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## Original article

## Perinatal mortality audit at Jimma hospital, South- Western Ethiopia, 199-1999

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### Abstact

A retrospective review of perinatal deaths that occurred during 1990-1999 at Jimma hospital, a teaching hospital in South-Western Ethiopia was conducted with the objective of determining the overall perinatal mortality rate and trend, identifying major causes and suggest possible preventive strategies. Record books of the maternity and neonatal wards were used to identify all perinatal deaths and live births that occurred during the study period and relevant sociodemographic and clinical data pertaining to the perinatal deaths were documented and analyzed. The overall perinatal mortality rate during the study period was 138.9 per thousand live births with an increasing trend. While 66.5% of perinatal deaths occurred among primigravid and grandmultiparous mothers, 52.7% were in mothers aged 20-29 years of age, and 14.9% were among teenage mothers. The majority of perinatal deaths were due to mechanical factors related to the peripartum period (53.3%), with obstructed labor with or without ruptured uterus being the single most important cause responsible for 37.4% of perinatal mortality. Other causes identified were hypertensive disorders (6.7%), lethal congenital anomalies (1.4 %), antepartum hemorrhage (2.1 %), and prematurity (7.2 %). In 28.9% of perinatal deaths, the cause could not be identified. This study has shown a high perinatal mortality rate with an increasing trend, the majority of deaths being due to mechanical factors related to the peripartum period. Analytic studies to identify mothers at risk for mechanical complications of labor like obstructed labor need to be conducted to identify mothers at risk for this peripartum complication so that limited resources can be focused on the provision of peripartum care to these groups to effect reduction in perinatal mortality.

### Introduction

Perinatal mortality rate, the number of fetal deaths after the twenty eighth week of pregnancy and neonatal deaths within the first seven days of life per thousand live births, is one of the important indicators of the health status of a given society. Perinatal death is one of the most significant contributors to infant mortality and reduced life expectancy.

The first report of the British perinatal mortality survey found a perinatal mortality rate of 33.1per thousand live births for England and Wales in 1958(1). However most recent reports on perinatal mortality in the developed world indicate a rate of 10 perinatal

deaths per thousand live births or less, the majority being in the very low birth weight premature infant (2). This steady decline, however, has not been reciprocated in the developing world where reports of perinatal mortality range from as low as 35 per thousand births to 100 per thousand live births. Estimate of the national perinatal mortality rate for Ethiopia is 100 perinatal deaths per thousand live births (3).

Reported rates of perinatal mortality vary widely. Billar found a rate of 22.4 per thousand live births in a relatively underprivileged population of Beirut (4). De Galaro Roosen et al

on a study of perinatal deaths in the Netherlands among 28, 983 births found a rate of 8.5 per thousand live births similar to rates found in the developed world (5). Lethal anomalies and placental insufficiency were the most frequent causes of death. Forssdas found a declining perinatal mortality rate in Finland from 8.8 to 6.7 per thousand births from 1987 to 1994 (2). The major reasons for the reduction was the improved survival of very low birth weight infants, which constitute the majority of perinatal mortality in the developed world. Nguyen from a Ho-Chi Minh city community-based study found a perinatal mortality rate of 25 per thousand live births. Major causes of perinatal mortality in their study were prematurity (33%), congenital anomaly (15%), perinatal asphyxia (12%), perinatal infections (11%), birth injury (4%) and unknown (16%) (6).

Dasgupta et al in a study on perinatal mortality in a medical college hospital in India found a perinatal mortality rate of 67.7 per thousand live births, 29.3% being early neonatal deaths (7). Major risk factors for perinatal deaths in their series were toxaemias of pregnancy (14.8%); severe anemia (13%) and antepartum hemorrhage (2.6%), 66.8% of all deaths occurring among the primipara. In the same locality in a community-based study of perinatal mortality, Nielsen et al found a rate of 42.0 perinatal death per thousand live births, indicating the overestimation that could occur in hospital-based studies (8).

