Retrospective Analysis of Neonates and Stillbirths
From FIVE HOSPITALS in Guyana, South America, 2007
December 2008
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From Five Hospitals in Guyana, South America, 2007

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**Acronyms**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<tr>
<td>BP</td>
<td>Blood Pressure</td>
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<tr>
<td>BCG</td>
<td>Bacille Camille Guerin</td>
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<tr>
<td>Caps</td>
<td>Capsules</td>
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<td>CBC</td>
<td>Complete Blood Count</td>
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<td>FHS</td>
<td>Family Health Services</td>
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<td>GMO</td>
<td>Government Medical Officer</td>
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<tr>
<td>GPHC</td>
<td>Georgetown Public Hospital Corporation</td>
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<tr>
<td>LGA</td>
<td>Large for gestational age</td>
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<tr>
<td>LAC</td>
<td>Latin America and the Caribbean</td>
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<tr>
<td>LSCS</td>
<td>Lower Rate Caesarean Section</td>
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<tr>
<td>Hb</td>
<td>Hemoglobin</td>
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<td>Hep B</td>
<td>Hepatitis B</td>
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<tr>
<td>IMCI</td>
<td>Integrated Management of Childhood Illness</td>
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<tr>
<td>IUD</td>
<td>Intra Uterine Device</td>
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<tr>
<td>IUGR</td>
<td>Intra Uterine Growth Retardation</td>
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<td>IV</td>
<td>Intravenous</td>
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<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<td>MCH</td>
<td>Maternal and Child Health</td>
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<td>MTCT</td>
<td>Mother to Child transmission</td>
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<td>MC</td>
<td>Maternal Clinic</td>
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<td>MDG</td>
<td>Millennium Development Goals</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>NMR</td>
<td>Neonatal Mortality Rate</td>
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<td>(N)</td>
<td>Negative</td>
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<td>SGA</td>
<td>Small for gestational age</td>
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<td>SIDS</td>
<td>Sudden Infant Death Syndrome</td>
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<td>STIs</td>
<td>Sexually Transmitted Infections</td>
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<td>TB</td>
<td>Tuberculosis</td>
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<td>(P)</td>
<td>Positive</td>
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<tr>
<td>PET</td>
<td>Pre-Eclamptic Toxaemia</td>
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<td>PID</td>
<td>Pelvic Inflammatory Disease</td>
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<td>PIH</td>
<td>Pregnancy Induced Hypertension</td>
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<td>PAHO</td>
<td>Pan American Health Organization</td>
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<td>PMTCT</td>
<td>Prevention of Mother to Child Transmission</td>
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<td>PPH</td>
<td>Postpartum Haemorrhage</td>
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<td>Rh</td>
<td>Rhesus</td>
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<td>RBS</td>
<td>Random Blood Sugar</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNFPA</td>
<td>United Nations Population Fund</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>VDRL</td>
<td>Venereal Disease Research Laboratory</td>
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<td>WHO</td>
<td>World Health Organization</td>
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The purpose of this study was to determine the causes of neonatal deaths in Regional Hospitals and the Georgetown Public Hospital Corporation (GPHC) and the attributing factors to this adverse effect.

This study was conducted in five hospitals namely: Georgetown Public Hospital Corporation (GPHC) and the four Regional Hospitals: New Amsterdam, West Demerara, Suddie and Linden McKenzie. These health facilities offer basic and comprehensive obstetric care to mothers. The results of this study would serve to inform the Maternal and Child Health Department on the issues related to the causative factors on neonatal deaths and the implications of service recommendations for the health sector.

Initially, this study was only designed to review neonatal deaths from 2006 and 2007. However, because of the large number of stillbirths in some regions in comparison to the average number of neonatal deaths it was decided to research the causes of the stillbirths as well. This study will examine the reasons why both stillbirths and neonatal deaths occurred as well as the interrelationships among the causative agents.

Maternity and neonatal charts were used to obtain data which was then used to fill the prepared questionnaires. The questionnaire consisted of both closed and open ended questions. Variables were divided into demographic, antenatal, intranatal and postnatal. This data was then entered into the Epi Info 2003 database. The data was analyzed using Epi Info analysis, using chi-square to determine whether the variables had any significance at a chi-square value of greater than 5. Analysis of the data was done under similar headings as the results of the study. Histograms, bar charts, frequency and line graphs were used to present the data.

A total of 127 charts were reviewed, 77 were neonatal deaths and 50 were stillbirths. There was inadequate documentation of records. In some hospitals, even though the numbers of deaths were recorded, the charts were misplaced. Only 2007 charts were reviewed due to other years not being consistent for all the hospitals. The majority of mothers in this study were between the ages of 18-35 years while mothers younger than age sixteen (<16 years) were the minority. The Afro-Guyanese was the leading ethnic group in the study with 43 (34%), followed by the Indo-Guyanese and the mixed groups, 37 (29%) and 28 (22%) mothers respectively while only 9 (7%) were Amerindians.

The nutritional status of the mothers showed that 52 (40.9%) in this study had a nutritional status of 11 grams and over, followed by 47 (37%) mothers with nutritional status of 7-10.99g/dl. One-hundred and twelve (88%) of the mothers screened for HIV were negative for HIV, pregnant mothers who delivered either a stillbirth or neonate who died were attended to by a qualified health worker that is a midwife, doctor or medex from the five hospitals While only 2 (1.6%) were delivered at home. Sixty three (82%) of the neonates died within the early neonatal period, that is, 7 days after delivery, 10 (13%) died during the late neonatal period and the time of 4 (5%) neonatal deaths was not stated. These findings were in keeping with international and national standards

Significant findings were ninety four percent of the stillbirths were weighed at birth and had higher birth weight than the neonates who died. This was very significant at a chi-square value of 11.7251, df 8 and a probability of 0.1639. Two mothers who had membranes ruptured over 1 week were not given any antibiotics. This was significant at a chi-square value of 23.3815, df 12 and probability of 0.0232.

More than half of the mothers in the study had complications during delivery. Nineteen (37%) had blood pressure >140/100 mmhg and 5 (10%) had blood pressure greater than 130/90 mmhg.

The five leading causes of neonatal deaths from the hospitals were acute respiratory distress, bacterial sepsis of the newborn, birth asphyxia, prematurity and brain haemorrhage (subarachnoid haemorrhage due to the injuries of the head of the foetuses. Birth injuries to the liver and brain damage occurred in eleven cases. These issues point to quality of care during intranatal care.

Socio-economic variables such as education, age of mother and parity did not have any significant impact on the outcome of the pregnancy. Since the old chart was used to collect data and some of this information could not have been obtained. Causal relationships were associated with birth weight and pregnancy outcomes, haemoglobin levels and ethnicity groups, prematurity and whether the mothers were given antibiotics. In the five regions studied, most mothers delivered in a health institution and such geographical location did not pose any direct causal effect to the outcome.

Complications during pregnancy such as high blood pressure, anaemia and prematurity had a positive effect on the pregnancy outcomes. This inevitability led to prematurity, stillbirths and neonatal deaths.

The question asked on reviewing of the intranatal data is “If there was over 87% of highly trained midwifery staff according to the data why did the stillbirths in most of the regions outnumber the neonatal deaths?” Highly trained staffs according to previous research are known to reduce the incidence of deaths and sickness of neonates and of stillbirths. Not only was there highly trained staff present during delivery but the mothers delivered at a comprehensive level of...
obstetric care services in the hospital while only 1.6% delivered at home. The leading causes of deaths of these neonates despite highly trained staff were birth asphyxia, respiratory distress, birth injuries during delivery and sepsis. These causes point to the issues of inadequate quality of care. Even though the research did not attempt to address the issue of adequate staff at these hospitals or time of referral, these factors should be explored in further studies.

Recommendations were based on the WHO neonatal mortality scenario for developing countries. The use of the partograph during labour to identify complications early and thus minimize complications for the mother and child. Implementation of a neonatal chart based on WHO module is essential. Health Workers must adhere to standards and protocols of care during intranatal care. Improvement of delivery techniques during labour by practical demonstrations with the use of mannequins is necessary. Enhancing IMCI at the peripheral levels to increase the skills of health workers is also important. Health workers should have continuous training in the management of high risk complications of pregnancy and definitions of care.

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Overview of Study

Local Context
The neonatal mortality rate is approximately 75% of the infant mortality rate. Though many adverse pregnancy outcomes (maternal and neonatal) death are reported by tertiary care facilities, many of these high-risk pregnant women and their neonates may have been referred from other institutions. To reduce the high neonatal mortality rates the Ministry of Health through the Maternal and Child Health Department embarked on a Safe Motherhood strategy focusing on antenatal, intranatal and postnatal care of pregnant women and their babies. However, an intensive study needed to be undertaken to determine the etiological factors and predisposing factors to the high prevalence of neonatal mortality and stillbirths. Criteria selection for the study included a retrospective study of mothers who delivered within the last year, 2007 in the five main hospitals. From this group, all mothers were studied on whether she had a neonatal death or an abortion.

