

## Determining the Causes and Risk Factors of Stillbirths at GPHC

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### Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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### ABSTRACT

**Background:** Although a worldwide issue, the burden of stillbirths is mostly upon middle- and low-income countries [1,2]. SDG for stillbirths has a target of 12 or fewer stillbirths per 1000 total births in all countries. Guyana, a middle-income country at the brink of achieving the upper limit for UN's SDG for stillbirths, in the year 2030 [1,3,4]. GPHC is the main tertiary, referral, specialist hospital in Guyana.

**Objectives:** This study aimed to determine the stillbirth rate at GPHC during the period of January 1 to July 31, 2021. It also aimed to determine the number of stillbirth cases that were being managed as inpatients vs referral, the number of stillbirth cases that were fresh vs macerated and also the main risk factors and causes of stillbirths at GPHC during the period January 1 to July 31, 2021

**Methodology:** A quantitative, retrospective, case control study was conducted. Cases included 37 stillbirths occurring at GPHC January 1 to July 31, 2021 that were 28 weeks gestation and older. Controls were 37 livebirths selected at random, meeting the same inclusion criteria as cases. Maternal medical records for cases and controls were review and descriptive statistics was used to analyse data extracted from charts.

**Results:** Stillbirth rate at GPHC from January 1 to July 31, 2021 was found to be 11.96 per 1000 births. More stillbirths were managed as referral (24 cases) vs inpatients (13 cases). Most stillbirths were macerated (68.57%) vs fresh (31.43%). Possible risk factors of stillbirth at GPHC include *male*

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sex, referral management, HTN disease, DM disease, not having antenatal labs done, having less than 8 ANC clinic visits, multiparity, preterm and post term gestation, advanced maternal age and being 35 and older. Most common cause of stillbirths was placenta abruption. Most common maternal condition is complications of placenta cord and membrane. The most common antepartum cause is foetal death unspecified, while the most common intrapartum cause was acute intrapartum event.

**Conclusion:** This study shows that there is improvement of stillbirth rate at GPHC. However, before the results from this study can be extrapolated onto Guyana, other comparative studies should be done.

**Keywords:** Stillbirths; GPHC; livebirths; Sustainable Development Goals (SDG).

## 1. INTRODUCTION

Stillbirths are an issue in all of the world [1,2] In the year 2015 alone, the stillbirth rate was noted to be 18.4 per 1000 birth [3]. Although, it is a global problem, the burden of stillbirths is experienced more in middle- and low-income countries [2]. What's even more appalling is, the majority of the causes of stillbirths are preventable [2].

UNs Sustainable Development Goals (SDG), has set a target for 12 stillbirths or fewer per 1000 total births for every country by the year 2030 [3]. Guyana, a middle-income country in South America, is at the precipice of the upper limit of SDG target for stillbirths, with a rate of 13.8 (per 1000 total births) in the year 2019 [1]. The trend of the stillbirth rate in this country is also decreasing when compared to previous years [1]. In order for Guyana to achieve UN's SDG by the next 9 years, strategies need to be put in place to eliminate preventable causes of stillbirths. This would entail the regular assessment of country's stillbirth rate and an analysis of causes of stillbirths, that will help guide the implementation of new strategies in maternal and child healthcare (MCH).

Georgetown Public Hospital Corporation (GPHC) is the largest hospital in Guyana and serves as a regional hospital and main tertiary referral health care institution in the country. It is a specialist hospital, inclusive of an Obstetrics and Gynaecological (OB/GYN) department. The majority of deliveries in region four (which contains the largest population in Guyana) are done at GPHC. The hospital also manages maternal emergencies from other health care institutions in the country. The OB/GYN department at GPHC follows standardised protocols adopted from ACOG and other international bodies with the aim of reducing the number of maternal and child morbidity and

mortality. The stillbirth rate for a 7 months period from January to July, 2019 was 15.8 (per 1000 total births), considerably higher than country's stillbirth rate in 2019, possibly attributed to high number of referral cases [4].

This study aimed to determine the stillbirth rate at GPHC from the period of January to July, 2021 and to distinguish the stillbirth cases that were being managed as inpatients vs the referral cases. It also aimed to highlight the main causes and risk factors identified for stillbirths at GPHC.

## 2. METHODOLOGY

This was a retrospective, observational, case control study of all stillbirths and proportion of the livebirth cases occurring in the OB/GYN department at GPHC, from January 1 to July 31, 2021. Cases for this study were selected based on the following criteria: Delivery occurring from January 1 to July 31, 2021 and, gestational age at delivery 28 weeks and older. All stillbirth cases that met the following criteria were selected as the sample of cases. A random sample of live birth cases (having the same sample size as sample of cases) that met the following criteria were selected as sample of control. Maternal charts for each sample unit was perused and the following data was extracted: *Registration Number, Initial of First and Last Name, Date of Admission, Maternal Age, Date and Time of Delivery, Gender of Baby, Fate of Baby, Maturity of Pregnancy, Birth Weight, Inpatient vs Referral, GsPs, Maternal Morbidity, Toxic Habits, Trauma, Number of Antenatal Clinic Attendances, HTN and/or DM disease, Maternal Hb, Recent Obstetric Ultrasound Findings, Diagnosis on Admission, ROM >18hrs, Antenatal Labs Done, Type of Delivery (for stillbirth cases fate of delivery {fresh vs macerated} and cause of death were also extracted). Data was inputted into an encrypted table with similar headings, that only the researchers had access to.*

Data entry file was then converted to as SPSS data file where the frequencies were computed and tables and charts were created. The odds ratio using binary logistics regression and multinomial logistics regression at the 95% confidence interval for the following factors were attempted in SPSS: *Maternal Age, Date and Time of Delivery, Gender of Baby, Fate of Baby, Maturity of Pregnancy, Birth Weight, Inpatient vs Referral, GsPs, Maternal Morbidity, Toxic Habits, Trauma, Number of Antenatal Clinic Attendances, HTN and/or DM disease, Maternal Hb, Recent Obstetric Ultrasound Findings, Diagnosis on Admission, ROM >18hrs, Antenatal*

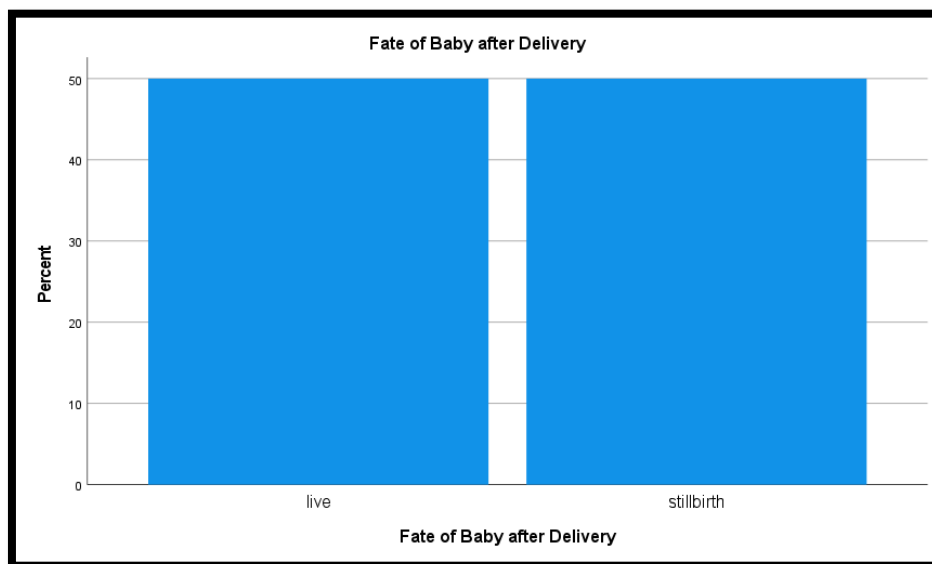
*Labs Done, Type of Delivery, Fresh vs Macerated.* However, odds ratio could not be computed due to the number of missing data from data set, for the factors, and therefore was excluded from the study. Higher frequency percentages of a factor for *stillbirth* cases, when compared to livebirth cases was used instead to determine whether a likely risk factor existed (although it is a weak tool for showing association).

The *ICD-PM Classification of cause death* was then determined for each stillbirth case.

### 3. RESULTS

**Table 1. Fate of baby after delivery**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	live	37	50.0	50.0	50.0
	stillbirth	37	50.0	50.0	100.0
	<b>Total</b>	<b>74</b>	<b>100.0</b>	<b>100.0</b>	



**Fig. 1. Fate of baby after delivery**

Sample for cases and controls consisted of 37 stillbirths and 37 livebirths respectively. The frequency table and bar chart in Figs. 1 and 2 depicts the aforementioned information.

#### Stillbirth Rate Calculation:

- Total Number of Stillbirth recorded at GPHC from Jan 1, 2021 to Jul 31, 2021 = **42**
- Total Number of Stillbirths whose medical records were located from Jan 1, 2021 to Jul 31, 2021 = **37**
- Total Numbers of Births Occurring at GPHC from Jan 1, 2021 to Jul 31, 2021 = **3, 094**
- Stillbirth Rate at GPHC from Jan 1, 2021 to Jul 31, 2021 = **13.57 per 1000 births**

- Stillbirth Rate at GPHC from this study, from Jan 1, 2021 to Jul 31, 2021 = **11.96 per 1000 births**

**Table 2. Frequency table**

<b>Variables</b>	<b>Categories</b>	<b>Stillbirths N</b>	<b>Stillbirth %</b>	<b>Livebirths N</b>	<b>Livebirths %</b>
Fate of Baby	Macerated	24	<b>68.6</b>	N/A	N/A
	Fresh	11	<b>31.4</b>	N/A	N/A
Sex of Baby	Male	22	<b>57.9</b>	16	<b>42.1</b>
	Female	13	<b>38.2</b>	21	<b>61.8</b>
Management in Hospital	Inpatient	13	<b>30.2</b>	30	<b>69.8</b>
	Referral	24	<b>77.4</b>	7	<b>22.6</b>
HTN Disease	HTN	16	<b>76.2</b>	5	<b>23.8</b>
	No HTN	21	<b>39.6</b>	32	<b>60.4</b>
DM Disease	DM	3	<b>60</b>	2	<b>40</b>
	No DM	34	<b>40</b>	35	<b>50.7</b>
Maternal Hb	Anaemia	9	<b>47.4</b>	10	<b>52.6</b>
	Normal Hb	27	<b>50</b>	27	<b>50</b>
Toxic Habits	Yes	2	<b>40</b>	3	<b>60</b>
	no	32	<b>48.5</b>	34	<b>51.5</b>
Trauma	Yes	1	<b>3.4</b>	0	<b>0</b>
	no	28	<b>96.6</b>	36	<b>100</b>
Antenatal Labs Done	Yes	28	<b>43.8</b>	36	<b>56.3</b>
Type of Delivery	No	6	<b>85.7</b>	1	<b>14.3</b>
	SVD	28	<b>50.9</b>	27	<b>49.1</b>
ROM<18hrs	LSCS	9	<b>47.4</b>	10	<b>52.6</b>
	Yes	22	<b>37.9</b>	36	<b>62.1</b>
Antenatal USG Done	No	2	<b>66.7</b>	1	<b>33.3</b>
	Yes	30	<b>45.5</b>	36	<b>54.5</b>
Number of ANC Attendance	No	5	<b>83.3</b>	1	<b>16.7</b>
	Less than 8 visits	23	<b>51.1</b>	22	<b>48.9</b>
Parity	8 visits and above	6	<b>28.6</b>	15	<b>71.4</b>
	Nulliparity	11	<b>44</b>	14	<b>56</b>
	Primiparity	3	<b>23.1</b>	10	<b>76.9</b>
	Multiparity	20	<b>66.7</b>	10	<b>33.3</b>
Gestational Age	Grand-multi parity	3	<b>50</b>	3	<b>50</b>
	28+0 to 31+6	13	<b>36.1</b>	0	<b>0</b>
	32+0 to 33+6	5	<b>13.9</b>	0	<b>0</b>
	34+0 to 36+6	11	<b>30.6</b>	3	<b>9.7</b>
	37+0 to 38+6	5	<b>13.9</b>	10	<b>32.3</b>
	39+0 to 41+6	1	<b>2.8</b>	18	<b>58.1</b>
Birth Weight	>42+0	1	<b>2.8</b>	0	<b>0</b>
	<1000g	5	<b>14.3</b>	0	<b>0</b>
	1000g to 1499g	7	<b>20</b>	0	<b>0</b>
	1500g to 2499g	10	<b>28.6</b>	2	<b>5.4</b>
	2500g to 4000g	11	<b>31.4</b>	32	<b>86.5</b>
	>4000g	2	<b>5.7</b>	3	<b>8.1</b>
Age	19 years and less	1	<b>2.7</b>	6	<b>16.2</b>
	20years to 34years	28	<b>75.7</b>	27	<b>73</b>
	35years and older	8	<b>21.6</b>	4	<b>10.8</b>

