



# Prevalence of Stillbirth and Its Associated Causative Factors at a Tertiary Hospital

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## Abstract

**Background:** Stillbirth is one of the most serious adverse outcomes of pregnancy. Each year approximately 2.6 million stillbirths are reported worldwide, with 98% of those stillbirths occurring in developing countries. **Aim:** To investigate the prevalence and causative factors associated with stillbirths and clinical presentation of mothers who deliver stillbirths at a tertiary hospital. **Methods:** This was a cross-sectional study conducted at the Maternity Unit of Nelson Mandela Academic Hospital (NMAH), Mthatha, South Africa. Mothers who delivered stillbirths were interviewed using a pre-coded questionnaire. Additional data were extracted from the clinical notes, and relevant laboratory investigations were carried out. Data were entered into MS EXCEL and then imported into SPSS statistical software package for analyses. The level of significance was set at  $P < 0.05$ . **Results:** There was a total of 2709 deliveries at NMAH during the period under review, and of these, there were 203 stillbirths, giving a hospital-based stillbirth rate of 74.9 per 1000 deliveries. The obstetric complications associated with stillbirths were preeclampsia (57.6%), abruptio placentae (28.1%), eclampsia (12.8), and placenta previa (3.9%). Of the preeclamptic patients, 20.2% had abruptio placentae, and 2.5% of eclamptic patients also had abruptio placentae. **Conclusion:** In this study, the stillbirth rate was high. Hypertensive disorders of pregnancy and abruptio placentae were major contributing factors to this birth outcome. The provision of quality antenatal care, monitoring of labour, and an effective referral system need to be strengthened to reduce this high rate of stillbirths.

## Subject Areas

Gynecology & Obstetrics

## Keywords

Stillbirth, Prevalence, Causative Factors

## 1. Introduction

As part of the perinatal mortality rate, the stillbirth rate is an essential indicator of the quality of obstetric care and, thus, antenatal care and care during labour and delivery. [1] General factors associated with foetal death are mainly socio-demographic. [2] Specific factors include maternal, foetal, placental and umbilical cord factors. [3] Some foetal deaths have no identifiable cause. [4]

A stillbirth is defined as the delivery of a foetus after the age of viability (which is 22 weeks of gestation or 500 g of weight) with no signs of life such as breathing, heartbeats, pulsation of the umbilical cord or definite movements of voluntary muscles. [5] A stillbirth can either be fresh or macerated. A macerated stillbirth is defined as the intrauterine death of a foetus sometime before the onset of labour, where the foetus shows degenerative changes, whereas fresh stillbirth is an infant born dead with its skin still intact implying that the foetus has been dead for less than 12 hours. [6]

The occurrence of an intrapartum stillbirth in developed countries is considered the result of inadequate obstetric care. In contrast, in developing countries, it may represent inadequate access to essential obstetric care and inadequate care. [7]

Ninety-eight percent of stillbirths occur in low and middle-income countries. [8]

The estimated incidence of stillbirths worldwide is 19.1 per 1000 births. In South Africa, the stillbirth rate is estimated to be about 22.5 per 1000 births, and this also varies according to the provinces and districts. [9]

In 2011, the O.R. Tambo district in the Eastern Cape was among the districts with the highest stillbirth rate in South Africa. [9] This inspired us to carry out a study on the prevalence and causative factors associated with stillbirths so as to document and suggest possible remedies for this high perinatal morbidity and mortality.

## 2. Study Methods

### 2.1. Study Design

This was a cross-sectional study, and it was conducted at the Maternity Unit of Nelson Mandela Academic Hospital (NMAH), South Africa, between December 2012 and June 2013.

### 2.2. Study Setting

NMAH is located and serves mainly the community of O.R. Tambo district municipality, which has an estimated population of 1,862,214, with 55% of those being females. [9]

### 2.3. Sample Size and Sampling Method

According to unpublished hospital data, the stillbirth rate was about 12% at

NMAH in 2011. [10]

Based on the above figures, using a stillbirth rate of 12%, with a power of at least 80% and a confidence interval of 95%; for an in-depth analysis of the prevalence of stillbirths, an estimated sample size calculated was 162. For good measure, the sample size was increased to 203.

$$n = z^2 \times p \times (1 - p) / e^2 \quad (1)$$

$$n = (1.96)^2 \times 0.12 \times (1 - 0.12) / 0.052 \quad (2)$$

$$n = (3.8416) \times 0.12 \times 0.88 / 0.0025 \quad (3)$$

$$n = 162 \quad (4)$$

In Equation (1),  $n$  stands for the sample size,  $p$  is the estimated population proportion,  $e$  is the desired level of precision (margin error) and  $Z$  is the  $Z$  score.

