Original article

Emergency obstetric performance with emphasis on operative delivery outcome: Does it reflect the quality of care?

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Abstract

Background: In Ethiopia, in the previous studies, the rates of perinatal and maternal mortality were reported as one of the highest in the world.

Objective: The purpose of the study was to analyze the rates of variables-specific perinatal deaths, maternal and perinatal case fatality rates and to determine common indications of operative deliveries with their out come indicators.

Method: A retrospective one-year medical record review of major emergency obstetric performance was conducted in Tikur Anbessa specialized hospital.

Result: During the study period, 3897 women with pregnancy related problems were admitted and managed as an emergency cases: 92% with gestational age of 28 weeks & above, 5.8% abortion, 2.0% ectopic pregnancy and 0.2% gestational trophoblastic disease. The 3583 women gave birth to 3672 babies, of which, 337 were perinatal deaths, making the gross perinatal and early neonatal mortality rates 91.8 and 26.1/1000 births each, respectively. The three leading causes of perinatal mortality were malpresentation (13.1%), uterine rupture (12.5%) and obstructed labor (11.9%), with obstructed labor and eclampsia the highest case-fatality rates (86.9-100% and 72.7%, respectively). The maternal mortality ratio was 1107.5/100,000 live births and the top three-implicated causes were postabortal complications (28.9%), eclampsia (21.1%) and ruptured uterus (15.8%). Operative (abdominal or vaginal) deliveries were performed for 43.1% babies. Fetal distress was the commonest indication for operative deliveries (32.5%) as well as the commonest cause of low Apgar scores at the 1st minute (61.4%).

Conclusion: Three-fourths of the total perinatal deaths were stillbirths, 94.2% referred. About half (48.9%) of the total causes of perinatal deaths were mechanical factors, predominantly obstructed labor that could have been totally averted if the system of basic obstetric care was properly established. Preventable obstetric complications such as abortion, eclampsia and uterine rupture are still the foremost causes of maternal deaths. [*Ethiop.J.Health Dev*. 2004;18(2):96-106]

Introduction

In general, the quality of obstetric care is reflected on the magnitude of perinatal and maternal mortality rates of a certain country, which is considered as one of the vital indicators of the health status. Although fetal and maternal out come depends on the quality of care provided starting from the preconception period, the big chunk of it is relied on timely and appropriately carried out intrapartum care (1). In the developed countries, one of the big advancement of modern medicine in the 20th century is the ability of abating the used to be prevailing treatable and preventable causes of perinatal and maternal mortality due to increasing professionalism of operative and non-operative measures. Unfortunately, in the third world like ours, mothers and their offspring are still dying of easily preventable but rapidly fatal pregnancy related causes; considered to be disease of the 19th century in the developed world. Donnay pointed out that 98% of perinatal and maternal deaths due to pregnancy related causes occur in developing countries (Asia and Sub-Saharan Africa), with India alone accounting for 25% of such deaths world wide while six other countries – Bangladesh, Ethiopia, Indonesia, Nepal, Nigeria, Pakistan accounts for a further 30%. At present, 1 woman in 12 will die of maternal causes in Sub-Saharan Africa, compared with 1 woman in 4000 in northern Europe and perinatal mortality rate 10/1000 live births (1,2).

To cite some specific comparative chronicle of perinatal and maternal mortality rates in the two world: the perinatal mortality rate (PMR) declined by four fold in 37– years, from 33.1/1000 live births for England and Wales in 1958 to 7- 8/1000 live births in 1995 for the whole United Kingdom (3,4).

In the United States, the fetal mortality rate declined from 18.4/1000 live births in 1950 to 6.7/1000 live births in 1998(5). A three-year survey (October 1995- July 1998) by D.Shah and colleagues in India at 38 centers showed that PMR was in the range of 38-180/1000 live births with mean 53. It revealed an 8.32 times higher

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chance of a perinatal death with preterm (<37 weeks) as compared to term delivery and with increasing gravidity or parity, the perinatal mortality worsened (6). A retrospective study by S.Ebrahim and colleagues over a three-year period (1 Jan 1999-31 Dec 1996) in South Africa at Johannesburg tertiary hospital reviewed 559 perinatal deaths (still births > 1000 gram & neonatal deaths before 7 days of extra-uterine life). In this study, the mean PMR was 25.9/1000 births and the five most common causes of death were unexplained intrauterine death (33%), antepartum hemorrhage (APH) (18%), infection, mainly syphilis (13%), asphyxia (10%) and preterm labour (9%), with avoidable factors implicated in 31.3% of all perinatal deaths (7).

In Ethiopian set up, a 4-year (1980-1984) and 10-year (1990-1999) retrospective perinatal death reviews were done in Jimma teaching hospital, South-Western Ethiopia, by Ghidey et al and Ashebir, respectively. The PMR was found being increased by about 1.5–fold from 1980-1984 review (95.9/1000 live births) to 1990-1999 (138.9/1000 live births). The latter study, out of 1664 perinatal deaths, identified mechanical factors (53.4%) as a leading cause of perinatal mortality, followed by unexplained intrauterine death (28.8%), prematurity (7.2%), preeclmpsia/eclampsia (6.7%) and APH (2.1%) (8,9).

