

# The Prevalence of Stillbirth and Its Associated Risk Factors at Kitwe Teaching Hospital

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## Abstract

**Introduction:** Stillbirth is a profound experience affecting millions of families worldwide every year. It is the most frequently reported adverse pregnancy outcome worldwide, which imposes significant psychological and economic consequences to mothers and affected families. The World Health Organization reports that there are nearly 2 million stillbirths every year. A lot of resources are dedicated to this area of research. Researchers worldwide are working hard to untangle the mystery surrounding the high prevalence of stillbirths. Majority of the causes and risk factors remain unknown, although some of them are preventable, the rate of stillbirths is very alarming. There is limited evidence on the pooled prevalence and associated factors of stillbirth in Zambia hence the need for this study.

**Objective:** To determine the prevalence of stillbirth and its associated risk factors at Kitwe teaching hospital in 2021.

**Study design:** Retrospective study.

**Study area:** Kitwe teaching hospital.

**Method:** This was a cross sectional retrospective study that included the use of a data extraction form to obtain secondary data from birth registry and maternal hospital records. The study took duration of 12 weeks. Data was entered and analyzed using the Statistical Package for Social Science (SPSS). Records of women of reproductive ages between 15 years and 50 years old who had stillbirths from January 2021 to December 2021 and delivered at KTH were randomly selected.

**Results:** Out of 384 total births, 17 stillbirths (4.4%) were observed. The SBR was calculated to be 44.16/1000 births. Out of the total number of stillbirths, 14 (82%) were macerated and 3 (18%) were fresh. Stillbirths were more common unregistered women compared to registered women, that is 11 (65%) and 6 (35%) respectively. A majority of the stillbirths, that is 9 (53%) were found in women from the rural population. caesarean sections were 4 (24%) and vaginal deliveries 13 (76%) among stillbirths in this study. The majority of stillbirths 7 (41%) were seen in women above the age of 35. The prevalence of low birth weight (<2500 g) including 2500-4000 and >4000 was 8 (47%), 5 (29%) and 4 (24%) respectively. The proportion of preterm stillbirths was 7 (41%) and it was highest among stillbirths in the study population. The proportion of preterm delivery, hypertensive disorders of pregnancy, abruption and congenital malformations with stillbirth was estimated to be 7 (41%), 5 (29%), 4 (24%) and 4 (24%) and they were statistically significant ( $P < 0.05$ ). Though FGR, fetal distress and DM in pregnancy are potential risk factors for stillbirth, they were not significantly associated with stillbirth in this study.

**Conclusion:** Stillbirth remains a major public health problem in the country. The prevalence of stillbirth at KTH was found to be high compared to national and regional figures. These findings highlight the weak healthcare system of the country. There's need to regularize uniform protocols for intranatal care in both urban and rural settings for a better neonatal outcome.

**Keywords:** Prevalence • Stillbirth • Risk factors • Confidence intervals (CI) • Mycoplasma/Ureaplasma

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**Abbreviations:** ANC: Antenatal Care; ARR: Absolute Relative Risk; CI: Confidence Intervals; ENAP: Every Newborn Action Plan; FGR: Fetal Growth Restriction; HTN: Hypertension; IUFD: Intra-Uterine Fetal Death KTH: Kitwe Teaching Hospital; OR: Odds Ratio; RR: Relative Risk; SPSS: Statistical Package for Social Sciences; UK: United Kingdom; WHO: World Health Organization

## Introduction

### Background

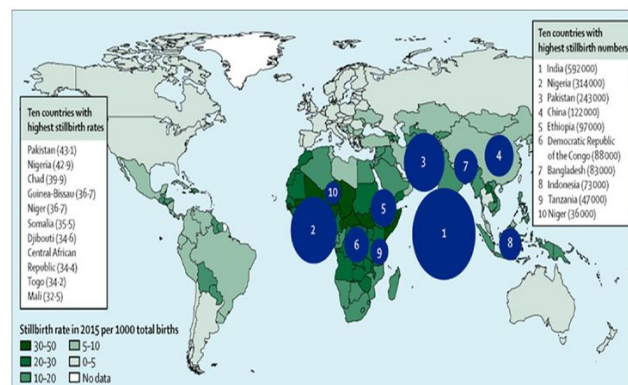
The international classification of death defines stillbirth as death of a fetus prior to complete expulsion from its mother irrespective of gestation age. The cut-off point is generally earlier in high-income countries than low/middle-income countries based on standards of viability. WHO defines stillbirth as a baby born with no signs of life at or after 28 weeks of gestation or if weight is <1000 gm when gestation age is not available. In this proposal, the WHO definition was used.