This Study has as its goal:
To determine the extent of neonatal deaths/stillbirths in five regional hospitals and the GPHC and the attributing factors to this adverse effect

Objectives
1. To determine the frequency of adverse pregnancy outcomes (neonatal deaths) among pregnant women.
2. To determine the main causes of why neonates die within the 28 days period.
3. To determine whether poverty, lower social economic status or any other contributing factors have a direct causal relationship to neonatal death.
4. To determine whether the geographical access to services has any direct relationship to neonatal deaths.
5. To determine if complications during pregnancy have any adverse effects on the pregnancy outcome.

The results of this study would serve to inform the Maternal and Child Health Department on the issues related to the causative factors on neonatal deaths and the implications of service recommendations for the health sector. Initially, this study was only slated to review neonatal deaths within the two year period that is from 2006 and 2007. However, because records were not available for years beyond 2007 in some hospitals due to infrastructural changes, it was decided to do a retrospective analysis of 2007 data only. Also because of the large number of stillbirths in some regions in comparison to the neonatal deaths it was decided to research the causes of the stillbirth as well. This study will examine the reasons why both stillbirths and neonatal deaths occurred as well as the interrelationship with all the known causative agents. Firstly, the study will look at previous research to review the causative agents and then link them to the analysis of the data of this study.
LITERATURE REVIEW

REGIONAL CONTEXT
The Region of the Americas has made great strides in reducing child and infant mortality. However, neonatal mortality trends have not shown any progress over the past ten years. As such, there is considerable inequity between countries and within countries. The Millennium Development Goal for child survival (MDG-4) will not be achieved without an equivalent reduction in neonatal mortality. Clear evidence-based and cost-effective interventions to improve neonatal health have been identified and are feasible even in settings with limited resources. However, these interventions are still not reaching those most in need, in part due to fragmented efforts targeting either maternal or child health, with the neonates “falling between the cracks” (WHO, 2005).

GLOBAL CONTEXT, MANDATES AND INITIATIVES
The Millennium Development Goals (MDGs) are the most widely ratified health and development targets in history. Almost all nations have agreed to reach these eight interlinking goals, nearly half of which concern different aspects of health – directly or indirectly.

The fourth goal (MDG-4) commits the international community to reducing mortality in children aged younger than 5 years by two-thirds between 1990 and 2015. Between 1960 and 1990, the risk of dying in the first 5 years of life was halved—a major achievement in child health. There has been relatively little decrease in the neonatal period (the first 28 days of life) and deaths in the first week of life have shown the least progress. It is also important in the continuum of care to approach acknowledge the link between the health of mothers and neonates in achieving progress with MDG-5.

To meet MDG-4, a substantial reduction in the neonatal mortality rates in high mortality countries is needed, and reducing deaths in the first week of life will be essential to progress (WHO 2003). Success in reducing neonatal deaths is possible in low-income countries and without highly developed technology by strengthening newborn care within existing child and maternal health programs and by providing more attention to reaching those who have been ignored.

These effective, low-cost interventions include:
- Diphtheria tetanus immunizations for pregnant women,
- Skilled attendant at childbirth,
- Resuscitation of newborn babies,
- Prevention and management of hypothermia,
- Skin to skin contact for low birth weight babies,
- Prompt treatment of newborn infections,
- Immediate and exclusive breastfeeding,
- Education about the importance of proper hygiene and warmth among others.

These practices can prevent 3 out of 4 newborn deaths (Save The Children, 2006). On September 12, 2005 the new global Partnership on Maternal, Newborn and Child Health (PMNCH) was officially launched. This new partnership marks a milestone in an intensive and growing global focus on the health of women, newborns and children. The aim of the PMNCH is to harmonize and intensify actions at country, regional and global levels in support of MDGs 4 and 5 to save the lives of millions of women and children by expanding access to proven, cost-effective interventions.

SITUATION ANALYSIS IN LATIN AMERICAN AND THE CARIBBEAN

NEONATAL CARE ISSUES
Neonatal mortality, defined as death in the first 28 days of life, for Latin America and the Caribbean (LAC) is estimated at 15 per 1,000, showing a narrow range of 14 (South America) to 19 (the Caribbean) per 1000 live births (WHO, 2006). In addition, it is estimated that, in this region, the stillborn rate (foetal death) approximates the neonatal mortality rate (NMR).

Newborn mortality, accounts for 60% of infant deaths and 36% of under-5 mortality although exact proportions vary in individual countries yet the majority of these deaths are avoidable. Mortality rates are highest in Haiti, Bolivia, Guyana, Dominican Republic and Guatemala, where rates are 5-6 times higher than in the countries with the lowest mortality rates, such as Chile, Costa Rica, Cuba and Uruguay.

The rural and urban poor, other marginalized communities as well as indigenous and Afro-descendent populations experience disproportionately high neonatal mortality.

Neonatal survival has not received enough attention, because these deaths are virtually invisible, occurring at home and often going uncounted in official statistics. In many societies, neonatal deaths and stillbirths are still not perceived as a problem, largely because they are very common. Many communities have adapted to this situation by not recognizing the newborn as an individual and by not naming the child, until the newborn has survived the initial period. The stagnation in the neonatal mortality rate also is due in part to a lack of programs specifically targeting neonates. The evidence suggests that the first week of life is the most vulnerable in terms of neonatal mortality risk and that the first 24 hours of life are determinants for the future survival of the child. Child survival programs have primarily focused on important causes of death after the first four weeks of life.

CAUSES OF NEONATAL DEATH
The top three leading causes of neonatal death in Latin America and the Caribbean region for 2004 include infections (32%), asphyxia (29%) and prematurity (24%) (PAHO, 2004).
Other indirect causes include socio-economic factors such as poverty, poor education, especially maternal education, lack of empowerment, poor access and hindering traditional practices.

Poverty is the root cause of many maternal and neonatal deaths, either because it increases the prevalence of risk factors such as poor nutritional maternal status, maternal infections or because it reduces access to care. Uneducated mothers are at a severe disadvantage, as are their babies. Mothers who missed out on schooling are more likely to be poor, to get pregnant younger and more often, to have higher rates of newborn and maternal mortality. Babies born to mothers with little or no education are at greater risk during birth and especially during the vulnerable early days of life. Practices, such as inadequate cord care, letting the baby stay wet and cold, discarding colostrum and feeding fluids/other food, are deeply rooted in the cultural fabric of societies and interact in ways that are not always understood. It is important to note that this is not a major problem in Guyana.

Maternal factors affecting neonatal health

Another major factor influencing of newborn deaths is poor maternal health, especially during pregnancy, delivery and the early postpartum period.

Many pregnant women suffer from malnutrition, are overworked and may still be recovering from a previous pregnancy resulting from a short interval between pregnancies. For many mothers, health care during the critical period—particularly during and immediately after birth is virtually nonexistent.

Other maternal factors affecting neonatal health include maternal infection such as sexually transmitted diseases (including HIV/AIDS and syphilis), other infections such as urinary tract infections, malaria, the age of the mother (less than 18 years or older than 35 years); a parity of more than 5, third trimester haemorrhage and complications in delivery (prolonged/obstructed labour).

Lessons Learned

Policies and health systems reform

The health sector reform process provides an opportunity to scale up highly effective and feasible MNCH essential interventions. If these interventions are part of the national health package and linked to targets and budget lines, then national ownership, sustainability, and accountability should occur.

These reforms focus on the continuity of care across women and children’s health (Brazil), maternal and child national health insurance initiatives (Bolivia) and free maternity programs (Ecuador). Due to the close link between maternal and newborn health, essential obstetric care has been expanded to include essential neonatal care (Bolivia, Honduras, Nicaragua, Peru, Guatemala and Paraguay), integrating the management of needs for skilled personnel, supplies, community support and referral processes where indicated. In addition, national standards and clinical guidelines for neonatal care need to be updated periodically to reflect the latest evidence about essential newborn care interventions.

Care and Access to Skilled Birth Attendance

On average, 79% of deliveries in LAC occur at the facility level, although there are wide disparities between and within countries, especially with respect to disadvantaged groups. In rural areas, access to skilled birth attendants, supplies, functioning equipment and referral services is frequently limited. In addition, a significant proportion of rural births may be attended by auxiliary nurses who do not have the necessary midwifery skills, equipment and supplies.

Integrated Management of Childhood Illness Approach

The Integrated Management of Childhood Illness (IMCI) strategy began as a means to improve the management of common childhood illnesses with proper nutrition and immunization. Currently, preventive and promotional approaches to improve the skills of health workers, the health system, and family and community practices have been incorporated into the strategy. In the LAC region, IMCI is more developed at the community and facility levels.