In 1977, a one-year perinatal and maternal mortality review by Naeye and et al found the PMR at Tikur Anbessa teaching hospital to be 91/1000 live births, obstructed labour being the second commonest cause of mortality (10).

Another indicator of the quality of obstetric as well as the health status of a country is maternal mortality. Etiologically, maternal deaths are classified as direct obstetric causes (hemorrhage, sepsis, unsafe abortion, obstructed labour, hypertension and ectopic pregnancy) and indirect causes (malaria, tuberculosis, cardio-pulmonary diseases, hepatitis) (1,11). More than 80% of maternal deaths world-wide are due to the first five direct obstetric causes (1). About a century back (1900), the lowest record of maternal mortality rate (MMR) was in Sweden, 228/100,000 live births. Recently, the lowest MMR in Canada was 4.0/ 100,000 live births. In Sri Lanka, the MMR dropped dramatically from 555 in the 1960 to 95 in the 1980, and to 30 in 1990 per 100, 000 live births each, while Ivory coast had a rate of 830/ 100,000 live births-yet both countries have a similar gross national product. (1,12).

A recent report from Bangladesh, one of the developing country with the highest MMR (600/100,000 live births) where 1 in 42 women die of pregnancy related complications, 82.3% of the total maternal deaths were due to direct obstetric causes–eclampsia (34%), hemorrhage (27.9%), and obstructed labor (11.3%)(11).

An eight-year (1990-1997) review, in Nigeria, at Ahmado Bello University teaching hospital, had shown that MMR was 652/100,000 deliveries with the leading causes of mortality eclampsia (24.6%), abortion (23.2%), ruptured uterus (14.5%) and obstetric hemorrhage (11.6%) (13). A six-year review of maternal mortality in Tikur Anbessa Hospital, from 1980 to 1985, by Seyoum et al, revealed that the range of maternal mortality was 800-1260/100,000 live births with mean 964.

The five direct common obstetric causes of MMR were abortion complications (22.2%), puerperal sepsis (16.7%), uterine rupture (13.4%), post partum hemorrhage (PPH) (6.5%) and eclampsia (5.5%) (14). The national MMR estimated by the ministry of health by the year 2001 was in the range of 450 to 500/100,000 live births (15).

To reduce the mortality rate, one of the life-saving services is providing an emergency obstetric care at least starting from the health center level. The basic emergency obstetric care (BEOC), the “signal functions” such as administration of intravenous/intramuscular antibiotics, uterotonics, anticonvulsants, manual removal of placenta or retained products of tissue and assisted vaginal delivery, is proposed to be delivered at a health center level, whereas comprehensive emergency obstetric care, services provided at the health center level plus caesarean sections and blood transfusions, is planned to be carried out at the district hospital level (16).

Emergency obstetric operative interventions (caesarean section and instrumental delivery), in conjunction with other life support measures, are considered to be instrumental to avert perinatal as well as maternal deaths. Furthermore, timely and safely managed abortion, ectopic and molar pregnancies would have a remarkable impact on the women survival and quality of life. In the United states, the rates of operative delivery from 1980 through 1997, has shown a remarkable change: caesarean section rate has increased from about 16% to 20.8%, forceps delivery has declined from 15% to about 3%, and vacuum extraction has increased from nil to 9.4%. The four common caesarean section indications in 1990 in decreasing order were previous caesarean section, breech, dystocia and fetal distress (17,18).

The caesarean section delivery rate in Brazil increased from 14.6% in 1970 to 31% in 1980 in the government’s health institution, and to more than 70% in the private sector group in 1990s (19). A comparative study in Tikur Anbessa hospital by Ayalew (unpublished data from the department of Obstetrics and Gynecology of the study

hospital) has shown that the caesarean section rate increased from 7.7% in 1986/1987 to 25.6% in1998/1999 with a change in common indication from previous caesarean section (29.7%) in 86/1987 to fetal distress (26.6%) in 1998/1999.

The purpose of this one year emergency obstetric performance review is to analyze the rate of perinatal deaths specific to the possible risk factors, to look into the maternal and perinatal case-fatality rates of implicated etiologies and to determine the common indications of operative deliveries with their out come indicators.

Methods

This retrospective one-year review encompassed major emergency obstetric performances and perinatal-maternal outcomes, from September 2001 to August 2002 in Tikur Anbessa specialized hospital. It is owned and governed by Addis Ababa University Medical Faculty (AAUMF), is the only central referral hospital with surgical, gynecologic/obstetric, medical and pediatric intensive care units; and further more, the only hospital in the country functioning as central practical training center for more than seven specialties in conjunction with other university affiliated hospitals in the metropolis. Taking in to account the better curative services provided for, it is considered to be the last destiny for patients coming from all directions of the country. With this intention, patients referred to this hospital were heterogeneous in terms of geographic location and economic status. However, most of the women with pregnancy-related complications occurring during and/or before parturition were referred from a very remote area in a very life threatening condition whereby a lot of energy, time and resources were spent to salvage the life of the mother and the fetus. The referral system established in 1997 was to let this hospital accept patients referred from other hospitals in the capital and in the periphery, worthy providing special care; however, it is not uncommon to manage patients referred from health centers or self-referral in real emergency situations.

Data sources revised were log-books of the labor ward, maternity and gynecology wards, surgical/gyn-obs and neonatal intensive care units, major and minor operations, discharge and death reports, monthly perinatal reports, NIGAT project (Nevirepin therapy research project), and morning reports. Using a structured data collecting format, patients' medical records documented on the respective logbooks were collected.

