Factors Associated with Perinatal Mortality in Umgua and Bubi Rural Areas, 2015-
The Effect of Maternal Human Immunodeficiency Virus Status

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Dissertation Submitted in Partial Fulfillment of
Masters in Public Health
University of Zimbabwe

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August 2015
Declaration Form

I do hereby declare that this dissertation is the original work of VIRGINIA MBIBA and has not been submitted before to the University of Zimbabwe or any other institution for the fulfillment of any degree requirement.

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Signature: _____________________________ Date: ______________

Supervisor:

I certify that I have supervised the writing of this dissertation and declare that it is indeed the original work of the student in whose name it is being submitted.

Name of Supervisor: ______________________________________

Signature________________________________ Date: __________________

The Chairman of Community Medicine, University of Zimbabwe Medical School.

Name: Professor Simbarashe Rusakaniko

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Date: ________________________________
Abstract: Factors Associated with Perinatal Mortality in Umguza and Bubi Rural Areas, 2015- The Effect of Maternal Human Immunodeficiency Virus Status

Introduction: The perinatal mortality rate (PMR) is used as a proxy for the quality of maternal and child health care services accessible to women during pregnancy, delivery and the postnatal period. The PMR increased from 8.9 to 33 deaths and 21 to 23 deaths per 1000 live births in Umguza and Bubi districts between the years 2010-2014. The study seeks to understand the determinants of perinatal mortality in the two districts so that appropriate measures can be put in place.

Methods: An unmatched 1:2 case control study was conducted using a pretested interviewer administered questionnaire. A total of 73 cases and 146 controls were recruited in the study. A case was a woman who resided in Umguza and Bubi districts who had a perinatal death from January 2014 to June 2015. A control was a woman who resided in Umguza and Bubi Districts whose baby survived the early neonatal period from January 2014 to June 2015. Two focused group discussions (FGD) were done one in each district using the FGD guide. The FGD consisted of 12 women for Bubi and nine women for Umguza district.

Results: The median age of cases and controls was 22 years (Q1=19; Q3=29) and 23 years (Q1=19.5; Q3=28) respectively. Gestational age of < 36 weeks OR 8.28 (3.67; 96.6), having a male baby OR 1.4 (1.09; 2.88), low birth weight of <2500g OR 1.37 (1.27; 6.96) and no antenatal care booking OR 24.6 (2.67;226.3) were independent risk factors for perinatal mortality. Antenatal booking OR 0.30 (0.14; 0.65) and secondary education were protective factors against perinatal deaths. Women’s cultural believes and poor nurse attitudes, resource shortages and patient delays were cited as contributory to perinatal mortality.

Conclusion: Gestational age of less than 36 weeks, not attending antenatal care, having a male baby and low birth weight were risk factors. The majority of perinatal deaths were macerated. Having early neonatal deaths occurring during the first 24 hours after delivery might be indicative of the quality of neonatal care provided.

Key words: Perinatal mortality, HIV, Bubi, Umguza, Zimbabwe
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University of Zimbabwe (August 2015)
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<td>AOR</td>
<td>Adjusted Odds Ratio</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
</tr>
<tr>
<td>ANC</td>
<td>Antenatal Care</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>COR</td>
<td>Crude Odds Ratio</td>
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<tr>
<td>FSB</td>
<td>Fresh stillbirth</td>
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<tr>
<td>GA</td>
<td>Gestational age</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>MOHCC</td>
<td>Ministry of Health and Child Care</td>
</tr>
<tr>
<td>MPH</td>
<td>Masters in Public Health</td>
</tr>
<tr>
<td>MSB</td>
<td>Macerated stillbirth</td>
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<tr>
<td>OR</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>PMTCT</td>
<td>Prevention of mother to child transmission</td>
</tr>
<tr>
<td>PHE</td>
<td>Provincial Health Executive</td>
</tr>
<tr>
<td>PHO</td>
<td>Public Health Officer</td>
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<tr>
<td>PM</td>
<td>Perinatal mortality</td>
</tr>
<tr>
<td>PMD</td>
<td>Provincial Medical Director</td>
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<tr>
<td>PMR</td>
<td>Perinatal mortality rate</td>
</tr>
<tr>
<td>PMTCT</td>
<td>Prevention of Mother-to-Child Transmission of HIV</td>
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<tr>
<td>PNC</td>
<td>Postnatal care</td>
</tr>
<tr>
<td>SB</td>
<td>Stillbirth</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>ZNASP</td>
<td>Zimbabwe National HIV and AIDS Strategic Plan</td>
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CHAPTER 1

INTRODUCTION

1.1 Background

Perinatal mortality (PM) reflects the quality and utilization of antenatal, delivery and post-delivery care available to women and their neonates. Perinatal mortality is an indicator which plays an important role in providing the information needed to improve the health status of pregnant women and level of socio-economic status attained in any community. The PM is defined as “number of stillbirths and deaths in the first week of life per 1,000 live births.” The perinatal period commences at 22 weeks of gestation and ends seven completed days after birth.

Globally about 3 million babies die in the early neonatal period and 3.3 million babies are stillborn every year. It is estimated that the highest risk of PM occurs at the time of delivery and these are usually preventable. About 98% of the perinatal deaths take place in the less resourced and developing world. Early neonatal deaths are preventable by cost effective modes like Helping Babies Breathe (HBB) interventions and essential obstetric care has been proven to avert 41% new-born deaths and 70% of stillbirths.

Perinatal mortality rates (PMR) differs between the developed and the developing countries. The PMR in Sub-Saharan Africa and Asian countries ranges between 50 and 60 deaths per 1000 total births compared to 10 deaths per 1000 total `births in developed countries. This has been attributed to changes of patterns in reproductive health, socioeconomic progress and quality of obstetric care. Public health interventions such as immunizations, improved nutrition, better water and sanitation contributes to better maternal quality of life. These were related to faster decline in perinatal mortality in areas with public health interventions on maternal health, child health and family planning programs.
Interventions such as mother baby packages during ANC integrated into functional health care systems and improved household practices were found to be useful in reducing perinatal deaths in Nigeria. Factors associated with perinatal deaths were birth asphyxia (21%), birth injury (11%), congenital abnormalities (11%), prematurity and low birth weight (LBW) 10%. Highly active antiretroviral therapy (HAART) increases the risk of preterm delivery in pregnant women. This was thought to be related to immune reconstitution syndrome. Risk of stillbirths and perinatal deaths were found to be increased in HIV positive women.

Zimbabwe implemented Prevention of Mother to Child Transmission (PMTCT) of HIV Option B+ (lifelong ART) in 2013 to reduce HIV vertical transmission by the end of 2015. PMTCT services have been scaled up, including provision of ART to pregnant mothers. Scaling up of PMTCT services goes a long way in reduction of perinatal mortality as mothers on ART have a reduced chance of losing their neonates. Zimbabwe has an HIV prevalence of 15% from 26% in 2005 among 15-49 year old adults. HIV testing and counselling (HTC), prevention and control of sexually transmitted infections services are offered to pregnant women and their families. An estimated 64 000 pregnant women are HIV positive, with an estimated 8 917 new HIV infections in children each year. Establishment of mothers’ HIV positive status provides an entry point to ART during pregnancy to reduce morbidity and perinatal mortality.

Regular perinatal audits are expected to be done monthly, quarterly and annually using a standard PM investigation forms and discussion of case notes. These are useful in trying to take corrective measures by finding out what went wrong in care of women during pregnancy, labour and post-natal periods.
Results from the 2010/2011 Zimbabwe Demographic Health Survey (ZDHS) showed that children born too soon (birth interval of less than 24 months) after the previous birth were at increased risk of poor health. The proportion of all early neonatal deaths was 81% for the five-year period preceding the survey. A child’s birth weight is an indicator of the risk of dying during infancy particularly during the first months of life. Babies of low birth weight (2.5 kilograms) are considered to have a higher risk of early childhood death. The Zimbabwe Perinatal Mortality Rate (PMR) was 29 deaths per 1000 total births in 2007 and increased to 39 deaths per 1000 total births in 2010/2011. The three major causes of perinatal deaths were preterm birth, intra-partum asphyxia, trauma and unexplained intrauterine death.

1.1.2 Background of the study setting

Bubi and Umguza districts are two of the seven districts found in Matabeleland North Province in Zimbabwe. Bubi district has a population of 63 758 with one District Hospital and nine rural health centres (RHC) where deliveries are conducted. It is primarily a rural community practising subsistence farming and small scale gold mining. The district hospital is the only referral facility for maternal cases with the capacity to conduct caesarean sections. Umguza district has a population of 99 216 with one District Hospital and nine health facilities where deliveries are conducted. It is a rural community practising subsistence farming. The district borders Bulawayo metropolitan province. Each rural health facility in both districts has at least one nurse trained in basic emergency management of neonatal and obstetric conditions (EMNOC). During the proposed time of study the two districts had a total of 3 564 deliveries, 90 perinatal deaths and 2 232 women knew their HIV status at the time of delivery.
1.1.3 Problem Statement

Figure 1 below shows the PMR in Umguza and Bubi districts as compared to the provincial figures from 2010 to 2014.

![Perinatal Mortality Rates Bubi and Umguza Districts, Matabeleland North Province 2010-2014](image)

Source: Matabeleland North Province Health Information System (2015)

In Umguza district the perinatal mortality rate (PMR) sharply rose from 8.9 deaths per 1000 live births in 2010 to 23 deaths per 1000 live births in 2011 followed by a decline during the following two years and only to increase to 34 deaths in 2014. The trend line shows an upward trend of PMR in Umguza over the 5 year period. Bubi district had a slight upward trend in PMR over the 5 year period. The PMR in Umguza exceeded the provincial rate of 23 deaths per 1000 live births in 2014. According to the ZDHS 2010/2011 the Zimbabwe PMR was 39 deaths per 1000 live births. The other 5 districts in Matabeleland North Province recorded some decrease in the PMR over the same period.
1.1.4 Justification for the study

Conducting a study on perinatal mortality will come up with some understanding of the underlying causes of perinatal deaths which might be peculiar to women in Umguza and Bubi districts so as to formulate strategies for prevention and addressing the identified challenges. Since about 75% of perinatal deaths are said to be avoidable the study can help in finding strategies to reduce the avoidable deaths. The PMR is used as a proxy for the quality of maternal and child health care services accessible to women during pregnancy, delivery and the postnatal period hence the study seek to understand why there is an upward trend in perinatal deaths in the two districts. The information will be useful to the emergency obstetric and neonatal care program as some health workers in the two districts were trained to offer emergency maternal and neonatal care to reduce maternal and perinatal mortality. Studies on perinatal mortality have been done in other provinces in Zimbabwe and no studies were done in Matabeleland North Province. Information found in this study will be useful in providing additional literature on factors associated with PM in a rural set up.
1.1.5 Conceptual Framework

Figure 2: The Mosley and Chen’s conceptual framework

Figure 2 shows the conceptual framework used in this study along with the selected possible factors associated with perinatal mortality. It is called the Mosley and Chen’s conceptual framework for studies on child survival in developing countries and was adapted from a study.
conducted in Indonesia\textsuperscript{14} (Titaley et al 2008). The factors associated with perinatal mortality are divided into socioeconomic and proximate determinants.