IMCI improves the practices of treatment and care and permits an adequate quality in the evaluation, classification, treatment and monitoring of the illnesses that affect the health of the mother and of the newborn. The neonatal component of the community IMCI constitutes an important tool to address the challenge of reducing neonatal mortality in the Americas as it helps reduce the incidence of illnesses and diminishes the occurrence of sequelae or complications.

Immunization

Immunizations have made significant contributions to the reduction of neonatal and child mortality throughout LAC. Since 1990, mortality from measles, neonatal tetanus and bacterial meningitis caused by Haemophilus influenza has been reduced by greater than 95% compared with 1990 figures, and mortality caused by pertussis decreased by more than 80%. Maternal immunization has also played an important role in reducing neonatal tetanus, and vaccination against rubella has contributed to a decrease in congenital rubella syndrome prevalence.

Micronutrients

Micronutrient deficiencies are common in women of reproductive age. Many women enter pregnancy with inadequate micronutrient reserves with other manifestations of deficiency that could seriously affect their health as well as that of their newborn. According to WHO, 43% of all women aged 15 to 49 in developing countries have anaemia during pregnancy. Anaemia is a recognized risk factor for maternal mortality. Vitamin A and Zinc deficiency may contribute to perinatal sepsis by impairing the physiological response to infections. Folic acid deficiency during the preconception period is related to neural tube defects and during pregnancy could be related to preterm delivery.
**Breastfeeding**

Early and exclusive breastfeeding is recognized as a key factor in newborn and infant health. While an estimated 90% of mothers in LAC breastfeed their newborns, only 35% breastfeed exclusively for six months. In addition, giving newborn teas or other fluids before breast milk or the early introduction of other fluids is common practice in the Region which can be harmful.

**Mother to child transmission of HIV**

Since the early 1990’s the HIV epidemic has become a serious threat to child survival in Latin America and the Caribbean mainly due to mother-to-child transmission (MTCT).

One cost effective intervention to stop the spread of HIV is the prevention of mother to child transmission (PMTCT). Quality and focused prenatal care is a key entry point for HIV testing, care and treatment. If integrated into prenatal care, PMTCT may prevent at least 50% of HIV infection in children and may contribute to the timely identification and referral of women for antiretroviral therapy (ART). Currently, several countries in Latin America and the Caribbean offer PMTCT in 100% of their prenatal services.

**Surveillance**

An ongoing challenge for the Region is to improve the registration of stillbirths and neonatal deaths in the official record system. It is important that the same standards/definitions for collecting data be used so that comparisons can be made within countries and in the Region. In many countries, a stillbirth or newborn baby who dies is not considered a person needing to be officially registered. At the present time, within certain Caribbean countries, there still persists some confusion as to the definition of a stillborn. Most LAC countries do not routinely monitor the indicators used for data collection. Local review, analysis and use of the information collected for decision-making are also grossly inadequate.

Ongoing monitoring of compliance with standards of newborn care by providers in hospitals and health centres is another strategy that has proven effective for making providers aware of gaps in quality of care and stimulating actions to improve health care quality.

**The Continuum of Maternal, Newborn and Child Care Approach**

The rationale for a continuum of care approach is based on the close link between the health and well-being of families, women, newborns, children, and adolescents. The goal of the framework is to ensure availability and access to evidence-based interventions to improve maternal, newborn and child health. The continuum of care approach has at least three dimensions.

First, it means care has to be provided as a continuum throughout the life cycle, including adolescence, preconception, pregnancy, childbirth and childhood, thereby building upon their natural interactions.

Second, it indicates that care has to be provided in a seamless continuum that spans the home, the community, the health centre and the hospital. Opportunities for strengthening care in the household may be missed because families are not informed or not empowered to act on healthy choices, or the socioeconomic conditions in which they live impede healthy choices.

Finally, the Continuum of Care approach also encompasses a seamless span of interventions from health promotion, disease prevention and control, treatment, rehabilitation and social reinsertion.

The key elements for a functioning continuum of care system include:

1) **Pre-pregnancy care to all women of childbearing age**
   - Quality health services for adolescents and access to those services.
   - Immunizations (e.g. Rubella vaccination, Hepatitis B vaccination).
   - Essential nutrition for girls and women, and control of nutritional disorders (obesity prevention), including folic acid supplementation.
   - Preventive visits, risk assessment and counselling (e.g. drug and substance abuse prevention, risk behaviours).
   - Family planning, including promoting healthy timing and spacing of pregnancy.
   - Screening and treatment for sexually transmitted infections, including HIV/AIDS.
   - Treatment of chronic conditions (e.g. diabetes management, hypothyroidism management). Include Malaria, TB and Chagas for the region.

2) **Prenatal Care**

**Four-visit prenatal care package, including:**

- History and physical examination with assessment of blood pressure, weigh gain, and fundal height; urine screen for protein (multiple dipstick).
- Screen for anaemia (Haemoglobin level).
- Blood type and Rh.
- Two tetanus immunizations.
- Iron and folate supplementation.
- Counselling and testing for HIV, drug abuse, syphilis screening and treatment.
- Identification and referral of multiple pregnancy, abnormal lie, preeclampsia-eclampsia.
- Birth planning and emergency preparedness.
- Prenatal counselling, safe delivery, and preparation for breastfeeding.
- Information counselling and support for women experiencing violence.
- Community mobilization and engagement.
- Identification and treatment of common maternal infections (i.e. urinary infections).
3) Childbirth Care

**Skilled care during labour and delivery, including:**
- Active management of third stage of labour.
- Use of partograph.
- Monitor maternal and foetal well-being; encouragement of supportive companion.
- Ensure clean delivery practices and beneficial practices.
- Delay cord clamping (up to 3 minutes).
- Clinical management and referral of maternal or newborn complications (emergency obstetric care at first level); newborn resuscitation if required.
- Emergency obstetric care package (second and third level).

4) Postnatal and Newborn Care

**Essential newborn care for all newborns should ensure:**
- Birth in a safe environment with access to complete obstetric and neonatal care.
- Avoid unjustified separation from the mother.
- Early and exclusive breastfeeding; early suckling, positioning and attaching the baby to the breast; rooming-in and unrestricted feeding; ten steps to successful breastfeeding; safe human milk banking.
- Warmth provision and avoidance of bathing during first 24 hours.
- Infection control, including cord care and hygiene.
- Postpartum vitamin A provided to mother.
- Eye prophylaxis to prevent gonococcal ophthalmia.
- Information and counselling for home care and emergency preparedness.

**Extra care for small babies**
- Extra home visits; support for breastfeeding, thermal care, and hygienic cord care.
- Extra attention to warmth, feeding support, and early identification and management of complications.
- Skin to skin thermal care (kangaroo mother care).
- Vitamin K administration at birth.
- Facility-based clinical care of ill newborn babies, particularly those with infections, prematurity, and birth asphyxia. Short and long term follow up.
- Early neurodevelopment stimulation.

**Pre-discharge package (at facility level or before birth attendant leaves the mother in the case of a home delivery)**
- Careful assessment of high risk factors/danger signs (for both mother and newborn).
- Counselling for mother and family in preventive care, recognition of danger signs, provision of care (what to do and where to go).
- Promotion and referral for early postnatal care.

- Follow-up care for birth spacing, immunization, nutrition (breastfeeding), growth monitoring and development of baby.

**Assure appropriate care in the home for the mother and newborn**
- Effective empowerment, participation and communication strategies including community involvement in planning MNCH programs.
- Community mobilization and engagement, and antenatal and post natal domiciliary behaviour change communications to promote: evidence-based care practices (breastfeeding, thermal care, and clean cord care), care seeking, and demand for quality clinical care.

5) Integrated Management of Childhood Illness

**Scaling up of implementation of IMCI especially in rural and impoverished communities including the critical first week of life.**

**Effective Community Based Interventions**
Recent reviews of the evidence regarding community-based interventions for improving perinatal and neonatal health outcomes in developing countries recommended an integrated approach to safe motherhood and newborn health.
Methodology

This study was conducted in five hospitals, namely the Georgetown Public Hospital Corporation (GPHC) and the four Regional Hospitals: New Amsterdam, West Demerara, Suddie and Linden Mackenzie. These health facilities offer comprehensive health care to mothers and children and they are referral centres for all health facilities within the respective regions and in the case of GPHC it is the national referral hospital.

A retrospective study was done by reviewing the charts of pregnant mothers whose babies died in the neonatal period in 2007. All charts of pregnant women attending these facilities who had a neonatal death were reviewed. Variables in the study consisted of demographic, antenatal, intra-natal and postnatal information which was extracted into a structure questionnaire.

