Missed Opportunity for Neonates to Live: A Cross-sectional study on Utilization of Peri-natal Death Audits to address the Causes of Peri-Natal Mortality in District Hospitals of East–Central Uganda.

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Abstract

Aim:

To assess the utilization of PDAs in addressing the avoidable causes of perinatal mortality in the eastern region of Uganda.

Methodology:

A cross-section design using a mixed method was conducted between 2014-2015 at Iganga, Bugiri, and Kamuli general hospitals in the East-Central region of Uganda. The interviews involved 115 health workers who included Doctors, Nurses/Midwives, Clinical officers, and Laboratory and Theatre staff. These were drawn from four departments including the Maternity ward, Outpatient department, Theatre, and paediatric ward. Hospital top and departmental managers formed the key informants for this study. Annual reports for the period 2009/10-2012/13 were reviewed. In addition, monthly reports for the calendar year 2013 together with patients' clinical case notes and patients' registers were also reviewed to determine the magnitude and causes of perinatal mortality. Factors contributing to perinatal death were assessed and categorized into foetal, maternal, and health facility factors.

Results:

Results revealed a high and rising perinatal mortality rate of 70/1,000 live births and a decreasing maternal mortality ratio of 363/100,000 live births. Most perinatal deaths were fresh stillbirths 48/88 which occurred during the intrapartum period and the majority of early neonatal death was due to birth asphyxia. None of the health facilities was conducting perinatal death audits and the quality of data used for perinatal death audits was inadequate and was scored poorly. Challenges hindering utilization of perinatal death audits included: lack of staff sensitization and training, work overload, lack of motivation, fear of blame and litigation, political interference, and lack of support from the community.

Conclusion:

There was a high prevalence of perinatal deaths in east-central Uganda yet none of the hospitals was conducting perinatal death reviews.

Recommendations:

Health workers should be trained on perinatal death audit tools and guidelines and the records departments are revitalized with tools and personnel for effective data management.

Keywords: perinatal deaths audits, maternal deaths, Eastern Uganda, neonatal deaths, stillbirths,
Date Submitted: 2022-08-30 Date Accepted: 2022-09-10

September 27, 2022

1. Background

In Uganda, 45,000 newborns die each year, half on the day they are born and up to three-quarters in the first week of life (GoU, MOH 2008). At the same time, newborn mortality remains high with many deaths still uncounted. An incredible two-thirds of mothers who reported newborn deaths had not registered them. Significant information and research gaps remain, which point to the urgent need to regularly update population-based data on the number and causes of newborn deaths and better collection of information on stillbirths (MoH, 2008). Although there is a national policy on maternal and perinatal death review in Uganda, audits of stillbirths or neonatal deaths have not been fully realised yet clinical audit is an important strategy in reducing health facility deaths Bhutta (2010). This is an affirmation of the adage that, policy on paper does not usually translate into practice, leading to the so-called "know-do-gap" or the "knowledge-implementation gap," (Sanders, 2006). Bhutta believes that let alone the unbelievable magnitude of avoidable premature deaths, historically neonatal health was a forgotten area left in the cracks of safe motherhood and child health programs,' (Bhutta 2010, p. 2034). Despite evidence that perinatal death audits (PDAs) reduce perinatal deaths in health facilities by 30% Pattinson (2009), these have not yet been scaled up in Sub- Saharan Africa. In Uganda, PDAs are performed in only a handful of health facilities (Pattinson 2009; Nakibuuka, Okong, Waiswa, and Byaruhanga 2012). The purpose of the study was to assess the utilization of PDAs in addressing the avoidable causes of perinatal mortality in the eastern region of Uganda. The specific objectives of the study were:

1. To determine the magnitude of perinatal and maternal deaths among district general hospitals of East-Central Uganda.

2. To establish the probable causes of perinatal death in district general hospitals of the East-central region of Uganda.

3. To determine the methods used to establish causes of perinatal deaths in district general hospitals in the region.

4. To explore the quality of PDA data generated within district general hospitals in East-Central Uganda.

5. To determine the extent to which PDAs are utilized at the health facility level in East-Central Uganda

6. To establish challenges affecting the utilization of PDAs in the region.

2. Methods and materials

The study was conducted in three district hospitals in the East-Central region of Uganda, namely Iganga, Bugiri, and Kamuli hospitals. A cross-section design using the triangulation mixed method was employed and data was collected from a randomly selected sample of 115 health workers and records were reviewed. A retrospective review of annual reports for the period 2009/10-2013/14 was performed to determine the trends of perinatal and maternal health performance over time. In addition, monthly reports for the calendar year 2013 from January to December as well as patients' registers from maternity, antenatal and paediatric wards together with patients' clinical case notes where there was a perinatal death for the same period were reviewed. We looked at all registered live births which occurred in the respective health facilities used in this study including those which occurred outside the facility but whose immediate after-birth care was conducted in the facility were included. We also considered many early neonatal deaths in each facility, these included deaths of live birth babies from time of birth to seven days after birth; the number of late foetal deaths or stillbirths included all foetal deaths who died in-utero, after 27 weeks of gestation. Maternal deaths which included the death of a woman during pregnancy, labour, or shortly after labour resulting from pregnancy-related causes were counted and used to determine the maternal mortality ratio and compared with the peri-

