Prevalence of Preterm Births, Associated Risk Factors and Preterm Outcomes at Mumbwa District Hospital

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Abstract

Background: Preterm births significantly contribute to mortality and the effect of preterm birth amongst some survivors may continue throughout life. These effects exert a heavy burden on families, society and the health system. According to the World Health Organization, the number of preterm born babies (<37 weeks) in Zambia for the year 2015 was 79,800 and the number of deaths in children below the age of 5 (0-59 months) due to direct preterm birth complications was 4,220.

Aim: The development of innovative solutions for prevention of preterm births rely on a better understanding of the factors leading to preterm birth and it's adverse outcomes. This research therefore aimed at determining the prevalence, risk factors and outcomes of preterm births at Mumbwa district hospital. The research findings will help assess and improve infrastructure for adequate care required for preterm babies thereby reducing neonatal mortality. This will in turn lead to improved medical care for pregnant women with risk factors that could cause premature births, thereby reducing neonatal mortality, chronic diseases as well as long term health expenditures.

Methodology: A hospital based retrospective study was conducted at the maternity ward Mumbwa district hospital a level III hospital, from June to August 2020, this included all births at the hospital from 1st January 2018 to 31st December 2019. Data was collected using a data extraction sheet formulated to encompass maternal factors, obstetrics related factors, relevant medical history, mode of delivery and short term birth outcomes including measurements of birth weight, sex and condition at time of discharge, from labor ward registers. Data were entered into excel and exported to SPSS version 20 for analysis. Descriptive statistics like frequencies, means and cross tabulations were performed. Association between risk factors and preterm birth was evaluated using bivariate analysis.

Results: In 2018 a total number of 2460 deliveries were conducted at Mumbwa district hospital. 126 (5.1%) of these deliveries were premature, 606 (25%) babies had low birth weight (<2500 g) and 28 (1.1%) neonatal deaths. In 2019 a total number of 1960 deliveries were conducted at Mumbwa district hospital. 135 (7%) of these deliveries were premature, 311 (15.9%) babies had low birth weight (<2500 g) and 12 (0.6%) neonatal deaths. The statistics show a reduction in total deliveries from 2460 to 1960 in 2018 and 2019 respectively, with a 1.9% increase in preterm births. There was a reduction in low birth weight (<2500) and a reduction in fetal deaths. According to the statistics 8 (6.3%) had history of previous cesarean section, 3 (2.4%) had bad obstetric history, 38 women had preterm births due to maternal, fatal and placental causes in 2018. According to the statistics 3 (2.2%) had history of previous cesarean section, 37 (4.57%) had bad obstetric history, 42 women had preterm births due to maternal, fatal and placental causes in 2019. The risk factors of preterm delivery at Mumbwa district hospital include maternal age (p=0.028), parity (p=0.039), previous obstetric history of cesarean section (0.012), bad obstetric history (0.027) and antepartum hemorrhage (0.001, 0.031). Furthermore, 87 (69%) and 107 (79.7%) preterm births were idiopathic in 2018 and 2019 respectively (p=0.001). In addition, preterm births are significantly associated with low birth weight (p<0.000).

Conclusion and recommendations: Research results show an increase in preterm births indicating that it is among the major health concerns in Mumbwa district. Enhanced sensitization of women on early signs of preterm labour and encouraging them to seek medical attention promptly is cardinal. To efficiently implement programs aimed at reducing preterm births it is essential to incorporate data to action

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plans, such as separate registers for focused data on preterm births. Survival of preterm babies also depends on timely referral to facilitate delivery in a resource adequate facility and timely medical intervention; as such there is need for equipment provision and infrastructure expansion of the maternal and neonatal unit at Mumbwa district hospital.

Keywords: Prevalence • Preterm births • Preterm outcomes • Neonatal unit

Introduction

According to the World Health Organisation preterm birth is any birth before 37 completed weeks of gestation or less, which is calculated from the first day of a woman's Menstrual Period (LMP). According to Marlow, preterm births are categorized into sub groups and these are: Extremely preterm births are <28 weeks, very preterm births are babies born during 28 ≤ 32 weeks and moderate preterm include babies born in the range of 32 ≤ 37 completed weeks of gestation. The lower limit of gestation is considered to be the period of viability; it varies from 20, 22 or 26 weeks in developed countries while in developing countries it is 28 weeks [1].

