

**UNIVERSITY OF GHANA
SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES**



**FACTORS ASSOCIATED WITH ADVERSE PREGNANCY
OUTCOMES AMONG WOMEN LIVING IN AKUMADAN
COMMUNITY IN THE ASHANTI REGION OF GHANA**

BY

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STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES

I declare that this protocol is my original work and is intended for academic purposes. There is no conflict of interest. This thesis has been written under the academic supervision of Dr. Alexander Manu, who has been of tremendous help. An ethical statement has been attached to the protocol. I, the Principal Investigator, is committed to ensuring that the terms and conditions of the Ethical board from which the approval is being obtained will be strictly adhered to. I promise to keep all participant information confidential, and to be used only for the purposes for which it will be gathered.

Thank you.



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DECLARATION

I, Nana Yaw Barima Sarfo-Kantanka hereby declare that this proposal is a result of my independent work. References to other works have been duly acknowledged. I further declare that this proposal has not been submitted for award of any degree in this institution and other universities elsewhere.



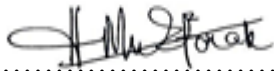
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TABLE OF CONTENTS

STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES	i
DECLARATION	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRACT	viii
CHAPTER ONE	1
INTRODUCTION	1
1.0 Background to the Study	1
1.1 Problem Statement	3
1.2 Justification of the Study	4
1.4 Research Questions	7
1.5 Objectives	8
1.5.1 Main Objective	8
1.5.2. Specific Objectives	8
CHAPTER TWO	9
LITERATURE REVIEW	9
2.0 Adverse Pregnancy Outcome	9
2.1 Socio -economic factors associated with adverse pregnancy outcomes	11
2.2 Health facility related factors that are associated with adverse pregnancy outcomes	14
2.3 Medical factors that are associated with adverse pregnancy outcomes	17
CHAPTER THREE.....	22
MATERIALS AND METHODS	22
3.0 Introduction	22
3.1 Research Design	22
3.2 Study Area	22
3.3 Study Population	23
3.4 Inclusion criteria	23
3.5 Exclusion criteria.....	24
3.6 Sample size and sampling procedures	24

3.7 Study Variables	25
3.9 Consenting.....	26
3.10 Data Analyses and Presentation	27
3.11 Ethical Considerations.....	28
CHAPTER FOUR.....	30
RESULTS	30
4.0 Introduction	30
4.1 The prevalence of adverse pregnancy outcomes	30
4.2 Proportion of the adverse pregnancy outcomes	30
4.3 Factors associated with adverse pregnancy outcomes.....	31
CHAPTER FIVE.....	38
DISCUSSION	38
5.0 The prevalence of adverse pregnancy outcome in Akumadan.....	38
5.1 The socio-economic factors and their association with the adverse pregnancy outcomes.....	39
5.2 Health facility related factors and their association with the adverse pregnancy outcomes.....	48
5.3 The medical factors and their association with the adverse pregnancy outcomes	49
5.4 Limitations of the Study	53
CHAPTER SIX	55
CONCLUSION AND RECOMMENDATION.....	55
6.0 Conclusion.....	55
6.1 Recommendations	55
REFERENCES.....	57
APPENDICES	64
Appendix A: Questionnaire.....	64
Appendix B: Participants' Information	68
Appendix C: Consent Form.....	71

LIST OF TABLES

Table 1: Shows the prevalence and percentage distribution of the adverse pregnancy outcomes30

Table 2: Shows frequencies and percentage distributions of factors associated with adverse pregnancy outcomes.....33

Table 3: Association between the adverse pregnancy outcomes and independent variables35

Table 4: Strength of association between the adverse pregnancy outcomes and independent variables37

LIST OF FIGURES

Fig. 1: Author's conceptual framework, 2019	7
Fig. 2: Shows proportions of the adverse pregnancy outcomes among the women	31

ABSTRACT

Background: Adverse pregnancy outcomes have devastating effects on the survival of both the mother and the infant. There is widespread adverse pregnancy outcomes in developing countries. About 5.4 million children die before their 5th birthday and 46% are neonatal deaths. Another 830 women die every day from complications related to pregnancy and childbirth. Several factors can lead to adverse pregnancy outcomes. These include socio-cultural factors, health facility related factors and medical factors. What has not been fully described is how these factors apply in the Ghanaian context especially in rural communities like Akumadan in the Offinso North District.

Objective: To identify the factors associated with adverse pregnancy outcomes among women in their reproductive age living in the Akumadan community of the Offinso North District.

Methodology: Using a descriptive cross-sectional design, structured questionnaires were administered to collect quantitative data on socio-cultural factors, health facility-related factors and medical factors associated with the adverse pregnancy outcomes among 300 women in their reproductive ages living in the Akumadan community. The data was analyzed using Stata version 15 (StataCorp, Texas, USA). Bivariate logistic regression models were fitted and chi-square statistics used to determine associations between the adverse pregnancy outcomes and the explanatory variables. Odds ratios and p-values were reported to establish the magnitude and strength of association of outcomes and the explanatory variables at the significance level (alpha) of 0.05 and confident level of 95%.

Results: The prevalence of adverse pregnancy outcome was (27.7%). The most prevailing adverse outcome of pregnancy among the women in Akumadan was stillbirth (8.0%) followed by miscarriage (7.7%), preterm (3.3%) and birth defects (2.7%). Marital status,

gravidity, occupation, drying food by the roadside and eating food dried by the roadside were found to have an association with the adverse pregnancy outcomes.

Conclusion: There was high prevalence of adverse pregnancy outcomes among residents in the predominantly farming communities at Akumadan and these were associated with important practices in their daily livelihoods like drying food by the roadside and eating food dried by the roadside. Marital status, gravidity and occupation. Further research should be conducted to establish the causal relationship between these factors and the adverse pregnancy outcomes.

CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Adverse pregnancy outcomes are unwanted or negative health events resulting from or associated with pregnancy such as maternal complications during birth (obstetric haemorrhage, eclampsia, infections, etc.), stillbirths, spontaneous abortions (miscarriages), birth defects (congenital anomalies), preterm births and low birth weight babies, etc. which can eventually lead to loss of the fetus and/or the mother. Adverse pregnancy outcomes are one of the most important global health concerns due to the devastating or detrimental effects on the women, families and communities.

Globally, forty-seven (47) percent of the 5.4 million deaths among children under five years are neonatal deaths, which is deaths of infants occurring within the first 28 days after birth. In the year 2018, 2.5 million neonatal deaths occurred with one third occurring on the first day of life (UNICEF, 2018). According to UNICEF (2018), Sub-Saharan Africa is the world's sub-region with the highest neonatal mortality rate of 28 deaths per 1000 live births. Hence a child born in the sub-Saharan Africa is ten times more likely to die in the first twenty-eight (28) days as compared to a child born in a high-income country (UNICEF, 2018). Similarly, an estimated 2.6 million stillbirths also occur every year with the majority (approximately 98%) of cases occurring in low- and middle-income (LMC) countries such as Ghana (WHO, 2018).

At the same time, about 830 women die every day from complications resulting from or associated with pregnancy (WHO, 2018). It is estimated that 99% of all global maternal deaths occur in developing countries in Sub-Saharan Africa, (WHO, 2018).

Neonatal mortality rate for Ghana is estimated to be 25 per 1,000 live births (Ghana Maternal Health Survey, 2017). The pregnancy-related mortality ratio (PRMR) is also projected to be 343 fatalities per 100,000 in 2017 (Ghana Maternal Health Survey, 2017). Many health and social interventions have been in place by the government to resolve negative results of pregnancy and their associated implications, but there has been little progress over the past decade.

There are several factors that can lead to a negative outcome of pregnancy. Tabia et al (2018) categorized factors that may result in adverse outcomes of pregnancy into maternal factors, factors / conditions of delivery and fetal factors. Hypoxia, anaemia, diabetes, hypertension, smoking, nephritis, and heart disease, too young or too old, were among the maternal factors. Placental abruption, placenta previa, prolapsed cord, premature rupture of membranes, obstructed labor, breech presentation were the delivery factors that may trigger negative results of pregnancy, whilst multiple birth, congenital or malformed fetus, restricted intrauterine development etc. were included in the fetal factors Samed et al. (2016). In addition to these factors, are others such as social-cultural variables, epileptic family history, infertility treatment, prior stillbirths, etc.

Khasakhala (2003) argues that demographic features such as age, educational status, and economic status, number of births, birth spacing and interval of pregnancy may directly affect the outcome of the pregnancy. In addition, stillbirths and maternal mortality rates are high when delivering at the home compared to delivering at health facilities (Archibong et al, 2002).

1.1 Problem Statement

Adverse pregnancy outcomes have devastating effect on the survival of both the mother and the infant. The 2008 WHO review found that postpartum hemorrhage, hypertension, and sepsis are causing more than 80-85 percent of maternal deaths worldwide (WHO, 2008). In Africa, 700 females die of complications related to pregnancy, 3,100 babies are freshly stillborn and there are about 2,400 macerated stillbirths daily (WHO, 2008). A substantial number of babies born alive also die within the first month after birth.

The under-five mortality rate (U5MR) in Ghana has reduced over the years, yet the neonatal deaths has not significantly reduced. This has stagnated the overall reduction in U5MR since the neonatal mortality rate (NMR) as at the year 2014 is 29 per 1,000 live births constitute about 50% of the overall U5MR and continues to increase (Health, 2018). In view of this, the Ghana National Newborn Health Strategy and Action Plan aimed to reduce the NMR from 32 per 1,000 live births in 2011 to 21 per 1,000 live births in 2018 (Health, 2018).

In 2010, 3291 low birth weights and 730 stillbirths were recorded in Ashanti Region by the Ashanti Regional Health Directorate (Ghana Health Service, Ashanti Region Half Year Report 2010). Akumadan, which is a farming community in the Ashanti region accounts for 54% of the neonatal deaths higher than the average neonatal deaths in the Ashanti region as a whole. According to the 2015 Ghana Demographic Health Survey of the Offinso North District, the MMR is 100 per 100 000. However, in the Offinso North District, there is insufficient documentation on the factors that are accounting the relatively high rates of adverse pregnancy outcomes in the District. This research therefore aims to determine the factors associated with adverse outcomes of pregnancy among women of reproductive age

residing in Akumadan, the District capital of Offinso North District. Understanding these factors will help design interventions to address them.

1.2 Justification of the Study

The findings of this study would be valuable in targeting interventions at the community and national level with the knowledge on the factors that are primarily associated with adverse pregnancy outcomes. The results of this work could also inform policies at the ministry of health, the Ghana Health Service to put measures in place such as formulating policies and organizing interventional programmes that are capable and necessary to address the challenge of adverse pregnancy outcomes in the population. This could go a long way to save lives of many women and infants. Again, the study will also contribute knowledge to the scientific world and other researchers. The findings of this study may also serve as baseline information for further research in the future on factors influencing adverse pregnancy outcomes at the district level in LMICs.

2.3 Conceptual Framework

There are a number of factors that can contribute to the adverse outcome of pregnancy. Such factors can be categorized into socio-cultural or maternal factor, health facility related factor and the medical factors. These factors are mostly interrelated and lead to negative results of pregnancy, which are ultimately maternal mortality and neonatal mortality. For the purpose of this study the adverse pregnancy outcomes to be measured are preterm baby, birth defect or congenital anomaly, stillbirth and spontaneous abortion or miscarriage. These negative outcomes of pregnancy are potential causalities for the secondary outcomes (neonatal death and maternal death) which are not going to be measured in this study.

