FACTORS ASSOCIATED WITH INTRAUTERINE FETAL DEATH AS SEEN AT KENYATTA NATIONAL HOSPITAL, NAIROBI

A DISSERTATION SUBMITTED AS PARTIAL FULFILMENT FOR THE AWARD OF MASTER OF MEDICINE IN OBSTETRICS AND GYNECOLOGY OF THE UNIVERSITY OF NAIROBI.

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DEDICATION

This book is dedicated to the most significant people in my life:

To my son Prince Salem, for his unconditional love and enduring the lifestyle of an absent mother at a young age. You make me proud to be a mother.

To my wonderful parents, for their encouragement, support and prayers, which have kept me going in the face of adversity.

To my dear sisters for being there for me in good and bad times and for their support in whichever small or big way which gave me the strength to press on and aim higher in life.

Last but definitely not least my best friend Mr Mwangi for being an inspiration in my life.
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7. To the midwives and nurses at KNH labor ward and Maternity theatre for their cooperation /assistance in data collection and the cordial relationship they accorded me during my training.

8. To all my fellow colleagues for their support, encouragement and teamwork during the course.
DECLARATION

This dissertation for MMed is my original work and has not been presented for a degree course in any other University.

Signed: ___________________________ Date: ___________________________

Dr Njuguna M. W.

CERTIFICATION OF SUPERVISION

This dissertation was researched upon by Dr Njuguna Mary under our guidance and has been submitted with our approval as University supervisors:

Signed: ___________________________ Date: ___________________________

DR F. X. ODAWA

Signed: ___________________________ Date: ___________________________

DR KAGEMA FRANCIS
DEFINITIONS

Anemia: hemoglobin level below 10gm/dl.

Intrauterine fetal demise/stillbirth: Death of a fetus weighing at least 500 grams or corresponding gestation of 20 weeks and above that shows no sign of life at or immediately after birth.

Early fetal death: Fetal death occurring from 20 – 27 weeks of gestation.

Late fetal death: Fetal death from 28 weeks of gestation.

Perinatal mortality rate: number of stillbirths and neonatal deaths per 1000 total births.

Stillbirth: no sign of life present at or after birth

Stillbirth rate: number of stillbirths per 1000 total births.

Neonatal death: death of a live born infant occurring up to 28 completed days of life.

Early neonatal death: death of a live born infant occurring up to 7 completed days of life.

Preterm birth: birth before 37 completed weeks of gestation.

Term birth: birth after 37 completed weeks of gestation and up to 42 weeks.

Postterm: birth after 42 completed weeks of gestation.

Antenatal care: This is the care a pregnant woman receives from the onset of pregnancy till onset of labor.

Intra-partum/intranatal care: This is the care woman receives while in labor, during delivery and immediate postpartum period i.e. first one hour after delivery.
**Postnatal care:** This is the care a woman receives during the puerperium approximately 6 weeks or 42 days following delivery.

**Primary PPH:** hemorrhage within 24 hours following the birth of the baby.

**Secondary PPH:** hemorrhage beyond 24 hours and within puerperium.

**Puerperal infection:** infection in the genital tract which occurs as a complication of delivery. It is indicated by rise in temperature and pulse rate, offensive and copious lochia discharge or tender sub-involuted uterus.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ANC</td>
<td>Antenatal clinic</td>
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<tr>
<td>APH</td>
<td>Antepartum hemorrhage</td>
</tr>
<tr>
<td>BBA</td>
<td>Babies Born before arrival</td>
</tr>
<tr>
<td>BMI</td>
<td>Body mass index</td>
</tr>
<tr>
<td>BP</td>
<td>Blood pressure</td>
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<tr>
<td>CNS</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>CPD</td>
<td>Cephalopelvic disproportion</td>
</tr>
<tr>
<td>DIC</td>
<td>Disseminated intravascular coagulation</td>
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<tr>
<td>EPMR</td>
<td>Early perinatal mortality rate</td>
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<tr>
<td>FSB</td>
<td>Fresh stillbirth</td>
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<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<tr>
<td>IUFD</td>
<td>Intrauterine fetal death</td>
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<td>IUGR</td>
<td>Intrauterine growth restriction</td>
</tr>
<tr>
<td>KDHS</td>
<td>Kenya Demographic and Health Survey</td>
</tr>
<tr>
<td>KNH</td>
<td>Kenyatta National Hospital</td>
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<tr>
<td>LMP</td>
<td>Last menstrual period</td>
</tr>
<tr>
<td>MSB</td>
<td>Macerated stillbirth</td>
</tr>
<tr>
<td>PMR</td>
<td>Perinatal mortality rate</td>
</tr>
<tr>
<td>PPH</td>
<td>Postpartum hemorrhage</td>
</tr>
<tr>
<td>PROM</td>
<td>Premature rupture of membranes</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical package for social sciences</td>
</tr>
<tr>
<td>SVD</td>
<td>Spontaneous vertex delivery</td>
</tr>
<tr>
<td>TORCH</td>
<td>Toxoplasmosis, Rubella, Cytomegalovirus, Herpes.</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>UTI</td>
<td>Urinary tract infection</td>
</tr>
<tr>
<td>VDRL</td>
<td>Venereal Disease Research Laboratory</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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ABSTRACT

Background: Fetal death in utero (stillbirth) is demise at 20 or more weeks of gestation and/or weight 500gms and more. Worldwide, fetal death rates vary considerably depending on quality of medical care available in the country in question. The local cut-off gestation is 28 weeks since the chances of survival below this gestational age are very minimal. There are gender and racial differences in perinatal mortality rates.

Fetal death at any point during gestation is a traumatic event not only to the family but also to the caregiver. Although overall perinatal mortality rates have fallen considerably in the past several decades in the developed world, it remains significantly high in the third world.

Despite improvement in antenatal and intrapartum care, stillbirth remains an important problem in obstetrics. Although several conditions have been linked to stillbirth, it is difficult to define the precise aetiology in many cases. The proportion of stillbirths that have a diagnostic explanation is higher in centres that conduct a defined systematic evaluation.

Objective: To determine factors associated with intrauterine fetal death at Kenyatta National Hospital labor ward.

Study design: This is a cross-sectional descriptive study. Mothers with intrauterine fetal demise were identified before, during labor and delivery. Their outcome was noted and the mothers followed up prospectively until discharge.

Study site: Labor ward, maternity theatre, antenatal/postnatal wards of Kenyatta National Hospital. This hospital is the national referral hospital and largest hospital in East and Central Africa with a capacity of about 2,000 beds. In the year 2010, a total of 10744 deliveries occurred at KNH, 557 (5.2%) of which were stillbirths.

Study population: A total of 90 women with intrauterine fetal death were enrolled and followed up during labor/delivery and postpartum period until the time of discharge.
Methods: A descriptive review of 90 cases of mothers with intrauterine fetal death between 1st February and 15th April was done. Structured questionnaires were used for collecting data of maternal demographic characteristics, past medical and obstetric history, index pregnancy antepartum, intrapartum and postpartum events, fetal, placental and cord assessment. Once recruited the women were followed up until discharge. The placentae were submitted for histopathological evaluation with the patients consent.

Results: 112 women had IUFD during the study period giving a prevalence of 5.1% and a stillbirth rate of 51 per 1000 total births. 90 cases (the calculated sample size) were recruited, their data collected and analysed. Hypertensive disorders were the commonest obstetric complications in these mothers (26.7%), followed by antepartum hemorrhage (25.6%), anemia (11.1%), PROM (11.1%) and urinary tract infections (11.1%). 10% of the mothers were sero-reactive, 6.7% had congenital fetal anomalies, 2.2% had a febrile illness while 2.2% had postterm gestation. Antepartum hemorrhage was the commonest cause of intrapartum deaths (34.3%).

Majority (64.4%) of the placenta had detectable histopathological findings while 35.6% showed normal placenta, cord and membranes. The commonest pathological findings encountered were infections (chorioamnionitis with or without funisitis) (21.1%), acute ischaemic necrosis (20.0%), placental hemorrhage and hematoma (13.3%) and placental calcification (7.8%).

90% of the mothers had no postpartum complications during the time of follow-up. The postpartum complications encountered were not directly related to the IUFD but to the obstetrics and medical co-morbidities that contributed to the fetal demise.

Conclusions: Hypertensive disorders and antepartum hemorrhage (APH) are the leading causes of intrauterine fetal demise at KNH. 65% of the placenta evaluated had detectable histopathological findings. Women who delivered by caesarean section had more postpartum complications and prolonged hospital stays.
INTRODUCTION

The common goal of modern obstetrics is to maximize the quality of maternal, fetal, newborn and infant life in such a manner as to give every individual who is conceived the greatest opportunity for optimal physical, mental, and emotional development.

The nature of care a woman receives during pregnancy, labor and delivery greatly impacts on the outcome of her pregnancy, and is reflected in the perinatal and maternal morbidity and mortality rates. The development of antenatal care services and intrapartum fetal surveillance has seen remarkable changes in perinatal and maternal mortality rates in developed countries, while in developing countries these rates are still very high.

