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Project Report

**Project Title. Analysis of Perinatal Death Reviews:
Factors Contributing To Perinatal Mortality In
Tanzania**

Masters in Public Health (General)

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Executive Summary

Background

In Tanzania the perinatal mortality rate is estimated at 69 per 1000 births.¹ In Tanzania perinatal death reviews are recommended as a strategy to improve quality of clinical care for pregnant women and newborn babies. The study was conducted to analyse all perinatal death reviews reported to the national level from January 2004 – December 2007 in order to describe factors contributing to perinatal mortality in Tanzania, completeness of reporting and assess quality of perinatal death reviews.

Methods

This cross sectional descriptive study analysed 418 perinatal death reviews that were notified over the four year period. Standard procedures of double data entry and consistency checks were carried out using Epi Data Version 3.1, while STATA Version 8 and Microsoft Excel were used for analysis. Frequency and distribution tables and charts were used for analysis of demographic characteristics, antenatal problems, intrapartum complications, maternal, foetal and health facility factors contributing to the perinatal deaths. The Chi squared test was calculated to see whether the differences among the early neonatal deaths, fresh and macerated stillbirths were due to chance when compared for gestational age, birth weight, place of delivery, mode of delivery ,assistant at delivery, parity, intrapartum complications and avoidability of perinatal death.

Action plans developed by perinatal death review teams were assessed by two independent assessors looking at components of the plan; problem identification, action, timeframe and outcome indicator. The quality of action plans was assessed by scoring each component of the plan as (1) unsatisfactory, (2) good and (3) very good.

Results: The 418 reviewed perinatal deaths over the four years imply a perinatal death review rate of 1.4/1000. Of 418 perinatal deaths, 191(46%) were early neonatal deaths, 130(31%) fresh stillbirths and 97(23%) macerated stillbirths. Reports of perinatal death reviews were from 15 (71%) regions and 32,(23%) districts. None of 42 reporting health facilities reported consistently over the four years. The reported cases were mainly from hospitals 97%.

One third of perinatal deaths occurred with mothers who were primigravida (32%) and a third of mothers were in risky age groups (below 20, > 35 years). The majority 82% had only primary level education and were farmers. Most mothers 99% attended ANC and complications were detected in 34% of cases. Deliveries took place mainly at health facilities, 94% with assistance of skilled attendant. Macerated stillbirths were more commonly delivered by SVD (93%) compared to early neonatal deaths (67%) and fresh stillbirths (48%, $p<0.001$). Intrapartum complications occurred in 62% of cases.

Low birth weight was present in 55% of all perinatal deaths,, 46% among early neonatal death cases compared to 13% of fresh stillbirths and 36% of macerated stillbirths ($p<0.003$). Fifty seven percent of reported cases were preterm. More fresh stillbirths 51% were term compared to 38% and 39% for early neonatal deaths and macerated stillbirths ($p <0.001$).

.Severe asphyxia was present in 45% of cases. Asphyxia ranked highest as a cause of probable cause of death in both fresh stillbirths (42%) and early neonatal deaths (41%), whereas untreated syphilis ranked highest for macerated stillbirths (18%).

Over half (54%) of the deaths were considered avoidable by the review teams. Identified contributing factors at health facility level were among others poor quality of ANC services (38%), delay in diagnosing intrapartum complications (13%), poor monitoring of

labour (8%) and delayed decision making at health facility level (8%). Key contributing maternal factors were poor compliance to ANC and delivery services (50%) and maternal conditions or complications (32%). The key contributing newborn factors were asphyxia and prematurity or low birth weight. The quality of action plans was poor with 75% graded as unsatisfactory.

Conclusions: There is a need to increase coverage and quality of perinatal death reviews including a systematic way of providing feedback to reporting facilities. Continuous quality improvement of ANC, delivery and newborn care services, implementing maternal and newborn community interventions including strengthening linkages between health facilities and communities are key steps to reducing perinatal deaths.

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Abbreviations and Definitions

ANC	Antenatal Care
BBA	Born before arrival
DDH	District Designated Hospital
DHS	Demographic and Health Survey
FBO's	Faith Based Organizations
HMIS	Health Management Information System
IPT	Intermittent Preventive Treatment
KMC	Kangaroo Mother Care
MCHC	Maternal and Child Health Clinic
LBW	Low birth weight
PIIP	Perinatal Problem Identification Programme
PPH	Post Partum Haemorrhage
PNMR	Perinatal Mortality Rate
TSPA	Tanzania Service Provision Assessment

Glossary

Perinatal death- dead born foetus (stillbirth) and newborn deaths occurring in the first week of life

Perinatal death review- a qualitative in depth investigation of causes of and circumstances surrounding perinatal deaths which occur in health facilities

Perinatal Mortality Rate – a ratio of number of perinatal deaths per thousand births

Stillbirth rate-a ratio of number of stillbirths per thousand births

Early Neonatal Death- death of a newborn within the first seven days of life

Fresh stillbirth-dead born foetus where intrauterine death occurs during onset of labour

Macerated stillbirth - dead born foetus where intrauterine death occurs before onset of labour

Born before arrival - babies that are born while the mother is on the way to the health facility. This includes delivery within a facility before arriving at the labour ward e.g at the reception.

Traditional Birth Attendant- resource persons at community level recognised to have skills in conducting delivery. Some have received some form of training though all by WHO definition are not skilled attendants.

District Designated Hospitals (DDH)- Hospitals that are owned by faith based organizations but have been designated as district hospitals in the government system.