1.1.6 Research Questions

What are the determinants of perinatal mortality in Umguza and Bubi Districts?

What is the contribution of maternal HIV status to perinatal mortality?

1.1.7 Hypotheses

$H_0$: Having a positive maternal HIV status is not associated with perinatal mortality.

$H_0$: Gestational age of $< 36$ weeks is not associated with perinatal mortality.

$H_0$: Having a birth weight of $< 2500g$ is not associated with perinatal mortality.

$H_1$: Having a positive maternal HIV status is associated with perinatal mortality.

$H_1$: Gestational age of $< 36$ weeks is associated with perinatal mortality.

$H_1$: Having a birth weight of $< 2500g$ is associated with perinatal mortality.

1.1.8 Objectives

1.1.8.1 Broad objective

To assess the determinants of perinatal mortality in Umguza and Bubi Districts, 2015.

1.1.8.2. Specific objectives

1. To describe the socio-demographic factors associated with perinatal mortality in Bubi and Umguza Districts, 2015.


CHAPTER 2

2. Literature Review

In a meta-analysis of 31 studies done worldwide on the association between maternal HIV and adverse perinatal outcomes, perinatal deaths were higher in mothers infected with HIV compared to HIV negative mothers and this was more pronounced in studies from developing countries [summary OR 4.15 (95% CI 2.82-6.15)]. The factors reported to be associated with perinatal deaths were intrauterine growth restriction and infections. In Brazil it was found that absence of antiretroviral use in HIV positive women during childbirth was associated with perinatal mortality with an increased risk of 17.7 times. But in Nigeria, use of ARVs during pregnancy was a protective factor for premature deliveries by up to 5 times and absence of antiretroviral drugs use during childbirth elevated the risk of perinatal mortality. The epidemiology of HIV among women in Brazil was different and they recommended performance of actions aiming at reducing exposure to HIV such as eliminating use of illicit drugs during pregnancy, enrolment in ANC and commencement of antiretroviral (ARV) drugs. A study done in the United Kingdom found that HIV positive women on HAART had an increased risk of death of their neonates.

In a study of perinatal mortality in rural Kenya maternal age of less than twenty years was found to be associated with perinatal deaths (OR 1.19) and this age group consists of adolescents who have a 50% increased risk of perinatal deaths due to preterm births, LBW and asphyxia. Strategies such as sex education, school based clinics and family planning clinics were found to significantly reduce pregnancies in the younger age groups.

In Tanzania approximately 38% of deaths among children younger than 5 years of age occur during the first 28 days of life, and 75% of the deaths occur within the first 7 days (Early neonatal period). Causes and determinants of early neonatal deaths and stillbirths were
attributed to insufficient care during the antenatal and postnatal periods, and during childbirth, especially in prevention of sepsis and haemorrhage which are common causes of death as well as lack of new-born care.\(^{21}\)

The risk factors of perinatal deaths were increased in the presence of premature labour especially with early rupture of membranes, obstructed labour and haemorrhage. Maternal factors such as hypertensive disorders were five times more likely to cause perinatal deaths compared to women without hypertension (OR 5.04). Other factors were a history of previous adverse pregnancy outcome and less than 35 weeks gestational age (GA). Intrapartum events such as abruption placenta, cord accidents, prolonged or obstructed labour, pre-eclampsia/ eclampsia and prematurity were identified underlying causes of perinatal death.\(^{22}\)

The Kenya Demographic and Health Survey (KDHS) reported that demographic factors such as age at first birth, parity, birth order and birth interval were the main predictors of perinatal deaths in their population based study. Mothers aged 35 and above and lack of schooling in women were observed to have higher proportions of perinatal deaths. The perinatal mortality rate was 118 per 1000 births in a rural Kenyan Hospital. Perinatal mortality was increased by between eight and 62 times in the presence on prematurity with labour complications occurring in 53% of the cases.\(^{23}\)

Maternal medical disorders like jaundice, anaemia, HIV and diabetes predisposed to perinatal mortality.\(^{24}\) In Ethiopia perinatal deaths were related to socioeconomic factors such as education, religion, accessibility of health services, socioeconomic status and demographic characteristics like sex of the child, mother’s age at birth, birth order and birth weight.\(^{25}\)
A comparison of the pattern of primary obstetric causes (e.g., preterm labour, antepartum haemorrhage and intra-partum asphyxia) intra-uterine growth restriction (IUGR), puerperal sepsis and antepartum haemorrhage contributed significantly to perinatal deaths in HIV positive women in Cape Town. The stillbirth rate in the HIV-positive population was 17.1 per 1 000 live births (LB) compared with 8.3 per 1 000 LB in the HIV-negative population. The early neonatal death rate in the HIV-positive population was 4.6 per 1 000 live births, compared with 3.1 per 1 000 LB in the HIV-negative population. The perinatal mortality in the same group was 21.7 per 1000 LB compared to 11.7 per 1000 LB born to HIV-negative women. There was a 75% greater risk of preterm delivery among HIV-positive women compared to those who were HIV-negative.

In a comparison of HIV positive and negative pregnant women in Tshwane South Africa, the HIV positive women had a decreased risk of hypertension and increased 30% risk of having a perinatal death due to spontaneous preterm birth, infection and intra-partum asphyxia than HIV negative women. Thirty-four percent of the HIV positive mothers had perinatal deaths compared to 26% in HIV negative women.

According to a meta-analysis of 44 world wide data sets avoidable causes of perinatal deaths were health care worker practice factors, patient delays, transport and administrative factors. The most common avoidable factors were sub-standard health care worker practice and patient delays. They recommended effective antenatal care, delivery services, and a coordinated referral system as well as community interventions including HIV counseling, treatment and support.

According to the Zimbabwe Perinatal Mortality Study belonging to the Apostolic sect religion was associated with risk of perinatal death. The causes of death in stillbirths were known in 96% of the deaths. There was high mortality in the first few days after delivery.
which were likely indicative of problems related to intra-partum complications leading to birth asphyxia. Nearly half died in the first 24 hours (49.4%) and more than two thirds (68.6%) died in the first 72 hrs. By the end of the first 7 days, 82.6% of the deaths had occurred.  

In Marondera, women who had complications during labour, positive HIV status, belonged to some apostolic sects and those who delivered at home were at risk of losing their babies. Women who belonged to some apostolic sects were not utilising the health care system for obstetric care and these delivered at home under the care of unskilled personnel.  

In a cross sectional retrospective study done at Harare Maternity Hospital the factors associated with perinatal mortality were having a breech delivery, older maternal age and lack of ANC. Coming from a rural residence was found to be strongly associated with PM with an adjusted relative risk of 1.33.
CHAPTER 3

3. Materials and Methods

3.1 Study design

A case control study is a type of observational analytic study and this was chosen because of its ability for comparability between mothers who had perinatal deaths (outcome of interest) and those without. The design allowed the investigator to identify adequate numbers of cases and controls as participants were selected on the basis of their disease status compared to prospective studies. The advantages of case control studies includes timely and cost-effectiveness because both disease exposure would have occurred and ability to examine multiple exposures. The study is retrospective in nature hence it is prone to recall bias and controls can be difficult to find. An unmatched 1:2 case control study was conducted. A case was defined as a woman who resided in Umguza and Bubi Districts who had a perinatal death from January 2014 to June 2015. A control was defined as a woman who resided in Umguza and Bubi Districts whose baby survived the early neonatal period from January 2014 to June 2015.

3.2 Variables

3.2.1 Dependant Variable

The dependant variable was perinatal mortality (PM) which refers to the number of stillbirths and deaths in the first week of life (early neonatal deaths). The perinatal period commences at 22 weeks of gestation and ends seven completed days after birth.
3.2.2. Independent Variables

Table 1: Independent variables

<table>
<thead>
<tr>
<th>Factor</th>
<th>Variables to be measured</th>
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<tbody>
<tr>
<td>Socio demographic factors</td>
<td>Age, educational level, marital status, religion, place of residence, Source of livelihood</td>
</tr>
<tr>
<td>Maternal factors</td>
<td>Maternal age, Maternal conditions, Previous perinatal mortality, HIV status, Parity, Maternal height</td>
</tr>
<tr>
<td>Intra-partum factors</td>
<td>Labour complications, Mode of delivery, Delivery assistance</td>
</tr>
<tr>
<td>Neonatal factors</td>
<td>Gestational age, Birth weight, Apgar score, Congenital abnormality, Sex and birth rank</td>
</tr>
<tr>
<td>Post-delivery factors</td>
<td>Place of delivery, PNC received</td>
</tr>
</tbody>
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3.3 Study setting

The study was conducted at Inyathi and Nyamandlovu District Hospitals and in the selected nine rural clinics in Bubi and Umguza Districts of Matabeleland North Province in Zimbabwe. Inyathi Hospital is situated 60km north east of Bulawayo, is a 78 bedded hospital which is a referral centre for all 10 clinics in Bubi district. It has 3 Doctors and 20 nurses trained in EMOC. Caesarean sections are done for obstetric emergencies. Nyamandlovu is a 36 bedded Rural Hospital, 51km from Bulawayo and gets patients referred from Umguza
district. It has 1 Doctor and 15 Nurses all trained in EMOC but has no capacity for performing caesarean sections and refers obstetric emergencies to Mpilo Hospital in Bulawayo. The population for women of child bearing age (15-49 years) is 47952 and 12943 for Umguza and Bubi districts respectively.

3.4 Study population

The study population consisted of all women who delivered in Bubi and Umguza Districts from January 2014 to June 2015. The Provincial Maternal and Child Health Officer, Provincial Nursing Officer, Provincial Reproductive Health Officer, doctors and nurse managers working in maternity departments were included in the study.

