Perinatal Death Review in Health Facilities Supported by USAID/Uganda Private Health Sector Support Program

Analytic Report January to March 2017

Subcontract # 4717-2017-FFP-020

Under Cardno Emerging Markets USA, Ltd. Prime Contract
USAID/Uganda Private Health Support Program

Contract No. AID-617-C-13-00005

PIBA CONSULT LIMITED
P.O. Box 37217, Kampala
pibaconsult@gmail.com/mp@pibaconsult.org
September 2017

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This activity was made possible with funding from USAID/Uganda Private Health Sector Support Program. PIBA Consult Limited greatly acknowledges this generous support towards the improvement of the quality of perinatal health care in private health facilities in Uganda.

This activity would not have been possible without the permission of the management of the hospitals and health centres mentioned in this report. Their approval of the activity created a friendly and no-blame environment during the audit process. In the same vein, the health facility teams were extremely supportive and open in discussions of perinatal deaths, systems and process of care within the health facilities and communities. This has tremendously enriched the findings and strengthened the integrity of the report. The willingness to unlearn old practices, acquire new skills and knowledge demonstrated their commitment to quality improvement. We are greatly indebted to them.

Finally, PIBA consult limited acknowledges the humanitarian contribution of all the private health facilities mentioned here in providing maternal and new-born health services to the population of Uganda. It is indeed a laudable and priceless contribution.

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Virus
AMTSL	Active Management of Third Stage of Labor
ANC	Antenatal Care
APH	Antepartum haemorrhage
BABIES	Birth Weight and Age at death Boxes for an Intervention and Evaluation
BEmONC	Basic Emergency Obstetric and New born Care
C/S	Caesarean Section
CEmONC	Comprehensive Emergency Obstetric and New born Care
HC	Health Centre
HIV	Human Immune deficiency Virus
HMIS	Health Management Information System
IPT1	Intermittent Presumptive Treatment (First dose)
IPT2	Intermittent Presumptive Treatment (Second dose)
IPT3	Intermittent Presumptive Treatment (Third dose)
ITN	Insecticide Treated Nets
MMR	Maternal Mortality Ratio
MNCH	Maternal New-born and Child Health
MPDRC	Maternal and Perinatal Death Review Committee
PDSA	Plan, Do, Study and Act
PFP	Private for Profit
PNFP	Private not For Profit
STI	Sexually transmitted infections
TT1	Tetanus Toxoid Vaccine (First dose)
TT2	Tetanus Toxoid Vaccine (Second dose)
TT3	Tetanus Toxoid Vaccine (Third dose)
UDHS	Uganda Demographic and Health Survey
UPHS	Uganda Private Health Support Program
USAID	United States Agency for International Development
UTI	Urinary Tract Infections
WHO	World Health Organization

GLOSSARY OF TERMS

Perinatal death: A perinatal death is a fetal death (stillbirth) or an early neonatal death

Stillbirth: This is death prior to the complete expulsion or extraction from its mother of a foetus/baby of 1000 grams or 28 weeks gestation; the death is indicated by the fact that after such separation the foetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles

Early neonatal deaths: These are deaths occurring during the first seven days of life

Live birth: is the complete expulsion or extraction from its mother of a foetus/baby of 1000 grams or 28 weeks gestation (in the case of Uganda); which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each foetus/ baby of such a birth is considered live born.

The perinatal period: This commences at 28 completed weeks of gestation and ends seven completed days after birth.

Confidential Inquiry:

In Confidential inquiry, the review is carried out by a group of appointed Independent assessors who will use the same audit guidelines to review selected maternal and perinatal deaths (even if these have already been reviewed by the Facility audit team**.**

Maternal death:

The International Classification of Diseases (ICD 10) defines a maternal death as:

"*The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes"*

EXECUTIVE SUMMARY

INTRODUCTION AND BACK GROUND

Introduction

Although Uganda has registered a remarkable increase in institutional deliveries in the last decade (UDHS 2016), the perinatal health status indictors such as perinatal morality, neonatal mortality and maternal mortality have either stagnated or registered suboptimal improvements. Maternal and perinatal deaths are still a significant service delivery and public health problem. Over half of the total newborn deaths occur during the first week of life. These deaths occur mainly in the first 24 hours of life, which strongly points to sub-optimal intrapartum care. An analysis and understanding of the bottle necks to providing optimum intrapartum is a critical first step in improving perinatal health outcomes.

Background

In the period January to March 2017, 22 out of 71 facilities supported by the USAID/Uganda Private Sector Support Program (UPHS) reported a total of 203 perinatal deaths. The Program planned to conduct audits of the perinatal deaths to identify the underlying risk factors/causes, so as to institute appropriate interventions to avert further deaths due to similar causes. None of the 71 facilities reported a maternal death. It is upon this background that PIBA Consult Limited was contracted to carry out perinatal death review and institute appropriate facility specific interventions.

Perinatal death review objectives

To conduct perinatal death review audit and integrate audit as routine instrument for quality improvement in 22 private health facilities in Uganda. Specifically, the activity was set out to identify/validate reported perinatal deaths in the period January to March 2017. Additionally, it was meant to describe the underlying causes of death and build capacity to provide quality perinatal health interventions and newborn services in 22 private health facilities supported by UPHS.

METHODS/PERINATAL DEATH AUDIT IMPLEMENTATION

The Audit involved a facility based perinatal death review using the Ministry of Health perinatal death review form (HMIS 010b). The core components of this activity included:

- The identification and validation of stillbirths and neonatal deaths reported by the facilities in the review period.
- Identification of any unreported maternal deaths in the private facilities in the review period.
- Systematic audit, review and in depth root cause analysis of perinatal deaths identified in the review period of January to March 2017. The audit took the approach of the classic six-step mortality audit cycle recommended by the world health organization.
- Formation of perinatal death review committees and mentorship/capacity building on perinatal health quality improvement. This focused on techniques (knowledge & skills), systems and processes that foster good perinatal health outcomes such as: helping

babies breath plus (HBB+) techniques, partograph use, helping mothers survive, and other perinatal health analysis tools such as the BABIES matrix.

RESULTS

Identification and validation of perinatal deaths

A total of 157 cases were reviewed in 21 health facilities. No perinatal deaths were identified in three of the 21 health facilities in the review period. Access to case files and records were denied in one facility (Mengo Hospital) despite frantic efforts to obtain permission from the authorities. The reasons cited for denied access was the mistrust of non-staff of Mengo Hospital with records and cases files of hospital clients.

Buluba Hospital registered 2 maternal deaths during the review period. One maternal death was notified and audited. The other was neither notified nor audited. St. Ambrose Charity health centre IV also registered 1 maternal death which had been notified and audited on time.

Audit/Review of the perinatal deaths

Characteristics of the mothers

The mean age of the mothers was 26 (standard deviation 6.3). The youngest mother was 17 years old. Over half (52%) of the mothers/neonates were referred from other health facilities. Lower level health centres contributed the highest burden of referrals (89%).

Only 18 (11.46%) of the mothers were primigravida. More than three quarters (82.17%) were multiparous women. More than three quarters of the women had singleton pregnancies. The mean number of children the women had given birth to (carried to 28 weeks and above) was 3 (standard deviation 2.4). Only 65 mothers had verifiable records of ANC attendance, of which 7 did not even make a single ANC visit.

Pregnancy progress and interventions during antenatal care

Of the 157 mothers, only 47 (29.9%), 35 (22.3%) and 4 (2.5%) had records of having received IPT1, IPT2 and IPT3 respectively. Similarly, only 46 (29.3%), 33 (27.4%) and 3 (1.9%) had records of having received TT1, TT2 and TT3 respectively. Of the 157 mothers, 77 had evidence of HIV testing. Of the 77, 8 (10.4%) were found HIV positive and 5 had evidence of being on antiretroviral treatment (ART).

Malaria, urinary tract infections and antepartum haemorrhage, multiple pregnancy and anaemia in pregnancy were the commonest pregnancy complications present among these cohort.

Labour and Delivery characteristics and interventions

The mean gestational age at delivery was 36 (standard deviation 3.6). The highest gestational age among this cohort was 43. A significant number of mothers (42%) were seen during labour with absent foetal heart at admission. This points to suboptimal care provided during antenatal care and 12 hours before delivery depending on the type of intrapartum still birth.

A significant proportion of the childbirths were pre-term (35.3%). More than 90% of the deliveries were conducted within a health care facility setting. Partograph use was noted as a challenge. In 35 of the deliveries monitored using a partograph, 9 of the partographs were incorrectly used (incorrect documentation). This has implications on decisions and interventions in the intrapartum period. Of the perinatal deaths 38.2% were after caesarean deliveries. The commonest reasons for caesarean section were obstructed labour with foetal distress and ruptured uterus. Other less common reasons were antepartum haemorrhage and hypertensive disorders of pregnancy (pre-eclampsia and eclampsia).

Of the 52 neonates whose fetal heart were present during labor and delivery, neonatal resuscitation was conducted in 36. Suction and stimulation was the commonest method of resuscitation performed in 35 of the babies. The use of a bag and mask (24) and oxygen therapy (16) for resuscitation were prevalent as well in the facilities.

