



**THE UNIVERSITY OF ZAMBIA  
SCHOOL OF MEDICINE**

**IMMEDIATE FETAL OUTCOMES OF CAESAREAN SECTIONS  
DONE FOR FETAL DISTRESS AT TERM AT UNIVERSITY  
TEACHING HOSPITAL LUSAKA ZAMBIA**

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**DISSERTATION SUBMITTED TO THE UNIVERSITY OF ZAMBIA IN PARTIAL  
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MEDICINE IN OBSTETRICS AND GYNAECOLOGY**

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**DECLARATION**

I, SAMUTUMWA NJEKWA, HEREBY DECLARE THAT THIS DISSERTATION HEREIN PRESENTED FOR THE DEGREE OF MASTER OF MEDICINE IN OBSTETRICS AND GYNECOLOGY HAS NOT BEEN PREVIOUSLY SUBMITTED EITHER IN EVERY RESPECT OR IN PART FOR ANY OTHER DEGREE AT THIS OR ANY OTHER UNIVERSITY, NOR BEING CURRENTLY SUBMITTED FOR ANY OTHER DEGREE.

SIGNED:

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DR. SAMUTUMWA NJEKWA

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DR. BELLINGTON VWALIKA (SUPERVISOR)

**STATEMENT**

I HEREBY STATE THAT THIS DISSERTATION IS ENTIRELY THE RESULT OF MY OWN PERSONAL EFFORT. THE VARIOUS SOURCES TO WHICH I AM INDEBTED HAVE BEEN CLEARLY INDICATED IN THE BIBLIOGRAPHY AND ACKNOWLEDGEMNT.

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**APPROVAL**

THE DISSERTATION OF DR. SAMUTUMWA NJEKWA IS APPROVED AS FULFILLING PART OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF MEDICINE IN OBSTETRICS AND GYNAECOLOGY BY THE UNIVERSITY OF ZAMBIA.

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## ABSTRACT

**Background:** Fetal distress is a common indication for an emergency caesarean section (C/S). The term fetal distress refers to the presence of signs in a pregnant woman that suggests that the fetus may be compromised and this is manifest by fetal heart rate abnormalities and/or presence of fresh meconium. Delayed intervention can lead to fetal death or serious long term neurological sequelae. There is a paucity of information on fetal outcomes of caesarean sections done for fetal distress and this study is aimed to determine this at the University Teaching Hospital (UTH), Lusaka, Zambia.

**Methods:** A cross sectional study documenting patient and pregnancy details, (including time interval from decision to C/S for fetal distress) and fetal outcomes. Data was collected by reviewing files of consenting patients with a term gestation (>37weeks) who had undergone C/S for fetal distress. Factors were stratified by fetal outcome (bad outcome= stillbirths and Apgar score at 5 minutes of <7). Chi square (or Fisher exact test) was used to test for association between factors and fetal outcome (unadjusted odds ratios). A multivariate logistic regression model was used to test for factors independently associated with a bad outcome, controlling for potential confounders (adjusted odds).

**Results:** Between September 2013 and January 2014, 216 women were recruited in the study of which 182 (84.3%) of the babies had good outcome (5 minute Apgar score 7 or more) while the other 34 (15.7%) had a poor outcome. In univariate analysis, age, parity, referral status, and clinical diagnosis were not associated with fetal outcome. However, caesarean section under general anaesthesia (as opposed to spinal anaesthesia) was associated with a poor fetal outcome (unadjusted OR 3.28, 95% CI 1.5 to 7.18) as was delay of greater than 3 hours from decision to delivery by caesarean section (unadjusted OR 2.65, 95%CI 1.24 to 5.73). Multivariate logistic regression, controlling for confounding, showed that general anaesthesia and delay >3hrs remained independently associated with poor fetal outcome (adjusted ORs of 3.7 and 5.13 respectively).

**Conclusion:** General anaesthesia and delay in doing C/S were important determinants of (poor) fetal outcome in C/S done for fetal distress. Attention needs to be paid in expediting C/S. Further studies are warranted to understand the reason general anaesthesia is detrimental to fetal outcome.

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## **ABBREVIATIONS**

C/S	Caesarean Section
UTH	University Teaching Hospital
CTG	Cardiotocography
DDI	Decision to Delivery Interval
UNZABREC	University of Zambia Biomedical Research Ethics Committee
NICU	Neonatal Intensive Care Unit

## **DEDICATION**

I dedicated this work to:

- My wife Mercy and my two children – Lilato and Walusiku.
- My parents for their love and support
- All the women that I have come across and yet to come across as I execute the duties of my career.