Kangaroo Mother Care – Special care for lowbirth weight babies with early, continuous and prolonged skin-to-skin contact between the mother and the baby and exclusive breastfeeding;

Low birth weight: Birth weight of less than 2500g regardless of gestational age

1.0 Introduction

The World Health report of 2005 states that, each year 3.3 million babies or even more are stillborn, more than 4.4 million die within the first 28 days of life and a further 6.6 million die before their fifth birthday. Ninety eight percent of the neonatal deaths occur in developing countries with highest rates in Sub- Saharan Africa and Asia.²

Tanzania has recently witnessed a decline in the overall under-five and infant mortality by 24% (from 147 in 1999 to 112/1000 live births 2004/05) and 31% (from 99 in 1999 to 68/1000 live births in 2004/05) respectively however neonatal mortality 32/ 1000 live births and maternal mortality 578/100000 live births has not shown progress for over a decade. Neonatal mortality accounts for almost 50% of the infant mortality and 29% of under-five mortality.³ The main causes of neonatal deaths are infections (30%), asphyxia (26%) and pre-term (27%), also 85% of all neonatal deaths are low birth weight (birth weight <2500gms).^{4,5} Further analysis of neonatal mortality shows that 50 % of neonatal mortality occurs within the first 24 hrs of birth and 75% of deaths have occurred within the first week of life.^{2,5} Addressing neonatal mortality requires continuity of care between maternal and child health care and the greatest gap in care often occurs in the first week of life. Only 46% of mothers receive skilled attendance during delivery and postnatal care coverage is 15%.³ The Lancet Neonatal series identified key cost effective clinical, outreach, family and community interventions that can reduce neonatal mortality if implemented at scale.⁷

Antenatal care coverage is high at 94% for one visit but quality of ANC needs to be improved.³

About 65% of the women have their blood pressure measured, 54% have blood samples taken for haemoglobin estimation and syphilis screening and 41% have urine analysis done.⁸ Only 22% of pregnant women attending the ANC clinic receive the complete

course of Intermittent Preventive Treatment for prevention of malaria and only 47% report having been informed of the danger signs in pregnancy.³

In Tanzania the perinatal mortality rate is estimated at 69 per 1000 births.¹ Perinatal mortality includes stillbirths and death within the first seven days of life. The stillbirth rate is 29/1000 births which amounts to 42,500 stillbirths per year, further more about 44,900 neonatal deaths occur annually. The numbers for neonatal deaths are calculated by multiplying the annual number of births with the Neonatal Mortality Rate based on DHS 2004, while stillbirths are calculated using modelling on vital registration, DHS and study data.⁴ Knowing the level of perinatal deaths is not enough to guide public health action to reduce these deaths, we need to understand the underlying factors that contribute to such deaths.⁹ The Lancet Neonatal series recommends perinatal death audits or reviews as a strategy to improve quality of clinical care.¹⁰ Facility based perinatal deaths reviews are a qualitative, in-depth investigation of the causes of and circumstances surrounding perinatal deaths occurring at health facilities. Deaths are initially identified at the facility level but such reviews are also concerned with identifying the combination of factors at the facility and in the community that contributed to the death, and which ones were avoidable.⁹ The lessons derived from death reviews enable health care practitioners and health planners to learn from the errors of the past. They will provide evidence of where the problems are and highlight the areas requiring recommendations for health sector and community action as well as clinical guidelines.¹¹

2.0 Background

Maternal and perinatal mortality are important indicators of quality of obstetric and paediatric care available. Maternal and perinatal death reviews are important steps in establishing the real causes of maternal and perinatal deaths.

In Tanzania policy guidelines require that all perinatal and maternal deaths occurring at the health facility are reviewed and discussed by audit committees at the health facility level then notification forms are filled and sent to district, regional and finally the national level. Perinatal forms have been collected at the Reproductive and Child health section of the Ministry of Health since 2003 but the data has not been analyzed. It is estimated that each year Tanzania has about 33,765*early neonatal deaths and 42,500 stillbirths (total estimated annual perinatal deaths 76,175).⁴ Many of these deaths occur in the community and are not reported and counted. The number of death reviews per year will give a sense of the proportion of perinatal deaths that are reviewed with forms that reach the Ministry of Health. It is also possible that some deaths are reviewed but notification forms have not reached Ministry of Health. This integrated project seeks to analyse the data from January 2004 – December 2007 and give recommendations that will help stimulate health sector action towards reduction of perinatal mortality in Tanzania. The quality of the reviews will also be assessed and areas for improvement will be recommended.

2.1 Aim

The study aims to analyse all perinatal death reviews reported to the national level from January 2004 – December 2007 in order to describe factors contributing to perinatal mortality in Tanzania, completeness of reporting and assess quality of perinatal death reviews.

2.2 Objective

1. To assess completeness of reviews conducted for perinatal deaths and perinatal death notification.
2. To describe demographic characteristics of mothers of stillbirths and early neonatal deaths (newborns up to 1st week of life)

* It is estimated that 75% of neonatal deaths occur within the first week.

3. To describe health care services received by newborns who died (1st week of life) and mothers of stillbirths and early neonatal deaths.
4. To describe maternal, foetal/newborn and health facility factors that contributed to perinatal deaths
5. To assess appropriateness of action plans as a result of perinatal death review

3.0 Methods

3.1 Study Design and Methods

The study design was a cross sectional descriptive study. Quantitative methods were used to describe factors that contributed to the perinatal deaths and qualitative methods were used to assess the quality of the death review.

3.2 Sample and Data Sources

Reviewed perinatal deaths that occurred over a four year period between January 2004 and December 2007 were included in the analysis. The Reproductive and Child Health Section of Ministry of Health was notified of 418 deaths that took place and were reviewed by audit committees over that period. All 418 cases which occurred all over the country were included in the analysis.

Completed perinatal death notification forms are filled in at health facilities after death review meetings, then sent to district and regional health authorities and then to the Reproductive and Child health Section of the Ministry of Health.

3.3 Variables and Measures

Maternal information included age, marital status, level of education, occupation and parity. Age was recorded in years, marital status was classified married, single, widowed, divorced or cohabiting and level of education was categorized as none, primary,

secondary or higher. Occupation was classified as farmer, businessman or professional job.

Service delivery data included antenatal clinic attendance, detected antenatal problems or complications, place of delivery classified as home, Born Before Arrival(BBA) or health facility by category (maternity home, dispensary, health centre, hospital), training of attendant at delivery was classified as (family member, traditional birth attendant, MCH aide, midwife, clinical officer, doctor) and delivery method including any intrapartum or postpartum complications. The survival of the mother dead or alive was also documented. Paternal (fathers) information included age, education level and occupation. Level of education and occupation were classified as described for the mother above.