In the absence of adequate facilities, antenatal care may deteriorate to routine abdominal palpations without adequate investigative history. Laboratory work up such as hemoglobin, syphilis and HIV screening, blood grouping and rhesus factor, urine, blood pressure and weight measurements are ignored and health education neglected. These are part of quality antenatal care and promote good fetal and maternal health. Factors influencing pregnancy outcome start from the preconception period. Maternal general health and nutrition are factors influenced by socio-economic status and other general health facilities availed to the population.

Approximately 50% of perinatal deaths are stillbirths (1). Of all the fetal deaths in the USA, over two thirds occur before 32 weeks gestation, 22% occur between 36 and 40 weeks and approximately 10% occur beyond 41 weeks(1).

Studies have been performed to identify any avoidable factors that contribute to antepartum fetal death. Failure of the medical team to respond appropriately to problems detected during pregnancy and labor, such as abnormal fetal growth assessments or intrapartum fetal monitoring results, significant maternal weight loss, or reported reduction in fetal movements constitute the largest group of avoidable factors. Antepartum fetal assessment can have a significant impact on the frequency and causes of antenatal deaths. Among the inclusion criteria for selecting patients for antepartum fetal assessment are utero-placental insufficiency leading to placental hypoperfusion, prolonged pregnancy, diabetes mellitus, hypertension, previous stillbirth, IUGR, decreased fetal movements and Rhesus isoimmunization.
**LITERATURE REVIEW**

Intrauterine fetal death (IUFD) embraces all fetal deaths weighing 500 grams or more occurring both during pregnancy (antepartum death) and during labor (intrapartum). Death of a fetus weighing less than 500 gms (before 20 weeks) has got a distinct aetiology and is usually termed as abortion. Intrapartum death is when the cardiac activity had been noted at some stage during labor and delivery while in antepartum death, no cardiac activity is appreciated from the time of admission to the delivery unit.

The American College of Obstetricians and Gynecologists defines fetal demise as death of a fetus past 20 weeks of gestation and/or weight of 500 grams and above (1). In the United States, there is no standard definition of the term “stillbirth.”(2). The CDC definition of “fetal death” is based on the definition promulgated by the WHO in 1950. It defines “fetal death” as death prior to the complete expulsion from its mother of a product of human conception, irrespective of the duration of pregnancy and which is not an induced termination of pregnancy. The death is indicated by the fact that after such expulsion, the fetus does not breathe or show any evidence of life such as heart beats, pulsation of the umbilical cord or definite movements of voluntary muscles. Heartbeats are to be distinguished from transient cardiac contractions; respirations are to be distinguished from fleeting respiratory efforts or gasps (2-4).

Perinatal death (stillbirths and neonatal deaths) occurs in the United States at a rate of 1 percent. Early studies reported that about 2% of pregnancies end in perinatal death after 28 weeks gestation, while 10 – 25% of recognized pregnancies end before 28 weeks (5). Today, an estimated 10 – 15% of all recognized pregnancies end in unexpected loss (6).

The fetal death rates in the United States varies among races, but overall, it is 7.5/1000 total births and accounts for approximately 50% of the perinatal mortality (fetal and neonatal deaths) (2). In Kenya, perinatal mortality rate (PNMR) ranges from 35-100/1000 live births (7). Lekha in 1989 found a PNMR of 502.1/1000 live births at Kenyatta National Hospital for births less than 2000 grams (8), while Obwaka in 1994 found a stillbirth rate of 22.5/1000 total births at Pumwani Maternity Hospital (9). Kavoo in his study of early perinatal mortality at Machakos General Hospital in 1988 found the PNMR of 72 per 1000 total births(7).
Mati and colleagues in the Nairobi Birth Survey in 1983 found early perinatal mortality rate in Nairobi to be 35.3 per 1000 total births (11). The Kenya Demographic and Health Survey (KDHS 2008-09) defines perinatal death as pregnancy losses occurring after seven completed months of gestation plus death of live births within the first seven days of life (early neonatal deaths). The results show that of the 5920 reported pregnancies of 7+ months duration, 68 ended in stillbirths and 149 were neonatal deaths, thus giving a PNMR of 37 per 1000 total births and a stillbirth rate of 11.5 per 1000 total births (12).

The timing of pregnancy losses vary and are related to the cause of the death. The incidence of early pregnancy loss varies with gestational age as below:

<table>
<thead>
<tr>
<th>Gestation (weeks)</th>
<th>Mean incidence pregnancy loss (%)</th>
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<tbody>
<tr>
<td>5 – 7</td>
<td>17.5</td>
</tr>
<tr>
<td>8 - 11</td>
<td>50.6</td>
</tr>
<tr>
<td>12 - 15</td>
<td>47.0</td>
</tr>
<tr>
<td>16 – 19</td>
<td>32.8</td>
</tr>
<tr>
<td>20 – 27</td>
<td>10.7</td>
</tr>
<tr>
<td>Total (5 – 27)</td>
<td>33.0</td>
</tr>
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</table>

(Adapted from UpToDate: Fetal death – etiology and pathological findings)(13).

The first trimester of pregnancy is defined as the period from fertilization until the 13th week of gestation. It is the most sensitive time of development for the conceptus. Therefore, there is a very high incidence of first trimester spontaneous abortion reported in literature. The most common cause of first trimester abortion is chromosomal abnormalities. The estimate of the incidence of chromosomal anomalies causing early fetal demise has typically been cited as 30-60% (14).

Second and third trimester fetal loss can be attributed to many different single causes, or to a combination of causes. There are acute etiologies such as abruption or umbilical cord complications; subacute etiologies such as infections, uteroplacental insufficiency, diabetes or immunologic rejection (10, 15).
Infection is a significant risk for the fetus (16-19). Romero and colleagues over a period of 15 years demonstrated the severe repercussions of intrauterine bacterial infections. They have postulated that ascending bacterial infections (where bacteria migrate from the vagina through the cervix into the uterine cavity) trigger a cytokine cascade that ultimately leads to preterm PROM, preterm delivery and in severe cases, IUFD (16, 19).

Not all intrauterine infections are caused by bacteria. For example, a study in Sweden showed that Parvovirus B19, which is found in 50-70% adults is often asymptomatic in this population, in pregnancy is associated with fetal anemia, fetal hydrops, spontaneous abortion and IUFD (20). Fetal infections with rubella, cytomegalovirus, parvovirus and chorioamnionitis are important. The frequency of fetal infections is higher in developing countries. Autopsy and histologic evaluation of the placenta is probably the best way to document an infectious aetiology for a fetal demise. Authority vary as to which panel of tests is appropriate. Traditionally, most authorities have recommended obtaining TORCH (Toxo, Rubella, CMV and Herpes virus) antibody titers. A more cost effective approach is to limit testing for CMV, rubella and Toxo to those patients in whom clinical findings suggest the possibility of intrauterine infection, i.e. those with intrauterine growth restriction or microcephaly (21, 22).

Akech, in the year 2000 studied the profile of structural congenital abnormalities in babies born at KNH and found that only 4.4% of these had congenital abnormalities diagnosed prenatally. 64% of these were CNS anomalies (hydrocephaly, spina bifida, and anencephaly), 17.6% were musculoskeletal, 8.8% were cranio-facial, 5.9% were genitourinary and 3.7% were gastrointestinal (23).

Diabetes is often the cause of complications during pregnancy for the fetus as well as the mother. Cundy et al. found that compared to the non-diabetic populations, the rate of fetal death occurring between 20 and 28 weeks increases 2.5 fold in women with Type 2 diabetes mellitus(24). The cause of fetal deaths in diabetes is not clear. Possible explanations are hypoglycemia, hypoxia and acidosis. Associated pre-eclampsia, polyhydramnios, congenital malformation, maternal ketosis are some of the factors responsible.

Pre-pregnancy body mass index (BMI) has been studied in correlation with poor pregnancy outcome. In one study, it was determined that nullipara women with a pre-pregnancy BMI of
25.0 or more had a quadrupled risk of late fetal death compared to women with a BMI of 20 or less. This study also documented that nullipara women with a high BMI had a higher rate of hypertensive disorders in pregnancy (25).

Advanced maternal age is associated with an increased risk of stillbirth. In a retrospective study in 2006, Reddy et al conducted an analysis of more than 5 million singleton deliveries. In this analysis, advanced maternal age was associated with a higher rate of stillbirth, with a peak risk period for stillbirth occurring among older mothers between 37 and 41 weeks of gestation (26). The KDHS 2008-09 showed the highest perinatal mortality risk is experienced among mothers age 30-39 years (43/1000) when compared with mothers under age 30(12).

