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DETERMINANTS OF LOW APGARS AND INTRAPARTUM STILLBIRTH IN 4 PUBLIC HOSPITALS IN KIGALI CASE CONTROL STUDY

Project proposal for dissertation to be submitted in partial fulfillment of the requirements for the award of degree of Master of Medicine in Obstetrics and Gynecology of the University of Rwanda

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August, 2021

DECLARATION

I,**Dr DUKUZUMUREMYI Fabien** hereby declare that, this dissertation entitled **« DETERMINANTS OF LOW APGARS AND INTRAPARTUM STILLBIRTH IN 4 PUBLIC HOSPITALS IN KIGALI; CASE CONTROL STUDY »** is my original work and has never been presented elsewhere for academic qualification.

Student name: **Dr DUKUZUMUREMYI Fabien**

Student number: 10100172

Sign: Date…/……/……

Certification by the Supervisor

This research has been submitted with my approval as the supervisor of the University of Rwanda.

Name: Prof Magriples Urania

Dr NTASUMBUMUYANGE Diomède

Sign: Date: / /

For and on behalf of the University of Rwanda.

DEDICATION

To the Almighty God

To my Wife and my Daughter

To my Mother

To my Brothers and Sisters

To all my Friends and Relatives

I dedicate this work.

ACKNOWLEDGEMENT

I sincerely articulate my appreciation from the bottom of my heart and thank all teaching staff of the college of Medicine and Health Sciences/University of Rwanda; especially those in Obstetrics and Gynecology department, for the devotion demonstrated in our training.

In particular, I also express my gratefulness to Prof. MAGRIPLES Urania, Dr NTASUMBUMUYANGE Diomède and Dr NKUBITO GATERA Valens who kindly accepted to guide me in the achievement of this work despite their busy schedules.

I also express our gratitude to any other person, who contributed to the realization of this work in one way or another. To them; I express my heartfelt gratitude.

ABBREVIATIONS AND ACRONYMS

1. **HIE:** Hypoxic Ischemic encephalopathy
2. WHO: World Health Organization
3. ANC:Antenatal Care
4. **BMI:** Body mass index
5. **HIV:** Human Immunodeficiency Virus
6. **DH:** District Hospital
7. **C/S**: Cesarean section
8. **SVD**: Spontaneous vaginal delivery
9. **RMH:** Rwanda Military Hospital
10. **CHUK:** Centre Hospitalier Universitaire de Kigali
11. **SPSS:** Statistical Package for the Social Sciences
12. **IUFD:**Intrauterine fetal demise
13. **CTG:**Cardiotocography

ABSTRACT

Background: The feature of Apgar score is to swiftly recapitulate the baby's health and to direct resuscitation. Low Apgar are linked to various antagonistic consequences including asphyxia, needs for intensive care, high risk of neonatal respiratory distress, the requirement for mechanical ventilation, and mortality. The present study aim was to determine the predictors of low Apgar and intrapartum stillbirth which can be used to determine strategies to decrease adverse birth outcomes in Rwanda.

Methods: A case-control study by utilizing a pre-established data collection form was conducted. Our study sites consisted of 4 public hospitals in Kigali including 2 district hospitals and 2 referral hospitals. A total number of 770 participants, including 385 cases defined as those whose outcomes are 5-minute Apgar below 7 or stillbirth and 385 controls defined as those whose five-minute Apgar are 7 and above. We used a simple random sampling method to select the study participants. Analysis was performed on Sociodemographic, peripartum and fetal characteristics.