## 1.0 INTRODUCTION

Fetal distress is one of the most common indications for an emergency C/S. The term fetal distress refers to the presence of signs in a pregnant woman before or during childbirth that suggests that the fetus may not be well. [1] Signs and symptoms of fetal distress include the following:

- Decreased fetal movements felt by the mother.
- Meconium in the amniotic fluid (Meconium stained liquor).
- Non-reassuring patterns seen on cardiotocography (CTG). This is manifested by fetal tachycardia or bradycardia especially during and after a contraction, decreased variability in the fetal heart rate and late decelerations.
- Biochemical signs, which could be fetal metabolic acidosis or elevated fetal blood lactate levels (lactic acidosis). This is assessed by collecting a small sample of baby's blood from a scalp prick through the open cervix in labor. However, this cannot be done in resource-limited centers. [2]

The main cause of antepartum fetal distress is uteroplacental insufficiency. Factors within labour are complex but processes such as uteroplacental vascular disease, reduced uterine perfusion, fetal sepsis, reduced fetal reserves and cord compression can be involved alone or in combination. Gestational and antepartum factors can modify the fetal response to them. [3]

Fetal distress is a very serious condition and delayed intervention frequently leads to fetal death or serious long term neurological sequelae. Proximity to health facilities and competent staff members are necessary to alleviate adverse fetal outcomes. [4] Roy et al, India, 2008 did a study in which they concluded that a non-reassuring fetal heart detected by CTG did not correlate well with adverse fetal outcome. [5]

A number of studies have been done in the western world in which 30 minutes has been adopted as the audit standard for decision to delivery interval for C/S for fetal distress though this is difficult to achieve.

No studies on caesarean section for fetal distress have been done in Africa.

This study will describe fetal outcomes of caesarean sections done for fetal distress at University Teaching Hospital (UTH) Lusaka. It is anticipated that the findings from this study will help to improve the management of cases of fetal distress at UTH2.

## 2.0 LITERATURE REVIEW

Intrapartum hypoxia complicates about 1% of labour and results in death in about 0.5 in 1000 pregnancies and cerebral palsy in 1 in 1000 pregnancies. When it is diagnosed clinically as “fetal distress” swift delivery is the aim, and the standard has become delivery within 30 minutes of diagnosing fetal distress. However, this standard is hard to achieve. [6]

The pathogenesis of intrapartum hypoxia is often multifactorial but poorly understood. Processes such as uteroplacental vascular disease, reduced uterine perfusion, fetal sepsis, reduced fetal reserves, and cord compression can be involved alone or in combination, and gestational and antepartum factors can modify the fetal response. Methods of screening and diagnosing the condition have limitations. Thus when the condition is thought to be present, diagnosed clinically as “fetal distress,” clinicians aim for a swift delivery because they lack a clear understanding of the severity of the hypoxia. [7]

Audit of the speed with which such caesarean sections are performed is important for clinical governance and risk management, and 30 minutes has been adopted as an audit standard. In the United Kingdom, however, most caesarean sections for fetal distress take longer than 30 minutes. Delays occur both in getting the patient to theatre and in achieving effective anaesthesia, though delivery within 30 minutes is more likely if the patient gets to theatre within 10 minutes.

For reasons which are not clear, logical, or evidence based, this audit standard of 30 minutes has become the criterion by which good and bad practice is being defined both professionally and medico-legally. The implication is that caesarean section for fetal distress that takes longer than 30 minutes represents suboptimal or even negligent care. Yet the evidence that 30 minutes represents a clinically important threshold is lacking both in theory and in clinical experience. [8]

In theory, the speed with which hypoxia develops and the ability of the fetus to withstand this insult vary and are difficult to quantify. For example, sudden and profound hypoxia such as occurs with placental abruption or vasa praevia probably requires

delivery within 10 minutes if death or serious disability is to be avoided. In contrast, if the hypoxic insult is more slowly progressive (as it usually is) delivery within 30 to 60 minutes is unlikely to result in serious harm. In such cases the usual threshold for intervention is a fetal scalp pH of  $<7.20$ , yet serious neurodevelopmental disability probably occurs only when the pH is  $<7.00$ . [9]

Mackenzie et al, USA, 1995 did an audit of 126 caesarean sections for fetal distress in 5846 deliveries and showed a non-significant trend to lower umbilical artery pH values in babies delivered after 30 minutes by caesarean section for fetal distress. This observation is in keeping with the findings of others. [7] Dunphy et al, UK, 1991 reported an audit of 104 caesarean sections for fetal distress in 9387 deliveries, found no correlation between decision-delivery interval and several outcome measures, including umbilical arterial acid-base state and 5 minute APGAR scores.[8]