Preterm births occur due to several causes which can be classified into two broad subtypes which are; spontaneous preterm birth due to spontaneous onset of labour or following Prelabour Premature Rupture of Membranes (PPROM) and provider-initiated preterm birth which is by inducing labour or elective caesarean birth before 37 completed weeks of gestation due to maternal or foetal indications or other non-medical reasons [2].

The cause of preterm labour in about 50%, cases is idiopathic and it is often multifactorial. Factors increasing the incidence of preterm labour include history, complications in present pregnancy categorised as maternal, foetal and placental causes, as well as iatrogenic factors.

According to Rogers and Velton, in addition to its significant contribution to mortality, some survivors are prone to adverse health effects that may continue throughout life. These include impairing neurodevelopmental functioning, learning impairment and visual disorders and affecting long-term physical health with a higher risk of non-communicable disease. These effects are a burden on families, society and the health system. As such, preterm birth is one of the largest conditions in the global burden of disease analysis given the high mortality and the considerable risk of life long impairment [3].

Silwimba conducted a study on preterm premature rupture of membranes at the university teaching hospital. According to his findings; low birth weight and low gestational age were linked to poor foetal outcomes in mothers with PPROM. Preterm births increase the baby's risk of dying due to underdevelopment. They are also susceptible to other neonatal infections. Preterm births are estimated to be a risk factor in at least 50% of all neonatal deaths [4].

Globally, there are 15 million preterm babies born every year, 60% in sub-Saharan Africa and South Asia. Complications of preterm birth are the second single largest direct cause of neonatal deaths, causing 35% of the world's 3.1 million deaths a year, while the first most common cause of under-5 deaths is pneumonia.

According to the World Health Organization Zambian statistical profile distribution of causes of death in children under 5 in 2013, prematurity was the fifth highest cause of death at 11% while malaria was the highest cause of 16% deaths.

Premature births can be reduced by allocating extra resources to enhance medical care for pregnant women with risk factors that could cause premature birth. This will ensure reduced neonatal mortality, chronic disease and long term health expenditures [5].

Prematurity is moving higher up on the global agenda. As such, new research to solve the problem is being undertaken. Global health organisations have intensified joint efforts to advocate for investment and policy approaches aimed at reducing preterm birth and improve new-born health. A significant moment in this effort is World Prematurity Day (WPD) which falls on the 17th of November.

Statement of the problem

The World Health Organisation statistics indicate that the number of preterm born babies (<37 weeks) in Zambia was 79,800 and the number of under 5 deaths due to direct preterm birth complications was 4,220. Despite inadequate documentation, preterm births are prevalent in Zambia, a common cause of death and preterm birth complications. However, no study has been done at Mumbwa district hospital to study the prevalence, risk factors and outcomes of preterm births, hence the need to conduct this research [6].

Rationale and justification

The research will provide information concerning prevalence, causes and outcome of preterm deliveries. This information will be disseminated to various stakeholders including health care providers and policy makers for informed decision making and programme implementation. It will help enhance antenatal monitoring of preventable causes of preterm births, early identification of risks that may cause preterm deliveries and identifying preventive interventions for the survival rate of preterm babies.

This research will also benefit all women and pregnant women as they will be well informed on risk factors of preterm births and the importance of seeking early medical attention. In addition, preterm deliveries, deaths and complications will reduce leading to improved health outcome [7].

Adverse birth outcomes due to prematurity and low birth weight are significant problems in both developing and developed countries.

Of the 15 million babies in the world each year, more than one in 10 births are born too prematurely and of these, more than one million die shortly after birth. Countless others who survive suffer from lifelong ailments that cause negative impacts on families and societies.

Extreme parity, a previous history of preterm birth or abortion, younger maternal age, inadequacy of prenatal care, reported hypertension, antepartum haemorrhage, premature rupture of foetal membranes and induced labour are significant determinants of preterm birth [8].

Globally, 4 out of 5 new-born deaths result from three preventable and treatable conditions, primarily prematurity. According to WHO, the proportion of women receiving antenatal care at least once during pregnancy was 83% between 2007 and 2014 globally. However, only 64% of pregnant women attained the WHO-recommended minimum of four or more antenatal care visits. Identifying warning signs early during pregnancy is an important goal in antenatal care. Preeclampsia, diabetes and hypertension, whether pre-existing or gestational, are maternal medical conditions that commonly predict preterm birth.

In addition to its contribution to mortality, preterm birth has lifelong effects and disabilities, as well as an increased risk of chronic disease in adulthood. The economic cost of preterm birth is high in terms of neonatal intensive care and on-going health care and educational needs. With many families experiencing the sudden loss of a preterm baby and a stressful hospital stay, sometimes for months, the social cost is high [9].