The mean weight of the babies was 2652.6 grams (standard deviation 861grams). A high number of deaths was registered among babies with normal weight [85, (54%)].There were more males than females among the perinatal deaths, however, this data could be influenced by the high proportion of unclassified sex (25%) of the infants at birth among this cohort.

Causes of perinatal death

Probable cause of death

The two leading causes of perinatal deaths in the 157 cases reviewed were intrapartum birth asphyxia and neonatal septicaemia. Intrapartum birth asphyxia was assigned in 97 (61.8%) of the cases. Other less common but prevalent causes include prematurity complications and congenital abnormalities. The commonest prematurity complications registered were hypothermia, difficulty feeding and difficulty breathing. One other notable cause of perinatal death assigned under others was maternal infections, especially malaria and urinary tract infections.

Modifiable/Avoidable factors

The commonest avoidable factor/missed opportunity has been delay by the individual mothers to seek appropriate health care (49) and delay by the mothers to reach a health facility which would provide appropriate interventions (30). Other prevalent modifiable factors were inappropriate interventions provided to pregnant mothers (35) and misdiagnosis of pregnancy and labour/delivery condition/complications (25).

Capacity building for quality improvement

Mentorship and formation of perinatal death review committees

A total of 145 health workers were trained, coached and mentored on various low cost and evidence based high impact interventions. These included Helping Babies Breath plus, partograph use & Active Management of Third Stage of Labour. The health workers were

constituted into ad hoc perinatal death review committees and taken through the classic process of perinatal death review.

New-born resuscitation training and demonstrations were done in the health facilities. The BABIES matrix methodology was applied in all facilities as a quality improvement tool. Infection control and correct use of the partogram was demonstrated in all facilities.

Best practices identified and challenges in provision of services

The coaching, mentorship, and observation/redesign of systems and process enabled the identification of best practices in the provision of maternal and child health services. Best practices were identified in some health facilities:

1. Neonatal Intensive care room in Kumi Hospital, and Kangaroo mother care integrated into postnatal care practice;
2. Neonatal intensive care unit in Kiwoko Hospital;
3. Institutionalisation of the partograph for foetal and maternal surveillance in Mengo Hospital.

Challenges

High staff attrition drained the facility of skilled and trained staff. Use of the partogram was still suboptimal in most facilities. Inadequate infection prevention measures in most facilities were noted to be contributing to the high infections. Facilities that offered advanced care (e.g. hospitals) recorded high numbers of fresh still births due to late referrals from feeder facilities.

CONCLUSION AND RECOMMENDATIONS

The findings of these review is critical for the improvement of the quality of perinatal health outcomes. Facility specific action plans with actionable areas and recommendations were developed and agreed on by all facility teams. Five recommendations were made in light of the findings: (1) the formed Maternal and Perinatal Death Review Committees (MPDRC) need to be functionalized and institutionalized; (2) there is need to strengthen health systems networks and coordination of referrals; (3) there is need to strengthen support to the private facilities; (4) findings of existing MPDR committees should inform actions taken by higher level facilities on case management in lower level facilities; and (5) infection prevention practices during labour and delivery needs to be strengthened.

1.0: INTRODUCTION AND BACK GROUND

Perinatal health status indicators in Uganda are still largely suboptimal with high levels of maternal and perinatal morbidity and mortality recorded in the last 3 demographic and health surveys. The principal perinatal health status indicators including the maternal mortality ratio (MMR), perinatal mortality rate, neonatal mortality rate, and supervised institutional deliveries have either stagnated or improved only modestly over the last two to three decades.

According to the Uganda demographic and health surveys (UDHS), supervised institutional deliveries increased from 36% in 1995, to 37% in 2000, 42% in 2006, 58% in 2011 and currently stand at 75% in 2016. This however has not had any marked effect on the neonatal mortality rate which has stagnated at about 27 deaths per 1,000 live births (UDHS 2016). About 10 to 14 years preceding the 2016 survey, the neonatal mortality rate stood at 24 deaths per 1,000 live births. Some of the key perinatal health status indicators over the last two decades are summarized in the table below:

Table 1: Trends in key perinatal health status indicators in Uganda

No.	Indicator	2000	2006	2011	2016
1	Institutional Delivery Rate: Proportion of all births occurring in health facilities over a specified time period	37%	42%	58%	75%
2	Maternal Mortality Ratio: Number of women who deliver and die in health facilities per 100,000 live births in health facilities	524	418	438	368
3	Perinatal Mortality Rate: Number of stillbirths and pre-discharge neonatal deaths (usually within the first 7 days) in health facilities per 1,000 births in health facilities	-	-	40	-
4	Stillbirth Rate: Number of stillbirths in health facilities per 1,000 births in health facilities	-	-	25	-
5	Neonatal Mortality Rate: The number of neonatal deaths per 1000 live births. A neonatal death is defined as a death during the first 28 days of life (0-27 days).	33	24	28	27

Source: UDHS 2000, 2006, 2011, 2016; WHO maternal and child health profile for Uganda 2014

We have observed an impressive increase in institutional deliveries over the past two decades, however, we have also observed that this has been inadequate to affect perinatal, neonatal and maternal mortality rates. Maternal deaths are not a rare occurrence and the numbers of perinatal deaths (still births and death during the first of life) are disheartening. Over half of the total newborn deaths occur during the first week of life and mainly in the first 24 hours of life. A considerable proportion of perinatal deaths are associated with sub-optimal obstetric care (especially care during labor and delivery). Clearly, there is need for a critical analysis and understanding of the bottle necks in

achieving optimal perinatal health outcomes in the context of the observed increase in institutional deliveries.

It is against this background that PIBA Consult with support from the USAID/Uganda Private Health Support Program (UPHS) conducted a perinatal death audit/review in 22 private health facilities in Uganda. Reviewing perinatal deaths and identification of the underlying risk factors/causes is necessary in understanding why the babies could have died. The aim of this activity was to undertake perinatal death audit and integrate audit as routine instrument for quality improvement in medical care in 22 private health facilities in Uganda. Specifically, the activity was set out to identify/validate reported perinatal deaths, describe/examine the underlying causes of death and build capacity to provide quality perinatal health interventions and newborn services in 22 private health facilities supported by UPHS.

Approaches for investigating perinatal deaths takes into account the medical causes and other factors that led to the death of a baby. A systematic review of each death can facilitate identification of social cultural issues and health systems weaknesses that contribute to death. Interventions and action plans developed as a result of this process are geared towards improving access to quality care. Actions to address the gaps and develop an effective response if implemented will consequently result in reduction in the burden of mortality and morbidity.

This report is intended for UPHS, the 22 private health facilities in Uganda and all stakeholders in improving the health and care of pregnant women and babies. This report covers the identification of perinatal deaths in 21 private health facilities in Uganda. Its main sections covers systematically the demographics of the mothers who lost babies, pre-natal and pregnancy care, and care provided during labour and delivery. The report analysis further summarizes the audit processes by pointing out probable causes of perinatal deaths and the underlying factors leading to deaths in the reported facilities. The report draws a conclusion from the findings and fronts 4 actionable albeit broad recommendations.

2.0: METHODS

2.1: Introduction

The Audit involved a facility based perinatal death review using the Ministry of Health perinatal death audit form (HMIS 010b). The core components of this activity included:

1. The identification and validation of stillbirths and neonatal deaths (within 0 – 7 days) reported by private health facilities in the review period.
2. Identification of any unreported maternal deaths in the private facilities in the review period.
3. Systematic audit, review and in depth root cause analysis of perinatal deaths identified in the review period of January to March 2017.
4. Formation of perinatal death review committees and mentorship/capacity building on perinatal health quality improvement. This focused on techniques (knowledge & skills), systems and processes that foster good perinatal health outcomes such as: helping babies' breath plus (HBB+) techniques, helping mothers survive, and other perinatal health analysis tools such as the BABIES matrix.

2.2: Setting up the committees

In all the health facilities, local in-house mortality reviews were not conducted as standard clinical practice and risk management. Perinatal death audit was institutionalised through existing maternal death review and quality improvement committees that existed in some facilities. Where none existed, the maternal and child health team were put together as a steering committee headed by the in-charge/focal person maternal and child health services in the facility.

2.3: The Audit approach

The Audit took the approach of the classic six-step mortality audit cycle recommended by the world health organization[1][2]. This is described below.

Step 1 – Identifying cases and validation of reported perinatal deaths: The consultants together with the facility based MNCH teams identified all perinatal deaths in the integrated maternity registers (HMIS 072) for the period 1st January – 31st March 2017. Records of births, still births and neonatal deaths were reviewed to validate reported perinatal deaths and identify all perinatal deaths as cases for review. Any maternal deaths identified were noted.

Step 2 - Collect information on causes of death and avoidable or modifiable factors:
All files of cases identified were reviewed. A standardized set of information was collected using the HMIS 010b. Other key issues noted were type of records in existence (paper or

[1] World Health Organization 2016**:** Making every baby count: audit and review of stillbirths and neonatal deaths. ISBN 978 92 4 151122 3

[2] Pattinson, R, Kerber, K, Waiswa, P, Day, LT, Mussell, F, Asiruddin, S, Blencowe, H & Lawn, JE 2009, 'Perinatal mortality audit: Counting, accountability, and overcoming challenges in scaling up in low-and middle-income countries', *International Journal of Gynecology & Obstetrics*, vol. 107, no. Supplement.

electronic); the quality of record keeping (e.g. completeness, accuracy); and reporting of perinatal deaths.