Perinatal mortality studies from African settings display even more dismal findings. Mc Dermont et al found a rate of 68.3% per thousand live births, major risk factors for perinatal deaths being nulliparity, reactive serology for syphilis, and previous perinatal deaths (9). They suggested concentrating on the management of labor in the nulliparous mothers would reduce perinatal mortality significantly.

Health institution-based studies on perinatal mortality and its major causes have been conducted at Addis Ababa and Jimma hospitals. Ghidey et al analyzed 4251 deliveries at Jimma Hospital from 1985 to 1989. They found a perinatal mortality rate of 95.9 per thousand live births with a stillbirth to early neonatal deaths ratio of three to one. Obstructed labor was responsible for 41% of all deaths (10). Naeye et al found the perinatal mortality at Tikur Anbessa hospital, a teaching hospital in Addis Ababa to be 91 per thousand live births and they found obstructed labor to be the second commonest cause of mortality at this tertiary care hospital (11). They ascribed most of the deaths to delays in seeking timely obstetric care by the patients. In a review of maternal and perinatal deaths at Tikur Anbessa hospital for the one-year period in 1980, Frost found the perinatal mortality to be 86 per thousand live births with mechanical causes responsible for 31.9% of the deaths, much less than the study reported from Jimma hospital. It was difficult to ascribe any cause of death in 19.8 % of the cases, which were unexplained (12).

Sahle Mariam and Berhane studied the neonatal mortality rate of 1334 singleton neonates born at three Addis Ababa hospitals prospectively followed during the neonatal period. They found the early neonatal mortality rate to be 50.9 per thousand live births, the main risk factors for perinatal mortality being low birth weight and prematurity. Early neonatal mortality accounted for 71 % of the total neonatal mortality rate (13). Kambarami found exceedingly high rates of perinatal mortality in community-based studies in two rural districts of Zimbabwe 182 and 48 perinatal deaths per thousand live births (14).

This ten-year retrospective perinatal mortality study was conducted to determine the perinatal mortality rate of the hospital and the changing trend over the years; determine major causes of perinatal deaths; outline sociodemographic characteristics and clinical profile of mothers with perinatal deaths, and suggest possible preventive strategies.

## Methods

A retrospective review of all perinatal deaths that occurred from September 1990 to May 1999 at Jimma hospital was undertaken. Jimma hospital, located in Southwestern Ethiopia three hundred and forty kilometers from Addis Ababa has been a teaching hospital affiliated to the Jimma Institute of Health Sciences for the last fifteen years. Referral patterns to the hospital during the period of 1990-1999 indicate that the hospital has been the referral unit for obstetric emergencies from a radius of three hundred to four hundred kilometers. As a teaching hospital, it has had the services of at least one obstetrician – gynecologist and one pediatrician during the study period. Twenty-five beds serve the maternity ward of the hospital excluding five labor suite coaches. The mean yearly number of deliveries at the unit was 1342.

Perinatal mortality is defined in the developed world as all fetal deaths after the 24th week of pregnancy and all neonatal deaths upto the 7th day of life per thousand total deliveries. It is computed from total deliveries as this data is easily obtainable in the developed world as most deliveries are duly registered. On the other hand total number of deliveries are difficult to compute as registration is poor in most of the developing world. Hence in the developing world and WHO, PNM is defined as all fetal deaths after the 28th week of life and neonatal deaths upto the seventh day of life per thousand live births, which is the definition used in this study. Currently due to the increasing survival chances of the premature neonate and as more of the neonatal deaths are occurring late in the neonatal period due to improved management in the developed world, perinatal mortality rate is computed from the 20th week of gestation to the 28 th day after delivery per thousand total deliveries. This is referred to as perinatal mortality rate I to differentiate it from perinatal mortality rate II used in the developing world as defined above (15).