The socio-cultural factors, health-related factors and medical factors are the explanatory variables that impact primary outcome variables (adverse pregnancy outcome) such as congenital anomaly, low birth weight, miscarriage, preterm baby, still birth and these could consequently lead to the secondary outcome variables (maternal mortality and neonatal mortality).

In some cases too, the health facility related factors such as Attitude of care providers, Cost of health service, Lack of medical supplies and Distance to health facilities could also lead directly to the maternal and neonatal mortality. Sometimes, due to the lack of medical supplies and equipment and the bad attitude of some health personnel, putting in interventions when pregnant women are in emergencies are delayed and could lead to death of the mother or the baby. Some pregnant women may refuse to attend antenatal care due to the attitude of the health personnel, the high cost of the health service and even the long distance of the health facility from their residence or community. These women may sometimes only go to the health facility only when they are in emergency which eventual lead to death.

Medical conditions including malaria and other infections, severe maternal anemia, obesity, diabetes, hypertension, HIV/AIDS are known to be directly causing maternal and neonatal mortality (Health, 2018). According to the National Malaria Control Program (2015), in Ghana malaria alone accounts for 17 percent of all out patient department visits by pregnant women, 13 percent of all the pregnant women admissions at the hospital and 3.4 percent of maternal deaths.

Socio-cultural factors including Education, Age, Income, Alcohol, Smoking, Occupation, Religion, parity, gravidity, birth order, and antenatal care attendance can lead to medical conditions such as hypertension, diabetes, obesity, HIV/AIDS etc.

Socio-cultural factors including economic status, for example could affect other health related factors such as cost affordability of the health facility resulting in other factors such as delay in seeking health care. Eventually, the delay in seeking health care could result in the development of adverse pregnancy outcome. The women's educational status is also found to be associated with their health seeking behavior.

The adverse pregnancy outcomes could eventually lead to fetal or infant mortality and maternal mortality.

Diagram of Conceptual Framework

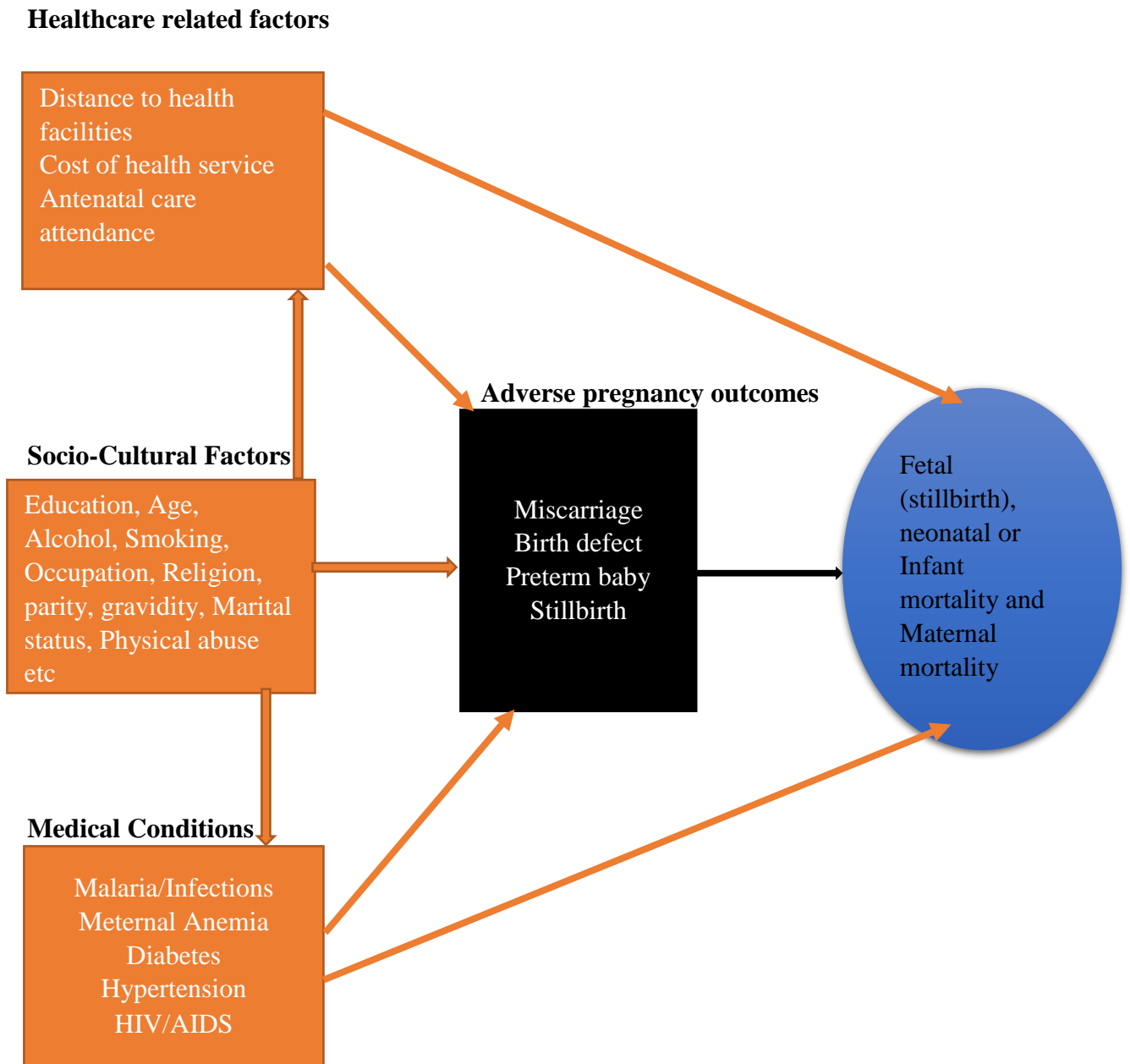


Fig. 1: Author's conceptual framework, 2019

1.4 Research Questions

1. What is the prevalence of adverse pregnancy outcomes among women in Akumadan Community?
2. Which cultural practices and socio-demographic factors are associated with adverse pregnancy outcome among women living in Akumadan Community?

3. Which health facility related practices or factors are associated with adverse pregnancy outcome among women living in Akumadan Community?
4. What are the medical factors that are associated with adverse pregnancy outcome among women living in the Akumadan Community?

1.5 Objectives

1.5.1 Main Objective

The main objective of this study is to identify the factors associated with adverse pregnancy outcomes among women in their reproductive age living in the Akumadan community of the Offinso North Dsitrict.

1.5.2. Specific Objectives

The specific objectives of the study are;

1. To determine the prevalence of adverse pregnancy outcomes among women in Akumadan.
2. To ascertain socio-economic factors that are associated with adverse pregnancy outcome among women living in the Akumadan Community.
3. To identify health facility related factors that are associated with adverse pregnancy outcome among women living in Akumadan Community.
4. To determine the medical factors that are associated with adverse pregnancy outcome among women living in the Akumadan Community.

CHAPTER TWO

LITERATURE REVIEW

2.0 Adverse Pregnancy Outcome

The higher incidence and prevalence of adverse pregnancy outcomes has taken global dimension regardless of being a developed country or developing country even though, there have been several studies that have estimated the prevalence of adverse pregnancy outcome in the developing countries to be about twice the prevalence in the developed country (Daniel, 2013) yet this still remains as a global burden. In east Africa, the prevalence of adverse birth outcome in Ethiopia is among the highest in the area. For instance, the level of adverse birth outcomes in Ethiopia are a major public health problem in areas such as Shire, Tigray, (22.6%) (Adane et al., 2014), Gondar (23%) (Abdo et al., 2016), and Hosanna, (24.5%) (Adane et al., 2013). A similar study done in rural Uganda found 7.2% abortion and 1.3% in stillbirth (Padhi et al., 2015). Studies in Ethiopia reported 8.8% and 10.5% prevalence of low birth weight in Addis Ababa and Tigray region, respectively (Mulatu, Zepre, Betre & Hailemichael, 2016; Mengesha, Wuneh, Weldearegawi & Selvakumar, 2017). Earlier, South Africa reported that there are about 39% and 42%, respectively, cases of direct maternal deaths and perinatal deaths that are directly related to intrapartum and represent the largest risk for either stillbirths or neonatal deaths (Moodley, 2003). The prevalence of low birth weight in Senegal, Burkina Faso, Malawi, was, respectively, 15.7%, 13.4% and 12.1% (He et al., 2018).

According to Daniel (2013), the prevalence of low birth weight (LBW) alone in the developing countries is 16.5percent which is about twice the rate of LBW in the developed countries which is 7 percent. About 15percent to 20 percent of all births are LBW worldwide

(da Silva Lopes et al., 2017; WHO, 2014) and the developing world, South and Central Asia accounts for 50 percent of all the low birth weight while Africa constitute 15 percent (Asia, 2012). The prevalence of LBW in Sub-Saharan part of Africa is estimated to be 13%. However, there are variations depending on the particular region of the SSA because as contained in the report, Eastern and Southern Africa had a prevalence rate of 11% of infants born with low birth weight while West and Central had 14%. Therefore, West and Central Africa have higher prevalence of LBW compared to Eastern and Southern Africa (Asia, 2012). A similar study conducted in Nigeria found that 40.0% of mothers delivered babies with low birth weight in the year 2015. According to Mohammed et al (2019), the prevalence of LBW in Ghana is 10 percent (Mohammed et al., 2019). The study went further to describe some of the factors that are associated with this adverse pregnancy outcome. These factors included, the age of the mother since the odds of giving birth to a LBW baby among teenage mothers were higher as compared to the odds among mothers who are thirty years old and above. It also describe the mother's educational level as one of the factors that influence this outcome. According to the study mothers who completed basic, secondary and tertiary education are less likely to give birth to a LBW baby as compare to mother who didn't have any formal education. The other factors this study found to be associated with low birth weight were antenatal visits, the economic status of the mother, residence, blood hemoglobin level, maternal nutritional status, health seeking behaviors of the mothers, parity and gravida etc.

There are over 2.6 million deliveries of stillbirths with 98% occurring in developing countries. The WHO estimates that in the first trimester of pregnancy in Africa, about 900,000 babies die as stillbirths (WHO, 2010). More than half of the 60% of the stillbirths in rural areas occur in conflict and emergency zones (Frøen et al., 2016; Lawn et al., 2016).

Congenital abnormality across the globe constitute 49.1 to 69.5 million disability adjusted life-years (DALY) and 80 percent of this is found in Sub-Saharan Africa (Quansah et al., 2015). Nearly all (99 %) maternal, newborn, and child deaths occur in low-income and middle-income countries. More than three million kids are also projected to die each year from congenital anomalies (defined as structural or functional anomalies occurring during embryo-fetal growth and present at birth). Additionally, another three million children born with congenital anomaly and who do not have access to healthcare may be disabled for life (Howson, Christianson & Modell, 2008). In industrialized countries, the risk of major congenital anomalies is about 3-5 percent (van't Hoog et al., 2011). Birth defects or congenital anomaly are also a global cause of infant mortality, affecting an estimated 1% to 3% of all births (Atta, Fiest & Frolkis, 2016).