Fig. 2 is a frequency table depicting frequencies for the following variables for stillbirth and livebirth pregnancies that occurred at GPHC from January 1 to July 31, 2021: “Sex of Baby, Management in Hospital, Hypertensive Disease, Diabetic Disease, Maternal Hb, Toxic Habits (alcohol use and smoking), Trauma, Antenatal Labs Done, Type of Delivery, ROM<18hrs, Ultrasound Done Antenatally, Maternal Age, Birth Weight of Baby, Number of ANC Attendances, Gestational Age, Parity”. The table also includes the percentages of frequencies for each variable. For **Fate of baby (macerated vs fresh) – stillbirths**: 24 cases were macerated, 11 cases were fresh, and 2 cases had missing data. N.B: fate of the baby was not applicable for livebirths. For **Sex of the baby – stillbirths**: 22 were males and 13 were females, 2 cases had missing gender, while for **Sex of baby – livebirths**: 16 were males and 21 were females. For **Management in hospital – stillbirths**: 13 were inpatients, 24 were referrals, while for **Management in hospital – livebirths**: 30 were inpatients and 7 were referrals. For **HTN disease – stillbirths**: 16 had HTN and 21 had no HTN, while for **HTN disease – livebirths**: 5 had HTN and 32 had had no HTN. For **DM disease – stillbirths**: 3 had DM and 34 had no DM, while for **DM disease – livebirths**: 2 had DM and 35 had no DM. For **Maternal Hb – Stillbirths**: 9 had anaemia, 27 had no anaemia and 1 had missing Hb, while for **Maternal Hb – livebirths**: 10 had anaemia and 27 had no anaemia. For **Toxic habits – stillbirths**: 2 cases had a toxic habit, 32 cases had none, and 3 cases had missing data, while for **Toxic habits – livebirth**: 3 cases had a toxic habit and 34 cases had no toxic habit. For **Trauma – stillbirths** 1 case had reported trauma, 28 cases had no reported trauma and 8 cases had missing data, while for **Trauma – livebirths** 0 cases had trauma, 36 had no trauma reported, 1 case had missing data. For **Antenatal labs done – stillbirths** 28 cases had labs done, 6 cases had no labs done and 3 cases had missing data, while for **Antenatal labs done – livebirths** 36 had labs done, while 1 had no labs done. For **Type of delivery -stillbirths** 28 cases were SVD and 9 cases were LSCS, while for **Type of delivery – livebirths** 27 cases were SVD and 10 cases were LSCS. For **ROM<18hrs – stillbirths** 22 cases had ROM<18hrs and 2 cases had ROM>18hrs, 13 cases had missing data, while for **ROM<18hrs – livebirths** 36 cases had ROM<18hrs, while 1

case had ROM>18hrs. **USG done antenatally – stillbirths** 30 cases had USG done antenatally, 5 cases had no USG done antenatally, and 2 cases had missing data, while for **USG done antenatally – livebirths** 36 cases had USG done antenatally and 1 had no USG done antenatally. For **Number of ANC visit – stillbirths** 23 had less than 8 ANC visits, 6 had 8 and greater ANC visits, 8 cases had missing data, while for **Number of ANC visit – livebirths** 22 cases had less than 8 visits and 15 cases had 8 visits and greater. For **Parity – stillbirths** 11 cases were nulliparous, 3 cases were primiparous, 20 cases were multiparous and 3 cases were grand-multiparous, while for **Parity – livebirths** 14 cases were nulliparous, 10 cases were primiparous, 10 cases were multiparous and 3 cases were grand-multiparous. For **Gestational age – stillbirths** 13 cases had GA from 28+0 to 31+6, 5 cases from 32+0 to 33+6, 11 cases from 34+0 to 36+6, 5 cases from 37+0 to 38+6, 1 case from 39+0 to 41+6, 1 case from >42+0 and 1 case had missing data, while for **Gestational age – livebirths** 0 cases had GA from 28+0 to 31+6, 0 cases from 32+0 to 33+6, 3 cases from 34+0 to 36+6, 10cases from 37+0 to 38+6, 18 case from 39+0 to 41+6 and 0 case from >42+0, 6 cases had missing data. For **Birth weight – stillbirths** 5 cases had <1000g, 7 cases had 1000g to 1499g, 10 cases had 1500g to 2499g, 11 cases had 2500g to 4000g, 2 cases had >4000g and 2 cases had missing data, while for **Birth weight – livebirth** cases 0 cases had <1000g, 0 cases had 1000g to 1499g, 2 cases had 1500g to 2499g, 32 cases had 2500g to 4000g, and 3 cases had >4000g. For Maternal Age – stillbirths 1 case was 19 years and less, 28 cases were ages 20 to 34 years, 8 cases were 35 years and older, while for Maternal ages – livebirths 6 cases were 19 years and less, 27 cases were ages 20 to 34 years, 4 cases were 35 years and older.

Fig. 2 is a bar graph showing the % frequencies of types of stillbirths. % Macerated stillbirth 68.57% while % fresh stillbirths 31.43%.

Figs. 3 and 4 are bar graphs showing % frequencies of “sex” of stillbirth and livebirth babies respectively at GPHC from January 1 to July 31, 2021. For stillbirth babies 62.86% were male while 37.14% were females. While for livebirths, 43.24% were male and 56.76% were female.