Smith and Fretts presented data from a literature search. They found an OR for stillbirth of 1.8 – 2.2 for women between 35 and 39 years of age and an OR of 1.8 –3.3 for women over 40 years of age. Other epidemiological risk factors were nulliparity (OR: 1.2-1.4), smoking (OR: 1.7-3.0), obesity (BMI>30; OR: 2.1-2.8), having had a previous SGA infant (OR: 2.0-4.6), multiple gestations compared with singleton gestations and black compared with white race (OR: 2.2-2.8)(27,28). Mothers with any illness during pregnancy are more likely to have perinatal deaths than those who had none (OR = 4.60) (10). These included Pre-eclampsia (35%), S.T.I.’s (29%), Malaria (6%) and Postdatism (6%), Unexplained stillbirths (12%). Mothers who did not attend ANC were more likely to incur perinatal mortality than those who had (OR=9.58)(29).

Umbilical cord accidents are a common cause of fetal deaths in the third trimester (30, 31). A study by Carey and Rayburn reported that over a 5 year period, a single nuchal cord was observed in 23.6% of all deliveries; both live and stillborn, and multiple nuchal cords were found in 3.7% of the stillbirths (32). Somes in his study in 2000, found an incidence of umbilical cord knots to be 1%, and a knot associated mortality rate of 2.7% (33). This was in contrast to the <1% mortality rate in unknotted population. However, mere presence of a knot does not predict death. If the knot is loose and fetal circulation is maintained, the fetus can survive but if the knot is tightened, there can be constriction of the blood vessels and fetal circulation cannot be maintained. Furthermore, decreased Wharton’s jelly in certain areas of the cord, most notably the fetal and placental insertions can result in occlusion of fetal blood flow if the vessels are twisted sufficiently (34).
Insertion abnormalities such as marginal insertion and velamentous insertion can also cause fetal death. Marginal insertions only occur 5 – 7% of the time, but may be more prone to vessel rupture or compression, thereby resulting in fetal demise (35). Velamentous insertion, which occurs in about 1% of singleton births, is the insertion of the umbilical cord vessels into the external membranes prior to their penetration into the placenta. Recent advances in ultrasound technology can help identify cord problems including velamentous insertion, vasa previa, short cords, long cords, two vessel cords, true knots and nuchal cords, thereby potentiating the ability of the obstetrician to intervene when possible(36).

The cause of fetal death can often be determined through pathologic examination of the placenta (37, 38). The major pathologic processes observable in the placenta that can adversely affect pregnancy outcome include intrauterine bacterial infections, decreased blood flow to the placenta due to calcification and thrombosis and immunologic attack of the placenta by the mother’s immune system (39).

Even with all of the advances made to date, it has been estimated that as many as 12 – 50% of stillbirths have no identifiable etiology (40).

Naked eye examination of the placenta and the cord including histology and examination of the baby including autopsy may give some clue as to the cause of death. The fetus is examined and weighed. Examination involves the overall appearance of maceration, meconium staining and skin lesions, documenting the integrity of the skull, neck and spine, presence of orbits and integrity of the palate should be included in the general description of the face. Abdominal wall defects such as scaphoid appearance (diaphragmatic hernia) or possible masses or organomegaly, presence of omphalocele or gastroschisis is documented. Genital sex should be assigned. Extremities of the infant should be checked for symmetry, proportions, all digits of the four extremities and abnormal palmar creases.

Postmortem studies may not be informative, except in cases of congenital malformations as the tissues are softened and necrotic, precluding proper examination. It may include full body radiographs and photographs. Autopsy is often useful in identifying the cause of fetal death. A study by Incerpi et al. showed that autopsy reduced the number of unexplained stillbirths by 10% (40). If consent for a full autopsy is not given, the patient should be asked to consider a limited
autopsy such as external examination by pathologist or internal examination limited to brain and/or spinal cord, chest organs or abdominal organs as appropriate.

Cytogenetic study by karyotyping of the baby is helpful in the presence of congenital malformations or IUGR. Cardiac puncture for 10 ml of heparinized blood is obtained or alternatively a skin biopsy can be sent in sterile saline. With maceration, culture failure rate is as high as 90% and in such instances internal tissues such as lung or diaphragm can be obtained.

**PREVENTION**

While IUFD cannot be totally prevented, the following guidelines can help to reduce its incidence.

◊ Preconception care: is essential to prevent its occurrence in the high risk group. This should include prenatal diagnosis and fluorescent in situ hybridization (FISH).

◊ Regular antenatal care: to prevent, detect at the earliest and institute effective therapy for conditions likely to cause fetal death. Optimal control of maternal diseases like hypertension and diabetes, cessation of drug/substance use both preconception and antenatally has a positive bearing.

◊ To screen out the ‘at-risk mothers’, to monitor carefully for the assessment of fetal wellbeing and to terminate pregnancy with the earliest evidence of fetal compromise.

◊ Intrapartum monitoring especially for the high risk mothers.

**RATIONALE**

While studies have been conducted to establish and delineate the causes of early and late neonatal deaths, little has been done for antepartum and intrapartum fetal deaths. The mothers’ questions about what caused the death often remain unanswered and the anxiety concerning subsequent pregnancy outcome remains high. This study endeavors to determine the maternal and fetal-placental factors associated with intrauterine fetal demise, both antepartum and intrapartum and the associated maternal adverse outcomes at Kenyatta National Hospital. Histological evaluation of placental tissue which is not routinely done will be done in all the patients with IUFD.
It will bring out gaps in our provision of comprehensive care to mothers and the possible intervention measures to improve the level of antenatal care to improve maternal and fetal outcomes.

All the local studies reviewed including the KDHS 2008-09 reports included perinatal data from 28 weeks gestation and above thus excluding data for gestations from 20 to 27 weeks. This certainly lowers the figures of the perinatal statistics and this study hopes to capture and include these pregnancy losses.

**RESEARCH QUESTION**

What are the maternal, fetal and placental factors associated with intrauterine fetal deaths at Kenyatta National Hospital?

**BROAD OBJECTIVE**

To determine the factors associated with intrauterine fetal demise (IUFD) at Kenyatta National Hospital.

**SPECIFIC OBJECTIVES**

1. To determine the prevalence of stillbirths at Kenyatta National Hospital.

2. To determine the socio-demographic characteristics of the mothers.

3. To determine the adverse maternal outcomes associated with stillbirths.

4. To determine maternal medical and obstetric factors.

5. To determine the fetal, placental and cord associated factors.
MATERIALS AND METHODS

STUDY DESIGN

This was a descriptive cross-sectional study. Mothers diagnosed with fetal demise prior to onset of labor or during labor and delivery were enrolled into the study and interviewed. After delivery, the fetus(es) were examined to identify gross anomalies and the placenta preserved for histopathological evaluation. The clients were followed up postpartum throughout their hospital stay until discharge or death.

STUDY AREA

The study was conducted at Kenyatta National Hospital labor ward and antenatal/postnatal wards (1A, GFA, GFB). KNH is the national referral and teaching hospital and the largest hospital in East and Central Africa with a capacity of 2000 beds. The labor ward is manned by a team of midwives, senior house officer(s), senior registrar and a consultant on call duties.

STUDY POPULATION AND SAMPLE SIZE

The study focused on mothers with IUFD at Kenyatta National Hospital labor ward during the study period. From the labor ward medical records, there were 5387 total births from January to June, 2010. Stillbirths (both fresh and macerated) totaled to 280. This gives a stillbirth rate of 52/1000 or 5.2%.

Sample size was calculated using the formula:

\[ N = \frac{Z^2 \times (1-P)P}{D^2} \]

N = sample size
Z = value of 95% confidence interval, which is the normal standard deviation = 1.96
D = difference in precision or estimate = 0.05 or 5%
P = prevalence as noted above = 5.2%

Using the formula, sample size of 75 was obtained.
A sample size of 90 was targeted to allow for approximately 20% loss through withdrawal or errors.

**INCLUSION CRITERIA**

1. Clients with intrauterine fetal demise prior to onset of labor and during labor.
2. Gestational age of 20 weeks and above.
3. Clients willing and consented to participate in the study

**EXCLUSION CRITERIA**

1. Clients who declined to participate in the study. The number of any clients who declined, or whose placentae were erroneously not preserved for pathological evaluation will be recorded for the sake of computation of incidence but no data concerning their profile will be collected.
2. Gestation less than 20 weeks.
3. Mothers of stillbirths delivered outside the KNH maternity unit or ward 1D (stillborn BBAs).

**DATA COLLECTION**

Data was collected by the principal investigator or study assistants in labor ward. Daily follow-up in the postnatal wards until discharge were done by the principal investigator. For those who were eligible, an informed written consent was obtained after explaining to the patient the purpose and nature of the study. A structured questionnaire was used to obtain data. Interviews were conducted on one to one basis and the data obtained was corroborated with the patients’ antenatal clinic card and labor ward file.