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natal death rate to determine the relationship between maternal and perinatal death. Records where a foetus or early neonate ended in death were considered for this variable. The indicators for this variable included assessment of maternal, foetal, and health facility causes of perinatal deaths. A Wrigglesworth and Aberdeen's perinatal death disease classification criterion (Lawn *et al.,* 2006) was adopted to yield seven categories of perinatal death causes which included: congenital abnormalities, neonatal tetanus, prematurity, birth asphyxia, infection, diarrhoea, and the 'others' sub-category. Health facility causes of death were assessed using the following indicators: estimated distance from the facility which was obtained by estimating the distance to the facility, availability of resources, attitude of health care provider, time between arrival and initiation of treatment, the time between arrival and death, qualification of birth attendants and utilization of a partograph. PDA reports were reviewed for evidence of application of any of the known methods used to conduct a PDA such as; clinical audits, facility-based audits, community-based surveys, criterion audits, confidential inquiry, and near miss surveys. Interviews of staff on these mentioned methods were also conducted. An assessment of timeliness, completeness, and accuracy of data collected for PDA was done. We determined the number of health facilities conducting PDA, type of records used to provide data for PDAs, frequency of PDA meetings conducted, types of recommendations made by PDA committee, methods used to communicate recommendations to stakeholders, availability of policies and Standard Operating Procedures (SOPs) formulated by PDA committees, availability of action plans to implement formulated policies and SOPs, and records of perinatal care CMEs conducted. Data were analyzed using SPSS.

3. RESULTS

Maternal and Perinatal performance indices

The total births, maternal deaths, and perinatal deaths were used to measure maternal and perinatal performance indices, and the results are presented in table 1.

Findings revealed that, as the birth rates were rising, the maternal mortality ratios were declining with a stagnation of the perinatal death indices.

There was a slow but steady rise in the number of total deliveries and number of live births with a trend of reducing maternal mortality, a shallow trough in the trends of neonatal mortality and.

Classification of perinatal deaths

Deaths were then classified according to the time at which the baby died. This classification included: fresh stillbirths for perinatal deaths which occurred shortly before birth, macerated stillbirths, for deaths believed to have occurred more than 48 hours before birth, and early neonatal death (ENND), for deaths of babies born alive and died within a period of seven (7) days after death. Findings revealed that, as the birth rates were rising, the maternal mortality ratios were declining with a stagnation of the perinatal death indices.

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Majority of the babies accounting to half of total deaths occurred during time of delivery as FSBs with almost equal proportions of MSBs and ENDs.

3.1.

3.1.1. Possible causes of perinatal deaths

These were broadly divided into possible causes of SBs or END.

Table 1: Maternal and perinatal performance from 2009/2010 to 2012/2013

Indicators	**2009/10**	**2010/11**	**2011/12**	**2012/13**
Total deliveries	7970	8590	9273	10540
Live births	7441	8035	8630	9290
Neonatal deaths (NND)	179	148	147	236
*NND rates (per 1,000 live births)	24.1	18.4	17.0	25.4
Still births (SB)	351	467	249	303
*SB rates (per 1,000 live births)	47.2	58.1	28.9	32.6
Maternal deaths	132	114	33	35
*MMR (per 100,000 live births)	1774	1419	382	377

*NND – Neonatal death, SB – Still Birth. MMR – maternal mortality Ratio

Table 2: Classifications of perinatal deaths according to sex and type of perinatal death

Perinatal indicator	**Category**	**Iganga Number (n=32)**	(%)	**Kamuli Number (n=32)**	(%)	**Bugiri Number (n=24)**	(%)	**Total Number (n=88)**	(%)
Type of PND	FSB	16	50.0	12	37.5	20	83.3	48	50.0
	MSB	6	18.8	12	37.5	2	8.3	20	27.3
	END	10	31.3	8	25.0	2	8.3	20	22.7
Total		32	36.4	32	36.4	24	27.9	88	100

PND = Perinatal death, FSB = Fresh still birth, MSB = Macerated still birth, END = Early neonatal death

Table 3: Possible causes of perinatal death

Perinatal death indicator	**Category**	**Type of PND**			**Total (n)**	**(%)**
		FSB	**MSB**	**END**		
Probable cause of still birth (fresh stillbirth and macerated still births) [n=68]	Congenital	6	0		**6**	6.8
	Ante-partum haemorrhage	6	2		**8**	9.1
	Intra-partum Still birth	26	0		**26**	29.5
	Maternal conditions	0	2		**2**	2.3
	Infections	2	0		**2**	2.3
	Unexplained antepartum	2	4		**6**	6.8
	Cause not recorded	6	12		**18**	20.5
	Total	48	20		**68**	**77.3**
Possible causes of Early neonatal death (n=20)	Congenital			2	**2**	2.3
	Birth Asphyxia			14	**14**	15.9
	Cause not recorded			4	**4**	4.5
	Total			20	**20**	**22.7**

PND = Perinatal death, FSB = Fresh still birth, MSB = Macerated still birth, END = Early neonatal death

Among the possible causes of still births, majority (29.5%) occurred during intrapartum period whereas birth asphyxia contributed to most early neonatal deaths.

3.1.2. Possible intrapartum causes of stillbirth

These deaths were further subdivided into fresh stillbirth, obstructed labour, breech, and other causes. Records reviewed yielded a 61.5% FSB and 30.8% resulting from obstructed labour.