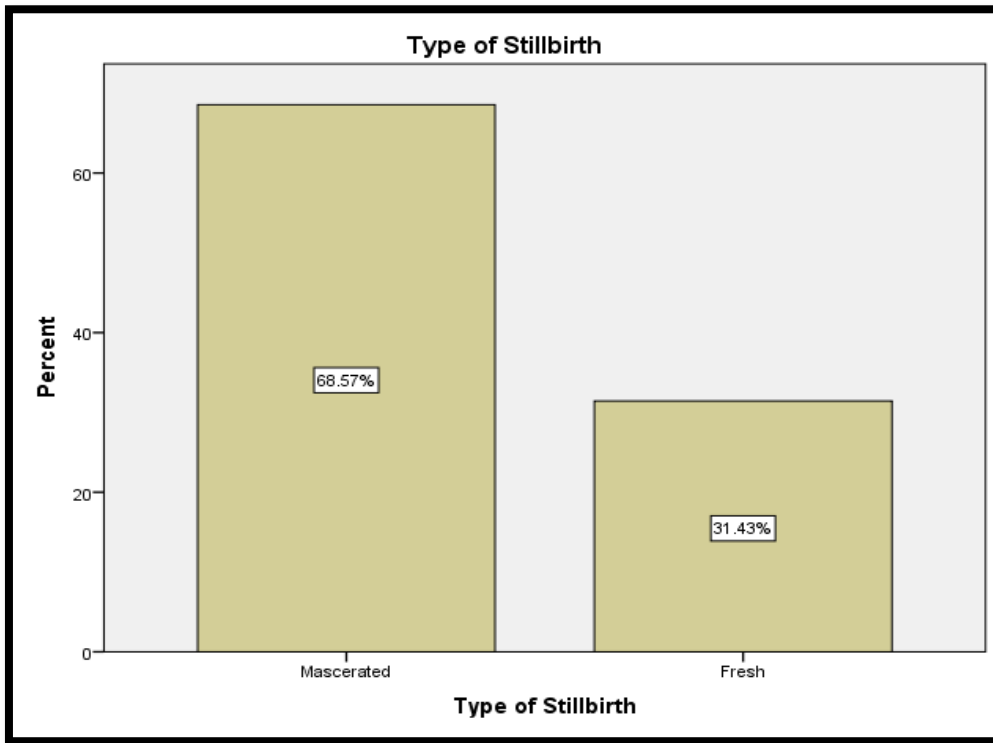


Fig. 2 .Type of Stillbirth

Sex of the Baby

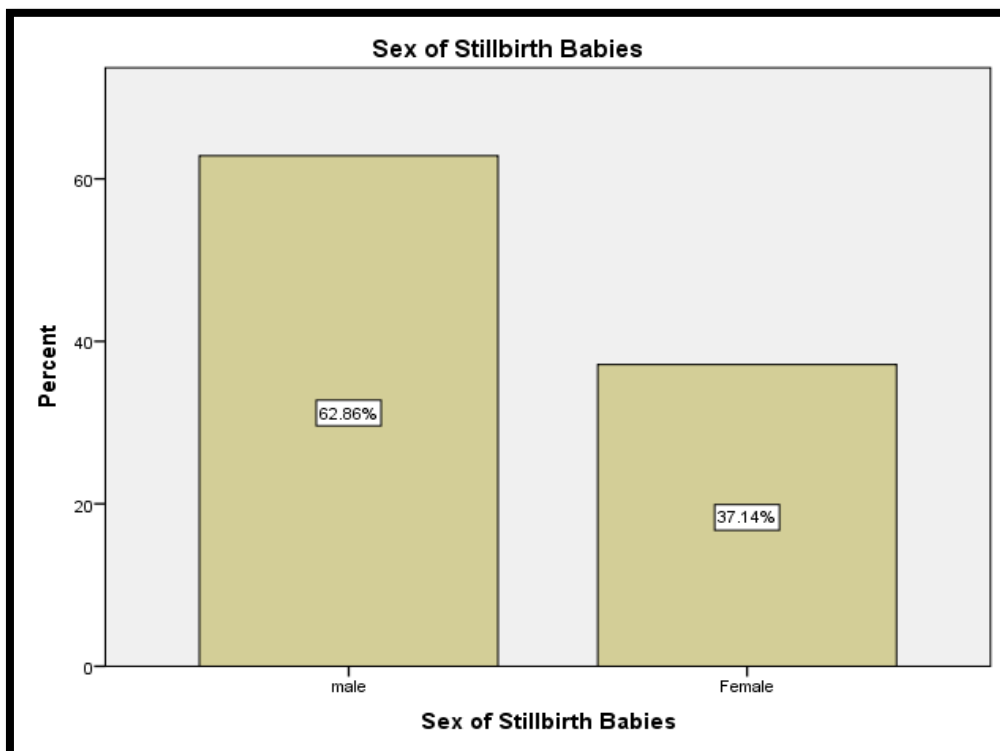


Fig. 3. Sex of the baby

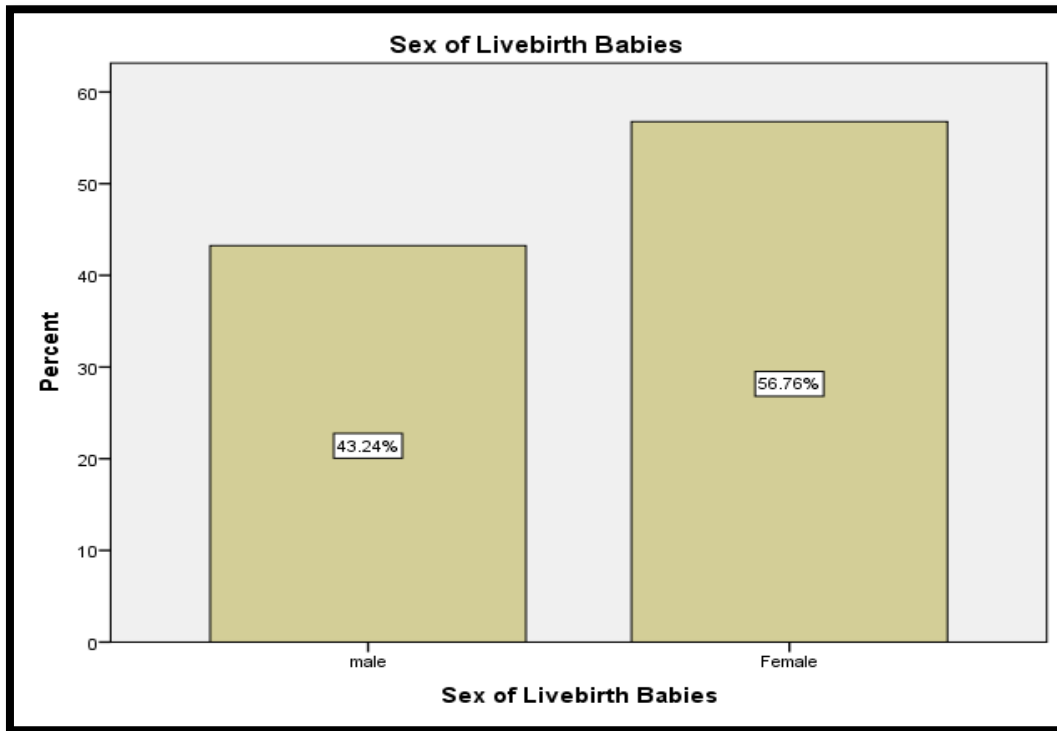


Fig. 4 Sex of livebirth babies

Management in Hospital

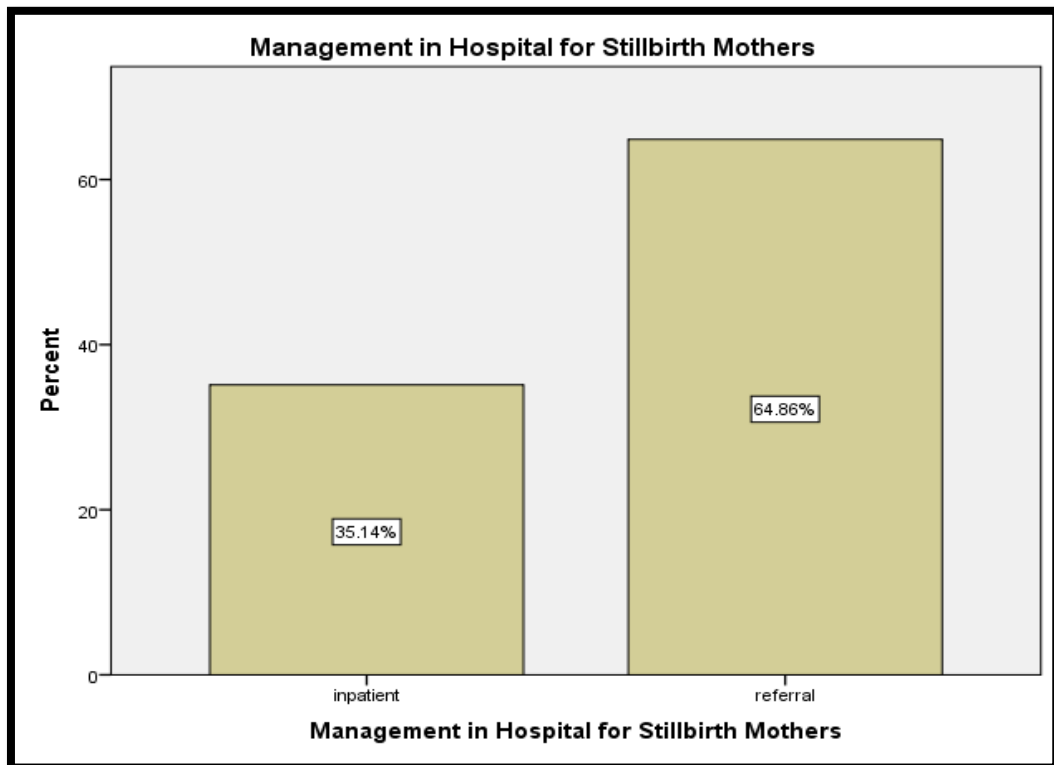
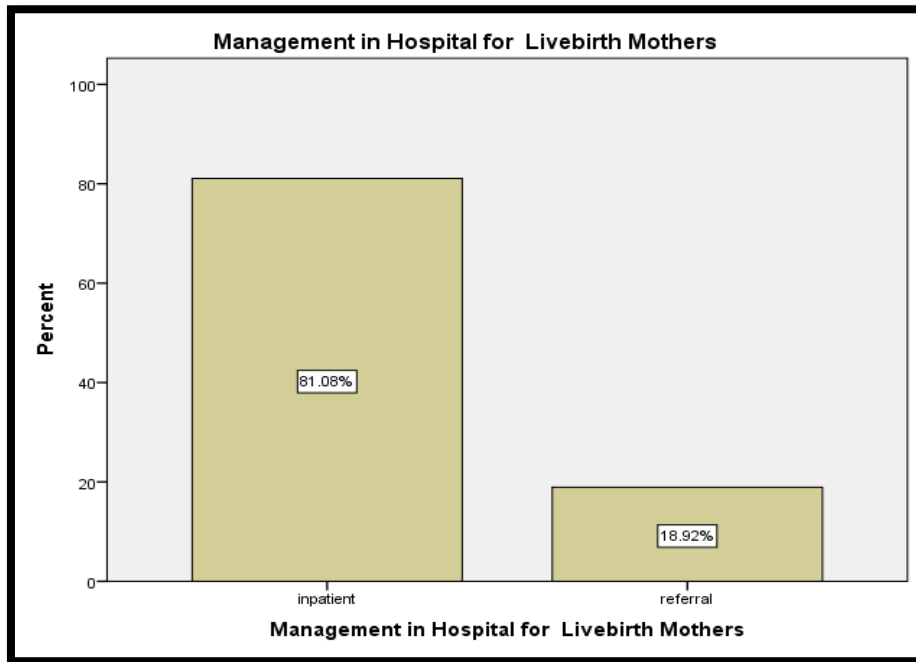


Fig. 5. Management in Hospital

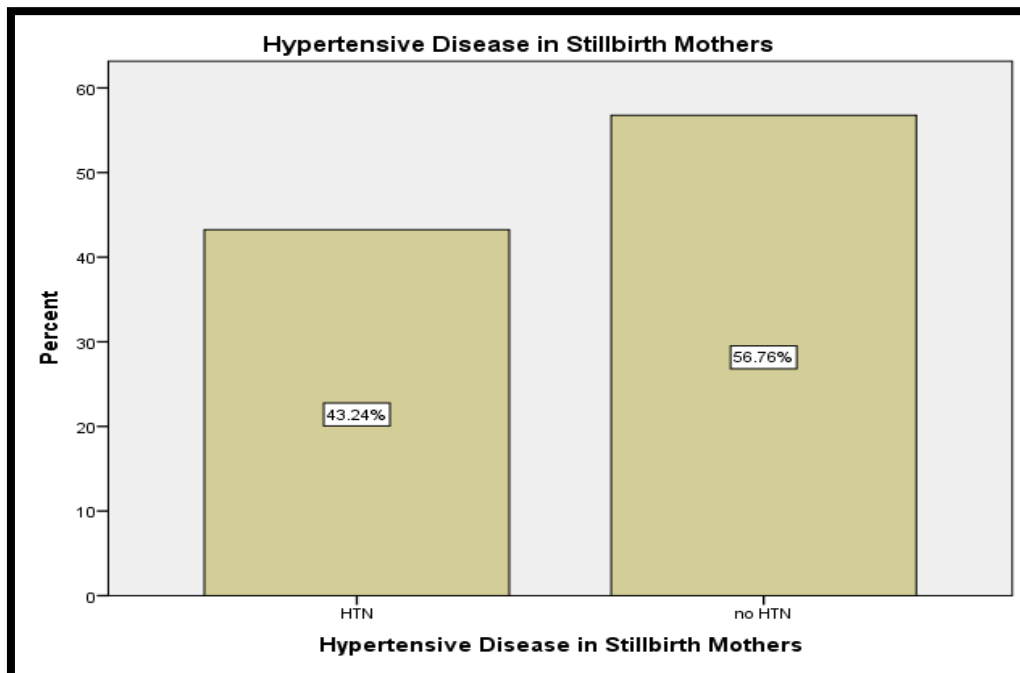


**Fig. 6. Management In hospital for live birth mothers**

Figs. 5 and 6 are bar graphs showing % frequencies for "Management of Stillbirth and Livebirth in Hospital", respectively, from January 1 to July 31, 2021 at GPHC. 35.14% of

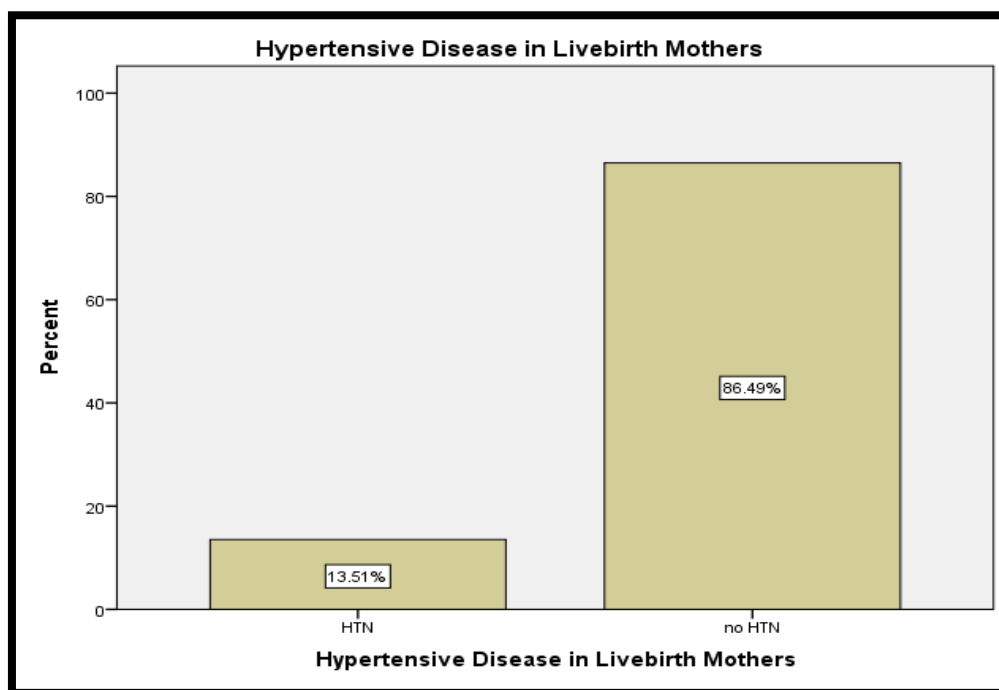
stillbirths were managed as inpatients, while 64.86% were referrals. For livebirths 81.08% were managed as inpatients while 18.92% were referrals.

### Hypertensive Disease



**Fig. 7. Hypertensive disease**



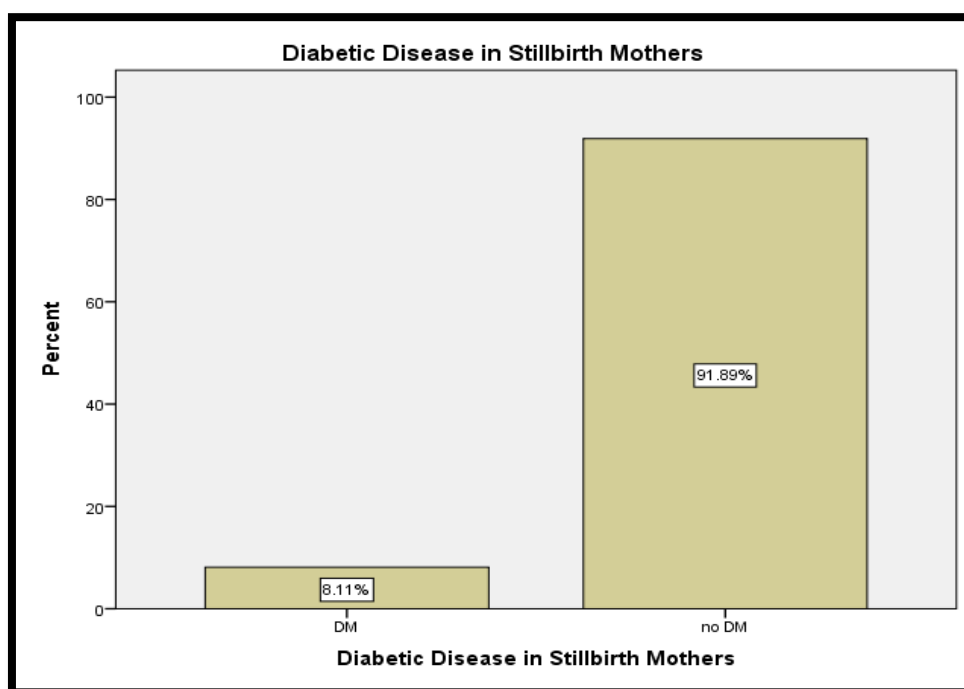


**Fig. 8. Hypertensive disease in livebirth mothers**

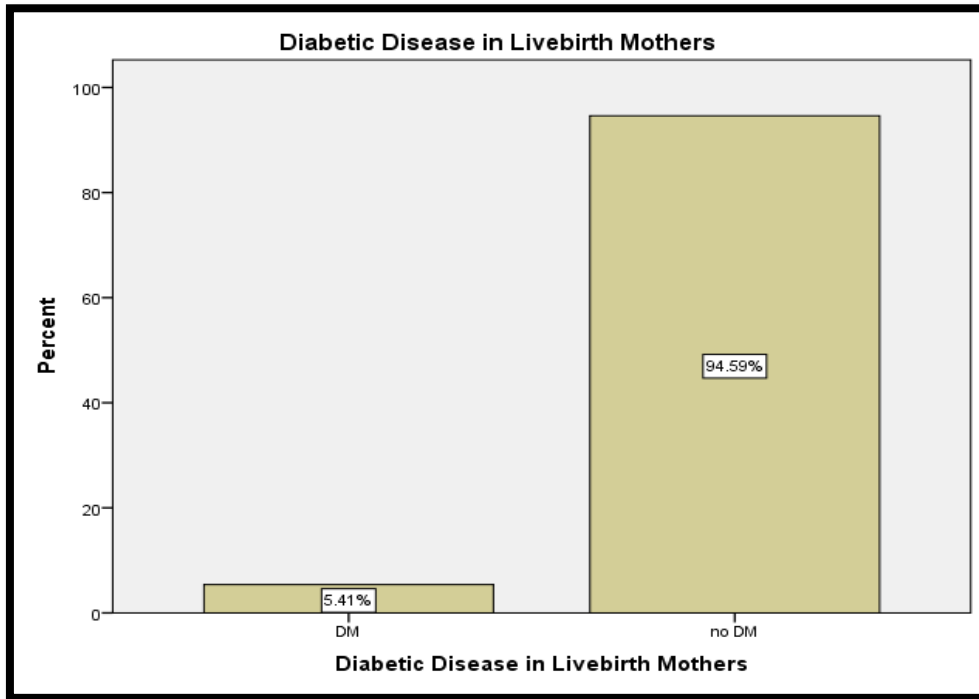
Figs. 7 and 8 are bar graphs showing % frequencies for "HTN Disease" in Stillbirth and Livebirth pregnancies, respectively, from January 1 to July 31, 2021 at GPHC. 43.24% of stillbirth

mothers had HTN while 56.76% of had no HTN. For livebirth cases 13.51% had HTN while 86.49% had no HTN.