Mothers diagnosed with IUFD prior to onset of labor were interviewed prior to commencement of induction of labor or before cesarean section was done where indicated; while those with intrapartum fetal death were interviewed immediately after delivery and their data corroborated with the ANC records and the admission notes and examination findings. The fetus(es) were examined grossly, weighed and any gross structural anomalies recorded. The placenta and cord were also examined and any anomalies entered in the data collection instrument. The placenta
was preserved in 10% buffered formalin and sent for histopathological evaluation. Complex and expensive analysis like autopsy and cytological studies of fetal tissues were not done due to time and financial constraints. No photographs or x-rays of the fetuses were taken after delivery.

The mothers were followed up daily in the postnatal wards by principal investigator until discharge to obtain data on maternal postpartum complications such as postpartum hemorrhage and sepsis and duration of hospital stay.

**DATA MANAGEMENT AND ANALYSIS**

Completed questionnaires were edited prior to entry into the computer. Data entry and cleaning was carried out by the principal investigator. Confidentiality was maintained by ensuring the questionnaires were only handled by the investigator and the study assistants, patients names were not used in the data collection instruments, only the inpatient file number and the assigned study number were used. Data was entered by the principal investigator into Ms Access database prepared by the statistician. Data was analyzed by SPSS statistical package Version 15. Chi-square test was used to describe the data and P<0.05 was used as the point of significance.

**ETHICAL CONSIDERATIONS**

1. Approval for the study was obtained from the Department of Obstetrics and Gynecology and Kenyatta National Hospital/ University of Nairobi Ethics and Research Committee.
2. Interview of mothers was done by the principal investigator on one to one basis after obtaining a written informed consent.
3. Confidentiality was maintained throughout the study.
4. No inducement of any kind for clients to participate in the study was done, and those who declined to enroll in the study received standard care.
STUDY LIMITATIONS

1. Due to technical, financial limitations and time factor, examinations such as autopsy and cytological studies of fetal tissues were not done. For this study, the investigator relied on gross examination of the fetus(es), cord and placenta to detect any gross anomalies. Autopsy could have picked up congenital fetal anomalies. Placenta histopathological evaluation was done for all the 90 study cases. This may have excluded or missed many anomalies that can only be detected by complex DNA and chromosomal analysis and reflect fewer fetal causes of demise while inflating the idiopathic/unknown causes. Failure to detect fetal anomalies like cardiac, gastrointestinal and urinary could be due to lack of routine fetal anomaly scans.

2. The study only assessed immediate outcomes and long-term effects were not studied.
RESULTS

During the two and a half months study period, there were 112 women with intrauterine fetal demise at KNH labor ward. Over the same period a total of 2196 deliveries occurred giving a stillbirth rate of 51 per 1000 total births. 90 of these constituted the study population and their demographic characteristics were as below:

Table 1

Socio-demographic characteristics of the study population.

1a: Maternal age

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>N=90</th>
<th>Number</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>4</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>20-24</td>
<td>23</td>
<td>25.6</td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>29</td>
<td>32.2</td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>25</td>
<td>27.8</td>
<td></td>
</tr>
<tr>
<td>35-39</td>
<td>6</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>=/&gt; 40</td>
<td>3</td>
<td>3.3</td>
<td></td>
</tr>
</tbody>
</table>

The mean age of the study participants was 27, median 27.5 and mode was 30 years. Over 75% of the mothers were aged between 20-34 years.

1b: Marital status

<table>
<thead>
<tr>
<th>Marital status</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>71</td>
<td>78.9</td>
</tr>
<tr>
<td>Single</td>
<td>16</td>
<td>17.8</td>
</tr>
<tr>
<td>Widowed</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Over 75% of the mothers were married.
1c: Level of education

<table>
<thead>
<tr>
<th>Level of education</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>Primary</td>
<td>32</td>
<td>35.6</td>
</tr>
<tr>
<td>Secondary</td>
<td>35</td>
<td>38.9</td>
</tr>
<tr>
<td>Tertiary</td>
<td>20</td>
<td>22.2</td>
</tr>
</tbody>
</table>

Majority of the mothers had at least basic level of education (96.7%).

1d: Occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>52</td>
<td>57.8</td>
</tr>
<tr>
<td>Self employed</td>
<td>14</td>
<td>26.6</td>
</tr>
<tr>
<td>Formal employment</td>
<td>24</td>
<td>15.6</td>
</tr>
</tbody>
</table>

More than half (57.8%) had no income generating activity.

Table 2: Obstetric Characteristics (N=90)

Table 2a: Parity

<table>
<thead>
<tr>
<th>Parity</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>28</td>
<td>31.1</td>
</tr>
<tr>
<td>1</td>
<td>24</td>
<td>26.7</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>22.2</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>7.8</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>7.8</td>
</tr>
<tr>
<td>=/ &gt;5</td>
<td>4</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Nullipara and low parity women (=/≤2) had the highest rate of stillbirths (80%). The parity of the mother did not have any association with the timing of the fetal demise (antepartum or intrapartum), p=0.908.
Table 2b: Previous pregnancy

<table>
<thead>
<tr>
<th>Outcome of previous pregnancy</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous pregnancy</td>
<td>28</td>
<td>31.1</td>
</tr>
<tr>
<td>Abortion</td>
<td>14</td>
<td>15.6</td>
</tr>
<tr>
<td>Preterm stillbirth</td>
<td>5</td>
<td>5.6</td>
</tr>
<tr>
<td>Term stillborn</td>
<td>3</td>
<td>3.3</td>
</tr>
<tr>
<td>Term live baby</td>
<td>40</td>
<td>44.4</td>
</tr>
</tbody>
</table>

44.4% of the mothers had previous live term births, 15.6% had abortions while 9% had a previous stillbirth.

Table 2c: Interval from previous pregnancy

<table>
<thead>
<tr>
<th>Interval (months)</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous delivery</td>
<td>28</td>
<td>31.1</td>
</tr>
<tr>
<td>&lt;12</td>
<td>8</td>
<td>8.9</td>
</tr>
<tr>
<td>12-24</td>
<td>11</td>
<td>12.2</td>
</tr>
<tr>
<td>&gt;24</td>
<td>43</td>
<td>47.8</td>
</tr>
</tbody>
</table>

47.8% had over 2 year gap from the previous pregnancy event.

Table 2d: ANC attendance

<table>
<thead>
<tr>
<th>ANC attendance</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>77</td>
<td>85.6</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
<td>14.4</td>
</tr>
</tbody>
</table>

85.6% of the mothers had attended ANC.
Table 2e: Place attended ANC

<table>
<thead>
<tr>
<th>Place ANC attended</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>13</td>
<td>14.4</td>
</tr>
<tr>
<td>Health center</td>
<td>43</td>
<td>47.8</td>
</tr>
<tr>
<td>Public hospital</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td>Private hospital</td>
<td>15</td>
<td>16.7</td>
</tr>
<tr>
<td>KNH</td>
<td>13</td>
<td>14.4</td>
</tr>
</tbody>
</table>

47.8% of the mothers had attended ANC at a health centre while only 14.4% attended at KNH.

Table 2f: Number of ANC visits

<table>
<thead>
<tr>
<th>Number of visits</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>13</td>
<td>14.4</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>13.3</td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>17.8</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>21.1</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>13.3</td>
</tr>
<tr>
<td>&gt;/5</td>
<td>18</td>
<td>20.1</td>
</tr>
</tbody>
</table>

Majority had attended ANC at least once while 14.4% had not attended ANC clinic.

Table 2g: Gestation at 1st ANC visit

<table>
<thead>
<tr>
<th>Gestation (weeks)</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No attendance</td>
<td>13</td>
<td>14.4</td>
</tr>
<tr>
<td>&lt;20</td>
<td>15</td>
<td>16.7</td>
</tr>
<tr>
<td>21-28</td>
<td>16</td>
<td>17.8</td>
</tr>
<tr>
<td>29-36</td>
<td>43</td>
<td>47.8</td>
</tr>
<tr>
<td>&gt;37</td>
<td>3</td>
<td>3.3</td>
</tr>
</tbody>
</table>

47.8% of the 1st ANC clinic visits were late attendance in the third trimester between 29-36 weeks.
Table 2h: Gestation of index pregnancy

<table>
<thead>
<tr>
<th>Gestation (weeks)</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-27</td>
<td>25</td>
<td>27.8</td>
</tr>
<tr>
<td>28-36</td>
<td>38</td>
<td>42.2</td>
</tr>
<tr>
<td>37-42</td>
<td>25</td>
<td>27.8</td>
</tr>
<tr>
<td>&gt;42</td>
<td>2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

The highest stillbirth rate occurred in the 3rd trimester between 28-36 weeks (42.2%). However, the gestational age did not have a significant association with the timing of the stillbirth (antepartum or intrapartum), p=0.702.