3.5 Study participants.

Women who delivered at Bubi and Umguza Districts were recruited into the study. Nurse Managers in maternity wards and doctors were interviewed as key informants.

3.6 Sampling Methods

3.6.1 Sampling for Health Facilities

A total of 11 out of 21 health facilities which conduct deliveries in the two districts were sampled due to feasibility issues, time constraints and availability of funds. In Bubi district, Inyathi Hospital was purposively recruited into the study as the only district hospital. Four out of eight rural health facilities were randomly selected. In Umguza, Nyamandlovu rural Hospital was purposively recruited as the only hospital in the district. Five out of 9 health facilities which conduct deliveries were randomly selected using the random number tables.
3.6.2 Sampling for Study Participants

Maternity delivery registers were used to develop line lists of perinatal deaths and these were used as the sampling frame. All available cases were recruited due to their lesser numbers. Proportional sampling was used to determine the number of participants selected from each district. Key informants were purposively recruited into the study. Notices for focus group discussions were communicated to women and charge nurses, and women who were willing were recruited.

3.6.3 Sample size calculation

Based on a case control study on perinatal mortality and associated factors among deliveries in three municipal hospitals of Dar es Salaam by Mpembeni et al, with the assumption that at least 39% of controls were exposed to antenatal care in hospital deliveries, an odds ratio of 1.79, at 95% level of confidence 80% power and alpha of 0.05. The sample size was calculated using the Fleiss Formula.

Where: \( n_1 \) = Number of cases, \( n_2 \) = Number of controls

\[
Z_{\alpha/2} = Z\text{-score for 2 tailed test based on alpha level (1.96)}
\]

\[
Z_{1-\beta} = Z\text{-score for one tailed test based on } \beta \text{ level (0.84)}
\]

\( r = \text{Controls: cases (2:1)} \)

\( p_1 = \text{Proportion of cases with exposure} \)

\[
p_1 = p_2(\text{OR}) / 1+ [p_2(\text{OR} - 1)]
\]

\[
p_1 = 0.39(0.79) / 1+ [0.39(1.79-1)] = 0.534
\]


\[ q_1 = 1 - p_1 = 1 - 0.534 = 0.466 \]

\[ p_2 = \text{Proportion of controls with exposure (39\% = 0.39)} \]

\[ q_2 = 1 - p_2 = 1 - 0.39 = 0.61 \]

\[ \bar{p} = \frac{p_1 + (rp_2)}{r + 1} = 0.534 + 2(0.39) \div 3 = 0.438 \]

\[ \bar{q} = 1 - \bar{p} = 1 - 0.438 = 0.562 \]

\[ n_1 = \left[ \frac{Z_\alpha / 2 \sqrt{(r + 1)\bar{p}\bar{q}} + Z_{1-\beta} \sqrt{rp_1q_1 + p_2q_2}}{r (p_1 - p_2)^2} \right]^2 \]

\[ n_1 = 1.96\sqrt{2 + 1}(0.438 \times 0.562) + 0.84 \sqrt{2 \times 0.534 \times 0.466} + (0.39 \times 0.61) \]

\[ \frac{2(0.534 - 0.39)^2}{2(0.534 - 0.39)^2} \]

\[ n_1 = 73 \quad n_2 = r \times n_1 = 146 \]

The sample size estimated comprised of 73 cases and 146 controls.

### 3.7 Inclusion Criteria

Women who delivered in Bubi and Umguza Districts with a known HIV result, who agreed to participate and provided informed written consent.

### 3.8 Exclusion Criteria

Women who had puerperal psychosis, postpartum depression, no HIV results, declined participation and could not provide informed written consent.
3.9 Data collection and analysis

3.9.1 Data collection

Data were collected through an interviewer administered questionnaire for both cases and controls. Two focused group discussions (FGD) were done one in each district using the FGD guide. The focus group discussions consisted of 12 women for Bubi and nine women for Umguza.

The data collection tools were pre-tested at Nkayi District. For cases and controls questionnaires were used to get information on socio-demographics, maternal, intra-partum, and postnatal factors associated with perinatal mortality. A separate questionnaire was used to interview key informants to elicit their perspectives on perinatal mortality and the districts’ efforts in addressing maternal and child health care. A total of 12 key informants comprising of four senior nurse managers, three doctors, three primary care nurses, one provincial reproductive health coordinator and one private EMnOC trainer were interviewed. A review of outpatient cards, clinic and hospital records were done to objectively verify information on ANC booking and labour history.

3.9.2 Pretesting of Tools

Data collection tools were pre-tested at Nkayi Hospital which had the same rural set up as Bubi and Umguza districts. After pretesting the tools were corrected and refined. Ten interviews were conducted which comprised of three cases, six controls and one key informant.

3.9.3 Data processing and analysis

Data were entered into Epi Info 7, cleaned and analysed using the same software. Proportions frequencies, means, Chi Square, odds ratios and p-values were calculated at 95% confidence interval. Stratification was done to identify effect modification and control for confounding at analysis stage in order to measure the true estimate of association between exposure and outcome. Multivariate logistic regression analysis was done to control for confounding and
to determine independent risk factors for perinatal mortality. Qualitative data from the FGDs and key informants were grouped according to responses for each question. Some informative word to word quotes were written. The data were analyzed by themes.

3.10 Permission to carry out the study

Ethical approval was sought from the Medical Research Council of Zimbabwe (MRCZ). Permission to carry out the study was sought from the Provincial Medical Directorate (PMD) for Matabeleland North Province, District Medical Officers (DMO) for Umguza and Bubi Districts and Health Studies Office.

3.11 Ethical considerations

Ethical approval to carry out the study was sought from the Parirenyatwa Joint Research and Ethics Committee (JREC). The aim of the study was explained to all the study participants and informed written consent was sought. Participants were afforded adequate time to go through the consent form. Consent forms were written in the local language of Ndebele and those who were not able to read, information was explained to them before they placed their mark of the thumb print. Participants were informed that they were free to withdraw at any time without giving reasons. A decision not to participate was respected and the participants were assured that non-participation will not affect their health care in anyway. Confidentiality was assured and maintained throughout the study by identifying questionnaires using numbers, exclusion of names on all questionnaires and keeping them separate from the signed consent forms. The completed data collection tools were kept in a locked cabinet. Back translation of all data collection tools was done to ensure accuracy. Participants who lost their babies were informed about the possibility of bringing back old memories and counseling was afforded at the health facilities by the nurse counselors.
CHAPTER 4

4. Results

A total of 73 cases and 146 controls were interviewed. In Bubi district 45 (61.6%) cases and 90 (61%) controls participated and in Umguza district 28 (38.4%) cases and 56 (39%) controls participated in the study.

4.1 Socio-Demographic Characteristics

Table 2 below shows the socio-demographic characteristics of cases and controls in Bubi and Umguza districts.

Table 2: Socio-demographic factors, Bubi and Umguza Districts, 2015

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cases (%)</th>
<th>Controls (%)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=73</td>
<td>n=146</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Age</td>
<td>≤16</td>
<td>4(6)</td>
<td>21(14)</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>17-34</td>
<td>60(82)</td>
<td>117(80)</td>
<td>0.364</td>
</tr>
<tr>
<td></td>
<td>35+</td>
<td>9(12)</td>
<td>8(6)</td>
<td>0.045</td>
</tr>
<tr>
<td></td>
<td>Median Age</td>
<td>22yrs(Q1=19 Q3=29)</td>
<td>23yrs (Q1=19.5 Q3=28)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Yes</td>
<td>69(95)</td>
<td>141(97)</td>
<td>0.243</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4(5)</td>
<td>5(3)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td>Apostolic</td>
<td>35(49)</td>
<td>43(30)</td>
<td>0.003*</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>36(51)</td>
<td>102(70)</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>Primary</td>
<td>32(44)</td>
<td>29(20)</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>40(55)</td>
<td>115 (79)</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>1(1.4)</td>
<td>2(1.4)</td>
<td>0.500</td>
</tr>
<tr>
<td>Employment (Mothers)</td>
<td>Yes</td>
<td>3(4)</td>
<td>6(4)</td>
<td>0.487</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>70(96)</td>
<td>140(96)</td>
<td></td>
</tr>
<tr>
<td>Employment (Husbands)</td>
<td>Yes</td>
<td>16(23)</td>
<td>55(38)</td>
<td>0.013*</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>55(77)</td>
<td>91(62)</td>
<td></td>
</tr>
</tbody>
</table>

*= Statistically significant at p-value <0.05
The majority of cases (82%) and controls (80%) were within the age group 17-34 years. The median age of cases and controls was 22 years (Q1=19; Q3=29) and 23 years (Q1=19.5; Q3=28) respectively. Ninety-five percent of cases and 97% of controls were married. Forty-nine percent of cases and 39% of controls had their religion as Apostolic with a p-value of 0.003. Mothers who belonged to the apostolic sect were more likely to have perinatal deaths compared to other religions. Fifty-five percent of cases and 79% of controls had secondary education as their highest level of education. Mothers who had attained primary education as their highest level were at risk of perinatal deaths than those who attained secondary education (p-value 0.000). Twenty-three percent of cases and 38% of controls had employed husbands. Having an employed husband reduced the likelihood of perinatal death (p-value 0.012).
4.2 Maternal factors

Table 3 below shows maternal factors associated with perinatal mortality in Bubi and Umguza districts.