Yearly perinatal mortality rates were computed from September to August of the following year from 1990 to 1998. The last period is only for eight months period from the beginning of September 1998 to May 1999. Recordbooks of the maternity and labor wards of Jimma hospital, Department of Gynecology and Obstetrics, were reviewed to obtain relevant sociodemographic and clinical data on all perinatal deaths and live births that occurred during the study period. Neonates with complications are kept in the maternity wards and followed by pediatricians and outcome recorded in the delivery record books. Overall documentation for the study period was good except that registration of birth weight for ruptured uterus cases and destructive deliveries was incomplete.
Data were entered and analyzed using Microsoft Excel 97 package.

## Results

During the study period, there were 13,425 deliveries at Jimma Hospital and 1664 perinatal deaths of which 1482 were still births and 182 early neonatal deaths making the overall perinatal mortality rate 1664/11983 (138.9 per thousand live births). Table 1 shows the yearly trend of perinatal mortality. The lowest perinatal mortality of 75.7 per thousand live births occurred during 1991 and the highest 213.3 per thousand occurred in 1995, whereas the overall trend was increasing during the study period. (Figure 1) Of all perinatal deaths,

52.7 % occurred in the age group 20-29 (Table 2); 14.9% among teenage mothers, while only 16.6% occurred among mothers more than 35 years of age. Of mothers with perinatal deaths 66.5% were primipara, grand multipara and huge multipara, while 33.0% were para two to four.

In 1185 (71.2%) of perinatal deaths, the event or cause initiating the cascade of events leading to the deaths can be identified (Table 3). In 479 (28.8%) cases no causative factor explaining the cause of death was found and, hence, were unexplained deaths. In 889/1664 (53.4 %) of all perinatal deaths, were mechanical factors, mostly associated withcomplications of labour. Obstructed labour with or without uterine rupture was the most important cause of death responsible for 623/1664 (37.4%) of all perinatal deaths. In 213/1664 (12.8%) of the perinatal deaths, pregnancy was complicated with hypertension, but hypertension was the main factor responsible for the perinatal death only in 112/1664(6.7%). 1.4% of deaths were due to congenital anomalies mainly externally visible neural tube defects. As pathological exam was not being conducted during the study period at Jimma hospital on perinatal deaths, congenital anomalies of the internal organs not externally visible are not documented. Of all perinatal deaths 84.6% occurred in foetuses with normal cephalic presentations with only 18.7% occurring among the malpresentations. When perinatal deaths are compared to specific presentations, however, malpresentations have a 2-6 times more risk of death as compared to cephalic presentations. When compared to cephalic presentations, the risk of death is statistically significant for the foetus with a malpresentation (P<0.1).

Of the perinatal deaths due to congenital anomalies 18/24 (75%) occurred in mothers in the age group 20-34, all being neural tube defects (Table 5). Of mechanical factors leading to perinatal deaths, 117/ 876 (13.4%) were among teenage mothers whereas 575/876 (65.6%) occurred among primiparous, grand multiparous and huge multiparous mothers.

Of those mothers who came from Jimma town there were 474 perinatal deaths making the perinatal mortality for these group of mothers 474/9927 (47.7 perinatal deaths per 1000 live births) which is quite small as compared to those referred from outside Jimma town. Perinatal mortality is six to ten times more for those mothers referred to Jimma hospital from outside the town, the highest being for those referred from 75-100 kilometres away, of which nearly 50% died. Out of the 13425 deliveries 9927 came from Jimma Town while only 3498 were referred cases from outside the town from up to a distance of 400 kilometres. 474/1664(29.9%) of perinatal deaths were from Jimma town, the remaining 70.1% occurred among the referred cases.
In 28.8% of mothers antenatal care status has not been documented. Where documented, there are almost as many mothers who had antenatal care (33.6%) as there are who did not have antenatal care follow-up (37.5%).