Results: The rate of low Apgar and stillbirths in general was 2.76% for all combined sites of recruitment, the prevalence of low Apgar only was 2.27% and that of stillbirths was 0.48%. Amniotic fluid status (OR=1.75; 95% CI: 1.20-2.56; p=0.003), parity (OR=1.41; 95% CI: 1.03-2.08; p=0.031), birth weight (OR=3.66; 95% CI: 2.20-6.09; p<0.001), intrauterine resuscitation (OR=3.28; 95% CI: 2.18-4.94; p<0.001), extreme prematurity (OR=16.9; 95% CI: 6.67-43.03; p<0.001) were predictors of low Apgar at the fifth minute, and stillbirth from the multivariable analysis. The use of Cardiotocography (CTG) during labor monitoring and education were found

to be protective factors from low Apgar and stillbirth. With Chi-square test, congenital fetal malformations were also found predictors of low Apgar or stillbirth.

Conclusion: This study shows that using CTG as a monitoring tool led to better outcomes. Given the adverse impact of the fifth minute low Apgar in neonates and the impact of stillbirth on patients and healthcare professionals, prospective studies are needed in low-resource settings.

INTRODUCTION

The Apgar is an approach to rapidly sum up the newborn's health and prompt resuscitative interventions. Virginia Apgar, a New York anesthesiologist created the score in 1952. The scoring system with Apgar is a diagnostic tool to assess the condition of newborns.[1] The Apgar represents respectively the appearance, Pulse, Grimace, Activity and Respiration, and each stage is rated using a scale of from 0 to 2 to 1, and with 5 minutes after birth. In some cases, when the child's condition is not satisfactory for five minutes, 10 minute points may be allocated to evaluate if further treatment is needed.[2] The score of 7 and above is considered normal and is linked to better birth outcomes. Neonates with four to six points are moderately depressed and those who get zero to three are very depressed and have bad outcomes.

Low birth Apgar is related to many adverse consequences including asphyxia, high risk of neonatal respiratory distress, need for mechanical ventilation, neonatal admission for intensive care, and neonatal demise.[3] The strong correlation between hypoxic-ischemic encephalopathy (HIE) and Apgar scores was found.[4] Apgar score below 7 at the fifth minute is linked to increased risks of neurologic disability and the later seems to persist many years postnatally.[5] A Nigerian study done in 2015 found that neonates with severe HIE had scores between four and five.[6]

Skin incision to delivery time, High blood pressure and gestational age have been found significantly linked with low Apgar score in Ethiopia, for mothers who underwent cesarean section.[7]

In Mulago, the rate of low Apgar at birth was 8.5% and cord accident, medical conditions, mode of delivery as well the age of the mother at delivery were found to be significant risk for low Apgar score.[8]

As defined by the World Health Organization (WHO), the term stillbirth consists of a child with no signs of life at all at birth or after gestational period of 28 weeks. Worldwide there are approximately 2.7 million stillbirth babies; most stillbirths (98%) are in low-income and middle-income countries.[9] Stillbirth rates vary worldwide and in Africa. In 1996 , the still birth rate was reported as 11.3/1000 births in a teaching hospital in Northern Jordan.[10] In Nigeria, over three year period there was 46.9 ±3.6 stillbirths per 1000 births in the hospital.[11]

The audit of perinatal death with application of a three-delay analysis was conducted in 2 urban hospitals and found the stillbirth rate to be at 20/1000. [12]That study was conducted in 2017 and the Low birth Apgar was not the outcome of interest.

Perinatal mortality refers to the sum of stillbirths and neonatal deaths divided by the total birthdays and live births. In developed countries, the individual, mortality ranges from 2 to 10/1000. The perinatal mortality rate in Rwanda is 31/1000, of which 61% is due to stillbirths. Improvements in prenatal care, health care delivery, and delivery follow-up are associated with better outcomes. [13-14] It is crucial to detect high-risk pregnancies early and provide adequate care during delivery to lessen the stillbirth rate.[15]