The convenience sampling method was used to obtain the study participants.

## 2.4. Study Variables

Study variables included prevalence of stillbirth, obstetric complications, HIV, maternal age, parity, and foetal characteristics. For each stillbirth, information was obtained on the type of stillbirth, estimated gestational age, birth weight, sex of the stillborn, and the clinical factors associated with the stillbirth, if present. All the mothers who delivered stillbirths at NMAH during the study were included as long as consent had been obtained from the participant.

## 2.5. Data Analysis

Data were entered into MS EXCEL and then imported into SPSS statistical software package for analyses. The comparison was performed using the chi-square test for categorical variables and the student t-test for continuous variables. In bivariate analysis, logistic regression analysis was performed using the forward Wald method and calculating odds ratios (OR) with 95% confidence intervals (95% CI). The level of significance was set at  $P < 0.05$ .

## 3. Ethical Considerations

The approval to conduct the study was obtained from Walter Sisulu University Bioethics Committee and from NMAH before the research was started. Written consent was obtained from the participants. Participants were free to opt-out of the study if they chose to, and this would not prevent them from getting care offered by the hospital.

## 4. Results

### 4.1. Rate of Stillbirths

There were 2709 deliveries with 203 stillbirths during the study period, giving a stillbirth rate of 75 per 1000 deliveries.

## 4.2. Baseline Demographic and Maternal Characteristics

A majority (60.6%) of women with stillbirths were between the ages of 20 and 34 years (Figure 1) with a mean age of  $26.3 \pm 7.8$  years and a range of 14 - 51 years. More than 2/3 of mothers with stillbirths were not married (Figure 2). Those who were married had a higher parity ( $4 \pm 2$  vs  $2 \pm 1$ ;  $P < 0.0001$ ) and were significantly older than the unmarried ( $31.4 \pm 7.1$  vs.  $24 \pm 7$  years;  $P < 0.0001$ ). The overall unemployment rate was 90%, and 74.7 % of the married women had unemployed husbands. The mean parity was  $2.3 \pm 1.7$  with a range of 1 - 10. The

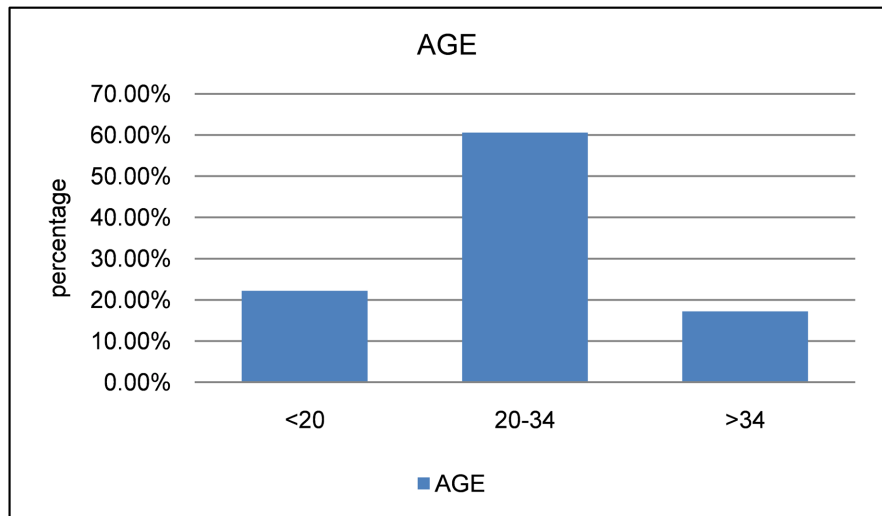


Figure 1. Age groups of mothers with stillbirths.