Table 6 shows analysis of perinatal deaths by birth-weight and gestational age. While 10.9 % of perinatal deaths were preterm, only 1% were post-term. Data on birth-weight was obtained in only 911 of the perinatal deaths. Information on birth-weight on the 250 neonates on whom destructive deliveries were conducted and on the 244 ruptured uterus cases has not been documented. Of the documented cases of perinatal mortality 14.9% were in the very low birth-weight group while only 0.8% were above 4000 grams.

**Discussion**

This study shows the perinatal mortality status at a hospital serving a predominantly rural population at the turn of the century. Not only is the overall ten-year perinatal mortality rate very high nearly fourteen times that reported for developed countries and even double that reported from other metropolis in Africa, but the trend has shown an increasing rather than a decreasing or stabilising trend. One possible reason for the increasing trend is the increasing number of deliveries during the study period due to increasing health awareness and seeking care at health institutions for pregnancy and delivery care.

This study compliments other studies on perinatal mortality in Addis Ababa and Jimma hospitals in demonstrating a high perinatal mortality rate and the fact that mechanical causes, mainly obstructed labour, are the main reasons for perinatal deaths. However, the magnitude of the problem is much higher with the mean perinatal mortality of 138.9 for the period being much higher than 86 and 91 reported from the Addis Ababa hospitals. This is probably because of delayed referral of complicated cases from long distances as it is a hospital serving mainly a rural population. It can be seen that the mortality rate at Jimma hospital has not decreased for the last fifteen years as can be seen in comparison with the four years analysis by Ghidey et al immediately preceding this study. The very high neonatal mortality found among the cohort of neonates followed at Addis Ababa by Sahle Mariam and Berhane indicates that the neonatal mortality rate found in the current study from Jimma hospital may be a gross underestimation of the problem as neonates who had no problems at birth were discharged within a few hours and not followed until the seventh day of life.

That 1482/1664 (89.0%) of perinatal deaths are stillbirths points to the lack of antepartum and intrapartum care rather than neonatal care to be mainly responsible for perinatal mortality. As neonates with normal apgar scores and no abnormalities are discharged within twenty four hours, it is difficult to know whether they have lived to the seventh day of life, and the actual perinatal mortality rate may be higher.


Of all perinatal deaths, 66.5% occurred among primiparous and grand multiparous mothers. However, this needs to be compared with the parity profile of the hospital obstetric population at the time of the study to identify if there is a real clustering of perinatal deaths in these parity groups. That data was not collected at the time of conduct of the study for logistic reasons. There is a need to conduct analytic studies to identify subgroups of mothers at risk for obstructed labour so that limited resources can be focused on provision of peripartum care to these mothers to effect reduction in perinatal mortality.

The Aberdeen classification, which classifies perinatal deaths on the basis of the initial perinatal event initiating the cascade of events that finally led to the perinatal death, has been used in this survey (16,17,18). The major setback faced in this study in using this classification is on three points because of its retrospective nature. Information on isoimmunization as a cause of fetal deaths is lacking. Pathological examination on perinatal deaths has not been performed at the hospital during the study period, eventhough routine pathological examination is not deemed to be absolutely necessary for this classification. Some of the unexplained deaths in this study may be due to isoimmunization or internal congenital anomalies, but whether these causes contribute to a significant proportion of unexplained deaths is doubtful.

With this limitation, the analysis of the cause of death by this classification provides insight into the main causes of perinatal death in this population. Significant finding is the importance of mechanical factors related to labour and its management as a cause of death responsible for 889/1664(53.5%) of all deaths. Obstructed labour with or without ruptured uterus is the single most important cause of perinatal mortality. Prematurity, responsible for 75-80% of perinatal mortality in the developed world, is a relatively insignificant

cause of overall perinatal mortality of 120/1664 (7.2%) in this population.

Lack of provision of emergency obstetric care at an accessible distance is demonstrated by analysis of perinatal mortality against referrals from a certain distance from the hospital. Nearly 50% of pregnancies coming from a distance of 100 kilometres and more from the hospital ended in perinatal death. The situation in which a laboring mother has to travel upto 400 kilometres to obtain basic obstetric care is a pathetic reality in rural Africa as we enter the next millennium.