There are many studies examining the determinants of stillbirth; there may be potential causes of child death. Maternal medical conditions; obstetric complications; maternal or fetal hematology; fetal genetic, structural, and karyotype abnormalities; placental infections, fetal infections, or both; and pathological diagnosis of the placenta were determined to be six types of stillbirth by the collaborative research network in the United States of America [16]. The stillbirth in Africa is caused by different causes. The study conducted in South Africa reported that 57.7% of stillbirth was found as the direct cause. Including placental abruption, umbilical cord prolapse and uterine rupture.[17] Another study Ghana in a tertiary hospital, multiparity and hypertension were risk factors for fetal death.[18] Maternal age, marital status, health insurance, parity, previous diabetes, high blood pressure, smoking, alcohol, pre-pregnancy BMI ≥ 30 kg/m2, and HIV are closely related to prenatal stillbirth.[19]

In-hospital fetal death is also considered a key indicator of poor quality of care because it reflects medical personnel, resources, and disease status.[20] As found in Tanzania, night shift delivery doubles the risk of adverse perinatal outcomes compared to morning shifts deliveries which may reflect insufficient staff and resources.[21] Intrapartum monitoring has also been shown to play a role because observational studies have shown a link between suspicious cardiotocographic traces and adverse delivery outcomes including stillbirth. [22]

The perinatal mortality rate should be reduced to 12 per 1,000 live births in accordance with Sustainable Development Goals.[23]

For this reason, the stillbirth rate must also be reduced. This can only be achieved by identifying high-risk prenatal conditions and perinatal distress. Identifying risk factors for stillbirth in Rwanda can help guide interventions to reduce adverse perinatal outcomes. This study evaluated

the determinants of intrapartum stillbirth and low Apgar at birth in CHUK, RMH, Masaka DH, and Muhima DH to help guide future interventions to reduce perinatal mortality.

METHODS

The study design was a case-control of deliveries resulted in stillbirth or a low Apgar score at birth, regardless of the delivery mode. The Apgar score was considered as low at birth if less than 7 at the 5^{th} minute. Overall, 770 participants were considered in the study (385 cases and 385 controls) considering the period of 1 year from January 2020 to December. Simple random sampling method was used.

A stillbirth is a newborn with no life's signs and Apgar 0 from a mother with positive fetal cardiac activity at the admission time. The mothers who delivered on the same day with good Apgar as outcome served as controls. The next patient in the delivery book served as the control. We enrolled mothers who gave birth at RMH and CHUK, Referral Hospitals in Kigali City on one side and Masaka DH, Muhima DH on the other side; they were chosen as they represent the largest proportion of maternity cases in Kigali. Midwives collected important research data from multiple locations; they were recorded on pre-designed structured data collection forms. Data were entered by aid of Epidata and data analysis with SPSS 16.0 software for Windows and Stata. The confection of text, tables, and graphics, were done via MICROSOFT WORD 2010 and MICROSOFT EXCEL 2010. We conducted bivariate and multivariate analysis for factors linked with stillbirth, and the p value was considered statistically significant if less than or equal to 0.05. Before collecting data, the protocol was submitted to the Institutional review board of the University of Rwanda, College of Medicine and Health Sciences for review and approval. We have also obtained ethical approvals from CHUK, RMH, Masaka DH and Muhima DH. The participant's name

was not displayed in the data collection tool to ensure the privacy of the information of study participants.

RESULTS

The study recruited 770 mothers who delivered in four health facilities in Kigali including 2 referral hospitals, CHUK and Rwanda Military Hospital, and 2 district hospitals, Muhima and Masaka district hospitals. The majority of participants (78.1%) were between 20 and 35 years old, and 33% of the participants were primiparas. 62% of participants have attended high school, and 73% of participants are unemployed. 93% of participants were Christians, and 75% of the study participants were from urban areas (Table 1).