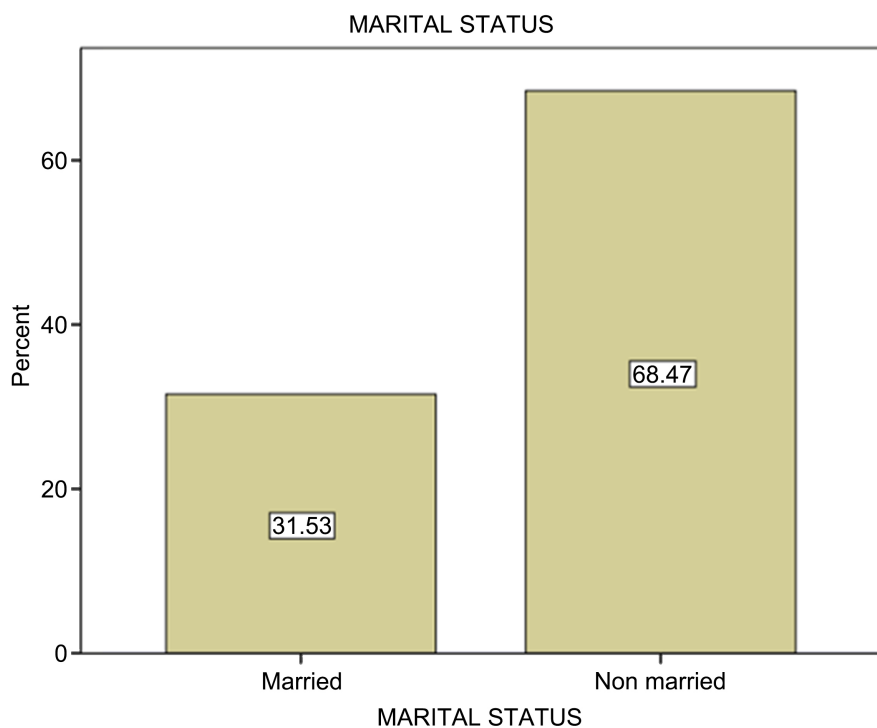


Figure 2. Marital status of mothers with stillbirths.

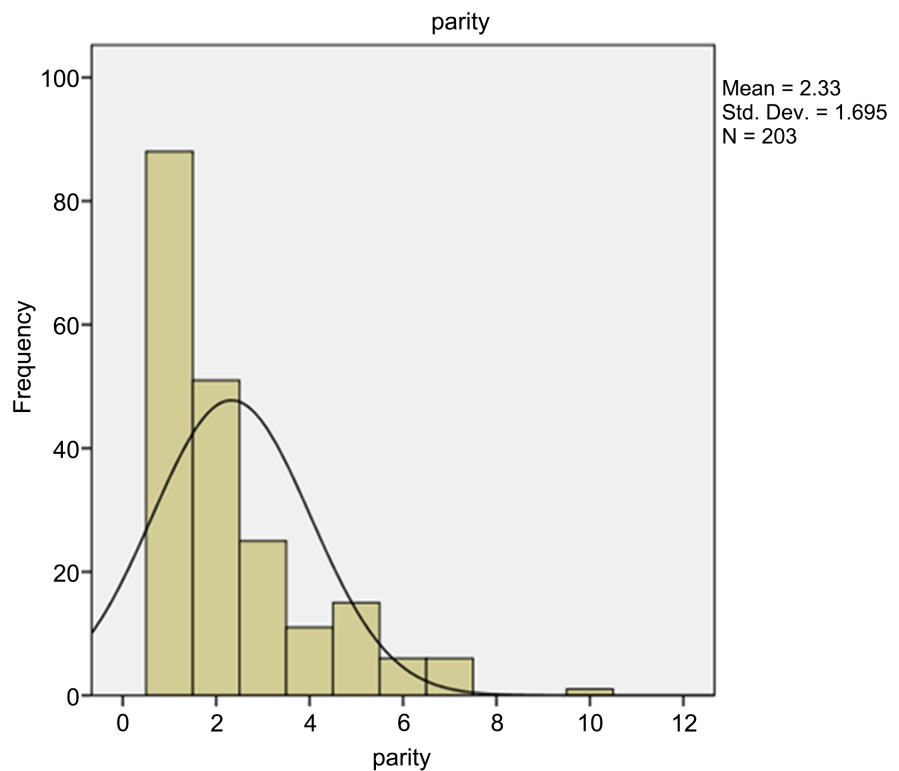
distribution of parity was asymmetric with 42.3% reported primiparous (which was the mode) (**Figure 3**). A majority (91.13%) of parturients were booked at the antenatal clinic. The mean gestational age at antenatal booking was  $22.1 \pm 4.8$  weeks, with a range of 13 - 38. Low birthweight was more frequent among those who were unbooked (94.4% vs 76.2%) and this was statistically significant (RR = 1.2; 95% CI 1.1 - 1.4; P = 0.049).