In general, there are two types of stillbirth namely fresh stillbirth and macerated stillbirth. Fresh stillbirth is where a baby is born dead without signs of skin disintegration and the death is assumed to have occurred 12 hours before delivery, while with macerated stillbirth, a baby is born with signs of disintegration [1]. Stillbirth is further classified as either early, late or term. An early stillbirth is a fetal death occurring between 20 and 27 completed weeks, a late stillbirth occurs between 28 and 36 completed weeks and a term stillbirth occurs between 37 or more completed pregnancy weeks [2]. Despite all these sub classifications, the primary method for classification of stillbirth is according to the presumed cause [3].

More than 3.2 million stillbirths are reported to have been occurring globally each year, yet stillbirths are largely invisible in global data, tracking, and policy dialogue and program implementation [4]. This mismatch of burden to action is due to a number of factors that keep stillbirths hidden, notably a lack of data and lack of consensus on priority interventions, but also to social taboos that reduce the visibility of stillbirths and the associated family mourning, whilst there are estimates of the numbers of stillbirths.

To date, there has been no systematic global analysis of the causes of death. Previous estimates have highlighted a large global burden of stillbirths, with an absence of reliable data from regions where most stillbirths occur.

The ENAP to end preventable deaths has set a stillbirth target of 12 per 1000 births or less by 2030. Global ARR needs more than double the present ARR of 2% to accomplish this target or reduction in stillbirth (Figure 1).



**Figure 1.** Above shows the world stillbirth rates per country as of 2015, Country variations in stillbirth rates.

**Source:** (The lancet, 2016)

Three-fourth of the stillbirths occurs in south Asia and sub-Saharan Africa and 60% occur in rural families from these areas. This reflects a similar distribution of maternal deaths and correlates with areas of low-skilled health professional attendants at birth. The stillbirth rate in sub-Saharan Africa is approximately higher [5].

Africa tops preterm births around the world at 11.9%. Of the 130 million babies born worldwide every year, approximately 4 million are stillborn, more than 98% of these occur in developing countries. Stillbirth accounts more than half of perinatal mortality in developing countries. In Zimbabwe, results show that fetal death is unacceptably high and associated factors vary across demographic sub-group [6].

### Statement of the problem

WHO reported that worldwide, for every 1000 total births, 18.4 babies were stillborn, mostly in low and middle-income countries? Globally, around 2 million stillbirths occur every year one baby dies every 16 seconds leaving behind a grieving family a loss that reaches far beyond the loss of life. Other studies by WHO have shown that the rates of stillbirth are increasing steadily globally and represent over 50% of perinatal mortality. Recent study by NIHR global health research group on stillbirth prevention and management in sub-Saharan Africa, Zambia's stillbirth rate was reported to be at 14.8 per 1000 births [7].

Despite the government of Zambia attaching great importance to improving maternal and new born outcomes to meet the Millennium Development Goals (MDG) on health, the problem of stillbirth continues to prevail in the country at an alarming rate.

### Justification of the study

WHO concluded that 98% of stillbirths occur in developing countries, especially sub-Saharan Africa and they have remained a neglected issue, invisible in policies and programs, underfinanced and in urgent need of attention.

The study will provide information on the prevalence and associated factors of stillbirth at Kitwe teaching hospital. This study also seeks to provide information to develop new strategies in reducing the stillbirth rate at the health institution and the country at large. The study will help the researcher to make the necessary recommendations to the health services to help reduce or eradicate the high prevalence of stillbirths.

Every day, more than 7200 babies are stillborn globally, according to the world health organization. In 2015 there were 2.6 million stillbirths globally, with more than 7178 deaths a day. Estimated proportion of stillbirths that are intrapartum varies from 10% in developed regions to 59% in south Asia [8]. Others have stated that half of these fetal deaths in the world occur in India, Pakistan, Bangladesh, Nigeria and China. In India, rates vary from 20-66 per 1000 births in different states [9].