Table 3: Maternal factors associated with perinatal mortality, Bubi and Umguza Districts, 2015

<table>
<thead>
<tr>
<th>Factor</th>
<th>Category</th>
<th>Cases n (%)</th>
<th>Controls n (%)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC Booking status</td>
<td>Yes</td>
<td>55(75)</td>
<td>133(91)</td>
<td>0.30 (0.14-0.65)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>18(25)</td>
<td>13(9)</td>
<td></td>
</tr>
<tr>
<td>ANC Attendance</td>
<td>1-3 visits</td>
<td>49(82)</td>
<td>63(43)</td>
<td>5.7 (2.79-12.05)</td>
</tr>
<tr>
<td></td>
<td>4 + visits</td>
<td>11(18)</td>
<td>82(57)</td>
<td></td>
</tr>
<tr>
<td>History of maternal</td>
<td>Yes</td>
<td>4(5)</td>
<td>2(1)</td>
<td>4.17 (0.75-23.3)</td>
</tr>
<tr>
<td>condition ×</td>
<td>No</td>
<td>69(95)</td>
<td>144(99)</td>
<td></td>
</tr>
<tr>
<td>Previous PM</td>
<td>Yes</td>
<td>5(7)</td>
<td>2(1)</td>
<td>5.10 (1.004-27.9)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>68(93)</td>
<td>144(99)</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td>&lt;4</td>
<td>62(85)</td>
<td>136(93)</td>
<td>0.41(0.17-1.03)</td>
</tr>
<tr>
<td></td>
<td>≥4</td>
<td>11(15)</td>
<td>10(7)</td>
<td></td>
</tr>
<tr>
<td>Median Parity</td>
<td>2(Q1=1.5;Q3=3.5)</td>
<td>2(Q1=1;Q3=3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Height</td>
<td>&lt;150cm</td>
<td>2(3)</td>
<td>6(4)</td>
<td>0.76(0.15-3.87)</td>
</tr>
<tr>
<td></td>
<td>&gt;150cm</td>
<td>61(97)</td>
<td>139(96)</td>
<td></td>
</tr>
<tr>
<td>HIV Status</td>
<td>Positive</td>
<td>22(44)</td>
<td>28(56)</td>
<td>1.82 (0.95-3.50)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>51(30)</td>
<td>118(70)</td>
<td></td>
</tr>
</tbody>
</table>

× History of maternal hypertension, Diabetes mellitus, anaemia

Seventy-five percent of cases and 91% of controls were booked for ANC. Antenatal care booking reduced the risk of experiencing a perinatal death OR 0.30 (CI 0.14 - 0.65). Women who booked for ANC were 70% less likely to have their neonate dying. ANC attendance of less than four visits was a risk factor for perinatal mortality OR 5.7 (CI 2.79-12.05). Having a
history of maternal condition during pregnancy increased the risk of death OR 4.17 (CI 0.75-23.3) though this was not statistically significant. Previous maternal history of perinatal mortality was a risk factor for development of another perinatal death OR 5.10 (CI 1.004-27.9) and this was statistically significant. Mothers who had a previous PM were 5.1 times more likely to develop another perianal death compared to those who did not.

Eighty-five percent of cases and 93% of controls had maternal parity of less than four. The median parity was 2 (Q₁=1.5; Q₃=3.5) and 2(Q₁=1; Q₃=3) for cases and controls respectively. Having a lesser number of children was not significant. Maternal height of <150cm was not a risk factor for perinatal mortality. Maternal HIV positive status was a risk factor for development of perinatal death OR 1.82 (CI 0.95-3.50) though this was not statistically significant. Cases and controls were comparable in HIV status and antiretroviral treatment.
4.3 Intra-partum Factors

Table 4 shows the intra-partum factors for cases and controls in Bubi and Umguza districts which were associated with perinatal mortality.

Table 4: Intra-partum factors associated with perinatal mortality, Umguza and Bubi districts, 2015

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cases n (%)</th>
<th>Controls n (%)</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormality on Admission×</td>
<td>Yes</td>
<td>59 (81)</td>
<td>9 (6)</td>
<td>64.2</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>14 (19)</td>
<td>137 (94)</td>
<td></td>
</tr>
<tr>
<td>Mode of delivery</td>
<td>NVD</td>
<td>56 (76.7)</td>
<td>139 (95.2)</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>LSCS</td>
<td>2 (2.7)</td>
<td>2 (1.4)</td>
<td>2.03</td>
</tr>
<tr>
<td></td>
<td>Breech</td>
<td>7 (10)</td>
<td>2 (1.4)</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td>Twin delivery</td>
<td>7 (10)</td>
<td>1 (1)</td>
<td>15.4</td>
</tr>
<tr>
<td>Delivery assistance</td>
<td>Trained nurse/Doctor</td>
<td>72(99)</td>
<td>144 (99)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1(1)</td>
<td>2(1)</td>
<td></td>
</tr>
<tr>
<td>Labour complications</td>
<td>Yes</td>
<td>33(45)</td>
<td>12(8)</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>40(55)</td>
<td>134(92)</td>
<td></td>
</tr>
</tbody>
</table>

×Abnormality on Admission were cord prolapse, preterm labour and no fetal heart

Eighty-one percent of cases and six percent of controls had an abnormality on admission to the health facility for delivery. Having an abnormality on admission was a risk factor OR 64.2 (CI 26.3-156.4). Mothers who had an abnormality on admission were 64.2 times more likely to have perinatal mortality compared to those without. This was statistically significant.
Among the modes of delivery normal vertex delivery (NVD) was protective OR 0.17 (CI 0.07-0.42) and mothers who delivered normally were less likely to develop perinatal mortality. Delivering by caesarean section was a risk factor OR 2.03 (CI 0.28-14.7) though this was not significant. Having a breech delivery OR 7.6 (CI 1.54-37.8) and twin delivery OR 15.4 (CI 1.85-128) were risk factors for developing perinatal mortality and this was statistically significant. An equal percentage (99%) of cases and controls had skilled attendance during labour as they were attended by either nurses or doctors. Hence having a home delivery was not a risk factor in this study. Forty-five percent of cases and eight percent of controls had a complication during labour OR 9.2 (CI 4.4-19.5) and this was statistically significant.

4.3.1 Types of abnormalities during labour

Figure 3 below shows abnormalities which occurred during labour among cases and controls.

Figure 3: Abnormalities During Labour, Bubi and Umguza Districts, 2015
The major abnormality among cases was preterm labour (34.3%). Controls experienced fewer frequencies of all abnormalities during labour.

### 4.4 Neonatal Factors

Table 5 below shows the neonatal factors associated with perinatal mortality.

**Table 5: Neonatal factors associated with perinatal mortality, Bubi and Umguza Districts 2015**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cases (%) n=73</th>
<th>Controls (%) n=146</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age</td>
<td>22-36 weeks</td>
<td>50(69)</td>
<td>3(2)</td>
<td>103(29.8-360.05)</td>
</tr>
<tr>
<td></td>
<td>≥37 weeks</td>
<td>23(31)</td>
<td>143(98)</td>
<td></td>
</tr>
<tr>
<td>Birth weight</td>
<td>&lt;2500g</td>
<td>51(70)</td>
<td>7(5)</td>
<td>46.0 (18.6-114.3)</td>
</tr>
<tr>
<td></td>
<td>≥2500g</td>
<td>22(30)</td>
<td>139(95)</td>
<td>0.02 (0.009-0.054)</td>
</tr>
<tr>
<td>Sex of baby</td>
<td>Male</td>
<td>44(60)</td>
<td>59(40)</td>
<td>2.24 (1.26-3.97)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>29(40)</td>
<td>87(60)</td>
<td>0.45 (0.25-0.79)</td>
</tr>
<tr>
<td>First birth rank</td>
<td>Yes</td>
<td>28(38)</td>
<td>55(38)</td>
<td>1.03 (0.58-1.84)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45(62)</td>
<td>91(62)</td>
<td></td>
</tr>
</tbody>
</table>

The neonatal factors associated with perinatal mortality (Table 5). Sixty-nine percent of cases had a GA of <36 weeks compared to only 2% among controls. This was a risk factor OR 103 (29.8-360.05) and was statistically significant. Mothers with preterm labour were 103 times
more likely to develop PM compared to those without. Seventy percent of cases and only 5% of controls had a birth weight of <2500g. Having a lower birth weight was a risk factor OR 46.0 (18.6-114.3) and this was statistically significant. Sixty percent of cases and 40% of controls were male babies. Male babies were 2.2 times more likely to die compared to female babies and this was significant. Male babies were at higher risk of dying compared to female babies OR 2.24 (CI 1.26-3.97). There was no difference in occurrence of perinatal death between the first born babies and their siblings.

4.4.1 Types of Perinatal deaths

The majority of perinatal deaths were macerated stillbirths in both districts, (Figure 3) Umguza district had a higher proportion of MSB (50%) and FSB (42.9%) compared to Bubi district. The proportion of early neonatal deaths was higher (24.4%) in Bubi district compared to Umguza district which had 7.1%.
4.4.2 Timing of early neonatal deaths

Figure 5 below shows the time of deaths for ENND.

![Figure 5: Timing of early neonatal deaths, bubi and Umguza districts, 2015]

The majority (69.2%) of ENND occurred in < 24 hours of birth. 23.1% occurred within 24-72 hours and the least (7.7%) occurred within 3-7 days. The risk of dying was great within the first day of birth.
4.5 Post-delivery Factors

Table 6 below shows the post-delivery factors

Table 6: Post-delivery factors associated with perinatal mortality, Bubi and Umguza Districts 2015

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cases (%)</th>
<th>Controls (%)</th>
<th>OR (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Place of delivery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>71 (97.3)</td>
<td>143 (97.9)</td>
<td>0.75 (0.12-4.56)</td>
</tr>
<tr>
<td>Home</td>
<td>2 (2.7)</td>
<td>3 (2.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Delivery attendance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse/ Midwife</td>
<td>70 (95.9)</td>
<td>138 (94.5)</td>
<td>1.03 (0.08-11.2)</td>
</tr>
<tr>
<td>Doctor</td>
<td>2 (2.7)</td>
<td>6 (4.1)</td>
<td></td>
</tr>
<tr>
<td>Unskilled person</td>
<td>1 (1.3)</td>
<td>2 (1.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Resuscitation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25 (34.3)</td>
<td>4 (2.7)</td>
<td>18.49 (6.12- 55.83)</td>
</tr>
<tr>
<td>No</td>
<td>48 (65.7)</td>
<td>142 (97.3)</td>
<td></td>
</tr>
</tbody>
</table>

The majority of both cases (97.3%) and controls (97.9) utilized the health facility for delivery. Attendance at delivery was mostly done by nurses among cases (95.9%) and 94.5% among controls. Women attended by an unskilled person at delivery were few, 1.3% cases and 1.4 controls. Resuscitation was done on 34.3% of cases and 2.7% of controls. Babies who were resuscitated were at risk of dying OR 18.49 (6.12- 55.83).
4.6 Stratified Analysis

Table 7: Analysis of apostolic religion and perinatal mortality stratified by level of education, Bubi and Umguza districts, 2015

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cases</th>
<th>Controls</th>
<th>Stratum Specific OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>Apostolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>26 (81)</td>
<td>16 (57)</td>
<td>3.25 (1.03; 10.4)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>6 (19)</td>
<td>12 (43)</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>Apostolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>9 (23)</td>
<td>27 (23.5)</td>
<td>0.9 (0.4;2.3)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>30 (77)</td>
<td>88 (76.5)</td>
<td></td>
</tr>
<tr>
<td>Crude</td>
<td>Apostolic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>35 (49)</td>
<td>43 (30)</td>
<td>2.9 (1.5; 5.7)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>36 (51)</td>
<td>100 (70)</td>
<td></td>
</tr>
</tbody>
</table>