Step 3 – Analysis of information: The consultants working with the MNCH/ad hoc perinatal death review committee reviewed identified cases. Probable causes of death and contributing factors were identified for each death of them. The fish bone root cause analysis approach was used to identify avoidable weakness in systems and process. These have been translated into actions for improvement in the facility specific action plans.

Descriptive statistics were calculated in Excel and STATA. The factors analysed include perinatal death by age of mother, referral status, HIV status of the mother, status/type of pregnancy at admission, antenatal attendance/interventions, parity, intrapartum interventions , place of delivery, cause of death and avoidable factors as assigned by ad hoc perinatal death review committee.

Step 4 - Recommend solutions: the consultants and the facility based committees assessed the capacity of the facilities to provide quality Maternal, Perinatal and Newborn services. A standardized health facility assessment tool was used to assess availability of key human resources, clinical care guidelines, medical equipment and the 13 essential lifesaving commodities; as well as the key perinatal health indicators. A synthesis of findings from the case reviews and the preliminary findings from the facility assessment was done to identify specific, measurable, attainable, relevant, and time-bound solutions. Facility specific action plans were developed. Best practices identified in specific health facilities where they existed were documented and shared with other facilities.

Step 5: Implementing solutions
Quality improvement [3] using the Plan Do Study Act (PDSA) approach was employed during coaching and mentorship. The following formed part of the coaching and mentorship in all facilities:

1. Partogram skills mentorship and coaching - partogram use, correctness and completeness of partograph plotting was demonstrated to front line midwives and nurses.
2. Helping babies breathe plus and helping mothers survive techniques – systematic support focusing on knowledge and skills was provided on essential and extra new born care. Neonatal resuscitation was demonstrated using a Neonatalie simulator. Other essential and extra newborn care areas of focus were the warm chain (keeping baby warm using kangaroo mother care), the clean chain (infection control and cord care), and early initiation of breastfeeding. The helping mothers survive techniques focused on Active Management of Third Stage of Labor (AMTSL) for prevention of primary postpartum hemorrhage.

[3] Ministry of Health 2015, *National Health care Quality Improvement Framework 2015/2016 - 2019/20120*, Ministry of Health, Kampala

3. All facilities were supported on the use of the Birth Weight and Age at death Boxes for an Intervention and Evaluation System (BABIES) matrix methodology to show outcomes by birth weight and time of death. Where they were nonexistent, the matrix was introduced and the team supported to populate it. Where they were in use, the team was supported to utilize it to inform process and systems improvement for better perinatal outcomes.
4. Best practices in some facilities were synthesized during the perinatal death review meeting, and during the coaching and mentorship. These were then summarized in a synthesis form, shared with other facilities. These have also been included in some facility specific reports.

Step 6: Evaluate and refine – the entire approach of identification of perinatal deaths, review of cases and the support provided to the facilities have been reviewed and recommendations suggested for follow up action. Follow up to ensure sustainable audit of perinatal deaths and subsequent improvement of systems and processes by facilities are subject for future action.

3.0: RESULTS

3.1: Objective 1 – Validation and audit of perinatal deaths

This section presents the results of the perinatal death audits and answers objective 1. As stated in the inception report, this objective was to conduct perinatal death audit/review in the 22 private health facilities in Uganda. It was developed from a critical analysis of the statement of work and the problem statement provided.

3.1.1: Perinatal deaths documented in the facilities

A total of 158 cases were reviewed in 21 health facilities as described in Table 2. In the analysis, 1 case from Kumi Hospital was excluded because of grossly missing data. This report presents findings of the 157 cases. No perinatal deaths were identified in three health facilities. Access to case files and records were denied in one facility (Mengo Hospital). The reasons cited for denied access was the mistrust of non-staff with records and cases files of patients who had gone through the hospital care, especially clients with poor outcomes.

Table 2: Facilities where perinatal deaths were reviewed

Facility	Reported	Actual	Audited	Unaudited	Comment
Nyapea Hospital	15	25	17	8	Missing client files
Kuluva hospital	10	14	7	7	7 missing files
Bugambe HC III	1	1	1	0	None
Kinyara HC III	3	3	3	0	None
Toro Kahuna health Centre	9	0	0	0	None
St Ambrose health Centre	9	10	9	1	Missing files
Mengo Hospital	34	-	-	-	
Span Medical Centre	14	0	0	0	None
Kumi hospital	19	29	29	0	None
Buluba hospital	21	16	16	0	None
Metha hospital	5	1	1	0	None
Kiwoko hospital	27	26	26	0	None
Ggwattiro Hospital	2	1	1	0	1 death was an abortion
Case hospital	1	0	0	0	No perinatal death
Holly Cross Orthodox Hospital	2	2	2	0	None
Kakira hospital	2	2	2	0	
Ankole tea estate	1	1	1	0	None
Ishaka Adventist	5	8	8	0	None
Kisiizi hospital	13	16	16	0	None
Bamu hospital	4	12	12	0	None
Double Cure	2	1	1	0	One death identified
Community Health plan	4	6	6	0	None
Grand total	**203**	**174**	**158**	**16**	

Buluba Hospital had registered 2 maternal deaths during the review period. One maternal death was notified and audited. The other was neither notified nor audited. St. Ambrose Charity health centre IV also registered 1 maternal death which had been notified and audited on time. Kumi Hospital registered a death of a pregnant mother during the review period but due to accidental causes (fall from a height). This did not meet the definition of maternal death.

3.1.2: Description of the mothers who had perinatal deaths

The mean age of the mothers was 26 (standard deviation 6.3). Table 3 provides a summary of the demographic and pregnancy related characteristics of the mothers. The youngest mother among this cohort of deliveries with perinatal deaths was 17 years old. Figure 1 illustrates the age distribution of the mothers. Over half (52%) of the mothers/neonates were referred from other health facilities. Lower level health centres contributed the highest burden of referrals (89%). It is interesting to note that general hospitals were also seen to refer obstetric and new-born cases.

Table 3: Demographic and obstetric characteristics of the mothers

Characteristic	n (frequency)	Percentage
Age group of the mothers		
14 – 19	24	15.29
20 – 24	42	26.75
25 – 29	33	21.02
30 – 34	25	15.92
35 – 45	18	11.46
Missing	15	9.55
Referral status of the baby/pregnant mother		
Referred to the facility (Yes)	82	52.2
Not referred to the facility (No)	68	43.3
Missing	7	4.5
Referring facility/unit (n = 82)		
Hospital	6	7.32
Health Centre	73	89.02
Village Health Team	0	0
Traditional Birth attendant	3	3.66
Mothers parity (pregnancies carried to 28 weeks and above)		
Primigravida	18	11.46
Multiparous	129	82.2
Missing	10	6.37
Type of pregnancy		
Singleton pregnancy	139	88.53
Multiple pregnancy	11	7.01
Missing	7	4.56
Attendance of antenatal care		
Attended antenatal care (Booked)	58	36.94
Did not attend antenatal care (unbooked)	7	4.56
Missing	92	58.6

Only 18 (11.46%) of the mothers were primigravida. More than three quarters (82.17%) were multiparous women and equally more than three quarters of the women had singleton pregnancies. The mean number of children the women had given birth to (carried to 28 weeks and above) was 3 (standard deviation 2.4). Of the 65 with evident documentation, 7 did not attend antenatal care.

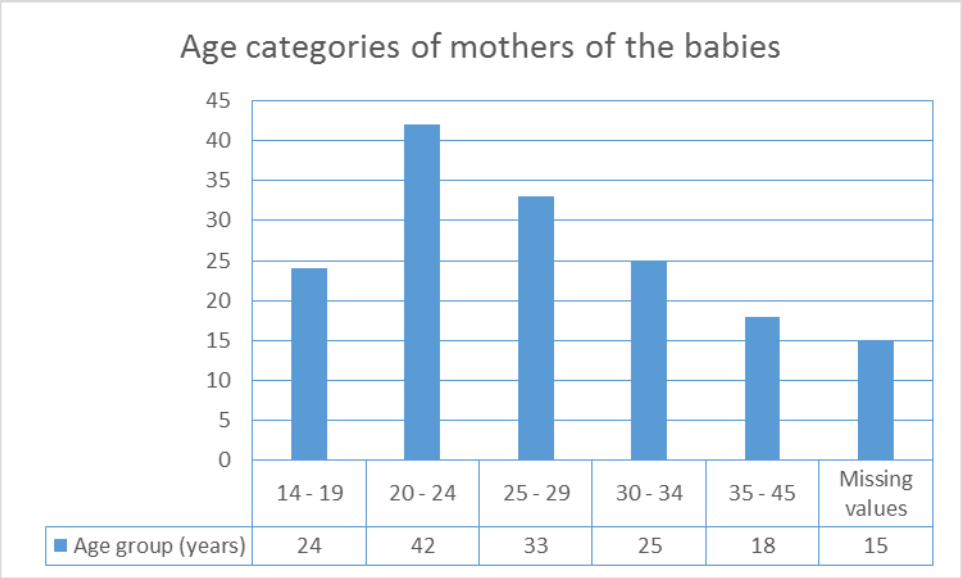

Figure 1: Age distribution of the mothers who had perinatal deaths

3.1.3: Pregnancy progress and interventions during antenatal care

Of the 157 mothers, only 47 (29.9%), 35 (22.3%) and 4 (2.5%) had records of having received IPT1, IPT2 and IPT3 respectively. Similarly, only 46 (29.3%), 33 (27.4%) and 3 (1.9%) had records of having received TT1, TT2 and TT3 respectively. Of the 157 mothers, 77 had evidence of HIV testing. A total of 8 (10.4%) were found HIV positive and only 5 had evidence of being on antiretroviral treatment (ART).

