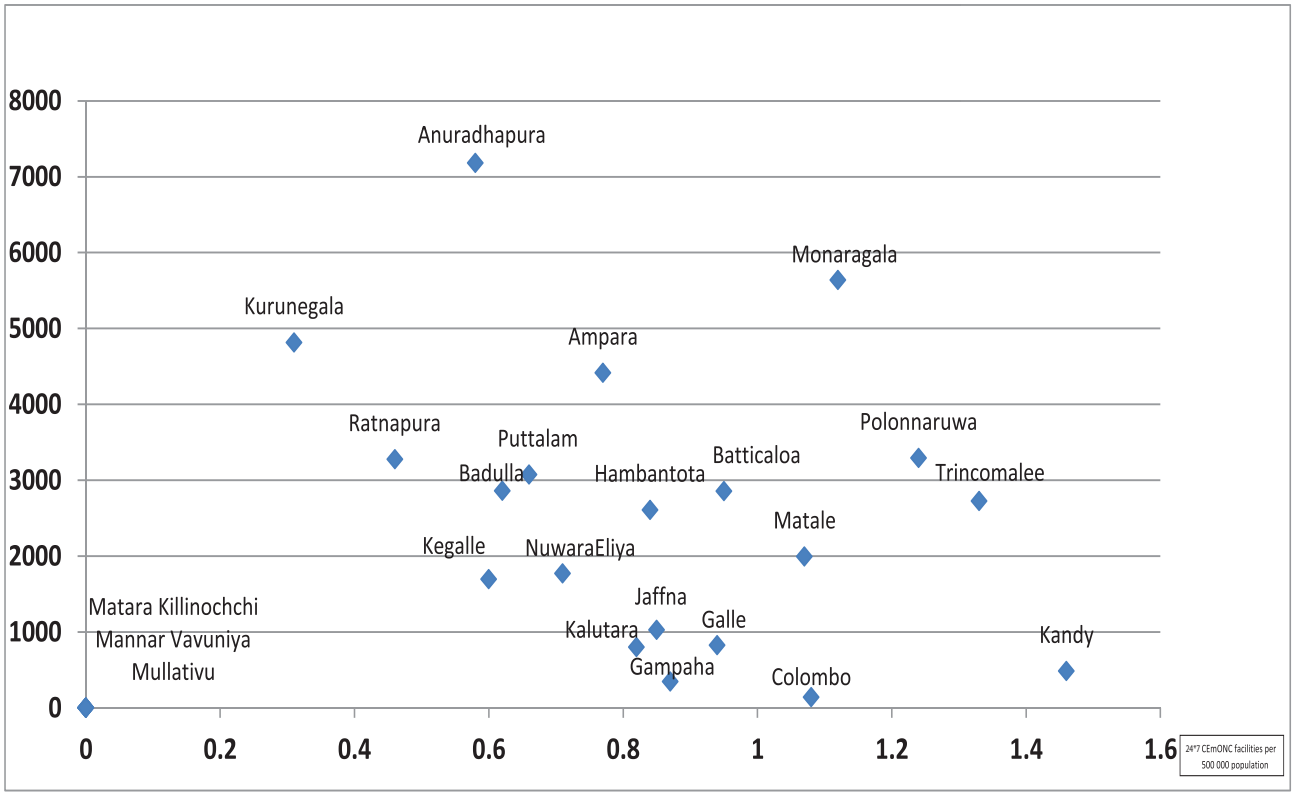


Figure 3.3 highlights that 24*7 CEmONC services are deficient by both indicators in a number of districts. While Kandy and Matale have more than one 24*7 CEmONC facilities for 500,000 population covering less than 2000km^2 , Nuwaraeliya has less than one 24*7 CEmONC facility cover and area of 2000km^2. The figures clearly show the necessity to develop a composite indicator which would examine both accessibility and availability together.

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

3.11 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. 11.1 Accessibility Index for a Specialized hospital – (AISH)

The accessibility index for a specialized hospital is a composite index between 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.

3.11.2 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).

AISU = Average number of deliveries per specialized unit / population density of a district

In the spectrum of AISU, lower values represent higher accessibility and higher values represent lower accessibility.

3.11.3. 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).

AISO = Average number of deliveries per specialist obstetrician / population density of a district

In the spectrum of AISO, lower values represent higher accessibility and higher values represent lower accessibility.

3.12 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 3.21. 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 National average for number of specialist units per 500 000 population is 2.59. The number of specialist obstetrician per 500 000 population for the country being 3.4. The average number of deliveries coming under the care of a specialist obstetrician per month is 207 per year.

Nuwara Eliya district has 2.12 specialist units per 500, population which is lower than the national average. Matale district has highest number of deliveries per specialist obstetrician in the province.

Table 3.20: Specialist obstetricians per district according to Minis try 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 obstetrician available	Specialist units per 500000 population	specialist obstetrician per 500000 population	Average number of deliveries per specialist obstetricians per month
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
Sri Lanka		**20 277 597**	**343 384**	**69**	**117**	**105**	**138**	**2.59**	**3.40**	**207**

Figure 3.5 summarises some of the indicators important for planning services.

Figure 3.5: Summary of indicators 1 and 2, new indicators and utilisation indicators by district

	WHO Indicators 1 & 2				New Indicators						Utilization indicators				
District	CEmONC / 500000 population	24*7 CEmONC / 500000 population	Area CEmONC facility	Area 24*7 CEMONC facility	Accessibility index for Specialist Hospital	Accessibility index for a Specialist Unit	Accessibility index for a specialist obstetrician	% population outside CEmONC	% population outside 24*7 CEmONC	% population outside 24*7 CEmONC_once BB services upgraded	Specialist unit / 500000 population	specialist obstetrician / 500 000 population	Average deliveries / specialist obstetrician /month		Average deliveries / Specialist unit /month
Kandy	1.46	1.46	485	485	10.40	4.62	3.20	0	1.2	2.3	3.29	4.75	188		272
Matale	2.07	1.03	997	1993	21.62	14.41	14.41	0	3.9	6.7	3.11	3.11	291		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
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		245
Green	>=3	>=1	< 500	< 1000	< 5	< 5	< 5	0.0	0.0	0.0	>= 3	> 3	=< 250		=< 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		>= 251

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.

The above figure and the numbers there in are presented so that they can be used to initiate a discussion and national consensus on standards for CEmONC care.

Chapter 4

Selected Care Practice

4.1 Caesarean deliveries

Data on Caesarean sections were available from multiple sources:

- H830 for 2010 and the quarter preceding data collection 2011,
- Ten Bed Head Tickets of patients who have had caesarean sections,
- Prospective morbidity survey (4 weeks).

4.1.1 Institutional caesarean section rates

In table 4.1 the caesarean section rates are calculated based on the actual number of deliveries that took place in the institutions. Hospital rates are difficult to interpret, since they depend on the case mix seen in the institution as well as preferences of providers and clients.

Table 4.1: Caesarean section rates by institution, district and province

Hospital	Kandy				Matale		Nuwara Eliya			Kandy District	Matale District	Nuwaraeliya District	Central Province
	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	DGH Malate	BH Dambulla	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada				
Based on H830 return for 2010													
Total reported deliveries/year	6919	5536	3680	3930	5436	NA	4724	2376	346	20065	5436	7446	32947
Total caesarian sections/year	2425	2335	1622	1273	1875	NA	1130	572	0	7655	1875	1702	11232
Institutional section rate	35%	42%	44%	32%	34%		24%	24%	0%	38%	34%	23%	34%
From the birth register for a quarter of 2011													
Total reported deliveries/quarter	1698	1749	875	923	1483	1130	1272	646	527	5245	2613	2445	10303
Total caesarian sections/quarter	717	764	412	369	456	350	236	171	16	2262	806	423	3491
Institutional section rate	42%	44%	47%	40%	31%	31%	19%	26%	3%	43%	31%	17%	34%

Table 4.1 shows that the section rates in all institutions other than in DGH Matale (which has remained more or less the same being 34% and 31% respectively in 2010 and 2011) the section rates have increased from 2010 to 2011. It is interesting to note that in both years the TH Gampola recorded higher rates than TH Kandy or TH Peradeniya.

The morbidity survey provided information on the proportion of caesarean sections by category. It is noted that in TH Gampola which had a high section rate, the proportion of elective sections are also high.

In the DGH Nawalapitiya also the elective section rates are higher than the emergency section rates. In three of the four units where there is only one specialist obstetrician the elective rates are higher (Table 4.2).

4.1.2 Indications for sections

Table 4.3 lists the indications for sections, which were obtained from the 10 BHTs perused per unit and the analysis is presented for the province.

Table 4.2: Category of caesarean sections by institution and by districts based on one month prospective survey

	CENTRAL PROVINCE										
	KANDY					MATALE			NUWARA ELIYA		
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA		DGH MATALE	BH DAMBULLA		DGH NUWARA ELIYA	BH DICKOYA	BH RIKILLAGASKADA
Cesarean Sections - Elective	171	89	82	59		66	60		32	34	17
Cesarean Sections - Emergency	232	107	33	21		75	35		30	21	32
Total Cesarean Sections	403	196	115	80		141	95		62	55	49
Total deliveries	995	429	252	161		451	346		388	229	105
CS as a percentage of total deliveries	40.5	45.7	45.6	49.7		31.3	27.5		16.0	24.0	46.7
Percentage of elective sections	42.4	45.4	71.3	73.8		46.8	63.2		51.6	61.8	34.7
Percentage of emergency sections	57.6	54.6	28.7	26.3		53.2	36.8		48.4	38.2	65.3

Table 4.3: Indications for Caesarean Section

Indication	Number	Percentage
No. of CS reviewed	**128**	
Previous sections	38	29.7
Foetal distress	26	20.3
Any other maternal complication	11	8.6
Cephalo-pelvic disproportion	7	5.5
Fetal growth impairment	6	4.7
Breech presentation	6	4.7
Subfertility	5	3.9
Failed induction	4	3.1
Pre eclampsia / Eclampsia	4	3.1
Elderly mother	2	1.6
Gestational age > 41 weeks	1	0.8
3rd Trimester vaginal bleeding	1	0.8
Multiple pregnancy	1	0.8
HIV	1	0.8

Table 4.3 shows that in nearly 30% of cases the indication for the section has been a previous section and in a further 20% foetal distress has been the indication.

The data were further analysed to examine the use of partographs among women who had emergency caesarean sections. A partograph had been maintained only for 65.6% of the emergency sections.

4.1.3 Selected care practices for caesarean section

Table 4.4: Service provision for caesarean sections

	Kandy				Matale		Nuwara Eliya						
	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	DGH Malate	BH Dambulla	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada	Kandy District	Matale District	Nuwaraeliya District	Central Province
Number of CS reviewed	30	20	20	10	10	10	10	10	8	80	20	28	128
C/S by selected characteristics													
Percentage decided by specialist obstetrician	96.7	90	100	100	100	70	100	100	100	96.3	85	100	94.9
Percentage performed by specialist obstetrician	0	40	5	0	20	10	100	0	0	11.2	15	0	3.8
Percentage performed by non-specialist MO	100	60	95	100	80	90	0	100	87.5	88.8	85	96.4	94.9
Proportion of CS transferred from other institutions	3.3	0	15	0	20	10	0	0	0	5	15	0	5.1
Percentage CS under general anaesthesia	6.7	0	0	0	10	0	0	0	0	2.5	5	0	3.8
Percentage CS under other anaesthesia (spinal and epidural)	93.3	100	95	100	90	100	100	100	100	96.3	95	100	96.2
percentage of CS that received antacid prophylaxis	83.3	60	90	70	70	DNA	100	90	0	77.5	77.5	67.9	65.4
Prcentage of CS administered prophylaxis antibiotics	66.7	85	70	30	100	100	30	100	100	67.5	67.5	75	78.2
No. of CS with surgical complications	1	0	0	0	0	0	0	0	0	1	0	0	1
No. of CS with anaesthetic complications	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean stay at hospital after CS (Days)	3.4	4.3	4.2	3.3	5.4	5.2	4.3	3.4	3	3.8	5.3	3.6	3.9
Modal stay at the hospital after CS (Days)	3	3	3	3	4	4	4	3	3	3	4	3	3

Except in BH Dambulla which is an institution with one specialist obstetrician, the decision for section has been made by the specialist obstetrician in over 90% of the instances. Proportion of sections performed by non specialist MOs varies from 60% to 100%. The proportion of sections done under spinal anaesthesia varies from 90-100%. Antacid prophylaxis varies from 60% to 100% and prophylactic antibiotic use from 30% to 100%. The modal stay in hospital is either 3 or 4 days. The province has seen one surgical complication due to caesarean sections.

4.2 Use of Partograph

The partograph use provides some insights in to monitoring of labour and may be considered as being indicative of quality of intra natal care. Table 4.5 gives details on selected aspects of partograph use in the three districts.

It is seen that all institutions other than two institutions in the province use a partograph. However, the recording on the partograph is rather poor, especially contractions, decent of the head, state of membranes and the drawing of an alert line.

Table 4.5: Use of the partograph in institutions

	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	BH Teldeniya	DH Akurana	DH Hasalaka	DGH Malate	BH Dambulla	BH Hettipola	DH Galewela	PU Nalanda	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada	DH Maskeliya	DH Lindula	RH Watawala	PU Agarapathana
Institutions using partographs																			
Number of partographs reviewed	15	10	10	5	5	5	5	5	5	0	0	0	5	5	5	5	0	5	5

	No.	*%*	*No.*	*%*	*No.*	*%*
Partograph was used when in labour	51	92.7	10	100.0	34	97.1
Charting statred when admintted to LR	50	90.9	6	60.0	30	85.7
Temperature recorded at least once	16	29.1	1	10.0	27	77.1
Blood pressure recorded at least once	17	30.9	3	30.0	17	48.6
Maternal pulse recored atleast once	32	58.2	1	10.0	30	85.7
Foetal heart sounds recorded at least once	55	100.0	10	100.0	34	97.1
Contractions recorded at least once	16	29.1	3	30.0	29	82.9
Vaginal Ex. Findings recorded at least once	42	76.4	9	90.0	33	94.3
Descent of the head recorded atleast once	8	14.5	0	0.0	16	45.7
State of membranes mentioned	10	18.2	4	40.0	28	80.0
Alert line drawn	18	32.7	6	60.0	21	60.0
Time of delivery filed in	50	90.9	5	50.0	23	65.7
Findings marked else where in the BHT	29	52.7	6	60.0	15	42.9

+	Using a Partograph	-	Not using a Partograph

4.3 Management of labour

4.3.1 Induction of labour

Table 4.6: Induction of labour in specialist and non-specialist institutions in Central province

	Kandy - Specialized		Kandy – non Specialized		Matale – Specialized		Matale – non specialized		Nuwara Eliya – Specialized		Nuwara Eliya – Non Special		Central - Specialized		Central – Non Specialized	
	No.	%	No.	%	No.	%	No.	%	No.		No.	%	No	%	No	%
Total BHT's Examined	2429		98		974		34		1058		60		4461		192	
Total BHT's reviewed in Obstetric wards	2257		85		886		26		983		60		4126		171	
Documented details of labor	468	26.9	30	100.0	591	74.2	1	14.3	566	75.9	19	100.0	1625	49.5	50	89.3
Labor - spontaneous	200	42.7	30	100.0	310	52.5	0	0.0	380	67.1	19	100.0	890	54.8	49	98.0
Labor - induced	268	57.3	0	0.0	281	47.5	1	100.0	186	32.9	0	0.0	735	45.2	1	2.0
If induced																
Syntocinon	183	68.3	0	0.0	228	81.1	1	100.0	160	86.0	0	0.0	571	77.7	1	100.0
prostaglandin (PG)	34	12.7	0	0.0	4	1.4	0	0.0	20	10.8	0	0.0	58	7.9	0	0.0
Synto + PG	49	18.3	0	0.0	40	14.2	0	0.0	6	3.2	0	0.0	95	12.9	0	0.0
Other and non-specified	2	0.7	0	0.0	9	3.2	0	0.0	0	0.0	0	0.0	11	1.5	0	0.0

Table 4.6 shows that labour is induced in 45% of deliveries occurring in specialist units in the province. The proportion varies from 57% in Kandy to 48% in Matale and 33% in Nuwara Eliya.

4.3.2 Selected practices related to labour

Table 4.7: Practices related to labour

	KANDY											MATALE					NUWARA ELIYA						
	TH KANDY	TH KANDY	TH KANDY	TH PERADENIYA	TH PERADENIYA	TH GAMPOLA	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
Episiotomy																							
The current policy of the unit regarding application of episiotomy																							
Perform Episiotomy on all primies		✓	✓	✓	✓		✓		✓			✓	✓		✓			✓	✓	✓		✓	✓
Perform episiotomy on all multies	✓			✓		✓				✓													
Perform episiotomy on selected primies								✓								✓	✓				✓		
Perform episiotomy on selected multies	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓				✓	✓
Local ansthesia to perform epis	✓	✓	✓	✗	✗	✗		✗	✗	✗	✗	✓	✗	✗		✓	✓	✗	✗	✗	✗	✗	✗
Local anstthesia to suture	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The person who performs the episiotomy																							
HO/MO		✓			✓									✓			✓		✓			✓	✓
Nursing officer	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓			✓			✓			✓	
Midwife		✓							✓	✓	✓			✓			✓	✓		✓	✓		
The person who suture the episiotomy																							
HO/MO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Nursing officer															✓								
Midwife																					✓		
Pain relief																							
The pain relief policy for normal vaginal delivery																							
Epidural	✓	✓		✓		✓	✓																
Pethidine	✓	✓	✓	✓	✓	✓		✓				✓	✓				✓						
None									✓	✓	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓
Active management of thirdstage of labour																							
A clear policy on active management of third stage of labour is available	✓	✓	✓	✓	✓	✓		✓	✗	✓	✗	✓	✗	✗	✓	✗	✓	✓	✓	✓	✗	✓	✓
A written document giving policy / flow chart/ is displayed	✗	✗	✗	✗		✗		✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓
Oxytocin is given immediately after the delivery																							
To all the cases	✓	✓		✓	✓	✓	✓		✓	✓		✓	✓				✓	✓	✓		✓	✓	
To selected cases			✓					✓			✓			✓	✓	✓				✓			✓

Table 4.7 describes institutional practices related to labour. It is seen that there is great variation in the pain relief procedure across the different institutions within the province. This aspect is particularly poor in the majority of institutions in the Nuwara Eliya district. Two institutions within the province have indicated that episiotomies may be sutured by nursing and midwifery staff.

