

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

**ANEMIA AMONG WOMEN SEEKING TREATMENT FOR
UTERINE FIBROIDS IN THREE SELECTED HOSPITALS IN
ACCRA METROPOLIS**



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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY
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DECLARATION

I, Lawrence Opong Buadi, declare that apart from specific references which have duly been acknowledged, this work is the result of my own original research, and that this dissertation either whole or in part has not been presented elsewhere for another degree.

.....
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.....
Date

.....
Dr. Richmond Aryeetey
(Supervisor)

.....
Date



DEDICATION

I dedicate this work to God almighty for bringing me this far.



ACKNOWLEDGEMENT

My profound gratitude goes to the Almighty God for giving me another opportunity to increase my knowledge to serve my generation.

It is difficult to choose the right words adequate to describe how grateful I am to my supervisor Dr. Richmond Aryeetey of Department of Population, Family and Reproductive Health, School of Public Health, Legon, so grateful to him for his kind supervision, his friendly advices, fruitful comments, guidance, support and opportunities given me throughout the period of this research.

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DEFINITION OF TERMS

Anemia: a low hemoglobin concentration

Uterine fibroids: noncancerous growths of the smooth muscle layer of the uterus

Abnormal uterine bleeding: bleeding that is excessive or occurs outside of normal cyclic menstruation

Hemoglobin: is an iron containing protein in red blood cells, which carries oxygen from the lungs to the body's tissues.

Hysterectomy: a surgical technique to remove all or part of the womb.

Myomectomy: a surgical procedure to remove uterine fibroids

Iron deficiency anemia: anemia due to insufficient iron

Parity: pregnancy beyond viability (28 weeks gestational age or higher in Ghana)

Ulipristal acetate: a selective progesterone receptor modulator

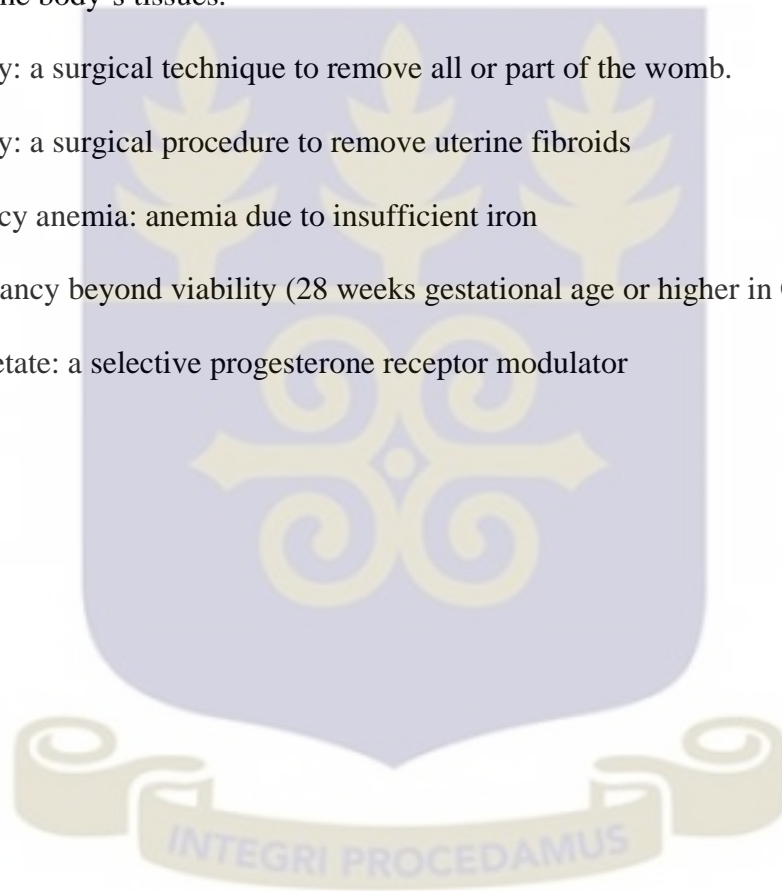


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LIST OF ABBREVIATIONS

- AUB – Abnormal uterine bleeding
- BMI – Body mass index
- BCL-2 – B-cell Lymphoma 2
- COCs – Combined Oral Contraceptive
- COMT – Catechol-O-Methyl transferase
- GnRH – Gonadotropin releasing hormone
- GnRHa – Gonadotropin releasing hormone agonist
- GDHS – Ghana demographic and health survey
- GnRHa – Gonadotropin Releasing Hormone agonist
- HMB – Heavy menstrual bleeding
- Hb – Hemoglobin
- HRQOL – Health Related Quality of Life
- IDA – Iron deficiency anemia
- KBTH – Korle-bu Teaching Hospital
- LNG-IUS – Levonorgestrel releasing intra-uterine system
- LA-UMLT – Laparoscopic assisted ultraminilaparotomy
- LNG-IUD – Levonorgestrel intra-uterine device
- MRI – Magnetic resonance imaging
- MRgFUS – Magnetic resonance imaging guided high-frequency focused ultrasound
- PBAC – Pictorial blood loss assessment chart
- PCNA – Proliferating Cell Nuclear Antigen
- TBA – Thermal Balloon Ablation
- USG – Ultrasonography
- UAE – Uterine artery embolization

UPA – Ulipristal acetate

UMLT – Ultraminilaparotomy

WHO – World Health Organization



ABSTRACT

Background: Anemia, defined as blood hemoglobin level below established cut-off points, is a pervasive global public health problem. An estimated 2 billion people are affected globally. Anemia prevalence is highest in developing countries but also high in developed countries. Worldwide, over 30% of all women suffer from anemia, with abnormal uterine bleeding being a risk factor for anemia. Uterine fibroids are the most common benign gynecologic tumors affecting premenopausal women, with commonest presentation being abnormal uterine bleeding. The current study aim to assess the relationship between anemia and heavy bleeding as a result of uterine fibroids among women seeking care in three selected hospitals in the Accra Metropolis.

Method: A sample of 385 non-pregnant women with uterine fibroids were recruited to participate in a cross-sectional survey. Data on uterine size, fibroid location, hemoglobin level and reason(s) why they seek treatment was collected using a structured questionnaire and analyzed using SPSS Version 23. Means and medians of continuous variables and proportions of categorical variables were calculated. Associations between continuous variables were determined using Pearson correlation while between categorical variables using Chi-Square, Fisher's exact test and logistic regression. All of these statistics were tested at 95% confidence level and standard error of 5%.

Findings: The current study found that 8 in 10 women seeking care for uterine fibroids had anemia.

There was an association between uterine fibroid location and anemia ($p = 0.002$) but not uterine size and anemia ($r = 0.014$, $p = 0.779$). Also 79.5% of the women sought care due uterine fibroid symptoms, inability to conceive (36.9%), cosmetic reasons (7.5%) and risk of cancer (1.6%).

Conclusion:

The study documented high prevalence of anemia among women with uterine fibroids. Anemia was significantly associated with uterine fibroid location but not uterine size. A large proportion of women with uterine fibroids sought care as a result of symptoms due to fibroids.



CHAPTER ONE

INTRODUCTION

1.1 Background

Anemia is a condition of low blood hemoglobin concentration (World Health Organization, 2015). It affects low, middle, and high-income countries. Anemia may occur as a result of single or multiple micronutrients deficiencies (e.g. folate, riboflavin, vitamins A and B12), acute and chronic infections (e.g. malaria, cancer, tuberculosis and HIV), and inherited or acquired disorders that affect hemoglobin synthesis, red blood cell production or red blood cell survival e.g. sickle cell disease and thalassemia (WHO, 2015). Anemia in women is associated with decreased work productivity resulting in economic losses and maternal mortality (Macdonald et al., 2010).

Anemia in pregnancy has been linked to adverse birth outcomes, thus contributing to an intergenerational cycle of poor health and compromised development (Macdonald et al., 2010). Approximately 50% of cases of anemia are considered to be due to iron deficiency, but the proportion probably varies among population groups and in different areas, according to the local conditions (WHO, 2015). It is estimated that approximately 29% of all women of reproductive age are anemic globally (WHO, 2015). The larger portion of this estimate occurs in developing countries and Africa. Hemoglobin level of less than 12.0g/dl is considered as anemia in non-pregnant women (Macdonald et al., 2010).

Uterine fibroids are the most common pelvic tumors in women and also, the most common benign gynecological tumor (Brito et al., 2014). This type of tumor occurs more frequently in women of black decent (Stewart et al., 2013). Uterine fibroids are present in

20-30% of women over 30 years of age, rising to more than 40% in those over 40 years old (Owiredu & Dapilah, 2015).

Eighty out of hundred women in the United States have uterine fibroids; however, approximately 30% will present with symptoms (Brito et al., 2014). Although the etiology of uterine fibroids is unknown, they are generally hormone sensitive, with rates of growth related to estrogen and progesterone receptor levels. Uterine fibroids are extremely common (Okogbo, Ezechi, Loto, & Ezeobi, 2011, Okogbo et al., 2011). However, only a proportion of women who have their fibroids clinically detected, have associated symptoms.

Uterine fibroid symptoms relate to the fibroid location and its size (Sulaiman, Khaund, McMillan, Moss, & Lumsden, 2004). The disease presentation ranges from no symptoms to a wide range of symptoms. The most common symptoms are abnormal uterine bleeding, heavy or painful periods, abdominal discomfort or bloating, painful defecation, backache, urinary frequency or retention, and in some cases, infertility.

Excessive menstrual bleeding occurs in about 30% of patients with uterine fibroids and blood loss associated with uterine fibroids can increase risk of iron deficiency anemia (Owiredu & Dapilah, 2015). Many studies have shown relationship between uterine fibroids and anemia (Doherty et al., 2014; Sambasivarao, 2013; Stewart et al., 2013).

1.2 Problem Statement

Uterine fibroids occur in women of reproductive age and among a small proportion known to negatively affect their health. Anemia is therefore a major public health problem. Over a quarter of women report lost work days and over one-fifth report concerns regarding

losing their job due to the uterine fibroids (Stewart et al., 2013). Uterine size correlates to the severity of bleeding and translate to the risk of anemia. Black women are known to have larger uterine size at diagnoses and also early age of onset (Stewart et al., 2013). Prevalence of anemia is 37.7% to 41.5% for non-pregnant women in the WHO African region plus countries with the lowest blood hemoglobin levels and highest prevalence of anemia are found in this same region (WHO, 2015).

In Ghana, 42 percent of the women are anemic, 32 percent mildly anemic, 10 percent moderately anemic, and less than 1 percent severely anemia (Ghana Statistical Service (GSS), Ghana Health Service (GHS), and ICF International, 2015). The World Health Organization recognizes anemia as a public health problem when its prevalence is 40 percent in any population (Macdonald et al., 2010). Proportion of anemia among women with uterine fibroids may be underestimated. Though there are several causal factors implicated in anemia, abnormal uterine bleeding associated with uterine fibroids is a major cause of anemia among women with uterine fibroids.

Estimates of anemia prevalence by themselves are only useful if they are linked with a picture of the various causal factors that contribute to the development of anemia in specific settings. Indeed these factors are multiple and complex, and it is critical to collect accurate information about them to provide the basis for developing the best interventions for anemia control. Furthermore, the impact of heavy bleeding during menstruation on anemia prevalence needs to be considered within some populations (WHO Global Database on Anemia, 2005).

1.3 Justification

Uterine fibroids associated abnormal bleeding cause iron deficiency anemia (IDA) in women with the disease. Despite the high prevalence of anemia and its serious consequences, there have been few reported studies assessing the effectiveness of anemia prevention and control programs in developing countries (Macdonald et al., 2010). Moreover, although it is well known that anemia is a result of multiple causes, there are few reported examples of integrated programs addressing the various causes, or assessments of the effectiveness of combining several interventions on anemia prevalence among women. Anemia is considered a severe public health problem when the prevalence is equal to or greater than 40 percent in a vulnerable group (Macdonald et al., 2010).