In India, a case control study on risk factors of preterm deliveries was done in a secondary care hospital in Dr. TMA Pai hospital, Udupi from January 2010 to May 2013. Among the 4,137 antenatal admissions during the study period, 238 were admitted with preterm labour. The preterm birth percentage was 5.8%. The study showed that preterm delivery was significantly associated with hypertensive disorders of gestation, height <1.50 m, premature rapture of membranes, oligo/polyhydramnios, threatened abortion and twin gestation. The percentage of preterm birth was low, comparable to developing countries.

A similar study was carried out to investigate the association between socio demographic data, obstetric risk factor and preterm birth in five maternal and child health hospitals in Beijing, China. According to the findings, obesity, stressful life events, sexual activity, placenta previa, gestational diabetes mellitus, hypertensive disorder complicating pregnancy, history of preterm birth and reproductive abnormalities are independent risk factors to preterm birth [10].

Research on the incidence, risk factors and mortality of preterm neonates: A prospective study from Jordan was carried out in 2012-2013, findings showed that mortality rate was considerably higher among preterm neonates than among term neonates. The neonatal mortality rate was 30 times higher in preterm neonates than in term neonates, which indicates a survival gap between the two groups. Evidence from previous studies indicated that young (<20 years) and advanced (≥40 years) maternal ages are strong risk factors of preterm births. Similarly, increased risks of mothers having a preterm birth were associated with low or no education levels.

Marchant carried out a research on neonatal mortality risk associated with preterm birth in East Africa. Findings indicated that moderately preterm babies who are also small for gestational age experience a considerably increased likelihood of neonatal death in East Africa. As such, preterm birth is a direct cause of mortality but also aggravates the effect of other risk factors.

HIV infection has been assumed to be a 'potent cause of preterm birth' in Africa compared with other regions. A prospective study was carried out on the risk factors of preterm birth among HIV infected Tanzanian women. The findings were that, *Entamoeba coli*, malaria and maternal age less than 20 years were significantly associated with risk of preterm and very preterm delivery.

The factors associated with preterm birth in an unselected rural pregnant population in Malawi, a country with the highest reported rate of preterm birth worldwide and with one in four women HIV positive, were studied. The findings indicated that despite claims that HIV infection is an important cause of preterm birth in Africa, there was no evidence of an association in this population (unexposed to anti-retroviral treatment). Persistent malaria was associated with late preterm birth. Maternal undernourishment and anaemia were independently associated with early preterm birth. The study did not assess whether the link was direct or whether a common precursor such as chronic infection was responsible for both maternal effects and early labour.

A similar study was undertaken to assess the association between maternal Human Immunodeficiency Virus (HIV) infection and Low Birth Weight (LBW)/Prematurity (PTD), conducted as a meta-analysis of cohort studies of HIV infected and uninfected women. Results showed that HIV infected women were at higher risk of having a low birth weight infant or a preterm delivery infant compared with uninfected women. Such associations did not change significantly over time or were not significantly affected by the usage of antiretroviral drugs.

According to current studies, multiparous women with a history of preterm birth are also at risk for further preterm birth. In the current study, the likelihood of having a preterm birth at least doubled when there was a history of preterm or low-birth-weight delivery in previous pregnancies.

Prior research has also shown that there are differences in risk factors and outcomes of preterm births on various study population. This research was undertaken to provide tailored statistical facts in order to adequately prevent and manage the outcomes of preterm births in Zambia.

Objectives

General objectives: To determine the prevalence, risk factors and outcomes of preterm births at Mumbwa district hospital.

Specific objectives

- To determine the prevalence of preterm births at Mumbwa district hospital.
- To determine factors associated to preterm births at Mumbwa district hospital.
- To examine outcomes of preterm births at Mumbwa district hospital.

Research questions

- What is the prevalence and risk factors associated with preterm births at Mumbwa district hospital?
- What is the survival rate of preterm babies and immediate complications in preterm babies?

Measurement

In this research, preterm birth refers to any birth before 37 completed weeks of gestation or lesser than 259 days since the first day of a woman's Menstrual Period (LMP). Classified as extremely preterm (<28 weeks), very preterm (28 ≤ 32 weeks) and moderate preterm; 32 ≤ 37 completed weeks of gestation. Gestational age is the age of the pregnancy calculated from the LMP or from the ultrasound.