Stillbirth is still an unfavorable outcome of pregnancy, while it is still prevalent in many countries despite remarkable efforts to improve the care of pregnant women. The incidence of stillbirth reported varies significantly between studies from different countries and depending on the definitions used, but generally ranges from 3.1 to 6.2/1000 births or 1 in 160 deliveries. The large majority of stillbirths (98%) occur in low/middle income countries. Due to these high rates, in 2014, the United Nations' every newborn action plan set a goal of 12 stillbirths per 1000 births by 2030 for all countries.

A study on trends and determinants of stillbirth in developing countries revealed that the mean stillbirth rates for the sites were 21.3/1000 for Africa, 25.3/1000 births for India, 569/1000 births for Guatemala. From 2010 to 2016 across all sites, the mean stillbirth rate declined from 31.7/1000 births to 26.4/1000 births for an average annual decline of 3.0%.

### Risk factors of stillbirth

Emerging obstetrics causes and risk factors associated with stillbirth remained largely unknown or understudied, especially in the developing world. In North India, Williams, et al. found significantly elevated odds of stillbirth of 3.10 (95% CI 2.69-3.57) for birth intervals of less than 18 months and 1.47 (1.30-1.68) for intervals of 18-35 months compared with intervals of 36-59 months. Studies in some African countries considered Low Birth Weight (LBW) as one of the leading causes of stillbirths and perinatal mortality.

Some studies show that, black women have 2-fold increased risk of stillbirth compared to white women. The black/white disparity in stillbirth hazard at 20-23 weeks is 2.75, decreasing to 1.57 at 39-40 weeks. Medical, pregnancy and labor complications account for 30% of the risk of stillbirth in blacks and 20% in whites and hispanics. Trends have also show that stillbirth rates are slightly higher among male compared to female fetuses.

The cause of the death of a fetus is often unknown, but can be attributed to various origins. Traditionally, the risk factors of stillbirth have been differentiated in social demographic, maternal, and fetal factors. The most commonly associated risk factors in literature are as follows:

**Maternal causes:** Maternal infection is one of the most important factors attributed to stillbirth. Common ascending infections with or without membrane rupture are due to *Escherichia*

*coli*, *Klebsiella*, group b *Streptococcus*, *Mycoplasma/Ureaplasma*, *Haemophilus influenza* and chlamydia. In developing countries, other infectious agents can also be considered, e.g., malaria, syphilis and HIV. A study conducted in England assessing viral infections as a cause of fetal losing data from 1988 to 2008 concluded that more than one-third (37%) of the viral-attributed fetal deaths occurred antepartum, from parvovirus (63%) or cytomegalovirus (33%).

A case control study conducted in a tertiary university hospital, Pakistan reported that obstetric factors significantly associated with stillbirth were obstructed labor, hypertensive disorders, abruptio placenta and preterm labor.

Diabetes mellitus, thyroid abnormalities, hypertensive disorders, systematic lupus erythematosus, cholestasis of the pregnancy, renal disease, sickle cell disease and other maternal medical conditions also cause stillbirth. Anemia and nutritional deficiencies in the mother, common in low/middle income countries, have long debated to be a risk factor of stillbirths or other adverse pregnancy outcomes. In contrast, a high first hemoglobin measurement in early pregnancy has been shown to be associated with an almost 2-fold increase in risk of stillbirth.

Say, et al. reported that stillbirth accounts for more than half of perinatal deaths in the developing world and occurs more frequently in developing than in developed countries. Recent reviews and studies of stillbirths have discussed common risk factors and causes for stillbirth in greater detail. However, many stillbirths do not have direct obstetric causes and are referred to as unexplained.