There are about 15 million babies who are born prematurely annually across the globe. Over 1 million babies born die instantaneously after birth and many other suffer from lifelong physical and mental conditions (Howson, Kinney, McDougall & Lawn, 2013). According to WHO (2006), SSA is the most dangerous region for newborns because at least 1.16 million new births die within the first 28 days of life (WHO, 2006). There are 3,100 newborns who die daily and 9,600 who die after their first four weeks of delivery as well as before they achieve the fifth year while 700 pregnant women are faced with pregnancy-related complications on every day in Sub-Saharan Africa (SSA) (WHO, 2006).

2.1 Socio -economic factors associated with adverse pregnancy outcomes

There are various socio cultural factors that have association with adverse pregnancy outcome among women as found in literature. These factors according to literature may be economical, educational, environmental which include peer influence, smoking and cultural

issues and poverty related problems in the community and these associations are established from the literature reviewed. Socio-cultural obstacles may raise the risk of complications of obstetrics and newborns. Socio-cultural factor sometimes delay decision making, particularly in societies where decision-making does not depend entirely on the woman (Onta et al., 2014). A study in Nepal found that females did not seek health care at birth even though the health facility was close due to the cultural practice of isolating a female during delivery and a few days after birth (Ibadin, Adam, Adeleye & Okojie, 2016).

Education and knowledge are some of the factors that are associated with adverse pregnancy outcome. Morgen et al. (2008) conducted a study within the Danish National Birth Cohort and the findings showed that among other socioeconomic measures, maternal education was the greatest predictor of preterm birth. In their study, it was demonstrated that females with less than 10 years of education compared to those with more than 12 years of education had a high risk of experiencing adverse pregnancy outcomes. In a similar study, Ugwuja (2011) conducted a study assessing the impact of socio-economic status on adverse pregnancy outcomes on Nigerian women and the results showed that there was no relationship between women without education and adverse pregnancy outcome. However, they recorded more adverse pregnancy outcomes among women who were housewives and farmers compared to women whose occupations were civil service and artisans. Another study on the association of education as a social factor and adverse pregnancy outcome was by Auger et al. (2011) who evaluated the association between education and stillbirth across gestation ages. The stillbirth rate was computed using stillbirth in a given gestational interval as the numerator and the multivariable logistic regression was used to compile odds ratio for the relationship between education rank and stillbirth. From their results, it was established that

women with lowest education level had two times higher odds of overall stillbirth relative to those with the highest education.

Apart from education, there are environmental factors that affect adverse pregnancy outcome. One such environmental factors is smoking learnt from peers which Chevailier et al. (2007) found that indicators such as smoking and BMI had expected impact on birth weight, with more smoking being associated with lower birth weight. Smoking can also be influenced by low levels of education among women especially in SSA. A research undertaken by Ayenigbara (2012) discovered that females with low levels or no formal education have more odds of smoking than the odds of smoking among others who have had some level of formal education and therefore doubled their danger of giving birth to a stillbirth infant. In a similar study but contrary to Ayenigbara and Absar (2009) found no significant relation between smoking and adverse pregnancy outcomes in urban Ghana. Another environmental factor is the location which could be rural or urban. Globally, research has shown that rural women are at risk of giving birth to a very low birth weight neonate compared to urban dwellers (Juliana, 2016).

Poverty is another socio cultural factor that influences adverse pregnancy outcome since most poor women cannot access quality health services especially in countries where they are not insured. An exploration on the relationship between poverty and adverse pregnancy outcomes in the United States, reported that poorer women received less prenatal care compared to wealthier women and this led to higher stillbirths among the poor compared to the wealthier (Najahawatic et al., 2008). In Africa, Chimaraoke (2010) conducted a study on the effect of poverty on adverse maternal outcomes in Nairobi among women and the results showed that poor women in the urban Nairobi associate poverty with complications

in pregnancy outcome. According to Isiugo-abanihe (2011), women with low standard of living such as impoverished social services like latrines, water supply, household fuel, and sleeping rooms, increases the risk of delivering LWB babies.

In another study, Silvestrin et al. (2013) found out in a study in Brazil that maternal age was significantly associated with birth outcome complications like still birth. Their results established that, the prevalence of low birth weight was higher in the extremes of reproductive life because the rates of low birth weight deliveries increased consistently with younger maternal age, with that of mothers aged 15years or younger recording higher percentages. Similar finding reported by MICS, (2011) indicated that both in the developed and the developing countries alike, teenager mothers who are yet to finish growing run the risk of bearing underweight babies. In a similar study in Ghana, Fosu et al. (2013) found that there is a relationship that exist between mothers whose ages are less than 24 and those greater than 35years alongside mothers with more than four children and low birth weight in Ghana.

2.2 Health facility related factors that are associated with adverse pregnancy outcomes

Accessing antenatal timely is generally accepted as an effective method used in preventing complications in pregnant women and the babies delivered (Alderliesten, 2007). Seeking ANC presents an opportunity for a pregnant woman to be given a number of interventions that improve their health and well-being and that of their infants (Abouzhar, 2003). Therefore, there should not be health related barriers that limit pregnant women in accessing ANC. However, there is evidence from research that suggest that inadequate number of ANC visits, laboratory investigations and physical examination of the mother and fetus are associated with adverse pregnancy outcomes (da Fonseca et al., 2014). For instance, a study

by Pell et al. (2013) found that mothers attending ANC to avoid reprimands from health workers is a factor that motivates pregnant women to attend ANC.

The WHO (2005) relates high maternal, perinatal and neonatal mortality to inadequate and poor quality of health services which affects the utilization of health care services.

Lule et al. (2005) made a similar report that women's inability to access obstetric care, particularly during work, further increases the risk of adverse outcomes of pregnancy, including death and physical disability. In other instances, females are likely to use health facility strategies as long as there are still obstacles to qualified personnel shortages, distance from the health facility, transportation costs, and cultural acceptability (Lancet, 2006).

The ability to acknowledge early signs of complications of pregnancy and refer the female to the suitable health facility with the necessary funds to manage complications and decrease perinatal and neonatal mortality (WHO, 2006). Poor clinician-client relationships, however, and providers' lack of attention to the needs of health seekers, are barriers to the use and implementation of institutionalized health care services and poor outcomes of pregnancy in developing countries (Chimaraoke, 2010).

Accessibility to antenatal quality care (ANC) has a positive effect on the outcome of pregnancy among women. Access to quality care provided by pregnant females during ANC depends on the amount of qualified health employees, appropriate equipment and supplies, and appropriate referral or safe transportation in the case of an emergency to a hospital or other health facility (Banchani & Tenkorang, 2014).

This implies that poor ANC quality is linked to adverse outcomes of pregnancy such as maternal and neonatal mortality. Distance is another factor that discourages ANC access. Gleib et al. (nd) also discovered that ANC utilization is inversely related to distance to the health facility.

In addition, it has also been shown that uncomfortable transportation, poor road conditions and difficulties in crossing large rivers are barriers to the use of Antenatal care. It is apparent from the literature reviewed that there are countless difficulties facing adolescent mothers. There are three kinds of delay in seeking care at the health facility. According to Chimaraoke (2010), there may be delays due to the inability of pregnant women to recognize signs of hazards and decide to seek care, to reach health facilities late and to receive care in health facilities late

Nandan (2009) also argues that the late decision on whether to seek care as a result of failure to recognize signs of complications, failure to perceive the severity of the disease, cost considerations, previous negative experiences with the health care system, and transportation difficulties may result in delay. Another reason for delays in reaching the hospital or health facility is the distance from the pregnant women's home to a facility or supplier, road situation, and absence of emergency transport (WHO, 2005).

Murray (2006) also noted that delays in getting care may result from providers' unprofessional attitudes, shortages of supplies and fundamental facilities, absence of health care staff, and bad health care providers' abilities. Most care providers' unprofessional behavior is prevalent and predictable.

High ANC charges are linked to the adverse outcome of pregnancy because most of the pregnant women who are unable to afford are likely to settle for cheaper services of traditional birth attendants (TBAs) who are also usually paid in kind (Ikamari, 2004).

This has severe health consequences for pregnant females because TBA-free delivery at home can contribute to poorer results for the mother and her child.

Through their studies in the Volta and Central Regions of Ghana, Ansong-Tornuiet et al. (2007) discovered that the sort of clinical care given before and after the implementation of the fee exemption policy did not alter, but made women with complications arrive in hospital sooner after the policy was introduced.

However, women admitted to delivery received very bad care and this could have led to many negative results of pregnancy, such as maternal and neonatal mortality, as was the case before the policy was implemented.

2.3 Medical factors that are associated with adverse pregnancy outcomes

Some medical conditions are associated with adverse outcome of pregnancy. Medical complications such as obesity, a lifestyle health risk, have become a global problem of person and public health with a dramatic increase in the rate. As indicated by Cedergren (2004), adverse pregnancy outcomes such as LBW were associated with maternal overweight and obesity. In an evaluation to determine whether morbid obesity, defined by BMI 35.1-40 or BMI above 40, was associated with Cedergren's increased danger of negative results of childbirth (2004)

The findings stated that the group of obese females experienced a 3-fold rise in stillbirth. Furthermore, Salihu (2011) provided evidence that the risk of death among obese mothers increased. It was observed that there was an incremental increase in mortality danger with rising BMI values, as well as an enhancement in fetal survival with a reduction in obese women's BMI inter-pregnancy. This given adequate proof to demonstrate a causal relationship between maternal obesity and mortality.

Hypertension is one of the most common medical diseases among pregnant females, with an incidence of around 2-10 percent globally (Owiredu, 2008b; Mammaro et al., 2009; Osungbade and Ige, 2011; Uzan et al., 2011). In Ghana, the prevalence of pregnancy-induced hypertension in rural areas is 0.4% and in urban areas is 3.1% (van Middendorp et al., 2013). Unless correctly managed, hypertension during pregnancy can lead to fetal and maternal morbidity and is known to be the major cause of maternal death (Uzan et al., 2011). For example, a study carried out in Iran to determine the prevalence and risk factors associated with preterm birth revealed that the prevalence rate of preterm birth was 5.1% and history of premature birth, complications of pregnancy (hypertension, oligohydramnios, preeclampsia, premature membrane rupture, antepartum hemorrhage, hyperemesis gravidarum), anemia were factors associated with Rugaranganda's 2008 research of high blood pressure in childbirth in Geneva showed that hypertension complicates 5-8 percent of all pregnancies. Preeclampsia is the most prevalent danger of hypertension.

In primigravida mothers, hypertensive disorder during pregnancy is higher. Hypertension, however, is mostly correlated in multipara with long-term essential hypertension or chronic renal failure. When considering all causes of hypertension in pregnancies, preeclampsia

accounts for 80%, 18% primary hypertension, kidney illness 1.9%, and 0.1% eclampsia (Ruparanganda, 2010).

Several studies have shown that there are several adverse effects of anemia during pregnancy. The pregnancy may have poor maternal and fetal outcomes based on the type and severity of anemia.

Low birth weight and fetal deficiency and infant fatalities are caused by anemia during childbirth (Banhidy et al. 2011; Kalaivani 2009). It also triggers premature birth, limitation of intrauterine development (Adam et al., 2007; Haggaz et al., 2010; Kidanto et al., 2009). According to Wolff et al. (2009), folic acid deficiency during pregnancy may lead to a severe neural tube deficiency that develops in embryos during the first few weeks of pregnancy leading to spine, skull and brain malformations. Anemia also causes heart defects and cleft lips, limb defects, and anomalies in the urinary tract (Goh & Koren, 2008), as found by Wilcox et al. (2007).