Independent variables: Maternal risk factors including mother's age, parity and gravidity, previous caesarean section, HIV status, Antepartum Haemorrhage (APH), pre-eclampsia/eclampsia, bad obstetric history, diabetes mellitus, infection (UTI, malaria) and preterm premature rapture of membranes. Placental factors such as placenta previa, placenta abruption, cord prolapse and chorioamnionitis. Foetal factors such as multiple pregnancy, congenital anomaly, foetal distress and Intrauterine Foetal Death (IUFD).

Dependent variables: Mode of delivery, birth weight, survival and mortality. Neonatal outcomes are characteristics or conditions linked to the neonate as a result of premature delivery. The neonatal outcome was measured in terms of survival and state of health from birth to the time of discharge [11].

Conceptual framework

Studies have shown that factors such as early or old age deliveries, weight, height, multiple pregnancy, physical abuse, previously premature delivery, cervical abnormalities, life style and drug abuse expose women to preterm delivery. These can result in injury, diseases such as diabetes, urinary tract infections and high blood pressure, leading to preterm delivery.

Babies born strive to survive due to incomplete development and are unable to withstand harsh environmental conditions. On the other hand, this may lead to long term health effects or mortality (Figure 1).
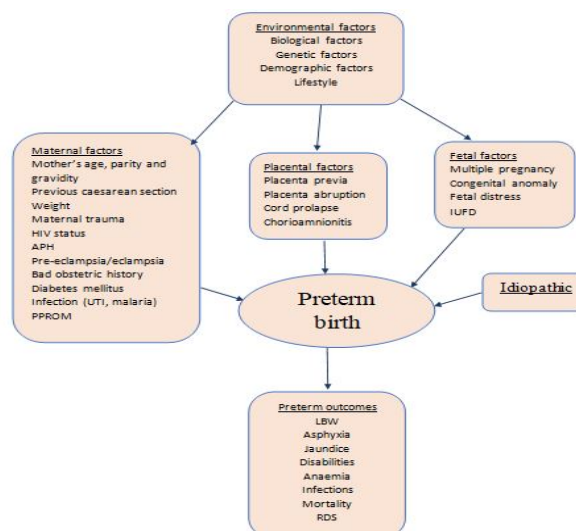

Figure 1. Conceptual framework for the study of prevalence, risk factors and preterm outcomes.

Materials and Methods

Study site

The study will be conducted at Mumbwa district hospital which is a referral hospital for delivery cases from nearby clinics within 23,000 km^2. It is a level III hospital with an approximated population coverage of 159,403. The total approximated population of Mumbwa as of 2020 is 227,719. The hospital is located in Mumbwa district and serves for people residing in urban and rural parts of the catchment area and is a referral centre for 28 health facilities which include health posts, health centres and clinics, with Nangoma mission hospital as the only other hospital which also refers some cases to the district hospital. Despite the hospital having been built recently, there is need to build fully equipped infrastructure for neonates including preterm babies [12].

Target population

The study will include all births at the hospital from 1st January 2018 to 31st December 2019.

Study design

A hospital based retrospective cross section study was conducted at the maternity ward Mumbwa district hospital a level III hospital, in June 2020. Data was collected from labor ward registers and this included mother's age, parity, gestational age, reason for referral, diagnosis, HIV status, mode of delivery, birth weight, sex of neonate and condition at time of discharge. This study included all women who gave birth throughout the day and night during the selected period of study.

Sample size

For this particular study, there was no calculation of sample size because all births at Mumbwa district hospital during the study period that met the inclusion criteria were included in this study.

Sampling procedure

For this study all cases meeting the inclusion criteria were included. The total number of deliveries were collected, detailed information pertaining to maternal records, causes and outcome were collected for the participants falling under the selected study period (1st January, 2018 to 31st December, 2019).

Inclusion criteria

All deliveries at Mumbwa district hospital at the hospital in 2018 and 2019.

Exclusion criteria

Unknown gestational.

Data collection and analysis

Babies born before 37 completed weeks of gestation but after 28 weeks of gestation, were considered as preterm, those born before 28 weeks of gestation were considered preterm based on clinical judgment. Gestational age collected from files was based on calculation from the Last Normal Menstrual Period (LNMP). Data was collected using a data extraction sheet formulated to encompass maternal factors, obstetrics related factors, relevant medical history, mode of delivery and short term birth outcomes including measurements of weight of the new and sex. Data was entered into excel and exported to SPSS version 20 for analysis. Descriptive statistics like frequencies, means and cross tabulations were performed. Association between risk factors and preterm birth was evaluated using bivariate analysis [13].