Although a majority of institutions have indicated that they have a clear policy on the active management of the third sage of labour the overwhelming majority do not have a written document/flowchart clearly displayed. Some institutions have indicated that Oxytocin is given immediately after delivery only to selected cases.

4.3.3 Referrals and average stay

Table 4.8 shows that except in DH Akurana and DH Lindula the duration of stay in hospital is the same for those with and without an episiotomy. The modal stay following a caesarean section varies from 3-4 days.

Table 4.8: Referral practices and duration of stay by institution and district

	Kandy									Matale					Nuwara Eliya						
	TH KANDY	TH KANDY	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	DG WATAWALA	DH AGARAPATHALA
General referral																					
plans/referrals/protocls for referrals displayed in the LR	✗	✓	✗	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
practice of ensuring service availability before transfer	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✓
Practice of informing the station before transfer	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗	✓	✓	✗	✓	✓	✓	✗	✗	✓	✓
practice of sending an appropriate staff member	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Duration of stay																					
Duration of stay following ND - without an episiotomy (hrs)	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	48	24	48
Duration of stay following ND - with an episiotomy (days)	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	3	1	2
Duration of stay following assisted vaginal delivery (Days)	3	3	2	1	2	2	DNA	DNA	DNA	3	2	DNA	DNA	1	2	2	2	DNA	3	2	DNA
Duration following a CS (Days)	4	4	4	DNA	4	4				3	3				4	3	3				

DNA- Data not available

4.4 Availability of guidelines and protocols for EmONC

Table 4.9 shows that the availability of guidelines and protocols is poor in the province. The labour room management guide and the Pregnancy, Childbirth, Postpartum and Newborn Care guides are the two documents mostly available, Breast feeding booklet and the breast feeding flash cards are available in ten out of 19 institutions in the sample.

Table 4.9: Availability of guide lines and protocols by institution

	KANDY										MATALE					NUWARA ELIYA						
	TH KANDY	TH KANDY	TH KANDY	TH PERADENIYA	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	DH HETTIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DH WATAWALA	DH AGARAPATHALA
HSDP National Guidelines																						
Labour room management guide																						
Pregnancy, Chid birth, Postpartum and Newborn Care Guide																						
Guidelines for the Management of HIV infection in Pregnancy in Sri Lanka																						
National guidelines for the prevention & management of malaria in pregnancy																						
Guidelines on immunization against Tetanus																						
Management of tuberculosis during pregnancy																						
Neonatal advanced life support protocol (wall chart)																						
Breast feeding booklet																						
Breast feeding flash cards																						

Chapter 5

Maternal Mortality and Morbidity

5.1 Maternal mortality

The trends in maternal mortality over the last 10 years in the two districts compared to the national scenario are presented in figure 5.1.

Figure 5.1 shows that there has been a sharp decline in maternal mortality in the Nuwara Eliya district and that the ratio is approaching the national value.

The trend in maternal mortality ratios for the Kandy district shows that it is very similar to the national trend. The trend in Matale shows fluctuations but overall trend is a decline.

Causes of death over this period of time has been examined for two 5 year time periods in tables 5.1(a-c).

Figure 5.1: Trends in maternal mortality by district 2001-2010

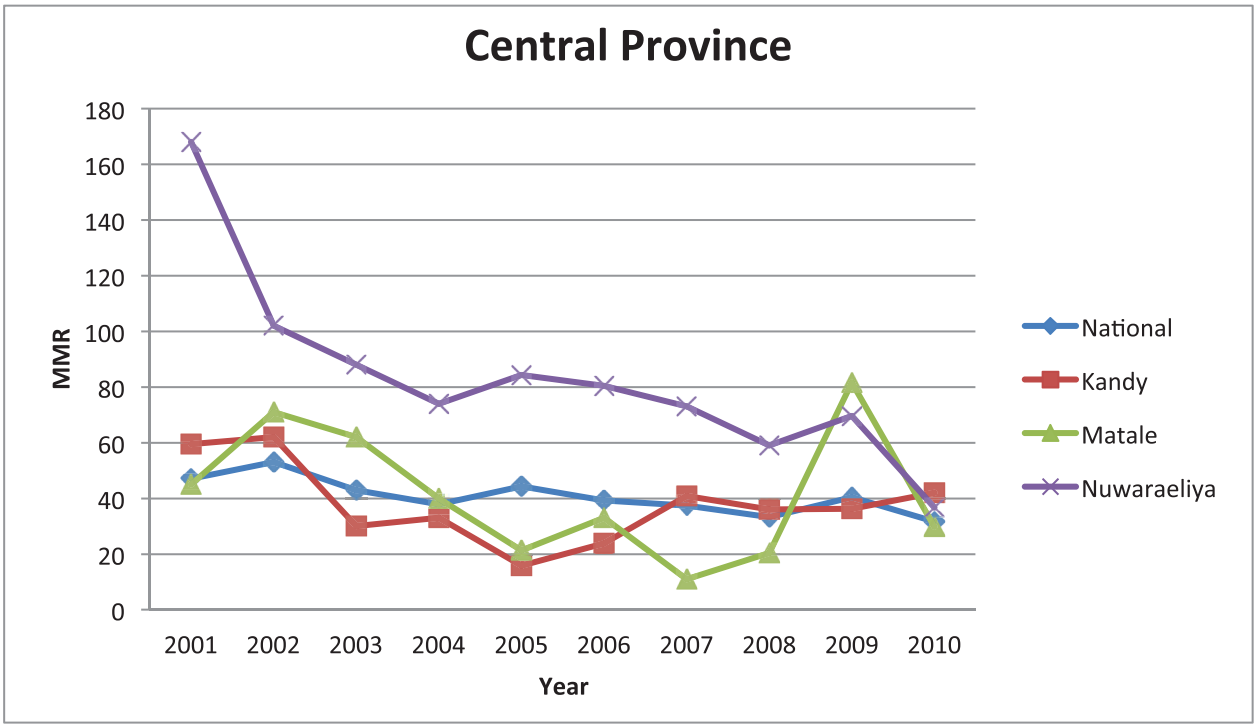


Table 5.1(a): Causes of maternal mortality by district 2001-2010 –Kandy

	2001	2002	2003	2004	2005	2001-2005	2006	2007	2008	2009	2010	2006-2010
MMR / 100,000 LB	59.5	62	30	33	15.8		23.9	40.9	34.41	36.2	41.9	
No. of all reported deaths	16	16	11	11	06	60	15	19	18	24	19	95
No. of confirmed maternal deaths	15	17	08	09	04	53	06	11	09	10	12	48
Type of Maternal Death												
Direct maternal deaths	10	12	04	06	04	36	04	07	04	04	04	23
Indirect maternal deaths	04	03	01	03	-	11	02	02	05	05	08	22
Inconclusive maternal deaths	01	02	03	-	-	06	-	02	00	01		03
Causes for maternal deaths												
Post partum haemorrhage	04	02		04		10	02	03	01	01	02	09
Pregnancy induced hypertension	03	06		02	01	12		02	02	02		06
Cardiovascular disease	03	01		01		05		02	01	02	07	12
Septic abortion		01	03		01	05	01			01	02	04
Pulmonary embolism	02	01	01			04		01				01
Lower respiratory tract infection		02	01	01		04				01		01
Reproductive tract sepsis		01			01	02						00
Amniotic fluid embolism						00		01				01
Ectopic pregnancy					01	01	01					01
Malignancy						00	02		02			04
Cerebrovascular disease			01			01						00
Suicide		01				01			01			01
Liver disease	01					01				01		01
H1N1infection						00				02		02
HIV						00			01			01
Sepsis – other			02	01		03			01			01
Other – direct	01					01						00
Other indirect						00					01	01
Inconclusive	01	02				03		02				02

Source: National Maternal Death Review minutes

The number of maternal deaths has declined marginally in the second five year period but it is seen that there has been a marked increase in the numbers of indirect maternal deaths. The increase of the later is mainly due to the increase in deaths due to cardiovascular diseases.

Table 5.1 (b): Causes of maternal mortality by district 2001-2010 –Matale

	2001	2002	2003	2004	2005	2001-2005	2006	2007	2008	2009	2010	2006-2010
MMR / 100,000 LB	45	71	62	40	21		33.1	10.9	20.47	81.9	29.7	
No. of all reported deaths	07	09	09	06	03	34	06	05	05	13	05	34
No. of confirmed maternal deaths	04	07	06	04	02	23	03	01	02	08	03	17
Type of Maternal Death												
Direct maternal deaths	02	01	05	03	01	12	-	01	01	05	01	08
Indirect maternal deaths	01	04	01	01	01	08	03	00	01	03	02	08
Inconclusive maternal deaths	01	01	-	-	-	02	-	00			00	00
Cause of maternal deaths								DNA				
Post partum haemorrhage	01		01	01		03				01		01
Pregnancy induced hypertension	01		01	01		03						00
Cardiovascular disease	01	02	01		01	05				01		01
Septic abortion		01		01		02						00
Leptospirosis						00					01	01
Ectopic pregnancy			02			02					01	01
Uterine rupture						00			01			01
Encephalitis						00			01			01
HELLP Syndrome						00				02		02
Pulmonary embolism						00	02					02
Liver Disease						00				01	01	02
Lower respiratory tract infection		01				01						00
Reproductive tract infection						00				02		02
Ante partum haemorrhage			01			01						00
Diabetes mellitus				01		01						00
Amniotic fluid embolism					01	01						00
Bronchial asthma						00	01					01
Malaria		01				01						00
Sepsis -other						00				01		01
Inconclusive	01	02				03						00

Source: National Maternal Death Review minutes

The Matale district also shows a decline in the number of deaths in the second five year period and that has been due to a decline in direct obstetric deaths.

Table 5.1(c): Causes of maternal mortality by district 2001-2010 –Nuwara Eliya

	2001	2002	2003	2004	2005	2001-2005	2006	2007	2008	2009	2010	2006-2010
MMR / 100,000 LB	168	102	88	74	84		80.4	73	66.34	69.62	37.97	
No. of all reported deaths	15	17	15	15	17	79	13	18	16	15	21	83
No. of confirmed maternal deaths	13	15	12	08	11	59	12	11	10	11	06	50
Type of Maternal Death												
Direct maternal deaths	10	11	09	06	10	46	08	09	05	09	05	36
Indirect maternal deaths	02	-	02	01	-	05	03	01	05	01	01	11
Inconclusive maternal deaths	01	04	01	01	01	08	01		00	01	00	02
Cause of maternal deaths								DNA				
Post partum haemorrhage	03	07	04	01	06	21	02		01		01	04
Pregnancy induced hypertension	02	02	02	01		07			01	03		04
PPH & PIH both					01	01						00
Septic abortion	01	01	02	01	01	06	04		02	05	02	13
Ectopic pregnancy	02	01		01		04						00
Pulmonary embolism					01	01	01					01
Lower respiratory tract infection			01			01	01		01			01
Liver disease	01					01			01			01
Rupture of uterus			01			01						00
Pericarditis			01			01						00
Necrotising enteritis			01			01						00
Bronchial asthma				01		01						00
Cerebrovascular disease				01		01						00
Anaemia complicating pregnancy				01		01						00
Ante partum haemorrhage					01	01						00
Lobar pneumonia					01	01						00
Reproductive tract sepsis						00	01			01		02
Heart disease						00	01		01			02
Fits /epilepsy						00	01				01	02
HELLP syndrome						00					01	01
Sepsis – other						00	01		02	01		04
Other direct	01					01					01	01
Other indirect	01					01			01			01
Miscellaneous	01					01						00
Inconclusive	01	04		01		06				01		01

Source: National Maternal Death Review minutes

In the Nuwara Eliya district there is a decline in the overall numbers of maternal deaths. The direct obstetric deaths show a sharp decline especially deaths due to post partumhaemorrhage. The number of septic abortions and other sepsis has doubled during the second half. Deaths due to indirect causes have increased but there is no one condition that shows a marked change.

5.2 Maternal morbidity

For this analysis the institutions within a district have been grouped according to availability of specialist services. The morbidity patterns are described separately for the two groups. Table 5.2 shows the admission patterns in the two groups.

5.2.1 Admission patterns

Table 5.2 shows that 28% of admissions to non specialist units have been transferred to other institutions. Only 47% of admissions to these units have been for delivery. They have been admitted mainly for complications other than IUGR, decreased foetal movements and febrile illnesses.

Table 5.2: Admission patterns by type of institution

	Kandy – Specialized		Kandy – non Specialized		Matale – Specialized		Matale – non specialized		Nuwara Eliya – Specialized		Nuwara Eliya – Non Special		Central – Specialized		Central – Non Specialized	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%	No	%
Total BHT's Examined	2429		98		974		34		1058		60		4461		192	
Total BHT's Examined in Obstetric wards	2257		85		886		26		983		60		4126		171	
Outcome of admission																
Live discharge – (mother)	2220	98.4	67	78.8	878	99.1	20	77.0	910	92.6	37	61.7	4008	97.1	124	72.5
Transfer to other institution	33	1.5	20	23.5	6	0.7	6	23.0	62	6.3	21	35.0	101	2.4	47	27.5
Death	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Needed critical care (ICU)	3	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.1	0	0.0
Transferred to Medical / Surgical unit	1	0.0	0	0.0	0	0.0	0	0.0	1	0.1	0	0.0	2	0.0	0	0.0
Reasons for admission																
Admitted for delivery	1552	68.8	44	51.8	763	86.1	10	38.0	754	76.7	27	45.0	3069	74.4	81	47.4
Investigation of IUGR	80	3.5	0	0.0	9	1.0	0	0.0	10	1.0	0	0.0	99	2.4	0	0.0
Decrease fetal movements	91	4.0	4	4.7	18	2.0	0	0.0	24	2.4	4	6.7	133	3.2	8	4.7
Admitted for investigations	98	4.3	0	0.0	10	1.1	0	0.0	27	2.7	0	0.0	135	3.3	0	0.0
Febrile illness	27	1.2	0	0.0	3	0.3	0	0.0	5	0.5	0	0.0	35	0.8	0	0.0
Other illnesses	92	4.1	5	5.9	4	0.5	6	23.0	16	1.6	7	11.7	112	2.7	18	10.5
Other complications of pregnancy	250	11.1	32	37.6	43	4.9	5	19.0	68	6.9	16	26.7	361	8.7	53	31.0
Other	162	7.2	3	3.5	36	4.1	4	15.0	97	9.9	4	6.7	295	7.1	11	6.4

5.2.2 Delivery pattern

Table 5.3: Delivery patterns in specialist and non-specialist institutions in province

	Kandy - Specialized		Kandy – non Specialized		Matale – Specialized		Matale – non specialized		Nuwara Eliya – Specialized		Nuwara Eliya – Non Special		Central - Specialized		Central – Non Specialized	
	No.	%	No.	%	No.	%	No.	%	No.		No.	%	No	%	No	%
Total BHT's Examined	2429		98		974		34		1058		60		4461		192	
Total BHT's reviewed in Obstetric wards	2257		85		886		26		983		60		4126		171	
-																
Mode of delivery																
Vaginal delivery	948	54.4	30	100.0	561	70.4	7	100.0	577	77.3	19	100.0	2086	63.5	56	100.0
Details documented	948	100.0	30	100.0	561	100.0	7	100.0	577	100.0	19	100.0	2086	100.0	56	100.0
Cephalic	913	96.3	30	100.0	555	98.9	7	100.0	566	98.1	19	100.0	2034	97.5	56	100.0
Vacuum	11	1.2	0	0.0	1	0.2	0	0.0	9	1.6	0	0.0	21	1.0	0	0.0
Forceps	24	2.5	0	0.0	5	0.9	0	0.0	2	0.3	0	0.0	31	1.5	0	0.0
CS - Elective	401	23.0	0	0.0	126	15.8	0	0.0	83	11.1	0	0.0	610	18.6	0	0.0
CS - Emergency	393	22.6	0	0.0	110	13.8	0	0.0	86	11.5	0	0.0	589	17.9	0	0.0
Total reported deliveries	1742	77.2	30	35.3	797	90.0	7	26.9	746	75.9	19	31.7	3285	79.6	56	32.7

Table 5.3 shows the delivery pattern.

5.2.3 Complications of pregnancy and labour

Table 5.4 shows the morbidity pattern in specialised and non-specialised institutions. An attempt was made to collect data on abortion separately as induced and spontaneous. However, only some institutions have reported the two separately, some reporting the two together as abortion. Therefore all data is presented as abortion.

Table 5.4: Complications of pregnancy and labour in specialist and non - specialist institutions in Central province

	Kandy - Specialized		Kandy – non Specialized		Matale – Specialized		Matale – non specialized		Nuwara Eliya – Specialized		Nuwara Eliya – Non Special		Central - Specialized		Central – Non Specialized	
	No.	%	No.	%	No.	%	No.	%	No.		No.	%	No	%	No	%
Total BHT's Examined	2429		98		974		34		1058		60		4461		192	
Complications of Labor																
Prolonged / Obstructed labor	6	0.2	0	0.0	20	2.1	0	0.0	8	0.8	2	3.3	34	0.8	2	1.0
Lack of progress	28	1.2	1	1.0	43	4.4	0	0.0	18	1.7	1	1.7	89	2.0	2	1.0
Retained placenta	11	0.5	1	1.0	12	1.2	0	0.0	7	0.7	0	0.0	30	0.7	1	0.5
Tears	58	2.4	0	0.0	5	0.5	0	0.0	13	1.2	2	3.3	76	1.7	2	1.0
Cord prolapse	0	0.0	0	0.0	2	0.2	0	0.0	0	0.0	0	0.0	2	0.0	0	0.0
Shoulder dystocia	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Other	54	2.2	3	3.1	8	0.8	0	0.0	18	1.7	1	1.7	80	1.8	4	2.1
Total	**157**	**6.5**	**5**	**5.1**	**90**	**9.2**	**0**	**0.0**	**64**	**6.1**	**6**	**10.0**	**311**	**7.0**	**11**	**5.6**
Hemorrhage																
Placenta previa	9	0.4	0	0.0	0	0.0	0	0.0	3	0.3	1	1.7	12	0.3	1	0.5
Accreta/increta/percreta placenta	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0
Abruptio placenta	2	0.1	0	0.0	4	0.4	0	0.0	0	0.0	0	0.0	6	0.1	0	0.0
Ruptured uterus	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0
Postpartum hemorrhage	8	0.3	1	1.0	15	1.5	0	0.0	8	0.8	0	0.0	31	0.7	1	0.5
Other obstetric hemorrhage	5	0.2	0	0.0	0	0.0	0	0.0	1	0.1	0	0.0	6	0.1	0	0.0
Total	**25**	**1.0**	**1**	**1.0**	**20**	**2.0**	**0**	**0.0**	**12**	**1.2**	**1**	**1.7**	**57**	**1.2**	**2**	**1.0**
Infection																
Post-Partum sepsis	3	0.1	0	0.0	0	0.0	0	0.0	1	0.1	0	0.0	4	0.1	0	0.0
Pyelonephritis	3	0.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	0.1	0	0.0
Influenza-like illness (viral fevers)	5	0.2	0	0.0	4	0.4	0	0.0	1	0.1	0	0.0	10	0.2	0	0.0
Other systemic infections/sepsis	7	0.3	0	0.0	0	0.0	0	0.0	2	0.2	0	0.0	9	0.2	0	0.0
Total	**19**	**0.7**	**0**	**0.0**	**4**	**0.4**	**0**	**0.0**	**4**	**0.4**	**1**	**1.7**	**27**	**0.6**	**1**	**0.5**
Hypertension																
Chronic hypertension	3	0.1	0	0.0	1	0.1	0	0.0	2	0.2	0	0.0	6	0.1	0	0.0
PIH other than eclampsia	84	3.5	5	5.1	45	4.6	0	0.0	47	4.4	3	5.0	176	3.9	8	4.2
Eclampsia	4	0.2	0	0.0	3	0.3	0	0.0	4	0.4	1	1.7	11	0.2	1	0.5
Total	**91**	**3.8**	**5**	**5.1**	**49**	**5.0**	**0**	**0.0**	**53**	**5.0**	**4**	**6.7**	**193**	**4.2**	**9**	**4.7**
Total gynaecological tickets examined	172	7.1	13	13.3	88	9.0	8	23.5	75	7.1	0	0.0	335	7.5	21	10.9
Gynaecological conditions																
Ectopic pregnancies	2	0.1	0	0.0	84	8.6	8	23.5	4	0.4	0	0.0	90	2.0	8	4.2
Abortions	23	0.9	0	0.0	2	0.2	1	2.9	71	6.7	0	0.0	96	2.2	1	0.5
Abortion related hemorrhage	1	0.0	0	0.0	82	8.4	7	20.6	1	0.1	0	0.0	84	1.9	7	3.6
Abortion related sepsis	0	0.0	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0

The proportion of deliveries with complications of labour in the province is 7% and 6% in specialist and non specialist institutions respectively. In the specialist units it varies from 6% in Nuwara Eliya to 9% in Matale. There is no difference in the proportion of hypertensive disease of pregnancy seen in specialist and non specialist units in the province.

5.2.4 Co-morbidities

Table 5.5: Co morbidities in specialist institutions and non - specialist institutions in Central province:

	Kandy - Specialized		Kandy – non Specialized		Matale – Specialized		Matale – non specialized		Nuwara Eliya – Specialized		Nuwara Eliya – Non Special		Central - Specialized		Central – Non Specialized	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%	No	%
Total BHT's Examined	2429		98		974		34		1058		60		4461		192	
-																
Co Morbidities																
Severe Anemia	6	0.2	1	1.0	2	0.2	0	0.0	6	0.6	0	0.0	14	0.3	1	0.5
Heart disease	28	1.2	0	0.0	17	1.7	0	0.0	8	0.8	0	0.0	53	1.2	0	0.0
Lung disease	8	0.3	0	0.0	10	1.0	0	0.0	5	0.5	0	0.0	23	0.5	0	0.0
Renal disease	1	0.0	0	0.0	1	0.1	0	0.0	1	0.1	0	0.0	3	0.1	0	0.0
Hepatic disease	6	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	0.1	0	0.0
Gestational diabetes	63	2.6	1	1.0	12	1.2	0	0.0	7	0.7	0	0.0	82	1.8	1	0.5
Diabetes prior to pregnancy	8	0.3	0	0.0	2	0.2	0	0.0	3	0.3	0	0.0	13	0.3	0	0.0
Impaired Glucose Tolerance	7	0.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	7	0.2	0	0.0
Total	127	5.1	2	2.0	44	4.4	0	0.0	30	3.0	0	0.0	201	4.5	2	1.0

About 6% of pregnant women in the province have a co-morbid condition. The commonest co-morbidity seen is gestational diabetes, impaired glucose tolerance and diabetes prior to pregnancy taken together as a group followed by heart disease.

5.3 Transfers

Table 5.6: Pattern of transfers in the Central province

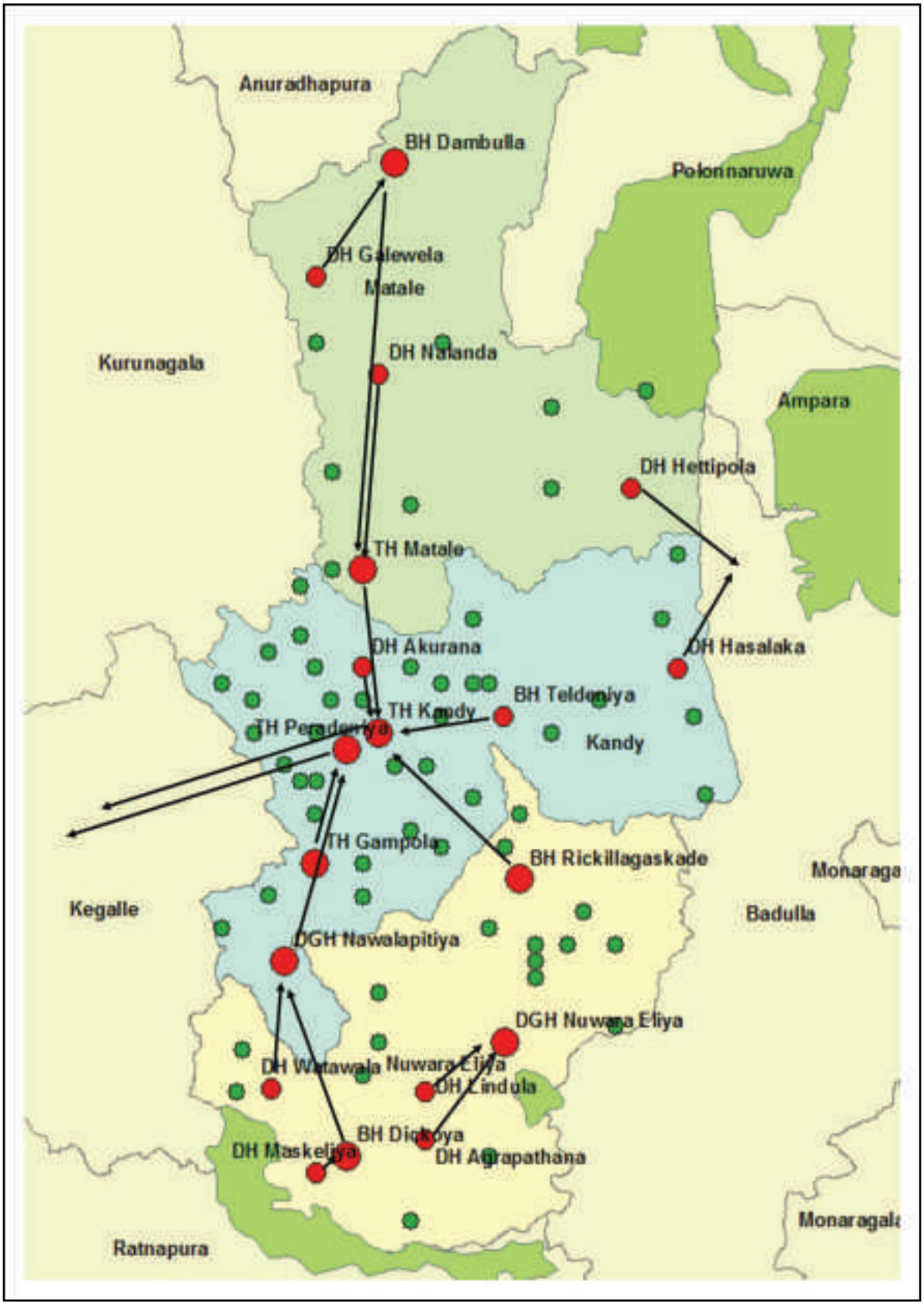
Hospital	Usual place of emergency transfer	Average time taken for a transfer in minutes	Number of obstetric cases transferred during the prospective survey (4 weeks)	Number of transfers with documented direct obstetric complications
Kandy District				
TH Kandy	CSHW	180 minutes	0	0
TH Peradeniya	NI	NI	1	0
TH Gampola	TH Peradeniya	25 minutes	18	3
DGH Nawalapitiya	TH Peradeniya	60 minutes	14	1
BH Theldeniya	TH Kandy	45 minutes	12	2
DH Akurana	TH Kandy	30 minutes	8	0
DH Hasalaka	BH Mahiyangana	15 minutes	0	0
Matale District				
DGH Matale	TH Kandy	45 minutes	0	0
BH Dambulla	DGH Matale	60 minutes	7	3
DH Hettipola	BH Mahiyangana	40 minutes	6	2
DH Galewela	BH Dambulla	25 minutes	3	2
DH Nalanda	DGH Matale	30 minutes	NI	NI
Nuwara Eliya District				
DGH Nuwara Eliya	TH Kandy	150 minutes	1	0
BH Dickoya	DGH Nawalapitiya	90 minutes	23	4
BH Rickillagaskade	TH Kandy	60 minutes	38	4
DH Maskeliya	BH Dickoya	30 minutes	0	0
DH Lindula	DGH Nuwara Eliya	40 minutes	21	4
DH Watawala	DGH Nawalapitiya	30 minutes	NI	NI
DH Agrapathana	DGH Nuwara Eliya	120 minutes	NI	NI

NI (No information available from the hospital)

Table 5.6 shows that the average travel times for transfer within the province vary from 15-60 minutes in the Kandy and Matale districts. However in the Nuwara Eliya district travel times vary from 30 minutes to 150 minutes.

Reasons for transfer are documented only for a small number of the transfers and as such are not analysed.

Figure 5.2 Pattern of transfers in the Central province



Chapter 6

Resources for EmONC - 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. 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. 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 district and institution. The information presented in table 6.1 was obtained from the heads of the institutions.

Table 6.1 Summary of services provided by institution district and 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
Facilities available for maternal care																			
Bed strength of the hospital	2291	910	351	463	84	81	50	750	266	58	90	42	426	92	126	120	74	57	47
No. of obtetrics units available	3	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1
No.of labor rooms available	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1
Total beds dedicated for obstetric care	239	149	NI	76	10	11	8	147	41	9	6	7	100	36	35	27	16	9	15
Proportion of Obs beds / total beds of the institution	10.4	16.4	NI	16.4	11.9	13.6	16.0	19.6	15.4	15.5	6.7	16.7	23.5	39.1	27.8	22.5	21.6	15.8	31.9
Beds dedicated for obs care - antenatal	73	72	NI	28	5	5	4	47	16	6	4	5	46	14	23	16	10	4	11
Beds dedicated for obs care - postnatal	114	77	NI	48	5	6	4	100	25	3	2	2	54	22	12	11	6	5	4
Antenatal clinic care	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Post natal clinic care	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Family planning clinic	✓	✓	✓	✓	✓	#	✓	✓	#	✓	✓	✓	✓	✓	✓	✓	#	✓	#
Well baby clinic	✓	✓	✓	#	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	#	✓	#
Health education unit	✓	✓	✓	✓	✓	✓	#	✓	✓	#	✓	#	✓	#	✓	#	#	✓	#
Infection control unit	✓	✓	✓	✓	✓	#	#	✓	✓	#	✓	#	✓	#	✓	✓	#	✓	#

NI- information not available

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.

6.2. 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.

Table 6.2: Summary of institutional profiles in each district and the province

	Kandy							Matale					Nuwara Eliya						
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	DH HETTIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARA ELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DG WATAWALA	DH AGARAPATHALA
Comprehensive EmOC status	+	+	+	+	-	-	-	+	+	-	-	-	+	+	+	-	-	-	-
Basic EmOC status	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24*7 Comprehensive EmOC status	+	+	+	+				+					+						
Institutions with 24*7 electricity	+	+	-	+	+	-	-	+	-	+	+	-	+	+	+	-	+	-	-
Institutions with 24*7 water supply	+	+	-	-	+	+	-	+	+	-	+	-	-	-	+	+	-	+	+
Institutions with 24*7 Transport	+	+	+	-	+	-	-	-	-	-	-	-	-	+	+	+	-	-	-
Institutions with 24/* Communication	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Availability of a functional theatre	+	+	+	+	-			+	+				+	+	+				
Availability of a functional blood bank	+	+	+	+	-			+	+				+	+	+				
24*7 obstetric surgical cover	+	+	+	+	-			+	-				+	-	-				
24*7 Anesthetic cover	+	+	+	+	-			+	+				+	-	-				
24*7 Blood transfusion service cover	+	+	+	+	-			+	-				+	-	-				
Dedicated Obstetric theatre	+	+	-	-				+	-				+	+	+				

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

INSTITUTION	Kandy									Matale					Nuwara Eliya						
	TH KANDY	TH KANDY	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	DG WATAWALA	DH AGARAPATHALA
Water Supply																					
Water supply	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	#	✓	✓
Elbow or foot operated tap for hand washing	✓	✓	✓	✓	✓	✓	#	#	#	✓	✓	#	✓	#	#	#	#	#	#	#	#
Electricity and Illumination																					
Generator / separate generator supply	✓	#	#	✓	✓	✓	#	✓	✓	#		✓	#	#	✓	#	✓	✓	#	#	#
Emergency lamps	✓	✓	#	✓	✓	#	✓	✓	#		#	✓	✓	✓	✓	✓	✓	✓	✓	✓	#
At each head-end of bed three, 13A plug points	✓	#	#	#	#	✓	#	#	#	#	✓	✓	#		#	#	#	#	#	#	#
At resuscitation area three, 13A plug points	✓	#	#	#	#		#	#	#	#	✓	✓	#		#	#	✓	#	✓	#	#
One, 15A plug point	✓	✓	#	#	#		#		#	#	✓		✓		#	✓	#	✓	✓	✓	#
Communication																					
Cordless telephone for PHO	#	#	#	#	✓	#	#		#	#	#	#	#	#	✓	#	#	#	✓	#	#
Direct telephone line to labour room	#	#	#	✓	#	✓	#		#	✓	#	#	#	#	✓	#	#	#	#	#	#
Intercom facilities	✓	#	✓	#	#	#	#		#	✓	✓	#	#	#	#	✓	✓	✓	✓	✓	#
Alarm for emergencies	#	#	#	#	#	#	#		#	#	#	#	#	#	#	#	#	#	✓	#	✓
Ventilation																					
AC the temperature maintained at 25°C	✓	#	#	#	✓	✓	#	#	#	✓	#	#	#	#	✓	#	#	#	#	#	#
Exhaust fan	#	✓	#	#	✓		#	#	#	✓	#	✓	#	✓	#	#	#	#	#	#	#
Presence of windows above 1.2m	✓	✓	#	✓	✓	✓	✓	✓	✓	✓	✓	✓	#	✓	#	✓	✓	✓	✓	✓	#