The premature delivery chances are more than doubled. In an anemic pregnant woman, even a moderate hemorrhage may be fatal (Olujimi et al., 2014). A fundamental concept of fetal / neonatal iron biology is that at the cost of other tissues, including the brain, iron is given priority to red blood cells. If iron supply does not satisfy iron requirement, even if the infant is not anemic, the fetal brain may be at danger. Anemia adversely impacts babies, kindergarten and school-age children's cognitive performance, conduct and physical development.

Ghana's elevated incidence of anemia during pregnancy is vital in determining the adverse outcome of pregnancy with related negative effect on pregnant women's social and economic growth. In a similar study conducted in Tanzania by Deborah (2007) to determine the risk factors for poor birth outcomes revealed that the prevalence of adverse pregnancy outcomes were 18% among which 2.7% were still birth, 12% preterm and 8% low birth weight, and these negative outcomes of the pregnancies were independently associated with maternal malaria and anemia. This means that malaria and anemia are strongly linked to result in negative outcomes of pregnancy.

In Ghana, a cross-sectional study was conducted in Kumasi to investigate factors influencing the use of antenatal care and its association with adverse outcomes of pregnancy (low birth weight, stillbirth and premature delivery) and the results showed that the prevalence of adverse birth outcome was 19%, while women with more than 5 births were found to be more likely to experience adverse outcome of pregnancy.

Women undergoing antiretroviral therapy (ART) are likely to have mortality. Stringer et al. (2018) performed a survey to analyze females who became pregnant while taking ART (HPTN 052, ACTG A5208, and ACTG A5175). Most of the women whom came from Africa were at a median age of 29. The study found 160 (63%) live births (76 term and 84 preterm), 11 (4%) mortality, 51 (20%) spontaneous abortions, 28 (11%) elective terminations, and 3 (1%) ectopic pregnancies. They found that premature birth rates and other negative results of pregnancy were high for females who conceived on ART.

Furthermore, Xiao et al. (2015) evaluated the connection between maternal human immunodeficiency virus (HIV) infection and low birth weight (LBW)/premature birth

(PTD) infection through a meta-analysis of cohort research of infected and uninfected females and the findings showed important heterogeneity among studies of LBW / PTD-related maternal HIV infection.

The meta-analysis showed that both LBW (pooled odds ratio (OR): 1.73, 95% confidence interval (CI): 1.64, 1.82, $P < 0.001$) and PTD (pooled OR: 1.56, 95% CI: 1.49, 1.63, $P < 0.001$) were significantly associated with maternal HIV infection. They concluded that women infected with HIV were at higher risk compared to uninfected women of having a low birth weight baby.

In another research carried out in Ghana to identify maternal birth weight determinants in northern Ghana, Abubakari et al. (2015) found a significant association between lower birth weights and inadequate weight gain (-0.51 ± 0.81 kg), lower Hb (-0.16 ± 0.09 kg) and mothers who experienced diarrhoea episode during pregnancy (-0.20 ± 0.09 kg). Abubakari et al. (2015) recognized pregnancy BMI, gestational weight gain, gestational age and child sex, maternity and diarrheal episodes during pregnancy as the most important negative pregnancy result variables.

CHAPTER THREE

MATERIALS AND METHODS

3.0 Introduction

The chapter discusses the methods used the study. These methods were described in section beginning with research design, followed by study area, study population, sample size, sample procedure, data collection technique and process, data analysis, ethical considerations, confidentiality and consent approval.

3.1 Research Design

The study adopted a descriptive cross-sectional design for community-based epidemiological data collection from women of the reproductive age in the Akumadan community in the Ashanti region of Ghana. The study employed only quantitative methods. Therefore, structured questionnaires were designed and administered to target respondents. The structured questionnaires were pre-tested in Abease community in the Pru West District of Bono East region since it has similar characteristics to Akumadan. The data collection was conducted between May and June 2019.

3.2 Study Area

Akumadan is the capital of Offinso North, a district in the Ashanti Region of Ghana. The total land area of the District is about 945.9 square kilometres and it lies between longitudes $1^{\circ} 6''\text{W}$ and $1^{\circ} 45''\text{E}$ and as well as latitudes $6^{\circ}5''$ to $7^{\circ}2''\text{N}$ and. It shares common boundaries with Techiman Municipal Assembly to the North, Sunyani Municipal Assembly to the West, Ejura Sekyedumasi District Assembly to the East and the Offinso Municipal Assembly to the South. Others are Nkoranza South District Assembly to the Northeast, Wenchi District Assembly to the Northwest, Tano North and South District Assemblies to

the Southwest. The Trans-West-African Highway from Accra to Ouagadougou traverses the District, thus making it the main gateway to the Ashanti Region from the northern part of the country.

The population of Offinso North District, projected from the 2010 Population and Housing Census, is 56,881 living in 11,162 households (mean household size of 5), with a Male:Female ratio of 0.992. Approximately 59% of the population is rural and the majority (78.8%) engage in agriculture, particularly crop farming (81.6%). Almost nine out of ten households (89.8%) in rural communities are agricultural households compared to 66% in the urban localities.

The Akumadan Health Centre is the primary facility that serves the health needs of the people in the community. The health centre offers general services including delivery services to the population and is National Health Insurance Authority (NHIA)-accredited service provider.

3.3 Study Population

The study population comprised all households in the Akumadan Community. Women of reproductive age (15-49) who have ever been pregnant or have children were selected for specific questions related to their medical conditions, health facility related factors in the community, socio-economic factors, pregnancy and birth outcomes.

3.4 Inclusion criteria

The study included all households in the Akumadan township. All women of reproductive age who have ever been pregnant or have children who are less than five years and provide consent form participation were included in the study.

3.5 Exclusion criteria

The study excluded all women in Akumadan Township who have never been pregnant and those who did not consent to participate in the study.

3.6 Sample size and sampling procedures

The sample size of this study was estimated based on significance level, statistical power and the prevalence of adverse pregnancy outcome in the Ashanti Region. The significance level (alpha) of 0.05 and confident level of 95% was used in this study. The results of the study were interpreted based on whether the significance association was found with p-value less than 0.05. The Cochran (1977) formula and the rate of adverse pregnancy outcome in the Ashanti Region Statistics which is 20% (Ghana Demographic and Health Survey- Ashanti Regional figure, 2018); sample size was calculated as follows:

$$N = \frac{[Z^2 \times P(1 - P)]}{e^2}$$

Where N = sample size per group,

Z = the standard normal probability value for 95% confidence level (1.96),

P = assumed prevalence of adverse pregnancy outcome (20%), and

e = margin of error, (0.05).

Hence, the minimum sample size (N) was approximately 246. Moreover, 20% attrition rate was added to give a total sample size of 300 respondents for the study.

Selection of respondents used a systematic random sampling approach. A recently generated list of all women of reproductive age (15-49 years) who had delivered in the last 5 years was obtained from the district health administration. This list of 1500 women was used for

the polio mass immunization campaign. Random sampling methods were used to select the respondents. By this, the total number of women who met the inclusion criteria were divided by the sample size to obtain the sampling interval of 5. The first household was selected using ballot from the first five households on the list and the 5th household from that one on the list was selected for the questionnaires.

3.7 Study Variables

The primary outcomes of interest in this study were adverse pregnancy and birth outcomes for women of reproductive age including spontaneous abortions, stillbirth, preterm births, congenital anomalies and early neonatal deaths over the past 5 years prior to the study. The secondary outcome of interest included the maternal mortality and the neonatal mortality. For the purpose of this study, only the primary outcomes were measured but the secondary outcomes were not measured.

The explanatory variables also included age, parity, educational status, religion, occupation, partner's occupation, residence, and family size, parity, gravidity, antenatal care attendance, gestation, pregnancy complication, birth order, and mother's age at current pregnancy, pre-existing medical condition such as diabetes mellitus, hypertension, cardiac disease, HIV/AIDS, anaemia, malaria, and oral health status.

The study also assessed pre-conception risk factors occurring before pregnancy such as the woman's pregnancy intention, psychoactive substance use, coffee consumption, periodontal disease, medication use, traditional medicine use during pregnancy, environmental exposure, pre-gestational disease, preconception folic acid supplementation use status, presence of external stressors, genetic disorder, health insurance status, physical

abuse, women's preconception health/care knowledge, inter-pregnancy interval, regular exercise, and uptake of preconception counselling, availability of health facilities, distance and the cost of health services.

3.8 Data Collection Procedure

Through collaboration with the national expanded program for immunization (EPI) in the community, a list of all compounds in the communities with women of reproductive age or, where available, children less than 5 years were selected using simple random sampling techniques as explained above. These households were visited by the study team and all women of reproductive ages within these households were interviewed for the study.

The research team read and explained the questions to the respondents who could not read and answered their responses appropriately. However, those who could read and write, answered the questionnaires on their own.

3.9 Consenting

Approval was sought from the Ghana Health Service Ethical approval committee for this research. Permission was obtained from the leadership of the community and the district health administration for the conduct of the study. In each household, consent was sought from the head of household for the interviews. An independent consent was obtained from the women of reproductive age for their interviews. A study information sheet was read to each participant in their language of choice. Research team explained the purpose of the study, the expectations of the respondents and the duration and what the study entails to them.

It was explained to the participants that there would be no risk to health in participating in the study and that the information obtained are solely for academic purposes. They were told that participation is voluntary and their refusal would not affect them in anyway in the community or health facility when they go for care. They were assured that they have the right to withdraw participation even if they initially consent to participate. They again assured that all their responses will be strictly confidential so that nobody could trace the responses to them or their household.

The potential participants were invited to ask questions or seek clarification on the information provided. When all their questions and queries are responded to, they were invited to participate in the study. Participation was indicated with a signature or thumbprint. If the participant was illiterate, a witness was sought to witness the consenting process and countersign the participant's consent form as witness to the consent. All consent forms were also signed by the research assistant.

3.10 Data Analyses and Presentation

All epidemiological data collected from participants were entered into Excel spreadsheet and translated into Stata version 15 (StataCorp, Texas, USA) for processing and analyses. Data processing included cleaning of the data through the conduct of range and consistency as well as integrity checks. Data cleaning started from the field where forms were checked for completeness and missing data were resolved by going back to the households, where indicated, to collect it. At the data management stage, outliers and inconsistent data report were generated and resolved by the investigators. The descriptive statistical analyses included means and standard deviations for continuous variables and, percentages and frequency analyses were used for categorical variables.

Bivariate logistic regression models were fitted and chi-square statistics used to determine associations between the outcome and the explanatory variables; with statistical significance of 5%.

Variables that were significant at the 10% level were included into a multivariate logistic regression models for the determinants of adverse pregnancy outcomes among the study population using backward stepwise regression methods where all the variables were fitted into the model and the least significant was removed from the model, one at a time, whilst simultaneously checking for confounding. The results were then presented as charts, tables and graphs.

3.11 Ethical Considerations

Throughout this study, the ethical issues were upheld to ensure that dignity of the participants are maintained. Major Ethical issues of concern in this study included informed consent, privacy and confidentiality, anonymity and conduct of the individual researcher.

