

Original Research Article

Maternal characteristics and outcomes of obstetric complications at a tertiary Health Facility in northern Ghana

ABSTRACT

Introduction: Ghana has recorded improved access to skilled care during pregnancy (4+ visits) 89% and labour 78%, yet maternal mortality is 310 per 100 000 live births. This research was conducted to identify the socio-demographic and obstetric characteristics of women with obstetric complications in a tertiary health facility in northern Ghana to gain sight to reduce maternal deaths.

Materials and Methods: This study was a cross-sectional quantitative retrospective study. We collected data from 384 women using a structured questionnaire and analysed it using SPSS version 20.0. Inferences were made using cross-tabulations with corresponding significance set at $P = .05$.

Results: This study revealed that, the typical woman with obstetric complication is 20-35 years old, mean age 27.7 and standard deviation of 6.2; married to a salaried worker; Dagomba by tribe; no formal education; petty trader; earn below minimum wage of Ghana (\$ 2.07); Moslem; resides in an urban setting; pregnant and delivering for the first time; gestational age of 37-42 weeks at labour and birth spacing of 2-3 years. Cross-tabulations revealed associations between three socio-demographic and four obstetric characteristic all with large effects sizes as follows; $X^2(3, N = 69) = 13.50, P = .004$; $X^2(65, N = 67) = 1.11, P = .000$; $X^2(2, N = 69) = 9.17, P = .010$; $X^2(12, N = 68) = 26.1, P = .010$; $X^2(3, N = 384) = 17.15, P = .001$; $X^2(4, N = 69) = 19.8, P = .001$; $X^2(65, N = 65) = 1.12, P = .000$; $X^2(1, N =) = 72.9, ; P = .000$ respectively.

Conclusion: Obstetric complications are universal; improving poor outcomes in the study setting will take identifying and filling gaps in the skill needs of maternal health care workers and addressing health facility challenges.

KEYWORDS

Obstetric complications; socio-demographic characteristics, obstetric characteristics; maternal outcomes; maternal morbidities and maternal mortalities

1.0 INTRODUCTION

Pregnancy and childbirth are natural processes in a woman's life, but it is by no means without risk. Motherhood for some women in parts of the world is tinged with uncertainty. In most developing countries, motherhood is often marred by unforeseen complications, resulting in some women losing their lives. The risk of dying during childbearing in developing countries is 1 in 41 women compared to 3300 women in developed countries. These mortalities usually arise due to obstetric complications [1]. Obstetric complications are anomalies that ensue in pregnancy, labour or postpartum [2]. These complications are unpredictable, occurring in about 15% of all pregnancies and childbirths [3, 4, 1].

Ghana as a country has made positive steps in increasing access to maternal health services. Antenatal care at least four-plus visits are 89%, and skilled care at birth is 78%. However, the

maternal mortality rate in Ghana is 310 per 100 000 live births, which is high. The causes of these deaths are largely preventable, which hints at sub-optimal maternal care [5, 6]. Therefore, this research sought to identify the socio-demographic and obstetric characteristics of women with obstetric complications; determine the diagnosis, interventions and outcomes of the obstetric complications; and determine the maternal characteristics associated with poor outcomes of the obstetric complications at a tertiary health facility in northern Ghana as part of more extensive research that delved into factors that contribute to obstetric complications and outcomes. This study will identify women at risk for obstetric complications to chart a path to developing pragmatic solutions towards improving maternal health in Ghana.

2.0 MATERIALS AND METHODS

This study is a cross-sectional quantitative study spanning six months (June to December 2015). Data was purposive and gathered at convenience from 384 women on admission due to obstetric complications at a tertiary health facility in Ghana. The sample size was arrived at using the Cochrane formula [7]. The reliability co-efficient for 95% confidence level was set at 1.96, and 50% was used since the population's occurrence rate of obstetric complications was unknown. The inclusive criteria are all pregnant women carrying a singleton foetus who developed obstetric complications during the third trimester of the pregnancy, during delivery or postpartum.

2.1 DATA COLLECTION INSTRUMENT

Data was collected from the study participants with a structured questionnaire with both closed and open-ended questions to answer the objectives of this study. The questionnaire was pretested on 10% of the sample who have similar characteristics to the study participants. Minor revisions were made to ensure the questionnaire was reliable.