Table 2i: Antenatal Profile/assessment

<table>
<thead>
<tr>
<th>Antenatal profile/assessment done (N=90)</th>
<th>Number done (%)</th>
<th>Not done (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td>73(81.1)</td>
<td>17(18.9)</td>
</tr>
<tr>
<td>VDRL</td>
<td>72(80)</td>
<td>18(20.0)</td>
</tr>
<tr>
<td>HIV test</td>
<td>80(88.9)</td>
<td>10(11.1)</td>
</tr>
<tr>
<td>Blood group/Rh factor</td>
<td>68(75.6)</td>
<td>22(24.4)</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>75(83.3)</td>
<td>15(16.7)</td>
</tr>
<tr>
<td>Blood sugar</td>
<td>5(5.6)</td>
<td>85(94.4)</td>
</tr>
<tr>
<td>HBsAg</td>
<td>0(0)</td>
<td>90(100)</td>
</tr>
<tr>
<td>TORCH screen</td>
<td>3(3.3)</td>
<td>87(96.7)</td>
</tr>
<tr>
<td>Weight</td>
<td>76(84.4)</td>
<td>14(15.6)</td>
</tr>
<tr>
<td>BP</td>
<td>78(86.7)</td>
<td>12(13.3)</td>
</tr>
<tr>
<td>Antenatal Obstetric scan</td>
<td>23(25.6)</td>
<td>67(74.4)</td>
</tr>
</tbody>
</table>

Only a minority of the patients had antenatal blood sugar screening done (5.6%) while none had Hepatitis B Virus screening.
Table 3

Medical conditions prior to index pregnancy

<table>
<thead>
<tr>
<th>Condition (N=90)</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>79</td>
<td>87.8</td>
</tr>
<tr>
<td>Chronic hypertension</td>
<td>4</td>
<td>4.4</td>
</tr>
<tr>
<td>HIV seropositive</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td>Asthma</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Drugs/substance use</td>
<td>Yes (%)</td>
<td>No (%)</td>
</tr>
<tr>
<td>Cigarette smoking</td>
<td>1(1.1)</td>
<td>89(98.9)</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>1(1.1)</td>
<td>89(98.9)</td>
</tr>
</tbody>
</table>

87.8% of the mothers had no medical illness preconception. However HIV infection and chronic hypertension were the most encountered conditions, 6.7% and 4.4% respectively.

Table 4

4a: Antepartum complications/risks in index pregnancy

<table>
<thead>
<tr>
<th>Complication (N=90)</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal bleeding(APH)</td>
<td>23</td>
<td>25.6</td>
</tr>
<tr>
<td>Anemia</td>
<td>10</td>
<td>11.1</td>
</tr>
<tr>
<td>Preeclampsia/eclampsia</td>
<td>24</td>
<td>26.7</td>
</tr>
<tr>
<td>Febrile illness</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>HIV seropositive</td>
<td>9</td>
<td>2.2</td>
</tr>
<tr>
<td>Abdominal trauma</td>
<td>2</td>
<td>11.1</td>
</tr>
<tr>
<td>PROM</td>
<td>10</td>
<td>11.1</td>
</tr>
<tr>
<td>UTI</td>
<td>10</td>
<td>11.1</td>
</tr>
<tr>
<td>Chorioamnionitis (offensive)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The commonest obstetric complications encountered among the study participants were hypertensive disorders (Preeclampsia/eclampsia) at 26.7%, antepartum hemorrhage (25.6%), anemia, PROM and Urinary Tract Infections each at 11.1% and HIV seroreactive at 10%.

### 4b: Antenatal obstetric scan

<table>
<thead>
<tr>
<th>Scan (N=90)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not done</td>
<td>67</td>
<td>74.4</td>
</tr>
<tr>
<td>Done</td>
<td>23</td>
<td>25.6</td>
</tr>
</tbody>
</table>

### 4c: Results of scan

<table>
<thead>
<tr>
<th>Scan report (N=23)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal scan</td>
<td>14</td>
<td>60.9</td>
</tr>
<tr>
<td>Fetal structural anomaly</td>
<td>4</td>
<td>17.4</td>
</tr>
<tr>
<td>Oligohydramnios</td>
<td>3</td>
<td>13.0</td>
</tr>
<tr>
<td>Oligohydramnios with IUGR</td>
<td>2</td>
<td>8.7</td>
</tr>
</tbody>
</table>

60.9% of the antenatal obstetric scans done were normal. Of those with detected anomalies, 17.4% showed fetal structural anomaly, 13% had oligohydramnios while 8.7% had oligohydramnios with IUGR. Only 25% of the mothers had antenatal scans done. This could be due to the financial constraints for majority of the mothers who were unemployed, unavailability of scan services in the health centres where most attended ANC and partly failure by doctors to do scans for all ANC mothers.
Labor and delivery

**Table 5a: mode of delivery**

<table>
<thead>
<tr>
<th>Mode of delivery (N=90)</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVD</td>
<td>65</td>
<td>72.2</td>
</tr>
<tr>
<td>Vaginal breech delivery</td>
<td>6</td>
<td>6.7</td>
</tr>
<tr>
<td>Caesarean section</td>
<td>19</td>
<td>21.1</td>
</tr>
</tbody>
</table>

Over 75% of the mothers had vaginal delivery (vertex + breech) while 21.1% had cesarean section done. The rate of cesarean sections would be brought down significantly if mothers with IUFD confirmed by scan with previous scars were offered mechanical induction rather than straight repeat sections. Some clinicians offered section for such mothers who were even remote from term gestations.

**Table 5b: Indications for caesarean section**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe APH</td>
<td>8</td>
<td>42.1</td>
</tr>
<tr>
<td>Previous C/S</td>
<td>6</td>
<td>31.6</td>
</tr>
<tr>
<td>Obstructed labor</td>
<td>3</td>
<td>15.8</td>
</tr>
<tr>
<td>Other: multiple gestation/breech</td>
<td>2</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Most cesarean sections were done due to severe APH (42.1%), 31.6% due to previous uterine scar and 15.8% due to obstructed labors.

**Table 5c: outcome of current delivery**

<table>
<thead>
<tr>
<th>Delivery outcome (N=90)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singleton</td>
<td>87</td>
<td>96.7</td>
</tr>
<tr>
<td>Multiple</td>
<td>3</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Table 5d: Timing of fetal demise

<table>
<thead>
<tr>
<th>Type (N=90)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrapartum deaths (Fresh SB)</td>
<td>35</td>
<td>38.9</td>
</tr>
<tr>
<td>Macerated SB</td>
<td>55</td>
<td>61.1</td>
</tr>
</tbody>
</table>

Macerated stillbirths accounted for 61.1%, while fresh stillbirths were 38.9%.

Table 5e: Causes of intrapartum deaths (FSB)

<table>
<thead>
<tr>
<th>Cause of intrapartum death (N=35)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tight nuchal cord</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>APH: Abruptio placenta</td>
<td>10</td>
<td>28.6</td>
</tr>
<tr>
<td>APH: Placenta previa</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>Cord prolapsed</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td>Obstructed labor</td>
<td>3</td>
<td>8.6</td>
</tr>
<tr>
<td>Ruptured uterus</td>
<td>2</td>
<td>5.7</td>
</tr>
<tr>
<td>Structural fetal anomalies</td>
<td>4</td>
<td>11.4</td>
</tr>
<tr>
<td>Labor-related cause not documented</td>
<td>10</td>
<td>28.6</td>
</tr>
</tbody>
</table>

Severe APH was the commonest cause of intrapartum deaths 34.3% with abruption being the biggest culprit compared to placenta previa.
Table 5f: Fetal structural anomalies (N=90)

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>84</td>
<td>93.3</td>
</tr>
<tr>
<td>Present</td>
<td>6</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Congenital structural anomalies were found in 6.7% of the cases while 93.3% had none. Since autopsy was not carried out, the presence of structural congenital anomalies could not be ruled out in these babies.

Table 5g: Type of Structural fetal anomalies

<table>
<thead>
<tr>
<th>Type (N=6)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS (hydrocephaly, anencephaly)</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>1</td>
<td>16.7</td>
</tr>
<tr>
<td>Other: cystic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hygroma/hydrops fetalis</td>
<td>1</td>
<td>16.7</td>
</tr>
</tbody>
</table>

Half of the detected congenital structural anomalies involved the central nervous system (CNS).

Table 5h: Cord factors

<table>
<thead>
<tr>
<th>Cord factor (N=10)</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cord prolapse</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Tight entangled cord</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>True knots</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>2 vessel cord</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Half of the cord associated factors were tight entanglement while 30% were cord prolapse.
Table 6: Histopathology results

<table>
<thead>
<tr>
<th>Histology findings (N=90)</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal placenta, cord and membranes</td>
<td>32</td>
<td>35.6</td>
</tr>
<tr>
<td>Acute ischaemic necrosis (infarcts)</td>
<td>18</td>
<td>20.0</td>
</tr>
<tr>
<td>Chorioamnionitis with/without funisitis</td>
<td>19</td>
<td>21.1</td>
</tr>
<tr>
<td>Placental calcifications</td>
<td>7</td>
<td>7.8</td>
</tr>
<tr>
<td>Placental hemorrhage with hematoma</td>
<td>12</td>
<td>13.3</td>
</tr>
<tr>
<td>True cord knot</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>2 vessel cord</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

The commonest histopathological anomalies were infection (chorioamnionitis with/without funisitis), 21.1%, acute ischaemic necrosis (20.0%), placental hemorrhage/hematoma (13.3%) and placental calcifications (7.8%).

Table 7
Postpartum period

<table>
<thead>
<tr>
<th>Postpartum complication</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>81</td>
<td>90</td>
</tr>
<tr>
<td>Primary PPH</td>
<td>5</td>
<td>5.6</td>
</tr>
<tr>
<td>Retained placenta</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Puerperal infection</td>
<td>2</td>
<td>2.2</td>
</tr>
<tr>
<td>Bleeding disorder (DIC)</td>
<td>1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Duration of hosp stay (days)

<table>
<thead>
<tr>
<th>Duration of hosp stay (days)</th>
<th>N=90</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>62</td>
<td>68.9</td>
</tr>
<tr>
<td>4-6</td>
<td>20</td>
<td>22.2</td>
</tr>
<tr>
<td>&gt;7</td>
<td>5</td>
<td>5.6</td>
</tr>
<tr>
<td>Postnatal maternal death</td>
<td>3</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Most mothers had no postpartum complications (90%). 5.6% had primary PPH, 2.2% had puerperal sepsis, 1.1% had retained placenta and 1.1% had disseminated intravascular coagulopathy. 3.3% of mothers suffered postpartum mortality. These 3 had abruptio placenta with DIC/PPH, cryptococcal meningitis with AIDS and eclampsia respectively. 68.9% stayed in hospital 3 days or less, while 5.6% stayed beyond 1 week.

Table 8: Association of fetal outcome with maternal medical and obstetric risks

<table>
<thead>
<tr>
<th>Medical/obstetric risks</th>
<th>Antepartum deaths</th>
<th>Intrapartum deaths</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N ( %)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Vaginal bleeding (APH)</td>
<td>12 (52.2)</td>
<td>11 (47.8)</td>
<td>0.130</td>
</tr>
<tr>
<td>PET/Eclampsia</td>
<td>20 (83.3)</td>
<td>4 (20.0)</td>
<td>0.009*</td>
</tr>
<tr>
<td>Anemia</td>
<td>6 (60.0)</td>
<td>4 (40.0)</td>
<td>0.939</td>
</tr>
<tr>
<td>Febrile illness</td>
<td>1 (50.0)</td>
<td>1 (50.0)</td>
<td>0.744</td>
</tr>
<tr>
<td>HIV +</td>
<td>3 (33.3)</td>
<td>6 (66.7)</td>
<td>0.154</td>
</tr>
<tr>
<td>Trauma</td>
<td>2 (100.0)</td>
<td>0 (0)</td>
<td>0.254</td>
</tr>
<tr>
<td>PROM</td>
<td>6 (60.0)</td>
<td>4 (40.0)</td>
<td>0.939</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>0 (0)</td>
<td>4 (100.0)</td>
<td>0.130</td>
</tr>
<tr>
<td>Postdates</td>
<td>1 (50.0)</td>
<td>1 (50.0)</td>
<td>0.744</td>
</tr>
</tbody>
</table>

From the table above, it is apparent that women with hypertensive disorders of pregnancy are more likely to have antepartum fetal demise. There was a significant association between PET/Eclampsia with the timing of fetal death, p < 0.01.

The medical/obstetric risk factors were not significantly associated with the type of placental histopathology = 0.290 – 0.916.
Table 9: Association between fetal outcomes with the placenta histopathology

<table>
<thead>
<tr>
<th>Placental histology</th>
<th>Antepartum deaths</th>
<th>Intrapartum deaths</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Normal placenta</td>
<td>19 (59.4)</td>
<td>13 (40.6)</td>
<td></td>
</tr>
<tr>
<td>Acute ischemic necrosis/infarcts</td>
<td>14 (77.8)</td>
<td>4 (22.2)</td>
<td></td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>10 (52.6)</td>
<td>9 (47.7)</td>
<td></td>
</tr>
<tr>
<td>Placental calcification</td>
<td>5 (71.4)</td>
<td>2 (28.6)</td>
<td>0.286(ns)</td>
</tr>
<tr>
<td>Placental hemorrhage/hematoma</td>
<td>5 (41.7)</td>
<td>7 (58.3)</td>
<td></td>
</tr>
<tr>
<td>Cord anomaly</td>
<td>2 (100)</td>
<td>0 (0)</td>
<td></td>
</tr>
</tbody>
</table>

Ns= not significant

Placental histopathology was not significantly associated with the type of stillbirth (intrapartum or intrapatum), p=0.28.

Table 10

Association between maternal age and timing of fetal demise

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Antepartum deaths</th>
<th>Intrapartum deaths</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>15-19</td>
<td>3 (5.5)</td>
<td>1 (2.9)</td>
<td></td>
</tr>
<tr>
<td>20-24</td>
<td>12 (21.8)</td>
<td>11 (31.4)</td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>17 (30.9)</td>
<td>12 (34.3)</td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>16 (29.1)</td>
<td>9 (25.7)</td>
<td></td>
</tr>
<tr>
<td>=&gt;35</td>
<td>7 (12.7)</td>
<td>2 (5.7)</td>
<td>0.678</td>
</tr>
</tbody>
</table>

There was no statistically significant association of maternal age with the timing of fetal demise, p= 0.678.
### Table 11

**Association between level education and timing of fetal demise**

<table>
<thead>
<tr>
<th>Education level</th>
<th>Antepartum deaths</th>
<th>Intrapartum deaths</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>2 (3.6)</td>
<td>1 (2.9)</td>
<td>0.351</td>
</tr>
<tr>
<td>Primary</td>
<td>16 (29.1)</td>
<td>16 (45.7)</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>25 (45.5)</td>
<td>10 (28.6)</td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>12 (21.8)</td>
<td>8 (22.9)</td>
<td></td>
</tr>
</tbody>
</table>

There was no statistically significant association between the level of education and the timing of fetal demise in this study, p=0.351.

### Table 12

**Association between gestational age at 1st clinic visit and fetal outcome**

<table>
<thead>
<tr>
<th>Gestational age (wks)</th>
<th>Antepartum deaths</th>
<th>Intrapartum death</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>&lt; 14</td>
<td>10 (21.3)</td>
<td>5 (16.7)</td>
<td>0.191</td>
</tr>
<tr>
<td>14-20</td>
<td>13 (27.7)</td>
<td>3 (10.0)</td>
<td></td>
</tr>
<tr>
<td>21-28</td>
<td>22 (46.8)</td>
<td>21 (70.0)</td>
<td></td>
</tr>
<tr>
<td>29-36</td>
<td>2 (4.3)</td>
<td>1 (3.3)</td>
<td></td>
</tr>
</tbody>
</table>

There was no statistically significant association between the gestational age at 1st ANC visit and the timing of fetal demise, p= 0.191.
A total of 90 cases of mothers with intrauterine fetal demise were studied with a mean age of 27.7 years and a median age of 27.5 (SD 5.203).

The key findings in this study are:

The stillbirth rate for the duration of the study was 51 per 1000 total births. This is higher compared to data from a study done by Obwaka at Pumwani maternity hospital in 1994 which gave a stillbirth rate of 22.5/1000 and the stillbirth rate given by the KDHS (2008-09) which was 11.5 per 1000 total births (12). This could be explained by the fact that KNH as a tertiary referral hospital attends to patients from other institutions with antepartum and labor complication which significantly raises the stillbirth rate. There is need to address the complications leading to referrals by early diagnosis and management in the referring institutions in which there are obstetricians serving in these institutions.

Most of the women were married, had attained primary and secondary level of education but over half (57.8%) had no income generating activity. This may have a bearing on the socio-economic status of these women which would in turn affect their health seeking behavior. This would indirectly affect the well being of these mothers and their unborn babies. There was no statistically significant association of the timing of fetal demise with the level of education in this study, p = 0.351.

Most of the mothers were nullipara (31.1%), 26.7% para one, 22.2 para two and only 4.4% were grandmultipara. Parity status had no statistically significant association with the timing of the fetal demise, p= 0.908.

Most mothers with stillbirths at KNH are referrals from other institutions, both for the antenatal and intrapartum deaths. Only 14.4% attended ANC at KNH. 47.8% had been followed up at a health centre level. Most had advanced gestation at first ANC visit with 47.8% attending for the first time between 29-36 weeks. This is way beyond the recommendation for Focused Antenatal care (FANC) where the first visit should be in the first trimester. Only 16.7% had the first clinic visit before 20 weeks gestation. 3.3% attended clinic for the first time at term.
The coverage of antenatal clinic profile/screening remains sub-optimal for most of the parameters. HIV screening is the most tested parameter followed by urinalysis, hemoglobin, VDRL, and blood group. Very few patients had blood sugar done to screen for diabetes mellitus (5.6%), while none had screening done for Hepatitis B virus. 86.7 % had BP measurement taken at least once during ANC visits meaning a significant number were missed considering that hypertensive disorders of pregnancy was the most prevalent obstetric complication in these mothers.

Only 25.6% of the mothers had prenatal scans done. Out of these 60.9% were normal obstetric scans while 39.1% detected some abnormality. This supports the significant role of obstetric scans for pregnant women especially those with obstetric and medical risk factors.

The most prevalent obstetric complications found were hypertensive disorders of pregnancy (26.7%), followed by antepartum hemorrhage (25.6%), Anemia (11.1%), PROM (11.1%) and UTI (11.1%) in descending order, though only hypertensive disorders showed a statistically significant association with the timing of fetal death (p= 0.009). Mothers with these risk factors are at a high risk for poor fetal outcome and fetal demise compared to those with no risks. Close individualized follow-up and monitoring is therefore necessary to ameliorate these adverse outcomes. This correlates with other studies which have showed that hypertensive disorders and antepartum hemorrhage are the biggest culprits contributing to adverse maternal and fetal outcomes.

None of mothers had Diabetes mellitus. This could have been an underestimation since very few mothers had blood sugar screening done during ANC visits (5.6%, all of which were random blood sugars) and some cases of Diabetes may have been missed. 15.6% had abortions while 8.9% had stillbirths in the previous pregnancies and this would call for blood sugar screening to rule out Diabetes mellitus in the index pregnancy. A study done by Baraza at KNH ANC in 2010 showed a high prevalence of glucose intolerance of 37%. This comprised of 16.7% cases of gestational diabetes (10). Routine screening of antenatal mothers using glucose tolerance test is highly recommended to ameliorate the morbidities and mortalities associated with diabetes in pregnancy.
Most mothers had their HIV test negative (78.9%), 10% were positive while 11.1% were unknown. Most of these sero-reactive mothers (89%) were asymptomatic (WHO stage I) while 11% had stage IV disease. With the advent of universal screening for HIV serostatus, all mothers should be counseled and encouraged to have the HIV test.

Most of the intrapartum deaths occurred due to antepartum hemorrhage, specifically abruption placenta. Other causes included cord entanglement and cord knots, cord prolapse and obstructed labor. Most of these cases of acute hemorrhage from placenta abruption are not preventable but cord prolapse, obstructed labor and fetal distress/hypoxia can be prevented through efficient intrapartum fetal monitoring.

Only 4.4% of the IUFD had identifiable congenital anomalies on prenatal scans in this study. 2.3% were identified on gross examination after delivery. The fetal anomalies encountered included CNS, musculoskeletal, genitourinary and cystic hygroma in descending order. This correlates with a study done by Akech at KNH in 2000 which showed that only 4.4% of fetal anomalies are diagnosed antenatally, 65% of these being CNS anomalies, 17.6% musculoskeletal, 8.8% cranio-facial, 5.9% genitourinary and 3.7% gastro-intestinal (23).

No craniofacial anomalies were found in this study.

Most of the placenta showed pathology on evaluation with 64.4% documenting pathology and 35.6% were normal. This finding asserts the need for histopathogical evaluation of placenta in cases of IUFD especially where there was no clinically detectable cause of the demise.

The common pathologies encountered were acute ischaemic necrosis, chorioamninitis with or without associated funisitis, placental calcifications, placental hemorrhage and hematoma, true cord knot and 2 vessel cord. Placental calcifications are not necessarily pathological and may not cause fetal demise since they are also found in placenta of live births, but where occurring concurrently with other pathology like infarcts and hemorrhage then they may be contributory.

Placenta histology detected more infective sequelae (chorioamnionitis/funisitis) compared to the cases detected clinically during the time of delivery (21.1% vs 4.4%). Though only 2.2% had puerperal sepsis during the follow-up period and with early discharge of the mothers who delivered vaginally, the large number of histologically detected placental infection could point to the fact that these mothers may have had a subclinical endometritis or developed late-onset infections after discharge. Placenta histology is therefore superior to clinical examination in
determining the infective cause of fetal demise. The findings of this study indicate that placental infections and reduced blood flow with ischaemic necrotic changes (infarcts) were the commonest histopathological findings, which correlates with the findings of similar studies (37,38,39).

Most of the mothers had incident free postpartum period with very few complications encountered. 5.6% had primary PPH. All these cases of PPH were not directly related to IUFD but were due to complications of placenta abruption and the associated coagulopathy. All cases of antepartum deaths at KNH are usually delivered without delay, hence none stays beyond the 4 weeks period when complications of DIC due to retained dead fetus become attendant. All the cases of puerperal sepsis had delivery by caesarean section. Operative delivery therefore increased the risk of infective morbidity. 1.1% of mothers had retained placenta. None of the mothers had significant psychological disorders.

The 3.3% cases of postpartum maternal mortality among the study participants were not directly related to IUFD but to the obstetric and medical conditions that led to the IUFD. 1.1% had severe PPH and DIC following acute abruptio placenta managed through caesarean section. 1.1% had cryptococcal meningitis and stage IV retroviral disease and the other 1.1% had eclampsia and acute renal failure. All of them were deaths within the first 24 hours postpartum.

Most of the mothers had uneventful delivery and were discharged the day after delivery. Most had hospital stay of 1-3 days and all these had delivered vaginally. 22.2% stayed from 4-6 days. These composed of the mothers who had caesarean section. Those with prolonged hospital stay beyond 7 days had puerperal sepsis and renal compromise related to preeclampsia/eclampsia and severe anemia. Maternal co-morbidities and caesarean section were reasons for prolonged hospitalization not the IUFD.
CONCLUSIONS

1. Intrauterine fetal demise (IUFD) is a common occurrence at Kenyatta National Hospital labor ward, which is the referral hospital for the country. The prevalence of IUFD at KNH is 5.1%.

2. Hypertensive disorders of pregnancy, antepartum hemorrhage, anemia and PROM were the common complications associated with stillbirths. However, only hypertensive disorders were shown to be significantly associated with antepartum stillbirths.

3. There are few complications directly related to IUFD at KNH since most mothers are delivered promptly after diagnosis. Most of the postpartum complications are directly related to the obstetric and medical co-morbidities like the hypertensive disorders, placental abruption, anemia, and PROM.

4. Histopathological evaluation of the placenta is the best method to detect the cause of fetal demise where no identifiable clinical cause of the demise was found.

RECOMMENDATIONS

1. There is need to improve on the coverage of antenatal profile done for all mothers attending ANC.

2. Education and counseling of patients on the need to start antenatal clinic visits early.

3. There is need to increase our screening for diabetes mellitus and hepatitis B virus for our antenatal mothers especially those at risk such as previous fetal loss.

4. Placenta of mothers of stillbirths should be submitted for histopathological evaluation.

5. Antenatal obstetric scans are recommended.
REFERENCES


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   Aspects of early Perinatal mortality at Machakos General Hospital.

8. Lekha M.
   Term still births, causes and potential prevention
   M Med Thesis, University of Nairobi, 1989

9. Obwaka W. M.
   A case control study of factors associated with stillbirths and 24-hour neonatal death at Pumwani Maternity Hospital.
   M Med Thesis, University of Nairobi, 1994
10. Baraza A.  
Glucose intolerance and associated factors among ANC clients at Kenyatta National Hospital at 24-36 weeks.  


23. Aketch Mathias Odera
Profile of mothers who gave birth to babies with congenital abnormalities at Kenyatta National Hospital


Appendix 1 (CONSENT FORM)

FETAL AND MATERNAL CHARACTERISTICS OF CASES OF INTRAUTERINE
FETAL DEATHS AT KENYATTA NATIONAL HOSPITAL, NAIROBI

Study number -------------------------------

Purpose of study

The purpose of the study is to document the maternal and fetal characteristics of mothers managed for intrauterine fetal death during the index pregnancy and their immediate postpartum outcomes. Your participation in the study will help us identify the risk factors and causes of fetal deaths at Kenyatta National Hospital, generate data for prevention of avoidable fetal deaths and plan for better management of mothers with fetal demise preconception and during future pregnancies.

Benefits:

There will be no direct benefit to you, but by participating in this study you will help us understand your condition better and find out ways we can improve treatment for women with this condition. This will help us reduce the number of women losing their pregnancies through preventable causes.

Participation in the study does not entail any financial benefits.

Risks:

There are no risks involved from participating in the study. All the tests and treatment you will receive will be the usual care that anyone with your condition receives. The placenta will be taken for histological evaluation and the cost for this will be footed by the investigator.
Voluntary participation

You are free to participate in this study. You are also free not to participate. Your decision will not affect the nature of care you will receive. You are also free to ask any questions now and at any other time.

Confidentiality

The information given to the investigator will be kept in strict confidence. No information by which your identity can be revealed will be released or published. In case you need to get further information do not hesitate to contact:

**DR NJUGUNA** on telephone numbers **0722-286530/0731387373**.

Supervisors: Dr Odawa 0733-716097
Dr Kagema 0722-712186

KNH/UON-ERC Tel 726300-9

Declaration:

I have understood the nature and purpose of this study and hereby voluntarily consent to participate.

…………………………………..  …………………………….
(Patient signature or Right thumb print)  Date
Appendix 2 (QUESTIONNAIRE)

IP NO: --------------------------

Study number: -------------------------- Date: --------------------------

SOCIO-DEMOGRAPHIC DATA

1. Age (years) [ ]

2. Marital status
   1. single
   2. married
   3. widowed
   4. divorced/separated [ ]

3. Level of education
   1. none
   2. primary
   3. secondary
   4. tertiary [ ]

4. Occupation
   1. unemployed
   2. self employed
   3. formal employment [ ]

OBSTETRIC AND MEDICAL HISTORY

5. Parity [ + ]
6. Describe previous pregnancies in terms of the following:

<table>
<thead>
<tr>
<th>Number</th>
<th>Date of delivery</th>
<th>Maturity (weeks)</th>
<th>Place of delivery</th>
<th>Mode of delivery</th>
<th>Weight of baby (gms)</th>
<th>Fate of baby</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For table above:

Place of delivery
1. home
2. health facility
3. other (specify) ……………………….

Mode of delivery
1. vaginal delivery
2. c/section

Fate of baby
1. live birth
2. still born

7. Outcome of last pregnancy
1. no previous pregnancy
2. abortion
3. live preterm baby
4. still born premature
5. still born term baby
6. live term baby

8. Duration of time (interval) since last pregnancy (months)
   1. less than 12 months
   2. 12 – 24 months
   3. above 24 months

9. Date of last menstrual period (LMP)

10. Gestational age of index pregnancy (weeks)
    1. 20 - 27
    2. 28 – 36
    3. 37 – 42
    4. >42

11. ANC attendance
    1. yes
    2. no

12. If yes to 10, health facility attended
    1. dispensary
    2. health centre
    3. public hospital
    4. private hospital
    5. Kenyatta National Hospital

13. Gestation at first ANC attendance (weeks)
    1. <14
    2. 14-20
3. 21-28
4. 29-36
5. >37

14. Number of times attended
   1. 1
   2. 2
   3. 3
   4. 4
   5. 5 and above

15. Antenatal profile and assessments done

   a. Hb measurement
      1. yes
      2. no

   b. VDRL
      1. yes
      2. no

   c. HIV Screening
      1. yes
      2. no

   d. Blood group/Rhesus factor
      1. yes
      2. no

   e. Urinalysis
      1. yes
      2. no
f. Blood sugar
   1. yes
   2. no [   ]

g. Hepatitis BsAg
   1. yes
   2. no [   ]

h. Weight/BMI measurement
   1. yes
   2. no [   ]

i. BP measurement
   1. yes
   2. no [   ]

j. Obstetric ultrasound
   1. yes
   2. no [   ]

k. TORCH screen (if any, specify) ----------------- -----------------------

16. Any medical illness before index pregnancy
   1. none
   2. chronic hypertension
   3. diabetes mellitus
   4. renal disease
   5. cardiac disease
   6. thyroid disease
   7. convulsive disorder
   8. HIV seropositive
9. tuberculosis

10. other (specify)………………………… [ ]

17. History of drug or substance abuse
a. cigarette smoking
   1. none
   2. smoked during pregnancy
   3. stopped smoking during pregnancy [ ]

b. Alcohol use
   1. none
   2. used during pregnancy
   3. stopped during pregnancy [ ]

c. Other drugs/substances
   1. none
   2. used during pregnancy (specify)………………..
   3. stopped during pregnancy (specify)…………….. [ ]

MEDICAL AND OBSTETRIC COMPLICATIONS ASSOCIATED WITH INDEX PREGNANCY

18. Any history of

a. Vaginal bleeding
   1. yes
   2. no [ ]

b. Anemia
   1. yes
   2. no [ ]

c. Preeclampsia/eclampsia
1. yes
2. no

[d. Gestational Diabetes mellitus (GDM)]
1. yes
2. no

[e. Febrile illness]
1. yes (specify)…………………….
2. no

[d. HIV Serostatus (diagnosed in this pregnancy)]
1. positive
2. negative
3. unknown

[e. If Seropositive above, state WHO staging]
1. stage 1
2. stage 2
3. stage 3
4. stage 4

[f. Abdominal injury/trauma]
1. yes
2. no

[g. Preterm rupture of membranes/Drainage of liquor]
1. yes
2. no

[h. Chorioamnionitis (foul smelling liquor)]
1. yes
2. no
i. Multiple gestation
   1. yes
   2. no

j. Rhesus isoimmunization (ICT +)
   1. yes
   2. no

k. Congenital anomaly on scan
   1. yes (specify) ………………………
   2. no

l. UTI (confirmed by urine test)
   1. yes
   2. no

m. Postterm pregnancy
   1. yes
   2. no

n. Others (specify) ………………………

**MODE OF DELIVERY**

19. Mode of delivery
   1. Vaginal delivery (SVD)
   2. Vaginal breech delivery
   3. C/section

20. If vaginal delivery in 19, indicate if
   1. spontaneous
   2. induced
21. If c/section to number 18, what was the indication?

1. Failed induction  
2. Severe APH  
3. Previous uterine scar  
4. obstructed labor/CPD  
5. Others (specify)…………………….    [    ]

**OUTCOME OF DELIVERY**

22. What was the outcome of delivery

1. single  
2. multiple    [    ]

23. If multiple above, number of babies delivered

1. two  
2. three  
3. above 3    [    ]

24. Status of the baby

1. Fresh still born  
2. macerated still born    [    ]

25. Cause of intrapartum death

1. Tight nuchal cord  
2. placenta abruption  
3. obstructed labour    [    ]

26. Identifiable structural congenital anomalies (gross examination):

a. CNS  
   1. Hydrocephaly  
   2. Spina bifida
3. Anencephaly

b. MUSCULOSKELETAL
1. Polydactyly
2. Talipes
3. Flexion deformities

C. CRANIO-FACIAL
1. Cleft lip/palate
2. Low set ears (Down’s syndrome)
3. Other (specify)-------------------

D. GENITOURINARY
1. Undescended testes
2. Ambiguous external genitalia
3. Hypospadia/epispadia
4. Hydrocele

E. GASTROINTESTINAL
1. Omphalocele
2. Gastroschisis
3. Anal atresia
4. Other

f. OTHERS (specify) -----------------------------

27. Placental risk factors (gross examination)
1. Abruptio placentae (retroplacental clots)
2. Placental infarcts

28. Placenta histopathology (specify) -----------------------------

29. Cord factors at delivery:
1. Cord prolapse

57
2. cord entanglement – neck, arms, legs
3. true cord knots
4. two vessels cord
5. velamentous insertion of the cord
6. other (specify)…………………….. [ ]

POSTPARTUM MATERNAL COMPLICATIONS

30. Indicate occurrence of any of these postpartum complications

a. Primary PPH
   1. yes
   2. no [ ]

b. Secondary PPH
   1. yes
   2. no [ ]

c. Retained placenta
   1. yes
   2. no [ ]

d. Puerperal infection
   1. yes (specify)……………………..
   2. no [ ]

e. Bleeding/coagulation disorders (DIC)
   1. yes
   2. no [ ]

f. Severe psychological disturbance
   1. yes
   2. no [ ]

31. Duration of hospital stay (in days)
   1. 1 – 3
   2. 4 – 6
   3. 7 and above [ ]
Appendix 3 (PLACENTA HISTOPATHOLOGY REQUEST)

STUDY TITLE: Fetal and maternal characteristics of cases of intrauterine fetal demise (IUFD) at KNH.

Analysis: Placenta histological abnormalities associated with IUFD

IP NUMBER  -------------------------------

STUDY NUMBER  -------------------------------

DATE:  -------------------------------

CLINICAL DIAGNOSIS:

HISTOLOGY REPORT:
Ref: KNH-ERC/ A/653

Dr. Njuguna Mary Waithira
Dept. of Obs/Gynae
School of Medicine
University of Nairobi

Dear Dr. Njuguna

Research proposal: “Fetal and maternal characteristics of cases of intrauterine fetal death in
Kenya National Hospital” (P203/06/2010)

This is to inform you that the KNH/UON-Ethics & Research Committee has reviewed
and approved your above revised research proposal for the period 8th December 2010 –
7th December 2011.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond
the deadline given. Clearance for export of biological specimens must also be obtained from
KNH/UON-Ethics & Research Committee for each batch.

On behalf of the Committee, I wish you a fruitful research and look forward to receiving a summary of
the research findings upon completion of the study.

This information will form part of the data base that will be consulted in future when processing
related research study so as to minimize chances of study duplication.

Yours sincerely

PROF A N GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
   The HOD, Records, KNH
   The Dean, School of Medicine, UON
   The Chairman, Dept. of Obs/Gynae, UON
   Supervisors: Dr. F. X. O. Odawa, Dept. of Obs/Gynae, UON
               Dr. Kagema Francis, Dept. of Obs/Gynae, UON