Data on newborn or stillborns included condition at birth, APGAR score at 5 minutes, birth weight, sex, gestational age at birth, duration of life after birth and congenital malformations. Condition at birth was classified as alive, fresh stillbirth or macerated stillbirth and APGAR score was categorized into three groups as normal (8-10), moderate (5-7) and severe asphyxia (<5). Duration of life after birth was documented in minutes for first hour, hours for first day then days up to seven days. Service delivery information included length of stay at the health facility before death and events before death.

The death was also categorized as avoidable or not avoidable by the health facility death review team.

Qualitative data included health facility, maternal and newborn/foetal factors that contributed to the perinatal death. The quality of the reviews was assessed by looking at the quality of the action plans. This was done by assessing the appropriateness of; 1) problem identification, 2) action to be taken, 3) outcome indicator and 4) feasibility of accomplishing the task within the planned time frame. The principle investigator and an experienced paediatrician independently gave a quality score to each category of the

action plans. The score were ranked as 1 for unsatisfactory, 2 for good, and 3 for very good. *Unsatisfactory* score was given for incorrect or inappropriate responses or key points missing, *good* for correct, appropriate but incomplete responses and *very good* when correct appropriate and complete. After comparison of the two independent scores the ones where the opinion of assessors differed were then discussed and the agreed score was recorded. Geographical data included reporting region and district. Name of reporting health facilities and ownership was also identified. The perinatal notification forms do not mention ownership but this was obtained using the names and linking to a national list that shows ownership.

3.4 Data Management

Data entry was done by data entry clerks from the National Medical Research Institute. Standard procedures of double data entry and consistency checks were carried out using Epi Data Version 3.1. Appropriate coding was done, codes were used instead of mothers names and codes were also assigned when quality of action plans was assessed.

3.5 Data Analysis

The data was analysed using STATA Version 8 and Microsoft Excel. Distribution tables were used to show where the reports are coming from by region and district, health facility name, ownership category and by year. Frequency and distribution tables and charts were be used for analysis of demographic characteristics, antenatal, maternal and foetal factors. The median and mean were calculated for birth weight, gestational age and parity. The Chi squared test was calculated to see whether the differences among the early neonatal deaths, fresh and macerated still births were statistically significant (in other words, whether the differences between these groups were likely to be due to chance) when compared for gestational age, birth weight, place of delivery, mode of delivery, assistant at delivery, parity, intrapartum complications and avoidability of perinatal death.

The quality of the review was assessed looking at completeness of the action plan, whether the information was correctly used to identify the problem, relevance of action to be taken and correct response, feasibility of taking action within the planned timeframe and indicators.

The health facility, maternal and newborn or foetal was analysed quantitatively using thematic analysis to identify emerging themes.

3.5 Ethical Considerations

The names of the mothers were not entered into the data base to protect the identity of the mother. Codes were assigned to each perinatal notification form. Ethical clearance was sought from National Institute of Medical Research in Tanzania and London School of Hygiene and Tropical Medicine.

4.0 Results

4.1 Completeness of reporting

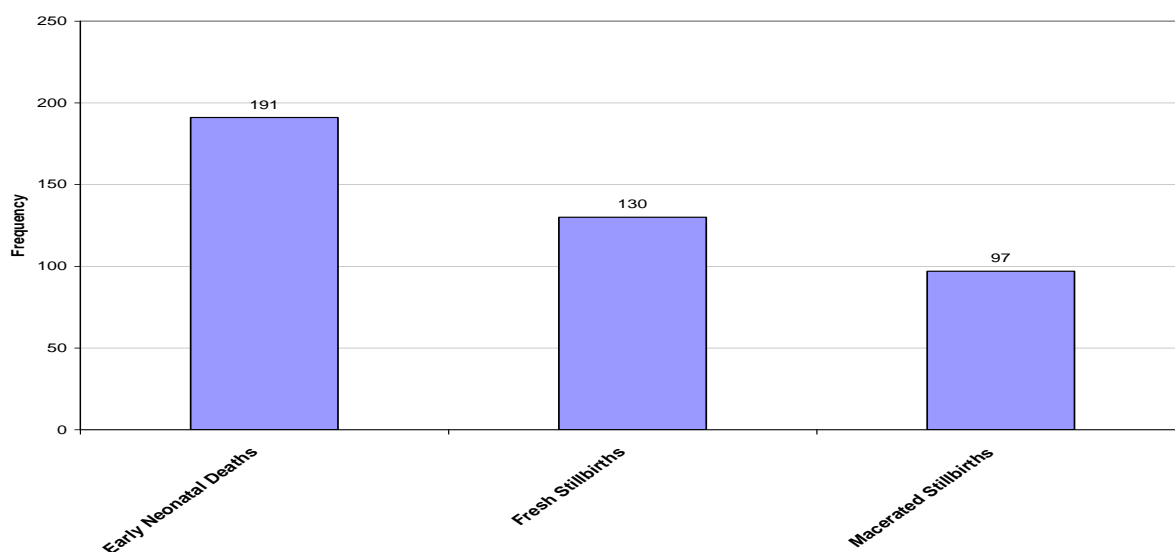
This study included 418 perinatal death reviews over a four year period. In Tanzania it is estimated that 76,175 perinatal deaths occur annually.⁴ The perinatal death review rate can be calculated as 1.4 / 1000. The perinatal deaths were reported from 15 regions (71%), 29 districts (23%) and 42 health facilities. Reporting health facilities were almost all hospitals (97%) and more than half (54%) of reporting facilities are owned by FBO's. Private for profit health facilities are not reporting: only 2 cases were reported, both from private maternity homes.

The number of cases reviewed and reported increased from 7 in 2004 to 171 in 2006 but declined to 81 in 2007. None of the health facilities reported consistently throughout the four years. The facility with highest reporting frequency Kondo Hospital notified 18% of all reviews and 59% of all the reviewed cases in the year 2007.