Cooke et al, USA, 2003 did a study whose objective was to determine how long it takes from the decision to achieve delivery by non-elective caesarean section (DDI), the influence on this interval, and the impact on neonatal condition at birth. [10] Prospective collection of data relating to all caesarean sections in a major teaching hospital obstetric unit was done without the knowledge of the other clinicians providing clinical care. Details of the indication for section, the day and time of the decision and the interval until delivery were recorded as well as the seniority of the surgeon, and condition of the baby at birth. The mean time from decision-to-delivery for 100 emergency intrapartum caesarean sections was 42.9 minutes for fetal distress and 71.1 minutes for 230 without fetal distress ( $P < 0.0001$ ). For 22 'crash' sections the mean time from decision-to-delivery was 27.4 minutes; for 13 urgent antepartum deliveries for fetal reasons it was 124.7 minutes and for 21 with maternal reasons it was 97.4 minutes. The seniority of the surgeon managing the patient did not appear to influence the interval, nor did the time of day or day of the week when the delivery occurred. Intrapartum sections were quicker the more advanced the labour, and general anaesthesia was associated with shorter intervals than regional anaesthesia for emergency caesarean section for fetal distress ( $P < 0.001$ ).

The conclusion was that fewer than 40% intrapartum deliveries by caesarean section for fetal distress were achieved within 30 minutes of the decision, despite that being the unit standard. There was, however, no evidence to indicate that overall an interval up to 120 minutes was detrimental to the neonate unless the delivery was a 'crash' caesarean section. This data thus does not provide evidence to sustain the recommendation of a standard of 30 minutes for intrapartum delivery by caesarean section. [10]

Thus a decision to delivery interval of 30 minutes is a useful audit standard, though it is difficult to achieve in practice. There is no evidence, however, that 30 minutes is a critical threshold in intrapartum hypoxia. For most cases, delivery after 30 minutes is not associated with adverse fetal outcome, yet for a few cases delivery has to be achieved much faster to avoid disability or death. In practice, emergency caesarean section for fetal distress should be undertaken as quickly as possible and ideally within 30 minutes but we should not consider it poor care if it takes a few minutes longer. [11]

Kumari R et al, Pakistan, 2007 did a study whose objective was to determine the fetal outcome and mode of delivery in patients with meconium stained liquor during labour. [12] This observational study was carried out at the Obstetrics and Gynecology Unit-II of Liaquat University of Medical Health Sciences from June to November 2007. The patients with gestational age more than 37 weeks who presented with meconium stained liquor and cephalic presentation were included and the fetal outcome and mode of delivery was assessed in all such subjects. The data was collected on pre-designed proforma and analysed using SPSS version 10. Chi square test was applied with 95% confidence interval and p-value  $\leq 0.05$  was considered significant. A total of 75 patients with meconium stained liquor were identified during the study period. The patients with reactive cardiotocography (CTG) were 50 (66.7%) and with non-reactive CTG, 25 (33.36%). Of the total, 45 (60%) patients were delivered through normal vaginal delivery, while 30 (40%) were delivered by caesarean section. The rate of instrumental delivery was also increased which was 12 (26.7%). Among the neonates exposed to meconium stained liquor, 62 (82.7%) babies were delivered with Apgar score  $> 7$ . Only 13 (17.3%) babies were delivered with Apgar score  $< 7$  in one minute. The conclusion was that meconium

stained amniotic fluid is a common occurrence during labour and is associated with increased caesarean section rate and fetal morbidity and mortality. [12]

There is generally a paucity of information in Africa on fetal outcomes of caesarean sections done with a diagnosis of fetal distress. This study is timely as it might provide valuable input to the current efforts to produce a protocol on management of fetal distress.

### **3.0 STATEMENT OF THE PROBLEM**

Fetal distress is a common indication for an emergency C/S and can have serious consequences on the fetal outcome if not expedited and managed properly. The decision to delivery interval of 30 minutes (international standard) may be unattainable due to limited staff and infrastructure.

### **3.1 STUDY JUSTIFICATION**

Information from this study can help the institution assess its management of fetal distress by C/S. The study can help in formulating evidence-based protocols on the management of fetal distress.

### **3.2 RESEARCH QUESTION**

What are the fetal outcomes of caesarean sections done for fetal distress at UTH Lusaka Zambia?

### **3.3 HYPOTHESIS**

#### **3.3.1 Null hypothesis**

Most fetal outcomes of caesarean sections done for fetal distress at UTH Lusaka Zambia are not favorable.

#### **3.3.2 Alternate hypothesis**

Most fetal outcomes of caesarean sections done for fetal distress at UTH Lusaka Zambia are favorable.

### **3.4 OBJECTIVES**

#### **3.4.1 Main objective**

To explore determinants of immediate fetal outcomes of emergency caesarean sections done for fetal distress at UTH, Lusaka, Zambia.

#### **3.4.2 Specific objectives**

1. To determine the factors associated with fetal outcomes at emergency C/S done for fetal distress.
2. To study the role of decision to delivery interval (DDI) of fetal outcome of emergency C/S done for fetal distress.
3. To determine the magnitude of caesarean sections done for fetal distress.

## **4.0 RESEARCH METHODOLOGY**

### **4.1 Study design**

This was a cross sectional study.

### **4.2 Study site and duration**

The study was done in the department of obstetrics and gynecology at UTH, Lusaka, Zambia from September 2013 to February 2014.

### **4.3 Target population**

Any caesarean section done for fetal distress at UTH, Lusaka, Zambia.

### **4.4 Study population**

Caesarean sections done for fetal distress at UTH, Lusaka, Zambia meeting the eligibility criteria as set by the inclusion and exclusion criteria.

### **4.5 Inclusion criteria**

- Caesarean sections with the indication as fetal distress
- Gestational age of 37 completed weeks or more calculated from the last menstrual period or first trimester scan.
- The pregnancy must have been singleton with a cephalic presentation and longitudinal lie.

### **4.6 Exclusion criteria**

- Caesarean sections done with an indication other than fetal distress.
- Gestational age below 37 completed weeks.
- Multiple pregnancy.
- Malpresentation.

#### **4.7 Participant recruitment**

Participants were recruited from caesarean sections done with an indication of fetal distress at UTH, Lusaka, Zambia meeting the inclusion criteria.

#### **4.8 Data collection**

Data was collected by reviewing files of patients who had undergone caesarean section for fetal distress. Consent was first obtained from the patient (Appendix 1) and data abstracted using a checklist (Appendix 2).

#### **4.9 Sampling method**

Convenience sampling methods were used as all consecutive patients who underwent C/S from the start of the study until the target was reached were invited to participate in the study as long as they met the inclusion criteria and gave consent.

#### **4.10 Sample size**

Using single proportion formula

$$N = Z^2 \times P(1-P) / d^2$$

N= sample required

Z= Z statistic (usually 1.96)

P=expected prevalence =0.15 (pilot showed that caesarean section for fetal distress at UTH has a prevalence of about 15 percent)

D= acceptable accuracy range (+/- 0.05)

$$N = 1.96^2 \times 0.15(1-0.15) / 0.05^2 = 196$$

To account for those not meeting the inclusion criteria at 10%, which is 19.6, brings the total sample size to 216.

Sample size=**216**

## 4.9 Variables

### Exposure (dependant) variables

- Age
- Parity
- Referral status
- Medical condition during antenatal period
- Use of oxytocin
- Type of anaesthesia
- Decision to delivery interval (DDI)

### Outcome (independent) variables

- Primary: Fetal Outcome (Apgar score at 5minutes; still births)
- Poor outcome=stillbirth or Apgar score <7 at 5 minutes
- Secondary: Admission to neonatal intensive care unit (NICU)

## 4.9 Data management and analysis

Data collected was entered in excel spreadsheet and exported to SPSS version 20 for subsequence analysis.

Exposure (dependent) factors were stratified by good or bad fetal outcome. Bad outcome was defined as stillbirths and Apgar score at 5 minutes of <7.

Univariate analysis was done by Chi square or Fisher exact test were used to test for association between independent variables and outcome variable. (unadjusted odds).

A multivariate logistic regression model was used to control for potential confounders and test for factors independently associated with a bad outcome.

Significance was set at  $p < 0.05$ .

#### **4.10 Ethical considerations**

This study in no way affected patient management as it was purely observational. Patient confidentiality was maintained and patients' names did not appear anywhere on the study data collection tools.

Permission was sought from the UTH management through the head of department of obstetrics and gynecology to carry out the research at the institution.

The study was approved by UNZABREC.

## 5.0 RESULTS

A total of 1993 caesarean sections with various indications were done between 1<sup>st</sup> September 2013 and 28<sup>th</sup> February 2014. Among these caesarean sections, 256 (12.8%) were done for fetal distress and of these 216 who met the inclusion criteria were recruited in the study. (Table 1)

**TABLE 1: Fetal outcomes (General)**

<b>Fetal condition</b>	<b>N (%)</b>	<b>Notes</b>
Good fetal outcome	182 (84.3)	Livebirth and 5 minute Apgar score >7
Poor fetal outcome	34 (15.7)	Stillbirth=13 5 min AS<7=21
<b>All</b>	<b>216 (100)</b>	

Out of the 216 patients that had a caesarean section for fetal distress and were recruited in the study 182 (84.3%) had a good outcome while 34 (15.7%) had a bad outcome. Among the 34 with a poor outcome, 13 were stillbirths and 21 had an Apgar score less than 7.

## Participant characteristics

Participant characteristics are shown in Table 2 stratified by fetal outcome. Among all the characteristics shown in only the type of anaesthesia was found to be significantly associated with a fetal outcome. Specifically, general anesthesia was associated with poor fetal outcome.

**TABLE 2: Selected characteristic stratified by outcome  
(Poor outcome=stillbirth or 5 minute Apgar score<7)**

		Fetal outcome		All N (%)	Test statistic (chi square or Fisher exact test if cell values<5)
		Poor Outcome n (%)	Good Outcome n (%)		
All		34 (15.7)	182 (84.3)	216 (100)	Unadjusted odds ratio 95% confidence interval p-value
Age	<20 years >20 years	5 (14.7) 29 (85.3)	30 (16.5) 152 (83.5)	35 (16.2) 181 (83.8)	OR=0.87 95% CI=0.31 to 2.44 P=0.996
Parity	Nulliparous Multiparous	16 (47.1) 18 (52.9)	99 (54.4) 83 (45.6)	115 (53.2) 101 (46.8)	OR=0.75 95% CI=0.36 to 1.55 P=0.549
Clinic referral	Yes No	32 (94.1) 2 (5.9)	157 (86.3) 25 (13.7)	189 (87.5) 27 (12.5)	OR=2.55 95% CI=0.58 to 23.21 P=0.161
Prolonged labour	Yes No	6 (17.6) 28 (82.4)	17 (9.3) 165 (90.7)	23 (10.6) 193 (89.4)	OR=2.08 95% CI=0.76 to 5.73 P=0.255
Type of anaesthesia	General Spinal	14 (41.2) 20 (58.8)	32 (17.6) 150 (82.4)	46 (21.3) 170 (78.7)	OR=3.28 95% CI=1.5 to 7.18 P=0.004

### Decision to delivery interval

The mean time for Decision to delivery interval DDI for all caesarean sections was 202.5 minutes (3 hours 22 minutes). (Table 3) The minimum time for DDI for all caesarean sections was 33 minutes while the maximum was 955 minutes (15 hours 55 minutes).

Those with a poor fetal outcome had a DDI of 233.8 minutes compared to 196.7 minutes for those with a good fetal outcome. However, this difference was not statistically significant ( $p=0.09$ )

**TABLE 3: Decision to delivery interval by outcome**

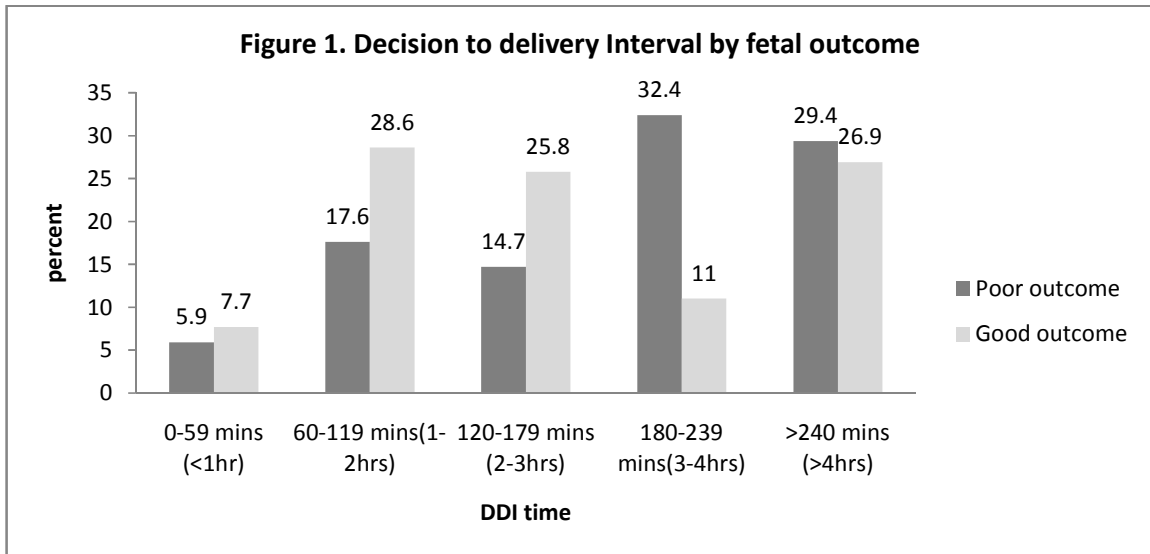
		Poor Outcome n (%)	Good outcome n (%)	All N (%)	Test statistics (Mann Whitney-U as data not normally distributed)
All		34 (15.7)	182 (84.3)	216 (100)	
Decision Delivery Interval (DDI)  (minutes)	Mean	233.8	196.7	202.5	p=0.09
	SD	177.8	154.1	158.2	
	Median	187.5	150	155	
	Minimum	33	33	33	
	Maximum	943	955	955	
	Range	910	922	922	