In this review, some of the variables included to identify risk factors association with early neonatal deaths (ENND) & stillbirths (intrauterine fetal death after 28 weeks of gestation) were address, antenatal care, gestational age, sex, mode of delivery, birth weight, maternal age, parity and fetal presentation. Other obstetric variables, which were accessible through logbooks, assessed were type and indications for operative deliveries (abdominal as well as vaginal) with 1st and 5th minutes Apgar scores, serious obstetric diseases (like hypertension, hemorrhage, ruptured uterus) and possible causes of perinatal and maternal deaths. Lastly, the first half pregnancy common complications (abortion, ectopic pregnancy, gestational trophoblastic diseases) total cases and types were reviewed in brief.

The rate of perinatal mortality was analyzed from the total number of perinatal deaths per 1000 total births (20). Deaths included in the ENND were those neonates died immediately after delivery and before the 7th day of extra uterine life in the neonatology unit of the hospital (excluding deaths occurring at home after discharge from the labour ward). Operative vaginal and abdominal deliveries with indications and respective out comes were measured in terms of Apgar scores. Taking into consideration that it is one of the indicators of perinatal asphyxia, Apgar scores of operative deliveries were stratified as very low Apgar scores (0-3), low Apgar scores (4-6) and normal range (≥7) (21).

The type and magnitude of operative deliveries and perinatal mortality were cross- matched to look into the relationship of operative interventions and perinatal outcomes. Taking the long standing dogma of potential risks in the two extreme reproductive ages, women who gave birth after the age of 28 weeks were stratified into < 20, 20-34 and ≥ 35 years (22). In this study, adolescent pregnancy is to mean before 20 years of age and grand multiparity 5 or above pregnancies. Abnormal delivery is also to mean all modes of delivery except spontaneous vertex delivery. Fetal birth weight is also stratified as extremely very low birth weight (<1000gm), very low birth weight (1000-1499gm), low birth weight (1500-2499gm), normal birth weight (2500-3999gm) and macrosomia (≥ 4000gm) (23). The quality of this study is that rates of perinatal death are analyzed in relation to a specific antepartum & intrapartum variables. Further more, the case fatality rate of almost all possible causes of perinatal and maternal deaths were analyzed. The limitation of this review is failure to include the possible early neonatal deaths occurring at home after discharged from the labour ward.

Chi-square test (Yates correction) was done using an Epi-info statistical package to test association of specific variables to outcome variables and P-value < 0.05 was considered statistically significant.

Result

During the study period, 3897 women with pregnancy related problems were admitted and managed as emergency cases: 3583 (92.0%) delivered either vaginally or abdominally after 28 weeks of gestational age. Two-hundred twenty five (5.8%) women with induced or spontaneous abortion were managed over the year with prevalence rate distribution of incomplete 197(87.6%), missed 21(9.3%) and inevitable 7(3.1%) abortion. Fiftyone (25.9%) of the incomplete abortion cases were septic and 28 (14.2%) of them deserved admission to wards. There were also 78 (2.0%) ectopic pregnancies: 52 (66.7%) ruptured, 6 (7.7%) unruptured and 20 (25.6%) chronic. Eleven (0.2%) gestational trophoblastic diseases were managed on emergency base.

During the one-year period, the 3583 women gave birth to 3672 babies: 3431(93.4%) and 241 (6.6%) were born alive and dead, respectively. Fourteen (5.8 %) of the stillbirths occurred antepartum and intrapartum among mothers admitted to ward as high-risk (including intentionally terminated severe preeclampsia cases remote from term). Among the live births, 96(2.7%) died of various causes in the early neonatal period in the hospital. The gross and corrected (excluding congenital anomaly incompatible with life & birth weight <1000grams) perinatal mortality rates of the year were 91.8 and 77.6/1000 total births (98.2 and 83.1/1000 live births), respectively.

The gross and corrected ENND rates were 26.1and 22.6/1000 total births (27.4 and 24.1/1000 live births), respectively. As it is shown in Table 1, 3168 (86.3%) of the babies born in the hospital were from Addis Ababa and the specific early neonatal deaths and stillbirths (Table 2) were lower than those who came from outside Addis Ababa. The specific total perinatal mortality rate of the latter group (261.9/1000 births) (P<0.0005) was about 4-fold of the former one (64.7/1000 births).

There were 457 (12.4%) women who didn't have antenatal care follow up, and thus, lack of it had been shown to predispose for about four times raised specific perinatal mortality rate as compared to the attending ones (271.3/1000 births vs 64.6/1000 births) (P<0.0005). In terms of sex distribution and out come of the newborns, males were dominant in number (55.3% vs 44.7%) but survival was better in females; the perinatal mortality rates of males and females were 103.0/1000 births (P<0.025) and 77.9/1000 births, respectively. The ratio of spontaneous vertex deliveries 1867(50.8%) to abnormal deliveries 1805 (49.2%) was about 1:1.