Adjusted OR 3.4(1.7; 6.9)

Chi-square 9.06

p-value =0.0026

The association between apostolic religion and perinatal mortality was modified by primary level of education. Babies of mothers who belonged to the apostolic religion were more likely
to die among mothers with primary educational level (AOR 3.2; 95% CI 1.03-10.4). There was no confounding

**Table 8: Analysis of gestational age <36 weeks and perinatal mortality stratified by birth weight in Bubi and Umguza districts, 2015**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cases</th>
<th>Controls</th>
<th>Stratum Specific OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWT &lt;2500g</td>
<td>GA &lt;36 Weeks</td>
<td>Yes</td>
<td>48 (94)</td>
<td>1 (14.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>3 (6)</td>
<td>6 (85.7)</td>
</tr>
<tr>
<td>BWT ≥2500g</td>
<td>GA &lt;36 Weeks</td>
<td>Yes</td>
<td>2 (9)</td>
<td>2 (1.5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>20 (91)</td>
<td>136 (98.5)</td>
</tr>
<tr>
<td>Crude</td>
<td>GA &lt;36 Weeks</td>
<td>Yes</td>
<td>50 (68.5)</td>
<td>3 (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>23 (31.5)</td>
<td>142 (98)</td>
</tr>
<tr>
<td><strong>Adjusted OR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chi-square</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>p-value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The effect of gestational age on perinatal mortality was confounded by low birth weight. The COR overestimated the risk between preterm babies with gestational age of < 36 weeks and
perinatal death. Premature neonates were 22.1 times at risk of dying compared to term neonates.

Table 9: Analysis of sex of baby and perinatal mortality stratified by low birth weight in Bubi and Umguza districts, 2015

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Cases</th>
<th>Controls</th>
<th>Stratum Specific OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BWT &lt;2500g</td>
<td>Yes</td>
<td>33 (75)</td>
<td>3 (5)</td>
<td>56.0 (14.56-215.4)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11(25)</td>
<td>56 (95)</td>
<td></td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BWT &lt; 2500g</td>
<td>Yes</td>
<td>18 (62)</td>
<td>4 (5)</td>
<td>33.6 (9.58-117.4)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11(38)</td>
<td>82 (95)</td>
<td></td>
</tr>
<tr>
<td><strong>Crude</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2500g</td>
<td>Yes</td>
<td>51 (69)</td>
<td>7 (5)</td>
<td>45.70 (18.41-113.44)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>22 (30)</td>
<td>138 (95)</td>
<td></td>
</tr>
<tr>
<td><strong>Adjusted OR 43.78 (17.54-109.3)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chi-square 98.62</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>p-value &lt;0.0001</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The association between low birth weight and perinatal mortality was modified by sex. Low birth weight babies were more likely to die (OR=56.0; 95% CI 14.56-215.4) among male babies compared to female babies. There was no confounding
4.7 Independent risk factors for perinatal mortality

Table 10 below shows the independent risk factors for perinatal mortality.

**Table 10: Independent risk factors for perinatal mortality, Bubi and Umguza districts, 2015**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Cases (%)</th>
<th>Controls (%)</th>
<th>Adjusted Odds (95% CI)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=73</td>
<td>N=146</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male baby</td>
<td>44(40)</td>
<td>59 (60)</td>
<td>1.4 (1.09; 2.88)</td>
<td>0.021</td>
</tr>
<tr>
<td>GA &lt;36 weeks</td>
<td>50(68)</td>
<td>3(2.1)</td>
<td>8.28 (3.67; 96.6)</td>
<td>0.003</td>
</tr>
<tr>
<td>No ANC visit</td>
<td>13 (18)</td>
<td>1 (1)</td>
<td>24.6 (2.67; 226.3)</td>
<td>0.005</td>
</tr>
<tr>
<td>Religion (Orthodox)</td>
<td>36 (26)</td>
<td>102(74)</td>
<td>0.67 (0.312; 0.852)</td>
<td>0.013</td>
</tr>
<tr>
<td>Secondary education</td>
<td>40(55)</td>
<td>115 (79)</td>
<td>0.32 (0.15; 0.71)</td>
<td>0.005</td>
</tr>
<tr>
<td>Birth weight &lt;2500g</td>
<td>51(70)</td>
<td>7(5)</td>
<td>1.37 (1.27; 6.96)</td>
<td>0.023</td>
</tr>
</tbody>
</table>

Factors that were independently associated with perinatal mortality (Table 8) were GA of < 36 weeks, being a male baby, low birth weight of <2500g and no antenatal care booking.

Male babies were 1.4 times more likely to experience perinatal death than females.

Gestational age of <36 weeks was a risk factor of perinatal death (p=0.003). Babies born with a GA of <36 weeks were 8.28 times likely to have perinatal death compared to those born 37
weeks and above. Lack of ANC visit was a risk factor (OR 24.6 95% CI 2.67-226.3) of perinatal death while having ANC visits of four and above was 17% (p<0.001) less likely associated with the risk of developing perinatal death.

Attending orthodox churches was a protective factor to perinatal death compared to Apostolic sects, with an odds ratio of (0.67, p=0.013). Babies born to mothers who attained secondary education were 32% (OR=0.32, p=0.005) less likely to experience perinatal death compared to babies born to mothers who attained primary level of education only. Babies born with a birth weight (BWT) of <2500g were at risk of perinatal death (OR=1.37, p=0.023), there were 1.37 times more likely to die as compared to those born with a BWT of ≥2500g.

4.8 Key informant interviews

A total of 12 key informants comprising of four senior nurse managers, three doctors, three primary care nurses, one provincial reproductive health coordinator and one private EMnOC trainer were interviewed. The median years in service for key informants were 4.5 years (Q1=2; Q3=7). Major contributory factors of perinatal mortality highlighted were prematurity, home delivery and inappropriate use of the partograms in monitoring of mothers during labour. Negative staff attitude towards women in labour were cited as contributory in occurrence of stillbirth due to lack of monitoring. Good nurse attitude was said to influence women’s decision on utilising health centres for delivery. It was reported that mothers in waiting shelters were not being monitored and some would just come to deliver in advanced labour with some complications already.

Shortages of material resources were highlighted especially at Nyamandlovu Hospital. Oxygen was out of stock for three months and there was lack of capacity. The hospital is
small and all delivered mothers were crowded together with those who have preterm babies except for the severe preterm who get referred. Perinatal mortality meetings were being held monthly in Bubi but in Umguza these were not held according to plans as they cited some competing programs and staff shortage. Patient delays were cited as mothers reported late to health facilities during labour though this could be due to issues related to distance to the facility. In Bubi district only 29% of the nurses were trained in EMnOC compared to Umguza (69%) and this could contribute to compromised expertise. The perinatal audits meetings were held every quarter with all other districts in the province. During the PM audit meetings case notes, interventions for preventing avoidable perinatal deaths and perinatal mortality surveillance are discussed.

4.9 Focus group discussions for women

Two focused group discussions were done one in each district. The focus group discussions consisted of 12 women for Bubi and nine women for Umguza.

Antenatal care: Participants expressed familiarity with the importance of ANC and they mentioned that it was provided for free. Women mentioned that according to culture they were not allowed to show off their pregnancy until it was at least too obvious that one was pregnant. The issue of distance to the health facility was raised by some participants as a hindrance to reporting to health facilities early for delivery. Some women mentioned that during farming they would only book in their 9th month while they are at mothers waiting shelters.

Health care workers attitudes: The participants reported that nurses in health facilities had attitudes towards women in labour. “Ungababiza kabaphenduli” meaning when you call
them to assist you they do not respond. Some mentioned that when you go early to a health facility in labour you will end up being operated because they will regard you to have prolonged labour. Hence they stay at home and present at the clinic in advanced labour.

**Perinatal mortality perspectives:** Participants aired that usually the community sympathises with a mother who lost a baby and they try to find a reason for the death. Some even visit the traditional healers or prophets to prevent future deaths. Some participants mentioned that some family members blame the mother for the death.

**Suggestions to health service management:** Participants in both districts expressed satisfaction with the fact that the Ministry of Health and Child Care provided maternity service for free. Women in both districts were concerned about the facilities not providing food to them while they were staying in maternal waiting homes. They were appealing for food provisions during their stay in waiting homes.
CHAPTER 5

5. Discussions and Conclusions

5.1 Discussion

Factors that were independently associated with perinatal mortality were GA of < 36 weeks, Apostolic religion, having a male baby, low birth weight of <2500g and lack of antenatal care booking. Apostolic religion as a risk factor for perinatal mortality in this study differs from other studies done in Zimbabwe. In previous studies some women were not booking for ANC and were delivering in their homes. In Bubi and Umguza districts the apostolic sect women attended ANC visits and were utilising health facilities. There might be other religious or cultural practices which might have not been revealed in this study which contributed to PM in the apostolic sect women.

Women who had an employed husband were less likely to develop PM in bivariate analysis. This might be related to social support for provisions which promote adequate nutrition and upkeep for mothers during pregnancy. Pregnant women with low socio-economic support reported reduced quality of life and were at risk of poor pregnancy outcomes. Lack of support was also related to poor maternal health. Partners of mothers can influence the decisions of women in utilising health care services which may aid in treatment of identified complications earlier.

Antenatal booking provides the opportunity for clients to be screened and treated for any complications. Some risk factors of pregnancy are identified and controlled to reduce perinatal deaths. Mothers with previous bad obstetric history (eg previous PM) would be closely monitored and advised to utilize maternal waiting homes prior to delivery. In this study ANC booking and attendance was protective and this was comparable to studies in the Southern African region. Mothers who had not attended ANC were most likely to develop
perinatal mortality compared to those who attended four visits and above. Mothers who do not book for ANC or book late are less likely to benefit from the health education and treatment provided to others.