**Diabetic Disease**



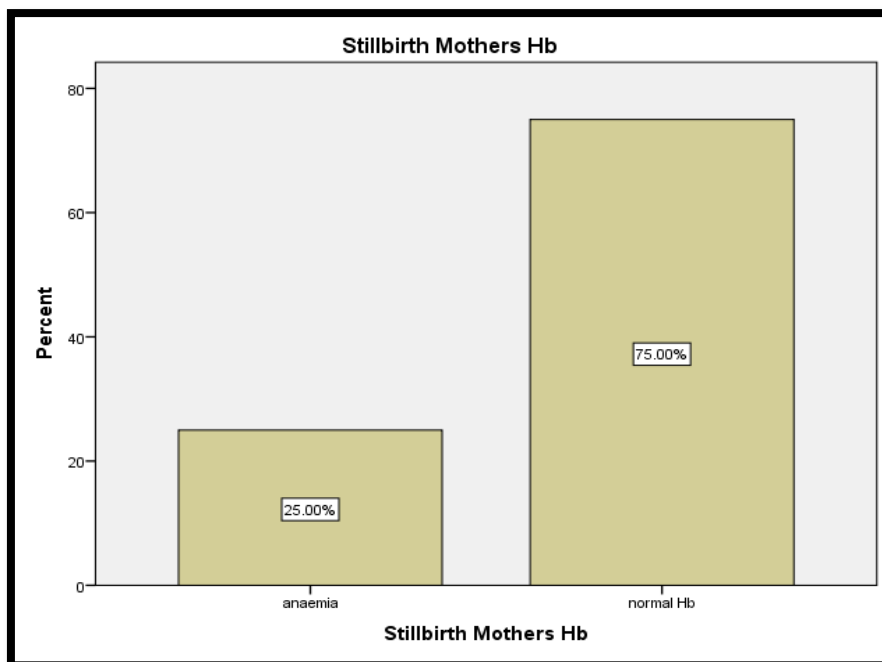
**Fig. 9. Diabetic Disease**



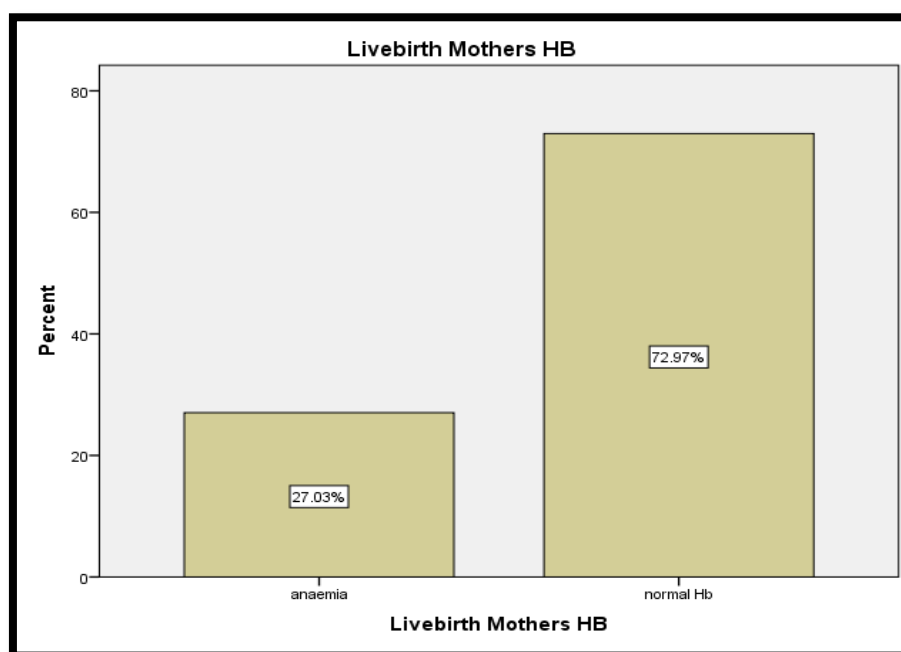
**Fig. 10. Diabetic Disease in Livebirth mothers**

Figs. 9 and 10 are bar graphs showing % frequencies of "DM Disease" in Stillbirth and Livebirth pregnancies from January 1 to July 31., 2021 at GPHC. 8.11% of stillbirth mothers had DM. While 91.89% had no DM. For livebirth mothers 5.41% had DM while 94.59% had no DM.

**Maternal Hb**



**Fig. 11. Maternal Hb**



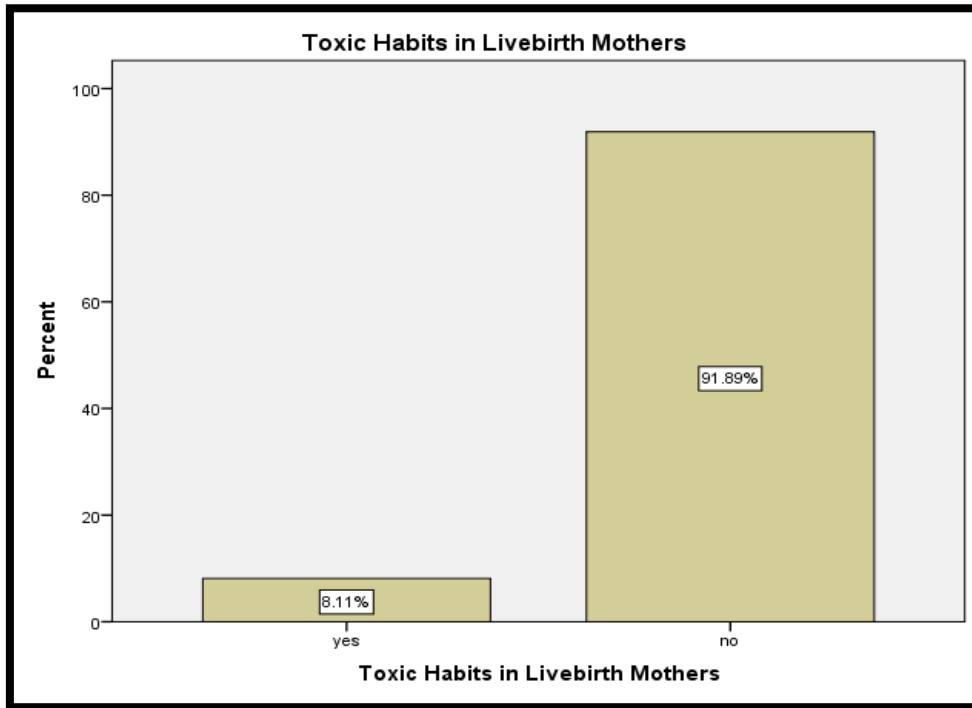
**Fig. 12. Livebirth Maternal Hb**

Figs. 11 and 12 are bar graphs showing % frequencies of "Maternal Hb" in Stillbirth and Livebirth pregnancies respectively, at GPHC from January 1 to July 31, 2021. For stillbirth mothers 25% had anaemia while 75% did not have anaemia. While for livebirth mothers 27.03% had anaemia while 72.97% had no anaemia.

### Toxic Habits



**Fig. 13. Toxic habits**

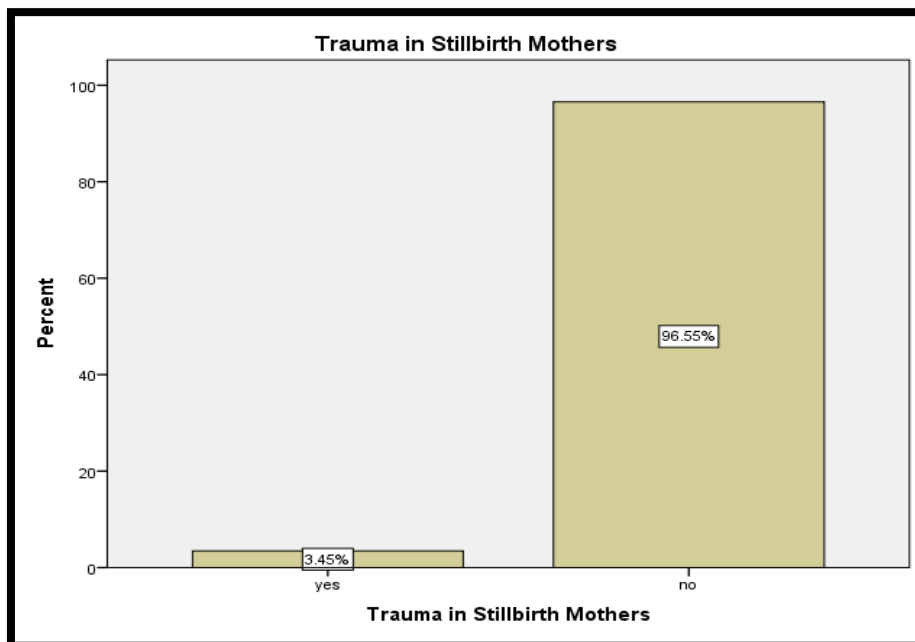


**Fig. 14. Toxic habits in livebirth mothers**

Figs. 13 and 14 are bar graphs showing the % frequencies of “*Toxic Habits (alcohol use and smoking)*” in Stillbirth and Livebirth pregnancies, respectively, at GPHC from January 1 to July 31,

2021. For stillbirth mothers 5.88% had toxic habits, while 94.12% had no trauma. While for livebirths 8.11% had toxic habits while 91.89% had no toxic habits.

### Trauma



**Fig. 15.**

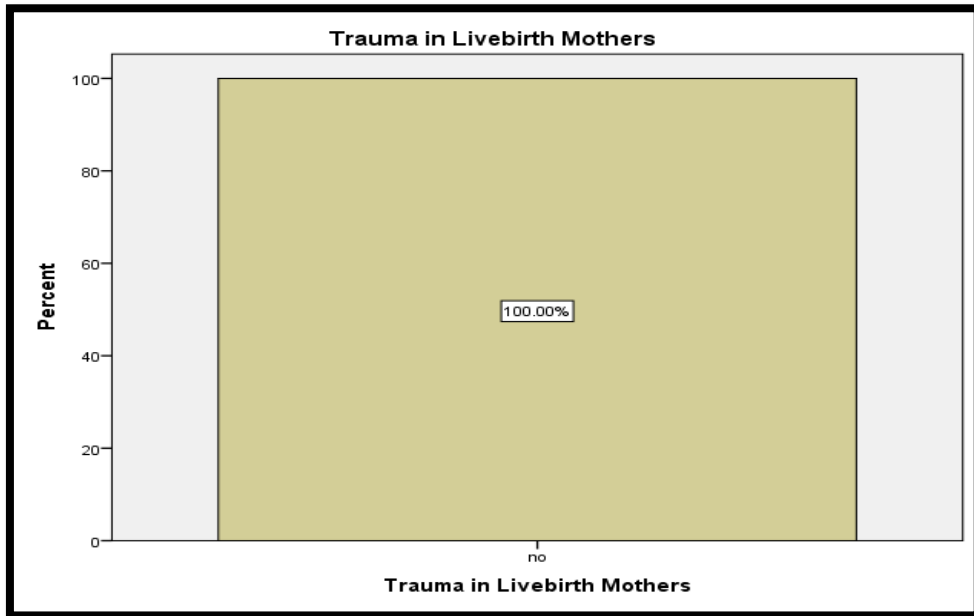


Fig. 16.

Figs. 15 and 16 are bar graphs showing the % frequencies for "Trauma" in Stillbirth and Livebirth pregnancies, respectively, at GPHC from January 1 to July 31, 2021. 3.45% of stillbirth mothers had trauma while 96.55% had no trauma. 100% of livebirth mothers had no trauma.