In conclusion this study shows a very high perinatal mortality over a ten-year period with an increasing trend. Stillbirth to early neonatal mortality ratio is 7:1. By far the most important factors leading to perinatal deaths are mechanical conditions associated with peripartum events like obstructed labour. Unlike in developed countries where 75-80% of perinatal deaths occur among the very low birth-weight premature neonates, the prototype of perinatal death in this study is a normal birth-weight, singleton fetus presenting in a normal cephalic presentation with no major malformation dying because of lack of basic peripartum care.

That currently proposed strategies to reduce perinatal mortality (such as antenatal care, family planning, management of high risk pregnancies and the provision of neonatal care) will reduce perinatal mortality is undoubted. With the sheer magnitude of the problem, and the limited resources available to third world countries like Ethiopia, concentrating on the provision of peripartum care focusing on high risk groups may be one strategy to effect a reduction in a short period of time. Perinatal death can occur due to events that may occur during the nine-month period of pregnancy or during the neonatal period. Concentrating the limited available resources on one specific area of care-in our case peripartum care- is perhaps one strategy that may be considered as an option if we are to see any meaningful reduction in perinatal mortality in the foreseeable future.

**Tables**

Table 1: **Distribution of perinatal mortality throughout the study period, by year.**

| Year | Perinatal deaths | Live births | Perinatal mortality (per thousand live births) |
|---|---|---|---|
| 1990 | 112 | 1115 | 100.4 |
| 1991 | 78 | 1031 | 75.7 |
| 1992 | 86 | 917 | 92.7 |
| 1993 | 144 | 822 | 175.2 |
| 1994 | 124 | 1184 | 104.7 |
| 1995 | 236 | 1106 | 213.3 |
| 1996 | 259 | 1444 | 179.4 |
| 1997 | 244 | 1710 | 140.9 |
| 1998 | 256 | 1476 | 173.4 |
| 1999 | 126 | 1178 | 106.9 |
| Total | 1664 | 11983 | 138.9 |

Table 2: **Analysis of perinatal mortality, by maternal age and parity**

| | Parity | | Total |
|---|---|---|---|

| Age | 1 | 2-4 | >5 | Total |
|---|---|---|---|---|
| <20 | 196 | 33 | 18 | 247(14.8%) |
| 20-24 | 272 | 153 | 13 | 437(26.3%) |
| 25-29 | 154 | 214 | 67 | 435(26.1%) |
| 30-34 | 24 | 100 | 145 | 269(16.2%) |
| 35-39 | 13 | 58 | 138 | 209(12.6%) |
| 40-44 | 1 | 4 | 51 | 56(3.4%) |
| 45 | - | 1 | 10 | 11(0.7%) |
| Total | 660(39.7%) | 562(33.8%) | 442(26.6%) | 1664(100%) |

Table 3: **Distribution of perinatal mortality, by primary obstetric cause of death**

| Cause of death | Still births | Early neonatal death | Total (%) |
|---|---|---|---|
| Congenital anomaly | 21 | 2 | 23(1.4%) |
| Antepartum hemorrhage | 33 | 2 | 35(2.1%) |
| Preeclampsia/Eclampsia | 81 | 31 | 112(6.7%) |
| Mechanical Malpresentations | 137 | 38 | 175(10.4%) |
| Ruptured uterus | 244 | 0 | 244(14.7%) |
| Obstructed labor | 350 | 29 | 379(22.8%) |
| Cord prolapse | 18 | 0 | 18(1.1%0 |
| Multiple pregnacy | 50 | 23 | 73(4.4%) |
| Intercurrent infection | 6 | 0 | 6(0.4%) |
| Prematurity | | | |
| Unexplained | 63 | 57 | 120(7.2%) |
| | 479 | 0 | 479(28.8%) |
| Total | 1482 | 182 | 1664(100.0%) |