Maternal education empowers women and is a measure of socioeconomic status as it influences the mother’s decisions regarding health matters. Education increases health knowledge and willingness to use of health facilities. Secondary education was a protective factor and mothers utilised the health facilities. Lack of schooling and lower levels of education were associated with perinatal deaths.\textsuperscript{35}

The study findings that maternal HIV status was not associated with perinatal mortality were contrary to other researches done in Zimbabwe and other developing countries\textsuperscript{27, 28, 30}, where positive HIV status was significantly associated with perinatal deaths. This could be related to the use of ART and Option B+ among pregnant mothers as compared to the studies which were done during the earlier periods of the HIV epidemic without the improved PMTCT programs. Use of ART during pregnancy was found to be protective against PM and improved maternal health and reduces perinatal deaths. The association between HIV and perinatal deaths was found to be confounded by other factors like poor obstetric services, malnutrition, anaemia and lack of comprehensive HIV services.\textsuperscript{36} The sample size in our study was not calculated based on the positive HIV status and the results could be explained by a smaller sample of HIV positive mothers.

Babies born with a low birth weight (LBW) are more likely to die as compared to those born with a BWT of \( \geq 2500\)g. This could be related to maternal malnutrition, anaemia and PIH as the fetus might be deprived of nutrients. Prematurity was the major cause of low birth weight and these are also likely to die during the perinatal period than low birth-weight term babies.\textsuperscript{37} The study was done in a rural set up where women are most likely to experience
poverty and not afford nutritious diets to take care of their needs and those of the growing fetus. Malnutrition increases risk of infection which leads to LBW babies with greater probability for mortality.

Premature babies are usually at risk of hypothermia, infection and intra-partum asphyxia and these can be prevented by essential and quality obstetric care. The Cochrane review of Kangaroo Mother Care (KMC) found evidence that it reduced ENND in premature low birth weight babies especially in low resource care settings. The Kangaroo care method is ideal in Bubi and Umguza as these settings are rural, do not have any conventional neonatal units and can be used at community levels. 38

Higher proportions of macerated stillbirths compared to early neonatal deaths indicate problems related to intra-partum complications leading to uterine hypoxia and intra-partum asphyxia. In explanation for a high proportion of MSB it should be considered that women who presented with abnormalities on admission had a higher proportion of those who presented with intra uterine death (IUD).

Male babies were more likely to die compared to female babies. The reason to this is not clear from available literature. According to the Six Global Studies on New-borns, this may be related to male short life spans, male babies were 14% more likely to be born prematurely and they develop slowly in utero compared to female babies. 39 Hence the possibility of dying from factors associated with prematurity and complications of prematurity.

Late ANC booking and utilisation of maternal health care were related to cultural demographics and socioeconomic factors. In this study the FGDs showed presents of some myths and cultural beliefs as women booked after 12 weeks of gestation. Provision of free maternity services provides incentives by women to utilise health care services. Poor nurses’
attitudes and quality of care provided to women’s during delivery affect decisions on future utilisation of the health care services.

Shortage of resuscitation resources like oxygen in a health facility is a clear indication of resource insufficiency. Oxygen is administered to babies with birth asphyxia and its absence may increase the occurrence of perinatal mortality.

The effect of home deliveries could not be assessed as we used the delivery registers as the sampling frame. Those women who had community perinatal deaths and did not report to health facilities were not interviewed. Using a known HIV status as the criteria for selection of study participants also excluded mothers who delivered at home but presented to the health facility. Men were not involved in the focus group discussions due to less invitation time. Men are head of households and might influences decisions regarding use of health facilities for better care. They could have brought out some valuable information on their views regarding perinatal deaths.

5.2 Conclusion

The independent determinants of perinatal mortality in Bubi and Umguza districts were gestational age of less than 36 weeks, non-attendance of ANC, Apostolic religion, being a male baby and birth weight of less than 2500g. Prematurity mostly contributed to perinatal mortality. The majority of perinatal deaths were macerated stillbirths and most early neonatal deaths occurred during the first 24 hours after delivery. Key informants highlighted shortage of resources lack of monitoring of mothers in MWHs, ineffective use of the partogram and patient delays as contributory to occurrence of PM.
6. Recommendations

The study recommends the following

1. Hospital managers in Umguza District to ensure provision of adequate resuscitation equipment.

2. The District Nursing Officers to ensure that nurses at each rural health facility are trained in EMnOC to improve their skills in resuscitation of babies.

3. Matrons to intensify supervision of nurses on effective use of partograms in monitoring during labour.

4. Nurses should advocate for Kangaroo care method for preterm babies.

5. Districts Medical Officer for Umguza to make sure they hold PM meeting monthly to audit the care provided to pregnant women and their neonates.

6. There is need for a further study to assess the social circumstances that surround pregnancy and delivery, and service related causes of PM.
7. References


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www.humreprod.oxfordjournals.org/content/22/3/869


www.ncbi.nlm.nih.gov/pmc/articles/PMC3480840


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Appendix 1

English questionnaire for Mothers  Status: Case/ Control  Number _____

1. Date of interview _____/____/________  2. Name of health Facility____________

3. District____________  4. Village__________

A. Socioeconomic and Demographic Data

5. What is your age? ___________ Years.

6. Are you married?  [ ] Yes [ ] No

7. What is your partner’s age? ______________

8. What is your level of education?

[ ] Nil [ ] Primary [ ] Secondary [ ] Tertiary

9. What is your source of livelihood?

[ ] Peasant farmer[ ] Housewife[ ] Formal employment [ ] Dependent

[ ] Other

10. What is your religion?

[ ] Apostolic[ ] Pentecostal[ ] Protestant[ ] Traditional [ ] Other

B. Maternal factors

11. How many pregnancies have you had before?

[ ] One
12. Out of these pregnancies how many children are alive?

[ ] None
[ ] One
[ ] Two
[ ] Three
[ ] Four or more

13. How old were you at the time of childbirth?

[ ] <16 years
[ ] 17-34 years
[ ] 35 years and above

14. Was the pregnancy planned?  [ ] Yes [ ] No

15. Did you suffer from any diseases during pregnancy?  Yes/No

16. If yes, which diseases did you suffer from?

[ ] Raised blood pressure

[ ] Diabetes mellitus (Raised blood sugar levels)

[ ] Anaemia (Less blood)

[ ] Nutritional deficiencies

[ ] Other (Specify) ____________________________
17. When you were pregnant did you go to a health center for ANC? [ ] Yes [ ] No

18. If no, what was the reason?

[ ] Had no money

[ ] Wanted to deliver at home

[ ] My religion doesn’t allow

[ ] Other (Specify) _________________________

19. If yes to question 17, at what gestational age did you attend the first ANC visit?

[ ] <12 weeks   [ ] 12-28 weeks   [ ] >28 weeks

20. May I know your HIV status at delivery (Verify with records) _____________

21. If positive when was ART initiated (Verify with records)_______________

22. Maternal height at delivery (Verify with records)

[ ] <150 cm   [ ] >150 cm   [ ] Not recorded
### C. Neonatal Factors (Verify with records)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Baby’s birth order</td>
<td>[ ] 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>[ ] 2&lt;sup&gt;nd&lt;/sup&gt; - 4&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>24. Date of birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Gestational age</td>
<td>[ ] &lt;24-36</td>
<td>[ ] &gt;37</td>
</tr>
<tr>
<td>26. Mode of delivery</td>
<td>[ ] NVD</td>
<td>[ ] LSCS</td>
</tr>
<tr>
<td></td>
<td>[ ] Other</td>
<td></td>
</tr>
<tr>
<td>27. Birth weight</td>
<td>[ ] &lt;2,5kg</td>
<td>[ ] &gt;2,5kg</td>
</tr>
<tr>
<td>28. Apgar score</td>
<td>[ ] 0-3</td>
<td>[ ] 4-6</td>
</tr>
<tr>
<td>29. Sex</td>
<td>[ ] Male</td>
<td>[ ] Female</td>
</tr>
<tr>
<td>30. Resuscitation</td>
<td>[ ] Yes</td>
<td>[ ] No</td>
</tr>
<tr>
<td>31. Abnormalities</td>
<td>[ ] Yes</td>
<td>[ ] No</td>
</tr>
<tr>
<td>32. Outcome</td>
<td>[ ] Alive</td>
<td>[ ] stillbirth</td>
</tr>
</tbody>
</table>

### D. Delivery Factors

33. Did you suffer from any complications of labour? [ ] Yes [ ] No

34. If yes, which complications did you suffer from?

[ ] Antepartum haemorrhage (Bleeding before delivery) [ ] Prolonged labour

[ ] Obstructed labour [ ] Other (Specify) ________________

35. Who assisted you with delivery of your baby?
[ ] nurse/midwife  [ ] Medical doctor  [ ] Family member  [ ] Traditional birth attendant

[ ] Other (Specify) ________________________________

C. Post-delivery Factors

36. What was the place of delivery?

[ ] Health facility  [ ] Home  [ ] Other (Specify) _________

For Cases only (Question 36-38)

37. How was the condition of your baby soon after delivery?

[ ] Cried loud  [ ] weak crying  [ ] was resuscitated  [ ] Was already dead

38. How many days after delivery did your baby pass on?

[ ] < 24hours  [ ] 24-72 hours  [ ] Day 3- day 7  [ ] Stillborn

39. Do you know what caused the death? (Verify)

[ ] Prematurity  [ ] Birth asphyxia  [ ] Deformity  [ ] Other (Specify) _________

For both cases and controls

40. Did your baby receive postnatal care (PNC) after delivery?  [ ] Yes  [ ] No

41. If yes, which type of PNC did your baby receive?

[ ] Day 0  [ ] Day 3  [ ] Day 7  [ ] 6 weeks  [ ] Other (Specify) _________
Appendix 2

IsiNdebele questionnaire for mothers:   Status: Case/ Control  Number ___


1. Ilanga lokucubungula _____/_____/________  
2. Igama lekilinika___________

3. Isiqinti___________  
4. Isigaba__________

A. Socioeconomic and Demographic Data

5. Uleminyaka emingaki yokuzalwa? __________

6. Wendile na?  [ ] Yebo [ ] Hatshi

7. Ukakho uleminyaka emingaki? ________

8. Wafunda wafika kuliphi ibanga?

    [ ] Angizange ngiye esikolo
    [ ] Imfundo ephansi
    [ ] Imfundo ephezulu
    [ ] Imfundo yekolitshini
9. Wenzani okokuziphilisa empilweni?