Table 4: Complications identified during the pregnancy

Characteristics/pregnancy condition	(n)frequency	Percentage
HIV test results (n = 77)		
HIV Negative	69	89.61
HIV positive	8	10.39
Syphilis testing (n = 47)		
Syphilis test done	17	36.17
Syphilis test not done	30	63.83
Pregnancy condition		
Antepartum haemorrhage	9	
Hypertension	5	
Pre-labour rupture of membranes	7	
Diabetes	1	
Anemia	7	
UTI	12	
Malaria	15	
Multiple pregnancy	8	
Breech presentation	4	
Previous C/S scars	4	

Of the 157 mothers, only 47 had complete information on syphilis testing. None of the 17 who had a syphilis test done turned out positive. Table 4 describes conditions identified as complications during pregnancy. Malaria, urinary tract infections and antepartum haemorrhage, multiple pregnancy and anaemia in pregnancy were the commonest pregnancy complications present among these cohort of mothers. These conditions have all been associated with sub-optimal perinatal outcomes.

3.1.4: Labour and Delivery interventions

The mean gestational age at delivery was 36 (standard deviation 3.6). The highest gestational age among this cohort of women was 43. Figure 2 shows categorization of gestational age in terms of presumed maturity of the foetus.

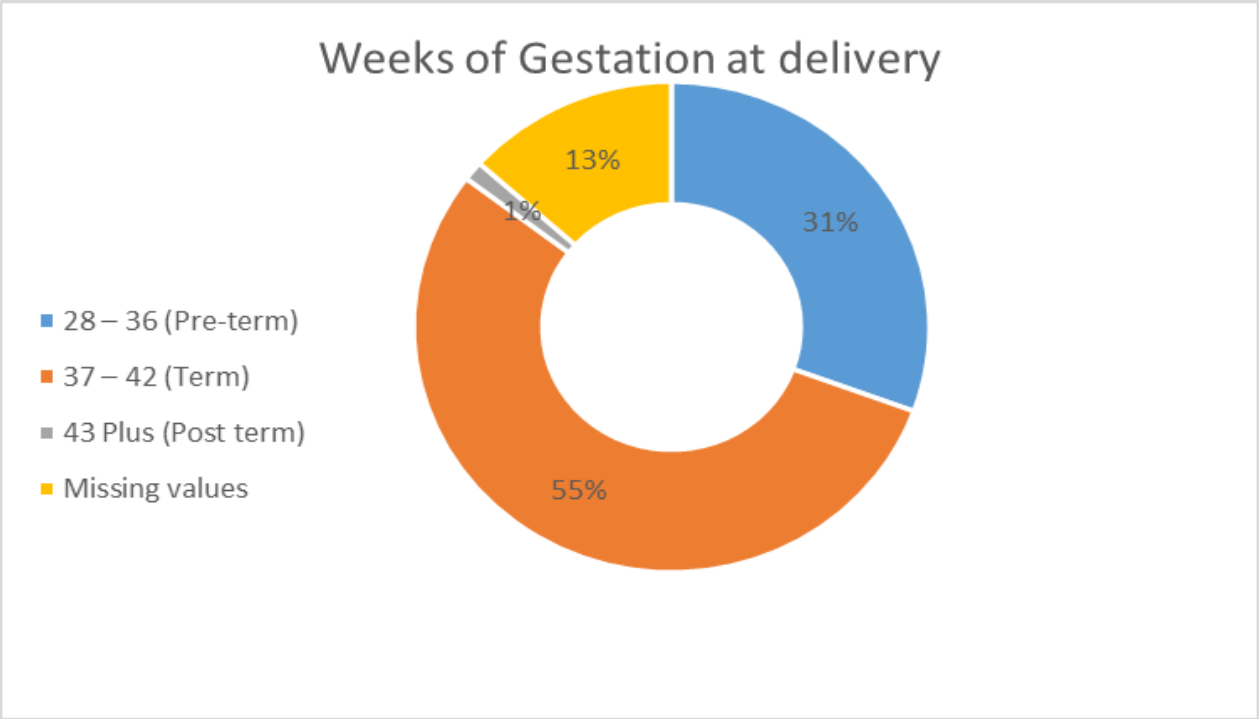

Figure 2: Gestational age at delivery of mothers who had perinatal deaths

Pre-pregnancy and prenatal care have been known to have implications on the outcomes of labour and delivery. Table 5 describes the characteristics and care provided to the mother during labour and delivery. In this cohort, a significant number of mothers (42%) were seen during labour with absent foetal hearts. This points to suboptimal care provided during antenatal care and 12 hours before delivery depending on the type of intrapartum still birth.

A significant proportion of the childbirths were pre-term (35.3%). Interestingly, more than 90% of the deliveries were conducted within a health care facility setting. Partograph use was noted as a challenge. Among 35 deliveries documented as monitored using a partograph, 9 of the partographs were incorrectly used (incorrect documentation). This has implications on decisions derived from labour monitoring using this tool. A significant proportion of the perinatal deaths resulted from mothers who had child birth operatively (either by caesarean – 38.2% or instrumental – 1.3%). The commonest reasons for

caesarean section were obstructed labour with foetal distress and ruptured uterus. Other less common reasons were antepartum haemorrhage and hypertensive disorders of pregnancy (pre-eclampsia and eclampsia).

Table 5: Intrapartum characteristics and care of the mothers/fetus

Characteristic	n(frequency)	Percentage
Weeks of gestation		
28 – 36 (Pre-term)	48	30.57
37 – 42 (Term)	86	54.78
43 Plus (Post term)	2	1.27
Missing	21	13.38
Place of delivery		
Health facility	149	93.63
Home	6	3.82
TBA	0	0
Missing	2	1.27
Presence of foetal heart sounds at admission		
Present	52	33.12
Absent	66	42.04
Not assessed	7	4.46
Missing	32	20.38
Partograph Use during labour/delivery (122)		
Used	36	29.51
Not used	69	56.56
Unknown	17	13.93
Correct use partograph (n = 35)		
Used correctly	26	74.29
Used incorrectly	9	25.71
Mode of delivery		
Normal Delivery	81	51.59
Caesarean Section	60	38.22
Vacuum or forceps	2	1.27
Others (Breech delivery)	5	3.18
Missing	9	5.73

New born resuscitation is a critical intervention to ensure adequate ventilation and hence improved chances of newborn survival at birth. Table 6 describes the conditions of the nannies during labor and delivery including newborn resuscitation provided. Of the 52 neonates whose fetal heart were present during labor and delivery, neonatal resuscitation was conducted in only 36 of the deaths. Suction and stimulation was the commonest method of resuscitation performed in 35 of the babies. The use of a bag and mask (24) and oxygen therapy (16) for resuscitation were prevalent as well in the facilities.

The mean weight of the babies was 2652.6 grams (standard deviation 861grams). Figures 3 to 4 illustrates the weight and sex distribution of the new-borns. What is striking is the high number of deaths among babies with normal weight [85, (54%)]. A significant proportion of the perinatal deaths were very low birth weight (10%) and low birth weight babies (16%). There were more males than females among the perinatal deaths, however,

this data could be influenced by the high proportion of unclassified sex (25%) of the infants at birth among this cohort.