2.2 APPLICATION PROCEDURE AND MATERIAL

The questionnaire was administered to participants on admission at the obstetrics and gynaecological units of the health facility using face to face interviews after the necessary explanations were made and consent sought. For some of the too sick patients at data collection, the interview was postponed until they were sufficiently recovered. We retrieved data from their folders for patients who either died or could not respond to some questions.

2.3 STATISTICAL ANALYSIS

Data gathered was subjected to thorough checks at the site of data collection to ensure completeness. The questionnaire was coded and entered into SPSS version 20.0 for statistical analysis. Socio-demographic and obstetric characteristics and diagnoses, interventions, and the complications' outcomes are described using frequencies and percentages. Inferences are made using cross-tabulations with the corresponding chi-square test of significance set at $P = .05$. Results emanating from the data analysis are described with the aid of tables.

2.4 ETHICAL APPROVAL

Ethical approval was obtained from the ethics committee of the Tamale Teaching. All the study participants were assured that participating in the study was voluntary and answers to their questions were highly confidential. This assurance was given both on the questionnaire as well

as explained verbally. Participant's willingness to answer questions from the researchers was taken as consent to participate in the study.

3.0 RESULTS

3.1 Socio-demographic characteristics of Respondents

The first objective of this research seeks to identify the socio-demographic characteristics of women with obstetric complications at a Tertiary Health Facility in northern Ghana. Most women, 73.7%, were between the ages of 20 and 35 years. Women aged 14 to 19, 36 to 45 and 46 to 50 formed 15.1%, 9.9% and 1.3% of the respondents, respectively. These women were mainly Muslims, 85.2%, and the rest were Christians, 14.8%. On the part of marital status, 94.8% of the respondents have married, while only 5.2% were single. These women were predominantly urban dwellers, 72.9% and the remaining 27.1% lived in rural areas. Again, more than half, 69.0% of these women belonged to the Dagomba ethnic group in northern Ghana. A good number of these women had no formal education, 45.8%; therefore, their main occupation was petty trading 38.8%, a more significant number 56.5% of the women earned below the daily minimum wage for Ghana of approximately 200 Ghana Cedis a month. 1.8% of the women were not able to respond to this question leading to missing variables. The highest number of their spouses were salaried workers, 29.4%, while the lowest proportion, 0.3%, was dead. There were two missing variables for spouse's occupation. Table one shows other detailed socio-demographic characteristics of respondents with obstetric complications and their spouses.

Table 1: Socio-demographic characteristics of Respondents

Variable	Frequency (%)n=384
Age	
14-19	58 (15.1)
20-35	283 (73.7)
36-45	38(9.9)
46-50	5(1.3)
Marital status	
Married	364 (94.8)
Single	20 (5.2)
Educational background	
No formal education	176(45.8)
Non-formal education	3(0.8)
Basic education	74(19.3)
SHS high school	59(15.4)
Vocational education	13(3.4)
Tertiary education	56(14.6)
Religion	
Muslim	327(85.2)
Christians	57(14.8)
Residential area	
Urban	280(72.9)
Rural	104(27.1)
Ethnicity	
Dagomba	265 (69.0)
Gonja	23 (6.0)
Chekosi/Baasari/Konkonba	17 (4.4)
Dagaaba/Wala/Sisala	18 (4.7)
Frafra/Kusasi/Kassina	23 (6.0)
Southerners	16 (4.2)
Foreigners	22 (5.7)
Respondent's Occupational status	
Unemployed	12(3.1)
Housewife	58(15.1)
Petty trading	149(38.8)
Business	6(1.6)
Farming	54(14.1)
Salaried worker	51(13.3)
Artisan	31(8.1)
Student	19(4.9)
Apprentice	4(1.0)

Respondents' financial status	
Above minimum wage (≤ 200 cedis)	217(56.5)
Below minimum wage (≥ 200 cedis)	160(41.7)
Missing variables	7(1.8)
Spouses'/partner occupation	
Unemployed	3(0.8)
Trading	81(21.1)
Business	12(3.1)
Salaried worker	113(29.4)
Artisan	67(17.4)
Farming	97(25.3)
Student	8(2.1)
Dead	1(0.3)
Missing variables	2(0.5)

3.1.1 Descriptive statistics of the continuous variable, age

The average age of the women with obstetric complications is 28 years, with a standard deviation of ± 6.2 . The minimum age is 16 years, while the maximum age is 49 years old.