**Antenatal Labs Done**

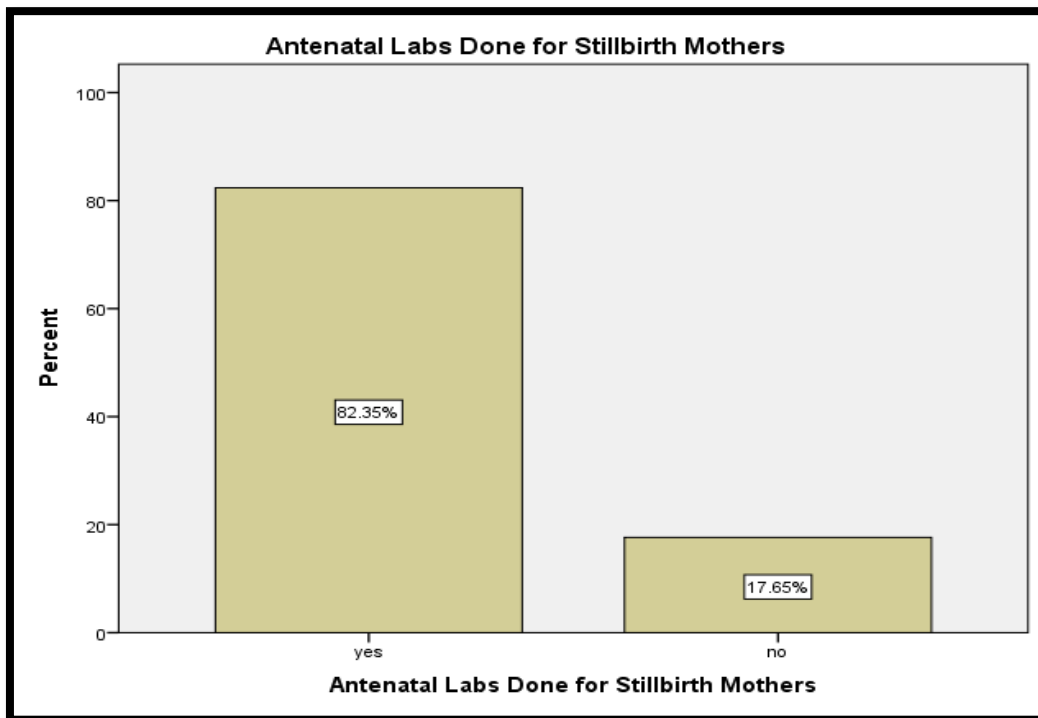
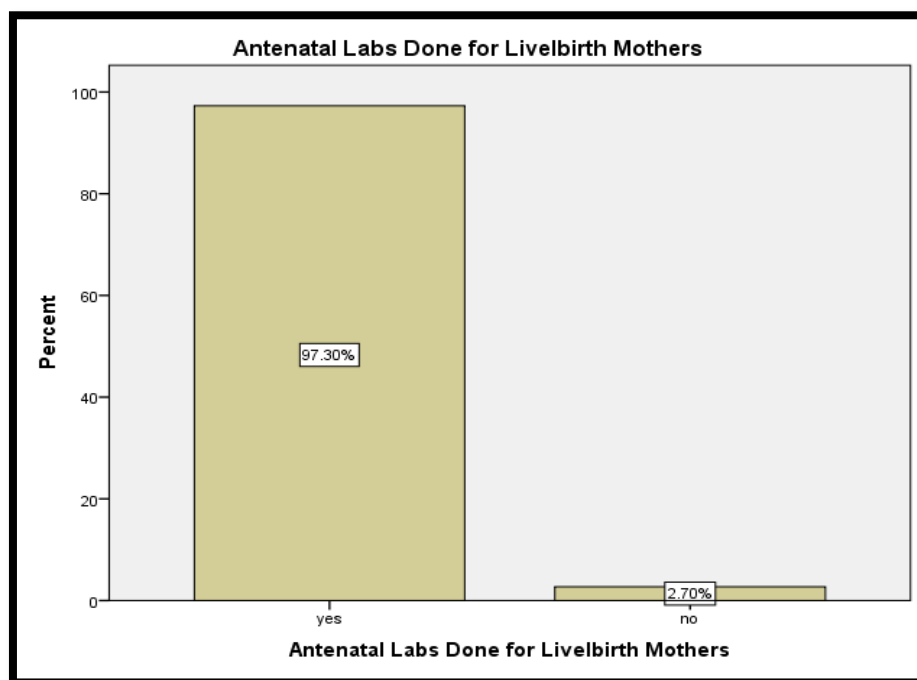


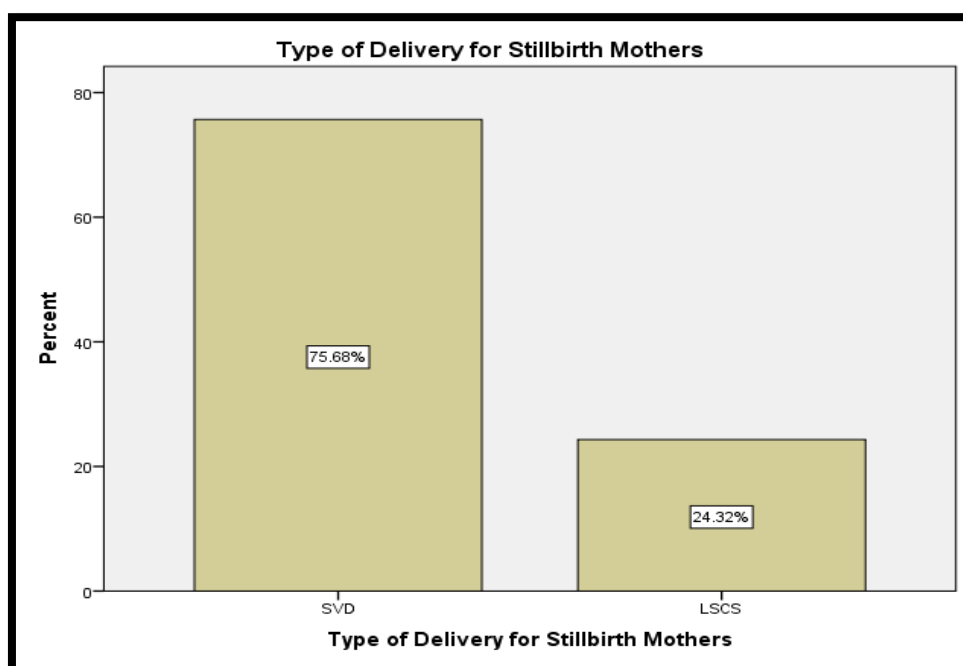
Fig. 17.



**Fig. 18.**

Figs. 17 and 18 are bar graphs showing the % frequencies of “*Antenatal Lab Done*” for stillbirth and livebirth pregnancies, respectively, at GPHC from January 1 to July31, 2021. 82.35% of stillbirth mothers had antenatal labs done, while 17.65% had no labs done. For livebirth mother 97.30% had antenatal labs done while 2.70% had no labs done.

**Type of Delivery**



**Fig. 19.**

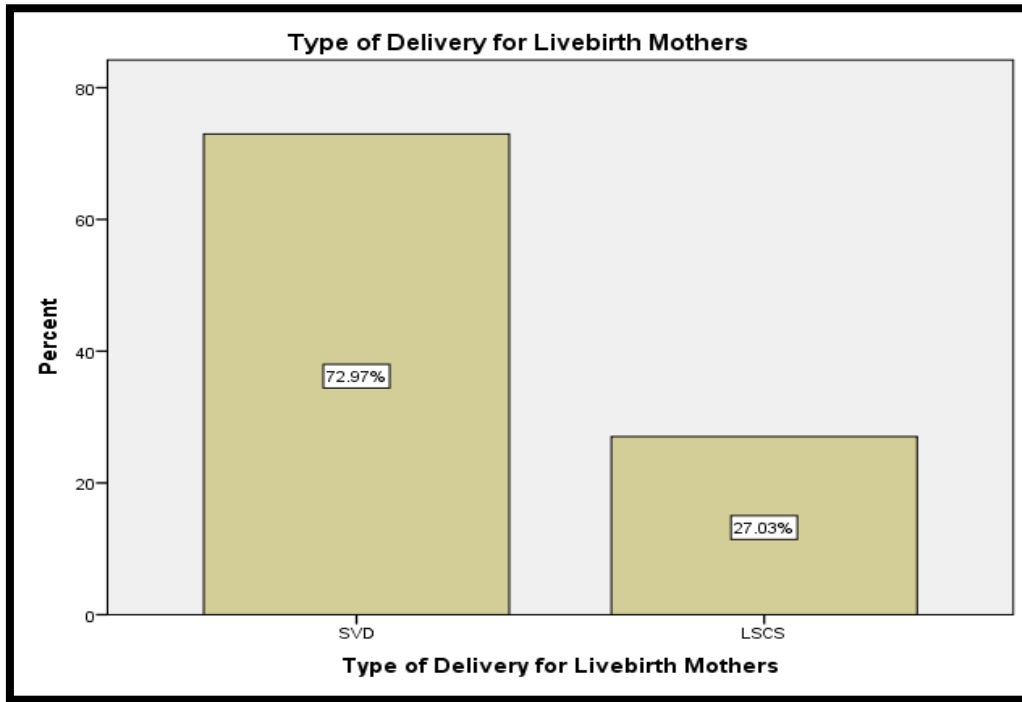


Fig. 20.

Figs. 19 and 20 are bar graphs showing % frequencies of "Type of Deliveries" of Stillbirth and Livebirth pregnancies, respectively, at GPHC from January 1 to July 31, 2021. 75.68% of stillbirth cases were delivered via SVD while 24.32% were delivered via LSCS. For livebirth cases 72.97% were delivered via SVD, while 27.03% were delivered via LSCS.

ROM<18hrs

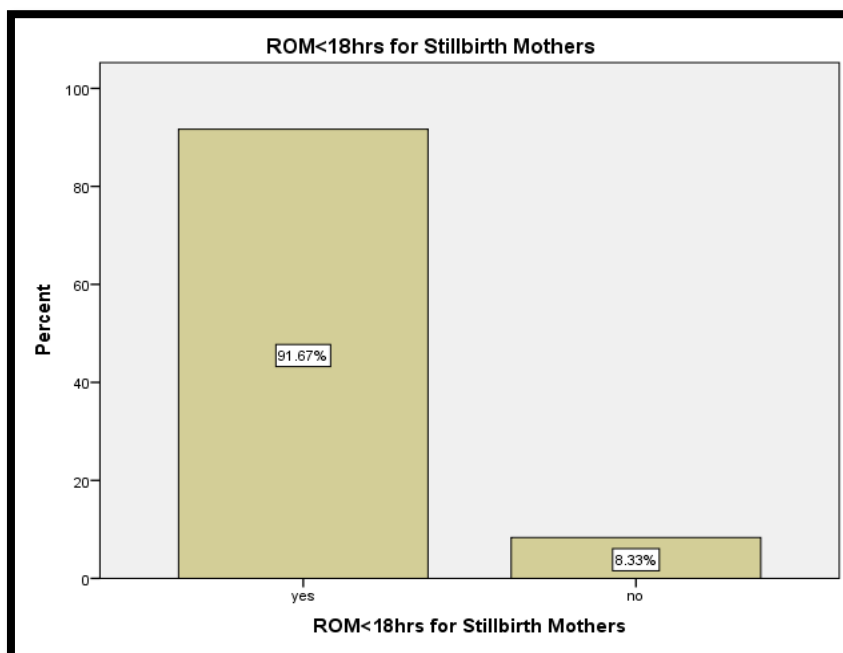


Fig. 21.

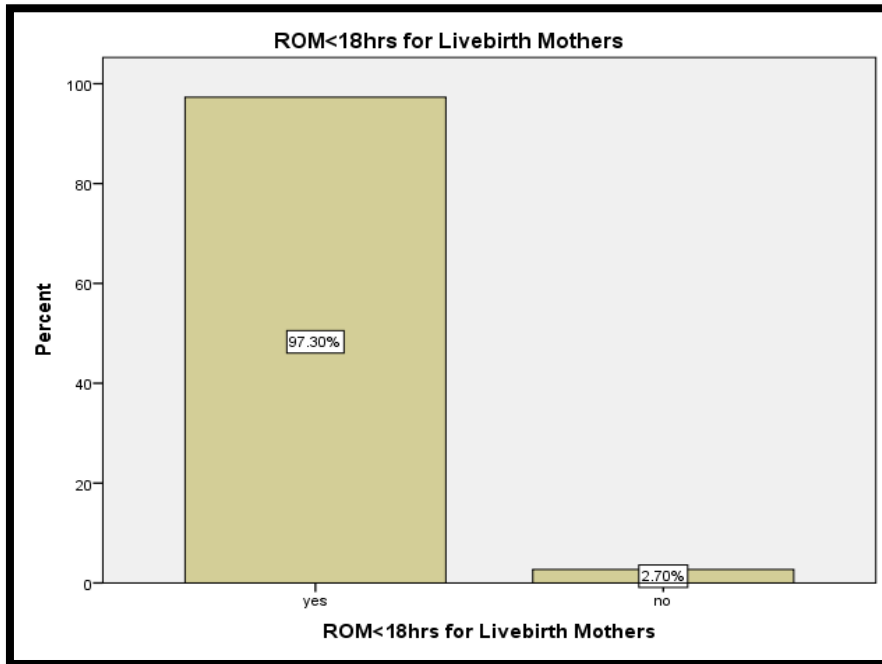


Fig. 22.

Figs. 21 and 22 are bar graphs showing % frequencies for "ROM<18hrs" in stillbirth and livebirth pregnancies, respectively, at GPHC from January 1 to July 31, 2021. For stillbirth cases 91.67% had ROM<18hrs, while 8.33% had ROM>18hrs. While for livebirth cases 97.30% had ROM<18hrs while 2.70 had ROM>18hrs.