About one-third (34.2%) of the birth weight of the newborn babies was beyond the normal range: 107 (2.9%) were macrosomic; 689 (18.8%) were low birth weight (LBW); 125 (3.4%) were very low birth weight (VLBW); and 36 (1.0%) were extremely very low birth weight (EVLBW). The specific PMR was higher in babies with birth weight below the normal range: macrosomic 84.1, normal range, 51.2, LBW 146.6(P<0.0005), VLBW 472.0(P<0.0005) and EVLBW 805.6(P<0.0005). To be specific, about two-third of ENNDs (65.6%) and half of stillbirths (52.3%) were born with birth weight less than 2500grams (Table 2).

In Table 1, it is also shown that 369 (10.3%) and 340(9.5%) of the total women were teenagers and ladies in the range of old reproductive age, respectively. On the other hand, half of the women (52.8%) were primiparas and 7.8% were grand multiparas.

In this study, the two extreme reproductive ages (<20 and >34-years) and adolescent pregnancy were not significantly associated with high perinatal mortality: < 20, 105.7; 20-34, 89.4; ≥35, 120.6/1000 maternities each. However, grand multiparity has been shown to be significantly associated with high perinatal mortality rate (228.6/1000 maternities) (P<0.0005).

As it is shown in Table 2, breech delivery is associated with high both ENNDs (11.1%) & stillbirths (21.4%); however, 10 of the 14 ENNDs & 21 of the 27 stillbirths were premature and below 1500 gm at birth. Breech presentation was also found to be risk factor for both high ENNDs and stillbirths.

One thousand five hundred eighty one (43.1%) babies necessitated either abdominal or vaginal operative deliveries, of which, caesarean section was done for 961(26.2%); forceps delivery and vacuum extraction were done for 406(11.1%) and 214(5.8%), respectively (Table 3). As the type of operative deliveries and perinatal mortality rates shown on Table 4, forceps was the commonest form of instrumental delivery throughout the year, and it was also clearly seen that the rates of forceps delivery and caesarean section (C/S) shows monthly variation; the higher the C/S rate in a specific month, the lower the forceps delivery and vice versa. The highest and the lowest perinatal mortality rates were seen in the months of April and August, respectively, irrespective of the mode of deliveries.

Table 1: **Specific perinatal mortality rate/1000 births or maternities in Tikur Anbessa hospital, September 2001 – August 2002**

Variables	Total babies born (n=3672) & mothers (n=3583) No (%)	(n=337) No (Total PMR/1000 births ‰)	X^2 (P-value) ϕ
Address (n=3672)			
Addis Ababa	3168 (86.3)	205 (64.7)	Reference
Outside A.A	504 (13.7)	132 (261.9)	201 (<0.00050)
Antenatal Care (n=3672)			
Yes	3158 (86.0)	204 (64.6)	Reference
No	457 (12.4)	124 (271.3)	204 (<0.0005)
Unknown	57 (1.6)	9 (157.9)	6.4 (<0.025)
Babies number			
Single	3519 (95.8)	313 (80.9)	Reference
Twin	144 (3.9)	21 (145.8)	4.74 (<0.05)
Triplet	9 (0.3)	3 (333.3)	NA
Sex			
Male	2029 (55.3)	209 (103.0)	6.6 (<0.025)
Female	1643 (44.7)	128 (77.9)	Reference
Gestational Age (n=3672)			
Term	2123 (57.8)	102 (48.0)	Reference
Preterm	332 (9.1)	102 (307.2)	250 (<0.0005)
Post term	334 (9.0)	19 (56.9)	NS
Un known	883 (24.1)	114 (129.1)	60 (<0.0005)
Mode of Delivery (n=3672)			
Spontaneous	1867 (50.8)	147 (78.7)	Reference
C/S	961 (26.2)	60 (62.4)	NSψ
Forceps	406 (11.1)	9 (22.2)	16.8 (<0.0005) ψ
Vacuum	214 (5.8)	7 (32.7)	5.7 (<0.025) ψ
Breech	126 (3.5)	41 (325.4)	47.9 (<0.0005)
Face	26 (0.7)	1 (38.5)	NA
Laparotomy β	42 (1.1)	42 (1000.0)	NA
Destructive	30 (0.8)	30 (1000.0)	NA
Birth Weight (gm)			
500-999	36 (1.0)	29 (805.6)	340 (<0.0005)
1000-1499	125 (3.4)	59 (472.0)	320 (<0.0005)
1500-2499	689 (18.8)	101 (146.6)	75 (<0.0005)
2500-3999	2715 (73.9)	139 (51.2)	Reference
≥4000	107 (2.9)	9 (84.1)	NS
Maternal age (n=3583)			
<20	369 (10.3)	39 (105.7)	NS
20-34	2874 (80.2)	257 (89.4)	Reference
≥34	340 (9.5)	41 (120.6)	NS
Parity			
I	1892 (52.8)	171 (90.4)	NS
I-IV	1411 (39.4)	102 (72.3)	Reference
≥IV	280 (7.8)	64 (228.6)	62.7 (<0.0005)

PMR = Perinatal mortality rate
C/S = Caesarean section
NS = Not statistically significant
NA = Not applicable
ϕ = Chi-square test (Yates correction) done for the total PMR in relation to the specified references
ψ = Since stillbirths are included, may not be conclusive
β = Destructive deliveries done under direct vision were excluded

Table 2: **Specific early neonatal death (ENND) and stillbirth rates/1000 births in Tikur Anbessa hospital, September 2001 – August 2002**