Table 2: Descriptive statistics of the continuous variable, age

Age	Mean	Standard deviation	Minimum	Maximum
Mothers age (years)	27.7	6.2	16	49

3.2 Obstetric characteristics of respondents

The second objective of this research was to identify the obstetric characteristics of women who sought care for obstetric complications. Results point to the fact that women pregnant for the first time were the majority, 29.9%. Those pregnant for the second, third, fourth, fifth and sixth or more times formed 24.0%, 16.4%, 13.0%, 8.1% and 8.3%, respectively. There was a 0.3% missing variable. As far as parity or the number of deliveries were concerned, a more significant percentage, 32.3%, of women delivered for the first time. Those delivering for the second, third, fourth, fifth, sixth and above times had the following proportions; 23.2%, 17.7%, 10.9%, 7.8% and 7.8%, respectively. There was 0.3% of missing variables.

Although 0.5% of the respondents did not know their pregnancy gestational age, 79.9% of the respondents had term pregnancies (37-42 weeks) at the obstetric complication. 10.7% and 8.9% of the pregnancies were post-term (above 42 weeks) and preterm (less than 37 weeks), respectively. Additionally, the study respondents reported that the interval between their previous

and the most recent pregnancy was as follows; 33.3% of women had a 2 to 3 years interval between their previous pregnancy and the recent one. 32.3% answered not applicable because the recent pregnancy was their first. 20.6% of women waited four 4 to five years. Women who had six years or more were 8.9%. Bringing up the rear were women who had one year and less than a one-year interval between their previous and current pregnancies, each with 3.9%. Also, 1.0% of responses were missing. Still, on obstetric characteristics of women who presented with obstetric complications, 86.5% said they were healthy during the recent pregnancy, while 13.3% said they were sick. Again, 0.3% did not respond to this question. Of the respondents who reported being sick during the recent pregnancy, the top four diagnoses made were as follows, most 49.0% had pregnancy-induced Hypertension (PIH), and 15.7% of the women had severe malaria. Hyperemesis gravidarum and Anaemia each had 9.8%. Table three contain details of the obstetric characteristics of the respondents.

Table 3: Obstetric characteristics of respondents

Variables	Frequency (%)
Gravida	
First Pregnancy	115 (29.9)
Second Pregnancy	92 (24.0)
Third Pregnancy	63 (16.4)
Fourth Pregnancy	50 (13.0)
Fifth Pregnancy	31 (8.1)
≥ Sixth Pregnancy	32 (8.3)
Missing variable	1 (0.3)
Total	384 (100)
Parity	
Have never delivered	1 (0.3)
First delivery	123 (32.0)
Second delivery	89 (23.2)
Third delivery	68 (17.7)
Fourth delivery	42 (10.9)
Fifth delivery	30 (7.8)
≥ Sixth delivery	30 (7.8)
Missing variable	1 (0.3)
Total	384 (100)
The interval between previous and current Pregnancy	
< one year	3 (0.8)
One year	12 (3.1)
2-3 years	128 (33.3)
4-5 years	79 (20.6)
≥ Six years	34 (8.9)
Not applicable	124 (32.3)
Missing variable	4 (1.0)
Total	384 (100)

Gestational age at labour	
< 37 weeks	34 (8.9)
37-42 weeks	307 (79.9)
> 42 weeks	41 (10.7)
I do not know	2 (0.5)
Total	384 (100)
Health status at current pregnancy	
Healthy	332 (86.5)
Sick	51 (13.3)
Missing variable	1 (0.3)
Total	384 (100)
Diagnoses of sickness	
Hyperemesis	5 (9.8)
Anaemia	5 (9.8)
Antepartum haemorrhage (APH)	2 (3.9)
Peptic Ulcer	2 (3.9)
Pregnancy induced hypertension (PIH)	25 (49.0)
Malaria	8 (15.7)
Sickle Cell Disease (SCD)	1 (2.0)
Severe Nose bleeding	1 (2.0)
PIH/SCD	1 (2.0)
Hepatitis B	1 (2.0)
Total	51 (100)

3.3 Diagnoses, Interventions and Outcomes of the obstetric complications

Objective three sought to describe the diagnoses of the complications, the interventions to manage the obstetric complications, and the complication outcome post the interventions.