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

INSTITUTION	Kandy									Matale					Nuwara Eliya						
	TH KANDY	TH KANDY	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	DG WATAWALA	DH AGARAPATHALA
Walls and Floor																					
Walls tiled up to 1.8m from floor	✓	✓	#	#	✓	✓	✓	✓	✓	✓	✓	#	✓	#	#	✓	✓	✓	✓	✓	#
Tiled floor	✓	#	#	#	✓	✓	#	✓	✓	✓	✓	✓	✓	✓	#	✓	✓	✓	✓	✓	✓
At the entrance to labour room																					
Place to change clothes	#	#	#	✓	#	✓	#	✓	✓	#	✓	#	#	#	✓	#	#	✓	#	✓	✓
Place for hand washing	✓	✓	✓	✓	✓	✓	✓	✓	✓	#	#	#	#	#	✓	#	✓	✓	✓	✓	✓
Shoe rack	✓	✓	#	✓	✓	✓	✓	✓	✓	✓	✓	#	#	#	#	✓	✓	✓	✓	✓	✓
Automatically closing doors to labour room	✓	#	#	✓	#	✓	#	#	#	✓	#	#	#	#	#	#	✓	#	#	#	#
Washroom																					
Separate room for washing instruments	#	✓	#	✓	✓	✓	#	#	#	#	✓	✓	#	#	✓	#	#	#	#	#	#
Steel/fiberglass sink	✓	#	#	✓	#	✓	#	#	#	#	✓	#	#	#	#	#	#	✓	#	✓	#
Racks	✓	✓	#	✓	✓	✓	#	#	#	#	✓	✓	#	#	#	#	#	#	#	#	✓
Two 13A plug points	✓	✓	#	✓	✓	✓	#	#	#	#	✓	#	#	#	✓	#	#	#		#	#
Separate entrance from outside	✓	#	#	#	✓	✓	✓	#	✓	#	#	✓	#	#	#	#	#	#		#	✓
Toilet Facilities																					
Separate toilets for labour room	#	#	#	✓	✓	✓	✓	#	✓	✓	✓	#	#	✓	✓	#	#	✓	✓	✓	✓
Commode type of toilets	#	#	#	✓	✓	✓	#	#	#	✓	✓		#		✓	#	#	✓	#	#	#
Squatting type of toilets	#	#	#	#	#	✓	✓	✓	✓	#			#	✓	#	#	✓	#	✓	✓	✓
Railings on either side of wall (for squatting)	#	#	#			✓	#	#	#	#	#		#		#	#	#	#	#	#	#
Other requirements																					
Separate trolley for labour room	✓	✓	#	✓	✓	✓	✓	#	✓	✓	✓	#	✓	✓	#	✓	✓	✓	#	✓	#
Place for temporary storage of dirty linen etc	✓	#	✓	✓	✓	✓	#	✓	#	✓	✓	✓	#	✓	✓	#	✓	✓	#	✓	#
Use of colour card system for waste disposal	✓	✓	#	✓	✓	✓	✓	✓	#	✓	✓	#	#	#	#	#	✓	#	✓	✓	✓
Notice board outside the labour room	✓	✓	#	✓	✓	✓	#	#	#	✓	✓	#	#	#	✓	✓	✓	#	✓	✓	✓
On call doctor's information displayed in LR	✓	✓	#	✓	✓	✓	#	#	#	#	✓	#	#	#	✓	#	✓	✓	✓	✓	#

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

INSTITUTION	Kandy									Matale					Nuwara Eliya						
	TH KANDY	TH KANDY	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	DG WATAWALA	DH AGARAPATHALA
Human Resources																					
Nursing Officersmidwifery trained	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗	✗	✗
Nursing Officerswithout midwifery training	✓	✗		✓	✗	✗	✓	✓	✓	✗		✓	✗	✓	✓	✗	✗	✓	✓	✓	✓
Midwives		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24hr on-call house officer	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✗	✓	✓
Newborn care area																					
Resuscitaire	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✗		✗	✓	✓	✓	✓	✗	✗
Neonatal cots	✓	✓	✓	✗	✓	✓	✗	✓	✓	✗	✗	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗
Sink with water supply	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓	✓	✗	✗	✓
Low tech incubators	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗
Neonatal suckers	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
Secca weighing scale	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Infant Magill's laryngoscope(straight blade)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✗	✓	✓	✗
Furniture and General Items																					
Delivery beds with stirrups	✓	✓	✗	✓	✗	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
Spot lamps (movable)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wall clock	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oxygen cylinder stands and regulators	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Refrigerator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓
Wall thermometer	✗	✗	✗	✗	✓	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗		✗	✗	✗	✗
Equipments																					
Delivery sets	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pinard foetal stethoscope	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Doppler (Foetal heart detector)	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✓	✗	✓	✓	✗	✓	✗	✓
CTG machine	✓	✓	✗	✓	✓	✓	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓	✓	✗	✗	✗	✗
Vacuum extractor	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓		✗	✗	✗	✗
Wrigley's forceps	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✓	✓	✓	✗	✓	✓	✗
Surgical consumables																					
Cord clamps/Sterile Threads	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Neonatal ambu bag	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓
Neonatal sucker tubes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Naso-gastric tubes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✗	✗	✓	✓
Endo tracheal tubes	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✓	✗	✓	✗	✓	✗	✗	✓	✗
Size 2.5	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗	✗
Size 3	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✗		✓	✗	✓	✗	✗	✗	✗
Size 3.5	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✗		✓	✗	✓	✗	✗	✓	✗
Size 4	✓	✓	✗	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗		✓	✗	✓	✗	✗	✓	✗
Flexible stiletto(for ET tube)	✗	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗	✗
IV cannula	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓
Disposable syringes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drugs																					
Adrenaline	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Naloxone	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✗	✓	✓	✓	✓	✗	✗	✗	✗
Vitamin K	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗
Normal Saline	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

6.3. 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.

Table 6.4: Operation theatre facilities by institution

	KANDY						MATALE				NUWARA ELIYA		
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA		DGH MATALE	BH DAMBULLA	BH HETTIPOLA		DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA
Theatre complex	✓	✓	✓	✓	✗		✓	✓	✗		✓	✓	✓
Functioning or not	✓	✓	✓	✓			✓	✓			✓	✓	✓
Separate operating theatre only for obstetric patients	✓	✓	✗	✗			✓	✗			✓	✓	✓
Arrangement during working hours													
Interrupt the Surgical list			✓	✓			✓	✓					
Interrupt the Gynae list			✓					✓					
Arrangement during off hours													
Theatre is freely available				✓			✓						
disturb a casualty list .								✓					
During the past two months a delay of > 20 mins from the time of request due to the OT being occupied by another surgery	✗	✗	✓	✓			✗	✗			✗	✗	✗
Equipments and Supplies													
Availability of an operating table	✓	✓	✓	✓			✓	✓			✓	✓	✓
In functional condition	✓	✓	✓	✓			✓	✓			✓	✗	✓
Availability of adjustable light	✗	✓	✓	✓			✓	✓			✓	✓	✓
The light is shadow less	✗	✓	✓	✓			✓	✗			✗	✓	✓
Requested for additional linen during the past three months	✓	✓	✓	✓			✗	✗			✗	✓	✓
Use separate packs (laparotomy packs, LSCS packs) for surgeries	✓	✓	✓	✓			✓	✓			✓	✓	✓
Number of LSCS packs	10	7	12	5			4	7			3	2	4
Number of laparotomy packs	5	0	5	3			3	2			1	1	1
Postponing emergency obs surgery	✗	✓	✗	✗			✓	✗			✗	✓	✗
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	0	0	0	0			0	0			0	0	0
Separate generator for the theatre	✗	✗	✓	✗			✓	✗			✗	✗	✗
Dedicated staff for generator	✓	✗	✗	✗			✗	✗			✓	✗	✓
Continous supply of water	✓	✓	✓	✓			✗	✓			✓	✗	✓
Days without water	✗	✗	✓	✗			✗	✗			✗	✓	✗
Direct telephone line to the theatre	✗	✓	✓	✓			✗	✗			✓	✗	✗
Direct dialing facility in the theatre	✓	✗	✗	✓			✗	✗			✗	✗	✗
Cell phones	✓	✓	✓	✓			✓	✓			✓	✓	✓
Resuscitator at the newborn corner of the OT	✓	✓	✗	✓			✓	✓			✓	✓	✓

6.4. 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.

Table 6.5: Blood transfusion services by institution

	KANDY						MATALE				NUWARA ELIYA		
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA		DGH MATALE	BH DAMBULLA	BH HETTIPOLA		DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA
Availability of a blood bank	✓	✓	✓	✓	✗		✓	✓	✗		✓	✓	✓
Mismatch transfusions recorded during the past six months	0	0	2	0			3	0			1	0	0
Instances of septicemia following blood transfusions recorded during the past six months	0	0	0	0			0	0			0	0	0
Availability of blood products													
Whole blood	✓	✓	✓	✓			✓	✓			✓	✓	✓
Platelets	✓	✓	✓	✓				✓			✗	✗	✗
FFP	✓	✓	✓	✓			✓	✓			✓	✗	✗
Cryopresipitate	✓	✓	✓	✓							✗	✗	✗
O negative blood in stock	✓	✓	✓	✓			✓	✓			✓	✓	✗
O positive blood in stock	✓	✓	✓	✓			✓	✓			✓	✓	✗
Cross matching of blood during normal working hours													
MO/Blood Bank	✓	✓	✓	✓			✓	✓			✓	✓	✓
House Officer													
Cross matching of blood after normal working hours													
MO/Blood Bank	✓	✓	✗	✗				✓				✓	✓
House Officer			✓	✓			✓				✓		

6.5. Laboratory services

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

Table 6.6: Laboratory services by institution

	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	DG WATAWALA	DH AGARAPATHALA
A functioning laboratory is available	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✗	✓	✗	✓
Laboratory facilities available for 24/7	✓	✓	✓	✓	✗	✗	✗		✓	✓	✗	✗	✗		✓	✗	NI		✗		✗
What is the operational arrangement of maintaining the 24/7 service	R	OC	OC	R					R	R					OC	R					
Testing facilities available																					
DURING NORMAL WORKING HOURS																					
a. Haemoglobin	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓		✓	✓			✓		✓
b. WBC/DC	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓		✓	✓			✓		✓
c. Platelets	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓		✓	✓			✓		✓
d. PCV	✓	✓	✓	✓	✓				✓	✓		✓			✓	✓			✓		
e. Blood urea	✓	✓	✓	✓					✓	✓					✓	✓					
f. Blood sugar	✓	✓	✓	✓	✓				✓	✓					✓	✓					✓
g. Bilirubin	✓	✓	✓	✓					✓						✓	✓					
h. Grouping & Rh	✓	✓														✓					
i. Electrolytes	✓	✓	✓							✓					✓						
j. Blood culture & ABST	✓	✓		✓					✓						✓						
k. Urine culture & ABST	✓	✓		✓					✓	✓					✓						
l. BT / CT	✓	✓	✓	✓	✓				✓	✓	✓	✓			✓	✓			✓		✓
m. Urine bile	✓	✓	✓	✓	✓				✓	✓		✓			✓	✓					
n. ECG		✓		✓	✓				✓				✓			✓					✓
o. X ray		✓		✓					✓	✓						✓					
AFTER NORMAL WORKING HOURS																					
a. Haemoglobin	✓	✓	✓	✓					✓	✓					✓						
b. WBC/DC	✓	✓	✓	✓					✓	✓					✓						
c. Platelets	✓	✓	✓	✓					✓	✓					✓						
d. PCV	✓	✓	✓	✓					✓	✓					✓						
e. Blood urea	✓	✓	✓	✓					✓	✓					✓						
f. Blood sugar	✓	✓	✓	✓					✓	✓					✓				✓		
g. Bilirubin	✓	✓	✓	✓					✓										✓		
h. Grouping & Rh	✓	✓													✓				✓		
i. Electrolytes	✓	✓								✓					✓				✓		
j. Blood culture & ABST			✓						✓						✓				✓		
k. Urine culture & ABST									✓						✓				✓		
l. BT / CT	✓	✓	✓	✓					✓	✓					✓						
m. Urine bile		✓	✓	✓					✓	✓					✓				✓		
n. ECG		✓											✓						✓		
o. X ray		✓		✓					✓	✓									✓		

6.6: Infection Control

The information in table 6.7(a) was collected from the in charge of the CSSD and table 6.7(b) 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 (a): Availability of infection control measures by institution

	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
Availability of a separate CSSD	✓	✓	✓	✓	✓	✗	✗		✗	✓	✗	✗	✗		✗	✗	✓	✗	✗	✗	✗
If no CSSD:																					
Separate autoclave room						✓	✗		✗		✗		✗		✓	✗			✗	✓	
Autoclave (with temperature and pressure gauges)						✓	✗		✓		✓	✓	✗		✓	✓			✓	✓	
Hot air Sterilizer (dry oven)						✗	✓		✗		✗		✗		✗	✗			✗	✗	
Steam Sterilizer						✗	✗		✓		✗		✗		✓	✓			✓	✗	
Sterilizer / Pressure Cooker (electric)						✗	✗		✓		✗		✗		✗	✓			✗	✗	
Sterilizer / Pressure Cooker (kerosene heated)						✗	✗		✗		✗		✗		✗	✓			✗	✗	
Sterilization drum						✓	✓		✓		✓		✗		✓	✓			✓	✓	
Sterilization drum stand						✗	✓		✗		✗		✗		✗	✓			✓	✗	
Availability of a policy on waste disposal	✓	✓	✓	✓	✓	✗	✗		✓	✓	✗	✓	✗		✓	✓	✓	✓	✓	✓	✓
It is functioning	✓	✓	✓	✓	✓	✗			✓	✓	✗	✓	✗		✓	✓	✓	✓	✓	✓	✓
Availability of a specific methodology of biological waster such as placenta	✓	✓	✓	✓	✓	✓	✓		✓	✓	✗	✓	✓		✓	✓	✓	✓	✓	✓	✓
If yes describe briefly																					
PIT				✓	✓	✓	✓		✓	✓		✓				✓	✓	✓	✓	✓	✓
Burried													✓								
incinerate	✓	✓	✓																		
Refridgerate and cremation																					
Availability of a functioning incinerator	✗		✓	✓	✗	✗	✗		✓	✓	✗	✓	✗		✗	✗	✗	✗	✗	✓	✗

Table 6.7 (b): Infection control measures by institution

	KANDY											MATALE						NUWARA ELIYA						
	TH KANDY	TH KANDY	TH KANDY	TH PERADENIYA	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	DG WATAWALA	DH AGARAPATHALA
INFECTION PREVENTION																								
Soap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✗	✓	✓
Antiseptics	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗		✓	✓	✓	✓	✗		✓	✓	✓	✓	✗	✓	✓
Gloves	✓	✓	✗	✓	✗	✓	✓	✓	✓	✓		✓	✓	✗	✓	✓		✓	✓	✓	✓	✓	✓	✓
Heavy duty gloves	✓	✓	✗	✗	✗	✗	✓	✓	✗	✓		✓	✓	✗	✓	✓		✗	✗	✓	✗	✗	✓	✗
Non-sterile protective clothing	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓		✓	✓	✗	✓	✗		✓	✓	✓	✗	✗	✓	✗
Bleach or bleaching powder	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✗	✓	✗		✓	✓	✓	✗	✓	✓	✓
Prepared disinfection solution	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✗		✓	✓	✓	✗	✗	✓	✓
Covered contaminated waste trash bin	✓	✓	✓	✓	✗	✓	✓	✓	✗	✗		✓	✓	✗	✓			✓	✓	✗	✗	✓	✓	✓
Puncture proof sharps container	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓			✗	✗	✗	✗	✓	✓	✓
Protective equipment for HIV	✓	✓	✗	✓	✓	✗	✓	✗	✗	✗		✓	✗	✗	✗	✗		✓	✗	✗	✓	✗	✗	
Chlorhexidine	✗	✗	✓	✓	✓	✓	✓		✗	✗		✓	✓	✗	✗	✓		✗	✗	✗	✗	✗	✓	
Ethanol (70%)	✓	✓	✓	✓	✗	✓	✓	✓	✗	✗		✓	✓	✗	✓	✗		✓	✗	✗	✗	✗	✗	✓
Polyvidone iodine	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗		✓	✓	✗	✓	✓		✓	✓	✓	✗	✗	✓	
Hand rub	✓	✓	✓		✓	✗	✓		✗	✗		✓	✓			✗		✓	✗	✓	✓		✗	

6.7: Pharmacy and Medicines for EmONC services

The information in tables 6.8a, 6.8b and 6.9 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.