Variables	Total babies (n=3672)	(n=96) No (ENND ‰)	(n=241) No (Still births ‰)	(n=337) No (PMR ‰)
Address				
Addis Ababa	3168	69 (21.8)	136 (42.9)	205 (64.7)
Outside A.A	504	27 (53.6)	105 (208.3)	132 (261.9)
Antenatal Care				
Yes	3158	71 (22.5)	133 (42.1)	204 (64.6)
No	457	24 (52.5)	100 (218.8)	124 (271.3)
Unknown	57	1 (17.5)	8 (140.4)	9 (157.9)
Babies number				
Single	3519	82 (23.3)	231 (65.6)	313 (80.9)
Twin	144	11 (76.4)	10 (69.4)	21 (145.8)
Triplet	9	3 (333.3)	----	3 (333.3)
Sex				
Male	2029	61 (30.1)	148 (72.9)	209 (103.0)
Female	1643	35 (21.3)	93 (56.6)	128 (77.9)
Gestational Age				
Term	2123	24 (11.3)	78 (36.7)	102 (48.0)
Preterm	332	43 (129.5)	59 (177.7)	102 (307.2)
Post term	334	3 (8.9)	16 (47.9)	19 (56.9)
Un known	883	26 (29.4)	88 (99.7)	114 (129.1)
Fetal Presentation				
Vertex	3374	82 (24.3)	206 (61.1)	288 (85.4)
Breech	211	14 (66.4)	27 (127.9)	41 (194.3)
Face	32	----	1 (31.3)	1 (31.3)
Transverse	28	----	7 (250.0)	7 (250.0)
Brow	18	----	----	----
Compound	9	----	----	----
Mode of Delivery				
Spontaneous	1867	39 (20.9)	108 (57.8)	147 (78.7)
C/S	961	33 (34.3)	27 (28.1)	60 (62.4)
Forceps	406	6 (14.8)	3 (7.4)	9 (22.2)
Vacuum	214	4 (18.7)	3 (14.0)	7 (32.7)
Breech	126	14 (111.1)	27 (214.3)	41 (325.4)
Face	26	----	1 (38.5)	1 (38.5)
Laparotomy	42	----	42 (1000.0)	42 (1000.0)
Destructive	30	----	30 (1000.0)	30 (1000.0)
Birth Weight (gm)				
500-999	36	9 (250.0)	20 (555.6)	29 (805.6)
1000-1499	125	21 (168.0)	38 (304.0)	59 (472.0)
1500-2499	689	33 (47.9)	68 (98.7)	101 (146.6)
2500-3999	2715	33 (12.2)	106 (39.0)	139 (51.2)
≥4000	107	----	9 (84.1)	9 (84.1)

ENND = Early neonatal death
PMR = Perinatal mortality rate
C/S = Caesarean section

Table 3: **Indications for operative deliveries and below 7 Apgar scores at the 1st and 5th minutes in Tikur Anbessa hospital, September 2001 – August 2002**

		1st minute		5th minute	
Indications	**No (%)**	**0-3 No (%)**	**4-6 No (%)**	**0-3 No (%)**	**4-6 No (%)**
Caesarean section (N=961)					
Fetal distress	233 (24.3)	4 (1.7)	100 (42.9)	----	21 (9.0)
CPD	168 (17.5)[8]	----	21 (12.5)	----	3 (1.8)
One c/s + x-factor	107 (11.1)	----	10 (9.3)	----	3 (2.8)
Breech + x-factor	85 (8.8)	3 (3.5)	10 (11.8)	1 (1.2)	1 (1.2)
Malpresentation	69 (7.2)[4]	----	12 (17.4)	----	4 (5.8)
APH	55 (5.7)[8]	3 (5.5)	10 (18.2)	1 (1.8)	4 (7.3)
Arrest disorder	53 (5.5)	----	11 (20.8)	----	3 (5.7)
Failed induction	45 (4.7)	2 (4.4)	4 (8.9)	1 (2.2)	2 (4.4)
Twins pregnancy	31 (3.2)	---	3 (9.7)	----	----
Tow previous c/s	29 (3.0)	---	1 (3.4)	----	----
Repaired VVF	21 (2.2)	---	1 (4.8)	----	----
Obstructed labour	16 (1.7)[5]	6 (37.5)	5 (31.3)	1 (6.3)	10 (62.5)
Preeclampsia/eclampsia	15 (1.6)[1]	5 (33.3)	9 (60.0)	1 (6.7)	2 (13.3)
Others	34 (3.5)	----	1 (2.9)	----	----
B. Forceps (N=406)					
Fetal distress	189 (46.6)	5 (2.6)	70 (37.0)	1 (0.5)	15 (7.9)
Prolonged 2nd stage	116 (28.6)	----	10 (8.6)	----	2 (1.7)
Poor maternal effort	53 (13.1)	----	3 (5.7)	----	----
To shorten the 2nd stage	45 (11.0)	----	2 (4.4)	----	1 (2.2)
Others	3 (0.7)	----	-----	----	----
C. Vacuum (N=214)					
Fetal distress	92 (43.0)	3 (3.3)	29 (31.5)	1 (1.0)	7 (7.6)
Prolonged 2nd stage	67 (31.3)	----	6 (8.9)	----	----
To shorten the 2nd stage	34 (15.9)	----	4 (11.8)	----	----
Poor maternal effort	21 (9.8)	----	3 (14.3)	----	----
Total	1581 (43.1)	31 (1.9)	325 (20.6)	7 (0.4)	78 (4.9)

Superscript numbers indicate Caesarean sections done for intrauterine fetal death + X-factor.
C/S = caesarean section; VVF = vesicovaginal fistula; APH = antepartumhemorrhage; CPD = cephalopelvic disproportion; X –factor = Premature rupture of membrane, malpresentation, malposition, multiple gestation etc.