Data was then entered into Epi Info version 3.2.2, 2003. The socio-demographic, obstetric and the adverse pregnancy outcomes among high risk pregnant women were described in the univariate analysis. Factors impacting on adverse pregnancy outcomes will be determined in the bivariate analysis using the chi square, df and probability to determine the statistical significance of those variables on the outcome of the pregnancy.

Ethical Consideration

The names of pregnant women were not recorded on the questionnaire. All charts were reviewed at the health facilities and no copies of the charts were made. Only persons affiliated to the research project had access to the data. Each mother was given a number followed by the year, in case the charts needed to be reviewed at another time.

Data Collection

The data collection process commenced on June to November 2008 in all the five main hospitals; see below for the details on how this was done for each region.
REGION 2: OSCAR JOSEPH’S HOSPITAL AND SUDDEE PUBLIC HOSPITAL
For Region 2, data was collected from the Oscar Joseph’s Hospital at Linden and Suddee Public Hospital. At Oscar Joseph’s Hospital all maternity charts including infant charts were stored together according to the year. The team was given the charts for each year between 2003 to 2007 and then identified the charts for the study. A total of four hundred and seventy two charts (472) were examined. However, data was only recorded for the neonatal deaths for 2007 since in many of the charts there was missing information. The researchers had to check other areas of the charts for such information.

At Suddee Hospital the neonatal death charts along with most of the maternal charts were compiled according to the respective years, 2003 to 2007, thus giving the researcher easy access to the charts. A total of forty eight (48) deaths were recorded from 2003-2007. For 2007, there were a total of 17 neonatal deaths. However, only the 2007 data was used since the other regions did not have data on these years.

REGION 3: WEST DEMERARA REGIONAL HOSPITAL
Recorded information on the number of deaths were available from 2003-2007. Neither maternity nor neonatal charts could be obtained from the period beyond 2006 since they were put in an area that was not accessible to persons, as told by the head clerk of the unit. However the neonatal deaths charts were made available by the statistical clerk who pulled them from the records. There were a total of 5 neonatal deaths and 24 stillbirths in the year 2007. These were coded as the same number on the mother’s charts.

REGION 6: NEW AMSTERDAM REGIONAL HOSPITAL
A total of 37 stillbirths and 10 neonatal deaths were recorded for 2007. Data for all the neonatal deaths charts was not available as these charts were with the pathologist who was conducting post-mortem examinations. Data was not obtained for the neonatal deaths even though it was promised on several occasions.

REGION 10: LINDEN HOSPITAL COMPLEX
There were a total of 17 stillbirths and 2 neonatal deaths in Region 10 for 2007. Data was obtained from the maternity register which was well kept. Unlike the other hospitals Linden Hospital Complex formerly run by Limine Bauxite Company, a Private agency were not using any neonatal charts which made the process of obtaining data complex. Although the study period was 2003-2007 it was not possible to obtain data from the years before 2007. The labour ward register provided a monthly summary of all the perinatal information and deliveries.

The neonatal and maternity charts were used to obtain the data for the neonatal and stillbirth cases. Although data was only obtained for 50% of charts, data from both charts was extracted for the prepared questionnaire which noted 127 stillbirths and 125 neonatal deaths.

All the charts were found for 2007 with the corresponding mother’s chart. However, there were certain deficiencies in the information that was recorded on the charts. There was a register of neonatal deaths and stillbirths in the statistical department. These were coded as the same number of the mother’s charts even though they were filed separately.

The neonatal and maternity charts were used to obtain the data for the neonatal and stillbirth cases. Using both charts data was extracted into the prepared questionnaire.

REGION 4: GEORGETOWN PUBLIC HOSPITAL CORPORATION (GPHC)
Georgetown Public Hospital is the largest hospital and is the referral hospital for all regions. Data was completed for the previous year on the computer. A print out of the year 2007 was made then the chart was pulled based on their registration number. There were some difficulties in obtaining some of the charts for this hospital but using data from the records, information was extracted for the questionnaire.

LIMITATIONS OF DATA
• Some information was not recorded on the charts for example the weight or time of death of the neonate.
• Sometimes there was no information concerning the monitoring of the mother or the neonate’s condition.
• Some mothers were admitted in the second stages of labour and limited information was recorded about the mother.
• For High risk mothers for example previous PPH or diabetes seem not to be monitored adequately during pregnancy.
• In few cases it was recorded that the mother had prenatal care at a specified health centre, but the number of antenatal visits was not stated.
• Absence of mothers’ chart caused limited information to be gathered about the mothers.

USE OF THE OLD PERINATAL CHARTS:
• Some information was not recorded on the charts for e.g. the weight, time of death of the neonate.
• Some mothers’ charts were not located as the mother was either transferred to a hospital or the infant was transferred from other health facility. As such limited history taking was done about the mother.
• The cause of death and date of death in some cases were not recorded in the area provided on the chart.
• The number of antenatal visits was not marked, since no particular spacing was available in the old chart.
This survey reviewed data from 2007 of all neonatal deaths and stillbirths from one national hospital and four regional hospitals namely: Georgetown Public Hospital (Region 4, Georgetown), Linden Hospital Complex (Region 10), McKenzie Hospital (Region 10), New Amsterdam Hospital (Region 6), Public Hospital Suddie (Region 2) and West Demerara Regional Hospital (Region 3).

Data obtained from the number of neonatal deaths were in close correlation with the national data from the Ministry of Health Statistical Department 2007. Although the study did not intend to determine the causes of the stillbirths there were more stillbirths than the neonatal death in all areas, hence the researchers decided to include this area in the study.

Figure 1: Data on Neonatal Deaths

Data was also reviewed from 2003-2006 from all hospitals where data was obtained. Data was not obtained from some facilities since the charts could not be located even though the number of deaths was recorded.

There were a total of 169 recorded neonatal deaths in 2007 from the five hospitals; however charts were only obtained for 77 of these cases. Most of the data was obtained from hospitals except the Georgetown and New Amsterdam Hospitals. The stillbirths number far exceeded the neonatal deaths as clearly seen in Figure 2.
National data shows that with the exception of Region 2 and Region 10 the stillbirths outnumbered the neonatal deaths.

Figure 3 shows that the majority (74%) of mothers in this study were between the ages of 18-35 while mothers younger than age sixteen (<16 years) were the minority. Teenage pregnancies below 18 years comprised 14% of the mothers in the study. The age of mother and the pregnancy outcome was significant at a Chi-square =5.9071, df 5, probability 0.3154.

Figure 4 shows that 50 (39%) were stillbirths and 70 (61%) were babies who were born alive and subsequently died.

The education level in the study revealed that 26 (20%) of the mothers had secondary education, 24 (19%) had primary education while for 75 (59%) of the mothers this was not stated. This is because the old perinatal charts were used to record the data in the study (refer Figure 5).
AFRO-GUYANESE 43 (34%) 16 (13.8%)
AMERINDIAN 9 (7.5%) 1 (0.8%)
INDO-GUYANESE 28 (22.5%) 20 (16.9%)
MIXED 37 (29%) 11 (9.1%)
NOT STATED 9 (7.5%) 2 (1.7%)

Figure 6: Ethnicity of the mothers and pregnancy outcomes

The Afro-Guyanese was the leading ethnic group in the study with 43 (34%), followed by the Indo-Guyanese and the mixed groups with 28 (22%) and 20 (16.9%) mothers respectively. Nine mothers (7%) were Amerindians while for the remaining 10 (8%) ethnicity was not recorded. Indo-Guyanese from the research tended to have higher stillbirths than neonatal deaths as illustrated in Figure 6. Mixed and Afro-Guyanese showed a lower level of stillbirths but more neonatal deaths. The one mother who delivered a twin, one was a neonatal death and one stillbirth was in the mixed group.

Figure 7: Antenatal Care

Figure 8: Old antenatal chart used

Figure 7 shows that 44 (35%) of mothers had more than 4 visits for antenatal care, while for 65 (51%) this was not stated because the old antenatal charts were used.

Figure 9: Nutritional Status of Mother

Two mothers (1.6%) had a nutritional status of < 7 g/dl while for 26 (20.5%) of mothers the Hb level was not stated.

Figure 10: Ethnicity level in comparison to Hb level

On examination of the haemoglobin levels during pregnancy, it was found that the 20 Afro-Guyanese had low Hb levels (less than 11 g/dl) than any other group and were anaemic, 18 Indo-Guyanese had higher Hb level (over 11 g/dl), 26 (20.5%) Hb levels of the mothers that was not stated (refer Figure 11).
Twenty three mothers from Region 4 (GPHC) had anaemia in comparison to the rest of regions. The 2 mothers who had severe anaemia came from Regions 6 – Berbice and Region 10 both of which are rural areas. Fourteen mothers from Regions 2 and 3, had Hb levels between 7 – 10.99 g/dl. Mothers from Region 4 – Georgetown had higher Hb levels (over 11 g/dl) than any other region (refer Figure 11).