A study was aimed at determining the prevalence of stillbirth, demographic characteristics and identifying the possible risk factors in a tertiary hospital in Niger delta area of Nigeria. There was a total of 19,347 deliveries with 937 stillbirths, giving a stillbirth rate of 40.41/1000 total births or 4.0%. Of the 937 stillbirths identified, only 582 (62.1%) case files could be retrieved and was used for analyses. There were 381 (65.5%) macerated and 201 (34.5%) fresh stillbirths. Stillbirth rates were higher among grand multiparous women, women with primary education and unbooked women. There were 309 (53.1%) male stillbirths and 273 (46.9%) female stillbirths. Male fetuses were higher among fresh stillbirth (54.9%) while female fetuses had more macerated stillbirths (48.8%) than fresh stillbirths (45.1%). The major causes of stillbirths were hypertensive disorders of pregnancy (12.2%) and abruption placenta (9.3%). A total of 121 (20.8) of the stillbirths were unexplained.

Another study was done in South Africa, Limpopo province. There were 5597 deliveries. Hospital-based stillbirth rate was 38.4 per 1000 births, with 71% being macerated. The majority of women with stillborn infants in the study were in the age group 20-34 years (24%), followed by aged 35 years and older (23%). Null parity was associated with stillbirth. Unexplained intrauterine fetal death, hypertensive disease, placenta abruption was the leading cause of stillbirth.

**Fetal causes:** Poor fetal growth or intrauterine fetal growth restriction is considered one of the most frequent risk factors associated with stillbirth. Presumably, the growth restriction is due to a placental dysfunction which may be related to numerous maternal diseases or infections described above. Other cited factors are: multiple gestation, congenital anomalies, genetic abnormalities,

fetal infection, and post maturity. The most common genetic etiology for stillbirth is due to karyotype abnormalities, however many stillborn fetuses with normal karyotypes have genetic abnormalities.

**External factors:** Some common examples are: Antepartum mother’s injuries/trauma or delivery/labor incidents such as birth asphyxia and obstetric trauma. Where modern obstetric care is not available, deaths can be frequent. It is estimated that in developing countries asphyxia causes around seven deaths per 1000 births, whereas in developed countries this proportion is less than one death per 1000 births (5,20). Availability of good delivery facilities also affects the pregnancy outcomes, as it was observed in a study that availability of skilled attendant during delivery (one of the factors in delivery process) lead to decline in stillbirth rate, however the authors concluded that this needs further analysis.

There are many known epidemiological risk factors for stillbirth. Systematic reviews have confirmed very early or advanced maternal age as risk factors. Moreover, nulliparous women have a higher risk of stillbirth than multiparous women across all ages. Of these, nulliparous women aged 35 years and older have been shown to have a 3.3 fold increase in the risk of unexplained fetal death compared with women younger than 35 years of age. The odds ratio for maternal a 40 years and older is 3.7.

A number of causes and risk factors associated with stillbirths remained unknown in the low and middle-income countries as well as other communities, this call for serious concern.

### Stillbirth in Zambia

Recent studies to understand the complexities of unexplained stillbirth in sub-Saharan Africa were conducted. The stillbirth rate in Zambia and Tanzania was far higher than the risk recorded from national data, with woman reporting a previous stillbirth being at higher risk. Providing health professionals with support and continuing training is key to improving the experiences of women and future care.

NIHR global health research group on stillbirth prevention and management in sub-Saharan Africa showed Zambia’s stillbirth rate to be at 14.8 per 1000 births as of 2021. Stillbirth is a major contributor to poor perinatal outcomes in the country.

## Materials and Methods

Research to determine the factors associated with fetal deaths in Zambia showed that only 5.3% women in Zambia had a fetal death. The odds of having a fetal death were higher for women whose health care was decided by their partner; increasing maternal age increased the odds of having a fetal death by 1.02 and the odds of having a fetal

death was lower for women who had children or a child alive.

A study done in Lusaka province of Zambia on stillbirth and neonatal death revealed that most antepartum deaths were classified as fetal deaths of unspecified causes. Intrapartum deaths were due to acute intrapartum events or malformations or chromosomal abnormalities. Another study by the same author in 2013 to determine rates of stillbirth and the associated risk factors among twins revealed that twins were at an increased risk of stillbirth. They further concluded that improved understanding of factors associated with stillbirth could help improve perinatal outcomes globally.

Miyoshi, et al. in Zimba of southern province of Zambia evaluated the rates and causes of stillbirth and neonatal deaths and they revealed that perinatal deaths were associated with acute intrapartum events and considered preventable in 40 cases.