Low Apgar scores (4-6) among live operative deliveries at the 1st and 5th minutes of life were identified in 332 (9.0%) and 53 (1.4%) neonates, respectively. Of 38 (1.0%) and 7(0.2%) neonates with very low Apgar scores at the 1st & 5th minutes, operative deliveries were done in 31(81.6%) and 7 (100%), respectively. In the study period, fetal distress was the commonest indication for both abdominal and vaginal operative deliveries: 233(24.2%) for C/S and 281(45.3%) for forceps & vacuum. Fetal distress was also the commonest cause of low Apgar scores at the 1st minute among indications of operative deliveries, 199(61.2%); however, the rates of very low Apgar scores at the 1st minute were recorded in obstructed labor and preeclampsia/eclampsia (37.5% and 33.3%, respectively).

In Table 5, the possible causes of perinatal and maternal deaths, and the case-fatality rates of incriminated etiologies are presented. The five leading causes of perinatal deaths were malpresentation, mainly breech 44 (13.1%), uterine rupture 42(12.5%), obstructed labor without uterine rupture 40(11.9%), unexplained intrauterine death 37(11.0%) and prematurity 30(8.9%).

Obstructed labor without uterine rupture, and uterine rupture, accounted for about a quarter of total perinatal deaths, 82(24.3%), with the leading case-fatality rate among preventable ones (100% for uterine rupture and 86.9% for obstructed labor). Among 46 women with obstructed labor, 33(71.7%) had no antenatal care, and 40 (86.9%) came from out side Addis Ababa. This was also true in women with uterine rupture; out of 42 cases, 28(73.7%) had no antenatal care and 40(95.3%) traveled 45 to 330 kilometer to reach to the hospital. The five commonest causes of ENNDs were prematurity 30 (31.2%), multiple pregnancy 14 (14.6%), malpresentation

Table 4: **Type of operative deliveries percentage, gross and corrected perinatal mortality rates /1000 births in Tikur Anbessa hospital, September 2001 – August 2002**

PMR & delivery mode	Month 1 (n=310)	2 (n=366)	3 (n=338)	4 (n=305)	5 (n=297)	6 (n=317)	7 (n=284)	8 (n=249)	9 (n=317)	10 (n=288)	11 (n=279)	12 (n=327)
Gross PMR/1000	77.4	76.5	82.8	90.6	91.8	94.6	88.0	144.6	119.9	93.7	89.6	71.4
Corrected PMR/1000	71.4	71.4	77.4	87.5	85.5	80.1	75.0	127.0	114.3	86.8	83.0	62.1
C/S + forceps + vacuum/ 1000	34.8	39.9	45.9	41.8	42.3	39.1	46.4	42.5	47.9	49.7	40.9	46.8
C/S/100	20	25.1	23.7	27.6	23.6	25.9	28.9	25.7	27.3	33.9	23.7	30.7
Forceps/100	10.3	9.6	16.3	8.1	10.2	8.5	9.6	10.8	15.5	11.8	12.2	9.6
Vacuum/100	4.5	5.2	5.9	6.1	8.5	4.7	7.9	6.0	5.1	4.8	5.0	6.5

N = total number of babies born in each month

Table 5: **Perinatal and maternal mortality by possible causes and case fatality rates in Tikur Anbessa hospital, September 2001 – August 2002.**

A. Perinatal mortality (n=337)		
Cause of death	**(n=337) No (%)**	**Case-fatality rate (%)**
Mechanical	164 (48.9)	164/1182 = 13.9
Malpresentation	44 (13.1)	44/298 = 14.8
Uterine rupture	42 (12.5)	42/42 = 100.0
Obstructed labour	40 (11.9)	40/46 = 86.9
Multiple gestation	24 (7.1)	24/153 = 15.7
Cord accident	10 (2.9)	10/23 = 43.5
"Birth trauma"∀	4 (1.2)	4/620 = 0.6
"Prematurity"	30 (8.9)	30/332 = 9.0
Hypertensive disease		
Preeclampsia	27 (8.0)	27/103 = 26.2
Eclampsia	16 (4.8)	16/22 = 72.7
Antepartum hemorrhage (APH)	29 (8.6)	29/92 = 31.5
Congenital anomaly		
Neural tube defect	20 (5.9)	20/20 = 100.0
Multiple anomaly	3 (0.9)	3/3 = 100.0
Maternal disease	10 (2.9)	NA
RH-Isoimunization	1 (0.3)	NA
Unexplained	37 (11.0)	NA
B. Maternal (n=38)		
Postabortal complications	11 (28.9)	11/225 = 4.9
Eclampsia	8 (21.1)	8/22 = 36.4
Ruptured uterus	6 (15.8)	6/42 = 14.3
Puerperal sepsis	3 (7.9)	3/15 = 20.0
Post partm hemorrhage (PPH)	3 (7.9)	3/34 = 8.8
Pelvic abscess after caesarean section	2 (5.3)	2/961 = 0.2
Seroposetive for HIV	4 (10.5)	3/81ψ = 3.7
? Amniotic fluid embolism	1 (2.6)	1/1 = 100