4.2 Categories of Perinatal Deaths

Early neonatal deaths comprised almost half of the perinatal deaths 191(46%) and stillbirths were divided into fresh stillbirths 130(31%) and macerated stillbirths 97(23%).

Figure 1: Frequency of Categories of Perinatal Deaths



4.3 Maternal Characteristics

Over one third of mothers were in the risky age group categories 22% less than 20 years and 17% were 35 years and above. Majority of the mothers were alive (97%), of the few that died 5 (62%) occurred in the mothers of fresh stillbirths. One third of perinatal deaths occurred with mothers who were primigravida (32%) and 20% had parity above five.

Most mothers were married (90%) and only 10% were single. Majority of fathers and mothers had attained primary education 78% and 82% respectively. However secondary and higher education attainment was very low. Only 3% of mothers had secondary education and none had higher education, whereas 6% of fathers had secondary and about 1% had attained higher education. Both fathers and mothers were mostly farmers 96% and 88% respectively.

Table 1: Maternal Characteristics

	Condition of deceased baby at birth			
	Early Neonatal N (%)	Fresh Stillbirth N (%)	Macerated Stillbirth N (%)	Total N (%)
Maternal age				
15 – 19	40(22)	22(17)	26(27)	88(22)
20 – 24	51(28)	26(21)	21(22)	98(24)
25 – 29	40(22)	28(22)	24(25)	92(23)
30 – 34	27(15)	22(17)	9(9)	58(14)
35 – 39	21(11)	18(14)	13(14)	52(13)
40 – 44	2(1)	11 (9)	2(2)	15(4)
Parity of the mother				
1	59(34)	33(29)	28(31)	120(32)
2-3	59(34)	26(23)	29(33)	114(30)
4-5	24(14)	29(25)	16(18)	69(18)
>5	32(18)	27(23)	16(18)	75(20)
Mother's marital status				
Married	163(88)	116(91)	84(91)	363(90)
Single	21(11)	10(8)	8(9)	39(10)
Divorced	0(-)	1(1)	0(-)	1(0)
Widow	1(1)	0(-)	0(-)	1(0)

4.4 Antenatal Problems

Generally in Tanzania most mothers attend antenatal clinic for at least one visit.³ in this study 99% of mothers attended antenatal clinic services. Antenatal problems were detected in 34 % of mothers. Multiple pregnancy ranked the highest, reported in 9 % of overall perinatal deaths. The next most common problems were anaemia, malaria and polyhydramnios each 5%.

Table 2: Antenatal Care

	Early Neonatal Death N (%)	Fresh Stillbirth N (%)	Macerated Stillbirth N (%)	Total N (%)
Antenatal attendance				
Attended	179(99)	125(100)	91(99)	395(99.5)
Not attended	1(1)	0(-)	1(1)	2(0.50)
Antenatal complications				
Multiple pregnancies	18(11)	9(9)	2(3)	29(9)
Anaemia	10(6)	6(6)	2(3)	18(5)
Malaria	5(3)	6(6)	6(9)	17(5)
Polyhydramnios	8(5)	4(4)	5(7)	17(5)
Hypertensive disorders	7(4)	2(2)	3(5)	12(4)
APH	1(1)	7(7)	2(3)	10(3)
Syphilis	2(1)	1(1)	3(4)	6(2)
Diabetes	4(2)	0(-)	1(1.49)	5(2)
HIV	0(-)	0(-)	2(2.99)	2(1)
Heart disease	1(1)	0(-)	0(-)	1(0.30)
None	113(67)	62(64)	41(61)	216(65)

4.5 Delivery Services

Most of the mothers delivered in hospital or other health facility 94% and only 18 (4%) delivered at home. Majority 94% of mothers were delivered by a skilled attendant. Deliveries of 15% of early neonatal deaths did not take place at hospital level compared to only 3% and 5% for fresh and macerated stillbirths ($p < 0.018$)

Of the home deliveries only 7(39%) were delivered by a TBA and more than half 10 (56%) were delivered by family members.

The main mode of delivery was Spontaneous Vaginal Delivery (SVD) 67% followed by Emergency Caesarean Section 22%. Laparotomy was done for 13 cases of ruptured uterus.

Macerated stillbirths were more commonly delivered by SVD (93%) compared to early neonatal deaths (67%) and fresh stillbirths (48%, $p < 0.001$). Whereas the majority (86%) of macerated still births were delivered by midwives, 56% of fresh stillbirths were delivered by doctors ($p < 0.001$).

Table 3: Delivery Services

	Perinatal Death			Total N (%)	p-value
	Early Neonatal N (%)	Fresh Stillbirth N (%)	Macerated Stillbirth N (%)		
Category of place of birth					
Hospital	160(85)	121(95)	92(97)	373(91)	< 0.018
Health Centre	2(1)	3(2)	1(1)	6(1)	
Dispensary	4(2)	1(1)	0(-)	5(1)	
Maternity Home	1(1)	0(-)	0(-)	1(0)	
Home	16(7)	1(1)	1(1)	18(4)	
BBA	5(3)	1(1)	1(1)	7(2)	
Mode of delivery					
SVD	126(67)	59(48)	87(93)	272(67)	<0.001*
LSCS	43(23)	38(34)	3(3)	88(22)	
Breech delivery	7(4)	10(8)	2(2)	19(5)	
Vacuum extraction	12(6)	2(2)	0 (-)	14(3)	
Laparotomy	0(-)	11(9)	2(2)	13(3)	
Assistant in delivery					
Midwife	95(50)	55(43)	83(86)	233(57)	<0.001*
Doctor	66(35)	71(56)	10(11)	147(36)	
Clinical officer	2(1)	0(0)	1(1)	3(1)	
Medical attendant	5(3)	0(-)	0(0)	5(1)	
Family member	13(7)	0(0)	2(2)	15(4)	
TBA	6(3)	1(1)	0(-)	7(2)	
Others/self	1(1)	0(-)	1(-)	2(0)	

* Significance different at $\alpha=0.05$ confidence level

4.5.1 Intrapartum Complications

Intrapartum complications were reported in 62% of mothers. Foetal distress (16%) was the most common complication among all perinatal deaths and was higher (21%) in early neonatal deaths than in fresh still births (17%, $p<0.001$). Obstructed labour was the second most common complication at 8%. Cord prolapse was more common in fresh stillbirths (14%) than in early neonatal deaths (1%) and macerated stillbirths (2%, $p<0.001$). Ruptured uterus also ranked higher for fresh stillbirths 11% than early neonatal deaths (0%, $p<0.001$). Other intrapartum complications mentioned were cord around the neck, malpresentation (breech, arm prolapse), retained second twin and shoulder dystocia.