**Ultrasound Done Antenatally**

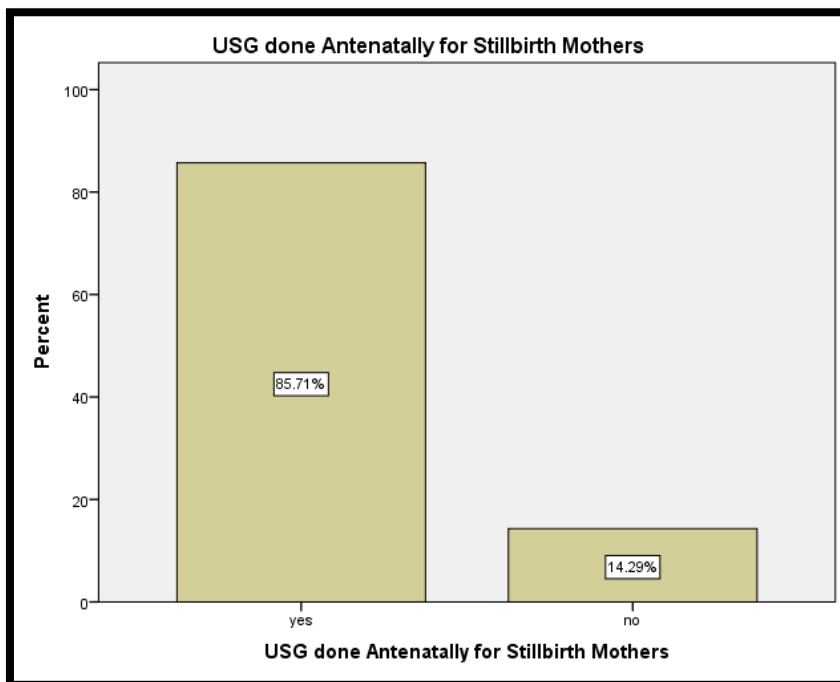


Fig. 23.



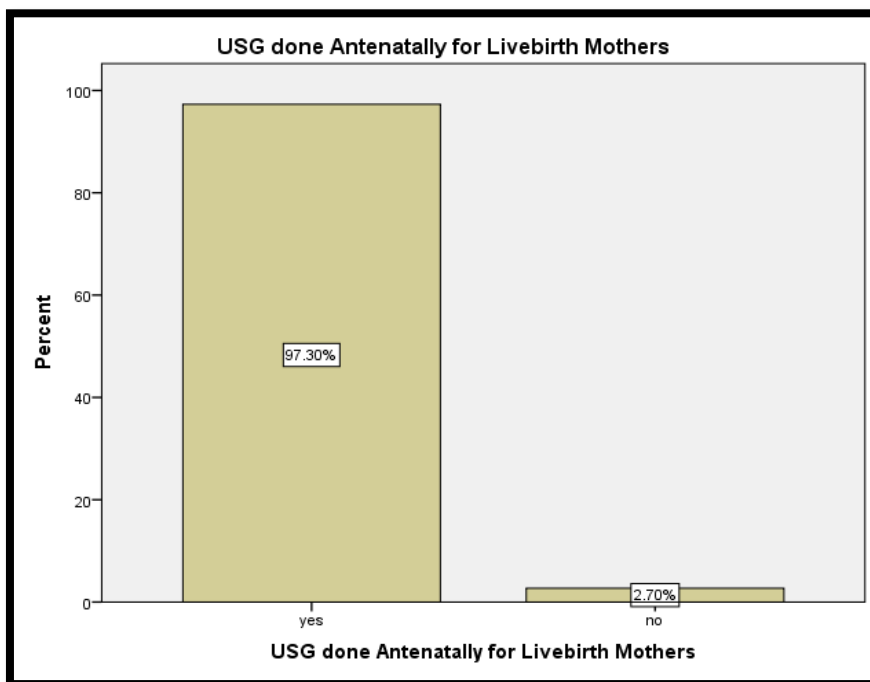


Fig. 24.

Figs. 23 and 24 are bar graphs showing % frequencies for "USG Done Antenatally" for stillbirths and livebirths respectively, at GPHC from January 1 to July 31, 2021. For stillbirth

cases 85.71% had USG done antenatally and 14.29% had no USG done antenatally. For livebirths 97.30% had USG done antenatally while 2.70% had no USG done.

**Maternal Age**



Fig. 25.

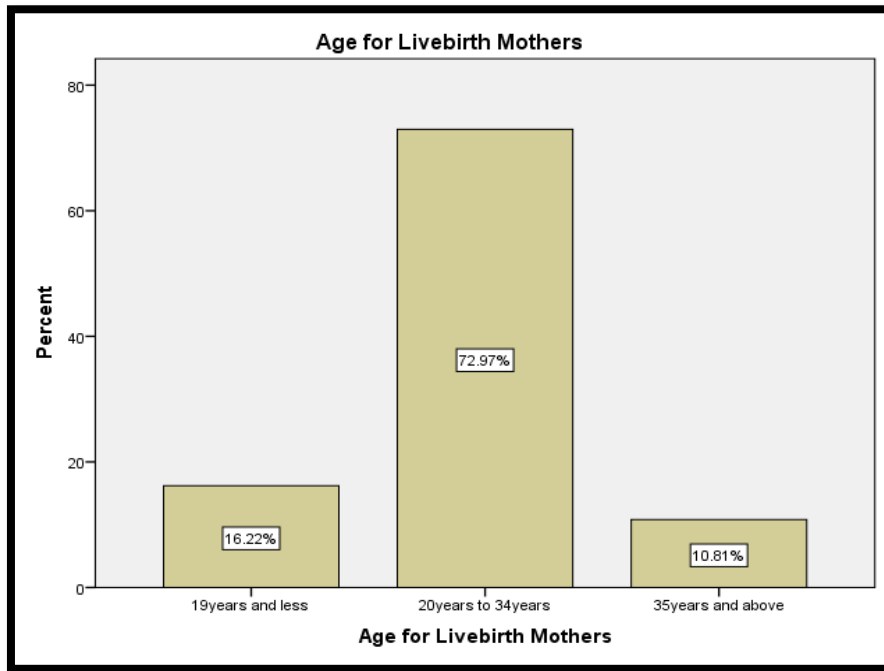


Fig. 26.

Figs. 25 and 26 are bar graphs showing % frequencies for “Ages of Stillbirth and Livebirth Mother”, respectively, from January 1 to July 31, 2021 at GPHC. 2.70% of stillbirth mothers were 19 years and less, 75.68% were 20 to 34 years

and 21.62% were 35 years and older. For livebirth mothers 16.22% were 19 years and less, 72.97% were 20 to 34 years and 10.81% were 35 years and older.

**Birth Weight of Baby**

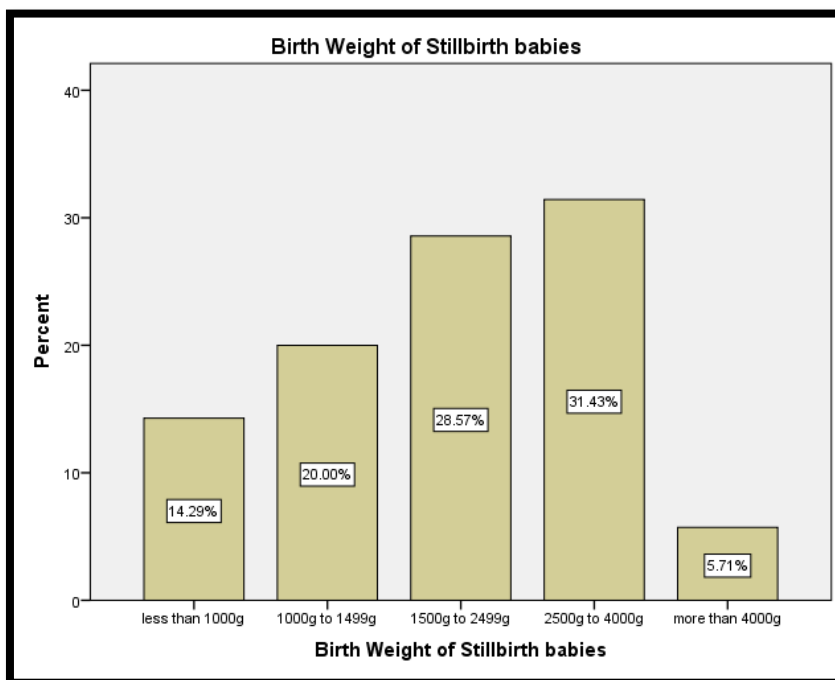


Fig. 27.

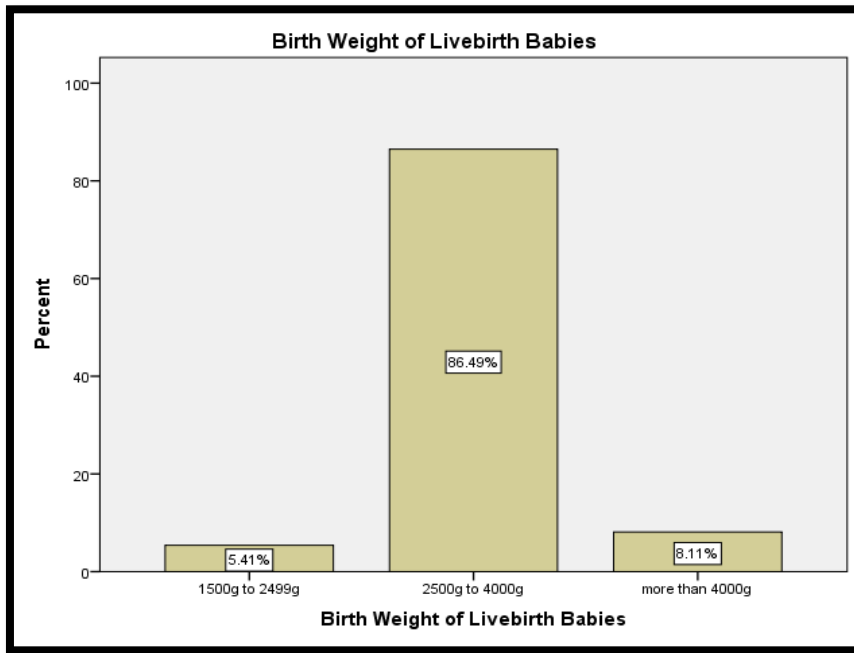


Fig. 28.

Figs. 27 and 28 are bar graphs showing the % frequencies of "Birth Weight of Babies" from stillbirth and livebirth pregnancies respectively, in January 1 to July 31, 2021 at GPHC. For stillbirth cases 14.29% were less 1000g, 20% were

1000g to 1499g, 28.57% were 1500g to 2499g, 31.43% were 2500g to 4000g and 5.71% were more than 4000g. For livebirth cases 5.41% were 1500g to 2499g, 86.49% were 2500g to 4000g, while 8.11% were more than 4000g.

**Number of ANC Attendances**

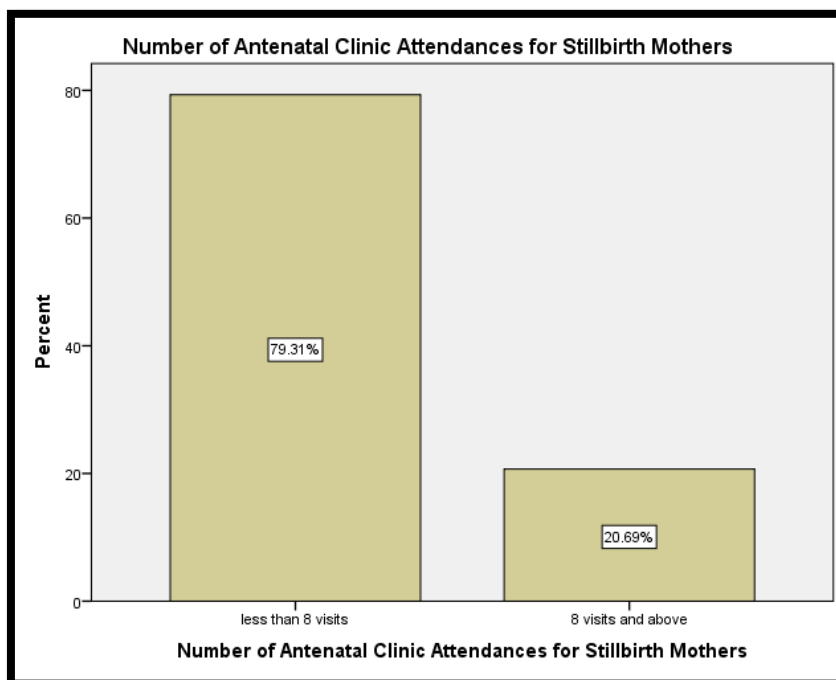
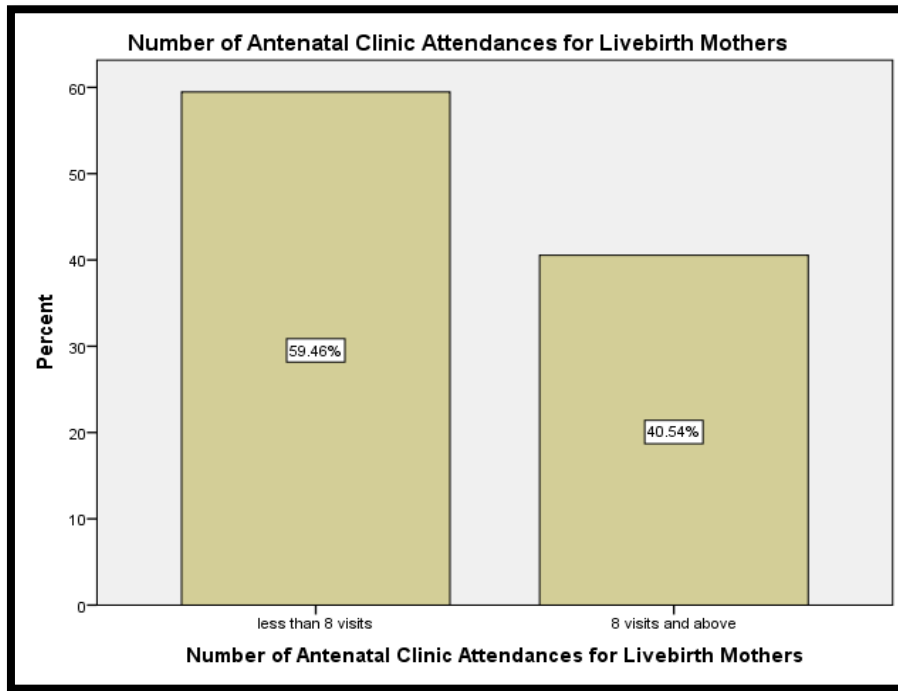