¢ = 12 were preterm babies; ∀ = subgaleal hemorrhage and cephalhematoma

ψ = There were 81 mothers who were screened and registered as sero-positive for retroviral infection and these may not be representative.; NA = Not applicable; Denominators = all emergency gynecology and obstetrics cases managed in the hospital; ENND = early neonatal death

(mainly breech) 14 (14.6%), APH 8 (8.3%) and preeclampsia 7 (7.3%). Directly or indirectly almost all ENNDs deaths were related to preterm deliveries and prematurity.

One hundred sixty four (4.5%) pregnancies were complicated by hypertensive diseases: preeclampsia 103 (62.8%), pregnancy induced hypertension 28(17.1%), eclampsia 22 (13.4%) and chronic hypertension 11 (6.7%). Preeclampsia and eclampsia accounted for 43(12.8%) of the total perinatal deaths and eclampsia alone was the third with highest perinatal case-fatality rate (72.7%). Thirteen (59%) of the eclamptic mothers had antenatal care follow up. In general, mechanical causes were incriminated for almost half of the total perinatal deaths, 164 (48.7%).

There were 38 maternal deaths of direct obstetric causes 34(89.5%) and indirect obstetric cause, HIV, 4(10.5%), making the total maternal mortality ratio of the year 1107.5/100,000 live births. The three leading causes of maternal mortality were post abortal complications 11(28.9%), eclampsia 8 (21.1%) and ruptured uterus 6(15.8%). However, the maternal case-fatality rate of eclampsia was the highest (36.4%) followed by puerperal sepsis (20.0%) and ruptured uterus (14.3%).

All cases of ruptured uterus (42), obstructed labor (46), eclampsia (22) and puerperal sepsis (15) occurred outside the hospital and they were found to have high association with maternal and perinatal (except the last one) deaths; however, there were 34 women diagnosed to have post partum hemorrhage (PPH) and 15 (44.1%) of these occurred in the hospital, the rest 19 (55.9%) were either self or institutional referral.

Discussion

In Tikur Anbessa hospital, although the caesarean section rate has increased by more than 3-fold (7.7% to 26.2%) in about 15 years period (19), the gross perinatal mortality rate remains almost the same after 25 years: in 1977 (10) and in this study 91/1000 live births and 98.2/1000 live births, respectively. Ayalew also found such comparatively high rate of C/S about 5-years back (unpublished data) and the type of cases (high-risk mothers) managed after the hospital has been changed to be central referral since 1997 may justify this. However, still the gross perinatal mortality couldn't be reduced to the acceptable range in a good setup (1). Before giving an erroneous conclusion on the performance of the hospital, based on the gross statistical figures, it is judicious to look into the objective evidences identified.

To begin with, about three-quarters (72%) of the total perinatal deaths were stillbirths; of which majorities (94.2%) were diagnosed from the out set at admission, and half of the deliveries were spontaneous vertex delivery. This shows that the hospital is still overwhelmed by many cases that can be managed elsewhere in a hospital or health center setup. Providing service for such cases by large would hamper the hospital's capacity to give priority for the women with serious pregnancy related complications, and this would have a vicious cycle on maternal and perinatal survival and death. Secondly, despite being the central referral hospital and high operative interventions, the other plausible explanation why the perinatal mortality rate remains the same after a quarter of a century is that although referral system was set, the referring hospitals and health centers capacity to handle relatively uncomplicated cases isn't yet upgraded. Thirdly, the above justification can be strengthened by the fact that about half of (48.9%) the causes of perinatal mortality were mechanical factors that could be almost totally preventable if the referral system could have been appropriate and timely carried out; furthermore, specific PMR has shown to be significantly higher in those who come from outside Addis Ababa and lack of antenatal care, which clearly speaks up the "prematurity" and inefficiency of the integrated primary health care service implemented starting from the community level. In other words, the finding of many women traveling a long distance to reach to a center after life threatening complications developed, prevention in terms of antepartum and intrapartum high risk identification as well as timely intervention at the easily accessible areas is not yet materialized.

Moreover, 30 prematurity singleton, 10 prematurity with breech presentation and 12 prematurity with multiple pregnancies accounted for about 54.2% of the hospital deaths in the early neonatal period. On the other hand, 65.6% of the ENNDs and 52.3% of the stillbirths were having birth weight less than 2500gm. Although prematurity as a cause of high perinatal mortality is a worldwide problem (5-7), upgrading the hospital's neonatal unit setup may increase the survival of the preterms.