3.3.1 Diagnoses of obstetric complications

Overall, 20 obstetric complications were diagnosed for the 384 women during the period of data collection. Of the 384, 14.6% had two complications, and while 0.3% had three complications. The top three causes of maternal morbidity during the period were; obstructed labour, preeclampsia/eclampsia and postpartum haemorrhage, which were suffered by 56%, 14.6% and 11.5% of the respondents, respectively. Table four shows details of the other complications that occurred.

Table 4: Diagnoses of obstetric complications

Types of Diagnosis	1 st Diagnosis n=384	2 nd Diagnosis n=56	2 nd Diagnosis n=1	Total
Obstructed labour	213	2	0	215
Pre-eclampsia/Eclampsia	51	5	0	56
Postpartum Haemorrhage (PPH)	7	37	0	44
Foetal distress	29	0	0	29
Ruptured uterus	18	0	0	18
Oligohydraminous	17	0	0	17
Retained placenta	14	1	0	15
Antepartum Haemorrhage (APH)	11	0	0	11
Post maturity	8	1	0	9
Prematurity	3	4	0	7
Severe perineal/Cervical laceration	5	0	1	6
Puerperal sepsis	3	0	0	3
Intrauterine foetal death (IUFD)	0	3	0	3
Polyhydraminous	2	0	0	2
Bicornuate uterus	0	1	0	1
Poor maternal health	1	0	0	1
Puerperal psychosis	0	1	0	1
Bad obstetric history	1	0	0	1
Placenta abruption	1	0	0	1
Sickle cell crisis	0	1	0	1

3.3.2 Interventions to manage obstetric complications

A total of 12 interventions were carried out to save the lives of the 384 mothers with obstetric complications. Some of the women had multiple interventions as follows; 25.5% of the respondents had twointerventions, while 4.4% had three interventions. The three most frequent interventions carried out include; caesarian sections 89.3%, blood transfusions 14.3% and intensive care and treatment 14.3%. Details of the above summary are in table five.

Table 5: Interventions to manage obstetric complications

Interventions	1st Intervention n=384	2nd Intervention n=98	3rd Intervention n=17	Total
Caesarian section	336	7	0	343
Blood transfusion	6	39	10	55
Intensive care and treatment	14	35	6	55
Hysterectomy	0	9	0	9
Laporotomy/re-laporotomy	7	2	0	9
Manual removal of the placenta	7	1	0	8
Failed vacuum extraction	6	0	0	6
Repair of lacerations	4	0	1	5
Bilateral tubal ligation	0	5	0	5
Induction of labour	2	0	0	2
Vacuum extraction	1	0	0	1
Failed induction of labour	1	0	0	1

3.3.3 Maternal outcomes of the obstetric complications

This research monitored the outcomes of the obstetric complications following the interventions. It was revealed that the majority, 81.8%, of the respondents said they had recovered 24 hours after the intervention. The remaining 18.2% of the respondents said they were still sick 24 hours post-intervention. Of the sick respondents, 60% became better and were discharged three days later with medications. 25.7% became better seven days post-intervention and were also discharged with medications. 1.4% was healthy ten days after treatment. Unfortunately, 12.9% of the respondents died on admission. The causes of maternal deaths were preeclampsia/eclampsia 55.6%, haemorrhage (A combination of antepartum and postpartum haemorrhage (APH)/PPH) 22.2%, a combination of Preeclampsia/eclampsia and postpartum haemorrhage caused 11.1% death while ruptured uterus also caused 11.1% death. Table six outlines these results.

Table 6: Maternal outcomes of obstetric complications

Variable	Frequency (%) n=384
Maternal health after intervention (24 hours)	
Healthy	314(81.8)
Sick	70(18.2)
The outcome of the sickness	
Better, discharged three days with treatment	42(60.0)
Better, discharged seven days with medication	19(27.1)
Died on admission	9(12.9)
Total	70(100)
Causes of maternal deaths	
Preeclampsia/eclampsia	5(55.6)
Haemorrhage (APH and PPH)	2(22.2)
Preeclampsia/eclampsia and PPH	1(11.1)
Ruptured uterus	1(11.1)
Total	9(100)

3.4 Maternal characteristics associated with the outcomes of the obstetric complications

This research also sought to identify the maternal characteristics (socio-demographic and obstetric characteristics) associated with the maternal outcomes following the obstetric complications. Therefore, the maternal characteristics were cross-tabulated with all the maternal outcomes. Results were as follows

3.4.1 Socio-demographic characteristics and maternal outcomes cross-tabulation

All the nine socio-demographic characteristics of the respondents (age, marital status, ethnicity, respondent's occupation, respondent's financial status, religion, residential area, educational background and partner's occupation) were cross-tabulated with each of the maternal outcomes, namely; maternal health status 24 hours after the interventions, diagnosis of the sickness (Obstetric complications), outcomes of respondent's sickness after admission and causes of maternal deaths for those who died as a result of the sickness (Obstetric complications). It emerged that only three (age, Husband's/partner occupation and residential area) out of the nine socio-demographic characteristics were significant with the maternal outcomes.