Table 6: Immediate perinatal interventions and outcomes

Characteristic	n (frequency)	Percentage
Apgar score at 1 minute (n = 143)		
Less than 7	133	
7 and above	10	
Apgar score at 5 minutes (n = 111)		
Less than 7	95	85.59
7 and above	16	14.41
Resuscitation done at delivery (n = 98)		
Yes	36	36.73
No	62	63.27
Resuscitation done by (of 36 resuscitated)		
Doctor	11	30.56
Nurse	17	47.22
Others	1	2.78
Missing	6	1.67
Weight of the baby (grams)		
≤ 1499	15	9.55
1500 - 2499	32	20.38
≥ 2499	85	54.14
Missing	25	15.92
Sex of the baby		
Male	73	46.5
Female	45	28.7
Missing	39	24.8
Type of perinatal death		
Fresh still birth	61	38.9
Macerated still birth	41	26.1
Early neonatal death	45	28.7
Missing	10	6.4
Reasons for admissions of neonates who died		
Difficult feeding (baby)	12	
Difficult breast feeding (mother)	5	
Jaundice	4	
Anaemia	3	
Difficult breathing	39	
Hypoglycaemia	3	
Septicaemia	6	
Hypothermia	3	
Convulsions	5	
Bleeding	2	

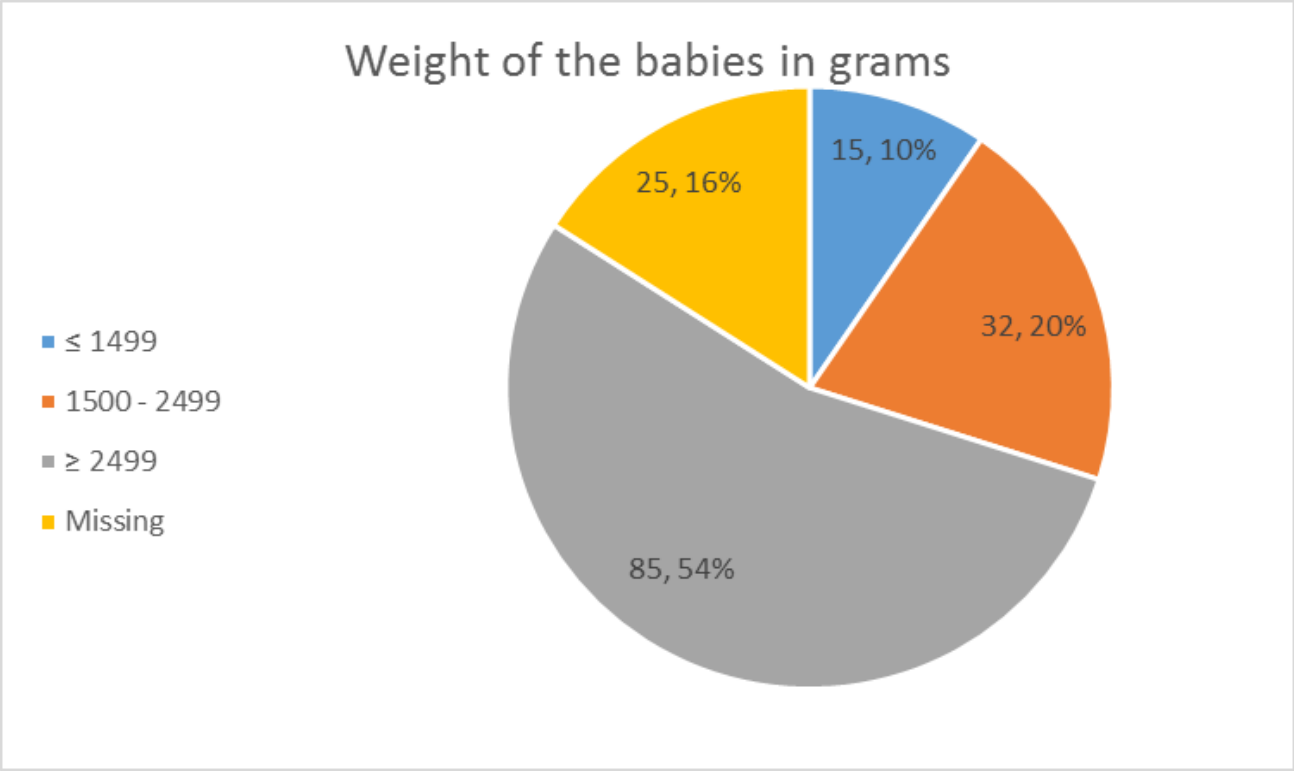

Figure 3: Weight distribution of the babies (perinatal deaths) in grams

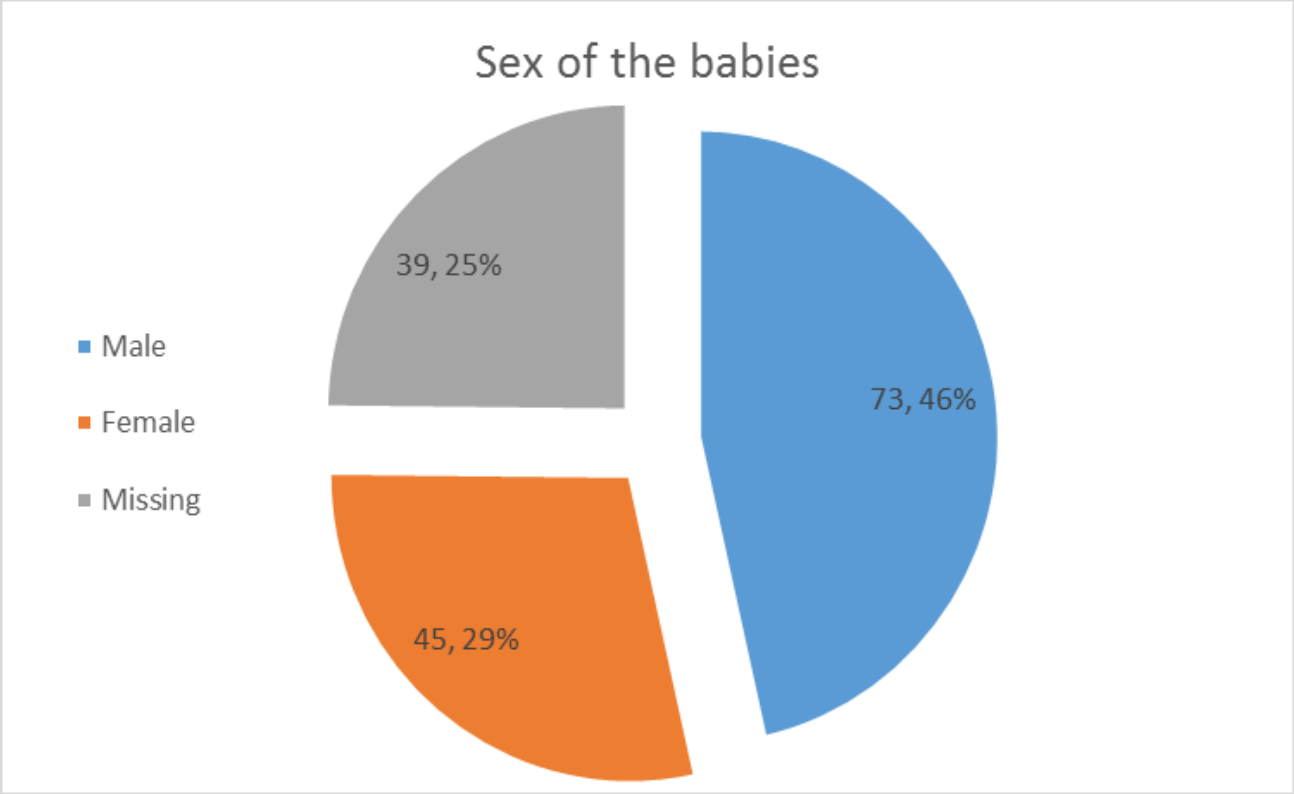

Figure 4: Sex distribution of the babies

3.2: Objective 2 Results – Causes of perinatal deaths

This section describes and answers objective 2. This was to describe/examine the underlying causes of perinatal death in 22 private health facilities in Uganda.

3.2.1: Cause of death

The types of perinatal death were almost equally distributed although there appeared to be more fresh still births. Figure 5 illustrates the distribution of perinatal deaths documented among this cohort.