3.1.3. Factors associated with perinatal deaths

Assessment of factors that contribute to perinatal death was also categorised into foetal, maternal, and facility factors. Health workers were asked to rank each category of these factors from the highest to the least perinatal death contributor. Findings revealed that prematurity was the leading contributing foetal factor to perinatal death (36/115) followed by infections and low birth weight with 30/115 each. Conversely, the leading maternal contributing to perinatal deaths were nutritional status (63/115), age at conception (22/115), and low birth spacing (14/115) respectively. The health facility factors contributing to perinatal deaths ranked as the leading factor were long distances from the health facility,

(58/115) inadequate resources, (30/115), and delayed care (11/115). Records were also reviewed to determine possible factors that contributed to perinatal deaths, and these were also categorised into maternal, foetal, and health facility factors.

Maternal age. The age of mothers who had a perinatal death ranged from 16-45 years and the majority were in the age group of 19-35 years with a mean and age range of 26.2 and 29 years respectively and skewed by 0.585 to the left. However, most deliveries took place among the age group of 19-35 years; therefore, the maternal age-specific perinatal death rates were determined based on total deliveries in each health facility. Findings revealed that there was an overall two-fold increased risk of perinatal death among maternal ages above 35 years than maternal ages below 18 years and between 18 and 35 years.

Mother's education level

A large proportion of mothers who had a perinatal death had attained education up to the primary level (46.6%) and 30.7% had not attended school at all **Maternal health factors**

The maternal health factors contributing to perinatal death in the region included: maternal gravidity and parity, maternal health status on discharge, maternal HIV status, and maternal medical conditions during pregnancy.

(a) **Maternal gravidity and parity**

Findings revealed that the majority of mothers whose pregnancy ended up in a perinatal death had ever had more than four (4) pregnancies before as indicated in table 5. This indicates that there was an increased risk of perinatal death among babies born to mothers with high gravity.

3.2. Maternal deaths as a factor contributing to perinatal death

Out of 88 perinatal cases reviewed in this study, two (2) 2.3% were born to maternal death and eight (8) 9.1% cases did not have records about the maternal condition on discharge, and the majority 78 (88.6%) mothers were discharged alive.

3.3. Maternal conditions during pregnancy

Maternal conditions during pregnancy were assessed by review of records and surprisingly, records on this parameter were missing in more than half of cases 46 (52.3%). However, out of 42 cases where conditions during pregnancy were recorded, premature rupture of membranes (PROM) was the most contributing to maternal condition during pregnancy 16 (38.1%).

3.4. Maternal HIV status

The Uganda health policy on elimination of mother-to-child transmission of HIV (eMTCT) recommends that every pregnant woman and her spouse should be tested for HIV and given appropriate care. A large number of mothers (47.73%) had an HIV test performed on them as shown in table 6 However, it was also significantly noted that 36.36% of mothers' HIV test status was unknown.

3.5. Maternal syphilis screening test status

None of the facilities studied performed a routine syphilis screening test. Lack of laboratory supplies was mentioned to be one of the factors constraining the need to conduct routine screening for syphilis as revealed by one KI, *'... if the reagents are not enough to test patients for clinical diagnosis of syphilis, then there is no provision for testing all pregnant mothers for merely screening purposes,*' (Laboratory staff, 17/07/2014).

Probable foetal factors contributing to perinatal death

Among foetal factors assessed were the type of pregnancy, birth order in case of twins, foetal heart sounds, APGAR score, sex, birth weight, and status of the baby at the time of discharge as presented in table 6.

Most perinatal deaths occurred among female babies, and a significant number of perinatal deaths (27.3%) did not have their sex recorded. Many babies' weight was adequate for survival, that is, 2.5kg or more. Though a large number of the baby's weight was not recorded. On the other hand, the majority of babies who died had less than an APGAR score of 5 and so could not benefit from intensive comprehensive Emergency

Table 3: Perinatal deaths among different maternal age groups

Health facility	**Indicator assessed**	**Age of the mothers**			**Total**
		Below18 yrs	**18-35 years**	**Above 35 yrs**	
	Number of live births	936	4027	782	5742
Iganga	Perinatal deaths	68	294	79	441
	Age-specific PDR	67/1000	73/1000	101/1000	76.8
	Number of live births	229	1432	106	1767
Kamuli	Perinatal deaths	14	86	14	114
	Age-specific PDR	61/1000	60/1000	132/1000	64.5
	Number of live births	262	2030	125	2417
Bugiri	Perinatal deaths	11	116	12	139
	Age-specific PDR	42/1000	57/1000	96/1000	57.5
	Total deliveries	**1427**	**7489**	**1013**	**9926**
Total	Perinatal deaths	93	496	105	694
	Age-specific death rates	65/1000	66/1000	104/1000	70/1000

PDR = perinatal death rate

Table 4: Gravidity and parity of mothers with perinatal deaths

Mother's characteristics	**Category**	**Mother's age of mothers with a perinatal death**			**Total (N=840)**	**%**
		Below 18 years (n=10)	**18-35 years (n=60)**	**above 35 years (n=14)**		
Gravidity	Prime gravida	4	20	2	**26**	**31.0**
	2-4	2	18	2	**22**	**26.2**
	Above 4	4	22	10	**36**	**42.8**
Parity	0-4	4	46	10	**60**	**71.4**
	Above 4	6	14	4	**24**	**28.6**

Table 5: Maternal HIV test status

HIV test was performed	**Type of PND**			**Name of hospital**			**Total**	**%**
	FSB	**MSB**	**ENND**	**Iganga**	**Kamuli**	**Bugiri**		
HIV test done	22	12	8	12	16	14	**42**	**47.7**
HIV test not done	8	4	2	6	6	2	**14**	**15.9**
HIV test unknown	14	8	10	14	10	8	**32**	**36.4**
Totals	**44**	**24**	**20**	**32**	**32**	**24**	**88**	**100**

PND = Perinatal death, FSB = Fresh still birth, MSB = Macerated still birth, END = Early neonatal death.