Table 4: Intrapartum and Postpartum Complications Perinatal Deaths

	Early Neonatal Death N (%)	Fresh Stillbirth N (%)	Macerated Stillbirth N (%)	Total	p-value
Intrapartum Complications					
Abruption placenta	1(1)	10(8)	1(1)	12(3)	<0.001*
Eclampsia	2(1)	3(2)	0(-)	5(1)	0.271
Cord prolapse	1(1)	18(14)	2(2)	21(5)	<0.001*
Foetal distress	40(21)	22(17)	3(3)	65(16)	<0.001*
Obstructed labour	17(9)	12(9)	2(2)	31(8)	0.068
Ruptured uterus	0(-)	14(11)	3(3)	17(4)	<0.001*
Others	33(17)	25(20)	6(6)	69(17)	
None	75(39)	18(14)	58(60)	158(39)	
Postpartum Complications					
PPH	6 (3)			6 (3)	
Eclampsia	2 (1)			2 (1)	
Retained placenta	1 (1)			1 (1)	
Peuperal psychosis	0 (0)			0 (0)	
Others	9 (5)			9 (5)	
None	161 (90)			161(90)	

* Significant different at $\alpha=0.05$ confidence level

4.5.2 Postpartum Complications

The postpartum complication were analysed for mothers who delivered live babies. Only 10% of mothers experienced postpartum complication, the most common 6.2% being post partum haemorrhage (PPH).

4.6 Newborn/ Stillbirth Characteristics

Birth weight ranged from 700 to 5000grams and mean birth weight was 2,649grams. Fifty five percent of the perinatal deaths were low birth weight. Among the early neonatal death cases 46% were low birth weight where as 13% of fresh stillbirths and 36% of macerated stillbirths were low birth weight ($p < 0.003$). Males were more than females with an overall male to female ratio of **1.5:1**. Fifty seven percent of reported cases were preterm mostly between 33-36 weeks of gestation (43%). More than half (51%) of fresh stillbirths were term compared to 38% and 39% for early neonatal deaths and macerated stillbirths respectively ($p < 0.001$).

Table 5: Newborn and Stillbirth Characteristics

	Perinatal Death				p-value
	Early Neonatal N (%)	Fresh Stillbirth N (%)	Macerated Stillbirth N (%)	Total N (%)	
Weight at birth (gram)					
500-999	2(1)	0(-)	2(2.22)	4(1)	<0.001*
1000-1499	18(10)	2(2)	13(14)	33(8)	
2000-2499	25(13)	15(12)	18(20)	45(11)	
2500-3499	82(44)	71(56)	35(39)	58(14)	
≥3500	34(18)	31(24)	10(11)	188(47)	
Sex of baby					
Male	113(60)	79(62)	52(55)	244(59)	
Female	75(40)	49(39)	43(45)	167(41)	
Gestational age at birth					
<28	1(1)	1(1)	2(2)	4(1)	< 0.001*
28-32	20(13)	6(5)	22(26)	48(14)	
33-36	73(48)	50(43)	27(32)	150(42)	
37-44	58(38)	60(51)	33(39)	151(42.78)	
Perinatal death					
Avoidable	102(58)	75(64)	28(34)	205(55)	<0.001*
Not avoidable	73(42)	43(36)	55(66)	171(45)	

* Significant different at $\alpha=0.05$ confidence level

4.6 Birth Outcome

At birth 46% were born alive and 54% were still birth .APGAR score at 5 minutes was recorded for 155 live babies (81%), 45% of these had severe asphyxia (APGAR score <5. Over two thirds 67% of early neonatal deaths died within the first day. Twenty nine percent died 29% within the first hour, of these 23% died within the first five minutes. Eighty seven percent had died within the first three days of life.

Table 6: Survival and Birth Outcomes

	Frequency	Percentage	Cumulative %
Condition at Birth			
Alive	191	46	46
Fresh Stillbirth	130	31	77
Macerated stillbirth	97	23	100
APGAR score at 5 minutes			
<5	70	45	45
5-7	40	26	71
8-10	45	29	100
Duration of Life			
<1 hour	52	28	28
1hour-<1day	74	40	68
1-3days	38	20	88
4-7days	23	12	100

4.7 Probable Causes of Early Neonatal Deaths

In this study 191 babies were born alive, and events or conditions that these newborns had before death were documented. Some newborns presented with more than one event or condition. Difficulty in breathing 55% was the most common event followed by failure to suck 24% and cyanosis 21%.

The most common cause of early neonatal death was birth asphyxia 41% with prematurity ranking second 24%. Anaemia was due to cord bleeding or haemorrhagic disease of the newborn and infections were cord sepsis and septicaemia.

4.8 Probable Causes of Death in Stillbirth

Intrapartum asphyxia was the most common identified cause for fresh stillbirth (42%), whereas untreated syphilis ranked highest for macerated stillbirths (19%). The contribution of congenital malformations though small was similar in both groups around 3%. Others mentioned included ruptured uterus, cord accidents and drug intoxication.

Table 7: Events before END and Probable Cause of END and Stillbirth

Factors	Early Neonatal N (%)	Fresh Stillbirth N (%)	Macerated Stillbirth N (%)	Total N (%)
Events before death				
Difficulty in breathing	104(55)			104(55)
Failure to suck	45(24)			45(24)
Cyanosis	40(21)			40(21)
Fever	28(15)			28(15)
Hypothermia	15 (8)			15 (8)
Convulsions/fits	11 (6)			11 (6)
Jaundice	7 (4)			7 (4)
Cord sepsis	6 (3)			6 (3)
Abdominal distension	4 (2)			4 (2)
Probable Cause of END				
Prematurity	48(25)			48(25)
Asphyxia	83(43)			83(43)
Infection	35(18)			35(18)
Anaemia	9 (5)			9 (5)
Congenital Malaria	9 (5)			9 (5)
Birth Injury	20(10)			20(10)
Probable Causes of Stillbirth				
Intrapartum asphyxia		81(42)	10(10)	91(46)
Others		30(16)	16(16)	46(25)
Untreated syphilis		4(2)	18(19)	22(12)
Congenital Abnormality		6(3)	3(3)	9(5)
Severe Hypertension		3(2)	3(3)	6(3)
Severe Malaria		2(1)	2(2)	4(2)
HIV		0(-)	4(4)	4(2)
Diabetes		0(-)	2(2)	2(1)

4.10 Factors Contributing to Perinatal Deaths

Several factors contribute to occurrence of perinatal deaths. Health facility, maternal and newborn contributing factors were identified by the review teams. The teams also identified action that could prevent prenatal deaths in the future.

Table 8: Health facility, Maternal and Newborn/Foetal Contributing factors and Future Action

Factors /Action	Frequency	Percentage	Cumulative %
Health Facility Factors			
Poor quality of ANC services	26	36	36
Lack of facilities, equipment and supplies	9	13	49
Delay in diagnosing intrapartum Complications	9	13	62
Delay in decision making at HF level	6	8	70
Problems in Management Procedures	6	8	78
Poor monitoring of labour	6	8	86
Inadequate skills among health workers	5	7	93
Delayed Referral from other HF	4	6	99
Inadequate number of staff	1	1	100
Maternal Factors			
Lack of compliance to delivery services	69	42	42
Maternal Conditions/complications	52	31	73
Maternal risk factors	14	8	81
Lack of compliance to ANC services	13	8	89
Use of local herbs	6	4	93
Inadequate knowledge and education	6	4	97
Poor care practices for newborn	3	2	99
Delayed care seeking for sick newborn	2	1	100
Newborns Factors			
Prematurity/Low birth weight	13	17	17
Asphyxia/foetal distress	12	16	33
Malpresentation/ malposition	13	16	49
Congenital Malformation	10	13	61
Big baby	7	8	69
Cord around the neck	7	9	78
Infection malaria	6	7	85
Anaemia/bleeding	6	8	93
Twins/ Triplets	5	7	100
Proposed Actions			
Health Education/ Community Sensitization	54	43	43
Improve quality of Management of labour	27	21	64
Provide facilities, equipments and supplies	18	14	78
Capacity building of health workers	16	13	91
Family/communities compliance	10	8	99
Improving Referral/Ambulance	2	2	100

4.10.1 Health Facility Factors

The categories below emerged as a result of health facility factors identified by the review team. Poor quality of ANC ranked the highest 38% this included late detection of risk factors, SP for IPT not given and not checking; blood pressure, RPR test for syphilis, haemoglobin and other basic investigations.

Lack of facilities equipment and supplies included lack of facilities to care for pre-terms, lack of resuscitation equipment including oxygen and lack of laboratory facilities for appropriate investigations like culture and sensitivity.

Delay in decision making at health facility level involved delay in taking action for alternative mode of delivery. There was also delay in diagnosing intrapartum complications, malpresentation, cord prolapse, foetal distress and obstructed labour.

Poor management procedures were poor history taking and incomplete examination. Newborns were not properly assessed, managed and monitored. Poor monitoring of labour included inadequate or no foetal monitoring and not using or poorly filling partographs. Inadequate skills were mentioned for management of labour, neonatal resuscitation and management of sick newborns.

4.10.2 Maternal Factors

The highest ranking maternal factor was compliance to delivery advice 42%. Many mothers came to the health facility late in labour, some in second stage with complications; few delivered at home and on the way and some were considered uncooperative.

Mothers did not comply with ANC services advice by late, inadequate attendance, not using IPT and others. Maternal risk factors included high parity, previous caesarean

section and young age. Identified maternal conditions and complications include antenatal and intrapartum complications.

4.10.3 Newborn or Foetal Factors

The factors identified were newborn or foetal complications or risk factors. Prematurity and Asphyxia ranked highest 17.33% and 16% respectively. Congenital malformation ranked third at 13.3%.

4.10.4 Proportion of Deaths that could have been Avoidable

After discussing the each perinatal death and the circumstances surrounding the death the health facility perinatal review teams decided whether or not this death was avoidable. In 45 cases this was not filled, of those that were filled over half 55% were considered avoidable. Fresh stillbirths and early neonatal death were more likely to be avoidable (64% and 58%) than macerated stillbirths 34% ($p < 0.001$).

4.11 Proposed actions to Further Prevent Neonatal Deaths

The proposed actions strongly emphasized the need for community sensitization and health education (42.52%). The proposed health education themes were early care seeking for ANC, delivery services and sick newborns, family planning, birth preparedness danger signs in pregnancy labour and newborns. Improving the quality of management of labour included foetal monitoring and use of partograph to monitor labour. Providing facilities, equipment and supplies included reagents for syphilis testing and establishing units for preterm care with resuscitation equipment including oxygen supply. Proposed capacity building for health workers included supportive supervision and on job training on management of labour, newborn resuscitation and management of sick newborns

4. 12 Quality of Reviews

Out of 418 only 115 (27.5%) had action plans, the action plans included problem identification, action to be taken, time frame and outcome indicator. Each component of the plan was scored for appropriateness with score 1, 2 and 3 representing unsatisfactory, good and very good. The average score was less than two for each component meaning that in general they were unsatisfactory. For time frame and outcome indicator over two thirds were unsatisfactory. Time frame and outcome indicator were not filled for 30.43% and 26.96% respectively among the reviews that included action plans. The overall score was then calculated for each plan the highest possible score being 12. The overall scores were categorized as follows; unsatisfactory (≤ 6), good 7-9 and very good 10-12. Majority of the plans (75%) were unsatisfactory and only 2% of plans were very good.