[ ] Ngiyalima [ ] Ngendile [ ] Ngiqatshiwe [ ] Ngigciniwe [ ] Okunye ___________

10. Ulandela luphi ukholo? [ ] Ipostoli [ ] Ipentecost [ ] Isintu

[ ] Angilankolo engiyilandelayo[ ] Okunye ________

B. Maternal factors

11. Sowazithwala kangaki?

[ ] Kanye [ ] Kabili [ ] Kathathu [ ] Kane kusiyaphezulu

12. Bangaki abaphilayo?

[ ] Akula [ ] Munye [ ] Babili [ ] Bathathu [ ] Kane kusiyaphezulu

13. Wawuleminyaka emingaki ngesikhathi uzala?

[ ] <ngaphansi kwetshumi lanye

[ ] Amatshumi amabili-Amatshumi amathathu lane

[ ] Ngaphezulu kwamatshumi amathathu lanhlalu

14. Ukuzithwala kwakho wawukuhlelile? [ ] Yebo [ ] Hatshi

15. Ukewaba lobunzima ngesikhathi uzithwele? [ ] Yebo [ ] Hatshi

16. Nxa kungu yebo, waba lobunzima bani?

[ ] IBP ebangelwa yikuzithwala

[ ] Itshukela

[ ] Ukusilela kwegazi
17. Ngesikhathe uzithwele wake waya bhalisa ekilinika? [ ] Yebo [ ] Hatshi

18. Nxa kunguhatshi, wawulezizatho bani?

[ ] Ukuswela imali

[ ] Ngangifuna ukubelethela ekhaya

[ ] Ukholo lwami aluvumi

[ ] Okunye (Chasisa) _________________________

19. Wabhalisa ekilinika isisu sile nyanga ezingaki?

[ ] <Ngaphansi kwamaviki alitshumi lambili

[ ] Amaviki alitshumi lambili kusiya kumaviki angamatshumi amabili lasitshiyagalo mbili

[ ] Ngaphezulu kwamaviki angamatshumi amabili lasitshiyagalo mbili

20. Isimo sakho segazi (HIV) ngesikhathi ubeletha (nika ubufakazi) _____________

21. Nxa ulegcikwane amapilisi akhona uwaqalise nini? (nika ubufakazi) ____________

22. Ubudhe bakho (Nika ubufakazi)

[ ] Phansi kwekhulu lamatshumi amahlanu (<150cm)

[ ] Phezu kwekhulu lamathsumi amahlanu (>150cm)

[ ] Akuzange kubhalwe
### C. Neonatal Factors

<p>| | | |</p>
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<tbody>
<tr>
<td>23. Ingane yesingaki?</td>
<td>[ ] Kuqala</td>
<td>[ ] Yesibili kusiya kweyesine</td>
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<td>24. Usuku lokubeletha</td>
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<td>25. Amaviki esisu ubeletha</td>
<td></td>
<td>Phansi kwamatshumi amathathu lesikhombisa</td>
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<td>Phezu kwamatshumi amathathu lokwesikhombisa</td>
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<td>26. Wabeletha ngaluphi uhlobo</td>
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<td>Ngemvelo</td>
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<td>[ ] Okunye________</td>
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<td>27. Isisindo ekuzalweni</td>
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<td></td>
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<td>Phansi kokubili lengxenye</td>
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<td>lengxenye</td>
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<td>28. Ukukhala ekuzalweni</td>
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<td>Phansi kokuthathu</td>
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<td>Okwesikhombisa kusiya kutshumi</td>
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<td>29. Ubulili</td>
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<td>Owesilisa</td>
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<td>30. Ukucediswa ekukhaleni</td>
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<td></td>
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<td>Yebo</td>
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<td>31. Ukuzalwa uyisilima</td>
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<td></td>
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<td>Yebo</td>
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<tr>
<td>32. Impumela</td>
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<td>Ophilayo</td>
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</tbody>
</table>

### D. Delivery Factors

33. Wabalobunzima ngesikhathi ubeletha? [ ] Yebo [ ] Hatshi

34. Nxa kungu yebo, waba lobunzima bani?

   [ ] Ngopha ngingaka beleti

   [ ] Ngahelelwa okwesikhathi eside

   [ ] Ngangingela ndlela
35. Wangcediswa ngubani ekubeletheni?

[ ] Ngumongikazi/Ngumongikazi owafundela ukubelethisa [ ] Ngudokotela

[ ] Yisihlobo [ ] Ngumama obelethisela ngekhaya.

[ ] Okunye (Chasisa) ________________________________

C. Post-delivery Factors

36. Wabelethela ngaphi?

[ ] Esibedlela [ ] Ngekhaya [ ] Okunye (Chasisa) __________

For Cases only (Question 36-38)

37. Umntwana wayesesimeni bani ngemuva kokubeletha?

[ ] Wakhala kwezwakala [ ] wakhala kacane[ ] Wayesedlu[ ] wancediswa wazokhalela

kwelikhathana

38. Wadlula ngemuva kwamalanga amangaki umntwana?

[ ] ngaphezulu kwamahola angamatshumi amabili lane

[ ] Ngamahola angamatshumi amabili lane kusiyi ku mahola ayisikhombisa lamabili

[ ] Ngelanga lesithathu kusiyi kwayisikhombisa

[ ] Ngaswela

39. Uyakwazi okwabangela ukufa kosane? (ubufakazi) [ ] Ubulima [ ] waphuza ukukhala

[ ] Ngabeletha insuku zingakeneli [ ] Okunye (Chasisa) __________
For both cases and controls

40. Umntwana wahlolwa ngemuva kokubeletha (PNC)? [ ] Yebo [ ] Hatshi

41. Nxa kunguyebo, wahlolwa ngemva kwamalanga aphi?

[ ] Ngelanga lokuzalwa [ ] Ngelanga lesithathu[ ] Ngelanga lesikhombisa

[ ] Emavikini ayisithupha [ ] Okunye (Chasisa) __________

Ngiyabonga ngokupathisa kwakho
Appendix 3

Questionnaire for Key Informants

My name is Virginia Mbiba. I am a Public Health Officer from the Matabeleland North Provincial Medical Director’s office, Ministry of Health and Child Care. I am studying towards a Master’s Degree in Public Health with the University of Zimbabwe. I am conducting a study on Factors associated with perinatal mortality in Bubi and Umguza rural areas. I would like to ask you some questions. Please feel free to answer as frankly as possible. Any information we are going to discuss will be treated as confidential.

Participation into the study is voluntary.

1. Date of interview _____/____/________

2. Name of health Facility _________________________

3. What is your age? ___________Years

4. Sex: [ ] Male [ ] Female

5. What is your designation? ______________________________

6. How long have you been at this institution occupying that post? ______ Years

7. Did you receive any training in maternal Basic emergency obstetric and neonatal care (BEmONC)? [ ] Yes [ ] No

8. If yes, specify the type of training received ______________________________

9. Have you conducted any training of health workers on BEmONC?

   [ ] Yes [ ] No

10. If yes which staff members were trained?
11. When was the last time you conducted BEmNOC training? ________________

12. Do you hold any meetings on perinatal mortality  [ ] Yes  [ ] No

13. How often do you hold PM meetings?
   [ ] Once per month  [ ] every quarter  [ ] Other (specify) ________________

14. If yes, can I have a look at some of the minutes of such meetings?  [ ] Seen  [ ] Not seen

15. When was the last time you held a perinatal mortality meeting? ______________

16. Your district had an increase in perinatal deaths in the year of 2014, what do you think are the reasons?

   [ ] lack of material resources  [ ] Maternal HIV

   [ ] Home deliveries  [ ] PIH

   [ ] Unavoidable causes  [ ] Birth asphyxia

   [ ] Shortage of competent staff  [ ] Antepartum haemorrhage

   [ ] Other (Specify) ______________________________________________________

17. What do you think is the effect of maternal HIV status on perinatal mortality?

   _______________________________________________________________________

   _______________________________________________________________________

18. What can be done to reduce perinatal mortality in the district?

   _______________________________________________________________________

   _______________________________________________________________________
Appendix 4

English Consent for mothers

Title: Factors Associated with Perinatal Mortality in Umguza and Bubi Rural Areas
Matabeleland North Province, 2015- The Effect of Maternal Human Immunodeficiency Virus Status.

Name of researcher: Virginia Mbiba

Phone : 0772 211 412

Project description:
You have decided to take part in the research study named above. The study will collect your information about your age, place of residence, source of livelihood, your previous pregnancies and their outcomes. I would ask about reasons for babies dying before, or soon after delivery and risk factors for perinatal mortality in Umguza and Bubi rural areas. This consent form gives you information about the collection, storage and future use of data collected from you. Please ask if you have any questions. You will be asked to sign or make your mark on this form to indicate whether or not you agree to participate in the study. You will be offered a copy of this form to keep and i will keep the other form for at least 3 years.

Your rights
Before you decide whether or not to volunteer for this study, you must understand its purpose, how it may help you, the risks to you, and what is expected of you. This process is called informed consent.

Purpose of research study
The study seeks to assess the factors associated with perinatal mortality and the effect of maternal HIV status in Umguza and Bubi districts. The factors being looked at are divided
into maternal, neonatal, delivery and post-delivery factors. You will also be asked on your perceived ideas regarding perinatal deaths in your area.

**Procedures involved in the study**

Data will be collected using an interviewer administered questionnaire. The questionnaire you will respond to consists of open ended and closed ended questions and also closed-ended rating scale question. It will take about 15 minutes to ask the questions. If you feel you cannot answer any question, please feel free to say so.

**Discomforts and risks**

There are ethical risks related to storing your information. It is possible that if others find out information about you in the questionnaire, it could cause you problems of stigmatization. To minimize this risk your information will be strictly put under lock and key. Information collected from you will be used only for academic purposes. Questions regarding the death of your baby might remind you about your past emotional experiences. If you require counseling this will be provided by the nurse counselors at your local clinic.

**Potential benefits**

There are no immediate benefits to you from having your information stored. You and others could benefit in the future from research done on you. Research findings may help improve the care of mothers during pregnancy, labour and post-delivery. We hope to use the information that you give us to assist in identifying ways that can reduce perinatal deaths.

**Study withdrawal**

You may choose not to enter the study or withdraw from the study at any time without loss of benefits entitled to you.
Confidentiality of records

Completed questionnaires will be kept under lock and key for at least 3 years after which they may be destroyed. To keep your information private, your name will not be written on the questionnaire.

Problems/questions

Please ask about this research or consent now. If you have any questions in future please ask.

Authorization

I have read this paper about the study or it was read to me. I understand the possible risks and benefits of this study. I know being in this study is voluntary. I choose to be in this study. I know I can stop to be in this study and I know I will not lose any benefits entitled to me. I will get a copy of this consent form.