Table 6: Foetal factors contributing to perinatal death

Foetal characteristics	Category	FSB (n=44)	(%)	MSB (n=24)	(%)	ENND (n=20)	(%)	Total (N=88)	(%)
Baby's sex	Male	10	22.7	6	25.0	8	**40.0**	**24**	**27.3**
	Female	24	54.5	10	41.7	6	**30.0**	**40**	**45.5**
	Unrecorded sex	10	22.7	8	33.3	6	**30.0**	**24**	**27.3**
Baby's birth weight	Less than 2.5kg	2	4.5	4	16.7	6	**30.0**	**12**	**13.6**
	2.5 kg and above	16	36.4	10	41.7	12	**60.0**	**38**	**43.2**
	Unrecorded	26	59.1	10	41.7	2	**10.0**	**38**	**43.2**
Pregnancy type	Singleton	34	77.3	22	91.7	16	**80.0**	**72**	**81.8**
	Twin	8	18.2	0	0.0	4	**20.0**	**12**	**13.6**
	Unrecorded	2	4.5	2	8.3	0	**0.0**	**4**	**4.5**
If twin, perinatal birth order	1^{st} twin	2	4.5	0	0.0	0	**0.0**	**2**	**2.3**
	2^{nd} twin	4	9.1	0	0.0	4	**20.0**	**8**	**9.1**
	Unrecorded	4	9.1	2	8.3	0	**0.0**	**2**	**2.3**
	Not applicable	34	77.3	22	91.7	16	**80.0**	**76**	**86.4**
APGAR score	0-4	42	95.5	22	91.7	6	**30.0**	**70**	**79.5**
	5-7	0	0.0	0	0.0	6	**30.0**	**6**	**6.8**
	8-10	0	0.0	0	0.0	6	**30.0**	**6**	**6.8**
	Unknown	2	4.5	0	0.0	2	**10.0**	**4**	**4.5**

PND = Perinatal death, FSB = Fresh still birth, MSB = Macerated still birth, END = Early neonatal death.

obstetric and neonatal care (CEmONC) resuscitation strategy, yet this was missing in most cases.

4. Methods used to determine the causes of perinatal deaths

None of the facilities conducted a perinatal death audit. However, when health workers were asked to select from a list of possible standard methods used to establish causes of perinatal deaths used in their health facilities and most staff (39%) selected health facility-based surveys among others.

Quality of perinatal death data

To determine the quality of perinatal data used to conduct PDA, the three dimensions of data quality namely timeliness, completeness, and accuracy of data were assessed.

Timeliness of data for PDA

Staff were assessed for knowledge about the timeliness on perinatal death recording and reporting as in table 7

Majority of staff agreed that a perinatal death should be recorded immediately and reported to health head whenever it occurred.

4.1.

4.1.1. Completeness of data for PDA

Five parameters were used to determine completeness of data entry namely: maternal status of

Table 7: Assessment of timeliness for recording and reporting a perinatal death

Time between perinatal death and perinatal death incident recording:					
Suggested timeliness categories	**Name of health facility**			**Total (N=84)**	**%**
	Iganga (n=42)	**Kamuli (n=22)**	**Bugiri (n=20)**		
Immediately	22	38	35	88	**76.2**
After 24hours	8	0	0	11	**9.5**
After 1 week	2	0	0	3	**2.4**
After 1 month	10	0	0	14	**11.9**
Time between recording of perinatal death and incident reporting to the health facility head					
Suggested timeliness categories	**Name of health facility**			**Total (N=84)**	**%**
	Iganga (n=42)	**Kamuli (n=22)**	**Bugiri (n=20)**		
Whenever a death occurs	16	24	28	63	**54.8**
Monthly	20	7	7	38	**33.3**
Quarterly	2	7	0	8	**7.1**
Annually	2	0	0	3	**2.4**
Did not Know	2	0	0	3	**2.4**

ANC attendance, maternal gravidity, birth weight probable cause of still births and neonatal death as in table 8.

Death is misclassified due to lack of knowledge of what a perinatal death is comprised of in terms of the age at which the death occurred. In this study, therefore, respondents were assessed to determine their knowledge about the age category of a perinatal The overall completeness level was determined to be 61.4%. The worst completeness levels were observed among records for causes of perinatal deaths (for both stillbirths and neonatal deaths).

Similarly, all hospital records Officers did not carry out routine determination of completeness levels for any of the HMIS records. However, it was revealed that whenever there were incomplete records, the record Officers would follow up to look for the missing data to ensure completeness. "Sometimes the In-charges especially those who have just been transferred from other departments are not conversant with the tools such that they leave some indicators unfilled, which compels me to go to the wards and collect data which has not been filled," revealed by a records Officer (17^{th}/07/2014).

4.1.2. Accuracy of PDA data

Accuracy of data used for PDA was assessed based on appropriateness of data generation in the clinical assessment, competency of personnel involved in data management, appropriateness of tools used for data collection and analysis, comparison between aggregated data obtained from HMIS reports against raw data obtained from departmental records and quality check practices.

4.2. Accurate recording at data generation centres.

Very often cases of perinatal death. A list of alternatives with only one correct response was provided for the respondents to choose from.