Results of respondent's age cross-tabulation with maternal health status 24 hours after the intervention to resolve the obstetric complication was significant $X^2(3, N = 69) = 13.50, P = .004$. The association was large $\phi = .188$. The health status of women 24 hours after the intervention to resolve obstetric complications accounted for 3.5% of the variance in age. A statistical relationship was established when husband/partner occupation was cross-tabulation with the diagnoses of the sickness (Obstetric complications); $X^2(65, N = 67) = 1.11, P = .000$. Large effect size was observed $\phi = 1.29$. The occurrence of obstetric complications accounts for 166% of the respondent's husband/partner occupation variance. Also, respondent's residential area was associated with the outcomes of the obstetric complication; $X^2(2, N = 69) = 9.17, P = .010$. The effect size is large, $\phi = .364$. The outcome of the obstetric complication accounted for 13.2% of the difference in the residential area. Details of these results can be seen in table 7.

Table 7: Socio-demographic characteristics and maternal outcomes cross-tabulation

Maternal outcomes		Socio-demographic characteristics							
Maternal health status 24 hours post-intervention	Age					df	X ²	P	
	14-19 n=58	20-35 n=283	36-45 n=38	46-50 n=5	Total N=384				
Healthy	48	232	33	1	314	3	13.501	.004	
Sick	10	51	5	4	70				
Total	58	283	38	5	384				

Diagnoses of sickness	Husband/Partner occupation						df	X ²	P
	Unemployed	Petty trading	Farming	Salaried worker	Artisan	Dead			
PIH	0	11	5	8	9	1	65	1.114	.000
Asthma	0	1	0	1	0	0			
PPH/Anaemia	0	1	9	5	4	0			
Abdominal pain	0	1	0	0	0	0			
Retained placenta	0	0	0	0	1	0			
SCD/PIH	0	0	0	1	0	0			
Peptic ulcer	0	0	1	0	0	0			
Eclampsia/psychosis	0	0	1	0	0	0			
Puerperal infection	0	0	0	0	1	0			
Weak incision site	1	0	0	0	0	0			
PIH/Anaemia	0	0	0	1	0	0			
APH/PPH/Anaemia	0	0	2	0	0	0			
Hepatitis B	0	0	0	1	0	0			
Ruptured uterus	0	0	1	0	0	0			
Total	1	14	19	17	15	1			

The outcome of the obstetric complication	Residential area				
	urban	Rural	df	X ²	P
Discharged in 3 days	41	17	2	9.167	.010
Discharged in 7 days	2	0			
Died on admission	2	7			
Total	45	24			

3.4.2 Obstetric characteristics and maternal outcomes cross-tabulation

All the obstetric characteristics (gravida, parity, gestational age at labour, birth spacing, health status at recent pregnancy and diagnoses of the sickness during or after the pregnancy) were cross-tabulated with each of the maternal outcomes of the obstetric complications. These obstetric complications include maternal health status 24 hours after the interventions, diagnosis of the sickness, outcomes of respondent's sickness after admission and causes of maternal deaths for those who died due to the obstetric complications. A relationship was established between four of the obstetric characteristics and the maternal outcomes.

Results revealed that respondent's parity (number of deliveries) and outcomes of the obstetric complication is significant. The resultant chi-square test was as follows; $X^2 (12, N = 68) = 26.1$,