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

	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
ANTIBIOTICS																					
Amoxicillin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Ampicillin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✗
Benzyl Penicillin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Cefalexin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✗	✓	✓	✓	✓	✓	✓
Cefotaxime	✓	✓	✓	✓	✗	✗	✗		✓	✓		✗	✗		✓	✗	✓	✗	✗	✗	✗
Ceftriaxone	✓	✓	✓	✓	✓	✗	✗		✓	✓		✗	✗		✓	✓	✓	✗	✗	✗	✓
Cefuroxime	✓	✓	✓	✓	✗	✗	✗		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Cloxacillin	✗	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Phenoxymethyl penicillin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Erythromycin	✓	✓	✗	✓	✓	✓	✗		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Gentamicin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✗		✓	✓	✓	✓	✓	✓	✓
Metronidazole	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
ANTICONVULSANTS																					
Magnesium sulphate (injection)	✓	✓	✓	✓	✓	✗	✗		✓	✓	✓	✓			✓	✓	✓	✗	✗	✓	✗
Diazepam (injection)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Phenobarbital	✓	✓	✓	✓	✓	✗	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Phenytoin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
ANTIHYPERTENSIVES																					
Hydralazine	✓	✓	✓	✓	✗	✗	✗		✓	✓	✗	✗	✓		✓	✓	✓	✗	✗	✓	✗
Labetalol	✓	✓	✓	✗	✗	✗	✗		✓	✗	✗	✗			✓	✗	✓	✗	✗	✗	✗
Methyldopa	✓	✓	✓	✓	✓	✗	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Nifedipine	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
OXYTOCICS																					
Ergometrine	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Oxytocin	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Oxytocin + Ergomatrine	✗	✗	✗	✗	✗	✗	✗		✗	✗	✗	✗	✗		✗	✗		✓	✗	✗	✗
EMERGENCY DRUGS																					
Adrenaline (Epinephrine)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Atropine sulphate	✓	✓	✓	✓	✓	✗	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Calcium gluconate	✓	✓	✓	✓	✓	✓	✓		✓	✓	✗	✗	✗		✓	✓	✓	✗	✗	✗	✓
Digoxin	✓	✓	✓	✓	✓	✓	✗		✓	✗	✓	✓	✗		✓	✓	✓	✓	✗	✓	✗
Ephedrine	✓	✓	✓	✓	✗	✗	✗		✓	✓	✗	✗	✗		✓	✓	✓	✓	✗	✗	✗
Frusemide	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Hydrocortisone	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Naloxone	✗	✓	✓	✓	✗	✗	✗		✓	✓	✓	✓	✗		✓	✓	✓	✗	✗	✗	✗
Promethazine	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
ANALGESICS																					
Morphine	✓	✓	✓	✓	✓	✗	✗		✓	✓	✓	✓	✗		✓	✓	✓	✗	✓	✓	✗
Pethidine	✓	✓	✓	✓	✓	✓	✗		✓	✓	✓	✓	✗		✓	✓	✓	✗	✓	✓	✗
TOCOLITICS																					
Nifidipine	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Salbutamol	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓

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

	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	DG WATAWALA	DH AGARAPATHALA
STEROIDS																					
Betamethasone	✓	✓	✓	✓	✓	✓	✓		✓	✗	✗	✗	✓			✓	✓	✗	✗	✗	✓
Dexamethasone	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Prednisolone	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
IV FLUIDS																					
Dextrose	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Normal saline	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Ringer's lactate	✓	✗	✓	✓	✓	✗	✗		✓	✓	✗	✓	✓		✓	✓		✗	✗	✗	✓
Starch	✓	✓	✓	✓	✗	✗	✓		✓	✓	✗	✓			✗	✓	✓	✓	✓	✓	✓
ANTIMALARIALS																					
Chloroquine	✓	✓	✓	✓	✗	✗	✓		✓	✓	✓	✓	✓		✓	✗	✓	✗	✗	✓	✗
Quinine Dihydrochloride	✓	✓	✗	✗	✗	✗	✗		✓	✗	✗	✗	✗		✗	✗		✗	✗	✓	✗
ANTIRETROVIRALS	Available at STD clinics																				
CONTRACEPTIVES																					
Pills	✓	✓	✓	✓	✗	✗	✓			✗	✗	✗	✗		✗	✓	✗	✗	✗	✓	✗
Condoms	✓	✓	✓	✓	✗	✗	✓		✓	✗	✗	✗	✗		✗	✓	✗	✗	✗	✓	✗
DMPA	✓	✓	✓	✓	✗	✗	✓		✓	✗	✗	✗	✗		✗	✓	✗	✗	✗	✗	✗
IUD	✓	✓	✓	✓	✗	✗	✓		✓	✗	✗	✓	✗		✗	✓	✗	✓	✗	✓	✗
Implants	✗	✗	✗	✗	✗	✗	✗			✗	✗	✓	✗		✗	✓	✗	✗	✗	✗	✗
Emergency pills	✗	✗	✗	✗	✗	✗	✗			✗	✗	✗	✗		✗	✗	✗	✗	✗	✗	✗
OTHER																					
Vitamin K	✓	✓	✓		✓	✗	✗		✓	✓	✓	✓	✗		✓	✓	✓	✓	✓	✓	✓
Heparin	✗	✓	✓	✓	✗	✗	✗		✓	✓	✗	✓	✗		✓	✓	✓	✗	✗	✗	✓
Sodium citrate	✓	✓	✓	✓	✗	✗	✗		✓	✓	✗	✗	✗		✓	✓	✓	✓	✗	✗	✓
Anti Rho (D) Immune Globulin / Rhoghum	✓	✓	✓	✓	✗	✗	✗		✓	✓	✗	✗	✗		✓	✓	✓	✗	✗	✗	✗
Insulin – soluble	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Vitamin A mega dose	✓	✓	✓	✓	✓	✗	✗		✓	✓	✓	✓	✗		✓	✓	✓	✗	✓	✓	✓
Ranitidine	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

Table 6.9: Pharmacy management practices by institution

	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
Availability of an indoor pharmacy/drugstore	✓	✓	✓	✓	✓	✗	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Accessible 24/7	✗	✗	✗	✓	✗	✗	✗		✓	✗		✗	✗			✓	✗	✗	✓	✓	✗
Availability of a drug inventory	✓	✓	✗	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Drug inventary is updated	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Ordering drugs																					
Order at fixed time:annually or quaterly		✓	✓	✓		✓	✓			✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
Order when drug reach "reorder level"	✓	✓	✓		✓	✓			✓	✓	✓	✓			✓						
Order when ever drugs ran out				✓			✓														✓
Never order																					
Availability of a buffer stock at pharmacy for these drugs																					
OXYTOCIN	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✗	✓	✓	✓
MGSO4	✓	✓	✓	✓	✓	✗			✓	✓	✓				✓	✓	✓	✗	✗	✓	✗
HYDRLAZINE	✓	✓	✓	✓	✗	✗			✓	✓	✗				✓	✓	✓	✗	✗	✓	✗
NIFIDIPINE	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✗	✓	✓	✓
PLASMA EXPANDERS	✓	✓	✓	✓	✓	✗			✓	✓	✓	✓	✗			✓	✓	✗	✓	✓	✓
Availability of a qualified pharmacist 24 hours a day	✗	✗	✓	✓	✗	✗	✗		✓	✗	✓	✗	✗			✓		✗	✗	✗	✗
Availability of a 'First-expiry-First-out' system for issuing drugs	✓	✓	✓	✓	✓	✓	✗		✓	✓	✓		✓		✓	✓	✓		✓	✓	✓
The drug distribution register have columns for:Date of manufacture & date of expiry	✗	✗	✓	✓	✗	✗	✗		✓	✗	✗	✗	✗		✗	✗	✗	✗	✗	✓	✗
The drugs arranged according to 'First in First out' basis	✓	✗	✓	✓	✓	✓	✗		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Drugs protected from moisture, heat or infestation	✓	✗	✓	✗	✗	✗	✗		✓	✓	✓	✓	✗		✗	✗	✓	✓	✓	✓	✓
Drugs that require refrigeration stored in a functioning refrigerator	✓	✓	✓	✓	✓	✓	✗		✓	✓	✓	✓	✓		✗	✓	✓	✓	✓	✓	✓
Availability of a at least one functioning refrigerator	✓	✓	✓	✓	✓	✓	✗		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓

6.8 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.

Table 6.10 shows the unequal distribution of resources and inadequacy of simple necessities such as delivery sets in a majority of institutions in the province particularly in the Nuwara Eliya district.

The 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. 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.

Table 6.10: Average daily use of selected equipment by institution

Name of the Hospital	Kandy				Matale		Nuwara Eliya			Kandy District	Matale District	Nuwaraeliya District	Central Province
	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	DGH Malate	BH Dambulla	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada				
Total number of deliveries in 2011	10763	6715	4216	3733	5891	4088	5205	2795	378	27198	10415	10971	48584
Equipments													
Deliveries for a USS per day	9.8	9.2	11.6	2.6	16.1	11.2	7.1	7.7	1.0	7.5	26.6	7.5	9.9
Deliveries per CTG Machine per day	29.5	9.2	11.6	10.2	16.1	11.2	4.8	0.0	0.0	14.9	26.6	10.0	15.8
Deliveries for a Doppler Machine per day	7.4	9.2	11.6	10.2	16.1	5.6	14.3	3.8	1.0	8.3	13.3	7.5	9.3
Deliveries for a Labour room bed per day	1.2	1.3	1.9	1.0	1.8	1.9	1.3	1.3	0.3				
Deliveries for a delivery set per day	0.5	1.0	1.0	0.6	1.3	0.5	0.7	0.4	0.1				

Table 6.11: Average daily use of theatre facilities for obstetric care by institution

Hospital	Kandy				Matale		Nuwara Eliya			Kandy District	Matale District	Nuwaraeliya District	Central Province
	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	DGH Malate	BH Dambulla	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada				
Total caesarian sections/quarter	717	764	412	369	456	350	248	175	82	2262	806	505	3573
Operating tables	3	3	3	6	6	6	3	2	1	15	12	6	33
Laparotomy packs	5	5	5	3	3	2	1	1	1	18	5	3	26
LSCS packs	10	7	4	5	4	7	5	3	4	26	11	12	49
CS/operation table/day	2.66	2.83	1.53	0.68	0.84	0.65	0.92	0.97	0.91	1.68	0.75	0.94	1.20
LSCS packs/CS/day	0.80	1.21	1.14	0.82	1.27	0.56	0.55	0.65	0.23	0.97	0.81	0.47	1.23
CS/Theater/day	7.96*	8.48*	4.58	2.05	2.53	1.94	2.76	1.94	0.91	5.03	2.24	1.87	3.31

*dedicated theatre available NI – No Information provided

Table 6.11 highlights the fact that in some institutions there are insufficient numbers of LSCS packs. TH Gampola which has an average of 5 sections per day does not have a dedicated theatre.

6.9. Transport and communication

Table 6.12: Transport and communication facilities by institution

	Kandy							Matale					Nuwara Eliya						
	TH KANDY	TH PERADENIYA	TH GAMPOLA	DGH NAWALAPITIYA	BH TELDENIYA	DH AKURANA	DH HASALAKA	DGH MATALE	BH DAMBULLA	DH HETTIPOLA	DH GALEWELA	DH NALANDA	DGH NUWARA ELIYA	BH DICKOYA	BH RIKILLAGASKADA	DH MASKELIYA	DH LINDULA	DG WATAWALA	DH AGARAPATHALA
Transport facilities (for 24*7 cover)																			
Total number of ambulances	5	5	3	4	1	1	1	4	4	1	1	1	5	2	2	1	1	1	1
Means of repair	+	+	+	+	+	-	-	-	-	-	-	-	+	+	+	+	-	-	+
Funds available today for repairs	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	-	-	NI
Fuel available today for transportation	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	NI
Adequate number of ambulance drivers	+	+	+	+	+	NI	-	-	+	-	-	-	+	+	+	+	+	+	+
Absence of days when a driver was not available during the past month	+	+	+	-	+	+	-	+	+	-	-	-	-	+	+	+	+	-	+
Quality of the Ambulances																			
Availability of a fixed IV stand	5	2	3	4	0	1	1	2	0	1	1	1	0	0	2	0	1	1	1
Fixed O2 cylinder or a mechanism to carry one	4	2	0	2	0	1	1	3	0	0	1	0	1	0	1	0	0	0	1
Source of light sufficient for resuscitation	5	2	0	2	0	1	1	0	1	1	1	1	1	0	1	0	0	0	1
Ambu bag – for the ambulance	1	0	0	2	0	0	1	0	0	0	0	0	2	0	1	0	0	0	1
Availability of a foot operated sucker	3	0	0	2	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Communication facilities (for 24*7 cover)																			
Availability of land phones in the facility	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Communication facility to be available 24*7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Direct dialing facility in the LR	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-

6.10. Cost Incurred by patients

Table 6.13: Costs incurred by patients by institution

	Kandy										Matale						Nuwara Eliya						
	TH KANDY	TH KANDY	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	DG WATAWALA	DH AGARAPATHALA
Cost incured by Patients																							
Out of Pocket expenditure- Normal delivery	1	1	1	0	1	0	1	1	0		1	0	0	1	1		1	0	1	1	1	0	0
Drugs																							
Investigations																							
Other supplies																							
A routine list of items for Normal delivery	✓	✓	✓	✗	✓	✗	✓	✗	✗		✓	✗	✗	✗	✓		✗	✗	✓	✗	✗	✗	✗
Out of Pocket expenditure- Cesarean Section																							
Drugs																							
Investigations																							
Other supplies																							
A routine list of items for Cesarean Section																							
Out of Pocket expenditure- Gynae. emergency																							
Drugs																							
Investigations																							
Other supplies																							
A routine list of items for Gynae. emergency																							

No	Yes	Not relevant	Often	Rarely	Never

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 include 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 (which may be considered as a proxy for obstetrician) that is given in the Labour Room Guide Lines (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 VOG 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.

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 show the variation in work load in relation to normal deliveries in the individual institutions. 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 Guideline published by 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. 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 also 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 high 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

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: Work load of selected categories of care providers for normal deliveries by institution

Name of the Hospital	Kandy				Matale		Nuwara Eliya			Kandy District	Matale District	Nuwaraeliya District	Central Province
	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	DGH Malate	BH Dambulla	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada				
Total number of deliveries in 2011	10763	6715	4216	3733	5891	4088	5205	2795	378	27198	10415	10971	48584
Human resources													
Deliveries / specialist obstetrician / month	298.97	93.26	175.67	155.54	245.46	340.67	216.88	232.92	31.50	174.35	289.31	228.56	202.43
Deliveries/ MO-Obs**/Month	74.74	79.94	50.19	51.85	81.82	85.17	108.44	58.23	10.50	66.22	83.16	63.47	68.84
Deliveries /Midwifery staff*/ month	14.95	6.74	11.33	8.64	7.44	9.21	19.72	33.27	1.43	9.33	6.25	10.91	8.60

** Midwives and midwifery qualified nurses in the specialist units only*

*** MOs in Specialist units only*

Table 7.1 shows the unequal distribution of work load of different categories of staff between institutions.

7.1.2 Work load for caesarean sections

Tables 7.2 shows 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.

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

7.2: Workload for caesarean sections by institution

Hospital	KANDY				MATALE		NUWARA ELIYA			Kandy District	Matale District*	Nuwaraeliya District	Central Province
	TH Kandy	TH Peradeniya	TH Gampola	DGH Nawalapitiya	DGH Malate	BH Dambulla	DGH Nuwaraeliya	BH Dickoya	BH Rikillagaskada				
Number of sections performed / quarter 2011	717	764	412	369	456	350	248	175	32	2262	806	455	3523
Human resources for sections													
CS / Specialist Obstetrician / month	79.67	42.44	68.67	61.50	76.00	116.67	41.33	58.33	10.67	58.00	89.56	37.92	58.72
CS / specialist Anaesthetist / month	26.56	84.89	137.33	123.00	152.00	116.67	41.33	NA	NA	53.86	134.33	75.83	65.24
CS / Specialist Paediatrician/ month	119.50	127.33	137.33	61.50	76.00	116.67	41.33	58.33	10.67	68.55	89.56	37.92	65.24
CS / MO - Obstetrics / month*	19.92	36.38	19.62	20.50	25.33	29.17	20.67	14.58	3.56	23.56	26.87	13.79	22.16
CS / MO - Anaesthesia / month	4.35	10.61	22.89	12.30	13.82	23.33	5.90	29.17	10.67	7.94	16.79	8.92	9.17
CS / MO – Blood Bank / month	19.92	28.30	34.33	41.00	30.40	58.33	13.78	29.17	NA	26.93	38.38	18.96	27.31

**Medical officers in relevant units only*

The table 7.2 highlights the fact that caesarean section workload is un-evenly distributed among the specialists in the district. The caesarean section rate per MO obstetrics varies from 10.5 in DGH Nawalapitiya to 36% in TH Peradeniya.

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.

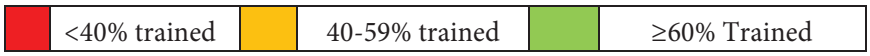
6.2.1 In-service training profile of selected categories of personnel

Table 7.3 shows the provincial in service training profile by category of staff. Training requirements may vary depending on the positions held by the different categories of staff. When at least 60% of staff has been trained in the identified program it was considered adequate and 40% and less was considered inadequate.

The table 7.3 in in-service training profile of different categories of staff shows that this has been very poor in the province.

Table 7.3: In-service training profile of selected categories of personnel in the province

		NO-OT		NO-LR		MW-LR		NO-PNS		NO-NICU		Total	
		N = 120		N = 238		N = 163		N = 62		N = 109		N = 692	
	Training	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Essential New Born Care	27	22.5	81	34	29	17.8	18	29	33	30.3	188	27.2
2	Neonatal Life Support	32	26.7	77	32.4	29	17.8	19	30.6	42	38.5	199	28.8
3	Lactation Management	25	20.8	85	35.7	56	34.4	18	29	32	29.4	216	31.2
4	Baby Friendly hospital Initiative	4	3.3	40	16.8	20	12.3	5	8.1	3	2.8	72	10.4
5	Labor Room Management	10	8.3	115	48.3	44	27	15	24.2	9	8.3	193	27.9
6	Infection Control	14	11.7	76	31.9	17	10.4	11	17.7	26	23.9	144	20.8



6.2.2 In-service training profile of Medical Officers

Information on in-service training was collected from a sample of 26 medical officers working in obstetric wards. Medical officers who are the first medical person to see patients in the obstetric ward and present at time of data collection were given the data collection tool. Intern medical officers were excluded from the sample.

Table 7.4: In service training profile of Medical Officers

	No	*%*
Sample size	*104*	
Internship in Obstetrics	82	78.8
Internship in Paediatrics	52	50.0
Anaesthesia	5	4.8
Blood Transfusion Procedures	28	26.9
Essential New Born Care	47	45.2
Neonatal Life Support - Basic	65	62.5
Neonatal Life Support - Advanced	44	42.3
Lactation Management	41	39.4
Baby Friendly Hospital Initiative	26	25.0
Labour Room Management	51	49.0
Infection control	25	24.0

A majority (79%) of medical officers have had training in obstetrics during their internship and nearly half also has had training in paediatrics. Training in infection control has been received by less than a quarter.

7.3 Knowledge among selected categories of care providers

This section present the information on knowledge of selected categories of care providers on EmONC and the analysis was done nationally.

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 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 specialist 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 7.5: 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 7.6: 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, multi parity, 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 7.7: 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
Multi parity	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
Abruptio placentae	6	1.3
Instrumental delivery	4	0.9
Past Section	2	0.4
Other causes	72	16.2

Table 7.8: 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 7.9: 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
Amniotic fluid embolism	43	9.7
Vasovagal Shock	37	8.3
Anaphylaxis	21	4.7
Thromboembolism	9	2.0
Septicaemia	8	1.8
Ruptured liver	1	0.2

Table 7.10: 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 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"!!

Table 7.11 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 7.11: Marks obtained by the midwives for each component

Marks	**PPH**	**PIH**	**Sudden collapse**	**Heart disease**	**Active Management of 3rd 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

- On 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 7.12: 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 are good.