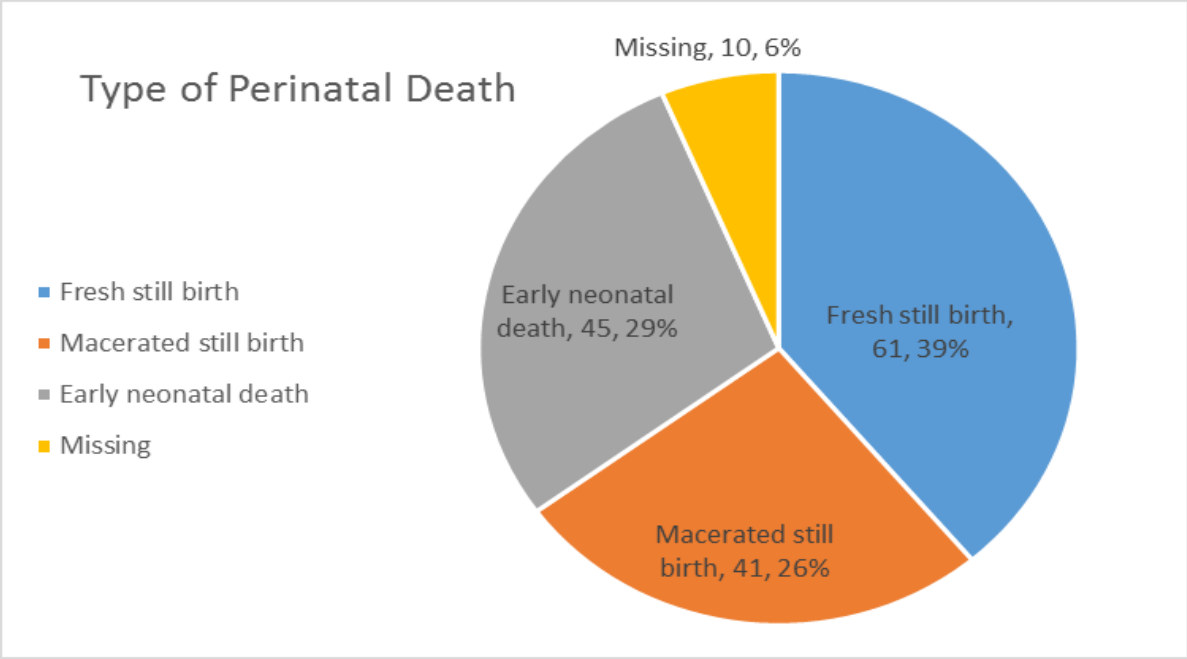

Figure 5: Pie chart showing the types of perinatal deaths identified

The commonest and probable cause of perinatal deaths assigned by the perinatal death review committee was birth asphyxia. This was assigned in 97 (61.8%) of the cases. It is noted here that majority of the mothers who had deliveries were referrals. A significant number of the mothers delivered through caesarean delivery because of obstruction and foetal distress and a significant proportion of the deliveries were from pre-term pregnancies. It is therefore not surprising that the most probable cause of death as assigned by the different ad hoc perinatal death review committees were birth asphyxia and prematurity complications. Table 7 lists the frequency of the different probable causes of perinatal deaths assigned by the ad hoc perinatal death review committees.

Table 7: Probable causes of perinatal deaths among the neonates

Probable cause of death	**Frequency**
Septicaemia	11
Birth Trauma	3
Birth Asphyxia	97
Prematurity complications	21
Congenital abnormalities	8

Prematurity complications, septicaemia and congenital abnormalities were prevalent and probable causes of perinatal deaths. The commonest prematurity complications registered were hypothermia, difficulty feeding and difficulty breathing. One other notable cause of perinatal death assigned under others was maternal infections. Malaria was the commonest noted in 17 mothers. Urinary tract infections (noted in 11 mothers) was equally prevalent pointing towards undiagnosed sexually transmitted infections. Other notable

conditions of pregnancy such as antepartum haemorrhage, preeclampsia and eclampsia were noted as probable causes of foetal deaths.

3.2.2: Modifiable/Avoidable factors

Table 8: Modifiable/avoidable factors identified during the perinatal death review

Thematic area	Underlying/avoidable factors/missed opportunities	Frequency
Family/Woman and logistical factors	Delay to seek health care	49
	Delay to reach the health facility	30
Health service and personnel related	Delay to provide care	15
	Absence of critical human resources	1
	Lack of resuscitation equipment	3
	Lack of supplies and drugs, and blood products	3
	Misdiagnosis	25
	Inappropriate intervention	35
	Others	1

Table 8 presents an analysis of some of the factors that could be modified to reduce perinatal deaths. The commonest avoidable factor/missed opportunity has been delay by the individual mothers to seek appropriate health care (49) and delay by the mothers to reach a health facility which would provide appropriate interventions (30). Other prevalent modifiable factors were inappropriate interventions provided to pregnant mothers (35) and misdiagnosis of pregnancy and labour/delivery condition/complications (25).

Delay to seek care

This delay is contributed to both by the health systems personnel and the individual mothers/families. We have noted that most mothers were held up in lower level facilities and maternity homes with no capacity to provide emergency obstetric care. Clients were often referred to high level facilities late, leading to delayed interventions. These were commonest in Kumi and Buluba Hospitals.

Delay to reach the health facility

Poor referral transport system contributed immensely to delays in reaching health facilities. The majority of the clients referred were responsible for their own transportation. This often led to delays as some would return home to organize logistical support for transportation. This prompted further delays in reaching high level facilities. Two unique cases were noted in Kumi and Kakira Hospitals. In one case a client was referred with a big baby for emergency caesarean delivery. This mother went home only to return to the same facility with an intrauterine foetal death two days later. Another instance after referral, the mother went to look for transportation, only for labour to intensify in the night and ending up in a fresh still birth.

Delay to provide care, misdiagnosis and inappropriate interventions

Health services and personnel factors that contribute to sub optimal care were the delay to provide care (15), misdiagnosis (25) and inappropriate intervention (35). Significant delays were observed often in providing emergency obstetric care services. At least 21 mothers with documentation took more than 30 minutes to receive caesarean sections from the time of decision to conduct emergency delivery. Misdiagnosis was noted as commonest among clients referred to high level facilities. Private clinics and some public health centres were not in position to diagnose poor labour progress or labour obstruction timely to allow appropriate intervention. Two instances were noted about mothers who had 2 previous caesarean section scars and were allowed to go into established labour in facilities without capacity for caesarean delivery.

3.3: Objective 3 Results - Capacity building for quality improvement

This section describes the key actions and achievements of the quality improvement coaching and mentorship provided. It answers Objective 2. The main areas of focus were trainings, coaching and mentorship on techniques such as helping babies breathe plus, infection control and other lifesaving skills.

3.3.1: Mentorship and formation of perinatal death review committees

A total of 145 health workers were trained, coached and mentored on various perinatal health quality improvement techniques. Table 9 summarizes the number of health workers mentored by health facility. Details of the health workers can be found in appendix 2. The health workers were constituted into ad hoc perinatal death committees and taken through the classic process of perinatal death review. Emphasis was placed on strengthening the completeness of data and case files to ensure accuracy of data, and completion of the perinatal death review process.

Table 9: Summary of health workers mentored on various techniques

Serial No.	Facility	Number mentored	Serial No.	Facility	Number mentored
1	Mehta Hospital	4	13	Case Hospital	11
2	Ankole Tea estate HC III	1	14	Mengo Hospital	16
3	Kumi Hospital	11	15	Span Medicare	8
4	Community Health Plan	5	16	Bugambe Tea HC III	5
5	Kisizi Hospital	9	17	Kinyara Hospital	10
6	St Francis Hospital Buluba	5	18	St Ambrose Charity HC III	7
7	Ishaka Adventist Hospital	5	19	Tooro Kahuna HC III	5
8	Kakira Hospital	4	20	Kaluva Hospital	7
9	Bamu Hospital	4	21	Nyapea Hospital	8
10	Kiwoko Hospital	7	22	Double Cure Health Centre	4
11	Ggwatiro Hospital	5	**Total**		**145**
12	Holly Cross Orthodox Hospital	4			

New-born resuscitation training and demonstrations were done in the health facilities. This focused on health workers who had limited knowledge and skills. It also helped refresh health workers who were skilled. The BABIES matrix methodology was applied in all facilities as a quality improvement tool. All health workers appreciated the significance of the tool in analysing perinatal health outcomes and designing interventions. Infection control and correct use of the partogram was demonstrated in all facilities.

3.3.2: Best practices identified and challenges in provision of services

Success stories identified

The coaching, mentorship, and observation/redesign of systems and process enabled the identification of best practices in the provision of maternal and child health services. Best practices were identified in some health facilities:

4. Neonatal Intensive care room in Kumi Hospital, and Kangaroo mother care integrated into postnatal care practice;
5. Neonatal intensive care unit in Kiwoko Hospital;
6. Institutionalisation of the partograph for foetal and maternal surveillance in Mengo Hospital.

Challenges

A number of challenges where noted that affected provision of maternal and new-born health services. High staff attrition drained the facility of skilled and trained staff. Intrapartum maternal and foetal surveillance using a partogram was still suboptimal in most facilities and led to high numbers of fresh still births. Inadequate infection prevention measures in most facilities were noted to be contributing to the high infections. Facilities that offered advanced care (e.g. hospitals) recorded high numbers of fresh still births due to late referrals from the referring (feeder) facilities.

3.3.3: Facility specific action plans and recommendations

Facility specific action plans with actionable areas, recommendations and responsible persons were agreed on and developed by all facility teams. This took in to account the findings of the perinatal death audit per facility, the BABIES matrix analysis and the reports from front line midwives and doctors during the facility. One critical quality gap that was addressed across the board was onsite training on neonatal resuscitation using the model neoenatalie. The action plans have been summarized with the facility specific reports.

4.0: DISCUSSION

The ultimate aim of any perinatal death review process is to improve the quality of intrapartum obstetric and new-born care provided in health facilities which should translate into a reduction in perinatal mortality and morbidity. This perinatal death audit has identified health system failures to prevent perinatal deaths in health facility settings. It has also generated broad actions and implemented some specific actions to correct system failures and modifiable factors that led to perinatal deaths with the aim of preventing similar deaths. It has also demonstrated the feasibility of perinatal death audit in private facilities and the need for a multidisciplinary team approach with learning/quality of care improvement (not blame) as the central pillar of the audits.

Causes of perinatal death

This review points out that the majority of the perinatal deaths were a result of birth asphyxia and septicaemia. This is similar to findings of similar publications in two regional referral hospitals[4] and Mulago Hospital[5]. Most deaths were clustered around the intrapartum and immediate postpartum period as evidenced by the high proportions of fresh still births and early neonatal deaths. Prolongation of labour and delivery as understandable through the three delays model is directly related to asphyxia at birth[6]. Interventions recommended in this review to target the prevention of birth asphyxia have thus focused on reduction of the three notable delays during labour and delivery as modifiable factors.