Immediately the research proposal was presented and approved, a letter introducing the researcher was written and presented to the District Health Directorates (DHD) of Offinso North and the community leaders of Akumadan. This enabled access to the targeted populations within the areas of study. The researcher then went ahead and carried out the research study. The researcher visited the research location, introduce himself to the target population and administered the questionnaires to the participants after they had given their consent.

The procedures involved in this study were non-invasive and caused no physical discomfort to the respondents. Results obtained from this study were made available to the University

of Ghana, Legon and the community involved so that the appropriate measures could be taken to address the situation.

The researcher ensured that the respondents were kept confidential throughout the study. On the questionnaire, the names of the respondents or any other type of identification were not used. All gathered information were stored, analyzed and recorded in formats that did not allow the individual participant to be identified.

CHAPTER FOUR

RESULTS

4.0 Introduction

In total, questionnaires were administered to 300 women in the study but one of the respondents did not provide consistent and complete data and was therefore excluded. Hence the remaining 299 respondents were included for the analysis.

4.1 The prevalence of adverse pregnancy outcomes

Altogether, the prevalence of the adverse pregnancy outcomes was estimated to be 21.7%.

Table 1: Shows the prevalence and percentage distribution of the adverse pregnancy outcomes

Variable	Category	Frequency	Percentage
Adverse pregnancy outcomes	No ABO	234	78.26
	Miscarriage	23	7.69
	Preterm	10	3.34
	Birth Defect	8	2.68
	Still Birth	24	8.03

4.2 Proportion of the adverse pregnancy outcomes

Among the women with the adverse pregnancy outcomes, 37% experienced still birth while 36% had miscarriage. Preterm and birth defect among these women were 15% and 12% respectively.

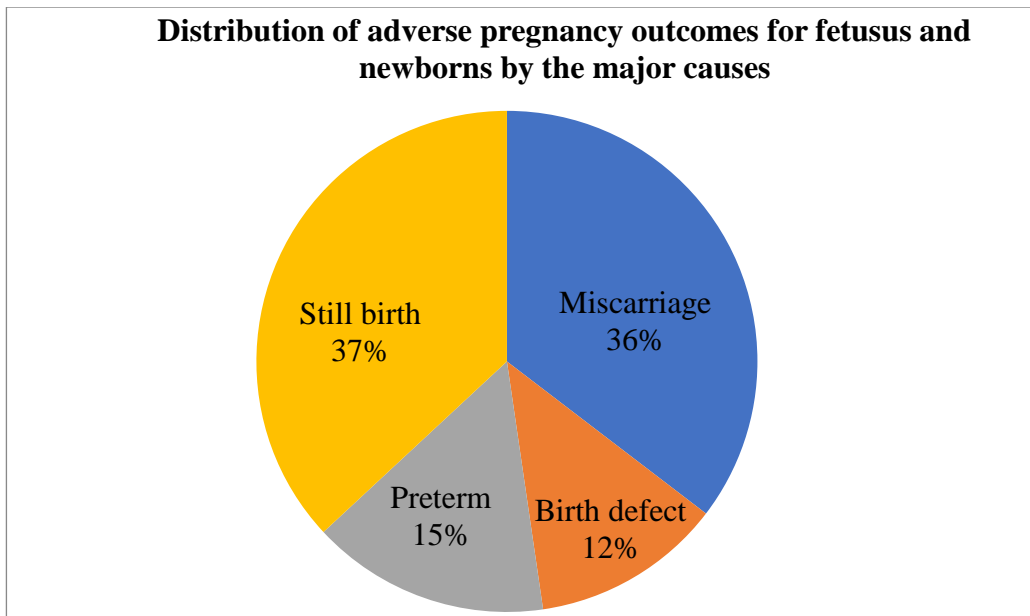


Fig. 2: Shows proportions of the adverse pregnancy outcomes among the women

4.3 Factors associated with adverse pregnancy outcomes

Majority (65.6%) of women were between 20 to 39 years and were either not educated (46.5%) or had only up to primary education (43.8%). Christians were in the majority with a proportion of 73.6%. About 72.2% of the women were married and an equal proportion (4.7%) of women were divorced as those that were widowed. Also, 69.9% of the women had less than 5 pregnancies and 4.7% off them having 8 or more pregnancies. With parity, 73.9% of the women reported to have less than 5 children and 5.7% have had 8 or more children. The prevalence of abortion among the women was as low as 6.7% since 93.3% of the women have not had abortion. The proportion of alcohol and coffee intake among the women were 3.7% and 1.0% respectively. The use of herbal medicine during pregnancy by the women was estimated at 46.5%. Among the women interviewed in Akumadan, 42.1% were farmers with 1.3% being students. The prevalence of the practice of drying food by the roadside and eating food being dried by the roadside were found to be 20.7% and 14.1% respectively. That is majority of the women were not into these practices. 56.5% of the women reported to have frequent exercise since most of them considered the kind of work

they do as part of their exercise. The antenatal coverage of these women is 94.0% and 92.3% have easy access to health facility. The cost of health services provided was reported to be affordable to 76.2% of the women interviewed. Though none of the women interviewed was said to have hypertension, diabetes or HIV/AIDS yet 21.4% and 42.5% of the women had anemia and malaria during pregnancy.

Table 2: Shows frequencies and percentage distributions of factors associated with adverse pregnancy outcomes

Variable	Category	Frequency (n)	Percentage (%)
Socio-cultural factors			
Age	15 – 19	43	14.38
	20 – 29	100	33.44
	30 – 39	96	32.11
	40 - 49	60	20.07
Level of education	No education	139	46.49
	Primary	131	43.81
	Secondary	23	7.69
	Tertiary	6	2.00
Religion	Christian	220	73.58
	Muslim	74	24.75
	Traditional	5	1.67
Marital status	Married	216	72.24
	Divorced	14	4.68
	Widowed	14	4.68
	Single	55	18.39
Gravida	1	209	25.42
	2-4	76	69.90
	5 or more	14	4.68
Parity	1	221	20.40
	2-4	61	73.91
	5 or more	17	5.69
Herbal medicine use during pregnancy	No	160	53.51
	Yes	139	46.49
Occupation	Farming	126	42.14
	Trader	90	30.10
	Unemployed	57	19.06
	Student	4	1.34
	Others	22	7.36
Drying food by roadside	No	237	79.26
	Yes	65	20.74
Eat food dried by the roadside	No	257	85.95
	Yes	42	14.05
Physical abuse from husbands	No	294	98.33
	Yes	5	1.67
Health facility related factors			
ANC attendance	No	18	6.02
	Yes	281	93.98
Accessibility of health services	No	23	7.69
	Yes	276	92.31
NHIS use	No	71	23.83
	Yes	227	79.17
Medical factors			
Anemia in pregnancy	No	235	78.60
	Yes	64	21.40
Malaria in pregnancy	No	172	51.53
	Yes	127	42.47

Under the bivariate analysis as shown below, age of participant (COR=1.72; P-value=0.01), marital status (COR=1.08; P-value=0.02), gravida (COR=3.38; P-value=0.01), parity (COR=2.83; P-value=0.01), use of Herbal medicine (COR=2.58; P-value=0.01), occupation (COR=1.95, P-value=0.01) drying food by the roadside (COR=3.12; P-value=0.02) and eating food dried by roadside (COR=2.30; P-value=0.02), were statistically associated with developing adverse pregnancy outcomes.

Table 3: Association between the adverse pregnancy outcomes and independent variables

Variable	Category	Adverse Pregnancy Outcome		χ^2	COR	P-value
		No	Yes			
Age	15 – 19	24	6	13.29	1.72	0.01
	21 – 29	147	34			
	30 - 39	55	22			
	40 – 49	8	3			
Level of education	No education	102	37	4.88	0.64	0.05
	Primary	106	25			
	Secondary	21	2			
	Tertiary	5	1			
Religion	Christian	167	53	5.81	0.68	0.21
	Muslem	64	10			
	Traditionalist	3	2			
Marital status	Married	175	41	14.52	1.08	0.02
	Divorced	7	7			
	Widowed	7	7			
	Single	45	10			
Gravida	1	49	27	30.98	3.38	<0.01
	2-4	180	29			
	5 or more	5	9			
Parity	1	42	19	26.15	2.83	<0.01
	2-4	186	35			
	5 or more	6	11			
Herbal Medicine Use	No	1	2	3.1	2.58	0.01
	Yes	97	42			
Occupation	Unemployed	44	13	11.21	1.95	0.01
	Trader	81	9			
	Farming	90	36			
	Student	3	1			
	Others	16	6			
Drying food by roadside	No	188	49	0.76	3.12	0.03
	Yes	46	16			
Eat food dried by roadside	No	207	50	5.61	2.30	0.02*
	Yes	27	15			
Attendance to ANC	No	11	7	3.31	0.41	0.08
	Yes	223	58			
Accessibility of Health facility	No	17	6	0.28	0.77	0.6
	Yes	217	59			
NHIS Use	No	50	21	3.30	0.57	0.07
	Yes	183	44			
Physical Abuse from husband	No	230	64	0.01	0.90	0.92¥
	Yes	4	1			

From the multivariate analysis results shown below, women who are divorced have an increased chance of developing adverse pregnancy outcomes compared to married women (AOR=6.62; P-value <0.01) women who had five or more pregnancies, are more likely to develop an adverse pregnancy outcomes compared to women who had one pregnancy (AOR=3.98; P-value= 0.02). And women whose occupation is farming had an increased odds of developing the adverse pregnancy outcomes as compared to women who are unemployed (AOR=1.4, P-value=0.02). Women who dry food by the roadside and women who eat food dried by the roadside are more likely to develop adverse pregnancy outcomes compared to women who do not dry food by the roadside or eat food dried by the roadside (AOR=3.36; P-value <0.01) and (AOR=2.9; P-value<0.02) respectively.

Table 4: Strength of association between the adverse pregnancy outcomes and independent variables

Variable	Category	COR	P-value	AOR	P-value
Age	15 – 19	1.72	0.01	1	
	20 – 29			0.99	0.98
	30 - 39			0.45	0.30
	40 – 49			0.44	0.49
Marital Status	Married	1.08	0.02	1	
	Divorced			6.62	<0.01*
	Widowed			1.91	0.39
	Single			1.12	0.80
Gravida	1	3.38	<0.01	1	
	4-2			6.94	0.06
	5 or more			3.98	0.02*
Parity	1	2.83	<0.01	1	
	4-2			0.96	0.95
	5 or more			2.92	0.27
Occupation	Unemployed	1.95	0.01	1	
	Farming			1.4	<0.02*
	Trader			0.7	0.5
	Student			1.3	0.9
	Other			1.2	0.8
Herbal medicine use	No	2.58	<0.01	1	
	Yes			1.77	0.09
Drying food by the roadside	No	3.12	0.03	1	
	Yes			2.9	<0.02*
Eat food dried by roadside	No	2.3	0.02	1	
	Yes			3.36	<0.01*

CHAPTER FIVE

DISCUSSION

5.0 The prevalence of adverse pregnancy outcome in Akumadan

The prevalence of pregnancy complications or the adverse pregnancy outcome in the sample population is 21.7%. The prevalence rate of 21.7% in Akumadan is approximately the same as compared to 22.6% in Shire as well as 23% in Gondar in studies conducted by Adane et al. (2014) and Abdo et al. (2016) respectively. Although approximately one-fifth of the respondents had adverse pregnancy outcomes, it is still lower compared to an African country like Ethiopia where the prevalence is 31.8%, thus about one-third of the women developing the adverse pregnancy outcomes (Kassahun et al., 2019). This could be due to the high patronage of ANC services during pregnancy by women in Akumadan. This is because ANC services are free in Ghana and that is when most of the complications that might arise during pregnancy and child birth is addressed early before they become a serious health challenge. It may also be due to the fact that these days they are a lot of educations on reproductive health that help couples especially the women to take an informed decision concerning their pregnancy and childbirth. Family planning services are readily available and free which help the couples to decide when to give birth and how to space out their children which improves the health of the mother and reduces the chances of developing an adverse pregnancy outcome.