Results

Prevalence of preterm births

In 2018 a total number of 2460 deliveries were conducted at Mumbwa district hospital. 126 (5.1%) of these deliveries were premature, 606 (25%) babies had low birth weight (<2500 g) and 28 (1.1%) neonatal deaths. In 2019 a total number of 1960 deliveries were conducted at Mumbwa district hospital. 135 (7%) of these deliveries were premature, 311 (15.9%) babies had low birth weight (<2500 g) and 12 (0.6%) neonatal deaths [14].

The statistics show a reduction in total deliveries from 2460 to 1960 in 2018 and 2019 respectively, with a 1.9% increase in preterm births. There was a reduction in low birth weight (<2500) and a reduction in fetal deaths as shown in Table 1.

Characteristic	2018		2019	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Total number of deliveries	2460	-	1960	-
Preterm deliveries	126	5.1	135	7
Term deliveries	2334	94.91	1825	93
Birth weight				
≥ 2500 g	1854	75	1649	84
<2500 g	606	25	311	15.9
Neonatal mortality				
Term fetal deaths	21	0.9	12	0.6
Preterm fetal deaths	7	0.3	5	0.3

Table 1. Statistics for total births, birth weight and mortality for 2018 and 2019.

Distribution of preterm births by gestational age

The mean gestational age in 2018 was 32.84 weeks, the minimum was 28 weeks and the maximum was 35 weeks. The minimum gestational age in 2019 was 26 weeks and the maximum gestational age was 35 weeks. The mean gestational age was 32.78 weeks, median was 34 weeks, minimum 26 weeks and maximum 35 weeks.

There were no extremely preterm births in 2018, very preterm births were 23 (18.3%) and majority of preterm births were moderate or late preterm with a proportion of 103 (81.7%). In 2019, extremely preterm births were 1 (1.5%), very preterm births were 22 (16%) and majority of preterm births were moderate or late preterm with a proportion of 112 (82.96%). Of important note is that the babies that were born extremely preterm died shortly after birth (Table 2).

Gestational age	2018		2019	
	(n=126) Proportion of births <37 wks	Percentage (%)	(n=135) Proportion of births <37 wks	Percentage (%)
Extremely preterm (<28 weeks) 0		0	1	1.5
Very preterm (28 ≤ 32 weeks) 23		18.3	22	16
Moderate or late preterm (32 ≤ 37 weeks)	103	81.7	112	82.96
Total	126	100	135	100

Table 2. Distribution of preterm births according to gestational age sub group.

Obstetric parameters

The minimum and maximum maternal age in 2018 was 14 and 44 respectively and the median age was 20 years. 60 (47.6%) were aged between 20 to 34 years, 54 (42.9%) were below 20 years and 12 (9.5%) were aged 35 years and above. 61 (48.4%) mothers were nulliparous, 51(40.4%) with parity of one to four and 14 (11.1%) were grand multiparous. 9.6% of these mothers were reactive for HIV and 90.4% were non-reactive. 87.3% of the mothers had spontaneous vaginal delivery and 12.7% underwent caesarian section. The minimum and maximum maternal age in 2019 was 14 and 41 respectively and the median age was 21 years. 64 (47.4%) were

aged between 20 to 34 years, 52 (38.5%) were below 20 years and 19 (14%) were aged 35 years and above. 73 (54.1%) mothers were nulliparous, 48 (35.6%) with parity of one to four and 14 (10.4%) were grand multiparous. 9.6% of these mothers were reactive for HIV and 90.4% were non-reactive. 82.2% of the mothers had spontaneous vaginal delivery, 1.5% had instrumental delivery and 16.3%underwent caesarian section. According to 2019 results maternal age and parity are risk factors of preterm delivery (p-value 0.028, 0.039). A summary of the statistics is shown in Table 3.

Demographic	2018 (N=126) Frequency (n)	Percentage (%)	P-value	2019 (N=135) Frequency (n)	Percentage (%)	P-value
Maternal age (years)						
<20	54	42.9	0.396	52	38.5	0.028
20-34	60	47.6		64	47.4	
≥ 35	12	9.5		19	14	
Parity						
Premipara	61	48.4	0.462	73	54.1	0.039
1 to 4	51	40.4		48	5.6	
≥ 5	14	11.1		14	10.4	
HIV status						
Reactive	12	9.6	0.105	13	9.6	0.185
Non-reactive	122	90.4		122	90.4	
Mode of delivery						
SVD	110	87.3	0.143	111	82.2	0.273
Instrumental delivery	0	0		2	1.5	
CS	16	12.7		22	16.3	

Table 3. Obstetric and medical parameters.