Infections in the new born (septicaemia) and the common prematurity complications such as difficult feeding, difficult breathing, and failure of temperature regulation were noted as probable causes of death in many of the neonates. These complications were also common causes of admissions of neonates to the postnatal wards and the neonatal intensive care units. In low resources settings with limited access to clean deliveries and emergency new born care facilities, prematurity complications and infections are bound to be prevalent[7]. Simple and low resource interventions have been suggested as recommendations including the clean chain/clean cord care and the kangaroo mother care model.

Modifiable factors and interventions

[4] Nakimuli, A., S. N. Mbalinda, et al. (2015). "Still births, neonatal deaths and neonatal near miss cases attributable to severe obstetric complications: a prospective cohort study in two referral hospitals in Uganda." BMC pediatrics **15**(1): 44.

[5] Musooko, M., O. Kakaire, et al. (2014). "Incidence and risk factors for early neonatal mortality in newborns with severe perinatal morbidity in Uganda." International Journal of Gynecology & Obstetrics **127**(2): 201-205.

[6] Kabakyenga, J. K., P.-O. Östergren, et al. (2011). "Individual and health facility factors and the risk for obstructed labour and its adverse outcomes in south-western Uganda." BMC pregnancy and childbirth **11**(1): 73

[7] Kamath, B. D., E. R. MacGuire, et al. (2011). "Neonatal mortality from respiratory distress syndrome: lessons for low-resource countries." Pediatrics **127**(6): 1139-1146.

The results of these reviews provide the necessary evidence for planning and design of interventions to improve quality of care in private facilities. The actionable recommendations suggested here complete the perinatal death review cycle. Completion of this cycle has evidently demonstrated before that simple low cost strategies which were instituted led to significant reductions in perinatal deaths[8].

Limitations

This perinatal death review in 21 health facilities is not without any limitations. Two significant limitations were noted. These are presented here with efforts made to address them.

1. Weakness in data quality – incompleteness of medical records, inability to retrieve some of the cases files may have had influence on the assignment of probable causes of perinatal deaths. This was mitigated by the triangulation of information from the integrated maternity register and verbal reports from midwives who recalled circumstances around some of the cases during delivery. Recall bias could not exclusively be verified as having been excluded.
2. Autopsies were not performed for any of the cases of perinatal deaths and all perinatal deaths were not audited in the facilities. Health workers cited time constraints especially within the 24 hours of death, unavailable client records, and being busy with other demands of health care as reasons for inability to conduct perinatal death audits. This has impact on accurate description of all the causes of deaths. However, the teams triangulated information from the integrated maternity register, client records and verbal reports from midwives/doctors who conducted the deliveries to improve the accuracy of assignment of cause of death. The causes of perinatal deaths and even avoidable factors in this report can be generalizable to perinatal deaths in other hospitals.
3. Inability to access the records of perinatal deaths at Mengo Hospital which was one of the high volume facilities in this sample (Up to 34 perinatal deaths were reported).

[8] Nakibuuka, V., P. Okong, et al. (2012). "Perinatal death audits in a peri-urban hospital in Kampala, Uganda." African health sciences **12**(4): 435-442.

5.0: CONCLUSION AND RECOMMENDATIONS

5.1: Conclusion

The findings of these reviews of perinatal deaths is critical for the improvement of the quality of perinatal health outcomes. The actions taken during the reviews and further commitment implementation of the facility specific action plans and recommendations are key to reduction of perinatal deaths observed in private health facilities. Five rather specific but broad recommendations are presented here in light of the findings from the review. Some of the actionable recommendations may go beyond the scope of the specific health facilities but are a precursor to improving systems for optimal obstetric care and hence perinatal health outcomes.

5.2: Recommendations

1. Perinatal death review committees or Maternal and Perinatal Death Review Committees (MPDRC) need to be made functional and institutionalized. The policy framework and requirements need to be made understandable by health workers and widely disseminated to health managers, supervisors and advocacy groups. Emphasis should be placed on perinatal death reviews for purposes of improvement, quality of care and accountability, and not as a blame or sanction avenue. To achieve this, there is need for ongoing support in form of mentorship and coaching to the formed Maternal and Perinatal Death Review Committees. This will strengthen monthly maternal and perinatal death review and serve institutionalise the practice of maternal and perinatal death review for quality improvement.

2. Strengthen health systems networks and coordination: Health system and leadership should be able to implement key high impact solutions to maternal and new-born morbidity and mortality. The systematic networking of health facilities and coordination of patient care through improved patient referral and transportation is one critical and high impact solution. Referral facilities (hospitals preferably) should be supported to take lead in the coordination and networking of referring facilities, including improvement of transportation and communication channels.

3. Strengthen support to the private facilities: The private facilities are not immune to the provision of suboptimal interventions during labour and delivery. There is need to improve monitoring of labour, provision of essential, extra and emergency new-born care interventions. Routine support in terms of capacity building trainings and coaching on appropriate use of a partograph, basic new-born resuscitation using helping babies breath plus techniques, helping mothers survives will significantly reduce intra-partum related maternal and perinatal deaths. Strengthened support should involve supporting high volume hospitals establish functional new-born intensive care units.

4. The MPDR findings should inform actions taken by specific facilities on case management in lower level facilities. Delay in decision making for referral, misdiagnosis and inappropriate interventions in lower level health centres impact on perinatal health

outcomes in referral facilities. This calls for capacity building support to health care workers in lower level facilities on the critical techniques during labour and delivery and decision making skills. Skills in critical assessment, obstetric evaluation of pregnant mothers and new-borns and quick action/decision making are required at the lower level health facilities.

5. Putting emphasis on infection prevention practices during labour and delivery to reduce incidences of perinatal sepsis during the perinatal period. This can be achieved through training, and ongoing mentorship/support.

6.0: APPENDIX

Appendix 1: Perinatal Death Review Consultants

1	**Dr. Odongo Musa**	Role: Profession:	Lead Consultant Public Health Specialist
2	**Dr. Musaba Milton Wamboko**	Role: Profession:	Consultant Obstetrician and Gynaecologist
3	**Nabulo Harriet**	Role: Profession:	Consultant Lecturer/maternal and child health specialist
4	**Aryasingura Benson**	Role: Profession: Tel: Email:	Consultant Human resource management specialist and Research Specialist 0772022827 pibaconsult@gmail.com

Appendix 2: Ad hoc committees created during the perinatal death audits

Facility	No	Names	Sex	Title
Mehta Hospital	1.	Nagayi Sylivia	F	E/M
	2.	Nalubega Betty	F	E/M
	3.	Namuli Angella	F	RN/M
	4.	Ogen Geoffrey	M	Administrator
Ankole Tea estate HC III	1.	Katungwensi Dinah	F	R/M
Kumi Hospital	1.	Omoding George William	M	Administrator
	2.	Angunkin Hellen	F	N/O Midwife
	3.	Akurut Anna Margret	F	E/M
	4.	Kedi Esther Lydia	F	E/M
	5.	Aumo Faith Joy	F	E/M
	6.	Areo Patricia	F	E/M
	7.	Akia Marie Lucy	F	N/O
	8.	Odikor Margaret	F	PNO
	9.	Alyebba Jesca	F	SN/O
	10.	Okello Mark	M	MRA
	11.	Dr. Olupot George	M	MO
Community Health Plan	1.	Kato Sadrach	M	C/O
	2.	Namubiru Resty	F	E/N
	3.	Namusobya Mariam	F	E/N
	4.	Nazziwa Doreen	F	EM/W
	5.	Abesigamukama Tadeo	M	C/O
Kisizi Hospital	1.	Friday Christine	F	Record Asst
	2.	Orishaba Susan	F	E/M
	3.	Kiconco Sarah	F	E/M
	4.	Amutuhaire Loyce	F	E/M
	5.	Rita Atim Kitsamba	F	RMN
	6.	Ainembabazi Susan	F	R/M
	7.	Asiimwe Olivious	F	E/M
	8.	Akanyijuka Sheila	F	E/M
	9.	Tucungwirwe	F	E/M
St Francis Hospital Buluba	1.	Nambi Agnes	F	R/M
	2.	Nakiwala Hellen	F	E/M
	3.	Dr. Martha Asiimwe	F	M/O
	4.	Isabirye Peter	M	MR/C
	5.	Nabacwa Cathy	F	E/M
Ishaka Adventist Hospital	1.	Mwebembezi Francis	M	Records Officer
	2.	Tumukunde Winfred	F	R/M
	3.	Atuhaire Precious	F	E/M
	4.	Amutuhaire Darlen	F	E/M
	5.	Asasiira Emily	F	E/M
Kakira Hospital	1.	Ninshaba Miria	F	E/M
	2.	Mukiibi Allen	F	R/M
	3.	Basirika Agnes	F	SNO
	4.	Machwera Peter	M	MO
Bamu Hospital	1.	Nakasendwa Harriet	F	E/N