Table 9: Quality of Action plans

	Unsatisfactory N (%)	Good N (%)	Very Good N (%)	Average Score
Action Plans				
Problem Identification	56(49)	38(33)	21(19)	1.7
Appropriate Action Plan	55(48)	53(46)	7(6)	1.6
Time frame	60(71)	20(24)	4(4)	1.2
Appropriate Indicator	63(64)	32(33)	3(3)	1.3
Overall Score of Plans				
Number of plans	86(75)	27(23)	2(2)	

5.0 Discussion/ Conclusions

This study covered 418 perinatal over a four year period; early neonatal deaths 46%, 31% fresh still births and 23% macerated stillbirths. Even though reports came from 71% of regions and 23% of districts the coverage of reviewing and reporting perinatal deaths within these areas was very low. The calculated overall perinatal death review rate was 1.4/ 1000. Incomplete health facility level data (Health Management Information System) of annual number stillbirths reported in zonal RCH reports documents over 7,000 per year. The number of early neonatal deaths could not be determined from health facility data since in HMIS they are reported as neonatal deaths. However the reported stillbirths show that majority of perinatal deaths within health facilities are not being reviewed.

Hospitals were the majority of reporting facilities these were Designated District.

Hospitals (DDH), District hospitals and FBO hospitals, 3 were regional hospitals however no consultant hospital reported. A study at Muhimbili National Hospital (consultant level) analyzed 9, 632 perinatal deaths over five years.¹² Hospitals are more likely to have more cases of perinatal deaths than primary health facilities because they handle complications however it is obvious that there is also under reporting from the primary level.

In Tanzania about 40% of hospitals are owned by Faith Based Organizations (FBO) 54% of the reporting health facilities were owned by FBO's. Private for profit owned health facilities account for 15.4% of the health facilities in Tanzania but only 2 private maternity homes reported.¹³

None of the health facilities reported consistently over the four year period, even facilities which provided regular reports in 2005 and 2006 did not report in 2007. This could be due to lack of feedback, several studies have commented on effectiveness of feedback especially when it is active feedback accompanied by recommendations.¹⁴

South Africa trained and supported health facilities to conduct perinatal death reviews and report consistently to the Perinatal Problem Identification database (PPIP).

Progressively new reporting health facilities were added; the 2003-2005 PPIP report covered 20% of all births in the country. The PPIP is used to generate reports with recommendations towards reduction of perinatal deaths.¹⁵ such strategies should be considered to increase reporting coverage.

A South African studies have demonstrated that deaths significantly reduced with quality improvement after conducting perinatal death reviews.¹⁶ A Cochrane review and WHO commentary also suggest that audit and feedback can be effective in improving professional practice especially when baseline adherence to recommended practice is low and feedback delivered more intensively. Factors that influence effectiveness of feedback include provision of feedback by senior person, continued feedback sessions, face to face feedback with individuals and feedback combined with educational meetings.^{17, 18}

The study analyzed information that had been collected as part of routine health care and not for research purposes. This is a limitation since procedures that ensure complete and consistent records during data collection for research could not be applied. Some data was missing due to incompletely or incorrectly filled forms and notification forms from different health facilities had different numbering, with or without coding therefore had to be harmonized.

The stillbirth and perinatal mortality rates for reporting health facilities could not be calculated since national level data show number of annual births and stillbirths by district not by health facility. Completeness of reporting by health facility also could not be calculated.

Institutional level Perinatal mortality Rate (PNMR) in developing countries is partly dependant on non health service factors due to low coverage of institutional deliveries .Reviewing trends of PNMR in an institution over several years or comparisons to similar facilities with similar social-economic and cultural settings is a way to reduce confounding effects on reliability of PNMR as an indicator of care. Despite the limitations institutional PNMR is an important indicator to help health facilities track progress.¹⁴

The WHO country estimate for perinatal mortality rate is 69 per thousand births in Tanzania.¹ Other studies in Tanzania conducted at health facility level identified perinatal mortality rates of 96 and 124 /1000 births^{12,19}, community studies reported PNMR of 68 and 73/1000^{19,20}. South African studies show a much lower rate 37.5 and 26/1000.^{15, 16} It is well known that mortality rates for boys in the early neonatal period are higher than those for girls.¹ In all categories of perinatal deaths males were more than females with an overall male to female ratio of **1.5:1**.

In Tanzania more than half of pregnant women 53% deliver at home without assistance from a skilled attendant, (19%) TBA's and (31%) by relatives 3% others.³ A prospective study in rural Tanzania compared perinatal mortality in health facility and home deliveries they found that 76% of the perinatal deaths from the two groups occurred in home deliveries.²¹

In this study 91% of perinatal deaths were delivered in health facilities only 4% were delivered at home. Therefore suggesting that newborns that were delivered at home and had complications are likely to remain at home till death without any contact with skilled provider, also stillbirths in the community are not reported to the health facility. This implies that even if there is completeness of reporting in all health facilities, still more

than half of the perinatal deaths will remain uncounted. A system needs to be put in place to track perinatal deaths in the community and address avoidable causes.

In Tanzania antenatal care coverage is high (94% at least one visit) yet the quality of services needs to be improved. According to the Tanzania Service Provision Assessment (TSPA) blood pressure, urinalysis and anemia is checked in 79%, 27% and 41% of ANC clients respectively. Only 50% of health centres and 13 % of dispensaries were able to test for syphilis.⁸ In this study untreated syphilis, undetected hypertension, anaemia, and malaria were avoidable contributing factors that could have been appropriately managed and prevented perinatal deaths.

Compliance to ANC and delivery services was the highest ranking maternal factors contributing to perinatal deaths. The reviewers identified delayed first visit to ANC clinic and inadequate frequency as a problem. A community based study conducted in 5 districts in Tanzania showed that the objective of ANC was poorly understood by pregnant women. Many women reported so that they know the size of the baby and whether it was alive. They start ANC clinic late because they don't see the need or believe the baby cannot be felt till quickening starts. Poor communication between health workers and clients including bad attitude of some health workers further affect attendance.²²

In this study many mothers also delayed to come to the health facility for delivery often presenting with complications, in some cases it was because of transport. The community based study suggests that TBA's and in-laws may influence delay but further in depth research is needed to understand culture and traditions that influence such decisions.²².