All these studies show that stillbirths in Zambia receive little investigations and are often unexplained. There’s need for further national surveys to investigate the rates and determinants of stillbirth.

### Objectives

**General objective:** To determine the prevalence of stillbirth and its associated risk factors.

**Specific objectives:** To determine the prevalence of stillbirth and its risk factors at Kitwe teaching hospital. To determine the most common type of stillbirth at Kitwe teaching hospital.

To determine the age group with the highest number of stillbirths at KTH. To determine the association between stillbirth and its risk factors.

### Study questions

- What is the prevalence of stillbirth and its risk factors at KTH?
- What is the most common type of stillbirth at KTH?
- Which age group has the highest number of stillbirths at KTH?
- What is the association between stillbirth and its risk factors?

### Measurement

**Scale of measurement:** The variables that can predispose to stillbirth were measured using the following scales; ordinal scale (ranking scale), nominal scale (class-factory scale), interval scale as well as ratio scale (Table 1).

Type of variable	Variable	Scale of measurement
Dependent	Stillbirth	Nominal
	Birth weight	Nominal
	Previous stillbirth	Nominal
	Diabetes	Nominal
	Maternal infection	Nominal
	Hypertension	Nominal



Abruption	Nominal
Congenital	Nominal
malformation	Nominal
Preterm labour	Nominal

**Table 1.** Scale of measurement.

**Description of variables**

- Dependent variable.
- The main outcome variable is stillbirth.
- Independent variable.
- These were grouped into sociodemographic variables, obstetric determinants and maternal medical related conditions.

**Sociodemographic factors**

- Marital status.
- Age.
- Residence (urban/rural).

**Obstetric factors**

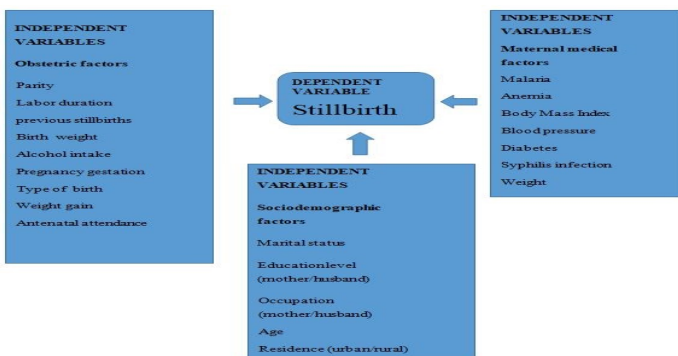
- Gravidity.
- Previous stillbirths.
- Birth weight.
- Mode of delivery.
- Antenatal attendance.

**Maternal medical factors**

- Maternal infection.
- Anemia.
- Diabetes.
- Hypertension.

**Conceptual framework**

Below Figure 2 presents the conceptual framework of the associated risk factors of stillbirth under headings, sociodemographic factors obstetrics factors and maternal medical factors.



**Figure 2.** Conceptual frameworks.

**Background of the study site**

The study was conducted at Kitwe teaching hospital. KTH is located in the city of Kitwe on the Copperbelt province. It is one of the largest hospitals in Kitwe district and a referral center for the Copperbelt province of Zambia. The hospital has four main wards: male, female, pediatric, and maternity. Services offered include: Out-patient services, casualty, dental services, ophthalmic care and orthopedic rehabilitation among others.

It provides antenatal, delivery and postnatal services, amongst others, attending to pregnant women that undergo antenatal (booked) in the hospital, those booked in other hospitals and clinics and those who do not attend antenatal (unregistered cases) The hospital also provides comprehensive quality healthcare and medical services and undertakes the functions of teaching, research, and development. It serves a population of 403,647. The hospital has 927 staff, of which <70 are doctors and the rest are nurses.

**Study population**

The study population comprised of records of women of Kitwe who delivered at KTH between ages 15 and 50.

**Study design**

This was a cross sectional retrospective study. A data collection tool was used to collect data from maternal records. This method is a quick way of determining the prevalence of stillbirth and the risk factors associated with stillbirth and giving clues for further in-depth studies (Table 2).