	2.	Tumuhimbise Grace	F	E/N
	3.	Kirungi Judith	F	E/N
	4.	Kapasika Fortunate	F	E/N
Kiwoko Hospital	1.	Nakakande Josephine	F	R/N
	2.	Namakula Hilda	F	R/N
	3.	Onyinkwa Vivian	F	SNO
	4.	Nabunya Hajara	F	R/M
	5.	Nakku Immaculate	F	R/M
	6.	Dr. Odong Paul Eric	M	M/O
	7.	Dr. Carrie Verduya	F	M/O
Ggwatiro Hospital	1.	Namuyiga Ryhama	F	E/M
	2.	Naketto Theo	F	E/M
	3.	Nabirye Hilda	F	Nurse
	4.	Dr. Katumba J	M	Doctor
	5.	Dr. Kato Sulaiman	M	M/O
Holly Cross Orthodox Hospital	1.	Nnalwanga Phiona	F	Chief Nurse
	2.	Nabunya Mary	F	E/N
	3.	Batende Polline	F	E/M
	4.	Nabulo Sharon Angella	F	E/M
Case Hospital	1.	Akulwi Elizabeth	F	M/W
	2.	Aliado Teddy	F	M/W
	3.	Deborah Kusasira	F	M/W
	4.	Fatuma Atyamisa	F	M/W
	5.	Adokorach Hellen	F	M/W
	6.	Nantale Susan	F	M/W
	7.	Namuyomba Hanifa	F	M/W
	8.	Namande Jackie	F	M/W
	9.	Nandawula Winnie	F	M/W
	10.	Gworyalya Winnie	F	M/W
	11.	Akatukunda Macline	F	N/A
Mengo Hospital	1.	Kayaga Heron	F	R/M
	2.	Nagayi Winfred	F	R/M
	3.	Kabajungu Joselyn	F	E/M
	4	Majje Frolence	F	R/M
	5.	Namukasa Goretti	F	R/M
	6.	Boonabana Violet	F	E/M
	7.	Nalwoga Ruth	F	E/M
	8.	Lumu Godfrey	M	E/M
	9.	Dr. Muyanga Byanjo	M	M/O
	10.	Dr Mubiru Edrine	M	M/O
	11.	Bukirwa Lydia	F	M/W
	12.	Kiiza Kevin	F	E/M
	13.	Namuganga Sharlotte	F	E/M
	14.	Kigundu Christine	F	R/M
	15.	Dr Ndinalteng	M	Obstetrician
	16.	Bulya Grace	F	R/M
Span Medicare	1.	Kayondo J		Administrator
	2.	Kemirembe Gladys		Nurse
	3.	Nsimbe Joanita		M/W
	4.	Timugibwa Dinah		M/W

	5.	Nakacwa Phionah		R/W
	6.	Dr. Tomusange Simon		M/O
	7.	Nakaango Vicky		M/W
	8.	Rusoke Micheal		Clinician
Bugambe Tea HC III	1.	Namarah Dinah	F	E/M
	2.	Achiro Lucy Elio	F	E/M
	3.	Birungi Jenipher	F	N/Asst
	4.	Proscovia Okwii	F	R/M
	5.	Amanyire Ismail	M	MCO
Kinyara Hospital	1.	Atugonza Winfred	F	E/M
	2.	Akech Juliet	F	E/M
	3.	Namutebi Maureen	F	E/M
	4.	Mugemo Wycliffe	M	E/M
	5.	Osbert Muhoozi	M	RON
	6.	Wobusobozi Joan	F	E/M
	7.	Atugonza Ruthren	F	Records
	8.	Kambabazi Justine	F	RM
	9.	Dr. Wandera James	M	MO
	10.	Adongo Christine	F	RON
St Ambrose Charity HC III	1.	Kisembo Doreen	F	E/M
	2.	Atugonza Vivian	F	E/M
	3.	Naija Bridget	F	E/M
	4.	Kakyo Eunice	F	E/M
	5.	Nalubega Bridget	F	E/M
	6.	Tuhaise Judith	F	E/M
	7.	Kasiime Lydia	F	R/Assistant
Tooro Kahuna HC III	1.	Agasa Newton	M	E/N
	2.	Kajura Samuel	M	Lab Ass
	3.	Byamukama John	M	E/N
	4.	Kobugabe Oliver	F	E/M
	5.	Kabahenda Framesa	F	N/A
Kaluva Hospital	1.	Leny Roseline	F	E/N
	2.	Orodriyo Scovia	F	E/M
	3.	Atizuyo Laura	F	E/M
	4.	Emuikia Rally	M	R/M
	5.	Mawa Wilfred	F	R/M
	6.	Ayikoru Peace Maria	F	E/M
	7.	Munduru Annet	F	E/M
Nyapea Hospital	1.	Dr. Omara January	M	M/O
	2.	Nseka Mutoro Janet	F	R/M
	3.	Lucky Emmily	F	E/M
	4.	Japiem Gift	F	Records
	5.	Acirolam Gorret	F	E/M
	6.	Asibazuto Josephine	F	E/M
	7.	Emmy Asusu	F	SNO
	8.	Lenia Vicky	F	E/M
Double Cure Health Centre	1	Mbabazi Sarah	F	MCO
	2	Nuwajuna Justus	M	MCO
	3	Nassazi Jenipher	F	E/M
	4	Nassolo Prossy Nabisere	F	E/M

Appendix 3: Picture gallery of the activities conducted

AnkoleTea estate HC III: Identification and validation of maternal and perinatal deaths

Kumi Hospital: Part of the maternity team and members of the MPDRC being taken through tallying of births in the maternity register for the population of the BABIES matrix. The BABIES Matrix for the month of July was populated together with the team

Bugambe Tea Estate HC III: Health workers demonstrate newborn resuscitation techniques as part of the Helping Babies Breathe plus training

Kiwoko Hospital: Review of perinatal deaths with the ad hoc committee at Kiwoko Hospital

Appendix 4: Best Practices Identified in Selected Health Facilities

Name of facility	**Kumi Hospital**
Medical superintendent	Dr. Olupot George
Focal person MNCH	Sr. Angorikin Helen
Title of best practice	Keeping newborn and premature babies warm – the warm chain: Neonatal Intensive care room in Kumi Hospital, and Kangaroo mother care integrated into postnatal care practice.
Problem Statement	Kumi Hospital receives referrals of premature babies, low birth weight (LBW) newborn babies and mothers at risk of LBW and premature deliveries from the many nearby private and government facilities. These newborn babies are always at risk of hypothermia which increases the risk of morbidity and mortality. In January to March 2017, 3 deaths of low birth weight babies were registered according to the BABIES analysis for Kumi Hospital.
Root causes	All the nearby private and public health facilities lacked the capacity, equipment and personnel trained to manage low birth weight and/or premature babies. In all the public hospitals/health centres, incubators were nonexistent.
Summary of best practice	Kumi Hospital developed a warm chain process for delivery and care of the newborn 1. A warm delivery chain for the new born baby and the mother with temperatures in the delivery room averaging 25 degrees. The maternity building was designed to regulate temperatures, keeping warm during cold weather. 2. The maternity ward cleaners were trained in infection control, prevention and are able to maintain 24 hour cleanliness in the labor room and wards 3. Mothers and babies are 'roomed in' – (mother and baby share the same bed). This has enabled the teaching and practice of Kangaroo Mother Care (KMC) as a routine to all mothers during the postnatal period. 4. A sick newborn isolation unit was created and is used to isolate newborns with infections in need of extra and emergency new born care. 5. A neonatal care unit (targeting premature and low birth weight infants) was set up and is functional albeit with one incubator. This often has two or three newborns in care.
What makes it a best practice	The creation of a sick newborn and neonatal care unit has strengthened emergency and extra newborn care provided to newborns in the catchment area of Kumi hospital. This has improved the chances of survival of at risk newborns. This best practice demonstrates the importance of delivery of all the components of essential newborn care

Name of facility	**Kiwoko Hospital**
Medical superintendent	Dr. Odong Paul Eric (In-charge Neonatal Intensive Care Unit – NICU)
Focal person MNCH	Nakku Immaculate
Title of best practice	Specialist Newborn/Neonatal Intensive Care Unit Saving Lives in Kiwoko Hospital
Problem Statement and root causes	Nakaseke, Luweero and surrounding areas have had high rates of low birth weight, premature and sick newborn babies. The weak capacity of government hospitals to provide neonatal intensive care and the absence of specialist neonatal hospitals meant the chances of survival of the sick and premature babies were very low. High deaths were noted due to preventable and treatable conditions such as hypothermia, hypoglycemia and neonatal infections. The NICU at Kiwoko hospital provides babies at risk of dying with a chance at survival.
Summary of best practice	Kiwoko Hospital initiated a neonatal intensive care unit to provide specialist care for neonates in need of extra and emergency newborn care. A neonatal intensive care unit fully equipped with incubators, trained newborn care midwives, nurses and doctors was established in the hospital. With an estimated bed capacity of 20, the unit provides extra and emergency newborn care to all babies born within or referred from nearby health facilities
What makes it a best practice	This is a unique and advanced care being provided only by this facility in the region. It has improved the chances of survival of babies born early (premature babies), babies with infections and other babies born with difficulty in breathing.