Medical and surgical risk factors of preterm births

According to the statistics 8 (6.3%) had history of previous cesarean section, 3 (2.4%) had bad obstetric history, 38 women had preterm births due to maternal, fatal and placental causes and 87 (69%) preterm births were idiopathic in 2018. About 3 (2.2%) had history of previous cesarean section, 37 (4.57%) had bad obstetric history, 42 women had preterm births due to maternal, fatal and

placental causes and 107 (79.7%) preterm births were idiopathic in 2019. From the results previous history of cesarean section (0.012), preeclampsia (0.001), antepartum hemorrhage (0.001, 0.031) and placenta abruption (0.004) are risk factors of preterm delivery. Table above shows a detailed summary of annual specific statistics (Table 4).

Risk factor	2018			2019		
	(N=126) frequency	Percentage (%)	P-value	(N=135) frequency	Percentage (%)	P-value
History						
Past cesarean	8	6.3	0.012	3	2.2	0.094

Bad Obstetric History (BOH)	3	2.4	0.443	37	4.57	0.027
Maternal						
Preeclampsia	8	6.3	0.096	5	3.7	0.001
Antepartum hemorrhage	9	7.1	0.001	8	5.9	0.031
PPROM	1	0.8	0.552	1	0.7	0.517
Oligohydramnios	1	0.8	0.661	2	1.5	0.182
Polyhydramnios	1	0.8	0.552	0	0	0.559
Infection	1	0.8	0.552	0	0	0.648
Fetal						
Multiple pregnancy	0	0	-	1	0.7	0.648
Congenital malformations	0	0	-	1	0.7	0.648
Intrauterine death	11	8.7	0.956	8	5.9	0.524
Placental						
Placenta previa	1	0.8	0.552	4	3	0.83
Abruption	2	1.6	0.064	1	0.7	0.559
Cord prolapse	0	0		2	1.5	0.353
Idiopathic	87	69	0.001	107	79.7	0.001

Table 4. Medical risk factors of preterm births.

Neonatal outcomes

According to the statistics female premature babies were more than male premature babies in both sample groups. The low birth weight (<2500 g) rate was 59% in 2018 and 73% in 2019 among the preterm babies.

Survival rate to the time of discharge was 86% in 2018 and 82% in 2019, while preterm mortality was 6% and 4% in 2018 and 2019 respectively. However, an increase in macerated and fresh still births was observed from 8.7% in 2018 to 14% in 2019. According to the analysis, preterm births are associated with low birth weight (p-value 0.000) (Tables 5 and 6).

Fetal outcome	2018			2019		
	Frequency (n) (N=126)	Percentage (%)	p-value	Frequency (n) (N=126)	Percentage (%)	p-value
Birth weight (grams)						
<1000	1	0.8	0	3	2.2	0
1000-1499	2	1.6		11	8	
1500-2499	71	56.3		85	62.5	
≥ 2500	32	25.4		37	27	
Gender of babies						
Males	59	46.8	0.72	63	46	0.375
Females	67	53.2		73	54	
Neonatal outcome						
Alive	108	86	0.32	111	82	0.451
Dead	7	6		5	4	

MSB/FSB	11	8.7	19	14	
Low birth weight	74	59	99	73	

Table 5. Neonatal outcome.

Parameter	Term deliveries (frequency)	Percentage (%)	Preterm deliveries (frequency)	Percentage (%)	Total
CS	365	14.8	16	0.7	381
Preeclampsia	24	1	7	0.3	31
MSB/FSB	47	1.9	11	0.4	58

Table 6. Comparison of statistics between term and preterm deliveries in 2018 (n=2460).

From the above statistics, a total of 381 (15.5%) were cesarean deliveries of which 365 (14.8) were term deliveries and 16 (0.7%) were preterm deliveries in 2018. Cases of pre-eclampsia were 31 (1.3%) of which 7 (0.3) led to preterm delivery. Total still births were 58 (2.4%) and 11 (0.4%) were preterm deliveries.

Discussion

A total of 4420 deliveries were conducted at the district hospital from January 2018 to December 2019 and a total of 261 deliveries before 37 weeks of gestation. The prematurity rate was 5.1% in 2018 and 7% in 2019. The preterm birth rate is closer to the preterm birth rate of 6.2% from the retrospective cohort study conducted in southern Mozambique.