Of the 770 participants recruited into this study, 385 for low birth Apgar in the first five minutes or stillbirth (cases), and other 385 participants delivered babies with good scores of 7 and above (controls). From each hospital, equal number of cases and controls were recruited (Table 2). The overall prevalence of low birth scores and stillbirth for all study sites was 2.76%, while the rate of only low birth Apgar was 2.27% and that of stillbirths was 0.48%. The rate of stillbirths was 0.45%, 0.37%, 0.66% and 0.85% at Muhima hospital, Masaka hospital, CHUK and RMH respectively. (Table 3)

The study findings illuminated that almost a half (42.9%) of all extreme preterm deliveries (24w0d-27w6d) were performed in CHUK, which may explain the rate of low Apgar at birth and stillbirths in comparison to DH. A great number of fetal malformations were diagnosed at RMH in second and Early third Trimester of pregnancy and termination was offered. This can also explain the proportion of low fifth minute Apgar and stillbirth at RMH between 28w0d-34w0d. (Table 4)

With comparison to mothers who delivered with a clear amniotic fluid, those with amniotic fluid stained with meconium were 2 times higher more likey to deliver babies with low fifth minute Apgar and stillbirth (OR=2.01; 95%CI: 1.43-2.80; p<0.001). Babies with low weight at birth were 6.6 folds higher to have low fifth minute Apgar and stillbirth as those with normal weight at birth with statistically significant difference (OR=6.64; 95% CI: 4.4-10.02; p<0.001) while there was statistically significant relationship between the rate of low fifth minute Apgar and stillbirth among macrosomic babies against babies with normal weight (OR=1.23; 95%CI: 0.50-3.01; p=0.650).

The mothers who had intrauterine resuscitation along delivery had 2.1 folds more higher to deliver a baby with low fifth minute Apgar and stillbirth compared to those who did not have intrauterine resuscitation with a statistically significant difference (OR=2.11; 95%CI: 1.58-2.81; p<0.001).

Extreme prematurity (24w0d-27w6d) had 16.9 odds to result in low fifth minute Apgar and stillbirth compared to term pregnancy (OR=16.9; 95% CI: 6.67-43.03; p<0.001), very and moderate preterm (28w0d-34w0d) had 5.11 odds higher to lead to low fifth minute Apgar and stillbirth compared to term pregnancy (OR=5.11; 95% CI: 3.00-8.68; p<0.001). Late preterm pregnancy was associated with 1.38 odds to result in low fifth minute Apgar and still birth compared to term but the difference was not statistically significant (OR=1.38; 95% CI: 0.91-2.09; p=0.125).

Mothers with no formal education had 2.71 odds to deliver babies with low fifth minute Apgar and stillbirth compared to those who attended university with statistically significant difference (OR=2.71; 95% CI: 1.37-5.35; p=0.004) and mothers who attended primary school had 2.34

folds to deliver babies with low fifth minute Apgar and stillbirth as those who attended university with statistically significant difference (OR=2.34; 95% CI: 1.32-4.13; p=0.003).

There was no association between low Apgar score at the 5th minutes and stillbirth among mothers who attended secondary school compared to mothers who attended university was not statistically significant (OR=1.51; 95% CI: 0.92-2.47; 0.102).

Labors with CTG category 2 had 2.2 folds to result in low fifth minute Apgar and stillbirth compared to those with CTG category 1 (OR=2.17; 95% CI: 1.28-3.66; p=0.004). The relationship between low fifth minute Apgar and stillbirth among labors with category 2 and without CTG compared to labors with CTG category 1 was not statistically significant. All the 13 babies who had fetal malformations had low fifth minute Apgar and stillbirth (p<0.001). (Table 5)

Status of amniotic fluid, parity, birth weight, intrauterine resuscitation, gestational age, educational attainment and the non use of CTG tracing during labor monitoring were the true predictors of low Apgar score at the fifth minute and stillbirth from the multivariable analysis. The participants with amniotic fluid stained with meconium had 1.75 odds to deliver babies with low Apgar score at the fifth minute and stillbirth (OR=1.75; 95% CI: 1.20-2.56; p=0.003), the ones with thick meconium had 2 folds to deliver a babies with low score at the 5th minute and stillbirth compared to those with clear amniotic fluid but the difference was not statistically significant (OR=2.08; 95% CI: 0.46-9.36; p=0.337). Primiparous mothers were more odds to deliver babies with low fifth minute score and stillbirth compared to multiparous mothers with statistically significant difference (OR=1.41; 95% CI: 1.03-2.08; p=0.031). Babies born with low birth weight had 3.66 folds higher to have low Apgar score at the fifth minute and stillbirth as compared to those born with normal weight (OR=3.66; 95% CI: 2.20-6.09; p<0.001). Babies