$P = .010$. The effect size is large $\phi = .619$. Parity accounted for 38.3% of the variance in the outcome of the obstetric complication. A relationship was also established between the gestational age at labour and maternal health status 24 hours after the obstetric complications; $X^2 (3, N = 384) = 17.15, P = .001$. The effect size is large $\phi = .211$. Gestational age accounted for 4.5% of the difference in respondent's health status 24 hours after the intervention has been carried out to resolve obstetric complications. Again, an association was established between gestational age at labour and the outcome of the maternal obstetric complication. Chi-square test of significance; $X^2 (4, N = 69) = 19.8, P = .001$. The resultant difference is large $\phi = .536$. Gestational age is accountable for 28.7% of the variance in the outcomes of the complication. Statistical significance was revealed between birth spacing and the diagnosis of the obstetric complication made during pregnancy or puerperium; $X^2 (65, N = 65) = 1.12, P = .000$. Large effect size was observed $\phi = 1.31$. Birth spacing is liable for 171.6% of the difference in the diagnoses made during the obstetric complication. Finally, the chi-square test indicated significance between maternal health status at the recent pregnancy and maternal outcomes 24 hours after the intervention; $X^2 (1, N = 383) = 72.9, P = .000$. The effect size is large $\phi = .436$. Maternal health status at the recent pregnancy accounted for 19.0% of the variance in the health status of respondent's 24 hours after the intervention to the obstetric complication. Table 8 contains details of these findings.

Table 8: Obstetric characteristics and maternal outcomes cross-tabulation

Maternal outcomes	Obstetric Characteristics									
The outcome of the obstetric complication	Parity (number of births)							<i>df</i>	X^2	<i>P</i>
	Never delivered	One	Two	Three	Four	Five	≥ Six			
Discharged in 3 days	0	18	10	11	8	4	7	12	26.1	.010
Discharged in 7 days	0	0	0	0	2	0	0			
Died on admission	2	1	1	3	0	2	0			
Total	2	19	11	14	10	6	7			

Health status 24 hours after intervention	Gestational age at labour				<i>df</i>	X^2	<i>P</i>
	< 37 weeks	37-42 weeks	> 42 weeks	I don't know			
Healthy	19	258	35	2	3	17.15	.001
Sick	15	49	6	0			
Total	34	307	41	2			

The outcome of obstetric complications	Gestational age at labour				<i>df</i>	X^2	<i>P</i>
	< 37 weeks	37-42 weeks	> 42 weeks	I don't know			
Discharged in 3 days	8	43	7	0	4	19.8	.001
Discharged in 7 days	0	2	0	0			
Died on admission	7	2	0	0			
Total	15	47	7	0			

Diagnoses of obstetric complication	The interval between previous and current pregnancy (year(s)) (Birth spacing)						df	X ²	P
	First Pregnancy	≤ 1	1	2-3	4-5	≥ 6			
PIH	9	0	1	12	8	3	65	1.12	.000
Asthma	2	0	0	0	0	0			
PPH/Anaemia	6	0	0	4	7	2			
Abdominal pain	0	0	0	0	1	0			
Retained placenta	0	0	0	0	1	0			
SCD/PIH	1	0	0	0	0	0			
Peptic ulcer	0	0	0	1	0	0			
Eclampsia/puerperal psychosis	0	0	0	0	0	1			
Puerperal infection	1	0	0	0	0	0			
Weak incision site	1	0	0	0	0	0			
PIH/Anaemia	0	0	0	0	0	1			
APH/PPH/Anaemia	0	0	0	0	0	1			
Hepatitis B	0	1	0	0	0	0			
Ruptured uterus	0	0	0	0	1	0			
Total	20	1	1	17	18	8			

Maternal health status 24 hours post-intervention	Maternal Health at recent pregnancy				
	Healthy	Sick	df	X ²	P
Healthy	294	20	1	72.9	.000
Sick	38	31			
Total	332	51			

4.0 DISCUSSION

We investigated the socio-demographic and obstetric characteristics of women with obstetric complications; identified the diagnoses of the sicknesses making up the obstetric complications, interventions made to manage the obstetric complication, and the outcomes of the obstetric complications maternal characteristics associated with poor outcomes.

Firstly, we identified in this study that the typical woman likely to get obstetric complication has a mean age of 27.7 years with a standard deviation of 6.2 years; married to a salaried worker; Dagomba by tribe; had no formal education; a petty trader; earn below the daily minimum wage (\$2.07) in Ghana; Moslem by religion and resident in an urban area. The above findings imply that women at risk of obstetric complications are those with intended pregnancies because young women 19 years or less may still be in school or learning a trade, and those above 35 years may have had their desired number of children. Authors have reported similar deductions such [8, 9, 10, 11, 12, 13] in Ghana, Hong Kong, India, Tanzania, Cameroon and Lao People's Democratic Republic.

Secondly, our study describes the classical obstetric characteristics of a woman with obstetric complications as; being pregnant and delivering for the first time, healthy during the pregnancy,

having a term pregnancy at the onset of labour, and having a birth spacing of 2-3 years. Just like the socio-demographic characteristics, the obstetric characteristics also paint the picture of women who seem to have had planned pregnancies. Other researchers such as [2, 8, 14, 9] in both developed and least developed countries identified similar characteristics of women with maternal morbidities and mortalities. Our results support obstetric complications' unpredictable nature, affecting all women in both developed and least developed alike [15, 6, 4, 16]. Therefore, if obstetric complications are universal, the poor outcomes experienced by the least developed countries compared to the more developed regions may be due to health providers and systemic challenges, as noted by [4, 17, 1, 5, 6]. Whilst this paper did not explore the latter to be sure of the specific health provider, and system challenges, an investigation of the specific factors could contribute to designing strategies that may reduce obstetric complications [17, 20, 22]

Thirdly, the results of this study also answered the objective that sought to describe the diagnoses of the obstetric complications and interventions made to manage the obstetric complication and the outcomes of the obstetric complications as follows; almost 15% of the respondents suffered multiple complications while the rest had single complications. The top 3 causes of maternal morbidity were; obstructed labour, preeclampsia/eclampsia and PPH. Literature has described similar consequences of obstetric complications [8, 1, 18, 19, 20]. Twelve interventions were carried out to manage the above complications, and multiple interventions were used in 29.9% of the respondents. The three most frequent interventions were; caesarian sections, blood transfusions and intensive care and treatment. Outcomes of the obstetric complications overall resulted in 97.7% survival (maternal near-miss) and 2.3% maternal deaths during the six months of data collection. These authors [20, 21, 22] also documented effects likewise with minor variations.

Finally, our research findings further clarified the maternal characteristics associated with poor outcomes. The associations were all observed to have large effect sizes. On the cross-tabulation, maternal aged 20-35 years were the majority who were still sick 24 hours after interventions to resolve the obstetric complications. Respondents married to farmers were those mostly recorded with obstetric complications. Also, of the nine women who died due to obstetric complications, seven lived in rural areas. Likewise, the four obstetric characteristics that were frequently linked to poor maternal outcomes on the cross-tabulation were as follows; respondents giving birth (parity) for the third time where the majority that died on admission. Respondents whose gestational ages were term (37-42 weeks) at labour reported remaining sick 24 hours after the interventions. Again, women with preterm pregnancies (gestational age of less than 37 weeks) were noted to contribute seven out of the total nine women who died.

On the other hand, it was revealed that women with no birth spacing, because they are pregnant for the first time, were the majority diagnosed with obstetric complications. It was also noted that respondents who reported to be healthy during the recent pregnancy were the highest who reported remaining sick 24 hours after health interventions were carried out to manage the obstetric complications. Several empirical and systematic reviews [16, 23, 24] conducted worldwide reported similar outcomes. However, the results of our study not only reiterated the findings of other studies but also discovered that women delivering for the third time or probably any delivery could equally die as a result of obstetric complications.

5.0 CONCLUSION

Our study intended to identify women at risk for obstetric complications to facilitate pragmatic solutions towards improving maternal health in Ghana. Evidence from our results strongly supported by published literature confirms the universal nature of obstetric complications, with

slight variations in numbers. However, the outcomes are widely variant, with outcomes better for women in well-resourced countries than those in less-resourced ones. Therefore, it is evident from this study and literature that maternal health care provider's skills in diagnosing and management of obstetric complications as well as health care facilities in less-resourced countries are suboptimal and need to be identified and resolved to improve maternal morbidity and mortality. This recommendation is buttressed by evidence from a South African [25] which discovered a significant reduction in maternal deaths after implementing "skills-and-drills emergency obstetric care (EmOC)" training.

6.0 KEY POINTS FOR THIS STUDY

1. Maternal obstetric morbidities are universal and mortalities arising are primarily preventable with expert care and management.
2. Authors recommend that maternal healthcare providers' skills in diagnosing and managing obstetric complications need to be evaluated and gaps comprehensively resolved.
3. Health care facilities in Ghana, especially the study site, need a comprehensive evaluation of logistics and human resources to identify and solve potential areas that may lead to maternal deaths.

7.0 LIMITATIONS

This study was conducted in a tertiary health care facility; therefore, the findings cannot be generalised, however, results can be helpful in the context of other health care facilities.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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