**Figure 11: Nutritional level and location of the mothers (n=127)**

Forty – eight mothers (38%) stated they were not diabetic while eight (6%) stated that they were. The remaining seventy (55%) did not record whether or not they were diabetic (refer Figure 13).

**Figure 13: Percentage of diabetic mothers**

Figure 14 illustrates that 50 babies were still births of which 6 mothers were diabetic in comparison with the neonatal deaths where only two mothers were diabetic out of 77. Forty eight mothers who delivered both still births and neonatal deaths did not have diabetes while for 70 mothers this was not stated. Diabetes during pregnancy and its outcome was significant chi-square value of 36.7839, df 6.

**Figure 14: Diabetes and pregnancy outcomes**
SCREENING FOR HIV DURING PREGNANCY

It is noteworthy that 112 (88%) of the mothers screened for HIV from the data review of the hospital inpatient record and were negative for HIV, while only 3 (2%) were positive for HIV and 10% of the results was unknown (refer Figure 15).

PARITY OF THE MOTHERS

At least 47 (37%) of the mothers had one previous child, 46 (36%) had 1 to 4 children, while 12 (10%) were grand multiparous women.

INTRANATAL CARE

According to the survey data for the neonatal deaths and stillbirths, 110 (87%) pregnant mothers who delivered either a stillbirth or neonatal death was attended to by a qualified health worker (midwife, doctor or medex) from the five hospitals while only 2 (1.6%) were delivered at home (refer Figure 17) and for 15 (12%) it was not stated who attended to them.

TYPE OF DELIVERIES

Seventy nine percent of the mothers had normal delivery and were delivered by a trained health professional, 12 (9%) had surgical intervention of lower segment caesarean section which was higher than the prevalence of footling and breech delivery 1 (0.8%) and 8 (6.3%) respectively (refer Figure 18).
PREGNANCY COMPLICATIONS

Figure 19: Pregnancy complications in the mothers

Figure 19 illustrates that 55 (43%) of the mothers who delivered stillbirths or had neonatal deaths had complications during pregnancy while for 51 (40%) it was not stated whether they had complication and only 21 (17%) did not have any complications.

TYPE OF COMPLICATIONS IN PREGNANCY

Figure 20: Distribution of type of complications in the mothers

The leading complication in this study was Pregnancy Induced Hypertension (PIH). Thirty (55%) of the mothers had PIH or hypertension in pregnancy, 6 (11%) had diabetes in pregnancy, 5 (9%) had ante-partum haemorrhage (Abruptio Placenta and or Placenta Previa), while 2 (4%) had postmaturity (refer Figure 20).

PREMATURE RUPTURE OF MEMBRANES

Figure 21: Gestational weeks of pregnancy and time of rupture of membranes

The majority of mothers 37 (48%) had normal rupture of membranes that is at term that is at 40 weeks (36 weeks and over). Thirty three (42 %) of mothers’ membranes ruptured before term (less than 36 weeks). Fifteen mothers (19%) had premature ruptured of membranes (before 28 weeks). Seven mothers (9%) had membranes rupture after 41 weeks (refer Figure 21).

Figure 22: Comparison of time of rupture of membranes and whether antibiotics were given

Figure 22 illustrates that the total number of mothers who were given antibiotics was twenty three. Of this 23, 6 mothers were given antibiotics less than one week, 8 just around delivery and for 8 mothers it was not stated. It is surprising that 2 mothers whose membranes were ruptured over 1 week were not given antibiotics. For one mother, it was not stated and for the other mother, this was not given. Only one mother’s membrane was intact on admission to the labour ward. Sixty three mothers had their membranes rupture just before or around delivery.
This implies that they had spontaneous rupture of the membranes before delivery. This was significant at a chi-square value of 23.5815, df 12 and probability of 0.0232.

Out of the 23 mothers who were given antibiotics, 10 (40%) were given Ampicillin (intra-venous or capsules) for either premature rupture of the membrane or any other complication during pregnancy. The second most common antibiotic used was Amoxil and Flagyl combination. Eight (32%) mothers were given these drugs while two mothers were given Ampicillin and Seclopen combinations and one was given Gentamycin and Crystapen injection (refer Figure 23).

**PROLONGED LABOUR AND PREGNANCY OUTCOME**

In response to the question, “Was labour prolonged?”, that is over 12 hours in a primigravida and over 6 hours in a multiparous, it was seen that 4 (8%) of the stillbirths had prolonged labour in comparison to 1 (1.3%) of the neonatal deaths. It is noteworthy that no prolonged labour was more common in the neonatal deaths than still births. This was significant at a chi-square level of 8.6381, df 2 and probability of 0.0133 (refer Figure 24).

**POSTNATAL CARE**

**BIRTH WEIGHT**

Figure 25 shows that 69 (54%) of the babies in the study had a birth weight of less than 2,500 grams according to WHO International Standards on postnatal care, while only 39 (31%) had a birth weight of over 2,500 grams. It is important to know that 26 (20%) had a birth weight of less than 1,500 grams while 43 (34%) did not have their weight stated.

When this was cross tabulated with the outcome of the infant, it was seen according to Figure 26, that 21 (43%) still births were infants with a birth weight of over 2,500 grams as compared with the neonatal deaths which showed that the neonatal deaths had a smaller number of babies with a lower birth weight. As a matter of fact 20 (25.9%) of the neonatal deaths had a birth weight of less than 2,500 grams.
Birth Weight and Pregnancy Outcome

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</tr>
<tr>
<td>Not Stated</td>
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Figure 26: Birth weight and pregnancy outcome of the babies in 2007 (SB n=50, ND n=77)

This was very significant at a chi-square of 11.7251, df 8 and a probability of 0.1639.

Apgar Score

Figure 28 shows that 17 (22%) of the neonates had an apgar score of 10 minutes after birth, the remaining 88% had an apgar score of less than 10 minutes.

Figure 27: Diagram illustrating if stillbirth was weighed at birth (n=50)

Figure 27 illustrates that 45 (90%) of the stillbirths were weighed at birth with 2 (4%) not stated and 3 (6%) not weighed.

Prematurity and Outcome

The apgar score of one of the neonates who was a twin was not stated. The stillbirths which numbered 50 had an apgar score of 0 as according to the international WHO definition. The chi-square value of the comparison of neonatal deaths and apgar score was 127 and df 24 and was significant.
Figure 29 and 30 show that 45 (58.4%) of the babies were premature at birth and subsequently died, in comparison to 28 (57.1%) stillbirths. As a percentage this ratio is approximately equal to 1. There was no significant variation of the outcome of the pregnancy whether it was a stillbirth or neonatal death. It is also noteworthy that 12 (24.4%) of the babies who were stillbirths were full term, in comparison to 18 (23.3%) of the babies who were neonatal deaths.

Figure 31 shows that 74 (58%) of the mothers delivered during the gestational weeks of 28-37 weeks, 30 (24%) between the 37-40 weeks and 3 (2%) mothers delivered were over the 40th gestational week.

**Artificial Heat Used After Birth**

Figure 32 illustrates that 62 (49%) of babies had artificial heat used after birth while only 9 (7%) had no artificial heat used. This is expected since over 87% of the babies were delivered in a health facility. This was not applicable for 50 (38%) of the babies since they had normal temperature at birth.

**Time of Death**

Figure 33 illustrates that 63 (82%) of the neonates died within early neonatal period (7 days after delivery), 10 (13%) died during the late neonatal period and the time of neonatal deaths of 4 (5%) was not stated.

**Immunization Recording**

Figure 34 illustrates that 113 (89%) of the mothers in the study did not have their immunization status recorded in the hospital charts since the old hospital charts were used while only 11 (9%) had their immunization recorded.
CAUSES OF NEONATAL DEATHS IN THE STUDY

The five leading causes of neonatal deaths from the hospitals were acute respiratory distress, bacterial sepsis of the newborn, birth asphyxia, prematurity and brain haemorrhage (subarachnoid haemorrhage) due to the trauma of the head of the foetus. Birth injuries to the liver and brain damage occurred in eleven cases (refer Figure 35).

RESUSCITATION PERFORMED AFTER DELIVERY

In response to the question as to whether resuscitation was adequately performed, 68 (53%) records revealed that the infant was dried, wrapped and suctioned at birth, as the criteria of performing good resuscitation. In 10 (7.9%) records it was not stated whether resuscitation was adequately performed (refer Figure 36).