Among the preterm births 81.7% were moderate or late preterm in 2018 and 82.96% were moderate or late preterm in 2019, which is higher than the rate from a study in eastern democratic republic of Congo where 66.97% of premature infants were born between 32 and 36 weeks of gestation. No extremely preterm births were recorded in 2018 and 23 (18.3%) were very preterm while 2019 characterized by 1 (1.5%) extremely preterm and 22 (16%) very preterm.

A larger proportion of women were aged between 20 to 34 years, followed by women below 20 years and women aged above 35 years were fewer per annum. Association between age group and preterm birth was significant in this study (p=0.028). A prior study in Malawi showed that age group and preterm birth was statistically significant, age over 40 years was associated with increase in late preterm compared to term birth (2.0% *vs.* 0.8%, p=0.06). These results are supported by many authors. A similar study by Moore et al, showed that young adolescents were significantly more concerned with preterm births. The young maternal age is a risk factor for preterm births is attributed to the assumption that women of this age group are not well informed on the management of pregnancies during antenatal care sessions.

Increasing maternal age is associated with high chances of multiple gestation predisposing women to several obstetric complications, increasing susceptibility to preterm birth. Another plausible explanation is attributed to the fact that extreme ages are frequently associated with pregnancy related complications leading to early delivery either by induction of labor or caesarean section. A prior study at UTH showed similar findings. In this study, parity was associated with preterm birth (p=0.039). Furthermore, results from other studies showed that nulliparity and/or multiparty were associated with preterm birth, while in other similar studies parity was not associated with preterm birth.

In this study 87 (69%) and 107 (79.7%) preterm births were idiopathic in 2018 and 2019 respectively (p value 0.001). Spontaneous preterm birth is a multifactorial physiological process due to several interlinked factors causing uterine change from quiescence to active contractions, hence birth before 37 completed weeks of gestation. Perpetuating factors vary by gestational age and precise factors causing preterm labor are unidentified in about 50% of all cases.

Previous obstetric history of cesarean section and bad obstetric history was significantly associated with preterm births (0.012, 0.027). Findings from a study in Malawi showed that more women with early preterm birth reported a previous adverse pregnancy outcome including previous preterm delivery (19.1% *vs.* 6.1%, p=0.001) and previous stillbirth, in addition preterm premature rapture of fetal membranes was a significant determinant of preterm delivery.

From the results previous history of cesarean section (0.012), preeclampsia (0.001) and antepartum hemorrhage (0.001, 0.031) are risk factors of preterm delivery. The other maternal, fetal and placental medical conditions were not significantly associated with preterm birth in bivariate analysis. A similar study in Beijing showed that placenta previa and hypertensive disorders complicating pregnancy were independent risk factors of preterm births. Hypertensive Disorders of Pregnancy (HDP) were also strongly associated with stillbirths.

HIV status was not associated with preterm births (0.105, 0.185). Similar to research findings in Malawi where the prevalence of HIV was not statistically different between women who delivered at term versus those who delivered preterm. In contrast, results reported from a study conducted in South Africa showed that 30.8% (approximately 300 000 live births annually) were HIV-exposed, resulting in increased risk of preterm births in HIV-exposed compared with HIV-unexposed infants. The risk was partly attributed to maternal Antiretroviral Treatment (ART) regimens, especially those including protease inhibitors. Findings also indicated that HIV-positive women on ART had more hypertensive disorders of pregnancy, such as preeclampsia. This is assumed to be perpetuated by immune reconstitution due to ART. Nevertheless,

adequate research is required to understand the pathophysiological basis of preterm births in women exposed to HIV and ART.

Among the preterm deliveries 110 women (87.3%) and 111 women (82.2%) had spontaneous vaginal delivery in 2018 and 2019 respectively. There were no instrumental deliveries in 2018 as opposed to 2019 with 2 (1.5%) instrumental deliveries. 16 (12.7%) cesarean sections were performed in 2018 and 22 (16.3%) cesarean sections were performed in 2019. Cesarean section delivery is not an unusual finding in preterm deliveries, this is because preterm labor may be characterized by malpresentation, furthermore, underlying complications such as antepartum hemorrhage, placenta previa and cord prolapse may be indications underlying the procedure. Furthermore, obstructed labor in case of a still birth may also be an indicator for delivery by cesarean section. Nevertheless, the procedure is done after careful assessment of the obstetric condition at hand, weighing the risks and other anticipated outcomes.