In this study and another study done about two years back by Tilahun (forceps vs vacuum, 13.5% vs 4.7%, respectively) (unpublished data from the department of Obstetrics and Gynecology of the study hospital) have shown that the rates of forceps delivery outweigh vacuum extraction through out the year. This is the mirror image of the practice in U.S.A about 20 years back (5). Currently, vacuum has worldwide acceptance because of technical simplicity to apply and relatively less maternal trauma (24). Thus, why do we still prefer forceps to vacuum? In this review, although there was no much difference seen between the two instrumental deliveries in terms of 1st and 5th minutes Apgar scores & ENNDs, late neonatal and maternal morbidity as a result of birth trauma has to be worked out before giving inconclusive reasoning. In modern obstetrics, very low Apgar score (0-3), particularly 5th minute, is one of the evidences to ascertain severe perinatal asphyxia (21). In this study, very low Apgar scores recorded in the 1st and

5th minutes were only in 38 (1.0%) and 7 (0.2%) neonates, respectively. With this premise, one may give a hypothesis that the vaginal or abdominal operative interventions were appropriate and timely carried out till proved by doing a prospective cohort study on the effect of unrecognized perinatal asphyxia in infancy as well as childhood to adolescent period.

Half of the women who gave birth after 28 weeks of gestational age being primiparous, 7.8% being grand multiparous and 80.2% being in the age range of 20-34 years perhaps indicate the positive attitude and practice towards family planning in the capital where 86% of the mothers came from. However, since this is not strongly persuasive to deduce, one has to do further study to look into other parameters of family planning success. Secondly, this study didn't show statistically significant association of perinatal mortality with primiparity, adolescent pregnancy and above 34-years of age. In the current view for the latter two ages of pregnancy is that as far as there is a proper perinatal care set up, considering the two extreme reproductive ages as risk factor is an old belief (22). However, this conclusion has to be supported with more analytical study such as a case-control study in our setup.

In contrast to the low national figure projected from the last census (15), about 20-years later, the MMR was found almost steady (14). It wasn't only the figure remains the same but also the etiologies implicated, with a little bit change in order of frequency. In the previous (14) as well as in this study the four leading causes of MMR were postabortal complications, puerperal sepsis, eclampsia and uterine rupture, which is also almost consistent with other studies (11,13). This showed that the primary problems predisposing (including unsafe abortion) for the occurrence of this fatal scenario is still untouched at the community level by large.

Mechanical causes accounted for almost half (48.9%) of perinatal deaths and third for maternal deaths, which are compatible with similar studies (8,14). Two scars dehiscence occurred intrapartum in the hospital unlike a study done in Ghana, a university hospital, where out of 106 uterine ruptures 38 (30 unscarred and 8 scarred uterus) occurred in the hospital (25). In this review, there was no unscarred uterine rupture among mothers labored in the hospital. However, the incidence and case fatality rates of uterine rupture were 11.4/1000 deliveries and 14.3%, respectively, which were almost five times and eight times higher than the findings in the study done in Ghana, 2.2/1000 deliveries and 1.8%, respectively (25).

To sum up this context, intrapartum mechanical factors are still dominant causes of perinatal and 3rd maternal deaths, which certainly herald the seriousness of the problem to evaluate the status of the referring health institutions (health centers, rural and zonal hospitals), prioritize and devise a strategy to provide basic emergency obstetric care at the nearby locality.

Quite high number of PPH has occurred in the hospital and it was the fourth cause of maternal death. Thus, management of third and fourth stages of labor has to be revised and special attention seems enquired, particularly, implementing universal active third stage management.

Incidence of eclampsia, although this finding is hospital based, was 61.4/10000 maternities, which is about 15 times higher than that of Qatar and U.S.A (4.1 and 4.3/10000 maternities, respectively). The reported maternal mortality rates range from 0.5 to 14% (26). It is said that many cases of eclampsia (21-38%) appear not to be preventable, even among women receiving regular antenatal care (27, 28), which is consistent with this study.

Although eclampsia was said to be the second commonest cause of MMR even in a best center (27), the case-fatality rate (36.4%) of this review was incomparably higher than acceptable range. At this juncture, it may be difficult to ascribe the rationale for the high case-fatality rate and investigating other possible risk factors do scientifically sound.

In conclusion, about 50% of the total deliveries were abnormal, 3/4th of perinatal deaths were stillbirths, and fetal distress was the commonest indication for both modes of operative deliveries and forceps delivery outnumbered vacuum extraction. Fifty percent of the women with viable pregnancy were primiparas but specific perinatal mortality rates weren't found to be statistically significant unlike in grandmultiparas. Other statistically significant associations of PMR were found in women with no antenatal care, address outside Addis Ababa, twins pregnancy, preterm delivery, breech delivery and birth weight below 2500gm. The leading causes of perinatal and maternal mortality were mechanical and abortion, respectively, with eclampsia the highest case-fatality rate for the mothers. There was no change in either PMR or MMR in 20 to 25–year's period, respectively, despite one of the measures taken, making the hospital central referral. Therefore, why many stillbirths, obstructed labour and rupture uterus referred to the tertiary hospital; why still mechanical is the leading cause of perinatal deaths; and why eclampsia is incomparably highly fatal has to be reevaluated to reduce the prevailing perinatal and maternal deaths.

Acknowledgement

Our heart felt gratitude goes to Dr. Zufan Lakew (head, department of obstetrics) and Dr. Fikre Enquselassie (statistician, department of community health) for reviewing the manuscript and their very constructive comments, which are included in the final write up. Furthermore, we would like to express our due thanks

and appreciation for the senior residents Dr. Alemayehu D, Dr. Asfaw F. Dr. Abdissa D, Dr. Yohannes T, Dr. Amir Z for their invaluable support and encouragement in data collection and analysis.

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