DATA ANALYSIS

Demographic data revealed that the highest number of neonatal deaths and stillbirths were recorded at the national referral hospital, Georgetown Public Hospital Corporation and the New Amsterdam Hospital. This is in keeping with the national data since both of these hospitals attend to over 85% of the deliveries in the country. Even though the number of neonatal deaths and stillbirths were recorded by month and year, there were difficulties in obtaining the hospital charts for some of the neonatal deaths and stillbirths.

Data obtained from the research was in close correlation with the national data with a few exceptions where a lower number of neonatal deaths were found in cases of the numbers reported.

It was intended to review only the neonatal deaths at the start of the study but it was discovered in some hospitals than the stillbirths doubled the neonatal deaths, suggesting that this needed to be researched as well.

There was no proper information system for recording the stillbirths. In some hospitals this was recorded as a separate chart within the mother’s hospital chart while in another there were no charts. There is need for a system to properly record the stillbirths in all hospitals. For the neonatal deaths this was recorded in most of the hospitals except for a few. A separate chart was used to record the neonatal deaths which were found in the mother’s chart. It must be noted that the West Demerara Regional Hospital, Mackenzie Hospital and the Suddie Hospital,
all had their records properly kept and the data was found very easily. There is need for a review of the record keeping at the hospitals. And attention should be paid in ensuring that the charts are properly filled in.

The need for the immediate transition to the New Perinatal Records at all hospitals is clearly shown. All hospitals should use updated information materials that are available. The new information chart contains detailed information on the number of antenatal visits, immunization status, antenatal care received at the local health facility. By using the new charts a continuum of material, newborn and child care is ensured. At the same time all categories of workers are able to review the patient chart at every stage of the pregnancy and delivery.

The age of the mothers who delivered whether a stillbirth or a neonatal death was in the 18-35 years age group. The higher age group which was over 35 years did not have any impact on the outcome of pregnancy. This shows that neonatal deaths and stillbirths are occurring in the childbearing age and not in elderly women.

Indo-Guyanese tended to have higher stillbirths than neonatal deaths as illustrated in Figure 6. The other mixed and Afro-Guyanese categories showed a lower level of stillbirths but more neonatal deaths. One mother of mixed ethnicity delivered twins, one was a neonatal death while the other was a stillbirth. This data needs to be further studied to determine the causes since this did not represent an area but five regions of the country.

The educational level of the mothers in the study revealed that 26 (20%) of the mothers had secondary education (refer Figure 5), 24 (19%) of the mothers had primary while for 75 (59%) of the mothers this was not stated as the perinatal charts were used to record data. There was no significant variation in the educational level of the mother since the ratio of primary to secondary education was 1 to 1.

Among the demographic factors, only the ethnicity showed scientifically significance on the outcome of the pregnancy. Location of neonatal deaths and stillbirths were skewed since these are the referral hospitals and it is expected that the majority of deaths would occur there.

Proper hygiene and aseptic techniques during delivery and postnatal care is vitally important for the neonate to survive beyond the critical 28 days period, bacterial sepsis of the newborn accounted for 16 of the neonates. This research has also shown that respiratory distress and birth asphyxia still remain the leading cause of neonatal deaths as it occurs internationally. According to the literature review, the top three leading causes of neonatal death in Latin America and the Caribbean region for 2004 include infections (32%), asphyxia (29%) and prematurity (24%).

There is need for better resuscitation techniques during the intranatal phase of delivery. Facilities also need to be better provided with equipment and supplies to deal with the respiratory complications of the neonates. This is coupled with the fact that 88% of the neonates in the study had an appgar score of less than 10 minutes and 63 (50%) of the neonates died within the early neonatal period that is within 7 days of life.

The first seven days of life in a neonate is the most critical period when they try to cope with new surroundings and the ability to breathe on their own, thus the health personnel must be effective in ensuring that the neonate is given the best care during this period.

**Antenatal Care**

The World Health Organisation has outlined a four prenatal visit package of care that will reduce the incidence of neonatal deaths and stillbirths in the country. Over the last 10 years there had been tremendous efforts by the technical staff to ensure that the package of care is available. The New Perinatal Chart which was introduced in late 2007 seeks to single out the indicator of antenatal visits. The number of antenatal visits can be recorded with the various other parameters. Even though the data showed that 35% of the mothers had more than 4 antenatal visits in the study, this cannot be taken as a true reflection of the antenatal care since this old antenatal chart was used in 98% of the cases. There is a need to rapidly implement the new perinatal information system.

Other prerequisites for good antenatal services are the taking of laboratory specimens including HIV testing of the mothers. Laboratory screening of the antenatal mothers are done twice during pregnancy for all the routine tests such as Haemoglobin (Hb), Sickle Cell test, RH factor, Blood Group and HIV (this is optional and not mandatory). Fifty two (40%) of the mothers had normal haemoglobin levels in the study and were not anaemic. The mothers who were considered anaemic, that is with an Hb level 7-10.99 g/dl were 47 (37%) and severe anaemia 2 (1.6%). Thirty seven percent of mothers were anaemic during pregnancy and more efforts should be concentrated in ensuring that they comply with their iron and folic supplementation during pregnancy. A good haemoglobin level during pregnancy ensures the pregnant women to better deal with the complications of pregnancy and prevents post partum haemorrhage which is the leading factor in Guyana’s maternal mortality over the last five years.

Anaemia is associated with maternal malnutrition, “small for dates” babies (less than 2,500 grams at birth) and to some extent prematurity. The fact that 54% of the babies had a birth weight of less than 2,500 grams could have been associated with anaemia in pregnancy. This also depends on the socio-economic, ethnic and cultural diversity. When this was compared with the ethnic grouping, it was found that 20 Afro-Guyanese had Hb levels less than 11 g/dl, more than any other group. This factor needs to be further researched in other studies.

Cross tabulation of regions illustrated that the rural areas had lower Hb levels than Region 4 (Georgetown). This is probably because the larger sample size came from the national referral
The majority of mothers who had severe anaemia were from Regions 2 and 6.

Iron and folic supplementation is very important during antenatal care and has been part of the package of care as recommended by WHO and UNICEF for antenatal mothers in Guyana since the earlier 1980s. As a matter of fact, the use of sprinkles (iron supplement for pregnant women) has been tried as a pilot nutrition project in some health facilities. The fact that 20.5% of the mothers did not have their HB stated could have been because HB test were not being done or the results were not available at the time.

Roundworms or any worms infestation is a cause of anaemia in pregnancy. The fact that one of the mothers whose baby died had roundworm infestation and a true knot might have been a contributing factor to the pregnancy outcome even though the percentage was low. Guyana, unlike the rest of the Caribbean countries has added helminths treatment in the second trimester of pregnancy to alleviate this problem.

As mentioned previously, screening for HIV during pregnancy is part of the Department of Maternal and Child Health mandate as it seeks to promote child survival and prevent HIV transmission from mother to child. HIV testing is a part of a routine screening which is offered voluntarily to the mother during antenatal care. Only 3 (2.4%) mothers were positive for HIV during pregnancy. This data more or less corresponds to international statistics. HIV counselling and testing services has formed part of Guyana’s antenatal services since 2001.

Parity of the mother had no direct relationship to the outcome of whether the outcome was a stillbirth or neonatal death. Forty seven mothers (37%) had one previous child while only 12 mothers were grand multiparous, who had over 5 pregnancies.

High blood pressure during pregnancy is known to be associated with poor pregnancy outcomes such as neonatal deaths and stillbirths. Nineteen (37%) mothers had blood pressure > 140/100 mm hgl and 5 (10%) had blood pressure greater than 130/90 mmhg (refer Figure 12). Thus could have been the attributing cause for the stillbirths and neonatal deaths.

Only a small percentage of the mothers in the study had diabetes in pregnancy 8 (6%). Of these eight mothers, 6 pregnancy outcomes were stillbirths in comparison to 2 neonatal deaths. There were more stillbirths born to mothers who were diabetic in comparison to the mothers who delivered babies. Even though this number was small, this was significant at a chi-square value of 36.7839, df 6.

In reviewing the section on antenatal care as it relates to neonatal outcomes and the WHO pre-packaged four antenatal visits, it can be seen that the programme has introduced the WHO and UNICEF guidelines. However, the focus should be concentrated on improving the weak areas.

**Intranatal Care**

The question asked on reviewing of the intranatal care data is “If there was over 87% of highly trained midwifery staff according to the data why did the stillbirths in most of the regions outnumber the neonatal deaths?” According to previous research highly trained staff are known to reduce the incidence of deaths and sickness in neonates and stillbirths. Not only was there highly trained staff but the mothers delivered at a comprehensive level of obstetric care services in the hospital while only 1.6% delivered at home. In spite of highly trained staff and according to the data the leading causes of death were birth asphyxia, respiratory distress, and birth injuries during delivery and sepsis. These causes point to the fact of quality of care. Even though the research did not attempt to address the issue of adequate staffing at these hospitals, this factor should also be looked at in further studies. Shortage of staff even though they are highly trained, can contribute to poor quality of care by decreasing the patient to health worker ratio according to international standards of care.