7.3.4.2 Nursing officers

Table 7.13: 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 7.14: Frequency distribution of the causes of PPH (Responses by nursing officers)

Cause of PPH	Number	Percentage
Multi parity	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
Polyhydroamnios	31	7.1
Abruptio placentae	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 have 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 7.15: 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 7.16: 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
Amniotic fluid 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
Septicaemia	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 was 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).

- 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 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 7.17: 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 7.17 shows that among the nursing officers only 4% considered orthopnoea as a sign they need 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.

- 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.

- 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.

- 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

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 7.18 Marks obtained by the nursing officers for each component

Marks	**PPH**	**PIH**	**Sudden collapse**	**Heart disease**	**Active Management of 3rd 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

Table 7.19: 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 7.19) show that 77% of nursing officers have scored over 70%.

7.3.4.3 Medical officers

Table 7.20: 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/not 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 7.21: Frequency distribution of the causes of PPH (Responses by medical officers)

Cause of PPH (n=298)	Number	Percentage
Multi parity	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
Abruptio placentae	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 multi parity and multiple pregnancy two commonly documented causes of atony were given by 71% and 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

Table 7.22: 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

59% participants respectively. "Tears in genital tract (20.1%), retained placenta (22.8%) and abruption (2.3%)" were mentioned by a relatively low number 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 7.23: 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
Septicaemia	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 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.

Some of the findings on the answers to questions on clinical scenarios are given below:

- 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

Table 7.24: 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

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 of cardiac failure, which if detected and treated effectively would be life saving.

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 7.25: Marks obtained by the medical officers for each component

Marks	PPH	PIH	Sudden collapse	Heart disease	Active Management of 3rd 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 7.25 shows that on PIH and heart disease the proportions obtaining 90% of marks or more was less than the other areas.

Table 7.25: Marks obtained by the medical officers for each component

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 7.26).

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

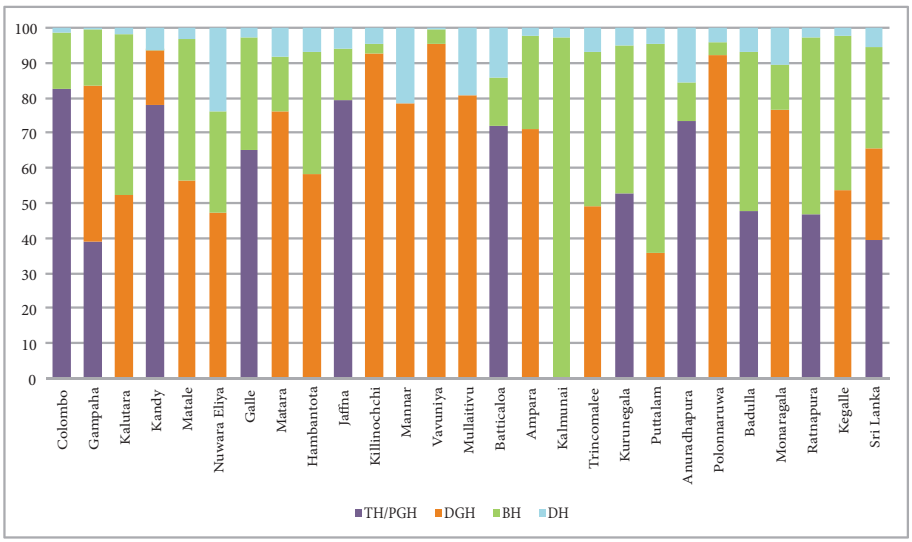


Figure 8.1 shows the percentage of births in 2011 in the country by type of hospital.

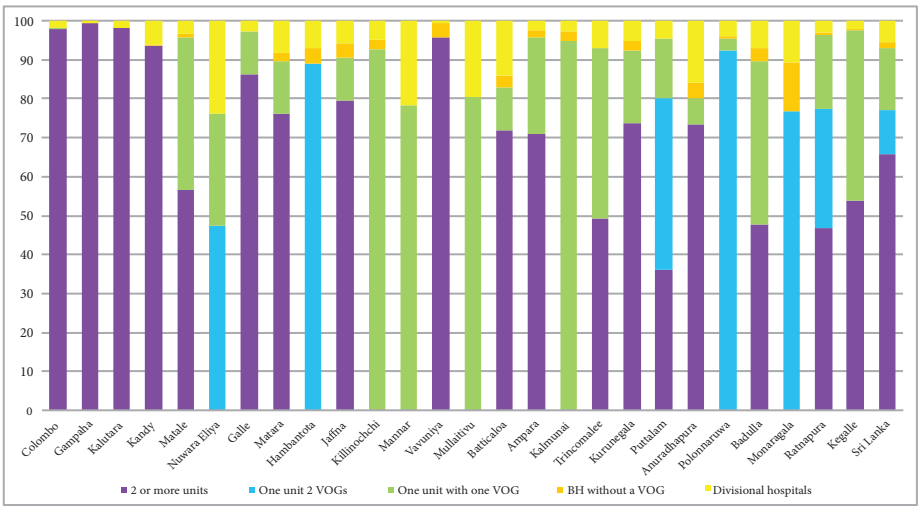
Of the total 343384 births that took place in the country during 2011, nearly 40% took place in 15 TH/PGH with a further 26% taking place in 18 District General hospitals. Only 29% of births took place in the 64 base hospitals spread throughout the country. It is noteworthy that only 5.4% of births have 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.

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 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.

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.

Of the total births in government institutions only 6.9% of births occur in hospitals without specialist services. These institutions comprise of a few base

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.

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 two sources may be used to examine completeness of field data.

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
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
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 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.	%
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
Sri Lanka	**83095**	**81742**	**98.4**	**20**	**0.02**	**1346**	**1.6**

Table 8.2 suggests that mothers in the Kandy district ranks first among those preferring private services (2.5%) in the province.

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.

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 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.

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

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.

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. 4: Deliveries occurring within the district, going out and coming in to the district

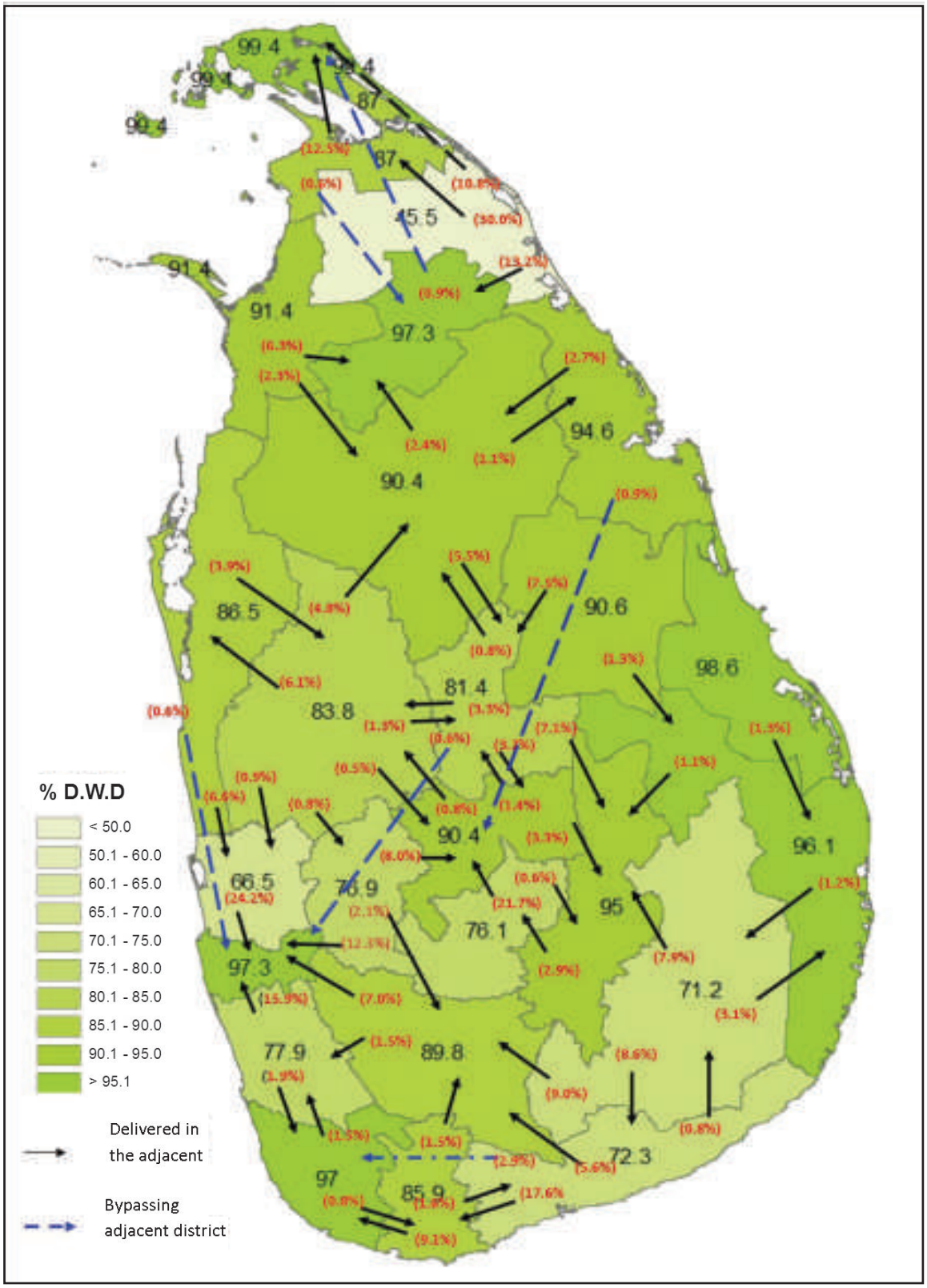
District	Deliveries in government hospitals	Delivering within the district		Going outside the district to deliver		Coming in to the district to deliver		Net migration per delivery	Net "migration" Index – NMI*per 1000 deliveries
		No.	%	No.	%	No.	%		
Kandy	5213	4714	90.4	368	7.1	1235	23.7	0.17	170
Matale	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
Sri Lanka	**83095**	**71448**	**86.0**	**10294**	**12.4**	**10294**	**12.4**	**0.00**	**0**

**Net "migration" Index – NMI*

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.

Figure 8.3: Distribution of place of delivery and within district migration for delivery



Chapter 9

Institution Based Family Planning Services

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 9.1-9.3 present information on the different aspects of services and are mostly self-explanatory; however a few important findings are discussed in the text.

The base hospital Dambulla and the district hospitals Akurana, Hasalaka, Lindula and Agarapathana do not have regularly functioning FP clinics. In 6 of the institutions studied 4 or more of the methods listed are not available. Referral from wards to the FP clinic is poor except in BH Dickoya.

Table 9.1 Institution based family planning services in Central province

INSTITUTION	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	DG WATAWALA	DH AGARAPATHALA
FAMILY PLANNING CLINIC																			
Availability of a regularly functioning FP clinic	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗
Frequency of the FP clinic (weekly)	Daily	Daily	2wkly	2wkly	2wkly			2wkly		4wkly	4wkly	4wkly	2wkly	wkly		wkly		2wkly	
Whether linked to a consultant unit	✓	✓	✓	✓				✓					✓	✓	✓				
Person who conducts the FP clinic	NO	VOG/SR /MO	VOG/ MO/ NO	VOG/ MO/ NO	MO			VOG/ MO		MO	MO/ NO	MO/ NO	VOG/ MO	MO	VOG	MO/N O		NO	
The contraceptives methods provided at the FP clinic																			
Pills	✓	✓	✓	✓	✓	✗	✓	✗		✗	✗	✗	✗	✓	✗	✓		✓	
Condoms	✓	✓	✓	✓	✓	✗	✓	✓		✗	✗	✗	✓	✓	✗	✓		✓	
DMPA	✓	✓	✓	✓	✓	✗	✓	✗		✗	✗	✓	✗	✓	✓	✗		✓	
IUD	✓	✓	✓	✓	✓	✗	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	
Implants	✓	✗	✗	✗	✗	✓	✗	✗		✗	✓	✗	✗	✓	✓	✗		✗	
ECP	✗	✗	✗	✗	✗	✗	✗	✗		✗	✗	✗	✗	✗	✗	✗		✗	
Person who inserts IUDs at the clinic	MO/NO	MO	MO	MO	MO		MO	MO		MO	MO	MO	MO	MO	MO	MO		MO	
Whether had training on IUD insertion	✓	✓	✓	✓	✓		✓	✓		✗	✓	✓	✓	✓	✓	✓		✓	
Person who insert the implants at the clinic	MO					MO					MO			MO	MO				
Whether had training on Implant insertion	✓					✓					✓			✓	✓				
No. referred from the ward to the FP clinic during the last 2 months	8	20	DNA	5	DNA	DNA	DNA	DNA		DNA	20	DNA	DNA	300	DNA	DNA		30	
Adequacy of privacy for patients undergoing IUD insertion	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	

Table 9.2: Institution based family planning clinics in Central province

INSTITUTION	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	DG WATAWALA	DH AGARAPATHALA
	F101	F102	F103	F104	F105	F106	F107	C101	C102	C103	C104	C105	G101	G102	G103	G104	G105	G106	G107
FAMILY PLANNING SERVICES																			
Provision of FP counseling for post partum and post abortion patients before discharge from the ward	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
Provision of FP services to post partum and post abortion patients before discharge from the ward	✓	✓	✗	✗	✗	✗	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓
If not, place referral for the FP services																			
Hospital FP clinic	✗	✗	✓	✗	✗	✗	✓	✓	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗
FP clinic at the MOH	✗	✗	✗	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓
Field PHM	✗	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Pharmacy	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
General practitioner	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Availability of dedicated theatre time for permanent FP methods (Sterilization)	✓	✓	✓	✓				✓	✓				✓	✓	✓				
If not, Arrangement for sterilization (LRT)of women																			
Routine list									✗				✗						
Casualty list									✗				✗						
Appointment (waiting list)									✓				✓						
Availability of a trained doctor who can perform ligation and resection of tubes (LRT)	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓	✓	✗	✗	✓	✗
Availability of a trained doctor who can perform vasectomy	✗	✗	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✓	✗	✓	✗	✗	✗	✗
No. of post partum LRT was done in your facility during the last 6 months	137	180	72	200				139	2				139	DNA	DNA				
%.of patents under went LRT after CS	20	15	35	10				10	30				10	20	25				

It is seen that although all institutions in the province except one has indicated that they provide family planning counselling to post partum and post abortion patients before discharge nine institutions have indicated that they do not provide a service to these women.

It is noted that the DGH Nuwara Eliya has no dedicated theatre for FP services. The information on postpartum LRT and LRT in CS patients cannot be interpreted since they do not have a denominator to which they could be related.

Table 9.3: Logistics and documentation of the Family Planning services

INSTITUTION	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	DG WATAWALA	DH AGARAPATHALA
LOGISTICS AND DOCUMENTATION																			
NO shortages of contraceptives during the last 6 months	✗	✓	✓	✓	✓					✓	✓	✗	✓	✓	✗	✓		✓	
What were the shortages?																			
Pills																			
Condoms																			
DMPA																			
IUD												✓							
Implants	✓														✓				
ECP																			
From where, the contraceptive supplies obtained																			
MOH														✓	✓	✓		✓	
RMSD	✓	✓	✓	✓	✓			✓		✓	✓		✓						
FHB																			
Other																			
Availability of the monthly contraceptive stock return/request (H 1158)	✓	✓	DNA	✗	✗			✓		✗	✓	✗	✓	✓	✓	✓		✓	
Regularly send the monthly return (H 1200 A) to MOH	✓	✓	✗	✓				✓		✗	✓	✓	✓	✓	✓	✓		✓	
Any methods of following up the clients	✗	✗	DNA	✗				✗		✗	✓	✗	✗	✓	DNA	✓		✓	

Table 9.3 highlights the fact that most institutions do not have a method of follow up of clients.

Chapter 10

Neonatal Care Services

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.

10.1 Distribution of neonatal care facilities within the province

Neonatal Intensive Care Units (NICU) are available in the TH Kandy, TH Peradeniya, SBCH and DGH Nawalapitiya. All the institutions that have NICU facilities have built in Special Care Baby Units (SCBU) as well. BHs Dickoya and Rikillagaskada the recently upgraded Base Hospitals do not have separate Special Care Baby Unit Facilities. Mother Baby Centres (MBC) and Lactation Management Centres (LMC) should be available in all the specialist hospitals. However in the Central Province there are only two MBCs and four LMCs.

Although no indicators have been published for neonatal care availability and geographic distribution of neonatal care services were examined in the same manner as described for EmONC.

Table 10.1 Facilities available for neonatal care in the Central Province

	Kandy						Matale		Nuwara Eliya		
	TH KANDY	TH PERADENIYA	Sirimavo Bandaranayake Children's Hospital	TH GAMPOLA	DGH NAWALAPITIYA	BH THELDENIYA	DGH MATALE	BH DAMBULLA	DGH NUWARAELIYA	BH DICKOYA	BH RIKILLAGASKADA
NICU	1	1	1		1						
SCBU	1	1	1	1	1	0	1	1	1	0	0
Incubators at NICU and SCBU/SCBU	14	5	8	4	5		9	8	6		
Ventilators at NICU & SCBU / SCBU	2	3	3		2		1	0	1		
CPAP at NICU & SCBU / SCBU	2	2	1								
Cots in the SCBU	20			7			11	9	6		
Rest room for mothers of babies in NICU & SCBU / SCBU	✗	✓	✗	✓	✗		✓	✓	✓		
Mother baby centre											
MBC	0	1	0	0	0	0	1	0	0	0	0
Number of beds		4					7				
Lactation Management Centre											
LMC	1	1	1	0	0	0	1	0	0	0	0
Dedicated staff for LMC	✓	✓	✓				✓				

Available Not Available DNA Data Not Available

10.2 Availability and geographic distribution of neonatal care facilities

Table10.2: Availability of NICU / SCBU by population and extent

	Kandy	Matale	NuwaraEliya	Central Province
Total enumerated population – 2012	1 368 216	482 348	706 210	2 556 774
Total land area Km^2	1940	1993	1771	5704
Facilities: NICU	*4*	*0*	*0*	*4*
Facilities: SCBU *	*5*	*2*	*1*	*8*
NICU / 500000 population	*1.5*	-	-	*0.8*
Area in km^2/NICU	*485*	-	-	*1426*
SCBU / 500000 population	*1.8*	*2.1*	*0.7*	*1.6*
Area in km^2/SCBU	*388*	*996.5*	*1741*	*713*
Institutions; Specialist Neonatologist available	*1*	*0*	*0*	*1*
Institutions: Specialist Paediatrician holding position of Neonatologist available	*4*	*0*	*0*	*4*
Institutions: 2 or more Specialist Paediatrician/Neonatologist available	*4*	*1*	*1*	*6*
No. of Specialist Paediatricians** + Neonatologists available to provide neonatal care	*9*	*3*	*4*	*16*
No of Institutions with Specialist Paediatricians	*5*	*2*	*3*	*10*
Institutions with a Specialist Paediatrician / 500 000	1.83	*2.07*	*2.12*	*1.96*
Institutions with a Specialist Paediatrician / area	1/388 km^2	*1/1034.5 Km^2*	*1/570.3 km^2*	*1/570.4 Km^2*
Facilities: 24*7 NICU	*3*	-	-	*3*
Facilities: 24*7 SCBU	*4*	*1*	*1*	*6*
24*7 NICU / 500000 population	*1.09*	-	-	*0.58*
24*7 NICU / area	*1/670Km^2*	-	-	*1939.6 Km^2*
24*7 SCBU / 500000 population	*1.4*	*1.04*	*0.71*	*1.17*
24*7 SCBU / area	*1/503Km^2*	*1/2069 Km^2*	*1/1738 Km^2*	*1/969.8Km^2*

*All the institutions with NICU also have SCBUs. These SCBUs are calculated as separate units in this calculation.

** 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

24*7 criteria for NICU

1. Functional / operational NICU / SCBU
2. Electricity
3. Functional generator
4. Continuous source of water
5. At least two Specialist Pediatrecians
6. At least six MO NICU/SCBU

24*7 criteria for SCBU

1. Functional / operational SCBU
2. Electricity
3. Functional generator
4. Continuous source of water
5. At least two Specialist Pediatrecians
6. At least three MO SCBU

The Central Province has one Specialist Neonatologist at the Teaching Hospital Kandy. At the other institutions work of the Neonatologist is covered up by Specialist Paediatricians. Neonatal Intensive Care Unit facilities are available only in the Kandy Districts. Though Nawalapitiya has a NICU there are no 24*7 facilities as they do not have MOs NICU/SCBU. Also 24*7 facilities are not available in the Nuwaraeliya District as there are only 2 MO NICU/SCBU at that hospital.

10.3 Morbidity profile

Information on the morbidities seen in the neonatal units was obtained through a prospective survey carried out for one month. Tables 10.3 present the data obtained by type of facility.

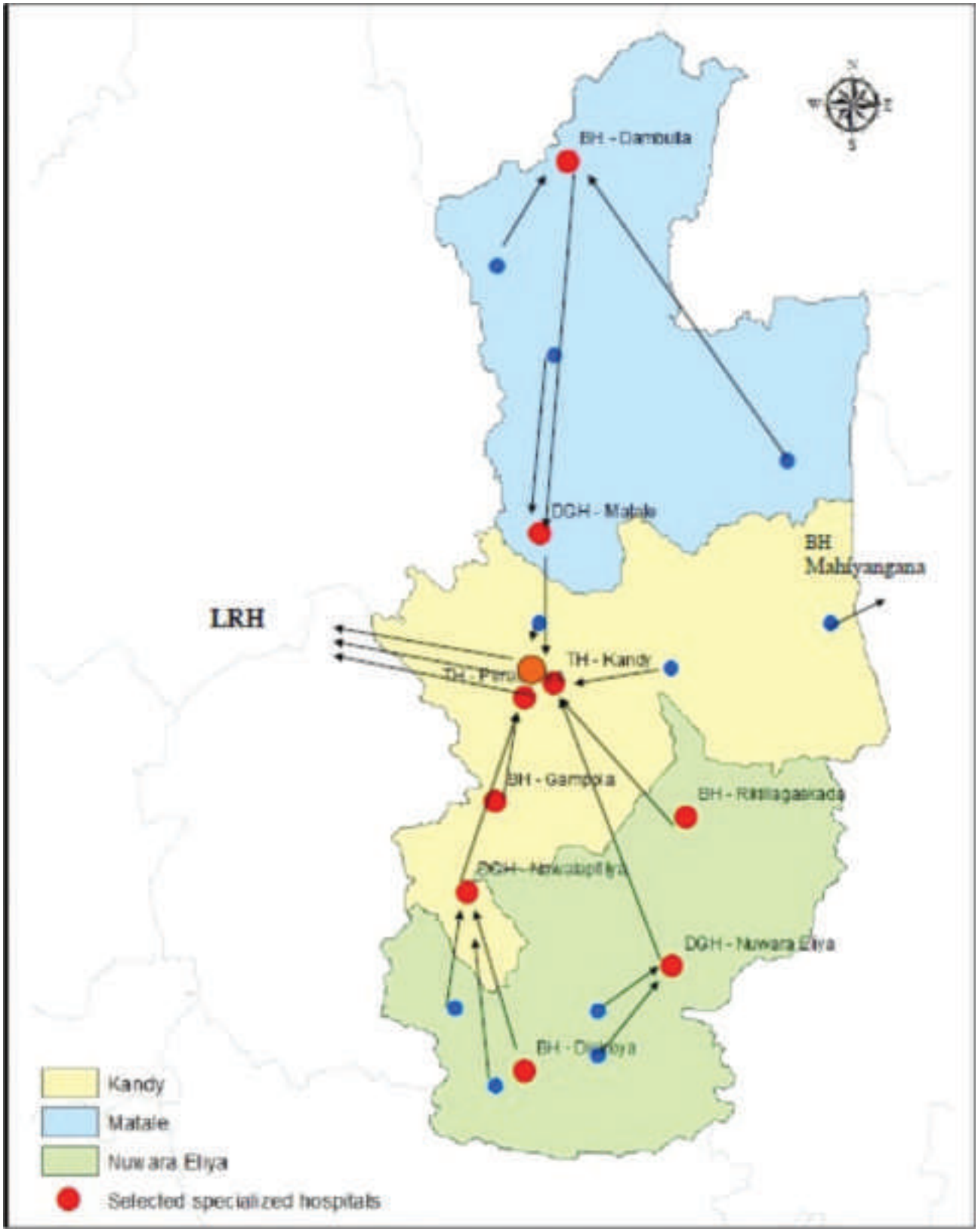
Whenever there is a NICU a SCBU is incorporated into it. Therefore the morbidity data from institutions with NICUs also includes the admissions needing SCBU care.

Septicaemia followed by Jaundice is the most common morbidity observed in the Neonatal Intensive Care Units and the Special Care Baby Units.

Table 10.3 Morbidity pattern at the Institutions with NICUs and SCBUs in the Central Province

Reason for admission	Admissions to NICUs	Admissions to SCBUs
No of tickets reviewed	298	209
Birth Asphyxia	18	11
Meconium aspiration	18	10
Septicaemia	132	25
Hypoglycaemia	15	05
Jaundice	69	36
Idiopathic Respiratory Distress Syndrome (IRDS)	45	11
Congenital Pneumonia	08	01
Meningitis	14	14
Persistent Pulmonary Hypertension (PPHN)	05	01
Intraventricular Haemorrhage/Periventricular Haemorrhage (IVH/PVH)	02	00
Necrotising Enterocolitis (NEC)	08	00
Other	40	59

Figure 10.1 Pattern of neonatal transfers in the Central Province



10.4 Interventions performed at the NICUs and SCBUs in the Central Province

Tables 10.4 provide information on the type of interventions carried out in the different level of institutions. This information was based on the 4 week prospective data collection.

Table 10.4: Interventions performed at the NICUs and SCBU by Province

Intervention	Interventions performed in the NICUs	Interventions performed in the SCBUs
No of tickets reviewed	**303**	**209**
Ventilation	23	05
Nasal Continuous Positive Airway Pressure Ventilation (CPAP)	23	01
Cardio-pulmonary resuscitation	20	11
Use of phototherapy in the first 24 hours	09	04
Exchange transfusion	00	01
Any surgery	07	00
Surfactant administration	08	10
Use of any inotropes	13	32
Use of anticonvulsants	17	10
Use of therapeutic intravenous antibiotics	211	93
Use of steroids to treat refractory hypoglycaemia	00	01
Use of Glycogen	00	00
Use of 12.5% Dextrose	00	44
Use of any blood products	13	09
Use of Umbilical Artery Catheter (UAC), Umbilical Venous Catheter (UVC), Arterial/Long lines	12	05
Other	03	01

The table 10.4 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 reflects the morbidity as well as facilities available In these.

10.5 Resources for neonatal services

10.5.1 Infrastructure

Table 10.5a: Infrastructure for neonatal services by institution and district

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	TH PERADENIYA NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA SCBU	DGH NAWALAPITIYA SCBU	DGH MATALE SCBU	BH DAMBULLA SCBU	DGH NUWARAELIYA NICU & SCBU
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
ARRANGEMENT OF THE NICU/SCBU											
Porch	✓		✓	✓	✗	✗	✓			✗	✓
Trolley transfer & reception area	✗	✓	✓	✓	✗	✗	✓		✗	✓	✓
Scrubbing area	✓	✓	✓	✓	✗	✗	✓	✓	✗	✗	✓
Stabilization area	✗	✓	✓	✓	✗	✗	✓	✓	✗	✓	✓
High Dependency area	✓	✓	✗	✓	✗	✗	✓	✓	✗	✓	✓
Low dependency area	✓	✓	✗	✓	✗	✗	✓	✓	✗	✓	✓
Procedure room	✓	✓	✓	✓	✗	✗	✓	✓	✗	✓	✓
Duty station	✗	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓
Isolation section	✓	✓	✓	✓	✗	✗	✗	✓	✓	✗	✓
Incubator washing and drying area	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	✓
Sterilization room	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✓
Sterilized good stores	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓
Pantry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drug store room	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Linen washing room	✗	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗
Cleaners room	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dirty utility room	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	✓
Veranda	✓	✓	✗	✓	✓	✓	✗	✗	✗	✗	✓
Room for Mothers of babies in the NICU/SCBU	✗	✗	✗	✓	✗	✗	✓	✓	✗	✗	✓
Breast feeding room	✓	✗	✗	✓	✓	✓	✗	✓	✗	✓	✓
Counseling room	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	✓
Toilets for Mothers of babies in the NICU/SCBU	✗	✗	✓	✓	✗	✗	✓	✓	✗	✗	✓
Dining room for Mothers of babies in the NICU/SCBU	✗	✗	✓	✓	✗	✗	✓	✓	✗	✓	✓
Consultants room	✓		✓	✓	✓	✓	✓	✗	✗	✓	✓
MO/NICU room	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓	✗
Sister's room	✗	✓	✗	✓	✓	✓	✓	✗	✗	✓	✓
Nurses room	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗
Minor staff room	✓	✗	✓	✓	✓	✓	✗	✗	✓	✗	✓
Store room	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓
Gas room and unloading bay	✓	✓	✓	✓	✗	✗	✗	✗	✗	✓	✗

None of the of the NICUs and SCBUs had all the areas as stipulated in the type plan as given in the National Guidelines for NICUs and SCBUs (Family Health Bureau, 2007). A separate room for mothers of babies in the NICU or SCBU was available only in four units.

Table 10.5b: Infrastructure for neonatal services by institution and district

	Kandy					Matale		Nuwara Eliya
	TH KANDY	TH PERADENIYA	Sirimavo Bandaranayake Children's Hospital	TH GAMPOLA	DGH NAWALAPITIYA	DGH MATALE	BH DAMBULLA	DGH NUWARAELIYA
UFI	F101	F102	F102	F103	F104	C101	C102	G101
Infrastructure at NICU/SCBU								
Rest room for the staff NICU/ SCBU	●	●	●	●	●	●	●	●
24/7 electricity supply	●	●	●	●	●	●	●	●
Days without electricity	●	●	●	●	●	●	●	●
Separate generator / line	●	●	●	●	●	●	●	●
dedicated staff for generator								
24/7 continous supply of water	●	●	●	●	●	●	●	●
days without water	●	●	●	●	●	●	●	●
water supply continous for NICU/S	●	●	●	●	●	●	●	●
24/7 communication facilities	●	●	●	●	●	●	●	●
Direct line to the NICU/SCBU	●	●	●	●	●	●	●	●
use it 24/7								

●	Available
●	Not available
NIL	"Zero" number of days

It is important to note that none of the institutions had a separate generator for the units, including the NICUs and none of the units had direct communication facilities.

10.5.2 Human resources

Neonatal Care is provided by specialist Neonatologist or specialist Paediatricians, Medical Officers in the NICU/SCBU and the nursing Officers in the NICU/ SCBU. There is a Specialist Neonatologists appointed to the TH Kandy and at the time of the survey in TH Peradeniya and SBCH there were Specialist Paediatricians working in the position of Neonatologists. In the hospitals without carder position for Neonatologist the Specialist Paediatricians in the hospitals provide services for the neonates as well.

With regard to Medical Officers most of the hospitals have designated Medical Officers for the NICU/ SCBUs. In the hospitals without designated officers, the medical officers attached to the Paediatric Wards carry out the functions of the MO NICU/SCBU.

Table 10.6 Human resource distribution

	Kandy District	Matale District	Nuwaraeliya District	Central Province
Total reported deliveries in Government hospitals	27199	10415	10971	48585
No of babies needing Special Care*	4079	1562	1645	7288
No. of Specialist Neonatologists available	1	0	0	1
No. of Specialist Neonatologists and Paediatricians caring for neonates**	*9*	*3*	*4*	*16*
No. MO/NICU or SCBU	35	6	2	43
No. of nurses at NICU or SCBU	118	16	11	145
Births per Neonatologist/Paediatrician	3022	3471.6	2742.7	3036.5
NICU & SCBU admission per Neonatologist/Paediatrician	453.2	520.6	411	455.5
Births per MO/NICU or SCBU	777.1	1735.8	5485.5	1129.8
NICU & SCBU admission perMO/NICU or SCBU	116.5	260.3	822.5	169
NICU & SCBU admission per a nurse at NICU or SCBU	34.5	97.6	149	50.2

*15% of the deliveries are likely to need special care (Building and Other Guidelines for Neonatal Intensive Care Units, Special Care Baby Units and Mother Baby Centers, Family Health Bureau, 2012)

**The Specialist Neonatologists, 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

It has to be noted that TH Gampola, DGH Nawalapitiya and BH Dambulla do not have MOs assigned to the SCBU. The Paediatric House Officers and Senior House Officers cover the duties of the SCBU. These MOs were also included in the above calculation for the district and province.

There is a wide variation in the availability of Medical Officers NICU or SCBU and Nurses NICU or SCBU within the Province. Kandy district has the lowest ratio of MOs and NOs per birth.

10.5.3 Guidelines, protocols, records and registers

Tables 10.7 and 10.8 indicate the availability of guidelines and protocols for the management of common newborn morbidities and the routine registers that should be available in the NICUs and SCBUs.

Table 10.7: Availability of protocols and guidelines at NICU / SCBU

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	TH PERADENIYA NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA SCBU	DGH NAWALAPITIYA SCBU	DGH MATALE SCBU	BH DAMBULLA SCBU	DGH NUWARAELIYA NICU & SCBU
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
MANAGEMENT PROTOCOLS FOR											
Hypoglycaemia		✗	✗	✗	✓	✓	✗	✗	✗	✗	✗
Birth asphyxia		✗	✗	✗	✓	✓	✗	✗	✗	✗	✗
Septic baby		✗	✗	✗	✓	✓	✗	✗	✗	✗	✗
Meconium Aspiration Syndrome		✗	✗	✗	✓	✓	✗	✗	✗	✗	✗
Persistent pulmonary HT		✗	✗	✗	✓	✓	✗	✗	✗	✗	✗
IRDS		✗	✗	✗	✓	✓	✗	✗	✗	✗	✗

●	Available
●	Not available

Management Protocols were available only in the NICU or SCBU in the Sirimavo Bandaranayake Children's Hospital, Peradeniya.

Table 10.8: Registers and records available at NICU / SCBU

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA SCBU	DGH NAWALAPITIYA SCBU	DGH MATALE SCBU	BH DAMBULLA SCBU	DGH NUWARAELIYA NICU & SCBU
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
REGISTERS AND RECORDS											
NICU/SCBU register	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Neonatal transfer form	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Neonatal diagnosis card	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Neonatal monthly return	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
Discharge register	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Death register	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Statistics file	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗
Correspondence Book/ File	✓	✓	✓	✓	✗	✗	✓	✓	✓	✗	✗
Perinatal conference minutes file	✓	✓	✗	✗	✓	✓	✗	✗	✗	✓	✗
Neonatal Drug Doses Book	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗

Availability of Newborn Formats that were introduced to the system in 2008 is satisfactory in all the institutions except at the DGH Nuwaraeliya. The minutes of the Perinatal Conference had been maintained only in TH Kandy and BH Dambulla.

10.5.4 Selected practices related to neonatal care

Neonatal Examination

Neonatal examination format (H 1162) is the Bed Head Ticket of the newborn. At birth irrespective of the place of birth (labour room, open theatre) a newborn examination format is initiated and is attached to the mother's BHT.