Among the various negative pregnancy outcomes captured by this study, the most prevailing negative outcome was stillbirth of 37% followed by miscarriage of 36% and then preterm birth and birth defect of 15% and 12% respectively as shown in **Fig 2**. A similar study done in rural Uganda found abortion prevalence to be 7.2% and that of stillbirth to be 1.3% (Padhi

et al., 2015). Another study was conducted in USA which also found that miscarriage is uncommon outcome of pregnancy with a prevalence of less than 15% (Bardos et al., 2016). These imply that stillbirth and miscarriage are very higher among women in Akumadan compared to women in Uganda and USA respectively. The high prevalence of miscarriage could be due to the high level of psychological and emotional stress that the women in Akumadan go through as a result of their farming occupation and poverty. It could also be as a result of the intake of drugs without prescription and also intake of herbal medicines since some of the herbs are known to cause miscarriage and other negative pregnancy outcomes. Certain medical conditions of the mother can also lead to miscarriages and still birth.

5.1 The socio-economic factors and their association with the adverse pregnancy outcomes

Researches have shown that there is a relationship between age, marital status, occupation, religion, level of education and adverse outcomes of pregnancy (Morgen et al., 2008; Ugwuja, 2011; Silvestrin et al., 2013).

The results of the study as shown in **table 2** indicate that almost two-third 65.6% of the respondent surveyed were between the ages of 20 to 39 years which is the ideal age range of giving birth or child bearing (Khalil et al, 2013) and 25% of the women fell between the ages of 40 to 49 with as few as 14.4% bearing children between the ages of 15 to 19. Age is one of the important factors to consider as far as pregnancy and its outcome is concerned. Getting pregnant or bearing children too early or too late in one's lifetime are known to be strongly associated with adverse pregnancy outcomes (Howson et al, 2013). Women in their early ages of life (in their teens) usually may not have their reproductive system and

structure well developed and as such giving birth at this early stage of life could result into pregnancy, maternal and neonatal birth complications (Althabe et al., 2015). Also, childbearing in the later part of women's life; thus, in the 40s is linked to adverse pregnancy outcomes. This could be attributed to the development of such medical conditions such as endometriosis, tubal diseases, uterine fibroids, hypertension, diabetes etc. which negatively affect the outcome of pregnancy (Carolan & Frankowska, 2011). This could also be due to the fact that the quality of eggs and the number of eggs a woman can produce throughout her life time declines with an increasing age. That is to say that as a woman's age increases, her chances of getting pregnant reduces and even if she is fortunate to conceive too, the quality of the eggs too becomes questionable which could lead to adverse pregnancy outcomes such as birth defect, low birthweight, preterm born and miscarriages (Laopaiboon et al., 2014).

Therefore this may be in line with reproductive health educations as part of the public health interventions to increase the survival of the mother and the baby during pregnancy and childbirth and also to curb the development of adverse pregnancy outcome in the country and for that matter the district, to have found out from Akumadan Community that majority of the women bearing children are within the age range of 20 to 39 when the women are physically, psychologically and socially sound and good for child bearing. This could account for the reason why in this study, after adjusting for other covariates in the multivariate analysis, age was shown not to be significantly having an association with the adverse pregnancy outcome because age becomes strongly linked to adverse pregnancy outcome when the woman bears children too early or too late in her lifetime. Moreover, after the age was stratified into groups, none of the age categories was significantly associated with adverse pregnancy outcome as shown in the **table 4** despite the conclusions

that have been drawn by other studies such as (Tsegaye & Kassa, 2018; Blencowe et al., 2013; Hsieh et al., 2010) that age is associated with adverse pregnancy outcomes. This could again be attributed to the fact that women of the Akumadan live a lifestyle that is different from the lifestyle of the people from other places where these researches were conducted. The women of Akumadan generally do not live a sedentary lifestyle. Because the main occupation there is farming, the women are almost always involved in one or the other physical activities such as weeding, carrying load, ridding bicycle etc. which makes them healthier. Also, because Akumadan is a rural community, green vegetables and fruits are readily available and cheap and forms greater part of the women's diet which makes them stronger and healthier irrespective of their age as compared to women living in the big cities where the reverse occurs. Moreover, the availability of health facility in the Community could account for the reasons why age was not found to be associated with the adverse pregnancy outcome because the women can readily access the facility for their health concerns to be addressed in time before it becomes complicated. Lastly, the current public health interventions such as the distribution of free insecticide treated net, free antenatal care (ANC) services, and the various educational programs might have gone a long way to control negative pregnancy outcomes irrespective of the woman's age.

Over two thirds of the respondents (73.6%) were Christians implying that Christianity was the dominant religion among women who took part in the study. Apart from Christianity, less than one-third of the respondents (24.8%) associated themselves with Islam and 1.7% of the respondents were traditionalist. Religion may have an influence on the health seeking behaviors of respondents since religious organizations have values and principles individuals must have adhered to. However, religion was not associated with the outcomes of pregnancy studied in this work.

Few of the women interviewed were single (18.4) and very few (4.6%) were widowed and (4.6%) divorced, with as many as 72.2% married. **From table 4**, being a divorced woman increases one's chances of developing adverse pregnancy outcomes more than six times (AOR = 6.6, 95% CI, P- value = 0.01) as compared to women who are married. A similar study has stipulated that marital status is one of the determinants of adverse pregnancy outcomes like low birth weight, preterm birth etc. The study again added that psychological support from husbands to their wives and the generalized societal acceptance are the postulated means by which marital status decreases adverse pregnancy outcomes (Maternal marital status, 2010). That is, the odds of adverse pregnancy outcomes among married women is significantly reduced.

The analyses rather found a variable such as eating food dried by the road side to be associated with adverse pregnancy outcome [AOR=3.4, 95% CI, P-value = 0.01]. **From table 4**, the odds of developing a negative pregnancy outcome were three times increased among women in Akumadan who eat food dried by the roadside as compared to women who do not eat food dried by the roadside. Food is mostly contaminated with heavy metals as they are spread by the roadside to dry as a preservation and/or processing method. In Ghana, drying by sun, as a method of food preservation is one of most utilized methods because it is cheap and the sun is readily available. However, this mode of food preservation and processing may require platform on which the material or food item will be dried. Some food items such as cassava, pepper, okra are sometimes dried on sacks of used fertilizers or roofing sheets or on leaves in the farms. In Akumadan community, the people use the tarmac of the tarred road as platform on which the food items are spread to dry. Inevitably, this exposes the food to the fumes from the vehicles that ply the road and hence heavy metal contamination. A study done on cassava flours sun-dried by the roadsides conducted in Nigeria by Obanijesu and Olajide (2009), concluded that cassava flour dried by the roadside exposed it to high levels of some of these trace metals which could be hazardous to human

health. Obanijesu and Olajide (2009), observed that the source of these excessive trace metals in the cassava flour could be directly linked to vehicular traffic, as areas with high traffic density had high concentration levels of some trace metals whereas areas with low traffic density had lower concentration levels of the trace metals analyzed. Therefore, eating such foods dried by the roadside would end up in ingestion of these heavy metals. Exposure to heavy metals has been linked to several human diseases such as developmental retardation and other adverse pregnancy outcomes (spontaneous abortion or miscarriage, pre-term born, birth defects, still birth) and even death in some cases of exposure to very high concentration (Z. Banu et. al., 2013). These accounts may be the explanation to why eating food dried by the roadside was associated with the adverse pregnancy outcomes.

Drying food by the roadside was found to be associated with adverse pregnancy outcome. From **table 4**, The odds of adverse pregnancy outcome among women who dried food by the roadside was almost more than three times as compared to women who practiced versa (AOR=2.9; P-value=0.02). This association could mean that the women who dry food stuffs by the roadside are the same women who eat the food dried by the roadside. Therefore, drying food by the roadside and eating food dried by the roadside could have the same mechanism of association with the negative outcome of pregnancy. This practice predominant in Akumadan could be due to the passing of the main road that links the northern sector of the country to the southern sector through the Akumadan Community which is tarred and serves as a platform on which the women usually dry their food stuffs.

Among the women who were interviewed, 20.8% had one child, 73.9% of them had two to four children and 5.7% had 5 or more children as indicated in **table2**. The number of children respondents have had in life or parity was not associated with the adverse

pregnancy outcomes after adjusting for other covariates. However, gravida or the number of pregnancies a woman had in life was linked to the adverse outcomes of pregnancy when all the other covariates were adjusted for. In other similar studies, there has been a record of association of adverse outcome of pregnancy and parity and gravida in other studies (Shah, 2010) and (Investigation, 2013). According to Shah (2010), there is an increase risk of adverse pregnancy outcome in primiparity and grandparity mothers. According **table 4**, the odds of developing adverse pregnancy outcome is 4 times higher in women who had five or more pregnancies as compared to women who had one pregnancy. Similarly, Multigravida women are found to be twice at risk of developing adverse pregnancy outcomes as compared to primigravida women. This has been attributed to the increasing socio-economic burden (Kassahun et al., 2019).

Herbal medicine use during pregnancy was found not to be associated with adverse pregnancy outcome in the sample population at 95% confidence level (AOR= 1.8, P-value = 0.09). The odds of adverse pregnancy outcome among women who use herbal medicine during pregnancy is 2.6 as compared to women who did not use herbal medicines during pregnancy in the univariate analysis as shown in the **table 3** but its association with adverse pregnancy outcome was not significant after adjusting for other covariates in the multivariate analysis as indicated in the **table 4**. Almost half (46.4%) of the respondents reported to have taken herbal medicine during pregnancy as indicated in **table 2**. This is very high as compared to other similar studies done elsewhere. According to a study done in Kenya the prevalence of the use of herbal medicine during pregnancy is 12% (Mothupi, 2014). Another similar study reported the prevalence of use of herbal medicine among the pregnant women to be 28.9% (Kennedy et al., 2013). These are all far below the prevalence of herbal medicine use during pregnancy found in this study. Despite the high prevalence of

herbal medicine use among pregnant women in Akumadan, there was no association with the negative outcome of pregnancy. This finding is contrary to what Journal et al., (2002) found. In that study by Journal et al., (2002) it was found that the use of herbal medicines during pregnancy is associated with the risk of maternal and baby outcomes of pregnancy. The lack of association in this study could be that the kind of herbs used by the women in Akumadan are safe in pregnancy because according this same research by Journal et al., (2002) which investigated the effect of individual herbs use among pregnant women, some of the herbs did not have any negative effect on the pregnant women who took them. It could also be that the doses of the herbal preparation they take is very minimal such that they cannot exert their negative effect on the pregnancy.