### 4.3. Obstetric Complications

Some patients had more than one obstetric complication: the preeclamptic 20.2% had abruptio placentae; 2.5% of the eclamptic women also had abruptio placentae. Eclampsia was significantly more frequent in the unbooked (38.9%; P < 0.001) compared to those booked (10.3%). Abruptio placentae was associated with significantly low haemoglobin levels ( $9.4 \pm 2.3$  vs.  $11.6 \pm 1.8$  g/dL; P < 0.0001) and higher gestational age ( $32.6 \pm 3.5$  weeks; P = 0.019).

### 4.4. History of Infectious Diseases

The infectious diseases associated with stillbirths were Human Immunodeficiency Virus (HIV) (29.1%) and Herpes (2%). There were no stillbirths associated with Rubella and cytomegalovirus. The estimated CD4 count in women with HIV and stillbirths was  $354.2 \pm 198.6$  cells/mm<sup>3</sup> (range 40 - 884 cells/mm<sup>3</sup>). Out of mothers with stillbirths and HIV infection, 81.4% and 57.6% had a CD4 count of <500 cells/mm<sup>3</sup> and a CD4 count <350 cells/mm<sup>3</sup>, respectively.



**Figure 3.** The parity distribution of mothers who delivered stillbirths.

#### 4.5. History of Chronic Illnesses

Chronic hypertension and diabetes mellitus were reported in women with stillbirth, at 3.9% (n = 8) and 3.4% (n = 7), respectively. Those with diabetes were older ( $34.7 \pm 10.8$  years vs.  $26.1 \pm 7.5$  years;  $P = 0.004$ ) and had higher parity ( $4 \pm 2$  deliveries vs.  $2 \pm 2$  deliveries;  $P = 0.004$ ) compared to non-diabetic mothers.

#### 4.6. Intrapartum Complications

7.9% and 0.5% had obstructed labour and uterine rupture, respectively. The stillbirth that was associated with a uterine rupture had a foetal weight (3595 g) which was greater than those of stillbirths where there was no uterine rupture ( $1740.3 \pm 912.9$  g).

#### 4.7. Clinical Characteristics of Stillbirths

2/3 of the total stillbirths were macerated (n = 135), and the rest were fresh (n = 68). There was a significant and higher risk of macerated stillbirths (73.5%, RR = 1.4; 95% CI 1.1 - 1.9;  $P = 0.014$ ) in preeclamptic mothers than in non-preeclamptic mothers (26.5%). Foetal sex ratio was 1 male: 1 female. Women who delivered male stillbirths had higher parity when compared with women who delivered female stillbirths ( $3 \pm 2$  vs.  $2 \pm 1$ ;  $p = 0.042$ ). Out of all stillbirths, 3.5% presented with congenital malformations. All these malformations were diagnosed by gross external examination of the stillbirths. The mean of birth weight of the stillborn babies was  $1740.3 \pm 912.9$  g (range 500 - 4945 g). Two stillborn babies (1%) weighed more than macrosomia (weight more than 4 kg), and 77.8% had a low birth weight. Preeclampsia was a significant predictor (prospective risk factor) of low birth weight (85.5% in preeclamptic, RR = 1.3; 95% CI 1.1 - 1.5;  $P = 0.002$  vs. 67.4% in non-preeclamptic).