### Sample size determination

Sample size was determined using the following formula.

$$\text{Sample size} = n / ((\text{population size} + n) / \text{population size})$$

$$\text{Where, } n = Z^2 p(1-p) / e^2$$

Level of confidence measure (Z)	1.96 (at 95% confidence level)
Margin error (e <sup>2</sup> )	5%
Baseline level of the indication (P)	50% as of no estimates

**Table 2.** Information required for computing the sample size.

P is the proportion of successes in the population, (p=0.5) to generate a 95% confidence interval for the unknown population proportion, p.

$$n = 0.5(1-0.5)(1.96/0.05)^2 = 384.2$$

Therefore, the sample size that is needed is 384.

### Sampling procedure

Random sampling of maternal records was employed to obtain the required data.

### Inclusion and exclusion criteria

The study included records of women who delivered from KTH of reproductive ages between 15 and 50 years old who had stillbirths from the January 2021-December 2022. Females below 15 years and above 50 years who had stillbirths before and after 2020 were excluded.

### Data collection and analysis

Data was collected from birth registry and maternal hospital records. A pretested data collection tool was used to ensure quality data capture during the study. Analysis of data was through the use of Statistical Package for Social Science (SPSS).

### Work plan

This study was conducted in 16 weeks.

## Results

### Prevalence of stillbirth

A total of 17 stillbirths (4.4%), with the stillbirth rate of 44.16/1000 births among 384 total births, were observed (Tables 3 and 4, Figure 3).

Stillbirth		Frequency	Percent	Valid percent	Cumulative percent
Valid	yes	17	4.4	4.4	4.4
	No	367	95.6	95.6	100
	Total	384	100	100	

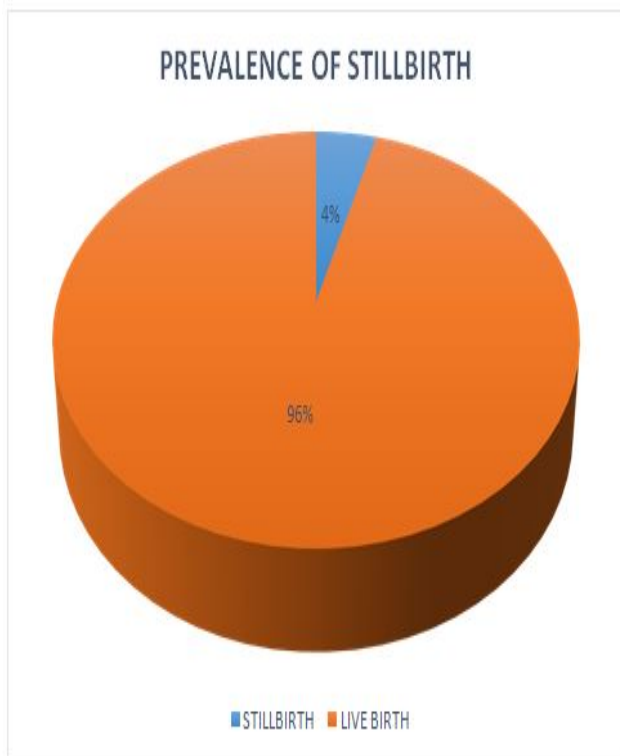
**Table 3.** Shows the prevalence of stillbirth.

### Social demographic and clinical characteristics of gravidas and their stillborn

Variable	Sub-variable	Number	Percentage %
Age distribution of women with stillbirths	15-25	6	35
	26-35	4	24
	>35	7	41

Stillbirths in different gravitas	G1	5	29
	G2-G4	3	25
	>G4	9	46
Antenatal care	Registered	6	35
	Unregistered	11	65
Mode of delivery in stillbirths	Vaginal delivery	13	76
	C/section	4	24
Residence	Urban	8	47
	Rural	9	53