Guyana has made great efforts in following the WHO and UNICEF recommended guidelines of intranatal care by introducing safe motherhood strategy at the primary health care levels, thus seeking to build the bridge between primary and secondary care obstetric and paediatric services. Organised emergency obstetric care for nurses and other health workers, ensured that active management of labour is adhered to during the third stage of labour, the use of the partogram during labour is implemented and emergency care for the neonates is provided. The issue of delayed clamping of the umbilical cord should be reinforced in all the hospitals. There is also need for more intensive care neonatal units at the hospitals since only one exists at the national referral hospital.

A previous situational analysis conducted by PAHO at GPHC and New Amsterdam Hospital in 2005 revealed that the rate of LSCS was lower than the acceptable rate of 15%. In this study the rate of LSCS was also in keeping with previous research at 9.4%. However, Breech delivery was the second leading type of delivery with 6.3%. The researcher did not attempt to verify if this had any direct relationship to the outcome of the pregnancy.

According to the data, the leading causes of neonatal deaths / stillbirths in the mothers are pregnancy induced hypertension or hypertension in pregnancy and bleeding during pregnancy (Antepartum Haemorrhage). In Guyana over the last 5 years hypertension during pregnancy has been the leading cause of death not only of the neonate but the mother as well. More aggressive treatment and adherence to protocols of care needs to be done at hospitals and also at the primary health care level.

Premature rupture of the membranes before delivery over 1 week without the use of antibiotics is known to be associated with bacterial sepsis of the newborn and early neonatal deaths. The fact that two mothers in the study had rupture of the membranes over one week and did not have
any antibiotics according to the data could have been attributed to either the neonatal deaths or stillbirths. Eighty percent of the neonates died within the first seven days according to the research. This is in keeping with international statistics.

Prevention of infection is the key to decrease the mortality and morbidity of neonates. One of the leading causes of neonatal deaths was bacterial sepsis of the newborn according to the data and this could have been prevented with the use of antibiotics and aseptic techniques at the appropriate time. The most common antibiotics given were Amoxil and Flagyl for the purpose of the premature rupture of the membranes.

Prolonged labour according to the data was more frequent in stillbirths than neonatal deaths. Good monitoring of the partogram by the nurses during labour for pregnant women aids in recognition of the signs of maternal and foetal distress so that quick action can be taken. The need to rapidly role out the new information system is seen more in the light of good monitoring during labour.

**Immediate Postnatal Period**

Postnatal care is the care given from delivery of the baby up to 6 weeks. The immediate postpartum period is the time up to four hours after delivery. This includes the weighing of the neonates, immunizations, keeping them warm, observations for any danger signs and assessment of the Apgar scores. The majority of the babies in the study had a birth weight of less than 2.500 grams. This is noteworthy and in keeping with previous research that babies with a birth weight of over 2.500 grams tend to have a better chance of survival. Babies who were born with a low birth weight develop a number of complications and died within the first seven days of life as revealed in this research. Eighty two percent of the neonates died within the early neonatal period while 10 (13%) died during the late neonatal period. Low birth weight predisposes the neonate to respiratory complications since their lungs lack adequate surfactant to deal with the respiratory needs. Low birth weight and prematurity also predispose the infant to sepsis during the first weeks of life. The causes and findings of this study directly correspond to previous researches in this field of neonatal deaths.

The five leading causes of neonatal deaths from the hospitals were acute respiratory distress, bacterial sepsis of the newborn, birth asphyxia, prematurity and brain haemorrhage (subarachnoid haemorrhage due to the trauma of the head of the foetus). Birth injuries to the liver and brain damage occurred in eleven cases (refer Figure 35). These leading causes of death clearly illustrated deficiencies in quality of care during the intranatal period since 87% of the persons were delivered by a trained health professional (doctor, nurse or medex) while only 2% of the deliveries occurred at home. The fact that birth injuries during delivery e.g. brain damage and liver damage occurred in 12 babies, illustrates that techniques during delivery need to be improved immediately. All aspects of the obstetric and paediatric care which promote good quality should be addressed, such as the number of human resources at the time of delivery, the ratio of deliveries to health personnel, the time and date, the number of specialists on duty, responding to calls promptly and the equipment and supplies used during the emergency response. A situational analysis of these issues would certainly improve the quality of care since as the research revealed 87% of stillbirths and neonatal deaths were delivered by highly trained personnel.

The question one might then ask is “What can be done to improve the quality of care at our health institutions?” The answer to this question revolves around a functioning health system with all the necessary resources, supplies, policies and the will and purpose of our health personnel to attain the best health for all before the end of the 21st century. Standards of resuscitation techniques need to be reinforced at the hospitals. Special neonatal intensive care facilities are needed at all the hospitals, not just the national referral hospitals as well as the availability of highly trained neonatal staff which include doctors and nurses. Clinical audit of neonatal conditions should form the basis of the monitoring and evaluation of every hospital in our country.

The health workers must be congratulated for following protocols of postnatal care as 90% of the stillbirths were weighed at birth. However, what was not explained was why babies with a larger birth weight were born as stillbirths against neonatal deaths.

Infants with Apgar score of over 10 minutes at birth are able to survive in the neonatal period. However, in this study 88% of the neonates who died had an Apgar score of less than 10 minutes. The stillbirths had an Apgar score of 0 at birth in keeping with international standards.

WHO has illustrated that early neonatal deaths contribute to 50% of the infant mortality rate in our countries. Data reviewed showed that 82% of our neonates died within the first seven days.

Premature babies (28 weeks to the 37 weeks) have a lower chance of survival than babies who are born over 37 weeks. Data reviewed that more neonatal deaths than stillbirth were premature. As seen earlier the stillbirths had a higher birth weight and were fresh stillbirths, indicating the need for further study.

Artificial heat was used for 49% neonates according to the data in the study. The type of heat used was the incubator. Recording of the BCG vaccine after delivery was absent in 89% of the mothers since the old chart was used to obtain this information. This is not a true reflection of the level of BCG immunization coverage.
RECOMMENDED FOR THE COUNTRY LEVEL (GUYANA) ACTIVITIES BASED ON WHO MORTALITY SCENARIO

Mortality Settings
NMR is between 15 - 19

The neonatal mortality recommendations from WHO for countries are stated below. These were used to determine the level of the country and the need for more activities at the country level. Some specific recommendations based on the findings of the study were also addressed.

IMMEDIATE STRATEGIES (2009 – 2013)

<table>
<thead>
<tr>
<th>WHO Recommendations</th>
<th>Study Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health Information System</strong> Utilize the Perinatal Information System for recording of obstetric and neonatal information. (WHO has patterns of hospital charts that are being used that can be adapted to the country). Training on health information is essential.</td>
<td>Guyana has already started the use of the Perinatal Obstetric hospital records for maternity cases, but not the neonatal charts. Currently, all of the five hospitals in the study are using the Perinatal charts. However, this needs to be strengthened since not all the data is being recorded. At the time of the study the old charts were used. The use of the partograph during labour still needs to be reinforced at all levels, since this will identify emergencies during labour. There is need to adapt the WHO neonatal chart for the hospitals that would record neonatal data and stillbirths with all the relevant information. All neonatal deaths recording should be coded with the mother’s delivery chart, so in the event that the chart is needed for further reference it can be found easily. A register should be made of the neonatal and stillbirths on the labour ward with the register number being the same as that of the mother’s chart. (Good example is Mackenzie Hospital and West Demerara Hospital). On mothers discharge from the ward, the neonatal and stillbirth chart should be placed in the mother’s chart and sent to the records department. This neonatal/stillbirth record should be entered separately in records in a log book and filled according to month and year. Training should be done for the clerks and the nurses in the maternity wards on the use of the charts and definitions of care. Hospitals should review the number of stillbirths and neonatal deaths on a monthly basis and seek ways to decrease the numbers.</td>
</tr>
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OVER 90% OF THE ANTE-NATAL, INTRA-NATAL AND POST-NATAL CARES ARE CONDUCTED IN THE MAIN HOSPITALS. THE PRINCIPLES OF CARE ARE BASED ON THE WHO SAFE-MOTHERHOOD PACKAGE. THE FOUR PRONE PACKAGE OF ANTE-NATAL CARE SEeks TO PROMOTE EARLY VISITS, LABORATORY TESTS, SCREENING FOR ANAEMIA AND HIV, THE USE OF IRON, SPRINKLES AND FOLIC ACIDS DURING PREGNANCY. GUYANA HAD IMPLEMENTED THIS WHO PACKAGE BUT WHAT NEEDS TO BE DONE IS FURTHER REINFORCEMENT. GUYANA, UNLIKE ANY OTHER CARIBBEAN COUNTRY HAS ALSO IMPLEMENTED ANTI-HELMINTHES TREATMENT DURING PREGNANCY TO COMBAT ANAEMIA PROBLEMS.