4.3. Competency of staff involved in perinatal data management

All records personnel involved in data management had professional training in General Records Management, and only one records Officer had a qualification in Medical Records Management none of them had special additional training in

Table 8: Completeness of data entry into patients' registers

Indicator	**Recorded**	**Unrecorded**
ANC attendance (n=88)	48 (54.5%)	40 (45.5%)
Maternal gravidity (n=88)	84 (95.5%)	4 (4.4%)
Baby's weight (n=88)	50 (56.8%)	38 (43.2%)
Probable cause of stillbirth (n=52)	18 (34.6%)	34 (65.4%)
Causes of ENND (n=36)	16 (44.4%)	20 (55.6%)
Overall/Average (n=70)	**43 (61.4%)**	**27 (38.6%)**

ANC = Antenatal care, END = Early neonatal death

Table 9: Knowledge of respondents about age category of a perinatal death

responses of alternatives provided.	**Name of health facility**				**Total**	**Right (√)c**
	Iganga	**Kamuli**	**Bugiri**	**No. (n=115)**	**(%)**	
1. Death of a full-term baby to 7 days after birth	15	7	8	30	**26.1**	**x**
2. All foetal deaths and death of babies up to 28days after birth	3	4	5	12	**10.4**	**x**
3. Foetal deaths after 7 months of gestation to 7 days after birth	19	19	9	47	**40.9**	√
4. Any death in the first 28 days	3	4	10	17	**14.8**	**x**
5. Did not Know	2	4	3	9	**7.8**	**x**
Total	42	38	35	115	**100.0**	

Findings (table 9) showed that most of the staff (59.1%) could not correctly record a perinatal death.

perinatal data management. This leaves a gap in the accurate management of perinatal death records.

4.4. Availability of tools used in PDAs

There was a 66.7% overall availability of source tools for data used in PDA which included: Antenatal registers, Maternity registers, and in-patient clinical case notes, Paediatric registers and in-patient clinical case notes and HMIS monthly and annual report forms. Though equally, none of the facilities had perinatal death incident report forms and PDA confidential inquiry forms.

4.5. Accuracy of data entry

A comparison between data obtained from monthly HMIS reports against data obtained from maternity ward delivery registers for the calendar year 2013 was done

Findings yielded an average 8.9% inconsistence in data entry with worst entry deviations realized among perinatal death entries.

4.6. Devices used for perinatal data management

All facilities used manual entry of data into patient registers and data is then compiled manually and entered into the different report forms as provided by the Ministry of Health HMIS. Calculators were used in carrying out simple arithmetic calculations. None of the facilities had a computer installation in the records department. *'I am trying to negotiate with the administration to secure for me a computer, and maybe you will also help me make them realize the importance of this department,'* lamented one of the Records Officers (17/07/2014). Manual analysis was often used and none of the facilities conducted a statistical presentation of results for easy interpretation by stakeholders.

Table 10: A comparison of records obtained from patients' registers with HMIS for accuracy

Indicator	**Health facility**	**Total from registers (A)**	**Total from HMIS (B)**	**Deviations** $_{positive}$ **(A-B)**	**Deviation (%) (A-B)/A *100**
Number of live births	Iganga Hospital	5742	5683	59	1.0
Perinatal deaths		441	434	7	4.6
Number of maternal deaths		18	18	0	0
Number of live births	Kamuli Hospital	1734	1767	33	1.9
Perinatal deaths		94	114	20	21.3
Number of maternal deaths		3	3	0	0.0
Number of live births	Bugiri Hospital	2417	2417	0	0.0
Perinatal deaths		102	139	37	36.3
Number of maternal deaths		13	15	2	15.4
Average percentage deviations					8.9

4.6.1. Quality control checks of data used for PDAs

None of the records Officers conducted any structural and objective quality control checks for data used in PDAs and any other form of data whatsoever. However, further interrogation revealed that some quality checks are unconsciously carried out when an obvious anomaly in compiled data arises, such as missing figures, unbelievably too high or too low totals, and delayed submission of periodical data returns, among others. This was evidenced by one of the records Officers who exclaimed: *"Quality control checks! Haaaa, I doubt whether I really even know what it exactly means ... what I do is; if some data is missing or the figures recorded are so different from the expected ranges, then I go to the ward where data was obtained from and compare with the records in the registers",* reported by a records Officer (17/7/2014).

To determine efforts taken by the hospital administration and records department to ensure the quality of data collected for PDA, this study evaluated how staff professional development was conducted. It was revealed that none of the facilities conducted any continuous medical education (CME) to promote quality of data collection, analysis, or presentation due to lack of funding as revealed by one records Officer *"I really feel it is vital to conduct CMEs because there are changes especially in the new tools used for data collection which require staff sensitization but I am crippled in terms of financial facilitation to conduct one..."*, revealed a records Officer (21/07/2014).

In conclusion the overall quality of data used for PDA was poor.

4.6.2. Availability of data used to conduct PDAs

Availability of sources of data used for conducting PDAs were assessed through records review

Results revealed that, none of the facilities had PDA confidential inquiry forms and PND incident report forms as shown in table 11.

5. DISCUSSION:

The magnitude of perinatal death

Many studies on the magnitude and causes of perinatal death are health facility-based studies, and so provide a rich source of clinical information for accurate determination of causes of death. However, these potentially miss out on causes of deaths occurring in communities. The perinatal death rate in the region was assessed based on the prevalence of stillbirths and early neonatal deaths. The rates of stillbirth and neonatal death did not have a significant deviation from the World Health Statistics on Uganda's child health indicators for 2011 (WHO, 2013). On a sad note, however, these rates are still too far higher than those of high-income countries.