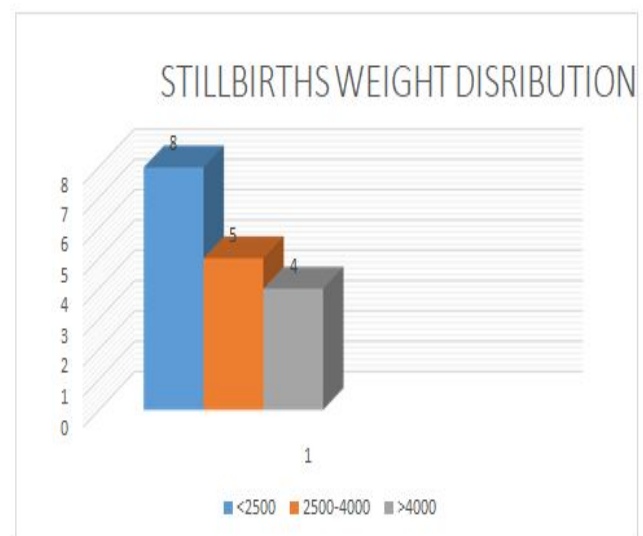
**Table 4.** Showing social demographic and clinical characteristics.



**Figure 3.** Shows the prevalence of stillbirth.

#### Distribution of birthweight among stillbirths

Figure 4 shows the distribution of birthweight among stillbirths which was observed to be as follows, the maximum number of stillbirths, that is 8 (47%), followed by 5 (29%) and 4 (24%) had birth weight <2500 g, 2500-4000 g and >4000 g respectively.



**Figure 4.** Stillbirths weight distribution.

### Most common type of stillbirth

It was observed to be as follows: The total number of stillbirths out

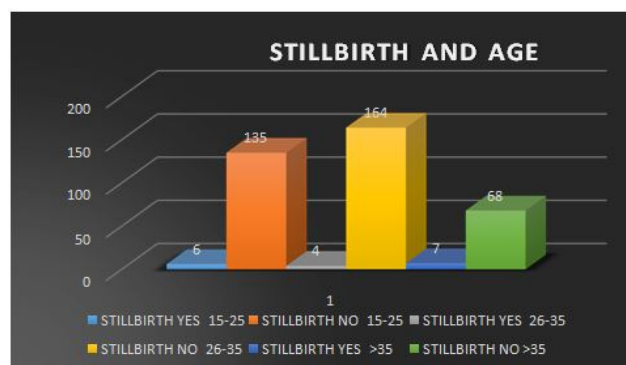
a sample size of 384 was 17, 3 (18%) were fresh stillbirths and 14 (82%) were macerated stillbirths as shown in Table 5.

Birth outcome		Frequency	Percent	Valid percent	Cumulative percent
Valid	Macerated stillbirth	14	82	82	82
	Fresh stillbirth	3	18	18	100
	Total	17	100	100	

**Table 5.** The total number of stillbirths out of a sample size of 384 was 17, 3 (18%) were fresh stillbirths and 14 (82%) were macerated stillbirths as shown.

### Age group mostly affected by stillbirth

The age group mostly affected by stillbirth of the total stillbirths was found to be ages >35(41%) followed by ages 15-25 (35%) and lastly ages 25-35 years old (24%) as shown in Figure 5 below (Table 6).



**Figure 5.** Stillbirth and age.

### Association between stillbirth and its risk factors

Maternal and fetal risk factors	Number of women with risk factors number n=385	Number of stillbirths with risk factors	Percentage	P-value
HTN	38	5	29	<0.0001
Abruption	17	4	24	0.0005
Anemia	27	6	35	<0.0001
Preterm deliver	71	7	41	<0.0001
FGR	69	2	12	0.458
Fetal distress	13	1	6	0.7271
DM	33	2	12	0.2309
Congenital malformatio ns	15	4	24	<0.0001
Maternal infections	26	1	6	0.0005
Previous stillbirth	12	2	12	0.2506
Post maturity	50	1	6	<0.0001
Antepartum hemorrhage	50	3	18	0.0005

**Table 6.** Up shows the association between stillbirth and different maternal and fetal risk factors.



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## Discussion

Among 384 total births, 17 stillbirths (4.4%) were observed. The SBR was calculated to be 44.16/1000 births. According to a report in year 2021, the national range of SBR in Zambia is around 14.8/1000 births. It has increased from 14.8/1000 to 44.15/1000 births. Out of the 17 stillbirths, 14 (82%) were macerated and 3 (18%) were fresh. Early prenatal care can help reduce perinatal deaths linking the woman to health care system, and this would reduce the likelihood of death of her infant in utero. Improved quality of obstetric care during labor and delivery has been the reason for the lower number of fresh stillbirths.