with history of intrauterine resuscitation had 3.3 odds to have low birth Apgar score at the 5th minute and stillbirth compared those without intrauterine resuscitation (OR=3.28; 95% CI: 2.18-4.94; p<0.001). Preterm delivery was associated with low score of Apgar at the 5th minutes and stillbirth compared to term pregnancies and the difference was statistically significant. Mothers without a formal education, and those who attended primary education had more odds to deliver babies with low score of Apgar at the fifth minute and stillbirth compared to mothers who attended university and the difference was statistically significant. Labors that were monitored without CTG had 2.5 folds higher result in low score of Apgar at the 5th minute and stillbirth compared to the labors that were monitored with CTG (OR=2.55; 95% CI: 1.67-3.88; p<0.001). (Table 6)

DICUSSION

Most of the participants (78.1%) were aged between 20 and 35 years old and 33% of the participants were primiparous. Sixty two percent of the participants had attended secondary school and 73% of the participants were unemployed. Ninety-three percent of the participants were Christians while 75% were from urban areas. These demographics are similar to most studies done for evaluation of predictors of Low fifth minute Apgar and stillbirth.

The present study aimed to assess the magnitude of low 5th minute Apgar and stillbirth in four public hospitals located Kigali. The frequency of stillbirth was 0.5 %, 0.4%, 0.7 and 0.9% for Muhima DH, Masaka DH, CHUK, and RMH, respectively and the percentage of low Apgar at the 5th minute was 1.8%, 2.2%, 3.7% and 3.6%. Extreme prematurity and fetal malformations were the ones responsible of apparently increased rate of low score of Apgar at the 5th minute and stillbirth in referral hospitals than in DH as almost half (42.9%) of all extreme preterm

deliveries (24w0d-27w6d) from CHUK and babies who had malformations incompatible with life at birth were found at tertiary level.

With our study, we found a low rate of low Apgar score at the fifth minute and stillbirth compared to other different countries. Like in different studies, the reported rate of stillbirth was 8.5%, 4.69%, 1.13%, 17.8% in Kenya, Nigeria, Jordan and Ethiopia respectively. [8 10 11 24] The possible explanation is related to improved health care service, health education during pregnancy and focused antenatal care.

Our study found that of amniotic fluid status, parity, birth weight, intrauterine resuscitation, gestational age, educational attainment and use of CTG tracing during labor monitoring were the true predictors of low score of Apgar, and stillbirth in multivariable analysis. The findings are in line with the study from southern Ethiopia which found a relationship between the meconium-stained liquor and low weight at birth, and low Apgar score at the 5th minute.[24]

Contrary, in Tanzania, a study found that off-hours deliveries especially at night, was linked with higher risk of bad perinatal outcomes, including low score of Apgar ,stillbirths and early neonatal mortality, compared to morning shifts, no difference is seen in our settings.[21]

As the current study use retrospective data and that there were some missed files, the two were considered as limitations to this study.

In our case-control study, the utilization of CTG monitoring tool led to better outcomes. Given the adverse impact of low score of Apgar at the 5th minutes on neonates and the consequence of stillbirth on both patients and health care providers, prospective studies are needed in low resource settings.

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LIST OF TABLES

Table 1: Sociodemographic characteristics of study participants

Characteristics	n	%
Maternal age		
12-19 years	56	7.3
20-35 years	601	78.1
36-50 years	113	14.7
Parity		
Primiparity	256	33.3
2-4	393	51.0
5 and above	121	15.7
Level of education		
No formal education	66	8.6
Primary school	145	18.8
Secondary school	482	62.6
University	77	10.0
Occupation		
Unemployed	564	73.3
Private sector	129	16.7
Public sector	77	10.0
Religion		
Christian	719	93.4
Muslim	36	4.7
None	15	2.0

Table 2. Participant's recruitment across hospital sites

Hospital	Recruited participants		Total
	Cases	Controls	
Masaka DH	114	114	228
Muhima DH	114	114	228
CHUK	100	100	200
RMH	57	57	114
Total	**385**	**385**	**770**

Table 3. Rate of Low birth Apgar and stillbirth at each study site

Hospital	Total Deliveries	Low birth Apgar (Rate)	Stillbirths (Rate)	Low Apgar and stillbirths (Rate)
Muhima	9291	164 (1.77%)	42 (0.45%)	206 (2.22%)
Masaka	4863	107 (2.20%)	18 (0.37%)	125 (2.57%)
CHUK	2268	85 (3.75%)	15 (0.66%)	100 (4.41%)
RMH	1289	46 (3.56%)	11 (0.85%)	57 (4.40%)
Total	**17711**	**402 (2.27%)**	**86 (0.48%)**	**489 (2.76%)**

Table 4. Prematurity distribution at different sites

SN	Hospital	Deliveries between24w0d-27w6d	Percentage	Deliveries between 28w0d-34w0d	Percentage
1	Masaka	19	30.2	24	26.7
2	Muhima	11	17.5	21	23.3
3	CHUK	27	**42.9**	18	20
4	RMH	6	9.5	27	**30**
		63		90	

Table 5: Factors associated with low Apgar score at 5th minute and stillbirth (using binary logistic regression)

Predictors	APGAR at 5th minute		OR (95% CI)	p
	≥7	<7and Stillbirth		
Mode of delivery				
SVD	212 (48.1%)	229 (51.9%)	1.21 (0.90-1.61)	0.195
Operative vaginal delivery	6 (60.0%)	4 (40.0%)	0.74 (0.21-2.69)	0.657
Breech delivery	0 (0.0%)	3 (100%)		
C/S	167 (52.9%)	149 (47.1%)	ref	
Status of amniotic fluid				
Clear	308 (54.7%)	255 (45.3%)	ref	
Meconium stained	74 (37.6%)	123 (62.4%)	2.01 (1.43-2.80)	<0.001
Thick meconium	3 (30.0%)	7 (70.0%)	2.81 (0.72-11.01)	0.136
Antenatal care				
Less than 3	116 (43.3%)	152 (56.7%)	2.18 (0.92-5.16)	0.075
Between 3 and 7	254 (53.1%)	224 (46.9%)	1.47 (0.63-3.42)	0.372

8 and above	15 (62.5%)	9 (37.5%)	ref	
Parity				
Primiparity	118 (46.1%)	138 (53.9%)	1.26 (0.94-1.71)	0.126
Multiparity	267 (51.9%)	247 (48.1%)	ref	
Time of delivery				
Day shift	203 (51.1%)	194 (48.9%)	0.91 (0.68-1.21)	0.516
Night/day off shift	182 (48.8%)	191 (51.2%)	ref	
Condition of perineum at birth				
Episiotomy	66 (51.2%)	63 (48.8%)	0.93 (0.72-1.37)	0.725
Perineal tear	56 (54.4)	47 (45.6%)	0.82 (0.53-1.25)	0.36
Both perineal tear and episiotomy	1 (12.5%)	7 (87.5%)	6.84 (0.84-56.0)	0.073
Intact	262 (49.4%)	268 (50.0%)	ref	

Table 5 Factors associated with low fifth minute Apgar score and stillbirth (binary logistic regression analysis) cont'd

Predictors	**APGAR at 5th minute**		**OR (95% CI)**	**p**
	≥7	**<7 and still birth**		
Birth weight				
<2.5 kg	34 (18.5%)	150 (81.5%)	6.64 (4.4-10.02)	<0.001
2.5 kg-4 kg	340 (60.1%)	226 (39.9%)	ref	
>4 kg	11 (55.0%)	9 (45.0%)	1.23 (0.50-3.01)	0.65
Presence of caput				
Caput present	22 (41.5%)	31 (58.5%)	1.44 (0.82-2.54)	0.202
Caput absent	363 (50.6%)	354 (49.4%)	ref	
Intrauterine resuscitation all along delivery				
Yes	148 (40.3%)	219 (59.7%)	2.11 (1.58-2.81)	<0.001
No	237 (58.8%)	166 (41.2%)	ref	
Gestational age				
24w0d-27w6d	5 (7.9%)	58 (92.1%)	16.9 (6.67-43.03)	<0.001
28w0d-34w0d	20 (22.2%)	70 (77.8%)	5.11 (3.00-8.68)	<0.001
34w1d-36w6d	57 (51.4%)	54 (48.6%)	1.38 (0.91-2.09)	0.125
37w0d-41w6d	279 (59.4%)	191 (40.6%)	ref	
≥42w0d	24 (66.7%)	12 (33.3%)	0.73 (0.35-1.49)	0.39
Educational attainment				
No formal education	25 (37.9%)	41 (62.1%)	2.71 (1.37-5.35)	0.004
Primary school	60 (41.38%)	85 (58.62%)	2.34 (1.32-4.13)	0.003
Secondary school	252 (52.3%)	230 (47.7%)	1.51 (0.92-2.47)	0.102
University	48 (62.3%)	29 (37.7%)	ref	

CTG Tracing				
Category 1	217 (53.6%)	188 (46.4%)		
Category 2	25 (34.7%)	47 (65.3%)	2.17 (1.28-3.66)	0.004
Category 3	1 (20.0%)	4 (80.0%)	4.62 (0.51-41.66)	0.173
No CTG	142 (49.3%)	146 (50.7%)	1.18 (0.87-1.61)	0.276
Fetal malformation				
Yes	0 (0.00%)	13 (100%)		<0.001
No	385 (50.86%)	372 (49.14%)		

Table 6: Obstetric factors predictive of low Apgar score at the fifth minute and stillbirth (Multivariable analysis).

	AOR	95% CI	SE	z	P value
Status of amniotic fluid					
Meconium stained	1.75	1.20-2.56	0.338	2.92	0.003
Thick meconium	2.08	0.46-9.36	1.597	0.96	0.337
Clear	ref				
Parity					
Primiparity	1.41	1.03-2.08	0.263	2.15	0.031
Multiparity	ref				
Birth weight					
Less than 2.5 kg	3.66	2.20-6.09	0.949	5.02	<0.001
2.5kg-4kg	ref				
Above 4 kg	1.20	0.46-3.11	0.583	0.38	0.702
Intrauterine resuscitation					
Yes	3.28	2.18-4.94	0.684	5.71	<0.001
No	ref				
Gestational age					
24w0d-27w6d	7.04	2.50-19.83	3.721	3.7	<0.001
28w0d-34w0d	2.93	1.58-5.39	0.914	3.44	<0.001
34w1d-36w6d	1.08	0.68-1.71	0.253	0.32	0.523
37w0d-41w6d	ref				
42w0d and above	0.74	0.34-1.57	0.285	-0.78	0.435
Level of education					
No formal education	2.58	1.17-5.69	1.041	2.36	0.018
primary school	2.14	1.11-4.09	0.709	2.29	0.022
secondary school	1.39	0.78-2.47	0.409	1.14	0.253
University	ref				
GTC tracing					

CTG present	ref				
No CTG	2.55	1.67-3.88	0.547	4.38	<0.001
Constant	**0.12**	**0.06-0.22**	**0.038**	**-6.55**	**<0.001**

AOR: Adjusted Odds ratio; CTG: Cardiotocography, ref: reference group; CI: Confidence interval