### 5. Discussion

In this study, the stillbirth rate was 75 per 1000 deliveries at NMAH. This rate is much higher than the South African stillbirth rate of 22.5 per 1000 and that of 38 per 1000 in South-East Nigeria but still below the stillbirth rate of 156 per 1000, which was observed in the Gambia. [9] [11] [12] It is comparable to the rate of 87 per 1000 at Felegehiwot Hospital, in Northwest Ethiopia. [13] The high rate of stillbirths in our study can be explained by inadequate antenatal care, which was evident in this study as there was an increased number of macerated stillbirths. [6]

Other factors that might explain this high rate of stillbirths are poor transport facilities, long distances to the referral hospital, inadequate number of obstetric referring centres close to patient residences, and a shortage of doctors and nurses. In the O.R. Tambo district, these mentioned factors have been highlighted in the health statistics of South Africa as causes of maternal and perinatal morbidity and mortality. [9]

In the present study, stillbirth was more common among young women. The

meanage of mothers with stillbirth was  $26.3 \pm 7.8$  years. And this is possible because of the high preeclampsia and abruptio placentae rate in this study. Preeclampsia and abruptio placentae are more common in younger women. [14]

The higher number of stillbirths with low birthweight among mothers who did not attend antenatal care in this study highlights the importance of antenatal care. Antenatal care provides a critical linkage between the woman and maternity care services. Thus, if promoted, attendance of antenatal care with delivery in skilled hands is an effective instrument to improve perinatal birth outcomes, particularly in developing countries. [15]

The present study showed a remarkably high proportion of mothers who had preeclampsia and eclampsia. Preeclampsia was responsible for 57.6% and eclampsia for 12.8% of stillbirths (Table 1). These findings were much higher than those which were observed in Nigeria, where hypertensive disorders of pregnancy were responsible for 12.7% of stillbirths. [15] NMAH is the only referral hospital in the O.R. Tambo district, and it receives all patients with preeclampsia in this municipality and its surroundings. This would probably explain the high prevalence of pregnant women with preeclampsia in this study.

The proportions of obstructed labour and uterine rupture in the present study were lower than those which Shrestha and Yadav observed. [16] But they were still unacceptably high compared to the developed world, where obstructed labour is almost non-existent. [17] Obstructed labour in our study led to 23% and uterine rupture to 7.4% of stillbirths, respectively. This increased proportion of obstructed labour in developing countries indicates poor intrapartum care, as obstructed labour commonly results from poor supervision and neglected labour. [18]

In the current study, the proportion of stillbirths that presented with congenital malformations was 3.5%. This was lower than the rate of 10.5% which other researchers observed. [19] The lack of post-mortems in our study could explain this difference. [20]

The increased number of stillbirths with low birth weight in the current study has also been observed in other studies. [21] [22] These huge numbers of stillbirths with low birthweight suggest that most stillbirth causes in these studies occur early in pregnancy.

**Table 1.** Obstetric complications associated with stillbirths

Variables	n (*%)
Preeclampsia	117 (57.6)
Abruptio	57 (28.1)
Eclampsia	26 (12.8)
Placenta previa	8 (3.9)

\*The percentage reported for each variable is out of the total women who had stillbirths.

## 6. Conclusions

Stillbirth is a devastating condition. The study aimed to investigate the prevalence and causative factors associated with stillbirths. In this study, the stillbirth rate was high. The study showed a stillbirth rate of 75 per 1000 deliveries at Nelson Mandela Academic Hospital, much higher than the South African stillbirth rate of 22.5 per 1000. There were more macerated stillbirths compared to fresh stillbirths indicating poor antenatal care. The study also showed a remarkably high proportion of mothers with preeclampsia, eclampsia and abruption placentae.

To reduce this stillbirth rate, policymakers, stakeholders, and healthcare workers need to strengthen the provision of quality antenatal care and labour monitoring. Furthermore, as preeclampsia and its complications were significant contributors to stillbirth in this study, early detection and appropriate management, including referral of patients with hypertensive disorders of pregnancy, needs to be strengthened at the primary health care level.

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## Conflicts of Interest

The author declares no conflicts of interest.

## Declarations

The author declares that this paper has been presented and published in the website for the “PERINATAL PRIORITIES CONFERENCE”.

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