________________________________________________________________________

Client Signature or Mark                      Date

________________________________________________________________________

Client Name (Printed)

________________________________________________________________________

Researcher Signature                      Date

________________________________________________________________________

Witness Signature                      Date
Appendix 5

Consent for mothers- IsiNdebele

**Inhloko ecubungulwayo:** Imbangela eziphathelane lokufa kwabantwana bengakazalwa loba bezalwa lanxa besanda kuzalwa esiqintini se Umguza leseBubi kumnyaka ka2015–Lokuthi kambe igcikwane lenculaza [Human Immunodeficiency Virus (HIV)] lingaba ngeyinye imbangela na?

**Ocubungulayo:** virginia mbiba

**Ucingo lwami** : 0772 211 412

**Ihlelo zokucungula lokhu**


**Amalungelo akho**

Unangakazinikeli qala uzwisise izizatho zalokhu kucubungula, ukuthi zingakunceda njani, ingozi ezingakuvulela lokuthi wena kumele wense. Lokhu kuthiwa yisivumelwano sesozwisisile okumunyethweyo.

**Izizatho zokucubungula**

Ukucubungula lokhu kucwayisisa izehlakalo eziphathelene lokufa kwabantwana bengakazalwa kumbe bezalwa, lokumayelana labomama abazithweleyo abalomkhuhlane wengculaza esiqintini seUmguza lase Bubi. Izehlakalo ezicubungulwayo zihlelwe zaba
kuzigaba lezi: omama abazithweleyo, insane, ababelethayo, lezehlakalo ezenzakala ngemvuva kokubeletha. Uzabuzwa imibono yakho ngokupathelane lokubhubha kwensane langokuswela kwabomama abazithweleyo.

**Indlela ukuzacubungulwa ngayo**


**Ukungaphatheki kahle lengozi**


**Inzuzo**

Akula nzuzo enikezwayo ekhuphathekeni kwakho kuloluhlelo. kodwa wena labanye lingancedakala ngaphambili. Okuzatholakala ekungxoxweni kuhangelelewe ukusetshenziwa ngabezempilakahle ukubumba inhlelo ezijonge ukwehlisa inani lensane ezifayo.

**Ukungaphatheki ekucubunguleni**

Ungakhetha ukungaphatheki kulokhu kucubungula lobanini kungela ongalahlekelwanga loba yini.
Ukucinwa kwalezi ngwalo

Ingwalo ezilemibuzo egcwaliwyo ziza ngcinwa zifihlakele, njalo zikhiyelwe okweminyaka emithathu besezi lahlwa ngendlela yakhona. Njengedlela yokungcina ifihlo ibizo lakho alizikubhalwa kulezingwalo.

Imibuzo

Nxa ulemibuzo mayelana lokuphatheka lokhu kumbe isivumelano lesi khathesi loba ngaphambilini uvunvelwe ukubuza.

Invumo

Ngizwisile ngalelephepha ekubaleni kwami kumbe ngibalelwe ngazwisisa, ngiyazwisisa njalo ukuthi kungabalengozi lokungangincedisa njalo. Ngiyazi ukupatheka kulokhu kucubungula yikuzikhethela, ngingayekela lobanini njalo ngingalahlekelwa lutho. Ngizathola iphepha elifanayo engiza sala lalo

__________________________________________
Isicindezele sophathekayo         Ilanga
__________________________________________
Ibizo lophathekayo

__________________________________________
Isicindezele somcubunguli         Ilanga
__________________________________________
Isicindezele umeli              Ilanga
Appendix 6

English Focus Group Discussion Guide for Mothers

1. What do you understand by Antenatal care (ANC) booking?
   - What is it?
   - What are the benefits?
   - Who benefits from ANC?
   - Is it important
   - Could ANC increase chances of baby survival?

2. What could be the possible reasons why some women do not book or book late for ANC?
   - Socio cultural issues?
   - Economic issue?
   - Religious issues
   - Health service related issues?

3. Why do some mothers lose their babies, during pregnancy, labour and soon after delivery?
   - Health worker attitudes?
   - Health care resources?
   - Socio-cultural practices?
   - Maternal diseases?
4. What are your views regarding the relationship between maternal HIV positive status and perinatal deaths

5. What are your views regarding delivering in health facilities and at home?
   - Barriers to a hospital delivery
   - Dangers of home delivery

6. How does the community view a woman who has lost her baby?
   - Blamed
   - Empathetic

7. How does the community feel about the care given to women during labour and delivery?

8. What do you suggest that health service managers should do to prevent occurrence of perinatal deaths?

9. Is there anything else you would like to say about why mothers lose their babies during pregnancy, labour and soon after delivery?

Thank you very much for your participation
Appendix 7

IsiNdebele Focus group discussion guide for mothers

1 Kuyini okwaziyo mayelana lokubhaliswa kwabomama abazithweleyo?
   - Kambe kuyini?
   - Kuyini Inzuzo yakhona?
   - Ngubani othola inzuzo ekubhaliseni?
   - Kuqakatheke ngani?
   - Kambe ukubhalisa kungangezelela impilakahle yensane na?

2. Kuyini okungaba yizizatho zokuthi abanye omama ababhalisi izisu zabo , kumbe baphuze ukubhalisa?
   - Kungaba yimvelo na?
   - Kungaba mayelana lezenothena na?
   - Kungaba mayelana ngezokholo na?
   - Kungaba mayelana lezempilakahle lezibhethelaphila na?

3. Imbangela zokuthi omama baswele besazithwele, bebeletha kumbe besanda kubeletha kungaba yini?
   - Isiphatho sabe zempilakahle
   - Ukuswelakala kwezinto ezisebenziswayo
   - Izenzo zemvelo
   - Imikhuhlane evelenele omama ngesikhathi bezithwele

4. Kuyini imbono yakho mayalana legcikwane lenculaza kumama ozithweleyo lokuswelakala kwensane?

5. Kuyini umbono wakho mayelana lokubelethela esibhedlela kumbe endlini?
   - Kuyini okungavalela omama ukuthi bengabelethelaphila esibhedlela
   - Ingozi zokubelethela endlini

6. Umphakathi umkhangelana njani umama osweleyo?
   - Bayasola na?
   - Bayamzwel na?
7. Umphakathi umbona njani mayelana lesiphatho esinikezwa obomama ababelethayo ezibhledlela?

8. Yiwaphi amacebo elinganikeza wona kubaphathi beze mphilakahle mayelana lokuswelakala kwensane?

9. Is there anything else you would like to say about why mothers lose their babies during pregnancy, labour and soon after delivery? Kukhona yini ongafuna ukutsho mayelana ngengcoxo yokuswelakala kwensane?

Ngiyabonga kakhulu ngokupathisa kulolu hlelo
Appendix 8

English Focus Group Discussion Guide Consent-

Factors Associated with Perinatal Mortality in Umguza and Bubi Rural Areas, 2015- The Effect of Maternal Human Immunodeficiency Virus Status

District………………………… Health Facility……………………

Date of discussion……………… Number of participants………………

Name FGD chair………………………… Moderator………………Recorder………………

Introduction –Welcome

Consent to participate in the study

My name is Virginia Mbiba from the University of Zimbabwe. I am currently studying for a Master of Public Health Degree. You have been selected to participate in this study entitled, “Factors Associated with Perinatal Mortality in Umguza and Bubi Rural Areas, 2015- The Effect of Maternal Human Immunodeficiency Virus Status”. The aim of the study is to determine the factors associated with perinatal deaths in Umguza and Bubi rural areas, This study is expected to generate evidence-based recommendations on how to reduce perinatal deaths.

Objective: The purpose of this discussion is for you to share your ideas and opinions with us so that we can understand your views and concerns that will help us to improve the quality of maternal and child health care services available to women during pregnancy and delivery

Participation: Everyone is free to speak. There is no wrong answer to the questions that will be asked. Feel free to speak out your views. Confidentiality and respect for others should be maintained here. Your names will not be mentioned anywhere. You are free not to answer
any question you are not comfortable with. Participation in this study is entirely voluntary. I request you to allow us tape and take notes on the proceedings of this meeting.

I have been informed about the purpose and benefits of the study and I am willing to participate

Participant’s signature………………Age……………Place of residence………………

Researcher………………………………………. Date……./…...2015
Appendix 9

IsiNdebele Focus Group Discussion Guide Consent

Lmbangela eziphathelane lokuwela kwabomam aabazithweleyo, loba ukuswelakala kwensane zibelethwa kumbe zisandakubelethwa eziqintini zeUmguza leBubi kumnyaka ka2015- lokuthi kambe igcikwane lenculaza lingaba ngeyinye imbangela na?

Isiqinti…………………….. Ibizo lesiBhedlela……………………

iLanga lokuxoxisana ………………… Inani labantu………………

Ibizo lo Mphathisihlalo………………Umphathintambo………………Ibizo le Nthatheli………

Ukwamukela

Imvumo yokupathisa ekuxoxisaneni

Igamalam ingingu Virginia Mbiba ngiyisifundi sesikholo safundo yaphezulu (University of Zimbabwe).Okwakathesini ngifundeleni isicoco seu semphilakhele kazulu. Ukhetwe ukuhlanganyela ekuxoxisaneni mayelana lembangela eziphathelane lokuswela kwabomama abazithweleyo, loba ukuswelakala kwesane zibelethwa kumbe zisandakubelethwa eziqintini zeUmguza leBubi kumnyaka ka2015- lokuthi kambe igcikwane lenculaza lingaba ngeyinye imbangela na? Injongo yohlelo yikudingisisa imbangela yokuswelakala kwensane. 2

Ukuxoxisana lokhu kukhangalelewe ukuphuma le zicwayiso zokuyehlisa inani lensane eziswelakalayo e ziqintini zethu.

Injongo

Injongo yokuxoxisana yikuthi sizwe umbono lomcijo yenu ukuze sizwisise lokuncedisana kuhlelo zokupathwa kahle kwabomama abazithweleyo lensane zabo ngesihathi bebeletha.
Ukuhlanganyela


Sengazisiwe ngenjongo langenzuzo yempumela yezifundo lezi njalo ngiyakhetha ukuhlanganela labanye kulokhu kuxoxisana.

Isicindezelo sopathekayo………………………….Iminyaka………………Isigaba………………

Isicindezelo somphathisihlalo……………………………………Ilanga……./……2015
Appendix 10
Matabeleland North Province approval letter
Appendix 11

Ethical approval letter
MRCZ Approval Letter