Intrapartum complications have a bearing especially on fresh stillbirths and early neonatal deaths. In this study 62% of cases had intrapartum complications, the most common being foetal distress and obstructed labour. Appropriate and prompt management can significantly reduce perinatal deaths.

Birth asphyxia and prematurity were the leading causes of neonatal deaths similar to national average and other studies.^{4, 12} Forty five (45%) of cases had APGAR score below five. The study shows that even at hospital level basic resuscitation supplies like oxygen and other equipment such as neonatal ambu bags and masks are also not available. There is also a deficit in skills for neonatal resuscitation. The TSPA documented that only 16% of health facilities offering delivery services have an emergency respiratory support system for newborns and only 3% had a heat source.⁸ Ensuring availability of resuscitation equipment and supplies and enhancing health worker skills through training and mentoring has the potential to improve the outcome of babies with birth asphyxia. From this study it is also evident that there is a gap in pre-term care. Several hospitals mentioned the need for preterm unit and others the need to have incubators. Hypothermia was documented as a cause of death in several pre-terms.

Low birth weight in the perinatal deaths (55%) was much higher than the national average 13%.³ These findings are similar to another health facility based perinatal death study in Tanzania where LBW was 59%¹². Low birth weight is a contributing factor to neonatal mortality, in Tanzania 85% of neonatal deaths are LBW.⁵ Another study looking at early neonatal mortality also showed risk of early neonatal mortality reduced with increasing birth weight.²³

None of the reporting health facilities referred to Kangaroo Mother Care (KMC) as an option to care for preterm or LBW babies which is a cost effective intervention.⁷

Hospitals should have appropriate facilities to care for LBW, preterm and sick newborns.

Fresh stillbirths are influenced by intrapartum care therefore many can be avoided by appropriate and timely management of complications, however macerated still births are mainly influenced by antenatal care and environmental factors which are events before labour.¹⁴ Over half 54% of the perinatal deaths were considered by health workers to be avoidable however for macerated still birth 66% were considered not avoidable, in a review of other studies the proportion of avoidable deaths ranged from 26 -76%.¹⁴ In this study the consideration of whether the death was avoidable or not was not systematically defined by the health facilities some focused on health facility factors whereas others included maternal factors that could have been avoided.

The action plans in most of the reviews were not specific to effect change and 74% were graded as unsatisfactory. As an example, in cases where the problem was poor monitoring of labour the identified action was “to monitor all patients in labour”. Other studies have stated that a combination of strategies should be used to implement change e.g. recognition of positive behavior, education and supervision, follow up audit and feedback, financial incentives and administrative regulation.¹⁴ The outcome indicators also need to be specific so that change can be effectively tracked.

6.0 Recommendations

This study clearly demonstrates the challenges of moving from policy to implementation. Perinatal death audit or reviews has been proved an effective strategy to reduce perinatal deaths. However if completeness of reporting and quality of the reviews are not supported it becomes an exercise that wastes time. Active feedback should be given to all reporting

levels in a cascade manner from national to regional, district and finally district to health facility. Policy guidelines should be in place in all health facilities. Reinforcement of positive behaviour of individuals and facilities, training, mentoring and supportive supervision should be considered as strategies to increase coverage and quality of reports.

Socio-economic and cultural factors including traditional beliefs have a bearing on perinatal mortality, hence community interventions including investigation of perinatal deaths at community level need to be implemented to reduce perinatal mortality. Health facility services also need to be linked to community maternal newborn and child health interventions to ensure a continuum of care from household and community level to health facility levels.

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ANNEX A

Serial No.

(MoH use only)

THE UNITED REPUBLIC OF TANZANIA - MINISTRY OF HEALTH

PERINATAL DEATH NOTIFICATION FORM - B

This form should be filled after REVIEW session and submitted to all levels according to guidelines.

Fill in the blanks or circle the appropriate response(s)

1. Name of the facility : District Region.....
1. Category of health facility:
3. Name of the mother of the deceased (Baby of)
4. Full address of the mother of the deceased: Region: District
5. Condition of deceased baby at birth:
6. Date of birth (Including Stillbirth):
7. Name and place where the baby was delivered:.....
8. Category of place of delivery:.....
9. What was the mode of delivery:
10. Delivery was assisted by:.....
11. Weight at birth Kg. Not recorded
12. Sex of the baby:
- *13. Gestational age at birth:
- 14 If born alive, what was the APGAR score at 5 minutes:.....
15. Date of admission of the newborn:..... Time of admission
16. Date of death of the newborn:..... Time of death
- *17. Duration of life after birth:.....
- *18. Is the mother alive?
19. Mother's inpatient number of admitted:.....
20. Mother's age:.....Years
21. Mother's marital status:.....
- *22. Parity of the mother including this delivery:.....
23. Mother's education:

- 24. Mother's occupation:
- 25. Father's education:
- 26. Father's occupation:
- 27. Did the mother attend antenatal clinic:.....
- *28. Relevant antenatal problems detected:
- *29. What were the Intra-partum complications:.....
- 30. Duration of labour in case of vaginal delivery
 1st Stage:..... 2nd Stage:
- 31. Duration of labour in case of cesarean section
 a) Time from onset of labour to C/S.....Hrs b) Type of anaesthesia used:.....
- 32. Post partum complications:
- *33. Congenital malformations:.....
- *34. Events before death in case of a live baby:.....
- *35. Probable cause of death in a live baby:.....
- *36. Probable cause(s) of stillbirth:.....
- 37. From information available and the assessment carried out was this peri-natal death avoidable?:.....

38. Briefly explain factors that contributed to this perinatal death at following levels:

Health facility:

Antenatal factors

*What were the maternal factors which could have contributed to the death of the baby?

Foetal/newborn factors

.....
.....
.....
.....
.....

*39. What could have been done to prevent this perinatal death?

Problem Identified	Action to be Taken	Responsible Person	Timeframe	Outcome Indicator