### Decision to delivery interval – timings categorized

Table 4 and figure 1 illustrates the breakdown of fetal outcome when the DDI timings were categorized in hourly intervals. After 3 hours, fetal outcome was worse.

**TABLE 4: Decision to delivery interval (DDI) by outcome (timings categorized)**

		Poor outcome n (%)	Good Outcome n (%)	All N (%)	Test statistic (Chi square or Fisher exact test if cell values<5)
All		34 (15.7)	182 (84.3)	216 (100)	
<b>DDI (categorical)</b>	0-59 mins (<1hr)	2 (5.9)	14 (7.7)	16 (7.4)	P=0.03
	60-119 mins(1-2hrs)	6 (17.6)	52 (28.6)	58 (26.9)	
	120-179 mins (2-3hrs)	5 (14.7)	47 (25.8)	52 (24.1)	
	180-239 mins(3-4hrs)	11 (32.4)	20 (11.0)	31 (14.4)	
	>240 mins (>4hrs)	<u>10 (29.4)</u>	<u>49 (26.9)</u>	<u>59 (27.3)</u>	
		<b>34 (100)</b>	<b>182 (100)</b>	<b>216 (100)</b>	
<b>DDI (Cumulative)</b>	<1 hr	2 (5.9)	14 (7.7)	16 (7.4)	
	<2 hrs	8 (23.5)	66 (36.3)	74 (34.3)	
	<3 hrs	13 (38.2)	113 (62.1)	126 (58.3)	
	<4 hrs	24 (70.6)	133 (73.1)	157 (72.7)	
	<5 hrs	<u>27 (79.4)</u>	<u>151 (83.0)</u>	<u>178 (82.4)</u>	
	<b>Any (up to 16 hrs)</b>	<b>34 (100)</b>	<b>182 (100)</b>	<b>216 (100)</b>	



**Association of specific Decision to delivery interval (DDI) timings with fetal outcome**

Table 5 illustrates that a DDI time of >3 hours was significantly associated with a poor fetal outcome (OR=2.65 95% CI=1.24 to 5.73, P=0.011).

**TABLE 5: Decision to delivery interval (DDI) by outcome**

		<b>Poor outcome n (%)</b>	<b>Good Outcome n (%)</b>	<b>All N (%)</b>	<b>Test statistic (Chi square or Fisher exact test if cell values&lt;5)</b>
All		34 (15.7)	182 (84.3)	216 (100)	Unadjusted odds ratio 95% confidence interval p-value
DDI	>1hr <1hr	32 (94.1) 2 (5.9)	168 (92.3) 14 (7.7)	200 (92.6) 16 (7.4)	OR=1.33 95% CI=0.32 to 9.02 P=0.77
DDI	>2hrs <2hrs	26 (76.5) 8 (23.5)	116 (63.7) 66 (36.3)	142 (65.7) 74 (34.3)	OR=1.85 95% CI=0.81 to 4.56 P=0.154
DDI	>3hrs <3hrs	21 (61.8) 13 (38.2)	69 (37.9) 113 (62.1)	90 (41.7) 126 (58.3)	OR=2.65 95% CI=1.24 to 5.73 P=0.011
DDI	>4hrs <4hrs	10 (29.4) 24 (70.6)	49 (26.9) 133 (73.1)	59 (27.3) 157 (72.7)	OR=1.13 95% CI=0.48 to 2.51 P=0.756
DDI	>5hrs <5hrs	7 (20.6) 27 (79.4)	31 (17.0) 151 (83.0)	38 (17.6) 178 (82.4)	OR=1.26, 95%CI=0.47 to 3.09, P=0.61

### Factors associated with poor fetal outcome - Multiple Logistic regression model

In Tables 2 and 5 the associations of various factors (including timing categories) with fetal outcome were expressed as unadjusted odds ratios. To take into account potential confounders, a multiple logistic regression model was developed and the findings presented in Table 6.