Table 10.9: Selected practices related to neonatal care by institution and district

	Kandy					Matale		Nuwara Eliya
	TH KANDY	TH PERADENIYA	Sirimavo Bandaranayake Children's Hospital	TH GAMPOLA	DGH NAWALAPITIYA	DGH MATALE	BH DAMBULLA	DGH NUWARAELIYA
UFI	F101	F102	F102	F103	F104	C101	C102	G101
Record keeping								
Use the neonatal examination format	✓	✓	✗	✗	✓	✓	✗	✗
Use NICU/SCBU history record sheet	✓	✓	✓	✗	✓	✓	✓	✗
The information recorded in the mothers BHT		✗		✗		✗		
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 trasferring newborns								
Ensure service availablitiy at receiving end	✓	✓	✓	✓	✓	✓	✓	✗
Inform the receiving end	✓	✓	✓	✓	✓	✓	✓	✗
Accompanied by a responsible person	✓	✓	✓	✓	✓	✓	✓	✗
Cost incurred by patients								
Out of pocket espenditure for NICU/SCBU care								
Drugs								
Investigations								
Other supplies								
Routine list for NICU/SCBU admission	1							
No out of pocket expenditure for an emergency	✓	✓	✓	✓	✓	✓	✓	✓

	No out of pocket expenditure		**Often**
	Has to incur out of pocket expenditure		**Rarely**
			Never

Mandatory Newborn Examination before discharge is performed in all the institutions in the Central Province and makes the necessary referrals. Clinic follow up plans are also available for the newborns discharged from all the institutions in the Central Province. Though out of pocket expenses are incurred in most of the institutions, in case of emergencies there are no out of pocket expenses in any of the institutions in the Central Province

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

It is noted that availability of essential drugs are satisfactory in most of the institutions.

Table 10.10: Drugs and equipment available for neonatal resuscitation at NICUs and SCBUs

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	TH PERADENIYA NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA SCBU	DGH NAWALAPITIYA SCBU	DGH MATALE SCBU	BH DAMBULLA SCBU	DGH NUWARAELIYA NICU & SCBU
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
NEONATAL RESUSCITATION TROLLY											
Neonatal Ambu (ventilatory) bag (250ml) with reservoir and O2 masks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Infant laryngoscope with spare bulb & batteries/Straight blade	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Endotracheal tubes- 2.5, 3.0, 3.5 with introducer stilette	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Straight suction catheter with thumb port– FG 5,6,8,10	✓	✓	✗	✗	✓	✓	✓	✓	✓	✗	✗
Feeding tube – 5,6,7,8,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓
Emergency tray with											
syringes 1,2,5,10 ml	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cannula 23,25 G	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	
Umbilical catheterization pack	✗	✗	✗		✓	✓	✓	✓	✗	✗	✗
Blood sample bottles, culture bottles	✗	✗	✓	✓		✓	✗	✓	✓	✗	✓
Drugs											
Adrenaline	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nalaxone	✓	✗	✓	✓	✓	✓	✓	✓	✗	✗	✗
N.Saline	✓	✓	✓	✓			✓	✓	✓	✓	✓
8.4% Na HCO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
10% dextrose	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗
Distilled water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

10.5.5 Drugs and equipment

Availability of essential drugs and equipment for neonatal care are given in Tables 10.11 – 10.13.

Almost all the essential drugs are available in the NICUs and SCBUs of the institutions in the Central Province.

All SCBUs and NICUs should have infrastructure facilities for infection control. The availability of these facilities by the institution and district are presented in Table 10.12.

Table 10.11: Drugs available at NICUs and SCBUs

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	TH PERADENIYA NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA SCBU	DGH NAWALAPITIYA SCBU	DGH MATALE SCBU	BH DAMBULLA SCBU	DGH NUWARAELIYA NICU & SCBU
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
Drugs available in the NICU/SCBU											
Gentamycin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3G Cephalosporins	✓	✓	✓	✓	✓	✓	✓		✗	✓	✗
Metronidazole	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cloxacillin (PO/IV)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Aminophillin	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Adrenaline	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Frusemide	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5% Dextroxe	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓
10%Dextroxe	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
Nebulisation solutions - Ipravent	✗	✓	✗	✗	✓	✓	✓	✓	✗	✗	✓
Hydrocortizone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dexamethazone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dopamin	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Dobutamin	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Digoxine			✓	✓	✓	✓	✗	✓	✓	✓	✗
Phenabarbitone (PO)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phenobarbitone (IV)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MgSO4	✓		✓	✓	✓	✓	✗	✓	✗	✗	✗
Sildenafil	✗	✗	✗	✗	✓	✓	✗	✗	✗	✓	✗
Glucagon		✓		✗	✓	✓	✗	✗	✗	✓	✗
NaHCO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
KCl	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Having a surfactant vial in stock	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓
Ability to local purchase surfactant when needed	✓		✓	✓	✓	✓		✓	✗	✗	

Table 10.12: Facilities for infection control by institution and district

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	TH PERADENIYA NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA	DGH NAWALAPITIYA	DGH MATALE	BH DAMBULLA	DGH NUWARAELIYA
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
FACILITIES FOR INFECTION PREVENTION											
Soap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Elbow taps	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✗
Running water	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hand rub solutions	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓
Gloves	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
Isolation facilities	✗	✗	✗	✗	✗	✗	✓	✗	✓	✓	✗
Disposable towels (single use)	✗	✗	✓	✗	✓	✓	✓	✗	✓	✓	✗
Hand washing facility available at the entrance	✓	✗	✓	✗	✓	✓	✗	✗	✗	✗	✗
A hand rub solution bottle per each section	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓
The hand washing/ hand rub practice satisfactory	✓	✓	✓	✓	✓	✓	✓			✓	✓

Some of the basic facilities for infection control such as elbow taps, gloves, single use disposable towels are not available in some of the institutions in the Central Province. These are extremely cost effective practices for the prevention of infections in the newborn.

Table 10.13 indicate the standard equipment that should be available in the NICUs and SCBUs.

Table 10.13 Equipment available at NICUs and SCBUs by institution and district

	Kandy								Matale		Nuwara Eliya
	TH KANDY SCBU	TH KANDY NICU	TH PERADENIYA SCBU	TH PERADENIYA NICU	SBCH SCBU	SBCH NICU	TH GAMPOLA SCBU	DGH NAWALAPITIYA SCBU	DGH MATALE SCBU	BH DAMBULLA SCBU	DGH NUWARAELIYA NICU & SCBU
UFI	F101	F101	F102	F102			F103	F104	C101	C102	G101
EQUIPMENT AND SUPPLIES											
Multipara monitors	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	✗
Pulse oxymeters	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓	✗
Open resuscitation table with overhead warmer	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓
Neonatal resuscitation trolley	✗	✓	✓	✓	✓	✓	✗	✗	✓	✓	✗
Syringe pumps	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Infusion pumps	✓	✗	✓	✓	✓	✓	✓	✓	✗	✓	✓
Nebulizers (Oxygen driven)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗
Electronic weighing scale (Digital)	✓	✗	✓	✓	✓	✓	✓	✗	✓	✓	✗
Portable sucker (one jar)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✗
Cold light for IV cannulation	✗	✗	✗	✗	✓	✓	✗	✓	✓	✗	✗
Spot lamp	✓	✗	✗	✗	✓	✓	✗	✓	✓	✓	✗
Computer	✓	✗	✓	✗	✓	✓	✓	✗	✗	✗	✗
Central suction	✓	✗	✗	✗	✓	✓	✗	✓	✗	✗	✗
Umbilical probes	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗
Phototherapy units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Perspex shields		✗	✗	✗	✓	✓	✗		✗		✗
Neonatal stethoscopes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗
Steel drums	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IV infusion stands	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
X ray illuminator	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗
Ward round trolley											
Tapes	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓
Torch	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓
Ophthalmoscope	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓
Charts (Growth, Bilirubin)	✗	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓
Lab request forms	✗	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓
Calculator	✗	✗	✗	✓	✓	✓	✗	✓	✓	✓	✓
O2 cylinders with flow meters & humidifier bottle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Empty O2 cylinders	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Head box	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✗
Cots	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Incubators	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ventilators	✗	✓	✗	✓	✓	✓	✗	✓	✓	✗	✓
Thermometer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Umbilical cannulation set	✗	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
Exchange transfusion set	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗
Wall dispenser	✗	✗	✗	✗	✓	✓	✓				✗
Wall clocks	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

This table depict the availability or non-availability of essential equipment in the SCBUs and NICUs in the institutions in the Central Province. However the adequacy of essential equipment according to the case load is not calculated here.

Chapter 11

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 on individual institution included in the assessment. The tables and figures presented in the provincial reports highlight the deficiencies identified at institutional and district level. Attending to these dfeciencies at institutional level will enable acheiving the broader recommendations outlined at national level.

11.1 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.

11.2 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.

11.3 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 re commended 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.

11.4. 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 11.1 (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 11.1 (a) be strengthened in the first phase to provide 24*7 CEmONC services. Figure 11.1 (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 11.1 (a): 24*7 CEmONC coverage after upgrading of in stitutions listed in table 11.1 (a)

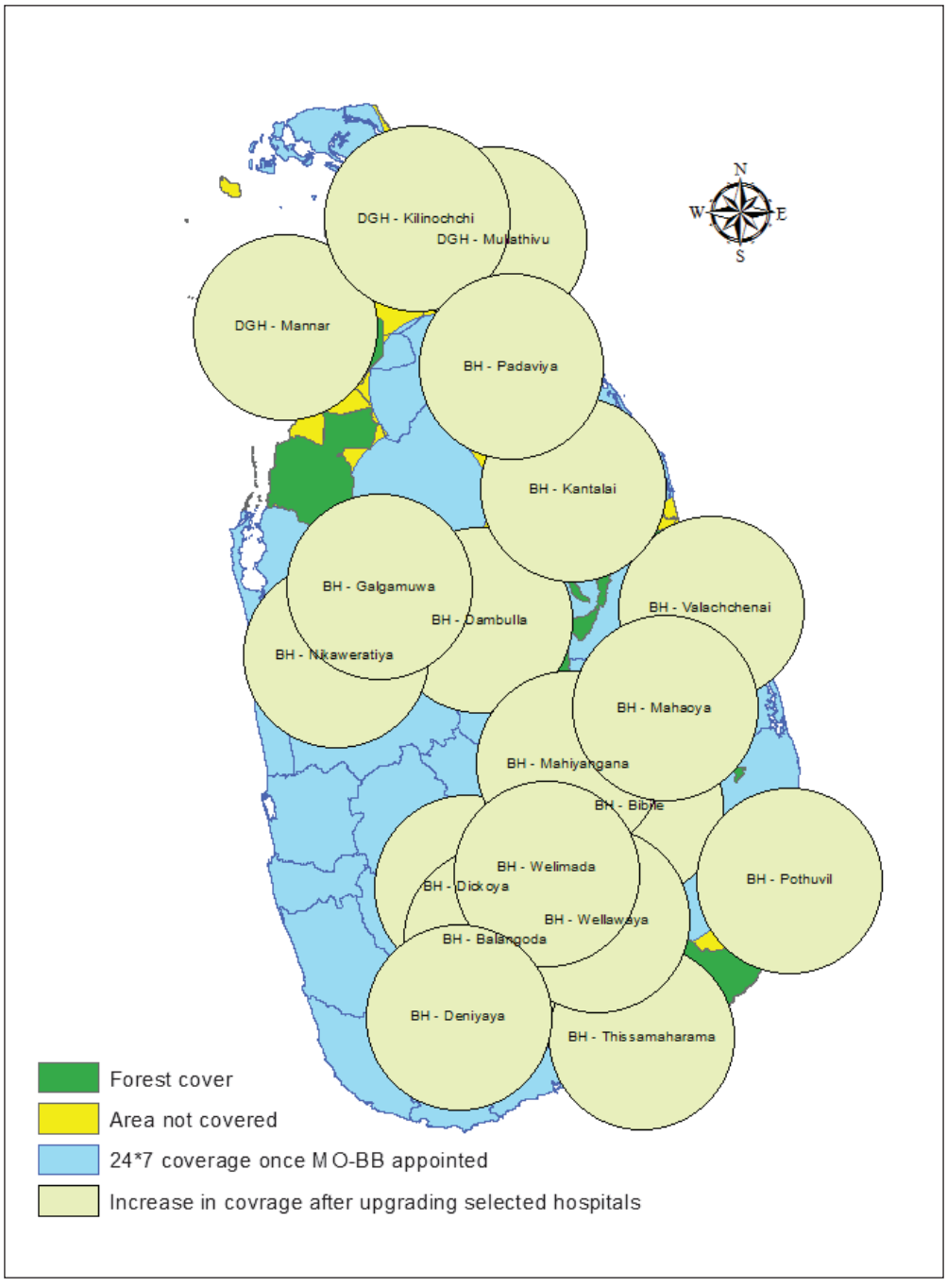
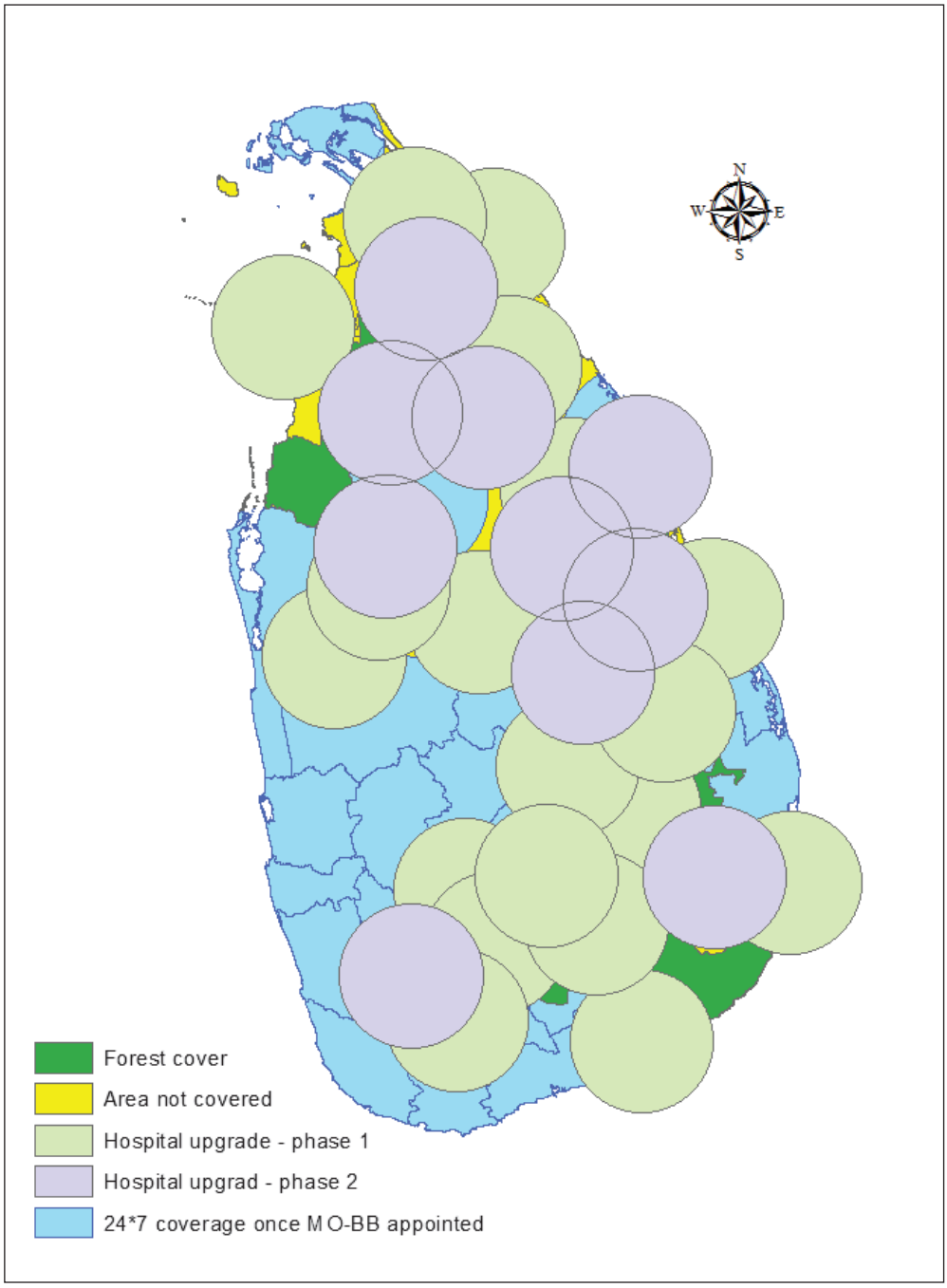


Table 11.1 (b) Institutions suggested for upgrading in the second phase

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 11.1 (b) be upgraded in the second phase. Figure 11.1 (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 11.1 (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.

11.5 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.

11.6. 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.

11.7. 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.

11.8. 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.

11.9. 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.

11.10 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.

11.11. 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.

11.12. 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.

11.13. 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

11.14 Neonatal care services

11.14.1 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.

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.

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 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

11.14.2. 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.

11.14.3 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.

11.14.3 (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 conduced 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.

11.14.4 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. .

11.14.5 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.

11.14.6 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.

11.14.7. 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.

11.15 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.

REFERENCES

Department of Census and Statistics. 2012. Census of population and housing 2012 [Online]. Department of Census and Statistics. [Accessed January 2013].

Family Health Bureau of Ministry of Healthcare and Nutrition, Perinatal Society of Sri Lanka & Central Engineering Consultancy Bureau 2007. Building and other guidelines for Neonatal Intensive Care Units, Special Care Baby Units, Mother Baby Centres.

Registrar General Department. 2012. Birth registration [Online]. Registrar General Department. [Accessed January 2013].

United Nations 1997. Guidelines for Monitoring the Availability and Use of Obstetric Services.

World Health Organization 2009. Monitoring Emergency Obstetric Care: A handbook. Geneva.

Annexure 1: 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