IMPROVEMENT IN HEALTH SERVICES BASED ON THE DATA IN THE STUDY IS NEEDED IN THE AREA OF TIMELY HB RESULTS SINCE SOME OF THE RESULTS WERE NOT KNOWN AND MORE COMPLIANCE IS NEEDED AS IT RELATES TO THE USE OF IRON AND FOLIC ACID SINCE MOTHERS WERE ANAEMIC.

SPECIAL ATTENTION MUST ALSO BE PLACED ON THE NUTRITION EDUCATION OF ANTE-NATAL MOTHERS STRESSING THE USE OF APPROPRIATE IRON RICH FOODS WHICH WOULD ENHANCE THEIR HB LEVELS.
## Clinical

Attain full coverage with skilled attendance, targeting un-reached populations; ensure emergency obstetric and neonatal care at peripheral facilities; develop comprehensive obstetric and neonatal care at district hospitals; improve quality and cultural acceptability of obstetric and perinatal care.

Gayana rates well, having over 87% of the staff skilled in obstetric during this study. However, the quality of intranatal care should be addressed immediately, since the majority of neonatal deaths and stillbirths occurred in the hospitals as consistent with national and survey data.

Good MCH achievement is that the population has recognized the importance of health and are seeking care as needed since more births occur in the hospital than at home. Strengthening of the intranatal services in the hospital based on the outcome of this study is based on improving the quality of care during delivery, paying special attention to the techniques of the delivery process.

The use of mannequins to demonstrate delivery techniques on a regular basis must be encouraged on the labour wards. Training of doctors in specialist care is also important. There is currently no neonatologist in any of the hospitals. More mannequins must be bought and placed on the labour ward. As a matter of fact, an area must be set aside as a practice area in the labour ward in each hospital. This would greatly increase the skills of the trained staff.

Protocols should be adhered to as it relates to the management of complications of pregnancy for example, use of antibiotics early in premature rupture of the membranes before delivery, prevention of prolonged labour by proper monitoring of hypertension in pregnancy and ante-partum haemorrhage.

The use of the partogram during labour will assist in early identification of foetal distress. The use of delayed clamping of the umbilical cord should be implemented during delivery.

At the primary health care levels, IMCI would be done with a focus on the neonatal component. This would lead to identification of danger signs in the neonate and the assessment of high risk cases in the mother for early referral.

Availability of supplies for neonatal care and the monitoring of the fetal heart during labour are necessary. It was quite obvious that no proper monitoring of the patients is being done during labour, since most of the cases were fresh stillbirths. For developing countries, the use of the partograph can make a great impact in identification of complications during labour.

Obstetric and neonatal intensive care is only available at two of these hospitals, New Amsterdam and Georgetown Public Hospital.

## Advocacy

Develop specific policies to address neonatal care.

Family Planning Policy was done in 2007 and addresses specific policies on neonatal care.

These policies must be reinforced at all hospitals and facilities.

Video documentary of maternity and neonatal care should be provided to the general public advising them of the program and where to seek care.

## Outreach

Achieve full coverage with antenatal care targeting un-reached populations; consider introducing additional antenatal care interventions.

Antenatal care is available for 90% of the population. Outreach activities are conducted to remote areas.

Strengthening outreach activities to remote areas is vitally important and also training of the lower cadre of staff to recognize high risk conditions and prompt referrals.

## Family and Community

Continue to promote health home behaviours and care seeking.

The promotion of good home care could be reinforced using the IMCI component which included teaching the parents how to care for their children and when to return in an event of complications.
REFERENCES


APPENDIX 1: QUESTIONNAIRE FOR THE NEONATAL STUDY

Maternal and Child Health Questionnaire for Neonatal Study
July 2008

(Answers to be obtained from records)

1. Region _____________________________________________

   Health Facility_________________________________________

   Record No. ____________________________

   DEMOGRAPHIC DATA

2. Age of mother (years)
   a) <16 □
   b) 16 - 17 □
   c) 18 - 35 □
   d) more than 35 □

3. Ethnicity
   a) Afro – Guyanese □
   b) Amerindian □
   c) Indo-Guyanese □
   d) Mixed □
   e) Other (please specify) ____________________________

4. Education level of mother
   a) Primary □
   b) Secondary □
   c) Tertiary □
   d) Not stated □

5. If (d) to (4), was the old chart used?
   a) Yes □
   b) No □
   c) NA □
6. State parity of mother?
   a) 1 or less  □
   b) >1 – 4  □
   c) 5 or more  □

7. Was immunization status recorded?
   a) Yes □
   b) No □
   c) NA □

8. If Yes to (7), was mother adequately immunized against Tetanus and Diphtheria?
   (Received 2 doses in pregnancy, had 5 doses before pregnancies, etc.)
   a) Yes □
   b) No □
   c) Not stated □

9. If b and c to (8), was the old chart used?
   a) Yes □
   b) No □
   c) NA □

10. Nutritional Status of mother (level of Hb)
    a) <7g/dl □
    b) 7 – 10.99g/dl □
    c) 11 gram and over □

11. Antenatal care (clinic attendance)
    a) Adequate (>4 visits) □
    b) Inadequate (<4 visits) □
    c) Not stated □

12. Screening for infectious disease (HIV)
    a) Yes □
    b) No □
    c) Not stated □

13. If Yes to (12), what was result?
    a) Positive □
    b) Negative □

14. Was mother screened for syphilis?
    a) Yes □
    b) No □
    c) Not stated □

15. If Yes to (14), what was result?
    a) RPR Positive □
    b) RPR Negative □
    c) NA □

16. Was mother diabetic?
    a) Yes □
    b) No □
    c) Not stated □

17. Was mother hypertensive before pregnancy or during pregnancy?
    a) Yes □
    a(i) State blood pressure reading on admission _______________
    b) No □
    c) Not stated □

18. Was there any complication during pregnancy?
    a) Yes □
    b) No □
    c) Not stated □

19. If Yes to (18), what was the complication? (please state)

   __________________________________________________________

20. At what time of gestation (28 to 37 weeks) did the membrane rupture?
    a) State weeks __________
    b) Not stated □
21. Was antibiotics given?  

Please state (specify) ________________________________

22. How long was the membrane ruptured before delivery?  
   a) Just around or before delivery □
   b) < or = 1 week □
   c) > 1 week □
   d) 2 weeks □
   e) >2 weeks □
   f) Not stated □

23. Was antibiotics given?  

Please state (specify) ________________________________

24. Who attended to mother at birth?  
   a) Qualified professional (Nurse, Midwife, Doctor, Medex) □
   b) Other (specify) ____________________________________

25. Was labour prolonged (>24 hours)?  
   a) Yes □
   b) No □
   c) Not stated □

26. Was delivery normal?  
   a) Yes □
   b) No □

27. If No to (26), what type of delivery was it?  
   a) Breech □
   b) Foot □
   c) Hand □
   d) Shoulder □
   e) Other (please state) ________________________________
   f) NA □

28. Was caesarean section done?  
   a) Yes □
   b) No □
   c) NA □

POSTNATAL

29. Was baby born alive?  
   a) Yes □
   b) Stillbirth □

29.1 If stillbirth was ticked, was the stillbirth weighed at birth?  
   a) Yes □
   b) No □
   c) NA □

If Yes to (29.1) write the stillbirth weight ____________________

30. If Yes to (29), what was the APGAR score of infant after 5 minutes?  

___________________________________________________

31. Was baby preterm greater than or equal to 28 weeks but before 37 weeks?  
   a) Yes □
   a) (i) State gestation weeks ___________________________
   b) No □
   c) Not stated □

32. What was baby’s weight at birth? State weight _____________
   a) <1500g □
   b) 1500 – 2500g □
   c) >2500g □

33. Was resuscitation adequately performed (skin dried, nostrils cleared or suction, infant kept warm)?  
   a) Yes □
   b) No □
   c) Not stated □
34. Was artificial source of heat used on infant?
   a) Yes □
   b) No □

35. If Yes to (33), what source was used?
   a) Lamp □
   b) Incubator □
   c) Other (specify) ____________________________________________

36. Was baby breastfed after birth?
   a) Yes □
   b) No □
   c) If No, (state reasons) _______________________________________

37. When did baby die?
   a) Within 7 days of birth □
   b) Between 7 and 28 days of birth □
   c) Not stated □

38. What was the cause of death? (specify) __________________________

39. Was the baby given BCG vaccines after birth?
   a) Yes □
   b) No □
   c) Not stated □