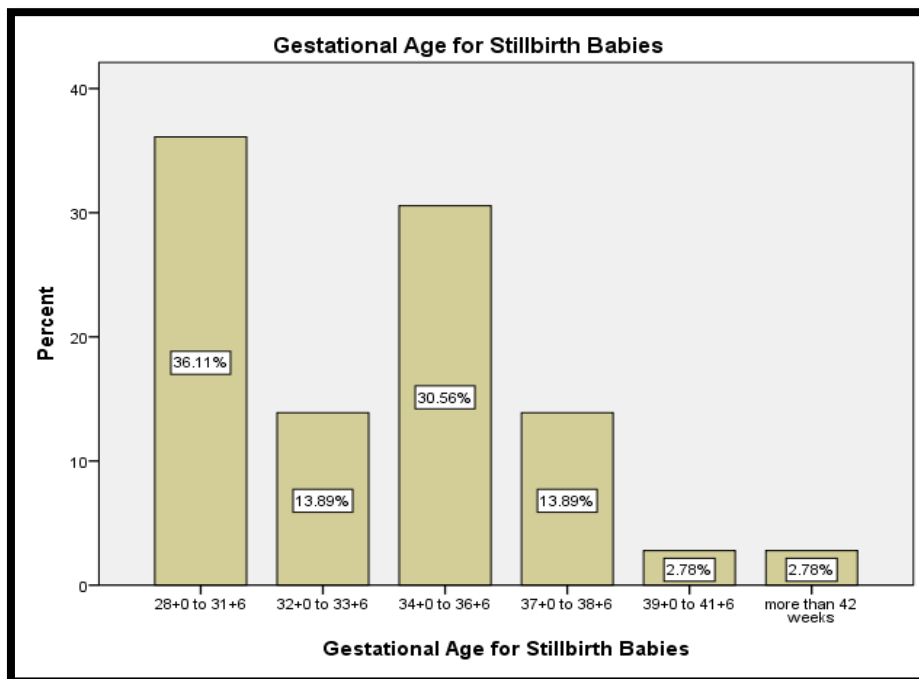
Fig. 29.



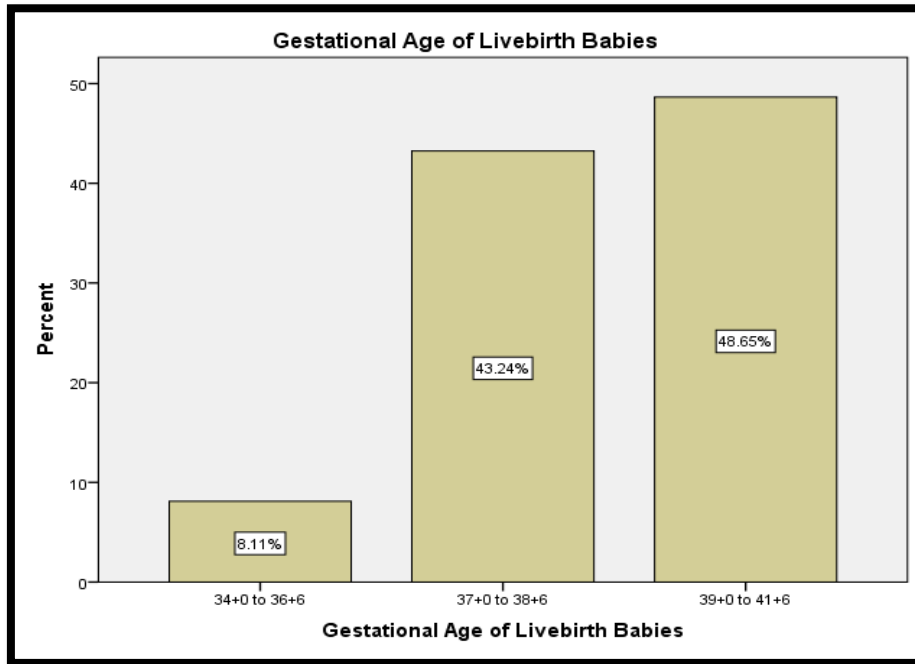
**Fig. 30.**

Figs. 29 and 30 are bar graphs depicting the % frequencies of “ANC Attendances” for stillbirth and livebirth pregnancies, respectively, from January 1 to July 31, 2021 at GPHC. 79.31 % of stillbirth mothers had <8 ANC visits, while 20.69% had 8 and more ANC visits. For livebirth mothers 59.46% had <8 ANC visits, while 40.54% had 8 and more visits.

**Gestational Age**



**Fig. 31.**

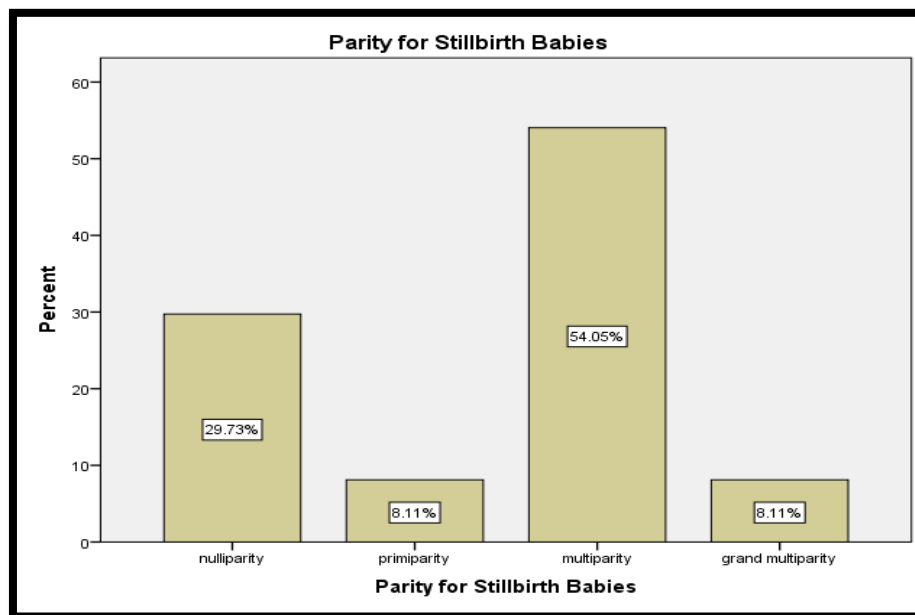


**Fig. 32.**

Figs. 31 and 32 are bar graphs showing the % frequencies of “Gestational Age” of Stillbirth and Livebirth babies, respectively, from January 1 to July 31, 2021 at GPHC. For stillbirths 36.11% were 28+0 to 31+6, 13.89% were 32+0 to 33+6,

30.56% were 34+0 to 36+6, 13.89% were 37+0 to 38+6, 2.78% were 39+0 to 41+6, 2.78% were >42. For livebirths 8.11% were 34+0 to 36+6, 43.24% were 37+0 to 38+6, while 48.65% were 39+0 to 41+6.

**Parity**



**Fig. 33.**

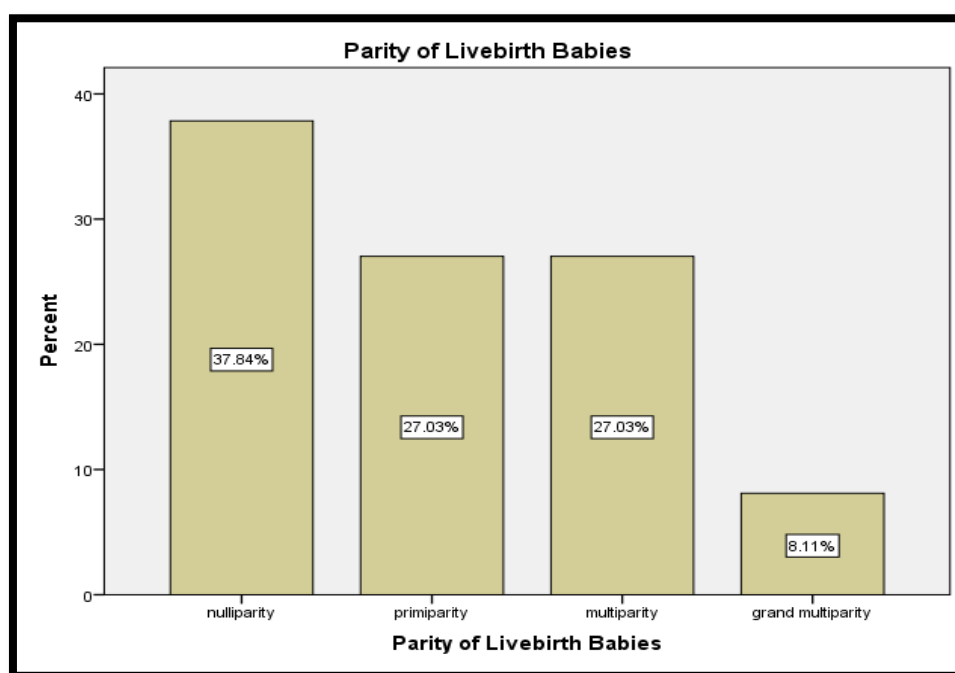


Fig. 34.

Figs. 33 and 34 are bar graphs showing % frequencies of "Parity" of stillbirth and livebirth pregnancies, respectively, at GPHC from January 1 to July 31, 2021. For stillbirth mothers 29.73% were nulliparous, 8.11% were

primiparous, 54.05% were multiparous, while 8.11% were grand multiparous. For livebirth mothers 37.84% were nulliparous, 27.03% were primiparous, 27.03% were multiparous and 8.11% were grand multiparous.

Table 1. Showing ICD-PM Classification of Stillbirth Deaths at GPHC from January 1 to July 31, 2021

Maternal Conditions	M1: Complications of placenta, cord and membranes	M2: Maternal complications of pregnancy	M3: Other complications of labour and delivery	M4: Maternal medical and surgical conditions	M5: No maternal condition identified	Causes Total %
<b>Antepartum Causes of Death</b>						
A1: Congenital malformations, deformities and chromosomal abnormalities		1				1 (5.6)
A2: Infection						0 (0)
A3: Antepartum Hypoxia						0 (0)
A4: Other specified		1				1 (5.6)

Maternal Conditions	M1: Complications of placenta, cord and membranes	M2: Maternal complications of pregnancy	M3: Other complications of labour and delivery	M4: Maternal medical and surgical conditions	M5: No maternal condition identified	Causes Total %	
						Count	Percentage
anteartum disorder							
A5: Disorder related to foetal growth	1					1	(5.6)
A6: Foetal death of unspecified cause	1			2	1	4	(22.2)
<b>Intrapartum Causes of Death</b>							
I1: Congenital malformations, deformities and chromosomal abnormalities						0	(0)
I2: Birth Trauma						0	(0)
I3: Acute Intrapartum Event	4		1			5	(27.8)
I4: Infection						0	(0)
I5: Other specified intrapartum disorder			1			1	(5.6)
I6: Disorder related to foetal growth	1				1	2	(11.1)
I7: Intrapartum death of unspecified cause				1	2	3	(16.7)
<b>Total Maternal Condition (%)</b>	<b>8 (44.4)</b>	<b>1 (5.6)</b>	<b>2 (11.1)</b>	<b>3 (16.7)</b>	<b>4 (22.2)</b>	<b>100</b>	

This table displays the ICD-PM classification of stillbirth deaths at GPHC from January 1 to July 31, 2021. From the total of 37 stillbirths from this study only 18 had a stated cause of death. The most common cause of death was placental abruption secondary to HTN (6 cases), there were 2 cases of placental insufficiency, 3 cases of HTN+DM, 3 unknown causes, 1 post term dysmaturity syndrome, 1 asphyxia, 1 foetal hydrops secondary to Rh incompatibility, 1 meconium liquor.

#### 4. DISCUSSION

The following study was retrospective, case control in nature and the first objective of this study was to determine the stillbirth rate at GPHC for the 7-month period of January 1 to July 31, 2021. The stillbirth rate was found to be

11.96 per 1000 births. This rate for the hospital is much lower than the stillbirth rate calculated from a prior study done by R. Hardy in 2019, for which the stillbirth rate was 15.8 per 1000 births [4]. This shows an improved stillbirth rate at GPHC over the past 3 years which infers that antenatal and obstetric care at the hospital is improving.