**Interpretation:** With 95% confidence, we can infer that the risk of poor fetal outcome in those delivered after 3 hours from decision to perform an emergency C/S for fetal distress is between 1.5 to 17.56 times greater than in those delivered before 3 hours

Similarly, with 95% confidence we can infer that the risk of poor fetal outcome when the emergency C/S was done under general anaesthesia is between 1.56 to 8.8 times greater than those delivered under spinal anaesthesia

**TABLE 6: Multiple Logistic regression model**

**(Factors associated with poor fetal outcome)**

Parameter	Adjusted Odds Ratio	95% confidence interval	P-value
Nulliparous	0.63	0.27 to 1.44	0.271
Clinical referral	1.74	0.36 to 8.46	0.495
Prolonged active phase	2.6	0.82 to 8.26	0.105
DDI>1hr	1.23	0.2 to 7.68	0.823
DDI>2hrs	1.24	0.33 to 4.66	0.749
DDI>3hrs	5.13	1.5 to 17.56	0.009*
DDI>4hrs	0.31	0.07 to 1.37	0.122
DDI>5hrs	1.53	0.33 to 7.16	0.586
General anaesthesia	3.7	1.56 to 8.8	0.003*

\*statistically significant

## 6.0 DISCUSSION

The objective of this study was to explore determinants of immediate fetal outcomes of emergency caesarean section done for fetal distress and to determine the magnitude of caesarean section done for the same indication at UTH, Lusaka, Zambia.

During the study period, 1993 Caesarean sections were done for various indications and out of these, 256 were for fetal distress. From this, the magnitude of Caesarean section done for fetal distress was found to be about 13% of all Caesarean sections.

Among the 216 study participants it was found that 182 (84.3%) had a good outcome while 34 (15.7%) had a poor outcome. Of the poor outcomes, 13 were stillbirths while 21 had Apgar score of less than 7 and these ended up in NICU. The study did not follow up the babies admitted to NICU to found out how many ended up with disability or death. A rate of 15.7% of poor outcomes is very high. However, it must be remembered that some of the babies were already distressed even as the mothers were been referred to UTH from the local clinics.

None of the Caesarean sections captured in the study was done within the internationally accepted standard of 30 minutes of making the diagnosis of fetal distress. This audit standard of 30 minutes is difficult to achieve as was alluded to in the literature review [Gaffney G et al, 1994]. However, if clinicians fail to achieve a delivery within 30 minutes of making a diagnosis of fetal distress they should aim to do so within a few minutes from the standard audit of 30 minutes.

In this study, the quickest delivery was achieved within 33 minutes of making the diagnosis and this is recommendable given the number of challenges faced in the labour ward and theatre at UTH. However, the most delayed delivery was achieved in about 955 minutes (15 hours 55 minutes) from time of making the diagnosis and this is not acceptable. Among the challenges faced at UTH include shortage of staff especially midwives, theatre nurses and anaesthetists. Therefore there is need to invest more in manpower so that the DDI can be brought to the acceptable audit standard of 30 minutes or as close as possible to that.

The mean time for DDI in this study was found to be 202.2 minutes (3 hours 22 minutes). This duration is too long compared to a mean of 42.9 minutes that was found in a study conducted by Cooke et al, USA, 2003.

DDI was found to be very significant after about 3 hours of making the diagnosis as was shown in the analysis that it can be inferred with 95% confidence that the risk of poor fetal outcome in those delivered after 3 hours from decision to perform an emergency C/S for fetal distress is between 1.5 to 17.56 times greater than in those delivered before 3 hours.

General anaesthesia was also found to be significant as shown in the analysis that with 95% confidence we can infer that the risk of poor fetal outcome when the emergency C/S was done under general anaesthesia is between 1.56 to 8.8 times greater than those delivered under spinal anaesthesia. However, this is in conflict with most literature as general anaesthesia has a shorter DDI and therefore the outcome is expected to be better.

## **7.0 CONCLUSION**

General anaesthesia and delay from decision to delivery by caesarean were important determinants of (poor) fetal outcome in caesarean section done for fetal distress.

Attention needs to be paid in expediting caesarean section.

No delivery was conducted within the recommended 30 minutes and only 7.4% of the deliveries were achieved within one hour of making the diagnosis of fetal distress. There is need for strengthening of systems that may include rapid deployment of a second operating theatre if necessary.

Further studies are warranted to understand the reason general anaesthesia is detrimental for fetal outcome.

## **8.0 STUDY LIMITATIONS**

Findings from this study cannot be generalized as determinants leading to prolonged DDI may be institutional specific

Study may have been underpowered to look at specific determinants

Fetal distress might have been noted before referral, though this study only included the time of decision for C/S at the hospital

The Apgar score is subjective with inter and intrapersonal variation. Other outcomes like admission to NICU could also have been used.

## **9.0 RECOMMENDATIONS**

Further in-depth studies to understand other reasons for poor fetal outcome after caesarean for fetal distress.

Efforts to decrease the decision to delivery interval would likely require more staff and infrastructure resources.

A second theatre should be opened whenever a diagnosis of Fetal Distress is made and a Caesarean section needs to be done.

Further studies should be done to look at determinants of poor outcomes when general anaesthesia is used as opposed to regional anaesthesia at UTH.

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**13.0 APPENDICES**

**Appendix 1. Participant information sheet**

**“Fetal outcomes of caesarean section done for fetal distress at term at university teaching hospital Lusaka Zambia”**

PRINCIPAL INVESTIGATOR: SAMUTUMWA NJEKWA

SPONSOR: GRZ

Dear participant,

I would like to invite you to take part in a study being conducted by Dr Samutumwa Njekwa as part of the requirement for the award of a Masters Degree in Obstetrics and Gynaecology.

The study is looking at fetal outcomes of caesarean section done for fetal distress at term at University Teaching Lusaka Zambia. You have been selected to take part in this study because you do meet the inclusion criteria. Research assistants will review your medical records to get some information and may interview you if need arises. Findings from this study will help to improve management of cases of fetal distress at this institution. There are no monetary or material gains in participating in this study. The study will in no way affect how you or your baby will be managed.

The information we will have about you will not be shared with anyone. The study will ensure strict confidentiality and will not reveal any information related to any individual participant to anyone.

If you agree to take part in this study kindly sign the consent form.

I understand all that has been explained to me as above and it is clear to me what this study is all about. I therefore voluntarily consent to take part in this study

Participant name..... Signature ..... Date.....

Witness name..... Signature..... Date.....

NB: Participant information sheet will be kept away from data collection tool

## Appendix 2 Checklist

### Fetal outcomes of caesarean section done for fetal distress at term at University Teaching Hospital Lusaka Zambia.

File #.....Date.....

Please fill in appropriate space or tick

#### Part 1: Social demographic detail

1. Age (years).....
2. Parity.....
3. Gravidity.....
4. Gestational age (weeks).....

#### Part 2: history of current pregnancy

##### 1. Conception method

- (a) Spontaneous ( )  
(b) Assisted fertilization ( )

##### 2. Attended antenatal

- (a) Yes ( )  
(b) No ( )

##### 3. History of any serious medical condition during this pregnancy

- (a) Yes ( )  
(b) No ( )  
(c) If yes specify.....

##### 4. History of premature rupture of membranes

- (a) Yes ( )  
(b) No ( )

##### 5. History of trauma

- (a) Yes ( )  
(a) No ( )

**6. Type of labor**

(a) Spontaneous ( )

(a) Induced ( )

**7. Clinic referral**

(a) Yes

(b) No

(c) If referred kindly state reason for referral.....

**Part 3: Management of labor**

**1. Use of oxytocin**

(a) Yes ( )

(b) No ( )

**2. Use of pethidine**

(a) Yes ( )

(b) No ( )

**3. Diagnostic criteria**

(a) Meconium stained liquor ( )

(b) CTG ( )

(c) Fetoscope ( )

(d) Ultrasound ( )

(e) Other (specify).....

**4. Level of officer making diagnosis**

(a) Intern ( )

(b) Registrar ( )

(c) Senior Registrar ( )

(d) Consultant ( )

**5. Time diagnosis was made.....**

**6. Time caesarean section was done.....**

**7. Interval between diagnosis and delivery.....**

**8. Type of anesthesia**

(a) General ( )

(b) Spinal ( )

**Part 4: Fetal outcomes**

**1. Sex**

(a) Male ( )

(b) Female ( )

**2. Birth weight (kilograms).....**

**3. APGAR score at 1 minute.....5 minutes.....10 minutes.....**

**4. Mortality**

(a) Yes ( )

(b) No ( )

**5. Admission to neonatal intensive care unit**

(a) Yes ( )

(b) No ( )