Stillbirths were more common unregistered women compared to registered women, that is 11 (65%) and 6 (35%) respectively in the study set up. This is concurrent to a study conducted by Rajagopal, et al. the diagnosis and surveillance of high-risk pregnancies by skilled health personnel and prompt effective management of complications of registered gravidas can explain the low stillbirths in registered women (Appendix 1-4).

A majority of the stillbirths that is 9 (53%) were found in women from the rural population. Dandona, et al also found higher stillbirths of 57% in the rural population. Though there is implementation of financial incentive programs for pregnant women attending health services, the quality of care in peripheral health facilities is usually compromised, and such women are referred late to tertiary care centers. It is reported that 20%-30% of stillbirths result from suboptimal obstetric care. The higher prevalence of stillbirths in the rural population suggests the need for improved obstetric care as well as availability of emergencies in the rural setting.

It was found that caesarean sections were 4 (24%) and vaginal deliveries 13 (76%) among stillbirths in this study. Most deliveries that result in stillbirths are induced by the vaginal route unless there is a contraindication. To reduce these stillbirths, there's need to ensure access to quality care in terms of comprehensive interventions focusing on social, nutritional and healthcare needs in developing nations as complications are often associated with poor outcome of pregnancy.

Advanced maternal age is a known risk factor for both increased perinatal morbidity and mortality. The majority of stillbirths 7 (41%) were seen in women above the age of 35 in the study population. Similar higher rates were seen in a study conducted by Nyirenda, et al.

The prevalence of low birth weight (<2500 g) including 2500-4000 and >4000 was 8 (47%), 5 (29%) and 4 (24%) respectively. Similar results were seen by Sharma et al. (46%). Fetal Growth Restriction (FGR) and prematurity are important causes of low-birth-weight stillbirths.

The proportion of preterm stillbirths was 7 (41%) and it was highest among stillbirths in the study population. The higher number of stillbirths is comparable to other studies such as Agbata, et al. (40%), Devi, et al. (52%) and Ragopal, et al. 47%.

The proportion of preterm delivery, hypertensive disorders of pregnancy, abruption and congenital malformations with stillbirth was estimated to be 7 (41%), 5 (29%), 4 (24%) and 4 (24%) in the study and they were statistically significant ( $P<0.05$ ). Though FGR, fetal distress and DM in pregnancy are potential risk factors for stillbirth, they were not significantly associated with stillbirth in this study. Good antenatal care and institutional protocol based management of high risk pregnancy could be a reason for comparatively low stillbirths in these groups. Universal screening for pregnant women for DM and multidisciplinary management results in better compliance and reduced complications in diabetic pregnancy.

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## Conclusion

Stillbirth remains a major public health problem in Zambia. The prevalence of stillbirth at KTH was found to be high compared to national and regional figures. It is far below to achieve the ENAP target by 2030.

Preterm delivery, hypertensive disorders of pregnancy, abruption, anemia and congenital malformation were significantly associated with stillbirths. These findings highlight the weak healthcare system of the country.

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## Ethical consideration

Tropical Disease Research Centre (TDRC) Ethics approval was sought before beginning the study. Written request to conduct the study was made to management of KTH. Informed consent was obtained and they were assured that data generated will not be used for other purposes apart from those specified in the study protocol.

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## Acknowledgement

Many factors contributed to the limitation of the study however, time and literature limited the study a great deal. A few studies have been done in Zambia and most stillbirths go unrecorded.

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## Recommendations

A rising stillbirth rate is very alarming. Effective interventions, including better assessment of maternal risk and timely referral could contribute to the reduction of stillbirths. The government should strengthen intersectoral collaboration with health facilities to promote maternal and healthcare services utilization. The provincial health department and other concerned bodies should focus on the implementation of the strategies and policies that address and reduce the causes of stillbirth. All the risk factors can be minimized by screening for early detection and prompt effective timely intervention in resource poor settings. Finally, there's need to regularize uniform protocols for intranatal care in both urban and rural settings for a better neonatal outcome.

## Acknowledgement

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