The dominant occupation among the women surveyed was farming as has been the case in the population dynamics of the Akumadan community (Offinso North District Report, 2018). The unemployment rate among the respondents surveyed was about 19.1% which is higher than the national average of 16.7% (Ghana Statistical Service, 2017). Some of the respondents may be employed but lack decent jobs and for that matter they might consider themselves as unemployed. A respondent being a farmer has 1.4 odds of getting an adverse pregnancy outcome as compared to those who are not into any occupation (AOR=1.4, P-value=0.02) as indicated in **table 4**. Farming in this contemporary world including Akumadan as a rural farming community has taken a new dimension where farmers use no or very little of their human effort and natural ways of tilling the land, making the land fertile and prevention of pests and other insects. Hence, farmers turn to use chemicals such as weedicides, herbicides, chemical fertilizers and pesticides to clear the land, control pests and other insects and make the land fertile for agricultural activities. Some of these chemicals are detrimental to health and have been found to be associated with adverse

pregnancy outcome (Hanke & Jurewicz, 2004). According to Ahmed & Jaakkola (2007), the prevalence of preterm delivery was 4% among women who are housewives and this didn't differ much from the prevalence among women of other occupational groups with the exception of women who are into farming and forestry where the prevalence of preterm was estimated to be 11%. It was found from this study again that, there is more than twice the risk of delivering prematurely among women who are into farming and forestry as compared to women in other occupations.

Similarly, several researchers have discovered an association between maternal occupation and the development of adverse pregnancy outcome (Ahmed & Jaakkola, 2007). There is a higher risk of 29% to 65% of developing an adverse pregnancy outcome among women who are hairdressers as compared to women in the field of teaching. The risk is still increased in cosmetologists as compared to teacher as 50% (Halliday-bell et al., 2009). According to Halliday-bell et al. (2009), the increased risk of negative outcome of pregnancy among hairdressers and the cosmetologists is as the result of the occupational exposure to hazardous chemicals. One of the occupations that have been strongly associated with adverse pregnancy outcome is farming or agriculture (Hanke & Jurewicz, 2004).

Majority of the women surveyed had no formal education constituting 46.4% followed by those who have had basic education making up 43.8% and only 7.6% and 2% of the women had secondary and tertiary education respectively as indicated in **Table 2**. According to the research by Auger et al. (2011), negative outcome of pregnancy like stillbirth is associated with the mother's level of education. It stipulated that the higher the level of education, the lesser one's chances of the developing of negative outcome of pregnancy. This could be attributed to the fact that women of higher educational level usually have good jobs and

hence financially sound and stable. Again women in this category often attend the ANC clinic more than women of low or no formal education (Sakeah et al., 2017). This finding is contrary to the finding of this study which found that the women's level of education is not associated with the development of adverse pregnancy outcome. This could be as a result of the intensified public health education to encourage women of all class and social status to go for free ANC services.

The study found the prevalence of physical abuse during pregnancy among women who were interviewed in the Akumadan community to be 1.7% as indicated in **table 2**. A multi-national studies conducted by WHO on the women's health and the domestic violence against women during pregnancy estimated the prevalence of physical abuse of women during pregnancy by their partners to range between 1% in Japan City to 28% in Peru Province with majority of the areas fall within the range of 4% to 12% ("Information sheet Intimate partner violence during pregnancy," n.d.). Another study went on to estimate the prevalence in Africa to between 2% to 57% (Shamu et al., 2011). However, similar study conducted estimated the prevalence in Ghana, to be 5%(Pool et al., 2014). Considering the prevalence of the physical abuse among pregnant women in the entire country, the prevalence in Akumadan is low and this could be due to the recent education and campaign programs against physical abuse. Looking at the time Pool et al., (2014) did their research and when the data was collected for this study (2019), there is enough time for attitudinal change which might have resulted in the decrease in the prevalence of physical abuse during pregnancy as shown. Though, studies done by Pool et al.,(2014) and Shamu et al., (2011) found an association between the adverse pregnancy outcome and physical abuse yet after running the multivariate analysis no association was found. The subsequent reduction in the prevalence of the abuse in Akumadan might have accounted for this.

5.2 Health facility related factors and their association with the adverse pregnancy outcomes

93.9% of the women indicated that they attended ANC during pregnancy. A similar study conducted in Kumasi in the Ashanti Region of Ghana estimated that 98.9% of the women living in the city or moved to the city within the first 1-2 months of their pregnancy did attend the ANC clinic (Asundep et al., 2013). The high patronage of the ANC services among women in the city as compared to those in the village or the rural farming community of Akumadan could be accounted for by the differences in their lifestyle, educational level, civilization level, beliefs and cultural practices (Afulani, 2015). The readily availability of traditional medicine and the traditional birth attendants in the rural areas like Akumadan makes women in such place resort to this form of treatment and services hence neglecting the ANC services. The attitude of the healthcare personnel in the area too can be one of the reasons why pregnant mothers in this community might not fully patronize the ANC service. A study done in Malawi stipulated that the attitude of ANC service provider is strongly associated with ANC attendance (Roberts et al., 2015). According to Roberts et al. (2015) a good relationship between the ANC service providers and the pregnant women could increase the uptake of this service by pregnant women and reduce the negative outcome of pregnancies. ANC attendance is likely to reduce the adverse pregnancy outcome since most pregnancy complications are detected at the very early stage during the ANC sessions. Similarly, according Afulani (2015) and Asundep et al. (2013), adverse outcome of pregnancy is associated the number of times the pregnant woman visits the ANC clinic. From these studies, the more the mother access ANC services, the lesser the risk of developing a negative outcome of the pregnancy.

From **Table2**, it was indicated that 92.3% of the women reported that the health facility is readily available in the community and their service is also accessible and 76.1% reported that they use National Health Insurance Scheme (NHIS) to access health services and this make it very affordable to them. The studies done by Afulani (2015) and Asundep et al. (2013), fund that the cost of ANC services and the distance from the facility to the residence of the pregnant women are some of the reasons that reduces the uptake of the ANC services by the pregnant women. In this study, both reasons were not an issue since majority of the women reported that the health facility is not far from them and the cost of the services rendered too is within their means due to their membership in the NHIS. After adjusting for all other covariates in this study, ANC attendance, accessibility of health facility services and the affordability of services were not statistically associated with the adverse pregnancy outcomes.

5.3 The medical factors and their association with the adverse pregnancy outcomes

Among the sampled women in Akumadan community, none had hypertension, diabetes and HIV/AIDS during pregnancy hence these variables were not associated with adverse pregnancy outcomes despite strong associations been established between hypertension, diabetes and HIV/AIDS and negative outcomes of pregnancy by other studies. Chronic hypertension in women increases their chances of developing pregnancy complications such as cesarean section, low birth weight, preterm delivery, neonatal unit admission, perinatal death, eclampsia and preeclampsia (Bramham et al, 2014). According to Bramham et al (2014), the relative risks of preeclampsia, cesarean section, low birth weight, preterm delivery, neonatal unit admission and perinatal death are 7.7, 1.3, 3.2, 2.7, 2.7 and 4.2 respectively among women with chronic hypertension as compared to women without chronic hypertension. Gestational diabetes is linked to the negative outcomes of pregnancy

such as caesarean delivery, preterm delivery and preeclampsia (Oustan, 2012a). The odds of low birth weight among pregnant women with diabetes is 2.2 as compared to women with no history of gestational diabetes (Oustan, 2012b). There is a higher incidence of adverse pregnancy outcomes such as intrauterine growth restriction, caesarean delivery and preterm birth among pregnant women with HIV/AIDS infection who are not on Highly Active Anti-Retroviral Therapy (HAART) as compared to their fellow HIV/AIDS positive pregnant women on HAART (Joseph et al, 2011). This difference in incidence of negative outcome of pregnancy among the two groups was attributed to the fact that HIV/AIDS is strongly associated with adverse pregnancy outcomes hence HIV/AIDS positive women on HAART are able to achieve maximum viral suppression such that their effect on the pregnancy is significantly reduced whereas HIV/AIDS positive women without HAART have very little or no viral suppression and therefore the virus are able to exert their maximum effect on the pregnancy resulting in the various negative outcomes of the pregnancy. The lack of association between adverse outcome of pregnancy and Hypertension and diabetes could be due to the fact that these two medical conditions are much influenced by the lifestyle of the people. People who live sedentary lifestyle are at more risk of getting hypertension and diabetes as compared to people whose lifestyles are not sedentary and are mostly involved in one or the other physical activity (Duangtep et al, 2010). Regular physical activities, healthy diet with no or very low sugar, fat and oil but rich in fibers, green vegetables and fruits, reducing overweight and obesity are lifestyles that reduces the risk of developing diabetes since the disease is a metabolic disorder (“Hyperglycaemia and Adverse Pregnancy Outcome (HAPO) Study: associations with maternal body mass index,” 2010). However, Akumadan is a rural community where its residents are mostly farmers hence a sedentary lifestyle is not something practiced. The women are actively involved in the farming activities which makes them physically strong

and healthy and reduces their risk of getting hypertension or diabetes. Since it is rural community, their diet is mostly of fruits and green vegetables with very little or no fat and oil content.

The lack of association between HIV/AIDS and adverse outcomes of pregnancy in this study contrary to what others studies found may be due to the regular education and sensitization of the public on the HIV/AIDS and other public health intervention put in place by Ghana AIDS Commission and the Government of Ghana. Again, it may be as a result of false information given by the respondents. Some of the respondents due to the stigma attached to the disease may not willingly disclose their HIV/AIDS status irrespective of the amount of assurance of confidentiality given.

Again, as shown in **table 2**, 21.4% of the women in Akumadan had anemia during pregnancy. The prevalence of anemia among the pregnant women in Akumadan is similar to that of Iranian pregnant women in Urmia where the prevalence was stimated to be 20.2% (F & Barjasteh, 2015) but differed from the prevalence of anemia found in El Alto, Bolivia which was 17.5% (Dàdpph, n.d.) and also lower than what was found in a study conducted in Accra the nation's capital where the estimated prevalence was 51.0% (Sangam et al., 2015).

The variable anemia in pregnancy was not found to be associated with the adverse pregnancy outcomes. Similarly a study conducted by Bencaiova & Breymann (2014) stipulated that mild anemia and depleted iron stores at early stage of pregnancy are not associated with negative outcomes of pregnancy or pregnancy related complications. This is also contrary to other research work done elsewhere in which anemia was found to be

associated with adverse pregnancy outcomes. In comparison of hemoglobin level in pregnant women, it was found that women with higher levels of hemoglobin have higher neonatal birth weight with women having lower hemoglobin levels giving birth to babies with lower birth weight (F & Barjasteh, 2015). In another comparison of anemic pregnant women to non-anemic pregnant women, it was concluded that maternal anemia is associated with lower infant APGAR score, lower gestational age and complications of labor (Dàdpph, n.d.) and (Di Renzo et al., 2015). However, anemia was not associated with the adverse pregnancy outcomes among women in Akumadan because there was high patronage of ANC services among these women hence the anemia might have been detected early in the pregnancy and treated such that it could not impact negatively on the pregnancy outcomes as stipulated by Bencaiova & Breymann (2014) that anemia at early stage of pregnancy is not associated with negative pregnancy outcomes.

Malaria in pregnancy is a very serious public health challenge in malaria endemic countries including Ghana since several studies have concluded that there is a higher risk or detrimental effect of malaria in pregnant women more than non-pregnant women probably due to immunological and hormonal changes that occur during pregnancy (Takem & D'Alessandro, 2013).