The records department at GPHC found 5 additional cases of stillbirths than this study for the same time period of January 1 to July 31, 2021, for which their stillbirth rate was calculated at 13.57 per 1000 total births. In the "stillbirth book", which is a register of stillbirths occurring at GPHC, foetal demise <28 weeks gestation was also inputted into the register. It's likely that these 5 additional cases were births that did not meet the inclusion criteria for this study and therefore

were not included in the sample of cases (sample of stillbirths).

The second objective of this study was to determine the number of stillbirth cases that were inpatient vs referrals. This study identified a total of 37 stillbirths occurring over the 7-month period of January 1 to July 31, 2021 at GPHC. Out of those 37 stillbirth cases, 13 were being managed as inpatients while 24 were referral cases. The higher frequency of referral cases (~65% of cases) proves that the number of stillbirths at GPHC is greatly influenced by referral (see Figs. 3 and 4). This may be likely due to these referring facilities having limited resources to quickly recognize and deal with emergencies. Also, most of these referring facilities are located in outlying areas, which means patients would have to travel long distances from referring facilities to GPHC which increases the likelihood of antepartum and intrapartum demise. A study done by *Egbe et al* found similar findings relating to stillbirths and referrals [5].

The third objective of this study was to determine the number of macerated vs fresh stillbirths. Macerated stillbirths are more commonly as a result of antepartum insults (issues arising before labour). While, fresh stillbirths are commonly as a result of intrapartum insults (problems with labour and delivery) and the obstetric care. From the total number of stillbirths identified in this study, it was noted that 24 were macerated stillbirths, while 11 were fresh stillbirths. The type of stillbirth was not stated for 2 cases. Macerated stillbirths had the higher proportion (68.57%), which suggest that majority of stillbirth are likely due to antepartum insults. Delay of referral cases may also precipitate these insults promoting intrauterine demise. On the other hand, fresh stillbirths had the lesser proportion (31.43%). This suggests that fewer stillbirths are caused by intrapartum complications and it may also suggest that there may be mild inadequacies in obstetric care and delivery at GPHC. Mbachu et al. and Mutahir et al. in their studies identified that macerated stillbirths were more prevalent than fresh stillbirths in middle-to-low-income countries.

The final objective of this study was to determine the risk factors and causes of stillbirths. From this study, the following variables were highlighted to be possible risk factors of stillbirths: *male sex, referral management, HTN disease, DM disease, not having antenatal labs done, having less than 8 ANC clinic visits, multiparity, preterm and post term gestation and*

*advanced maternal age (being 35 and older).* These frequencies of these variables were found to be higher for stillbirths than livebirths. Contrary to this study's findings, *Nonterah et al* in their study showed that advanced maternal age was not a risk factor for stillbirths in Ghana [6]. However, Mutahir et al. in their study findings showed that advanced maternal age and multiparity were risk factors of stillbirths [7].

The most common cause of stillbirths highlighted in this study was placental abruption secondary to maternal comorbidities (HTN and DM). Other causes of stillbirths were maternal HTN and DM, unknown causes, post term dysmaturity syndrome, birth asphyxia, foetal hydrops secondary to Rh in compatibility and meconium liquor. Using the ICD-PM classification of causes of stillbirths the most common maternal condition noted to cause stillbirth was M1: complications of placenta cord and membrane. This was followed by no maternal condition identified, maternal medical and surgical conditions, other complications of labour and delivery and maternal complications of pregnancy, respectively. The most common antepartum cause was A6: foetal death unspecified, while the most common intrapartum cause was I3: Acute intrapartum event (placenta abruption being the most common identified in this study, followed by meconium liquor). Most studies identified *no known cause* as the popular cause of death [8-23]. This was different for this study possibly because of missing information on the cause of death for half of the cases.

## 5. LIMITATIONS OF STUDIES

Poor documentation and missing information from charts that were used for data collection are a major limitation of this study. For this reason, the odds ratio could not be computed to determine whether variable had any association with stillbirths. Frequency percentages were used instead as a measure to determine risk factors of stillbirth. This is a very weak measure of association.

## 6. STRENGTHS OF STUDY

The total population of stillbirths was used for data analysis and sample of livebirths was selected using random sampling technique. Results from this study can be extrapolated to the entire population of stillbirths and livebirths at GPHC. To extrapolate results from this study to



general Guyanese population, further comparative studies should be conducted.

## 7. CONCLUSION

1. Stillbirth rate at GPHC from January 1 to July 31, 2021 is 11.96 per 1000 births and has shown significant improvement over the past 3 years.
2. Referrals have a great influence on the number of stillbirths and can be considered a risk factor of stillbirths.
3. The most common type of stillbirth was identified to be macerated.
4. Other possible risk factors of stillbirth at GPHC include *male sex, referral management, HTN disease, DM disease, not having antenatal labs done, having less than 8 ANC clinic visits, multiparity, preterm and post term gestation, advanced maternal age (being 35 and older)*
5. Most common cause of stillbirths at GPHC from January 1 to July 31, 2021 was placenta abruption. Most common maternal condition was complications of placenta, cord and membrane. The most common antepartum cause was foetal death unspecified, while the most common intrapartum cause was acute intrapartum event (placental abruption and meconium liquor were identified from this study).

## ETHICAL CONSIDERATIONS

1. Permission was granted by GPHC to use the charts to obtain data for this study.
2. Patient's personal data were excluded from data collection and instead were identified by registration number on chart and initial of first and last names.
3. Data collected was also placed in an encrypted file that only the researchers had access to.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. GHO | By category | Stillbirth rate - Data by country [Internet]. Apps.who.int; 2021 [cited 27 May 2021].

- Available: <https://apps.who.int/gho/data/node.main.STILLBIRTH?lang=en>
2. Stillbirths [Internet]. World Health Organization; 2021 [cited 27 May 2021]. Available: [https://www.who.int/maternal\\_child\\_adolescent/epidemiology/stillbirth/en/](https://www.who.int/maternal_child_adolescent/epidemiology/stillbirth/en/)
  3. De Bernis L, Kinney M, Stones W, ten Hoope-Bender P, Vivio D, Leisher S et al. Stillbirths: ending preventable deaths by 2030. *The Lancet* [Internet]. [cited 24 May 2021]. 2016;387(10019):703-716. Available: [https://sustainabledevelopment.un.org/content/documents/975137\\_Leisher%20et%20al.\\_Stillbirths-Investment%20in%20ending%20preventable%20stillbirths%20by%202030%20will%20yield%20multiple%20returns%20and%20help%20achieve%20multiple%20Sustainable%20Development%20Goals.pdf](https://sustainabledevelopment.un.org/content/documents/975137_Leisher%20et%20al._Stillbirths-Investment%20in%20ending%20preventable%20stillbirths%20by%202030%20will%20yield%20multiple%20returns%20and%20help%20achieve%20multiple%20Sustainable%20Development%20Goals.pdf)
  4. Hardy R. Maternal Death and Stillbirth at GPHC: January to July, 2019. Presentation presented at; GPHC; 2019.
  5. Egbe T, Ewane E, Tendongfor N. Stillbirth rates and associated risk factors at the Buea and Limbe regional hospitals, Cameroon: a case-control study. *BMC Pregnancy and Childbirth* [Internet]. [cited 27 May 2021]. 2020;20(1). Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6998238/>
  6. Nonterah E, Agorinya I, Kanmiki E, Kagura J, Tamimu M, Ayamba E et al. Trends and risk factors associated with stillbirths: A case study of the Navrongo War Memorial Hospital in Northern Ghana. *PLOS ONE* [Internet]. [cited 27 May 2021]. 2020;15(2):e0229013. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7034822/>
  7. Mutahir J, Eka P. Stillbirths at the Jos University teaching hospital: Incidence, risk and etiological factors. *Nigerian Journal of Clinical Practice* [Internet]. [cited 27 May 2021]. 2011;14(1):14. Available: <http://www.njcponline.com>
  8. Al-Sheyab N, Khader Y, Shattnawi K, Alyahya M, Batieha A. Rate, risk factors and causes of neonatal deaths in Jordan: Analysis of data from Jordan Stillbirth and Neonatal Surveillance System (JSANDS). *Frontiers in Public Health* [Internet]. [cited 27 May 2021]. 2020;8. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7661434/>
  9. Prüst Z, Verschueren K, Bhikha-Kori G, Kodan L, Bloemenkamp K, Browne J et al. Investigation of stillbirth causes in

- Suriname: application of the WHO ICD-PM tool to national-level hospital data. *Global Health Action* [Internet]. [cited 27 May 2021]. 2020;13(1):1794105. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7480654/>
10. Al-Sheyab N, Khader Y, Shattnawi K, Alyahya M, Batieha A. Rate, risk factors and causes of neonatal Deaths in Jordan: Analysis of data from Jordan Stillbirth and Neonatal Surveillance System (JSANDS). *Frontiers in Public Health* [Internet]. [cited 27 May 2021]. 2020;8. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7661434/>
  11. What is Stillbirth? | CDC [Internet]. Centers for Disease Control and Prevention. [cited 27 May 2021]; 2021. Available: [https://www.cdc.gov/ncbddd/stillbirth/facts.html#:~:text=Stillbirth%20affects%20about%201%20in,stillborn%20in%20the%20United%20States.&text=That%20is%20about%20the%20same,Infant%20Death%20Syndrome%20\(SIDS\).](https://www.cdc.gov/ncbddd/stillbirth/facts.html#:~:text=Stillbirth%20affects%20about%201%20in,stillborn%20in%20the%20United%20States.&text=That%20is%20about%20the%20same,Infant%20Death%20Syndrome%20(SIDS).)
  12. Afshan K, Narjis G, Qayyum M. Risk factors and causes of stillbirths among pregnant women in Pakistan. *African Health Sciences* [Internet]. [cited 27 May 2021]. 2019;19(1):1507. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6531978/>
  13. Khader Y, Batieha A, Khader A, Hamadneh S. Stillbirths in Jordan: rate, causes, and preventability. *The Journal of Maternal-Fetal & Neonatal Medicine* [Internet]. [cited 27 May 2021]. 2018:1-8. Available: <https://www.tandfonline.com/doi/abs/10.1080/14767058.2018.1517326?journalCode=ijmf20>
  14. Flenady V, Koopmans L, Middleton P, Frøen J, Smith G, Gibbons K et al. Major risk factors for stillbirth in high-income countries: a systematic review and meta-analysis. *The Lancet* [Internet]. [cited 27 May 2021]. 2011;377(9774):1331-1340. Available: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(10\)62233-7/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)62233-7/fulltext)
  15. Causes of Death Among Stillbirths. *JAMA* [Internet]. [cited 27 May 2021]. 2011;306(22):2459. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4562291/>
  16. Manjavidze T, Rylander C, Skjeldestad F, Kazakhashvili N, Anda E. Incidence and causes of perinatal mortality in Georgia. *Journal of Epidemiology and Global Health* [Internet]. [cited 27 May 2021]; 2019. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7310824/>
  17. Zhu J, Zhang J, Xia H, Ge J, Ye X, Guo B et al. Stillbirths in China: A nationwide survey. *BJOG: An International Journal of Obstetrics & Gynaecology* [Internet]. [cited 27 May 2021]. 2020;128(1):67-76. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7754392/>
  18. Sun C, Chou H, Chuang L. Trends and risk factors of stillbirth in Taiwan 2006–2013: A population-based study. *Archives of Gynecology and Obstetrics* [Internet]. [cited 27 May 2021]. 2019;299(4):961-967. Available: <https://link.springer.com/article/10.1007%2Fs00404-019-05090-3>
  19. Zile I, Ebela I, Rumba-Rozenfelde I. Maternal Risk Factors for Stillbirth: A Registry–Based Study. *Medicina* [Internet]. [cited 27 May 2021]. 2019;55(7):326. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6681231/>
  20. Smith S, Thorp L, Karreman E, Adanlawo A. Review of Stillbirth in a Canadian Tertiary Care Centre. *Journal of Obstetrics and Gynaecology Canada* [Internet]. [cited 27 May 2021]. 2020;42(2):126-130. Available: [https://www.jogc.com/article/S1701-2163\(19\)30529-8/fulltext](https://www.jogc.com/article/S1701-2163(19)30529-8/fulltext)
  21. Okonofua F, Ntoimo L, Ogu R, Galadanci H, Mohammed G, Adetoye D et al. Prevalence and determinants of stillbirth in Nigerian referral hospitals: A multicentre study. *BMC Pregnancy and Childbirth* [Internet]. [cited 27 May 2021]. 2019;19(1). Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6937841/>
  22. Mbachu I, Achigbu K, Odinaka K, Eleje G, Osuagwu I, Osim V. Tracking stillbirths by referral pattern and causes in a rural tertiary hospital in Southern Nigeria. *Nigerian Postgraduate Medical Journal* [Internet]. [cited 27 May 2021]. 2018;25(2):87. Available: <https://www.npmj.org/article.asp?issn=1117-1936;year=2018;volume=25;issue=2;spage=87;epage=93;aulast=Mbachu>
  23. Lakshmi S, Thankam U, Jagadhamma P, Ushakumari A, Chellamma N, Hariharan S. Risk factors for still birth: A hospital based case control study. *International Journal of Reproduction, Contraception, Obstetrics*

and Gynecology [Internet]. [cited 2 July 2021]. 2017;6(3):970.

Available:<https://www.ijrcog.org/index.php/ijrcog/article/view/2398>

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