This study will help determine the prevalence of anemia among women with uterine fibroids seeking treatment and hence in developing programs to reduce the prevalence of anemia in this population to a level that is not of public health significance. Given the importance of this pathology in the world, numerous countries including Ghana, Malawi, Senegal, Ethiopia and Tanzania have implemented interventions to reduce anemia. In Ghana, this intervention was implemented particularly in most susceptible groups where a high prevalence of anemia and goiter (evidence of IDA) had been identified (Macdonald et al., 2010). In assessing the impact and the adequacy of the strategies implemented, and the progress made in the fight against anemia, information on anemia prevalence must be collected.

The burden of uterine fibroids also extends to increases in health care cost and decreased productivity at work, though yet to quantify (Stewart et al., 2013). Programs to reduce anemia among this group will add to improvement in health of these women and thus

productivity. Understanding the risk factors is important formulation of public health strategies to address. The current study will provide the first evidence on the contribution of uterine fibroids on anemia among a high-risk population of women. The evidence can be used to target intervention for women in this risk group.

1.4 Research Questions

The current study will answer the following research questions.

- What is the prevalence of anemia among women with uterine fibroids
- What is the relationship between uterine fibroid location and anemia
- What is the relationship between uterine size and anemia
- What are the reasons why women seek care for uterine fibroids

1.5 Objectives

1.5.1 General Objective

- To assess the relationship between anemia and heavy bleeding as a result of uterine fibroids among women seeking care in three selected hospitals in the Accra Metropolis

1.5.2 Specific Objectives

- To determine the prevalence of anemia among women with uterine fibroids
- To determine the relationship between uterine size and anemia
- To determine the relationship between fibroid location and anemia
- To identify reasons for seeking treatment in women with uterine fibroids

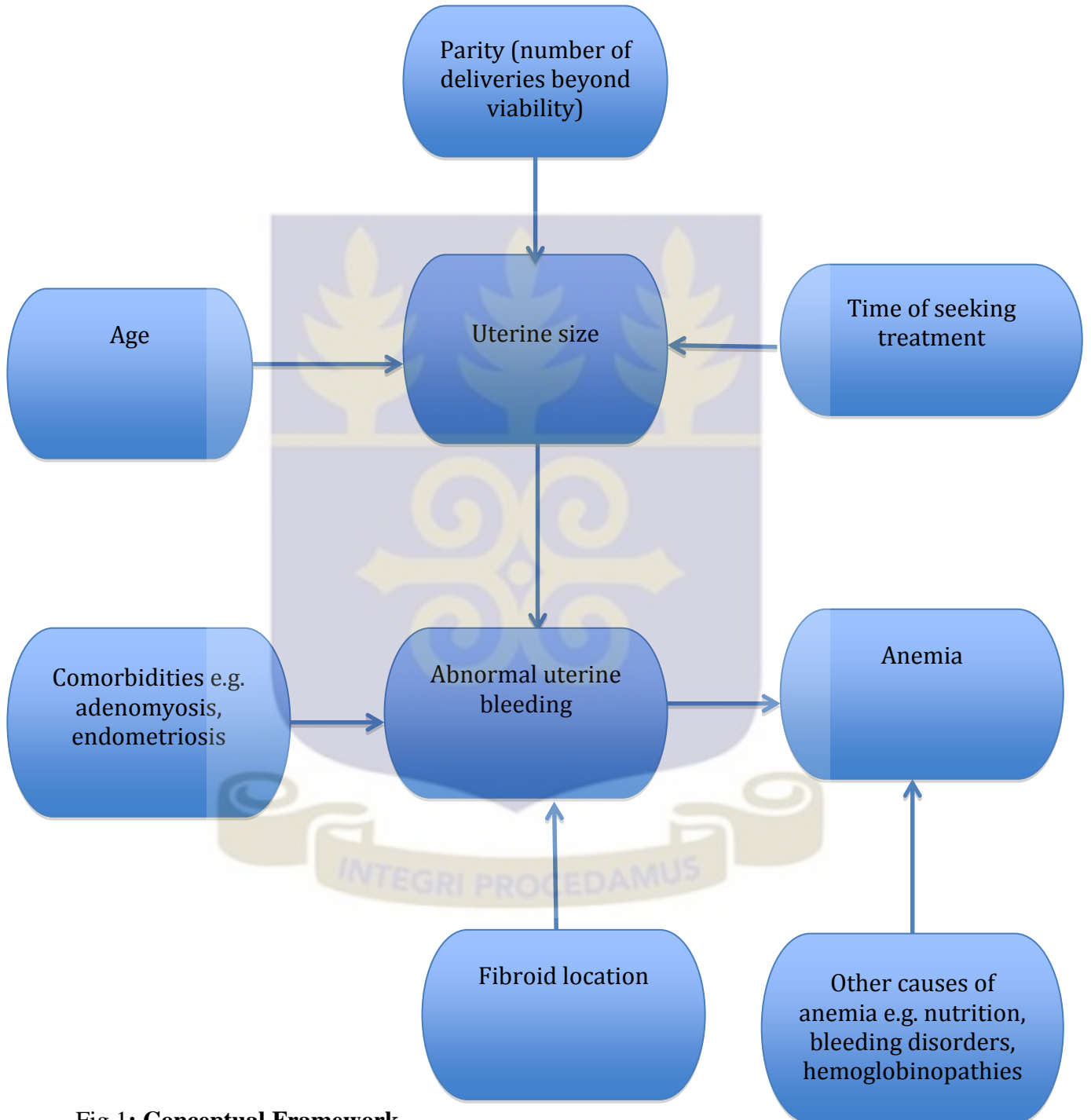


Fig 1: Conceptual Framework

1.6 Conceptual Framework Narrative

Abnormal uterine bleeding leads to iron deficiency anemia either during heavy menstruation or inter-menstrual bleeding. Number of uterine fibroid nodules causes an increase in the size of the uterus, affecting the physiological mechanism that prevents excessive bleeding hence heavy uterine bleeding and anemia. Fibroid location also leads heavy uterine bleeding especially with fibroids located submucosally. The presence of uterine comorbidities such adenomyosis amplifies uterine bleeding and cause severe anemia in women with such conditions and uterine fibroids. The presence of other causes of anemia such as micronutrient deficiency and sickle cell disease increase the level of anemia among non-pregnant women. Prevalence of uterine fibroids is high towards the end of the reproductive age and thus abnormal bleeding associated with fibroids and anemia. Nulliparity other than multiparity is associated positively with uterine fibroids, therefore increased probability of abnormal uterine bleeding and anemia. Long time interval between onset of uterine fibroids and seeking care increases the number and size of fibroids and therefore the associated bleeding and anemia.



CHAPTER TWO

LITERATURE REVIEW

Anemia, defined as blood hemoglobin level below established cut-off points is a widespread public health problem with two billion people estimated to be affected by anemia globally (Macdonald et al., 2010). Hemoglobin is a part of red blood cells, responsible for carrying oxygen to the body's tissues. Anemia occurs when concentration of hemoglobin falls below accepted levels, as a result of compromised production, excessive destruction or excessive loss of red blood cells (Macdonald et al., 2010).

Anemia is prevalent in developing countries. Worldwide, over 50% of pregnant women and over 30% of all women suffer from anemia and its harmful effects ranging from increased fatigue, decreased cognitive ability, decreased work productivity and subsequent economic costs of heightened morbidity and mortality (Macdonald et al., 2010).

Anemia is considered a severe public health problem when the prevalence is equal to or greater than 40 percent in a vulnerable group. Based on this criteria, anemia is a severe public health program in nearly all developing countries (Macdonald et al., 2010).

Table 2.1: Public Health Significance of Anemia

Anemia Prevalence	Public Health Significance
>40%	Severe
20-39%	Moderate
5-19%	Mild
0-4.9%	Normal

(Macdonald et al., 2010)

Overall, 42 percent of women in Ghana are anemic, 32 percent mildly anemic, 10 percent moderately anemic, and less than 1 percent severely anemic (Ghana Statistical Service (GSS), Ghana Health Service (GHS), and ICF International, 2015). WHO's Global Prevalence for Anemia in 2011, showed 56% of Ghanaian non-pregnant women with hemoglobin level less than 12.0g/dl.

2.1 Interventions Of Anemia

Anemia intervention is aimed at eliminating the causal factor and iron supplementation. While iron supplementation offers the best option for rapidly increasing hemoglobin concentration, it is not ideal as a long-term means of ensuring adequate iron status. Improving the dietary intake of bio-available iron through food-based approaches is key to viable means of prevention of iron deficiency anemia in developing countries. Food-based approaches include fortification, diversification of the diet, and modification of food preparation and consumption habits (Macdonald et al., 2010). According to clinical data, ulipristal acetate (UPA), a selective progesterone receptor modulator reduces fibroid-associated bleeding, which appreciably improves hemoglobin and hematocrit levels in anemic patients. It also causes a substantial reduction in the size of fibroids, which lasts for at least 6 months after the end of the treatment (Maiorana et al., 2014).

Available meta-analyses indicate that iron supplementation would raise the mean blood hemoglobin concentration by 8.6 g/dl in non-pregnant women and 10.2 g/dl in pregnant women. Applying these shifts to blood hemoglobin concentration estimates that nearly 50% of anemia in women could be reduced by iron supplementation (WHO, 2015).

2.2 Uterine Fibroids

Uterine fibroids (Leiomyoma) are benign tumors of the smooth muscle of the uterus. First described in 1793 by Matthew Baillie of St George's Hospital, London. Uterine fibroids are the most common benign tumor in women (Okolo, 2008). The incidence of uterine fibroids at the population level is unknown as a result of most studies evaluating the incidence occurring in women seeking medical care for their condition. Clinical diagnosis or diagnostic test reports underestimate the true incidence, because these results only relate to women with symptoms or those who come into contact with health professionals. Comparatively, reports based on histology alone may overestimate the true incidence as they relate to symptomatic women in whom non-surgical management of their uterine fibroids have failed, most of whom may therefore have fibroid (Okolo, 2008).

Although fibroids may occur in multiples or as solitary nodule in a woman's uterus, studies have shown that, irrespective of size, each fibroid develops from one single cell (the monoclonal development of fibroids concept) (Okolo, 2008, Carranza-Mamane et al., 2015). A study by Ofori et al., (2012) on the prevalence and sonographic patterns of uterine fibroid among Ghanaian women found that, out of 584 trans-abdominal pelvic ultrasound scanned images of women analyzed 143 representing 24.50% were confirmed to have uterine fibroid. This proportion is within the proposed prevalence for uterine fibroids among black women. The true prevalence of uterine fibroids may be underestimated, as the incidence at histology is more than double the clinical incidence (Okolo, 2008). Some studies put the prevalence from 20 to 50% in women depending on the age, ethnicity, parity, and methods use to assess their presence (Simms-stewart & Fletcher, 2012). In one study, these tumors were said to be found in 77% of postmortem specimens where uteri were examined critically for fibroids (Simms-stewart & Fletcher, 2012). In

that same study, more than 50% of the women were asymptomatic. Recent longitudinal studies estimated the lifetime risk of fibroids in a woman over the age of 45 years to be more than 60%, with higher incidence in blacks than whites (Okolo, 2008).

The etiology of fibroids still remains unclear and their biology poorly understood (Okolo, 2008). No single candidate gene has been detected for commonly occurring uterine fibroids, the occurrence of rare uterine fibroid syndromes such as multiple cutaneous and uterine leiomyomatosis has been linked to the gene that codes for the mitochondrial enzyme fumarate hydratase (Okolo, 2008). Cytogenetic abnormalities particularly deletions of chromosome 7 which are found in up to 50% of fibroid specimens have been implicated and the role of tumor suppressor genes have yielded conflicting results (Okolo, 2008). The steroid hormones estrogen and progesterone, growth factors, angiogenesis and the process of apoptosis may influence the growth of uterine fibroid. Uterine fibroids tend to occur within the reproductive age, usually between menarche and before menopause. Though uterine fibroids undergo rapid and significant growth during initial pregnancy, reasons supporting this phenomenon still remain unclear. The early increase in steroid hormones during early pregnancy may not be enough to rationalize the process thus other pregnancy associated hormones and proteins may also play key roles (Benaglia et al., 2014).

Uterine fibroids can be classified according to their location within the uterus i.e. intramural (in the muscular layer), subserosal, and submucosal fibroids. Estrogen concentrations have been found to be more in uterine fibroids than within surrounding normal myometrium, perhaps because of higher concentration of aromatase in the fibroids. Hormonal responsiveness seems to be greater in submucosal than subserosal fibroid

nodules (Carranza-Mamane et al., 2015). Majority of fibroids are found within the muscular layer of the uterus. A study conducted among Ghanaian women revealed that 44 percent of the fibroids were located within the muscle layer of the uterus (Ofori et al., 2012). Submucous fibroids (SM) are known to cause heavy menstrual bleeding (HMB) thus causing anemia, though not all study supports this (Puri, Famuyide, Erwin, Stewart, & Laughlin-tommaso, 2014). Rates of implantation, clinical pregnancy, ongoing pregnancy, miscarriage, and live birth have been found to be negatively associated with submucosal uterine fibroids (Carranza-Mamane et al., 2015).

Typically, nulliparous women and those of low parity are commonly affected by uterine fibroids with the relative risk decreasing with increasing number of term pregnancies (Okolo, 2008). Pregnancies ending before viability appear not to alter the risk of fibroids (Okolo, 2008). It has been postulated that the correlation between nulliparity and fibroids is most probably due to the continuous estrogen secretion in nulliparity uninterrupted by pregnancy and lactation, for a relatively high number of menstrual cycles in a woman's reproductive life. It is more commonly observed in women of African ancestry (Simms-stewart & Fletcher, 2012). Uterine fibroids, the most common tumors in women of childbearing age, are symptomless in at least 50% of affected women while in others cause significant morbidity and affect their quality of life (Gupta, 2008).

In the vast majority of women, asymptomatic fibroids will only be noticed during routine cervical screening or by pelvic imaging for a different reason altogether (Divakar, 2008). Where there is a significant pelvic mass and the clinical suspicion is a uterine fibroid, it may be prudent to confirm the diagnosis by pelvic ultrasound scan, which is cheap and noninvasive. Reassuring the woman that the pelvic mass is indeed a simple benign fibroid

will go a long way towards allaying the anxieties engendered by the initial finding of a pelvic mass (Divakar, 2008). Once with a confirmed diagnosis, most women will be reassured by a simple explanation of what fibroids are, what symptoms they may cause [with emphasis on the fact that her fibroid(s) are asymptomatic] and that no intervention is warranted while they remain asymptomatic (Divakar, 2008). Common clinical features of uterine fibroids include menorrhagia with symptoms of anemia (Simms-stewart & Fletcher, 2012). Extramedullary hematopoiesis and intravascular thrombi associated with uterine fibroids have been documented in a case report (Cui, Peker, Greer, Conner, & Novak, 2014). The condition probably due to high level of erythropoietin associated with bleeding uterine fibroids and anemia among others.

Uterine fibroids are a major cause of morbidity in women of a reproductive age (and sometimes even after menopause). The clinical presentation of uterine fibroids maybe linked to their location in the uterus, the number and size of fibroid nodules present that translate to the size of the uterus. The most likely presentation of fibroids is by their effect on the woman's menstrual cycle or pelvic pressure symptoms (Press, 2011). Approximately 30 percent of women with fibroids have menstrual abnormalities. Heavy menstrual bleeding being the most common symptom with submucosal fibroids (Doherty et al., 2014). The size and location of fibroids have classically been thought to play a role in the incidence and severity of AUB. Abnormal uterine bleeding is the most common clinical feature of uterine fibroids especially heavy menstrual bleeding. The mechanism by which uterine fibroids lead to heavy menstrual bleeding (HMB) is unknown, but submucous localization, vascular defects, and impaired endometrial hemostasis have been suggested as possible explanations (Fonseca-Moutinho et al., 2013). This same study also shows that, menorrhagia was significantly associated with multiplicity of uterine fibroids

but not with the volume of the largest one, elaborating the importance of factors other than those associated with distortion of the myometrium and endometrial cavity.

Excessive menstrual bleeding is often the main reason to seek healthcare. Random screening by self-report, medical record review, and sonography of women aged 35 to 49 found that by age 35 the incidence of fibroids was 60% among African- American women and more than 80% by age 50 (Okogbo et al 2011). The size and location of uterine fibroids have been linked to the incidence and severity of abnormal uterine bleeding, with fibroids in the submucous location the most likely cause. This theory has been disputed by those who have shown that fibroids of any size or location can cause significant abnormal uterine bleeding (Doherty et al., 2014). Several theories explain the menstrual dysfunction and bleeding that occur in women with uterine fibroids. One typical theory is that increased endometrial surface area and endometrial cavity size lead to increased menstrual blood flow. A better-supported theory is that alterations in the venous structures in the myometrium and endometrium, produced by the presence of fibroids, causes venule ectasia. With this venule ectasia, the natural hemostatic actions of platelets and other coagulation factors are overwhelmed by the increase in vessel caliber (Doherty et al., 2014). While vascular compression may result in these vascular alterations, more current evidence proposes that vasoactive growth factors released from fibroids are enough to cause vascular ectasia biochemically. These vasoactive growth factors, identified to be abnormally regulated within fibroids, get into the endometrium and cause the proliferation and growth of blood vessels (Doherty et al., 2014).

Inter-menstrual bleeding is more common among women with submucous fibroids. These women have lower hemoglobin level and are more likely to be anemic. Uterine fibroids

may also lead to infertility and recurrent miscarriages in some women. Generally the level of knowledge on uterine fibroids, its and treatment modalities among women of reproductive age are lacking in this part of the world. A study done by M. Adegbesan-Omilabu and colleagues on the knowledge, perception and attitude towards uterine fibroids among women with uterine fibroids in Lagos revealed that awareness of uterine fibroids is high, but correct knowledge on etiology and proper treatment is low.

2.3 Diagnostic Procedures For Uterine Fibroids

Uterine fibroids diagnosis ranges from incidental finding to clinical diagnosis. Most fibroids go unnoticed especially if no associated symptoms. Proper selection of patients for therapy be it medical, noninvasive procedures, or surgical procedures depends on an accurate assessment of the size, number, and position of fibroids. Abdominopelvic examination is the simplest way of diagnosing uterine fibroids though there are other sophisticated imaging techniques such as ultrasonography, saline-infusion sonography, hysteroscopy, magnetic resonance imaging (MRI) among others for confirming the presence of fibroids in the uterus. The sensitivity of these procedures varies in their diagnosis of uterine fibroids. Imaging is seen necessary in preoperative evaluation of fibroids especially for uterus- sparing procedures.

Ultrasonography has been found to be an adequate, quick, safe, and cost-effective means of evaluating the size, number, and location of fibroids. Ultrasonography may be suboptimal for multiple fibroids, because of acoustic shadowing, and for the proper evaluation of endometrial impingement. MRI has been well studied in the evaluation of uterine fibroids, for fibroid mapping and submucosal involvement. It has been found to be the most reliable method of evaluation compared with vaginal ultrasonography,

hysterosonography, and hysteroscopy, with 100% sensitivity and 91% specificity (Carranza-Mamane et al., 2015).

2.4 Treatment Of Uterine Fibroids

Uterine fibroids are an exceptionally common finding in women of reproductive age, and various conservative treatment approaches are available. Treatment options for uterine fibroids are individualized and take into consideration the patient's age and chronological proximity to menopause, severity of signs and symptoms, the size and location of fibroids, number and fertility desire of women with the disease (Khan, Shehmar, & Gupta, 2014).

Options may also be due to patients wish to avoid surgery or other invasive procedures in order to preserve or enhance their reproductive functions or potential. Asymptomatic women with uterine fibroids, or those that decline medical or surgical treatment can be managed expectantly. Presently, there is no uterine size at which surgical treatment should be suggested (Doherty et al., 2014). In the past, hysterectomy was recommended for women with uterine size greater than 12 weeks; these recommendations have been reassessed and seen to be unnecessary. Likewise, the rate of growth of fibroids was historically used to guide management decisions. The average rate of fibroid growth in a recent prospective study of 72 premenopausal women was 9% increase in 6 months, and most fibroids do not increase in volume greater than 20% every 6 months (Doherty et al., 2014). There are racial differences in fibroid growth and prevalence (Doherty et al., 2014) (Flake, Andersen, & Dixon, 2003). Fibroid growth rates in premenopausal white women decrease in those older than 45 years, whereas growth rates in black women do not until menopausal period (Doherty et al., 2014).

Women with rapidly enlarging uterine fibroids (uteri growing more than 6 weeks gestational size within 12 months) were thought to be at high risk of leiomyosarcoma and hence recommended to undergo hysterectomy. More current evidence advises that the rate at which fibroids enlarge do not influence the risk of leiomyosarcoma (Doherty et al., 2014). Fibroids are hormonally responsive and therefore may regress after menopause due to cessation of ovarian steroid hormone production. Any growth in fibroids after menopause requires careful evaluation.

Current options available are medical, surgical and radiological (uterine artery embolization (UAE), magnetic resonance imaging (MRI) guided high-frequency focused ultrasound surgery (MRgFUS) therapies.

2.4.1 Medical therapy:

Consist of hormonal and non-hormonal medications aimed to improve presenting symptoms. Modern-day medical management of uterine fibroids uses the estrogen- and progesterone-responsiveness of uterine fibroids; though, no pharmacological agent is curative of fibroids (Carranza-Mamane et al., 2015). Medical therapy is principally a treatment option for the control of symptoms. Numerous agents exist for the treatment of uterine fibroids via symptom control, decrease in fibroid volume, and reduction in menstrual blood loss. Most commonly used agents have been GnRH analogues. Latest, innovative therapies including aromatase inhibitors, mifepristone, selective estrogen receptor modulators, and selective progesterone receptor modulators have been found promising in symptom improvement and fibroid regression without the hypo-estrogenic symptoms coupled with GnRH analogues (Carranza-Mamane et al., 2015). Summary Gonadotropins-releasing hormone (GnRH) agonists are approved for medical treatment of

fibroids and used only in the short term for about 3-6 months, preceding fibroid-related surgery with iron supplementation to facilitate surgery and reduce anemia (Doherty et al., 2014).

In another study on medical management of fibroids, it was found out that Gonadotropin-releasing hormone agonists (GnRHa) in the management of fibroids was useful pre-operatively, however it should be used in addition to other treatment because of the rebound fibroid growth when treatment is stopped (Sankaran & Manyonda, 2008). It should also be noted that a Randomized Control Trial subsequent to the Cochrane Review, was incapable to show any difference in the amount of blood loss at surgery, duration of surgery, postoperative morbidity or hospital stay between women who received pre-operative GnRHa therapy and those who did not (Sankaran & Manyonda, 2008). Likewise, it was not feasible to determine any difference in cleavage planes among treated and untreated uterine fibroids (Sankaran & Manyonda, 2008).

Other hormonal therapies such as estrogen and progestin therapy and levonorgestrel releasing intrauterine system (LNG-IUS), have been found to be effective in the management of abnormal uterine bleeding in uterine fibroids (Doherty et al., 2014). Since recent medical therapy for the management of uterine fibroids is related to ovulation suppression, decrease in the production of estrogen, or disruption of target action of estrogen or progesterone at the receptor level, and having the ability in interfering with endometrial development and implantation, there is no role for medical therapy as stand-alone treatment for fibroids in the infertile population (Veena & Shivalingaiah, 2014). The LNG-IUS is also well known in the management of menorrhagia, much so that it is now commended as first line treatment in the management of menorrhagia. Its value in the

context of uterine pathology such as fibroids is less clear. One longitudinal study has found significant decrease in menstrual blood loss and increased in mean hemoglobin concentration within three months of insertion of the LNG-IUS, in women with a uterine size of 12 weeks or less and one or more fibroids greater than 1.5 cm in diameter (Jefferys, 2016). The outcome of the levonorgestrel bearing intra-uterine device (LNG-IUS) on the risk of fibroids is unknown. The LNG-IUS has been found to be efficient in the management of menorrhagia associated with fibroids, and a recent small comparative study revealed that it decreases uterine volume in women with fibroids by an as yet undetermined mechanism, thus indicating that the LNG-IUS may prevent the growth of preexisting fibroids (Okolo, 2008). Some reports on the contrary described the use of LNG-IUS in women with uterine leiomyoma-associated menorrhagia and reported significant decreases in menorrhagia without decreases in the myoma or uterine size (Sabry & Al-Hendy, 2012). Amusingly, another study reported that 64% of women who used the LNG-IUS avoided hysterectomy within a 6-month period of the study (Sabry & Al-Hendy, 2012). Though the use of a levonorgestrel intrauterine device (LNG-IUD) has been found to be associated with a reduction in menstrual blood loss in women with uterine fibroids, reports on its effect on the size of uterine myoma and the uterus as a whole are conflicting (Press, 2011).

A study that sought to identify variables associated with treatment failure in women with menorrhagia who were treated with thermal balloon ablation (TBA) or levonorgestrel releasing intrauterine system (LNG-IUS), and to establish if there are subgroups where one treatment type is more effective than the other concluded that a large myoma is a risk factor for treatment failure in women with menorrhagia treated with TBA or LNG-IUS (Suh, 2013).

The US Food and Drug Administration just approved ulipristal acetate (UPA), an oral selective progesterone-receptor modulator, for the preoperative management of moderate and severe symptoms of uterine fibroids in women of reproductive age. Clinical data has shown several benefits of UPA: it is faster than leuprolide in reducing the fibroid-associated bleeding, it considerably improves hemoglobin and hematocrit levels in anemic patients, and allows a significant decrease in the size of fibroids lasting for at least 6 months after the end of the treatment (Maiorana et al., 2014). UPA also shows a better tolerability profile compared to leuprolide; it keeps the levels of estradiol at mid follicular phase range, thus reducing the episodes of hot flushes and exerting no effect on bone turnover. On this evidence, the administration of 5mg/day ulipristal acetate for 3 months is recommended for different patient categories and allows for planning a treatment strategy geared toward meeting an individual patient's needs (Maiorana et al., 2014). A study that investigated the efficacy and safety of ulipristal acetate (UPA) for long-term treatment of symptomatic uterine fibroids reported that repeated 3-month courses of oral UPA 10 mg once daily effectively controlled bleeding and pain, reduced fibroid volume, and restored quality of life over the long term in many women with symptomatic fibroids, providing an effective and well-tolerated long-term medical treatment for fibroids (Tomaszewski & Nouri, 2014).

Danazol, a synthetic isoxazole derivative chemically related to 17-ethinyl testosterone. It causes a high androgen and low estrogen environment leading to thinning of the endometrium and shrinkage of uterine fibroids. Its androgenic effect leads to undesirable side effects associated with its use such as acne, hirsutism, weight gain, irritability, musculoskeletal pain, hot flushes, and breast atrophy. Danazol has been found to be an effective therapy to shrink fibroids and control their symptoms and its anti-estrogenic

effect is the probable mechanism of its efficacy in fibroid treatment and there is no reliable evidence from randomized controlled trials (RCTs) concerning the benefits and/or harms of its use in treating uterine myomas (Press, 2011). It purportedly induced a significant 24% uterine fibroid volume reduction but a recent Cochrane study failed to show any RCTs that compared danazol to placebo or any other medical therapy in women with uterine leiomyomas (Sabry & Al-Hendy, 2012).

Because exposure to female sex hormones promotes the growth of uterine fibroids management with a well-studied antiprogestin, mifepristone, has been assessed. Initial reports of the use of mifepristone for the management of uterine fibroids date back to 2002, when De Leo et al used doses ranging from 12.5 to 50 mg daily and found a reduction in uterine fibroid volume of 40%–50%, plus amenorrhea in most subjects (Press, 2014). This report was supported by a paper one year later from a group that used mifepristone at a lower dose of 5 or 10 mg per day for 1 year, and reported its effective in decreasing mean uterine volume by 50% in the subjects (Press, 2014). Engman et al gave 30 women with uterine fibroids with 50 mg mifepristone for a period of 3 months prior to surgery and found a 28% decrease in the fibroid volume compared with 6% for the placebo group (Press, 2011). Mifepristone may therefore be a viable alternative to Gonadotropin Releasing Hormone Agonist (GnRHa) for use in the preoperative management of uterine fibroids.

Combined oral contraceptive (COC) hormones have been widely used by physicians to reduce abnormal uterine bleeding associated with uterine fibroids. A large prospective study involving more than 3,000 patients with uterine fibroids found a positive correlation between the early use of COCs (before 17 years) and the incidence of fibroids while other

controlled trials found no association between the use of COCs and the development of uterine fibroids (Press, 2014). The effect of COCs in reducing the size of fibroids is not documented (Press, 2014).

Vitamin D has been found to be an anti-fibrotic factor that inhibits growth and induces apoptosis in cultured human leiomyoma cells through the down regulation of proliferating cell nuclear antigen (PCNA), cyclin-dependent kinase 1 (CDK1), and B-cell lymphoma 2 (BCL-2) and suppresses catechol-O-methyl transferase (COMT) expression and its activity in human leiomyoma cells (Press, 2014). A study saw that 1,25-dihydroxyvitamin D3 is significantly lower in women with uterine fibroids compared to normal healthy controls and also lower levels of total serum 25-hydroxyvitamin D3 have been noticed in women with uterine fibroids compared to healthy controls (Press, 2014).

Other non-hormonal treatments, involving anti-fibrinolytics and nonsteroidal anti-inflammatory drugs (NSAIDs) have also been used in the management of symptomatic uterine fibroids in women (Brito et al., 2014).

2.4.2 Surgical therapy:

Notwithstanding the advances in medical therapeutics in managing uterine fibroids, surgical treatment in uterine fibroids still remains gold standard in managing uterine fibroids. Several women with uterine fibroids experience heavy menstrual bleeding, and may also have pelvic pressure and pain resulting from the existence of uterine fibroids. Hysterectomy is the ultimate treatment for uterine fibroids, but results from the vaginal abdominal or laparoscopic uterine excision (VALUE) study found that severe operative

complications ensue in 4.4% of women (Garcı et al., 2015). This same study again found that the risk of severe complications was more in women with fibroids than in those undergoing hysterectomy for other reasons. Patients who do not wish to undergo hysterectomy may seek uterus-preserving procedures (UPPs), like myomectomy, endometrial ablation (EA) or uterine artery embolization (UAE). Endometrial ablation is most of the time used in the treatment of heavy menstrual bleeding, however may also be used in the management of submucosal fibroids. Fibroid reappearance (i.e. regrowth and/or the development of additional fibroids) is common after uterus-preserving procedures, leading to some women undergoing further procedures, including hysterectomy (Garcı et al., 2015). *In fact, ultrasound examination showed fibroid recurrence in 46% of women 2 years after abdominal myomectomy, and in 84.4% of women 8 years after laparoscopic myomectomy, though the majority of women who experienced fibroid recurrence did not undergo further procedures* (Garcı et al., 2015).

Nearly 50% of women who get diagnosed of uterine fibroids will seek a second opinion, and the most common question they ask is ‘Do I need a hysterectomy?’ Although hysterectomy is the only true curative therapy for uterine fibroids, a large number of women with uterine fibroids will never require a hysterectomy (Divakar, 2008). The typical treatment for symptomatic uterine fibroids is either hysterectomy or myomectomy in women who wish to preserve their fertility.

The Agency for Healthcare Research and Quality has produced an evidence report on the management of fibroids; thus there are no data supporting the use of prophylactic hysterectomy or myomectomy in women with asymptomatic fibroids (Divakar, 2008). Most frequent indications for surgery in pre-menopausal women are fibroids, which pose a

major public health cost. Myomectomy is the single invasive procedure for the management of uterine fibroids that is recommended for patients wanting to retain potential future fertility (Garci et al., 2015). A great proportion of women aged 34 years or younger may not have completed their family and may consequently wish to preserve uterine integrity. Myomectomy can be done hysteroscopically, laparoscopically, or trans-abdominally (Van Der Kooij et al., 2010a). A study by Edwards et al., that summarized the evidence on short-, mid-, and long-term results of several studies comparing uterine artery embolization and surgery revealed that patients who undertook hysterectomy had fewer symptoms (bleeding, pain and pressure) than those who had uterine artery embolization. Hysteroscopic myomectomy (transcervical removal of submucosal uterine fibroids) increases pregnancy rates and live birth rates in patients with infertility. The increase in pregnancy rates in patients with submucosal uterine fibroids happens regardless of whether pregnancies are conceived spontaneously or by Assisted Reproductive Therapy (ART). A randomized trial in which patients with primary infertility and submucosal fibroids were randomized to hysteroscopic myomectomy or diagnostic hysteroscopy found that patients who had myomectomy had appreciably greater spontaneous pregnancy rates than patients who had diagnostic hysteroscopy (Doherty et al., 2014). The coming into existence of minimally invasive myomectomy involving endoscopic methods may reduce the higher frequency of complications that are associated with myomectomy and also allow smaller fibroid nodules be removed per vaginam by way of laparoscopic-assisted vaginal hysterectomy (Omole-Ohonsi & Belga, 2012).

Ultraminilaparotomy (UMLT) means making an incision length of <4 cm whilst laparoscopically assisted myomectomy (LAM) is a variation of laparoscopic myomectomy with the aim of reducing the technical difficulty and involves easier identification of the

uterine fibroids by the fingers or hands through a small wound, and easier and more definite repair of the uterus by conventional suture techniques. A cohort study that evaluated the long-term efficacy and outcome of myomectomy performed either through traditional laparotomy or with 1 of 2 modified approaches i.e. ultraminilaparotomy or laparoscopically assisted UMLT (LA-UMLT), for women with symptomatic uterine fibroids concluded that UMLT and laparoscopically assisted UMLT can be used successfully in place of the traditional laparotomy in the management of uterine fibroids (Wen, Chen, Sung, & Wang, 2010).

2.4.3 Radiological therapy:

These are procedures that offer minimally invasive management options for women with fibroids. These procedures may successfully reduce the symptoms of heavy menstrual bleeding, pelvic pain and pressure. These procedures include uterine artery embolization (UAE) and magnetic resonance imaging guided high-frequency focused ultrasonography. These procedures have improved abnormal uterine bleeding, dysmenorrhea, and uterine reductions in fibroid volume (Doherty et al., 2014). Another study by Van Der Kooij et al., (2010) indicated that UAE is a well-established alternative compared to hysterectomy and therefore patients should be counseled on UAE as an option for treatment. Since the technique targets to achieve uterine fibroids shrinkage rather than removal it is less effective in the case of large fibroids that cause pressure symptoms and most effective in the treatment of menorrhagia (Jefferys, 2016).

A study done on the effect of selective uterine artery embolization on uterine fibroids revealed that it contributes to a long-term significant improvement of all investigated uterine fibroid-related physical symptoms and significantly improves women's health-

related quality of life (Jun et al., 2009). Another study that compared clinical outcome and health related quality of life (HRQOL) 5 years post uterine artery embolization (UAE) or hysterectomy in the treatment of heavy bleeding during menstruation caused by uterine fibroids showed that UAE is a well-established alternative to hysterectomy about which patients should be counseled (Van Der Kooij et al., 2010b). a study conducted to evaluate the efficacy of pre-myomectomy uterine artery embolization with gelatin sponge particles to reduce operative blood loss and facilitate removal of fibroid found out that preoperative uterine artery embolization is effective in decreasing intraoperative bleeding and improves the chances of performing conservative surgery and may therefore be a useful aide to myomectomy in women at high hemorrhagic risk or who refuse blood transfusion (Butori et al., 2011).

Magnetic Resonance Imaging (MRI) Focused High Intensity Ultrasound is the newest interventional radiology technique to be used for managing symptomatic uterine fibroids. This technique employs MRI scanning to find the fibroid and center a high intensity ultrasound beams on to a point within the fibroid nodule leading to tissue heating and then necrosis. Observational studies have constantly shown symptomatic improvement over a 6 to 12 month period and fibroid shrinkage from 15 to 70% at 6 months (Jefferys, 2016). Various size and locations of uterine fibroids have been managed though uterine size larger than 24 weeks gestation and pedunculated types of fibroids are relatively contraindicated to this treatment and also not useful in multiple fibroid uteri (Jefferys, 2016). There have been many reports from the United States, Europe, Japan, and Korea confirming the safety and effectiveness of high intensity focused ultrasound therapy in managing uterine myoma and case reports that found its effectiveness in controlling acute vaginal bleeding as well as symptom relief (Lim et al., 2011).

2.5 Care Seeking Behavior For Uterine Fibroids:

Health seeking behavior among women with uterine fibroids varies across the globe. Women have varied reasons for seeking care for their fibroids depending on race, fertility wishes, ethnicity, age, religious background and severity of presentation of the disease.

African-American women were significantly more likely to feel self-conscious about the size and appearance of their stomach and about weight gain. Apprehensions about staining clothes or bedding with menstrual flow were significantly more likely for African-American women. (Stewart et al., 2013).

Excessive menstrual bleeding occurs in about 30% of patients often the main reason to seek healthcare (Owiredu & Dapilah, 2015). Child bearing plays a pivotal role in the Ghanaian family system, which makes infertility a key health and social concern because women in this category could face stigmatization. Fibroids create marital problems relating to intercourse due to frequent and excessive bleeding, blood changes associated with menstrual cramps and heavy bleeds and therefore a health condition that requires attention (Ofori et al., 2012). The prohibitive premium placed on childbirth by the society has resulted in a strong aversion to hysterectomy and patients thereby resorting first to “traditional doctors”, who claim to “dissolve” uterine fibroids. This route taken by patients result in increasing cost of treatment and the influence of “Faith Therapy” by spiritual churches causes further delay in presentation to clinicians. Patients, like that found in a case report on giant uterine fibroids; consequences of delay in presentation unfortunately end up with the type of surgery that might have otherwise been avoided with early presentation (Orazulike, Green, & Uzoigwe, 2015).

CHAPTER THREE

METHOD

3.1 Study Design:

A cross-sectional study was carried out at the Gynecological outpatients clinics of the Korle-bu Teaching Hospital (KBTH), Ridge Regional and La General hospitals in the Accra Metropolis. Women who visited the gynecological clinics to seek care for uterine fibroids were approached, and those willing to participate after consent had been sought were included in the sample needed for the study.

3.2 Study Area:

Gynecological clinics at KBTH, La General and the Ridge Regional Hospitals were the sites for the study. KBTH has five Gynecological teams that conduct clinics for all the weekdays, seeing an average of 40 fibroid cases per week. Ridge and La General hospitals conduct three specialist clinics per week and see about 25 fibroid cases per week. These three hospitals were selected because they serve as referral points for all other smaller hospitals in Accra metropolis. Referrals from other regions in Ghana may also end up in these hospitals as well, especially in Korle-bu Teaching Hospital.

3.3 Study Population:

Women in their reproductive age (>15 years) seeking care for uterine fibroids.

3.3.1 Inclusion criteria:

- Non-pregnant women in their reproductive years with uterine fibroids

3.3.2 Exclusion criteria:

- Women with abnormal vaginal bleeding not associated with uterine fibroids

- Women with adenomyosis and uterine masses other than uterine fibroids.

3.4 Sample Size Calculation:

Using Cochran's sample size formula for cross-sectional studies,

$$N = \frac{z^2 p(1-p)}{d^2} = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 385$$

$$N + 10\%(N) = 424$$

The sample size (N) was calculated based on the following assumptions:

- Literature search both electronic and manual indicated a gap in terms of documentation on the prevalence of anemia among Ghanaian women with uterine fibroids, therefore estimated $p = 50\%$;
- $Z = 1.96$ at a 95% confidence level;
- $d =$ standard error 5%;
- Addition of 10% of minimum sample size (N) to correct for non-response rate and participants who withdraw from study prematurely.

3.5 Study Sampling And Sample Selection:

Participants were selected as per their willingness to be part of study, and a total of 385 respondents were used in study. The sample size was distributed among the three hospitals in the following proportions; 40% (KBTH), 40% (Ridge Regional Hospital) and 20% (La General Hospital). Recruitment allocations were based on the numbers of uterine fibroid cases seen at the gynecological clinics of these hospitals. Ridge Regional hospital at the time of the study had a lot more women seeking care for uterine fibroids reason why its recruitment allocation rose close to that of Korle-bu Teaching Hospital.

Eligible participants were recruited if they were willing to be part of study until sample size was reached.

3.6 Training of Research Assistants

At each study area, doctors performing their house-manships were recruited and trained as research assistants to help in the collection of data from consented participants. In total 6 research assistants were used.

The Research assistants were trained on how to retrieve information from patients' records and how to use the Pictorial Blood Assessment Chart (PBAC). They were also trained on how to estimate participants' uterine sizes as per standards taught in the medical schools here in Ghana. The research assistants had hands on training in how to use the weight and height measuring scales provided in the Gynecological clinic. The principal investigator did this training within the week prior to commencement of the data collection process.

3.7 Data Collection Process

A structured and pretested interviewer-administered questionnaire containing both open and closed ended questions were administered to each consented participant. Information on socio-demographic characteristics of the participant, their reasons for seeking treatment and pattern of uterine bleeding was collected using this questionnaire. Pictorial blood loss assessment chart (PBAC) was used to document level of bleeding in the last month. This is a validated measure of blood loss that asks women to quantify the number of tampons and pads used per day for each day in their cycle. The number of clots and menstrual accidents was also quantified and the weighted scores added together. A score of >100

correspond to 80mL blood loss and represents heavy menstrual bleeding. Inter-menstrual bleeding was assessed in the same manner and recorded.

Measurements of uterine sizes: Uterine sizes of participants already determined by clinicians in their medical records were compiled.

Measurement of hemoglobin levels: These were done using an instant hemoglobin-check test kits (URIT-12) by URIT Medical Electronic Co., Ltd. which were provided at each facility by Principal Investigator.

Location of fibroids: Ultrasonography (USG) reports revealing fibroid location were retrieved from consented participants' medical records and photocopied for analysis. Consented participants with no USG report had it done at the radiology unit of the hospital and paid for by Principal Investigator.

Weight of Participants: weights of participants in kilograms (kg) were estimated by using the weighing scales provided at the clinics by the various hospitals and recorded. Height of Participants: participants heights were estimated in meters (m) by a graduated height scale draw on a wall in a consulting room at the various hospitals.

BMI: calculated by dividing weight by height squared of participants (kg/m^2). At the beginning of each day's gynecological clinic, patients who visited the clinic to seek care for uterine fibroids were assembled, talked to and those that consented to be part of study

were taken through the necessary protocol to retrieve all relevant information needed for the study.

3.8 Variables:

3.8.1 Dependent

- Anemia (hemoglobin <12g/dl)

3.8.2 Independent

- Uterine bleeding; (using PBAC)
- Uterine size: determined by abdominal/pelvic examination by trained clinicians
- Reason for seeking treatment:
- Fibroid location (from pelvic ultrasound scan report in patients medical records)
- Socio-demographic characteristics (age, educational level, parity, marital status, occupation, weight, height, body mass index (BMI), medical history)

3.9 Data Analysis

Data from 385 women seeking care for uterine fibroids in 3 selected hospitals in Accra Metropolis between 1st June and 7th July 2016 was collected using structured questionnaires. The data was entered into an excel spreadsheet of office 2011, cleaned and analyzed using SPSS Version 23. Categorical data was analyzed using frequencies, percentages, Chi-square, Fisher's exact test and logistic regression. Variables with significant p-values were selected into the logistic regression model and their adjusted odds ratio determined. Scale data was analyzed using Student T-test, Mann-Whitney test and Pearson correlation and described using mean, median, standard deviation and

interquartile range. All of these were done at 95% confidence level and standard error of 5%.

3.10 Ethical Consideration

Ethical approval for the study was sought from the Ghana Health Service Ethical Review Committee with reference number: GHS-ERC 36/12/15. An introductory letter from the Department of Population, Family and Reproductive Health of the School of Public Health was presented to the three-selected hospitals to seek permission to undertake the research in hospitals. Informed consent was also obtained from the participants.

Before obtaining consent, the participants were thoroughly briefed on the study and ample time given them to decide whether or not to participate in the study. The purpose of the study was explained to the participants to enable them make an informed decision. The participants were made aware that participating in the study was voluntary and they have the right to opt out of study at any point in time without explanation. They were made aware of the fact that there were no direct benefits or risk involved in the study except for minor discomfort in taking checking hemoglobin level by way of finger prick. Importance of the study was explained to participants and confidentiality assured through out study. Data collected from study was only used for the set objectives of this study. Code numbers identified the participants and data collected stored electronically secured by password with access given only to the research team. The results of this study will be disseminated in such a way that no information will be linked to the identity of the participants.

Possible benefits:

Participants were made aware that they may not benefit directly from this study but findings will be disseminated to stakeholders, which will be used to improve outcomes of women with uterine fibroids.

Compensation:

Participants were told that participating in this study was purely voluntary and there is no monetary compensation available for accepting to be part of this study.



CHAPTER FOUR

RESULTS

Mean age of respondents was 40.39 ± 7.92 . Median parity of respondents was 1 (IQR 0-2). Median weight of respondents was 67 (IQR 60-79). Median height of respondents was 1.6 (IQR 1.57-1.67). Median BMI of respondents was 26.56 (IQR 23.0-30.0). Median period with which respondents lived with fibroid was 2 (IQR 1-3) years. Median period with which respondents had been experiencing bleeding since onset of fibroid was 6 (IQR 3-12) months. Median hemoglobin was 10.35 (IQR 9.10-11.7). Median uterine size was 19.64 (IQR 16.0-22.0).



Table 4.1: Socio-demographics characteristics among women seeking treatment for uterine fibroids in 3 selected hospitals in Accra Metropolis (N=385)

Variable	Frequency N=385	Percent
Age groups		
20-30	66	17.1
31-40	116	30.1
>40	203	52.7
Parity		
P0	147	38.2
P1-P3	189	49.1
P4+	49	12.7
Education		
Tertiary	76	19.7
Secondary	73	19.0
Primary	153	39.7
None	83	21.6
Marital status		
Single	142	36.9
Married	197	51.2
Divorced	32	8.3
Widowed	14	3.6
BMI category		
Underweight	6	1.6
Normal	144	37.4
Overweight	138	35.8
Obese	97	25.2

A little over half of the respondents were more than forty years of age and one hundred and fifty three had completed primary education (39.7%). Half of the respondents were married (51.2%) and also a third of respondents had normal weight for height ratio (37.4%). A large proportion (38.2%) of the women who sought care for uterine fibroids at the three selected hospitals were nulliparous (had never carried pregnancy beyond viability [28 weeks gestation]) as illustrated in table 2.

Table 4.2: Health History of women seeking treatment for uterine fibroids in three selected hospitals in Accra Metropolis

Disease	N (%)
Sickle cell	5 (1.3)
Malaria in the last month	17 (4.4)
Hepatitis B	2 (0.5)
Asthma	4 (1.0)
Diabetes	3 (0.8)
Hypertension	45 (11.7)
None	309 (80.3)
Contraception	
Ever used contraception	41 (10.6)
Currently using contraception	29 (7.5)
None	315 (81.9)
Medication use	
Yes	128 (33.2)
No	257 (66.8)
Menstrual history	
	Mean (SD)
Age at menarche (n=279, missing=106)	14.99 (\pm 1.72)
Age at first pregnancy (n=240, missing=145)	23.23 (\pm 5.44)

Five (1.3%) of the respondents had Sickle Cell Disease. Life style diseases like diabetes (0.8%); hypertension (11.7%) were found in the respondents. Twenty-nine (7.5%) of the respondents were using contraceptive at the time of the study as shown in the table above.

Table 4.3: Uterine fibroids and bleeding characteristics among women seeking treatment in 3 selected hospitals in Accra Metropolis

Variable	Frequency N=385	Percent
Fibroid history		
Have you experienced any abnormal bleeding since onset of fibroid	268	69.6
Location of fibroid;		
Intramural	267	69.4
intramural subserosal	61	15.8
Submucosal	32	8.3
Subserosal	10	2.6
Intramural submucosal	15	3.9
PBAC scores		
<100 (no bleeding)	169	43.9
>=100 (abnormal bleeding)	216	56.1

PBAC: Pictorial blood assessment chart

A larger proportion (69.4%) of the women had their uterine fibroids located in the intramural site only and 69.6% of the women reported abnormal uterine bleeding since onset of uterine fibroids. The pictorial blood assessment chart (PBAC) revealed a little above half (56%) of the respondents had abnormal uterine bleeding.

Table 4.4: Relationship between uterine fibroid location and anemia among women seeking care for uterine fibroids in 3 selected hospitals in Accra Metropolis

Location of fibroid	Anemia		P-value
	No N=85	Yes N=300	
Intramural	66 (23.8)	201 (76.2)	0.002**
intramural subserosal	4 (6.6)	57 (93.4)	
Submucosal	12 (37.5)	20 (62.5)	
Subserosal	0 (0.0)	10 (100.0)	
Intramural submucosal	3 (25.0)	12 (75.0)	

**Fisher's exact test

Fisher's exact test revealed a relationship between anemia and uterine fibroid location (p=0.002)

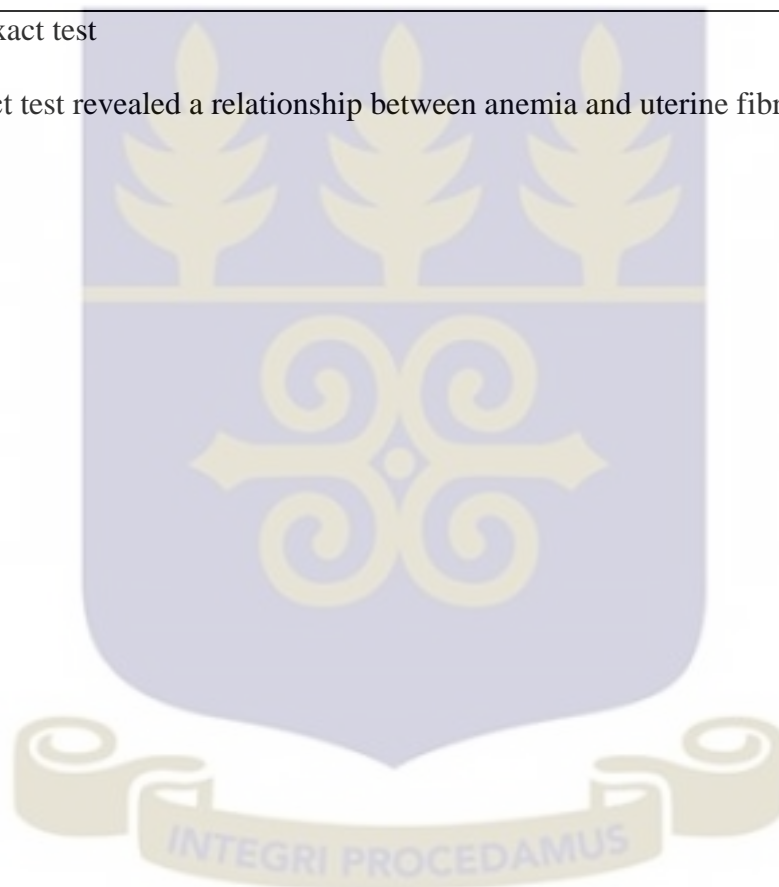


Table 4.5: Respondent Characteristics associated with anemia among women seeking care for uterine fibroids in 3 selected hospitals in Accra Metropolis

Characteristic	Anemia		P-value
	No N=85	Yes N=300	
Educational level			0.030
Tertiary	15 (19.7)	61 (80.2)	
Secondary	24 (27.9)	62 (72.1)	
Primary	39 (25.5)	114 (74.5)	
None	7 (10.0)	63 (90.0)	
Parity			0.308
P0	31 (21.1)	116 (78.9)	
P1-P3	39 (20.6)	150 (79.4)	
P4+	15 (30.6)	34 (69.4)	
BMI category			0.040**
Underweight	0 (0.0)	6 (100.0)	
Normal	38 (26.4)	106 (73.6)	
Overweight	21 (15.2)	117 (84.8)	
Obese	26 (26.8)	71 (73.2)	
Sickle cell			<0.001**
No	80 (21.0)	300 (79.0)	
Yes	5 (100.0)	0 (0.0)	
Age at menarche	14.48 ±1.51	15.16 ±1.76	0.009*
Uterine size (~weeks of gestation)			0.266
<12	4 (44.4)	5 (55.6)	
12-16	28 (21.2)	104 (78.8)	
>16	53 (21.7)	191 (78.3)	
Bleeding since onset of fibroid			<0.001**
No	55 (47.0)	62 (53.0)	
Yes	30 (11.2)	238 (88.8)	
PBAC score	35 (34-53)	132 (84-152)	<0.001***
Hemoglobin	18 (14-22)	19 (16-24)	0.091

*t-test, **Fisher's exact test, ***Mann Whitney test

Prevalence of anemia in women seeking care for uterine fibroids was 77.9% thus approximately 8 out of every 10 women with uterine fibroids at the 3 clinics. Anemia was also found to be associated with educational level ($p = 0.03$), BMI category ($p = 0.04$), and medical history of sickle cell ($p = <0.001$), age at menarche ($p = 0.009$) and PBAC total

score ($p = <0.001$). Mann Whitney test revealed no significant difference ($p=0.091$) in uterine size for anemic and non-anemic fibroid respondents. There was a very weak non-significant negative correlation ($r = -0.0014$) between the uterine size and hemoglobin levels ($P = 0.779$).

Table 4.6: Multivariate analysis with adjusted odds ratio for factors contributing to anemia.

	B	Sig.	AOR	95% C.I. for AOR	
				Lower	Upper
Education					
None	Reference				
Tertiary	-1.356	.110	.258	.049	1.361
Secondary	-2.389	.004	.092	.018	.469
Primary	-2.102	.010	.122	.025	.602
BMI category					
Underweight	Reference				
Normal	-19.618	.999	.000	.000	0
Overweight	-19.273	.999	.000	.000	0
Obese	-19.858	.999	.000	.000	0
Fibroid location					
Intramural submucosal	Reference				
Intramural	-20.603	.999	.000	.000	0
Intramural subserosal	-19.907	.999	.000	.000	0
Submucosal	-21.759	.999	.000	.000	0
Subserosal	-20.385	.999	.000	.000	0
Age Menarche	.273	.012	1.314	1.061	1.628
Abnormal uterine Bleeding	2.073	.000	7.952	3.920	16.134

AOR = adjusted odds ratio, C.I. = confidence interval

After adjusting for educational level, BMI, fibroid location and abnormal uterine bleeding, anemia was found to be associated with abnormal uterine bleeding and early age at menarche. Respondents with abnormal uterine bleeding had about 8 times the probability of getting anemia than those who did not. The study also found that for every unit increase

in age at menarche, there was a 1.3 probability of getting anemia. All other characteristics of respondents showed no association.

Table 4.7: Reasons for seeking treatment for uterine fibroids among women in 3 selected hospitals in Accra Metropolis

Reason	N (%)
Cosmetic	29 (7.5)
Symptoms	306 (79.5)
Inability to conceive	142 (36.9)
Risk of cancer	6 (1.6)
Other reasons	6 (1.6)

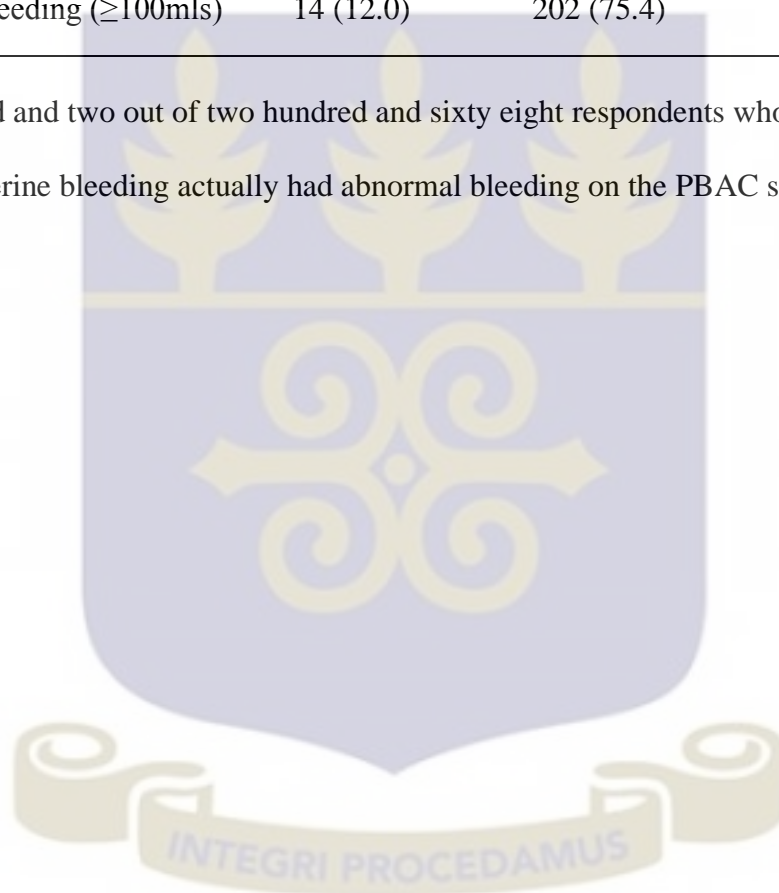
As illustrated in table 8, majority (79.5%) of the respondents sought care as a result of direct symptoms (e.g. pelvic pain, abnormal uterine bleeding etc.) of uterine fibroids. Other reasons for seeking care for uterine fibroids were incidental findings and inability to do active work.



Table 4.8: Agreement between bleeding since onset of fibroids and PBAC among women seeking care for uterine fibroids in 3 selected hospitals in Accra Metropolis

	Bleeding since onset of uterine fibroid		P-value
	No N=117	Yes N=268	
Abnormal bleeding (PBAC)			<0.001
Normal bleeding (<100mls)	103 (88.0)	66 (24.6)	
Abnormal bleeding (\geq 100mls)	14 (12.0)	202 (75.4)	

Two hundred and two out of two hundred and sixty eight respondents who agreed to have abnormal uterine bleeding actually had abnormal bleeding on the PBAC score.



CHAPTER FIVE

DISCUSSION

5.1.1 Key Findings:

The results of this study found that 8 out of 10 women seeking for uterine fibroids at the selected hospitals in the Accra Metropolis were anemic. The study did not find any work done locally among women with uterine fibroids to compare this high prevalence with. Anemia prevalence among non-pregnant women of reproductive age worldwide is 29% and 37.8% in the African region (WHO, 2015). The respondents only noticed the presence of uterine fibroids when they became symptomatic and not from regular gynecological consult. Median period within which respondents had been experiencing bleeding since onset of fibroid was 6 (IQR 3-12) months i.e. time interval between onset of uterine fibroids and onset of abnormal uterine bleeding. Most of the respondents failed to recognize this time interval since they only found that they had uterine fibroids when they noticed the abnormal uterine bleeding. Median hemoglobin level of respondents was 10.35 (IQR 9.10-11.7) g/dl. The mean age of the women who sought care for uterine fibroids in the three-selected hospitals in Accra Metropolis was 40 (SD 7.92) years with a median parity of 1 (IQR 0 - 2) and a median body mass index (BMI) of 26.56 (IQR 23.0 – 30.0) kg/m². These suggest that most of the women with uterine fibroids are in the middle age and of lower parity.

A study on the factors associated with uterine fibroids in Ghanaian women concluded that that uterine fibroid in Ghanaian women is mainly associated with women of older age group of the reproductive age than younger age categories and also associated more with women in the lower parity range than higher parity (Sarkodie, Botwe, Adjei, & Ofori, 2016). This study also found that nulliparous women formed a larger percentage (38%) of

the respondents. An explanation that has sometimes been used in the literature for these findings is that pregnancy decreases the period of exposure to unopposed estrogens, while nulliparity or reduced fertility may be related with anovulatory cycles characterized by long-term unopposed estrogens (Flake et al., 2003). The other possibility is that uterine fibroids are the cause of the infertility, rather than the outcome of it; nonetheless, the diminished relative risk of fibroids associated with parity remains essentially the same after excluding women with a history of infertility (Flake et al., 2003).

Higher Body Mass Index has been associated with uterine fibroids due to peripheral aromatization and hyper-estrogenic state (Okolo, 2008). Majority of the women who sought care for uterine fibroids in this study had a median BMI within the overweight range. Body weight of 70 kg or greater is purportedly associated with nearly three times the risk of developing uterine fibroids compared with body weight lower than 50 kg and thus weight reduction consistently leads to a reduction in the risk of developing uterine fibroids (Okolo, 2008).

This study found an association between anemia (due to abnormal uterine bleeding) and uterine fibroid location diagnosed on ultrasound scan as seen in some studies though others have disputed this, saying uterine fibroids of any size or location can cause significant abnormal uterine bleeding (Doherty et al., 2014, Puri et al., 2014). There was no association found between uterine size as measured clinically by abdomino-pelvic examination and abnormal bleeding and thus anemia in this study. This finding simulate that found in studies which agree with any fibroid size or location being able to cause abnormal bleeding and anemia (Doherty et al., 2014).

Anemia was found to be significantly associated with abnormal uterine bleeding and age at menarche in the multivariate analysis. Such association has been seen in other studies (Moroni et al., 2015, Sarkodie et al., 2016). But unlike the study by Sarkodie et al., this study found that an increase in the age at menarche was positively associated with anemia. A large number of the women in this study sought care for uterine fibroids as a result of the direct symptoms of the fibroids (79.5%) i.e. pelvic pains, abnormal uterine bleeding, pressure symptoms etc. Since a small percentage of women with uterine fibroid are symptomatic there are a large number of them with the disease and not seeking treatment waiting till becomes symptomatic. This study found out 36.9% of women with uterine fibroids sought care as a result of the inability to conceive (infertility) which was similar to the percentage of women (31.9%) who presented with infertility in a study in uterine leiomyomata in Southern Western Nigeria (Okogbo et al., 2011). Median period within which respondents lived with uterine fibroids was 2 (IQR 1-3) years. This study was able to identify that the women who sought care for uterine fibroids at the three selected hospitals in Accra Metropolis had a median uterine size of 19.64 (IQR 16.0-22.0) suggesting most of them had a larger uterine size. Evidence has proofed the presence of larger uterine fibroids in black women (Stewart et al., 2013).

5.1.2 Limitations:

- The study was a hospital based one and the findings may not be a representative of the general population
- There was also selection bias in the recruitment of participants due to the limited time in attaining the sample size of 385 thus resorting to a nonrandomized approach i.e. a purposive manner to recruit participants.

- Different clinicians and ultra-sonographers with different levels of skills assessed the uterine sizes of participants so there can be inter-assessor variability.

5.1.3 Strengths of Study:

The use of multiple data sources enabled an almost complete data to be captured on each participant. Data was collected from medical records of participants, structured questionnaire and laboratory tests done on participants.

Review of questionnaire done by senior colleagues, and captured data entered the same day and doubly entered to reduce errors. Data cleaning was done, all in a bid to improve data quality.

5.1.4 Implication For Further Studies:

This study has established a baseline prevalence of anemia among women seeking care for uterine fibroids in three selected hospitals in the Accra Metropolis. Extension of this study will be needed to include all hospitals in Greater Accra and then the general women population so as to get a better picture of uterine fibroid-related anemia.



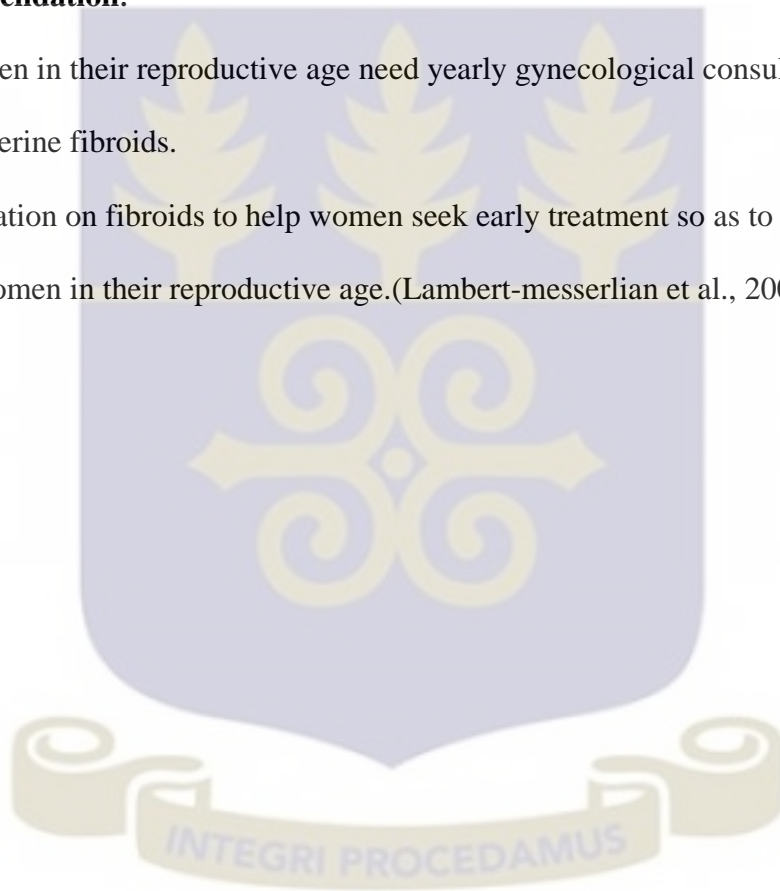
CHAPTER SIX

6.1 Conclusion:

There was high prevalence of anemia among women with uterine fibroids. Anemia was significantly associated with uterine fibroid location but not uterine size. Majority of the women with uterine fibroids sought care as a result of symptoms due to fibroids.

6.2 Recommendation:

- Women in their reproductive age need yearly gynecological consult for screening for uterine fibroids.
- Education on fibroids to help women seek early treatment so as to reduce burden on women in their reproductive age.(Lambert-messerlian et al., 2000)



REFERENCE

- Benaglia, L., Cardellicchio, L., Filippi, F., Paffoni, A., Vercellini, P., Somigliana, E., & Fedele, L. (2014). The rapid growth of fibroids during early pregnancy. *PloS One*, 9(1), e85933. <http://doi.org/10.1371/journal.pone.0085933>
- Brito, L. G. O., Panobianco, M. S., Sabino-de-Freitas, M. M., Barbosa, H. de F., de Azevedo, G. D., Brito, L. M. O., & Candido-Dos-Reis, F. J. (2014). Uterine leiomyoma: understanding the impact of symptoms on womens' lives. *Reproductive Health*, 11(1), 10. <http://doi.org/10.1186/1742-4755-11-10>
- Butori, N., Tixier, H., Filipuzzi, L., Mutamba, W., Guiu, B., Cercueil, J. P., Loffroy, R. (2011). Interest of uterine artery embolization with gelatin sponge particles prior to myomectomy for large and/or multiple fibroids. *European Journal of Radiology*, 79(1), 1–6. <http://doi.org/10.1016/j.ejrad.2009.09.028>
- Carranza-Mamane, B., Havelock, J., Hemmings, R., Cheung, A., Sierra, S., Carranza-Mamane, B., ... Burnett, M. (2015). The management of uterine fibroids in women with otherwise unexplained infertility. *Journal of Obstetrics and Gynaecology Canada*, 37(3), 277–288.
- Cui, X., Peker, D., Greer, H. O., Conner, M. G., & Novak, L. (2014). Extramedullary Hematopoiesis in Uterine Leiomyoma Associated with Numerous Intravascular Thrombi. *Case Reports in Pathology*, 2014, 1–4. <http://doi.org/10.1155/2014/957395>
- de Benoist, B., Mclean, E., Egli, I., & Cogswell, M. (2005). Worldwide prevalence of anaemia. *WHO Global Database on Anemia*.
- Divakar, H. (2008). Asymptomatic uterine fibroids. *Best Practice & Research Clinical Obstetrics and Gynaecology*, 22(4), 643–654. <http://doi.org/10.1016/j.bpobgyn.2008.01.007>
- Doherty, L., Mutlu, L., Sinclair, D., & Taylor, H. (2014). Uterine Fibroids: Clinical Manifestations and Contemporary Management. *Reproductive Sciences*, 21(9), 1067–1092. <http://doi.org/10.1177/1933719114533728>
- Flake, G. P., Andersen, J., & Dixon, D. (2003). Etiology and Pathogenesis of Uterine Leiomyomas : A Review. *Environ Health Perspect*, 111(8), 1037–1054. <http://doi.org/10.1289/ehp.5787>

- Fonseca-Moutinho, J. A., Barbosa, L. S., Torres, D. G., & Nunes, S. M. (2013). Abnormal uterine bleeding as a presenting symptom is related to multiple uterine leiomyoma: an ultrasound-based study. *International Journal of Women's Health*, 5, 689–94. <http://doi.org/10.2147/IJWH.S50786>
- Garcı, L. A., Martı, E., Andersson, S., & Soriano-gabarro, M. (2015). The incidence of hysterectomy , uterus-preserving procedures and recurrent treatment in the management of uterine fibroids. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 194, 147–152. <http://doi.org/10.1016/j.ejogrb.2015.08.034>
- Ghana Statistical Service (GSS), Ghana Health Service (GHS), and ICF International, 2015. (2015). Demographic and Health Survey.
- Gupta, S. (2008). Clinical presentation of fibroids. *Best Practice & Research Clinical Obstetrics and Gynaecology*, 22(4), 615–626. <http://doi.org/10.1016/j.bpobgyn.2008.01.008>
- Higham, J. M., O'Brien, P. M., & Shaw, R. W. (1990). Assessment of menstrual blood loss using a pictorial chart. *British Journal of Obstetrics and Gynaecology*, 97(8), 734–739. <http://doi.org/10.3109/01443619509020674>
- Jefferys, A. (2016). Modern management of fi broids. *Obstetrics, Gynaecology & Reproductive Medicine*, 26(5), 127–132. <http://doi.org/10.1016/j.ogrm.2016.02.004>
- Jun, F., Yamin, L., Yushun, Z., Lijuan, W., Xingye, W., Hao, Q., & Wenli, G. (2009). Effect of selective uterine artery embolization on symptomatic uterine fibroids ☆. *Journal of Medical Colleges of PLA*, 24(6), 346–353. [http://doi.org/10.1016/S1000-1948\(10\)60005-6](http://doi.org/10.1016/S1000-1948(10)60005-6)
- Khan, A. T., Shehmar, M., & Gupta, J. K. (2014). Uterine fibroids: current perspectives. *International Journal of Women's Health*, 6(1), 95–114. <http://doi.org/10.2147/IJWH.S51083>
- Lambert-messerlian, G. M., Silver, H. M., Petraglia, F., Luisi, S., Pezzani, I., Maybruck, W. M., ... Hogge, W. A. (2000). Journal of the Society for Gynecologic Investigation Second-rimester Levels of Maternal Serum Human Corionic Gonadotropin andn Inhii as Predictors of Preeclampsia in te Tird Trimester of

- Pregnancy. *Journal of the Society for Gynecologic Investigation*, 5576(0).
<http://doi.org/10.1177/107155760000700306>
- Lim, J. H., Chung, D. J., Lim, Y. T., Cho, S. H., Lee, J. M., & Hahn, S.-T. (2011). High-intensity focused ultrasound treatment of abnormal vaginal bleeding secondary to uterine myoma. *Journal of Ultrasound in Medicine Official Journal of the American Institute of Ultrasound in Medicine*, 30(3), 397–401.
<http://doi.org/10.1016/j.jmig.2011.05.013>
- Macdonald, C., Specialist, S. S., Canada, W. V., Mildon, A., Neequaye, M., Namarika, R., & Yiannakis, M. (2010). Anemia - can its widespread prevalence among women in developing countries be impacted? 1. 0 Anemia in Women : A Global Health Priority, (October 2002), 1–42.
- Maiorana, A., Alonzo, M. D., Monte, G. Lo, & Marci, R. (2014). Ulipristal acetate : a novel pharmacological approach for the treatment of uterine fibroids. *Drug Design, Development and Therapy*, 285–292.
- Moroni, R. M., Vieira, C. S., Ferriani, R. A., Dos Reis, R. M., Nogueira, A. A., & Brito, L. G. O. (2015). Presentation and treatment of uterine leiomyoma in adolescence: a systematic review. *BMC Women's Health*, 15(1), 4. <http://doi.org/10.1186/s12905-015-0162-9>
- Ofori, E. K., Antwi, W. K., Arthur, E. A., Brakohiapar, E. K., Sarkodie, B. D., Dzefi-Tetty, K., ... Coleman, J. (2012). PREVALENCE AND SONOGRAPHIC PATTERNS OF UTERINE FIBROID AMONG GHANAIAI WOMEN (Uterine Fibroid-The Ghanaian situation), (October 2015).
- Okogbo, F. O., Ezechi, O. C., Loto, O. M., & Ezeobi, P. M. (2011). Uterine Leiomyomata in South Western Nigeria: a clinical study of presentations and management outcome. *African Health Sciences*, 11(2), 271–8. Retrieved from <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3158515&tool=pmcentrez&rendertype=abstract>
- Okolo, S. (2008). Incidence, aetiology and epidemiology of uterine fibroids. *Best Practice and Research: Clinical Obstetrics and Gynaecology*, 22(4), 571–588.
<http://doi.org/10.1016/j.bpobgyn.2008.04.002>
- Omole-Ohonsi, A., & Belga, F. (2012). Surgical Management of Uterine Fibroids at Aminu Kano Teaching Hospital. *Obstetrics and Gynecology International*, 2012,

- 1–6. <http://doi.org/10.1155/2012/702325>
- Orazulike, N. C., Green, K. I., & Uzoigwe, S. A. (2015). Giant uterine fibroids: consequences of delay in presentation. *European Journal of Obstetrics and Gynecology*, *194*, 251–252. <http://doi.org/10.1016/j.ejogrb.2015.06.034>
- Owiredu, K. B. A. W., & Dapilah, T. (2015). Iron Status and Hematological Profile of Ghanaian Women with Fibroids Iron Status and Hematological Profile of Ghanaian Women with Fibroids. *British Journal of Medicine & Medical Research*, *5*(3), 303–311. <http://doi.org/10.9734/BJMMR/2015/12682>
- Press, D. (2011). Current and emerging treatments for uterine myoma – an update, 231–241.
- Press, D. (2014). Uterine fibroids □ : current perspectives, 95–114.
- Puri, K., Famuyide, A. O., Erwin, P. J., Stewart, E. A., & Laughlin-tommaso, S. K. (2014). bleeding and anemia. *The American Journal of Obstetrics & Gynecology*, *210*(1), 38.e1-38.e7. <http://doi.org/10.1016/j.ajog.2013.09.038>
- Sabry, M., & Al-Hendy, a. (2012). Medical Treatment of Uterine Leiomyoma. *Reproductive Sciences*, *19*(4), 339–353. <http://doi.org/10.1177/1933719111432867>
- Sambasivarao, S. V. (2013). NIH Public Access, *18*(9), 1199–1216. <http://doi.org/10.1016/j.ajog.2013.09.038>.Submucosal
- Sankaran, S., & Manyonda, I. T. (2008). Medical management of fibroids. *Best Practice & Research Clinical Obstetrics & Gynaecology*, *22*(4), 655–676. <http://doi.org/10.1016/j.bpobgyn.2008.03.001>
- Sarkodie, B. D., Botwe, B. O., Adjei, D. N., & Ofori, E. (2016). Factors associated with uterine fibroid in Ghanaian women undergoing pelvic scans with suspected uterine fibroid. *Fertility Research and Practice*, 1–7. <http://doi.org/10.1186/s40738-016-0022-9>
- Simms-stewart, D., & Fletcher, H. (2012). Counselling Patients with Uterine Fibroids □ : A Review of the Management and Complications. *Obstetrics and Gynecology International*, *2012*. <http://doi.org/10.1155/2012/539365>
- Stewart, E. a., Nicholson, W. K., Bradley, L., & Borah, B. J. (2013). The Burden of Uterine Fibroids for African-American Women: Results of a National Survey. *Journal of Women's Health*, *22*(10), 807–816.

<http://doi.org/10.1089/jwh.2013.4334>

- Suh, C. S. (2013). Effect of myoma size on failure of thermal balloon ablation or levonorgestrel releasing intrauterine system treatment in women with menorrhagia. *Obstetrics & Gynecology Science*, 56(1), 36–40.
- Sulaiman, S., Khaund, A., McMillan, N., Moss, J., & Lumsden, M. A. (2004). Uterine fibroids - Do size and location determine menstrual blood loss? *European Journal of Obstetrics Gynecology and Reproductive Biology*, 115(1), 85–89.
<http://doi.org/10.1016/j.ejogrb.2003.10.027>
- Tomaszewski, J., & Nouri, K. (2014). Long-term treatment of uterine. *Fertility and Sterility*, 101(6). <http://doi.org/10.1016/j.fertnstert.2014.02.008>
- Van Der Kooij, S. M., Hehenkamp, W. J. K., Volkers, N. a., Birnie, E., Ankum, W. M., & Reekers, J. a. (2010a). Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 5-Year outcome from the randomized EMMY trial. *American Journal of Obstetrics and Gynecology*, 203(2), 105.e1-105.e13. <http://doi.org/10.1016/j.ajog.2010.01.049>
- Van Der Kooij, S. M., Hehenkamp, W. J. K., Volkers, N. A., Birnie, E., Ankum, W. M., & Reekers, J. A. (2010b). Uterine artery embolization vs hysterectomy in the treatment of symptomatic uterine fibroids: 5-Year outcome from the randomized EMMY trial. *American Journal of Obstetrics and Gynecology*, 203(2), 105.e1-105.e13. <http://doi.org/10.1016/j.ajog.2010.01.049>
- Veena, B. T., & Shivalingaiah, N. (2014). Role of Transvaginal Sonography and Diagnostic Hysteroscopy in Abnormal Uterine Bleeding. *Journal of Clinical and Diagnostic Research*, 8(12), 10–12. <http://doi.org/10.7860/JCDR/2014/8813.5236>
- Wen, K. C., Chen, Y. J., Sung, P. L., & Wang, P. H. (2010). Comparing uterine fibroids treated by myomectomy through traditional laparotomy and 2 modified approaches: ultraminilaparotomy and laparoscopically assisted ultraminilaparotomy. *American Journal of Obstetrics and Gynecology*, 202(2), 144.e1-144.e8. <http://doi.org/10.1016/j.ajog.2009.10.872>
- WHO. (2015). The Global Prevalence of Anaemia in 2011. Geneva: World Health Organization.

APPENDICES

QUESTIONNAIRE

SOCIODEMOGRAPHICS

AGE AT LAST BIRTHDAY: _____yrs.

PLACE OF RESIDENCE: _____

EDUCATION: Please tick

Tertiary [] Secondary [] Primary [] None []

MARITAL STATUS

Single [] Married [] Divorced [] Widow []

OCCUPATION: Specify _____

NUMBER CHILDREN:

WEIGHT/KG:

HEIGHT/METERS:

BMI:

MEDICAL HISTORY

Even been diagnosed with any of the following diseases?

Disease	Tick
Sickle cell	
Cancer	
Malaria in the last month	
Any other infection in the last month.	
Chronic disease: (HIV, chronic kidney disease, liver diseases)	
Others: specify	

MENSTRUAL HISTORY

Last menstrual period (LMP): _____

Age at menarche: _____ yrs.

Age at first pregnancy: _____ yrs.

History of contraceptive use

Have you ever used any contraception? Yes [] No []

Are you currently using any contraception? Yes [] No []

Please specify:

Pills [] Injectable [] Implants [] IUDs [] Tubal ligation []

Duration of contraceptive use _____

Amount of blood loss in the last month: Please use PBAC sheet attached.

DRUG HISTORY:

Are you taking any medicine?

Please specify _____

DIET HISTORY:

Breakfast _____

Lunch _____

Dinner _____

UTERINE FIBROID HISTORY

How long have you had uterine fibroids? _____ Yrs.

Have experienced abnormal uterine bleeding since onset of fibroids

Yes []

No []

If Yes, how long? _____







REASON FOR SEEKING CARE

Why are you seeking care for your condition? Please tick.

REASON	TICK
Cosmetic e.g. body disfiguring due to size of fibroid	
Symptoms /signs of uterine fibroid . e.g. bleeding, lower abdominal pains etc.	
Inability to conceive	
Risk of cancer	
Any other; please specify:	



Pictorial Blood Assessment Chart adapted from (Higham, O'Brien, & Shaw, 1990) Each row represents a day of the month

	Pads		Tampons		Clots		Flooding	Score		
Date	 light (1 pt.)	 Medium (5 pts.)	 heavy (20 pt.)	 light (1 pt.)	 medium (5 pt.)	 heavy (20 pt.)	5 pes. size (1 pt. each)	50 pes. size (5 pts. each)	1 pt. each episode	
1										
2										
3										

4										
5										
6										
7										
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22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
Total										

Count the number of sanitary pads and/or tampons you use each day (24 hour period).

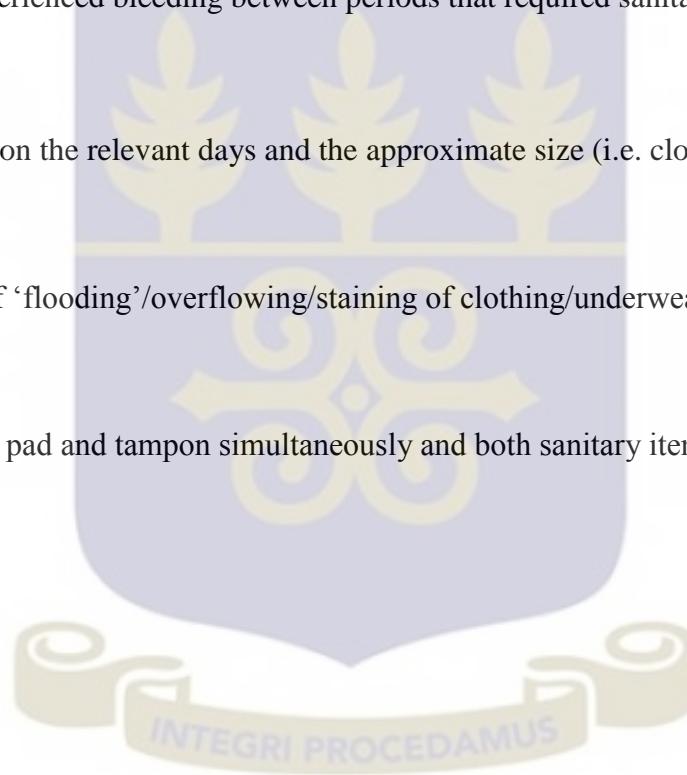
Calculate a score for each day, then add up the score at the end of the month.

Bleeding between periods - if you also experienced bleeding between periods that required sanitary protection please record this on the relevant days.







Clots – if you pass clots, please indicate this on the relevant days and the approximate size (i.e. closer to Ghanaian 5 pesewas or 50 pesewas coin).

Flooding – if you experience any episodes of ‘flooding’/overflowing/staining of clothing/underwear please indicate the number of episodes on the relevant days.

Double protection – if you have used both a pad and tampon simultaneously and both sanitary items were stained with blood don’t forget to include both sanitary items on the PBAC.



PBAC Scoring System

Pads		
1 point	For each lightly stained pad	
5 points	For each moderately stained pad	
20 points	For each completely saturated pad	
Tampons		
1 point	For each lightly stained tampon	
5 points	For each moderately stained tampon	
10 points	For each completely saturated tampon	
Clots/Flooding		
1 point	For each small clot (Ghanaian 5 pesewas coin)	
5 points	For each large clot (Ghanaian 50 pesewas coin)	
5 points	For each episode of flooding	