Since the life of a mother is inseparable from that of a baby, there is a relationship between the quality of maternal perinatal care and perinatal health outcomes (Knippenberg *et al,* 2005). There was an overall reduction in the trend of perinatal death and maternal death in the region. However, the perinatal death rate was initially relatively stagnant and thereafter it shot sharply upwards with a corresponding sharp reduction in maternal mortality. This was probably due to the implementation of maternal death reviews without the integration of PDAs (Bhutta 2010).

There were non-ignorable variations in the overall PDR and MMR among hospitals for the monthly death indicators of 2013, for example, Bugiri, had the lowest and highest PDR and MMR respectively. This probably is indicative that non-integration of maternal and child health programme implementation leaves one thriving with better performance outcomes at the cost of the other. However, there were no seasonal variations in PDR and MMR throughout the year 2013, meaning that health facilities need to be prepared for individual cases at all times, unlike other conditions such as communicable diseases which are manifested with peaks and troughs of incidence.

In this study perinatal deaths were sub-divided into fresh stillbirths, macerated stillbirths, and early neonatal deaths (ENND) contrary to other scholars who classify PND into stillbirths (to include FSB and MSB) and ENND (Australian Bureau of Statistics 2009, Nankabirwa *et al* 2011 P. 2). The above classification used in this study is preferred for its strength to identify causes of PND which occur around the intrapartum period since this time is associated with a high index of strategies to prevent PND.

Among perinatal deaths reviewed, 50% were fresh stillbirths; this was consistent with findings of Nankabirwa (2011) in Mbale Eastern Uganda. The incidence of stillbirths was high possibly because the study took place in district general hospitals which are referral centres for the whole district hence there is a high rate of delay in the intrapartum period resulting in the loss of intrauterine life as a fresh stillbirth.

Both staff interviews and records review revealed birth asphyxia as the greatest cause of perinatal deaths, similar to studies elsewhere in Tanzania, (Mbaruku *et al,* 2009; Kidanto, 2009; Lawn; 2009; WHO, UNFPA, UNICEF, AMDD, 2010). Birth asphyxia is an intrauterine period and if rigorous interventions are instituted such as timely referral and delivery by caesarean section, these deaths can be prevented.

Among maternal causes of perinatal deaths, obstructed labour scored highest and this is also related to poor interventions during antenatal period to set strategies for delivery of an anticipated obstructed labour. Worthwhile, in a staff survey a remarkable number of respondents close to 20% pinned perinatal deaths as to result of criminal induction of labour. This is coined to the high prevalence of unwanted pregnancies due to low rates of unmet need for contraceptives.

To devise effective long-term preventive strategies for perinatal deaths, an understanding of factors contributing to perinatal deaths needs to be unveiled and so this study categorised these fac-

Table 11: ources of data used for PDA

Name of hospital:	**Availability of sources of data used for PDA Available (.) Not available (X)**		
Sources of data for PDAs	**Iganga**	**Bugiri**	**Kamuli**
Antenatal registers	•	•	•
Maternity in-patient registers and clinical notes	•	•	•
Paediatric in-patient registers and clinical notes	•	•	•
HMIS monthly and annual report forms	•	•	•
Perinatal death incident report forms	X	X	X
PDA confidential inquiry form	X	X	X

tors into maternal, perinatal, and health facility factors.

There was a high perinatal death rate among mothers with an age above 35 years. The extreme ages confer a high risk to the mother and baby hence more likely to result in perinatal death. An age range of 29 years implies that mothers were sharing a labour suit with their potential children.

The other socio-demographic data which included the mother's education level, marital status, and parental occupation are indirect social empowerment factors that when well addressed can promote standards of living, healthcare-seeking habits, and health decision making hence preventing poor health outcomes.

The more direct maternal factors contributing to perinatal death were: parity and gravidity, maternal conditions during pregnancy, maternal HIV and Syphilis status, and whether the mother lived or died after birth. Whereas the majority of mothers (43%) had gravidity of above 4, few (28.6%) had ever experienced between 4 or more pregnancies carried to term for delivery. This probably increased their need to conceive to have more children. These findings agree with Prof. Mahmoud Fathalla's quotation in a Video titled "Why did Mrs. X die - retold," (WHO cited in Hands-on for mothers and babies 2012), which describes the role of a woman in society being that of producing children.

Premature rupture of membranes (PROM), scored highest among recorded maternal conditions during pregnancy which could have contributed to perinatal death. This implies there was a delay in seeking appropriate health care to counter the effects of maternal conditions during pregnancy.

Though the majority of mothers had an HIV test performed on them, this prevalence of HIV tests is still too low since in Uganda it's mandatory by a policy that every pregnant woman must be tested for HIV for appropriate care plan and prevention of vertical prevention. Similarly, none of the facilities performed a Syphilis test which is among the causes of poor pregnancy outcomes.

On the assessment of foetal factors contributing to perinatal deaths, it was found that close to half of perinatal deaths were female (45%). Other deaths (27.3%) did not have sex recorded. These findings contradict those of other studies where there were more male deaths in the early neonatal period, attributed to the biological survival advantage of girls in the neonatal period, (Jehan et al 2009). There is yet no explanation as to why many female babies ended in a perinatal death compared to males, and if these findings are consistent with other studies, then it will necessitate the need for genetic intrauterine studies to determine the cause of such death predisposition.

Foetal birth weight (BWT) is notably a key cause of perinatal death. In this study, 13.6% of babies were born with a BWT less than 2.5kg though the majority of the babies (43.2%) were not weighed to provide a basis for better compar-

ison. This implies that most of the deaths were of viable foetuses which only lacked adequate obstetric care during pregnancy and labour.