Table 4: **Perinatal mortality, by fetal presentation**

| Presentation | Number of deaths | % of total deaths | % of similar presentations |
|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Breech | 172 | | 172/1664(10.3%) | 172/447(38.5%)(P<0.1) | | |
| Brow | 3 | | 3/1664(.2%) | 3/14(21.4%)(P<0.1) | | |
| Cephalic | 1408 | | 1408/1664(84.6%) | 1408/12801(11.0%) | | |
| Compound | 3 | | 3/1664(.2%) | 3/9(33.3%)(P<0.1%) | | |
| Face | 14 | | 14/1664(.8%) | 14/69(20.3%)(P<0.1) | | |
| Shoulder | 64 | | 64/1664(7.1%) | 64/108(59.3%)(P<0.1) | | |
| Total | 1664 | 1664/1664 | 1664/11983 | | | |

Table 5: **Age and parity distribution of mothers with perinatal death by specific causes of death**

| Age | Maternal factors | Congenital anomalies | Antepartum hemorrhage | Mechanical | Preclampsia/ Eclampsia | Unexplained |
|---|---|---|---|---|---|---|
| <20 | 1(16.6%) | 1(4.2%) | 5(14.3%) | 117(13.4%) | 23(20.5%) | 80(16.7%) |
| 20-24 | 2(33.3%) | 9(37.5%) | 9(25.7%) | 213(24.3%) | 24(21.4%) | 152(31.7%) |
| 25-29 | | 3(12.5%) | 11(31.4%) | 248(28.3%) | 25(22.3%) | 121(25.2%) |
| 30-34 | 2(33.3%) | 6(25%) | 8(22.9%) | 148(16.9%) | 23(20.5%) | 61(54.5%) |
| | 1(16.6%) | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 35-39 | 0 | 3(12.5%) | 2(5.7%) | 111(12.7%) | 13(11.6%) | 46(9.6%) |
| 40-44 | 0 | 2(8.3%) | 0 | 32(3.7%) | 4(3.5%) | 16(3.3%) |
| 45 | 0 | 0 | 0 | 7(0.8%) | 0 | 3(0.6%) |
| Total | 6(100%) | 24(100%) | 35(100%) | 876(100%) | 112(100%) | 479(100%) |

Parity

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 3(50.0%) | 4(17.4%) | 13(37.1%) | 340(38.8%) | 58(51.8%) | 215(44.9%) |
| 2-4 | 3(50.0%) | 11(47.8%) | 15(42.9%) | 301(34.4%) | 32(28.6%) | 148(31.0%) |
| 5-9 | 0 | 8(33.3%) | 4(11.4%) | 220(25.1%) | 18(16.1%) | 95((19.8%) |
| 10 | 0 | 0 | 3(8.6%) | 15(1.7%) | 4(3.6%) | 21(4.4%) |
| Total | 6(100%) | 24(100%) | 35(100%) | 876(100%) | 112(100%) | 479(100%) |

Table 6: **Perinatal mortality by gestational age and birth wieght distribution**

| Birth weight (grams) | Still births | Early neonatal deaths | Total (%) | |
|---|---|---|---|---|
| <1500 | 69 | 57 | 126(14.9) | |
| 1500-<2500 | 149 | 60 | 209(21.8) | |
| 2500-400 | 469 | 79 | 548(59.2) | |
| >400 | 32 | 5 | 37(0.8) | |
| Total | 719 | 192 | 911 | |
| Gestational age | | | | |
| Preterm | 126 | 44 | 170(10.2) | |
| Term | 1314 | 137 | 1451(87.8) | |
| Postterm | 16 | 0 | 16(1.0) | |
| Unknown | 27 | 0 | 27(1.6) | |
| Total | 1482 | 182 | 1664 | |

Figure 1: **Trend of perinatal mortality during the study period**

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