Preterm survival rate to the time of hospital discharge was 86% (n=125) in 2018 with a slight reduction to 82% (n=136) in 2019. From the study, a well-documented short term adverse effect was preterm mortality which was 6% in 2018 and 4% in 2019 signifying a 2% reduction, of these, 3.4% and 2.4% was male in 2018 and 2019 respectively. MSB/FSB was not associated with preterm births (p=0.320, 0.451). MSB/FSB among preterm births was 11 (8.7%) in 2018 and 19 (14%) in 2019. In 2018 19% of still births were with preterm births.

Preterm births are significantly associated with low birth weight (p<0.000). From the study low birth weight among preterm babies was at 59% in 2018, with a marked increase to 73% in 2019. It was a common finding for health care providers to categorize Low Birth Weight (LBW), birth weight <2500 g babies in term pregnancy as premature delivery. This is particularly useful in guiding clinical management but is less useful for accurately determining preterm birth status, as a proportion of LBW infants are Intrauterine Growth Restricted (IUGR) full-term infants, and thus Small-for Gestational Age (SGA). Equally, infants born ≥ 2500 g are not all full term. Infants born small for gestational age and those born too soon are outcomes that have different etiologies.

Furthermore, a study in Mozambique showed that small for gestational age was associated with a lower risk of death compared to preterm births in all models. Being preterm and low birth weight are associated to a high risks of being a stillbirth compared to a live birth.

However, the preterm labor increases the risk for stillbirth or the condition that caused the stillbirth may have also precipitated the preterm delivery.

Sex of the fetus was not associated to preterm births with a p value of 0.720, 0.325. However, a definitive conclusion could not be made as the sex specific statistics of total births (both term and preterm) were not known. In this regard, a similar study showed that a great number of preterm neonates were males, but with a statistically insignificant difference. Additionally, in a study by Zeitlin it was established that preterm birth is both more common in boys, with around 55% of all preterm births occurring in males. In conclusion, the distribution of cases of preterm births according to sex varies from one study to another, but there is no statistical significant deference in it.

Findings from a study comparing early neonatal deaths among preterm infants with term neonatal deaths at the university teaching hospital showed that birth weight and sex were associated with preterm death, females had lower odds of mortality as compared to males in the first week of life. Males are associated with a higher risk of dying compared to girls born at a similar gestation. The biological factors attributed to increased risk of neonatal deaths in male infants include late maturity leading to high prevalence of respiratory diseases in males.

Conclusion

Preterm births are a significant health concern at Mumbwa district hospital as observed from the rise in cases from 5.1% in 2018 to 7% in 2019. The risk factors of preterm delivery at Mumbwa district hospital include maternal age (p=0.028), parity (p=0.039), previous obstetric history of cesarean section (0.012), antepartum hemorrhage (0.001, 0.031) and bad obstetric history (0.027).

87 (69%) and 107 (79.7%) preterm births were idiopathic in 2018 and 2019 respectively (p value 0.001). In addition, preterm births are significantly associated with low birth weight (p<0.000). Further research on socio-demographic risk factors including traditional practices is essential to help identify modifiable risk factors and aid policy making as well as interventions to prevent adverse outcomes.

Ethical Considerations

This research was conducted only after approval by the Tropical Disease and Research Centre (TDRC) ethics committee. Permission to collect information was also be obtained from the district medical officer at Mumbwa district health headquarter and a confidentiality agreement form was signed. Data was recorded as case number and all information that was collected was strictly confidential. Research information was then disseminated to relevant authorities.

Limitations

The patients' files could not be accessed as it was going to be labour intensive on the registry department and cases of missing files could have led to most cases being omitted due to incomplete information hence data was only collected from the labour ward registers as they contained uniform information thereby suitable for wide coverage. The findings have omitted certain demographic, social and maternal characteristics such as maternal weight, height, child spacing, co-morbidities, antenatal visits, anemia, marital status, level of education and cigarrate smoking or alcohol intake, as risk factors for preterm birth. Despite the mentioned hindrances, cardinal information to establish prevalence and neonatal outcomes to establish extent of the burden of preterm births was collected.

Recommendations

Sensitize women on early signs of preterm labour and encourage them to seek medical attention promptly. To efficiently implement programs aimed at reducing preterm births it is essential to incorporate data to action plans, such as separate registers for focused data by gender. Survival of preterm babies also

depends on timely referral to facilitate delivery in a resource adequate facility and timely medical intervention. Mumbwa district hospital is in the urban area surrounded by several rural and peri-urban areas whose hospitals refer patients to the district hospital, as such, preterm babies' survival rates also depend on the availability and quality of equipment and intervention measures in the neonatal care unit. The current neonatal unit can only accommodate six neonates including preterm babies, ill neonates and those under kangaroo mother care.

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