The majority of births were singleton with only 13.6% deaths from twin pregnancies. Among the twins, there was a 4-fold perinatal death incidence among the 2nd twin than the 1st twin, this was contrary to the known advantage of the second twin to survive due to the less struggle to exit through the birth canal.

A low APGAR score in a newborn is indicative of birth asphyxia. In this study 79.5% of perinatal deaths had an APGAR score of less than 5, implying that, these would require equipped facilities with highly skilled staff for their resuscitation to live, short of which would result in perinatal death. This agrees with the Democratic Republic of Ethiopia Ministry of Health 2012; whose argument emphasises the need for skilled staff and equipment to deliver Basic emergency obstetric and neonatal care (EmONC) and CEmONC to help babies survive from birth Asphyxia.

Among health facility factors that were sought to have contributed to perinatal death was the distance between the mother's residence and the hospital. More than half of the mothers were estimated to have lived within more 5 km radius distances from the hospital. This points to a probable delay in transit from home to the hospital called "second delay" or "delay 2".

Delay reaching the hospital was also identified. In cases where the time of the mother's arrival at the hospital and the time of vaginal delivery were recorded, 27.3% of mothers delivered within 30 minutes from the time of arrival, implying a compounded delay 1 and 2. First and second delays are important because many births occur at home and referral practices still cause problems—as observed in Mbaruku *et al* 2009, 35.8% occurred at home owing not only to poor transport and long distance but also to lack of trust in the health system. On the other hand, for mothers where time at which a decision for C/S and actual C/S delivery was recorded, all mothers were operated on after 60 minutes, with significant a delay 3. Among perinatal deaths, 34.1% were by C/S, and contrary to the ideal, C/S is mentioned as a major intervention to reduce perinatal mortality but there seems to be a very poor outcome for an intervention meant to prevent maternal and perinatal mortality. This corresponds with Mbaruku *et al* 2009 study where 33% of deliveries were by C/S. All this is stemmed from delayed correct diagnosis and quick appropriate intervention.

Antenatal care is pertinent in identifying risk factors during pregnancy and so their prevention. Records of 54.5% of mothers had attended ANC, the rest did not have a record of their ANC attendance status. Attendance alone is not enough, but how many times and medical prophylaxis received. Records reviewed were not conclusive to determine the frequency of ANC attendance and prevalence of Malaria and Tetanus prophylaxis received, though these too determine the quality of ANC and in turn perinatal outcome.

Establishing the causes of perinatal death is a multi-faceted exercise that requires employing several methods both at the health facility and community levels. In so doing, strategies to address the causes of these deaths can accurately be identified through a cause-root analysis. However, PDA was not conducted among the facilities studied, the methods that the majority of health workers identified namely: health facility and community-based surveys would only fruitfully be conducted following a clinical death audit were presumably guessed. Better still an integration of various methods used to conduct PDAs potentiate each other to increase levels of accuracy and precision as supported by studies conducted elsewhere to compare the strength of using Verbal Autopsy (VA) visa-vie hospital-based records, (Edmond *et al.* 2008, Thatte 2009).

Timeliness of data collection should be an integral role for all care providers to ensure that critical health situations are quickly identified and rapid responses instituted (Moyo, 2005). Unfortunately, difficulties arise to assess timeliness as a dimension of the quality of data used in health care because most health systems do not record the time at which activities are performed. The majority of health workers contended that perinatal deaths are recorded and reported immediately to the hospital head after the occurrence and

this prevents reporting recall bias due to temporal relationship. However, none of the Records officers routinely conducted timeliness performance on HMIS report submission according to MOH policy guidelines. There was an overall 57.2% completeness level of data used to conduct PDAs. This is inadequate and agrees with a study carried out in Zambia where 30% of perinatal deaths were not assigned a cause due to insufficient case report details, (Turnbull *et al* 2011). It was not surprising to find that majority (40.9%) of staff did not know the correct definition of perinatal death. This remains a universal gap to harmonise the definition of a perinatal period since several sources have different descriptions of a perinatal period (Hinderaker 2003 Wanda *et al* 2011 WHO cited in Nakibuuka 2012). The result of this is misclassification and missed reporting on cases of PND. Lack of knowledge and skills cripple quality health service delivery and this was the case for all the staff involved in HMIS in this study specifically for PND audit data management. On the other hand, there was a commendable 91.1% accuracy data entry assessed based on a comparison between total annual perinatal indicators against totals from monthly reports for the year 2013. This was an excellent performance compared to the findings of Kintu 2013, in South-Western Uganda where inaccurate entry of data in some facilities was as high as 50%. Nevertheless, this level was selective for maternal death reporting of 100% accuracy in two hospitals compared to a 36.3% deviation in one of the hospitals and so this confirms the dogma that perinatal health has been left in the cracks of maternal health (Bhutta 2010). Worthwhile targets setting and measurement of indicators are the mainstay to monitor performance. This was not the case regarding monitoring the quality of data for PDA in the region. None of the hospitals had an established system to conduct quality checks for data on perinatal health.

Although the majority of staff respondents assumed that PDAs are conducted in their facilities, actually none of the 3 hospitals was conducting PDAs. There was no recorded evidence of PDA execution, and hospital managers anonymously confirmed that PDAs were not conducted. Such response from staff is typical of a health system that does not fully involve staff in its business of affairs. In this case therefore staff responses were possibly dependent on assumptions derived from the vigorous implementation of maternal death reviews in all facilities. A leaf is borrowed from Grol *et al* cited in Diem *et al* 2012, who suggest that the successful introduction of innovations in healthcare depends on a variety of factors related to the socio-political context, the organization in which the care is given, to the healthcare professionals themselves, to the innovation itself, and to the facilities needed to implement the innovation. This can only be achieved by providing a knowledge base to all stakeholders and involving them at all stages of implementation, (Diem 2012). Findings revealed that there were no PDA meetings conducted and so there were no recommendations made or disseminated, no policies and or SOPs were formulated, no CMEs on perinatal care were conducted as rooted in the PDA system and no improved perinatal care was implemented. This too confirmed the scholarly connotation that neonatal health was a forgotten area left in the cracks of safe motherhood and child health programs (Bhutta 2010, pp. 2034).

The current policies in Uganda stipulate that there is a need for death audits for every maternal and or perinatal death (MOH, 2010). This can only be achieved when the staff involved in the care of patients/clients are trained and fully sensitized to their roles. However, lack of training coupled with lack of sensitization was a key setback for the implementation of PDA. Sanders, 2006 describes this as a "know-do-gap," because the need to conduct PDA is known but not implemented.

Other hindrances, included lack of facilitation, work overload, fear of blame, political interference, and non-supportive communities. The latter two are typical of a de-motivating fault-finding system which instead of identifying gaps and seeking solutions to identified gaps, indulges in fault-finding and blaming staff involved in patients' care. That is why in Nsambya hospital where PDA has registered success, both bad and good

events have been reviewed to keep staff motivated, (Pattinson 2009).

Work overload has continued to be a challenge for most health systems in Africa and so a human resource for health indicators remains miserable amidst the need for improvement in the quality of health. The system used to determine staffing levels in Uganda for example is based on the level of service delivery to estimate staffing needs with little consideration of population dynamics.

6. Conclusion

There was a high perinatal mortality rate and reduced trends of maternal mortality in the region. The major putative cause of perinatal death was birth asphyxia. This indicates the magnitude of missed opportunities for perinatal survival attributed to the failure of health systems to reorganise and deter birth asphyxia as a cause of perinatal death. An effective PDA employing a variety of methods would reduce these deaths. Since none of the facilities was conducting PDA, the methods mentioned in this study were mere guesswork. Although the quality of data used in health care is the basis for quality improvement, maternal and perinatal health data was dilapidated. There was a lack of functionalization of the records department as pertinent in health services delivery and as a result, the records department did not prioritize quality data checks.

Recommendations

We recommend that staff should be trained on perinatal death audit tools and guidelines and that the records departments be revitalized and functionalized with data processing equipment, tools, and adequate qualified personnel for effective data management. Health facility managers should ensure that health policies and guidelines on perinatal death audits are effectively implemented.

7. Limitations

Since this was a facility-based study we could not establish community perinatal deaths and so findings on the magnitude of deaths can be inferred from the entire population. In addition, Partographs used in monitoring the progress of labour were kept separately from mothers' clinical notes and it was difficult to aggregate maternal clinical notes with data on partographs. Therefore, the use of partographs as an indicator to determine facility contributing factors to perinatal death and the quality of data based on partographs could not be determined.

ACKNOWLEDGEMENTS:

The authors would like to acknowledge the management of Uganda Martyrs University and health workers at the district hospitals in East Central Uganda for the utmost participation in the study.

ACRONYMS AND ABBREVIATIONS

AMDD Averting Maternal Death and Disability

ANC Antenatal care/clinic

APGAR Appearance, Pulse, Grimace, Activity, Respirations

BEmONC Basic Emergency Obstetric and Neonatal Care

BWT Birth weight

C/S Caesarean Section

CDRPC Child Death Review and Prevention Committee

CEmONC Comprehensive Emergency Obstetric and Neonatal Care

CME Continuing Medical Education

eMTCT Elimination of Mother-to-Child transmission of HIV/AIDS

ENND Early neonatal death

FBDR Facility Based Death Review

HMIS Health Management Information System

HSSIP Health sector Strategic and Investment Plan

MMR Maternal mortality ratio

MOH Ministry of Health

MPDR Maternal and perinatal Death Review

MSB Macerated still birth

PDA Perinatal Death Audits

PDR Perinatal death rate

PND Perinatal death

PROM Premature Rupture of membranes

SB Still birth

SOPs Standard operating procedures
SPSS Statistical Package for Social Sciences
UDHS Uganda Demographic Health Survey
UNFPA United Nations Population Fund
UNICEF United Nations International Children's Education Fund
VA Verbal Autopsy
WHO World Health

8. FUNDING

This research was funded by Uganda's Ministry of Health courtesy of the World bank fund.

9. COMPETING INTERESTS

The authors declare no competing interests.

AUTHOR'S CONTRIBUTIONS

Waako C.K., conceived the study, Nanyingi M., Atuhairwe C., Maniple E., and Katongole S.P., provided technical guidance in the design, conduct, analysis, and reporting. Konso J.M edited the paper and coordinated the authors. All the authors reviewed the different manuscripts and consented to the publication of this article.

CONSENT AND ETHICAL APPROVAL

The research ethics committee of Uganda Martyrs University provided Ethical approval. The management of the individual hospitals provided written administrative permission. Duly signed written informed consent was obtained from the study participants. All research information/data was handled with maximum confidentiality and only disclosed to the respective authorities.

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11. Publisher details:

Publisher: Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256775434261
Location: Wisdom Centre, P.O.BOX. 148, Uganda, East Africa.

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