The prevalence of malaria in pregnancy was estimated to be 35.1% in West Africa by Takem & D'Alessandro (2013). The prevalence of malaria among pregnant women in Nigeria is also calculated to be 26.0% (WOGU, 2014) and a similar study undertaken in the nation's capital, Accra and another study in Kumasi all in Ghana were found to be 5.0% and 12.6% respectively (Stephens et al 2014) and (Tay et al, 2013). However, the prevalence of malaria during pregnancy among the women in Akumadan was as high as 42.5%. The bad attitude

of pregnant women towards the free distribution of Insecticide Treated Nets (ITN) such as using the nets for backyard gardens and refusing to use the ITNs after collection, the filthy environment in the community with bushes all around the residence, bad or poor drainage system in the community stagnating the rain water, improper disposal of waste materials such as plastic bottles and cans bleed malaria parasite and this could account for the high prevalence of malaria during pregnancy among the women. Even though the prevalence of malaria during pregnancy among the women is very high, yet the study didn't find any statistical association between malaria in pregnancy and the adverse outcomes of pregnancy. However, several studies have found an association between the two. Malaria in pregnancy is statistically linked to adverse outcomes of pregnancy such as maternal anemia, low birth weight, intrauterine growth retardation, preterm delivery, still birth and neonatal deaths (Takem & D'Alessandro, 2013). Again miscarriage, still births and preterm delivery were found to be associated with the malaria in pregnancy (Turyakira et al., 2013). Unlike these findings from other studies, this study did not find any link between the two and this could be because the majority of the woman fully patronise the ANC services within which the malaria can easily be detected and managed effectively to prevent any complications that might arise from it. Moreover, it could also be as a result of the Intermittent Preventive Treatment in Pregnancy (IPTP) which is a malaria prevention intervention in pregnant women. This could prevent reoccurrence of malaria in the pregnant women and consequently prevent adverse outcomes of the pregnancy.

5.4 Limitations of the Study

This study was conducted among women in Akumadan community in the Offinso North District and for that matter the findings may not be generalizable to the whole population

and may only be relevant in settings where the practices are similar to the Akumadan community.

The study was carried out among women of reproductive age excluding men who are critical when it comes to factors related to adverse pregnancy outcome. The study was a cross-sectional study which used the questionnaire as the instrument of data collection and for that matter diagnostic approach to finding out the medical conditions that are associated with adverse pregnancy outcome could not be achieved. Being a cross-sectional study, it might not be sufficient to assess causality, however, establishing the strong associations may be informative.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0 Conclusion

The study concludes that, adverse pregnancy outcomes are as common in rural communities as they are in referral facilities with more than two in every ten women reporting some adverse fetal or newborn outcome of pregnancy. With all the adverse pregnancy outcomes researched in this study, the most prevailing outcome among the women in Akumadan was stillbirth and birth defect was found to be the negative outcome of pregnancy that is least prevailing.

The factors that were associated with the adverse pregnancy outcomes among women living in the Akumadan Community were marital status, gravida, occupation, drying food by the roadside and eating food dried by the roadside and are similar to those found in (Kassahun et al., 2019), (Hanke & Jurewicz, 2004) and (Z. Banu et. al., 2013).

The medical and health facility related factors were not associated with the adverse pregnancy outcomes. While these findings generate new hypothesis around these factors to be explored in larger study, in interim, interventions to impact APOs must target these factors and should be aimed at women with highest risk such as divorced women, women with high gravida, women who practice drying and eating food tried by the roadside etc. .

6.1 Recommendations

The following recommendations are made based on the findings of this research work.

1. The study showed high prevalence of the adverse pregnancy outcome therefore the District Health Directorate needs to intensify its educational programs and

other public health interventions on reproductive health to further reduce the prevalence to the best minimum.

2. The women of Akumadan and other places where drying of food stuff along the road is a practice should be educated to desist from it due to its association with the adverse pregnancy outcomes.
3. The community health workers and the health promotion officers in the Akumadan Sub-district should educate women on the harmful effects of eating foods dried along the road because it may have some adverse effects on pregnancy outcome.
4. Further research should be done to establish the causal relationship between eating food dried by the roadside and the adverse outcome of pregnancy.

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APPENDICES

Appendix A: Questionnaire

FACTORS THAT ARE ASSOCIATED WITH ADVERSE PREGNANCY OUTCOMES AMONG WOMEN LIVING IN AKUMADAN COMMUNITY IN THE ASHANTI REGION OF GHANA

Instructions: Please answer every question as honestly as possible. Do not leave any question unanswered. You may select more than one choice where appropriate.

Respondent Number.....

Date/...../.....

SOCIO-DEMOGRAPHIC INFORMATION

1. Age: Below 20 [] Above 20 []
2. Sex: Male [] Female []
3. Occupation: Farming [] Trader [] Unemployed [] Student []
 Others (Specify).....
4. Religion: Christian [] Moslem [] Traditionalist []
5. Marital Status: Single [] Married [] Divorced [] Widowed []
6. a. How many children do you have? None [] 1 [] Above 1 []

 b. What is the age of your last child?
year(s)/Month(s)

7. What is your highest level of education? None [] Basic [] Secondary [] Tertiary []

8 Do you smoke? Yes [] No []

1. Do you drink alcohol? Yes [] No []

OBSTETRIC CONDITION

10. How many live births have you had? 1 [] 2 [] above 2 []

11. How many pregnancies have you had? 1 [] 2 [] above 2 []

12. Did you attend antenatal visits did you have during pregnancy? Yes []

No []

13. What was your baby gestational age at delivery? Below 9 months [] 9 months [] after 9 months []

14. Which of the following pregnancy complications did you experience?

Miscarriage [] Preterm baby [] Birth defect [] Still birth []

15. How many of your children have birth defect? None [] 1 [] more than 1 []

PRE-EXISTING MEDICAL CONDITIONS

15. Are you hypertensive? Yes [] No []

16. Are you diabetic? Yes [] No []

17. Do you have any cardiovascular disease? Yes [] No []

18. Do you have HIV/ AIDS? Yes [] No []

19. Did you have anemia during the pregnancy? Yes [] No []

20. Did you have malaria during the pregnancy? Yes [] No []

PRE- PREGNANCY RISK FACTORS

21. Did you use any psychoactive substance/drug? Yes [] No []

If yes please specify

22. Were you using coffee? Yes [] No []

23. What was your pre-gestational BMI

24. Did you use traditional medicine Yes [] No []

25. Do you dry food dried by the roadside? Yes [] No []

26. Do eat food dried by the roadside? Yes [] No []

26. Do you stay close to the road? Yes [] No []

27. Were you using folic acid before conception? Yes [] No []

IF Yes please state how long.....

28. Do you have any hereditary or genetic condition in the family? Yes [] No []

IF Yes please specify.....

29. Do you have NHIS? Yes [] No []

30. Were you physically abused? Yes [] No []

31. What is your inter-pregnancy interval? Below 3 years [] above 3 years

32. How often do you exercise? None [] Frequently [] intermittently []

33. Did you go for any preconception counselling? Yes [] No []

HEALTH FACILITY-RELATED FACTORS.

34. Do you have a health facility in your community? Yes [] No []

35. What is the distance from your residence the facility?

36. Is the cost of service affordable to you? Yes [] No []

Appendix B: Participants' Information

Project title: Factors that are associated with adverse pregnancy outcomes among women living in Akumadan Community in the Ashanti Region of Ghana.

Institution: University of Ghana School of Public Health, College of Health Sciences

Background

I am Nana Yaw Barima Sarfo-Kantanka, a master's student in epidemiology and disease control. As part of the programme, I am conducting a research work. My work is on the Factors that are associated with adverse pregnancy outcomes among women living in Akumadan Community in the Ashanti Region of Ghana.

Adverse pregnancy outcomes have devastating effects on the survival of both the mother and the infant. There is widespread adverse pregnancy outcomes in developing countries. About 5.4 million children die before their 5th birthday and 46% are neonatal deaths. Another 830 women die every day from complications related to pregnancy and childbirth. Several factors can lead to adverse pregnancy outcomes. These include socio-cultural factors, health facility related factors and medical factors. What has not been fully described is how these factors apply in the Ghanaian context especially in rural communities like Akumadan in the Offinso North District.

Procedures

Selection of respondents used a systematic random sampling approach. A recently generated list of all women of reproductive age (15-49 years) who had delivered in the last 5 years was obtained from the district health administration. This list of 1500 women was used for the polio mass immunization campaign. Random sampling methods were used to select the respondents. By this, the total number of women who met the inclusion criteria were divided by the sample size to obtain the sampling interval of 5. The first household was selected using ballot from the first five households on the list and the 5th household from that one on the list was selected for the questionnaires.

Risks and Benefits

The procedures involved in this study are non-invasive and will cause no physical discomfort to you. University of Ghana, Legon and the communities involved so that the appropriate measures could be taken to address the situation.

Freedom to participate/ Voluntary withdrawal

Participant opinions and experiences are important to us, so we want you to be honest and truthful in answering our questions. Your participation is voluntary and you may refuse to participate at any time. You may ask me to stop the interview or blood sample collection at any point or you may also decline to answer any question if it makes you uncomfortable. However, I will humbly employ you to contribute to issues of adverse drug reporting by providing information to the researcher.

Privacy and Confidentiality

To ensure confidentiality and privacy we will not mark any of the samples with study participant's names: rather we will code numbers to the samples and keep an encrypted file that coordinates numbers to names on a secure laptop.

Protection of subjects' privacy

Participants do not have to answer any questions that they feel are an invasion of their privacy. Also, subjects do not have to participate in any particular aspects of the study that they find invasive.

Provision to prematurely end a particular subject's participation in the study

Participants can opt to be interviewed in a location of their choice to increase privacy. In the case of an untoward event or situation of distress, a subject's participation in the study will be concluded.

Data storage and protection

All research records, urine samples and data will be protected against inappropriate use or disclosure, or malicious or accidental loss or destruction. Data will be locked with restricted access on a secure laptop. There will be safe disposition/destruction of data or devices and the urine samples, as appropriate (e.g., shredding paper documents, secure erasure of electronic media) at the conclusion of the study. Study survey forms (hard copy) will be destroyed at the conclusion of the study.

Declaration of conflict of interest

I declare that, to the best of my knowledge, there is no actual, perceived or potential conflict of interest that will or may arise as a result of my involvement with this study.

Before taking Consent

Do you have any questions you wish to ask about the study? Yes No

(If yes, please indicate the questions below)

.....
.....

Dissemination of Results

The results of this study will be sent to you by email if you provide your email address below.

.....

Contact the Prinicipal Investigator, **Nana Yaw Barima Sarfo-Kantanka** on **0501367542** or my academic supervisor, **Dr Alexander Manu** on **0244619629**

Appendix C: Consent Form

Project title: Factors that are associated with adverse pregnancy outcomes among women living in Akumadan Community in the Ashanti Region of Ghana.

Participant's statement

I declare that the purpose, procedures, risks and benefits of the study have been explained to me in the language I understand best and I have understood them.

I hereby agreed to take part in the study.

Signature/thumbprint of participant: Date://

Investigator's Statement

I, the undersigned, have explained this consent to the subject in English Language that s/he understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.

The participant has fully agreed to participate in the study.

Signature of Investigator:

Date://

Address: