Perinatal mortality and associated factors among deliveries in three municipal hospitals of dar es salaam, tanzania

Abstract

Introduction: Perinatal mortality is one of the indicators used to measure the health status of women, newborns and the quality of health provided during antenatal and perinatal period. In Tanzania, Neonatal mortality has remained high (26/ 1000 live births) and it is estimated that more than 1.6 million babies are born every year of which 51,000 die within the first 28days of life. The objective of this study was to determine the causes and factors associated with perinatal deaths among women delivering in the three municipal hospitals in Dar es Salaam, Tanzania. **Materials and methods:** The study employed an unmatched case control study design and was conducted between November 2010 and February 2011. A pretested and structured data abstraction tool was used to collect information from labour ward registers and the antenatal cards of mothers of the study participants. Data was entered into the computer, cleaned and analyzed using EPI INFO 3.5.1 software. Bivariate analysis was done using the Chi-square test and multiple logistic regression was used to determine the variables which are independent predictors of perinatal mortality. **Results:** A total of 600 babies (200 cases and 400 controls) were included in the study. Major causes of perinatal mortality included prolonged/ obstructed labour (22%), pre-eclampsia/ eclampsia (23%), and prematurity accounting for 18.5% of the perinatal deaths. Mothers of the cases were more likely to have a history of previous adverse pregnancy outcome (AOR 2.35, 95%CI 1.15-4.79), hypertensive disorder (AOR, 6.67, 95%CI=3.55-12.64), and premature delivery (AOR 12.18, 95%CI=6.60-67.95). **Conclusion:** Pre-eclampsia/ eclampsia, prolonged/ obstructed labour, and prematurity were found to be the main causes of perinatal mortality. Hypertension during pregnancy, a history of previous adverse pregnancy outcome and prematurity, were significantly associated with increased risk of perinatal death. We recommend active screening for risk factors during ANC and timely management of hypertension and obstructed/ prolonged labour.

Keywords: perinatal mortality; causes; risk factors; tanzania

Volume 1 Issue 4 - 2014

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Received: July 17, 2014 | **Published:** August 01, 2014

Introduction

Perinatal mortality is used as one of the indicators of the quality of health provided during the ante natal and perinatal period.[1] Globally about 136million births occur every year, and of these approximately 3.7million die during the neonatal period and 3.3million are stillbirths.[2]. Perinatal mortality in developing countries is five times higher than in developed countries at 10 deaths per 1000 total births in developed regions, and 50 per 1000 in developing regions and over 60 per 1000 in least developed countries. In the African region perinatal mortality is estimated at 62 deaths per 1000 births which is the highest.[1,2] Approximately 38% of deaths among children younger than 5years of age occur during the first 28 days of life (neonatal deaths), and 75% of these neonatal deaths occur within the first 7 days.[2] Causes and determinants of early neonatal deaths and stillbirths are attributed to poor maternal health, inadequate care during pregnancy, inappropriate management of complications during pregnancy and delivery, poor hygiene during delivery and in the first critical hours after birth, as well as lack of newborn care.[2,3] In Tanzania, it is estimated that more than 1.6million babies are born every year and of these 51,000 die within the first one month of life. Perinatal mortality in Tanzania has remained unacceptably high for the past decade at 26/ 1000 live births.[4]

On recognition of the challenge in reaching the MDG 4, the African union declaration by heads of states and governments in September 2004 urged all countries in the region to accelerate reduction of maternal and newborn deaths. In response to this, Tanzania developed the National road map strategic plan to accelerate reduction in maternal and newborn deaths in Tanzania (2006-2010) which stipulates strategies to guide stakeholders including the government, development partners, NGOs, civil society Organization and communities among others, in working together towards attainment of the health Millennium Development goals.[5] Further support for in-cooperating child health interventions into the one plan was voiced by various stake holders and partners following the launching of the Tanzania partnership for maternal newborn and child health (TPMHCH) in April 2004. Subsequently, the New Delhi declaration 2005 further re-emphasizes the efforts and strategies in attaining the Millennium development goals in which countries including Tanzania committed to develop national ONE PLAN for maternal, newborn and child health for accelerating the reduction of maternal, newborn and child deaths in order to improve coordination, align resources and standardize monitoring.[6]

Tanzania has instituted several interventions which aim at addressing both maternal and child health such as, doubling public expenditure on health, increased coverage of key maternal, newborn and child survival interventions; Improving the quality of antenatal care through provision of Focused Antenatal Care (FANC), screening and treatment of syphillis, prevention of mother to child transmission of HIV, use of insecticide treated bed nets and training of health care

providers on care during pregnancy and child birth including obstetric emergency situation, lifesaving skills and provision of essential supplies and equipment.[5] Despite these ongoing interventions aimed at reducing perinatal deaths, insignificant reduction in perinatal mortality has been observed from 40/ 1000 live births in 1994 to 26/1000 live births in 2010. It is therefore important to establish the causes and predominant risk factors for perinatal deaths. The main objective of the study was to generate knowledge about the causes and risk factors for perinatal deaths in the municipal hospitals in Dar es Salaam. This will assist and guide health managers in making comprehensive plans and effective interventions to reduce perinatal mortality.

Materials and methods

Study design

The study employed an unmatched case control study design and it was conducted from November 2010 to February 2011. Quantitative research methods were employed and a structured data abstraction tool was used to collect the information.

Study area

The study was conducted in Dar es Salaam region with a total area of 1393 Sq.kms. Dar es Salaam has a population of 4,364,541with an annual growth rate of 4.3%. The number of women of child bearing age (15-49 years) is 1, 386, 425.[7] The proportion of deliveries that take place in health institutions in Dar es Salaam is 91%.[4] Administratively the city is divided into three municipal councils namely Ilala, Kinondoni and Temeke, and each of these councils has a municipal hospital. All hospitals provide comprehensive maternal, newborn and child health services. At the time of the study, all of these hospitals had more than 200 hospital beds and a minimum of 14 delivery beds. The hospitals conducted deliveries ranging from 1200 to 2,400 per month and the number of perinatal deaths ranged from 25-70 per month.

Study population

All women who gave birth in the three hospitals during the study period were observed and when a perinatal death occurred the mother was recruited in to the study as a case and the next two mothers, who delivered after the case and had live baby at discharge in the same labour ward, were recruited into the study as controls.

Data collection

Qualified nurses working in the hospital labour wards were recruited as research assistants. The research assistants were trained for two days on the objectives of the study, interview techniques and how to fill in the data abstraction form. The data abstraction tool was pretested for clarity reliability and validity before it was finalized for use. The abstraction tool was used to collect information on Socio-demographic characteristics of the mother, ante natal care utilization, gestational age at delivery, complications detected in the intrapartum period, birth weight of the baby, mode of delivery and the condition of the baby at birth and at discharge. The questionnaires were checked daily for completeness and consistency by the investigators. Questionnaires which were found to be incomplete or with inconsistent information, corrections were made by returning to the respondent for clarification.

Data analysis

Data were entered into the computer, cleaned and analyzed using EPI INFO 3.5.1. Software. Descriptive analysis was performed by running frequency distributions of maternal socio-demographic factors for both cases and controls. Bivariate analysis was done and Odds Ratios were used as measures of association and statistical significance was assessed at 95% confidence level. Factors that showed association in bivariate analysis (at p<0.20) and potential confounders were added into a multiple logistic regression model to identify factors that were independently associated with perinatal death.

Ethical issues

The study obtained ethical clearance from Muhimbili University of Health and Allied Sciences, Research Ethics Review Committee. Permission to conduct the study was obtained from the Dar Es salaam Regional Medical Officer (RMO) and the District medical Officers (DMOs) of the respective municipalities. Only women who gave a written informed consent were recruited to participate in the study. To maintain confidentiality at all levels of data handling and management, participant's names were not included in the data collection tools and data were entered into password coded computers.

Results

A total of 600 newborn babies were recruited into the study from 3 municipals hospitals in Dar as Salaam. Of these 200 were cases and 400 were controls. Two hundred and fifty two babies (42%) were recruited from Amana hospital where as only 25.5% were recruited from Temeke Hospital. Maternal age ranged from 15 to 40years. Mothers of the cases had a mean age of 25±5.7years, where as those for controls had a mean age of 26±6.2. Majority (80%) of the mothers were in the aged between 20-35 years. Over three quarters (78.8%) of mothers had primary education, 91% were married and a third of the women (33.5%) gave birth for the first time. None of the maternal socio demographic characteristics showed a statistically significant difference between cases and controls (p>0.05) (Table 1).

Causes of perinatal deaths by municipal hospital

Of the 200 perinatal death cases 163 (81.5%) were still births of which 96 were macerated still births and thirty seven (18.5%) were early neonatal deaths that occurred in the first 24 hours of delivery. The causes of death were reportedfor only 165 (82.5%). In 35 (17.5%) new born deaths, the cause of death was not documented in the records. Pre-eclampsia and eclampsia accounted for 46 (23%) deaths whereas prolonged and obstructed labour accounted for 44 (22%), and prematurity accounted for 37 (18.5%). Others causes included cord accidents, accounting for 21 (10.5%) and abruptio placenta which accounted for 17 (8.5%). Table 2 shows the distribution of causes of perinatal deaths by hospital.

Perinatal death by maternal and foetal characteristics

Table 3 shows maternal and fetal characteristics for cases and controls in the three municipal hospitals. Maternal and foetal factors that were significantly associated with perinatal mortality (P<0.05) were; number of ANC visits where women with ≤3 visits were almost 2 times more likely to have a perinatal death compared to those who attended for more than 3 visits (OR- 1.79, 95% CI 1.28-2.54). Women with a previous history of adverse pregnancy outcome were almost three times more likely to have a perinatal death compared to those who had no history of an adverse pregnancy outcome (OR 2.75 (95% CI 1.5-4.97) and premature delivery at the gestation age of 35weeks or less were 25 times more likely to be associated with perinatal death compared to those who delivered after 35weeks of gestation (OR- 23.9 (95% CI 11.6-49.2). Also findings showed that mothers who had

hypertension during pregnancy were almost seven times more likely to have a perinatal death compared to those who had no hypertension during pregnancy (OR 6.67 (95% CI 3.26-12.64) and babies born with birth weight less than 2500 grams were six times more likely to be delivered stillborn or have an early neonatal death compared to those who were born with a birth weight of more than 2500grams.

Risk factors for perinatal death

Factors observed to be associated with perinatal mortality in bivariate analysis were added in to a multiple logistic regressions in order to control for potential confounders such as parity, maternal age and gestational age. Factors that were found to be independently associated with perinatal death were, maternal hypertension, history of previous adverse pregnancy outcome and prematurity or delivery below 35 weeks of gestation; Women who had hypertension during pregnancy were five times more likely to have a perinatal death compared to those who had no hypertension (OR 5.04 (95% CI 2.11-12.04), Women with a history of previous adverse pregnancy outcome were two times more likely to have a perinatal death than those who had history of a live baby (OR 2.35 (95% CI 1.15-4.79), and Women who had delivered at 35 weeks or less gestational age were more likely to have a perinatal death compared to those who delivered after 35 weeks of gestation (OR 21.8 (95% CI 6.6 -67.95) as show on Table 4 below.

Table 1 Socio demographic characteristics of cases and controls

Category	Cases(n=200)(%)	Controls(n=400)(5)	Total(n=600)(%)	P value
Hospital				
Amana	42	42	42	
Mwananyamala	32.5	32.5	32.5	1.00
Temeke	25.5		25.5	
Maternal Age(Years)				
<20	11	12.5	12	
20-35	81	79.5	80	0.866
>35	8	8	8	
Maternal Education Level				
None formal	3.5	3.3	3.3	
Primary education	77.5	79.2	78.7	0.885
Secondary and above	19.0	17.5	18	
Maternal Occupation				
Employed	42.4	45.3	44.3	0.523
Unemployed	57.5	54.8	55.7	
Marital Status				
Never married	11.5	7.8	9.0	0.130
Married	88.5	92.2	91.0	
Parity				
0	34.5	33.0	33.5	
1-2	46.5	47.7	47.3	0.980
3-4	16.0	16.5	16.3	
>=5	3.0	2.8	2.8	

Table 2 Causes of perinatal deaths

Cause	Amana N=84(%)	M'nyamalaN=65(%)	Temeke N=51(%)	Total N=200(%)
Abruptio Placenta	8(9.5)	5(7.7)	4(7.8)	17(8.5)
Cord Accidents	4(4.8)	9(13.8)	8(15.7)	21(10.5)
Prolonged/ Obstructed **Labour**	23(27.4)	8(12.3)	13(25.5)	44(22)
Pre-eclampsia/Eclampsia	20(23.8)	15(23.1)	11(21.5)	46(23)
Prematurity	16(19.0)	16(24.6)	5(9.8)	37(18.5)
Course Not Recorded	13(15.5)	12(18.4)	10(19.6)	35(17.5)

Table 3 Perinatal deaths by mothers' characteristics

Characteristics	Cases	Controls	Crude OR	95% CI	P-Value
Maternal age(years)					
<20	22(11.0)	50(12.5)	0.86	0.5-1.47	0.30
20-35(ref)*	162(81.0)	381(79.1)	1.00	-	-
>35	16(8.0)	32.0(8.0)	0.98	0.52-1.84	0.48
Maternal height(cm)					
≤150	58(29.0)	102(25.5)	1.19	0.18-1.74	0.18
>150	142(71.0)	298(74.5)	1.0		
ANC Visits					

Table Continued...

Characteristics	Cases	Controls	Crude OR	95% CI	P-Value
Maternal age(years)					
≤3 Visits	107(53.5)	156(39.0)	1.79	1.28-2.54	0.0003
>3 Visits	93(46.5)	244(61.0)	1.0		
Gestational age at first ANC Visit					
> 16 weeks	134(67)	249(62.3)	1.23	0.86-1.76	0.13
≤16 weeks	66(33.0)	151(37.7)			
Parity					
0	69(34.5)	132(33.0)	1.06	0.74-1.53	0.35
1-4(ref)	111(55.5)	236(59.0)	1.00	-	-
>4	20(10.0)	32(8.0)	1.28	0.70-2.29	0.20
Maternal hypertension					
Yes	39(19.5)	14(3.5)	6.67	3.26-12.64	<0.001
No	161(80.5)	386(96.5)	1.0		
Prematurity(gestational age at delivery)					
<35 weeks	71(35.5)	9(2.3)	23.9	11.62-49.19	<0.001
≥35 weeks	129(64.5)	391(97.7)	1.0		
Maternal HIV status					
Yes(Positive)	14(7.0)	23(5.8)	1.23	0.62-2.45	0.27
No(Negative)	186(93)	377(94.2)	1.0		
Foetal birth weight(grams)					
≤2500	86(43)	44(11)	6.10	4.01-9.29	<0.001
>2500	114(57)	356(89)	1.0		
Previous adverse pregnancy outcome					
Yes	28(21.4)	24(9)	2.75	1.52-4.97	0.0004
No	103(78.6)	243(91)	1.0		

Table 4 Risk factors for perinatal deaths

Risk fator	Cases	Controls	Adjusted odds ratio	95% CI
Maternal hypertension				
Yes	39(19.5)	14(3.5)	5.04	2.11-12.04
No	161(80.5)	386(96.5)	1	
Previous adverse pregnancy outcome				
Yes	28(21.4)	24(9.0)	2.35	1.15-4.79
No	103(78.6)	243(91.0)	1	
Prematurity(gestational age at delivery)				
<35 weeks	71(35.5)	9(2.3)	21.18	6.60-67.95
≥ 35 weeks	129(64.5)	391(97.7)	1	
Birth weight				
<2500	86(43.0)	44(11.0)	1.98	0.58-28.49
>2500	114(57.0)	356(89.0)	1	
ANC Visits				
≤ 3	107(53.5)	156(39.0)	1.10	0.66-1.86
>3			1	

Discussion

This study found that the most common causes of perinatal deaths included pre-eclampsia and eclampsia, prolonged and obstructed labour, prematurity, Cord accidents and abruptio placenta. Risk factors that were found to be independently associated with perinatal death in logistic regression included maternal hypertension during pregnancy, previous adverse pregnancy outcome and prematurity or delivery gestational age of 35 weeks or less.

Causes of perinatal deaths

This study found that the common causes of perinatal deaths included pre-eclampsia and eclampsia, prolonged and obstructed labour and prematurity. These results are similar to those observed in a large WHO trial which involved six developing countries, which observed that the most common primary obstetric cause of perinatal death was spontaneous preterm delivery 28.7% and hypertensive disorders 26.3%, and the relative importance of these two causes of death was reflected in the causes of 71 early neonatal deaths of which 60.5% were attributed to prematurity.[4,6] Majority of the perinatal deaths in this study population were stillbirths of which ninety six were macerated, and sixty seven were fresh stillbirths. This finding is consistent with another study done in Zimbabwe where the majority of stillbirths were macerated.[8]

Fresh stillbirth accounted for 33.5% of all perinatal deaths while early neonatal death accounted for 18.5% which are both likely to be related to intrapartum complications leading to foetal hypoxia and asphyxia. In a study done in rural Ghana, it was also found that the most important cause of intrapartum death was obstetric complications accounting for 59.3% and 33% of the deaths that occurred in the ante partum period and 10.1% were due to infections.[9] It has been proven that maternal infections such as malaria, syphilis are associated with

ante partum stillbirths and foetal growth restriction,[1,9,10] In studies done in different areas of Tanzania, in Mwanza and Dar es Salaam as well as in Central Sudan, it was observed that maternal infections were associated with adverse perinatal outcome.[11-13]

In this study causes of perinatal death that were identified included abruptio placenta. This findings compares well to a study done in Maweni hospital, Kigoma.[14] The proportion found in this study is however lower than that reported from another study done in Karachi Pakistan, where abruption was responsible for 22% of women with still birth.[15] Other studies have also identified placenta previa and abruptio placenta as an important cause of still birth.[16–18] Prolonged/obstructed labour was found to be causes of perinatal death accounting for 20% of all perinatal deaths. These findings are consistent with findings of other studies done in Tanzania and elsewhere. Mbaruku et al.[14] in their study found that 18.5% of all perinatal deaths were due to prolonged or obstructed labour. Similarly other studies have found that the main labour complication causing perinatal death among others is prolonged or obstructed labour.[9,15,18–20]

Findings of this study showed that Hypertensive disorders of pregnancy, pre eclampsia/ eclampsia were responsible for 23% of all perinatal deaths, which was higher than that observed in Maweni hospital of 4.5%.[14] Another population based study done in Matlab Bangladesh found pre-eclampsia and eclampsia to be associated with a high perinatal mortality of 323 and 152 per 1000 births respectively.[20] Other studies has also shown that Pre-eclampsia/ eclampsia, account for the majority of adverse pregnancy outcomes such as stillbirths, small for gestational age, low birth weight and preterm labour.[21–23] Prematurity accounted for 18.5% of all causes of perinatal death in this study, which is low than that observed by Kidanto et al.[24] in their study in Muhimbili where they obtained a total of 29% stillbirths being due to prematurity. Similarly another study done in rural Gambia observed that prematurity accounted for 30% of all cause of early neonatal death.[25] In this study cord accidents accounted for 10.5% of all causes of perinatal death similar to the findings of other previous studies .[14,26] Cord compression or accidents lead to intrapartum hypoxia and eventually asphyxia if not identified and intervened in the early stages of labour.[26]

These causes are indicators of poor antenatal care and poor intrapartum monitoring of the pregnant woman. Quality antenatal services with identification of the at risk mothers who may benefit from targeted interventions during pregnancy, and diagnosis of risk factors at the antenatal clinics as well as close monitoring by competent skilled attendant during pregnancy and delivery are means of reducing perinatal deaths due to these causes.[1]

Risk factors for perinatal deaths

Factors that were found to be independently associated with perinatal death included, maternal hypertension during pregnancy, previous adverse pregnancy outcome and prematurity/ gestational age at delivery less than 35weeks of gestation. Mothers who experienced an adverse outcome in the preceding pregnancy were two times more likely to have a perinatal death compared to the mothers who never had a an adverse pregnancy outcome in the past. This finding is in agreement with other previous studies.[18,27] This is probably due to the fact that the multiple etiologic factors that affect foetal survival are generally the same in all pregnancies of the same mother. This further emphasizes the importance of quality antenatal and intrapartum care. The difference in maternal height in this study was not found to be a risk factor for perinatal death, as no difference in the height was observed between the cases and controls. It has however been observed in other studies that short maternal stature of less than 150

cm increased the risk of perinatal mortality.[28] This can be explained, that Short maternal stature is a risks factor for prolonged and obstructed labour with consequent adverse perinatal outcome. The average height for both cases and controls in this study was however above the critical height of 150 cm.

Maternal age has been identified as a risk factor for perinatal death, however it was not found to be significant in this study, probably due to the fact that a low proportion of 8% in both cases and controls were above the age of 34 years. Advanced maternal age increases the risk for adverse pregnancy outcome as it has been reported in several other studies.[29–31] Advanced age has been associated with increased risk of medical complications as well as poor placental circulation, as found in the Norwegian study where normal pregnancy, was found to have an increase in uterine artery impedance in women above the age of 35. This finding was related to the physiologic process of aging and could partly explain why pregnancies among older women are associated with diverse complications more often than those in younger women.[31]

Antenatal service utilization was high in this study population, with all mothers having attended ANC at least once. During ANC, women are provided with health education for care during pregnancy, detection of danger signs, birth preparedness, nutrition and care of the new born and identification of high risk pregnancy. Mothers who do not book for ANC or book late are less likely to benefit from the health education. Mothers who had attended less than three antenatal visits were almost two times more likely to get a perinatal death compared to those who had attended more than three visits an association which disappeared in multiple logistic regression. This is in contrary with other finding from population based studies done in rural Kenya, Nigeria and Marondera in Zimbabwe, where lack of antenatal care was found to be associated with increased risk of perinatal deaths.[18,32,33] In these studies, however omen who had attended at least one ANC clinic were classified as having ANC care while in the current study since all women attended we considered the number of ANC visits. Attendance of ANC is protective if the services are of good quality such that thorough examination of the pregnant woman and provision of basic investigations and provision of preventive therapeutic interventions are conducted in order to identify and manage high risk pregnancies.

Conclusion

Factors that was independently associated with perinatal death included, gestational age less than 35weeks at delivery, a history of adverse pregnancy outcome in the preceding pregnancy and mothers with hypertension during pregnancy. Intrapartum events such as abruptio placenta, cord accidents, prolonged or obstructed labour, pre-eclampsia/ eclampsia and prematurity were identified causes for perinatal death. Improvement of reproductive and child health services at all levels of health care delivery is crucial in the reduction of perinatal deaths. In the ANC clinics and labour wards the focus should be on the practical importance of identifying those at risk in the clinics as well as timely identification and management of detected complications as well as care of the new born in the immediate postpartum period. During the Intrapartum period, emphasis should be laid on health care workers' practical means of early identification of complication and appropriate timely interventions of the complications.

Acknowledgements

Conflicts of interest

Author declares there are no conflicts of interest.

Funding

None.

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