

**ENSIGN COLLEGE OF PUBLIC HEALTH, KPONG EASTERN REGION,
GHANA**

**ROUTINE USE OF ULTRASOUND IN ANTENATAL CARE - A SURVEY
TO ASSESS THE KNOWLEDGE AND PERCEPTION OF PREGNANT
WOMEN AT THE ATUA GOVERNMENT HOSPITAL**

by

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DEDICATION

I wish to dedicate this thesis to the glory of the Most High God for his love and grace throughout this programme of study.

ACRONYMS

| | |
|--------|--|
| CHPs | Community Health-Based Planning Services |
| GHS | Ghana Health Service |
| OPD | Out Patient Department |
| RADIUS | Routine Antenatal Diagnostic Imaging with Ultrasound Study |
| SPSS | Statistical Package for Social Science |
| WHO | World Health Organization |

ABSTRACT

Introduction

Ultrasound has useful application in the management of pregnancy. Among other uses, it is routinely used antenatal clinics in Ghana to determine gestation, sex of child, fetal and placental positions and fetal viability. To facilitate information and counseling, there is the need to know the perception of patients about the technology. Very little is known about this in Ghana.

Materials and Methods

This was a cross-sectional study conducted through administration of a questionnaire to antenatal attendants at the Atua Government Hospital in the Eastern Region of Ghana. All the women interviewed had undergone ultrasound scan at least one in the current or past pregnancies. Convenience sampling method was used to recruit 306 participants. Descriptive analysis were performed. Further analyses explored socio-demographic determinants of the belief that ultrasound was harmful to the growing fetus. The data were analyzed using descriptive and bivariate analyses

Results

A total of 306 women with a mean age of 25.9 (\pm 6.3) years were interviewed. The most commonly-mentioned use of the antenatal ultrasound was to assess gestational age (31.4.3%), estimate date of delivery (33.3%) and determine sex of fetuses (17.3%). Over half of pregnant women indicated that ultrasound could cause cancer. About 10% of women thought ultrasound could be harmful to the child; women under 25 years (OR=2.52, CI= 1.13-5.60, P-value < 0.02) were 2.52 times likely to indicate this than older women. Most respondents (89.5%) perceived antenatal ultrasound to be a useful tool and were willing to do it again if the need arose.

Conclusions

Despite appreciating its usefulness, a high proportion of pregnant women had apprehensions and misconceptions about the effects of ultrasound scans. Pregnant women undergoing ultrasound scans should be educated about the technology and the safety measures in place to avoid harm to them and their babies. Younger women may be particularly apprehensive and should be targeted for counseling.

APPENDICES

Appendix A; Ethics Approval Letter

Appendix B; Consent Form

Appendix C; Questionnaire

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

The Introduction of ultrasound in obstetrics by Professor Donald in 1958 revolutionized the process of fetal monitoring and diagnosis in perinatal care (Mann, 1997) At present, ultrasound has become an indispensable part of modern antenatal care because of direct access it gives to healthcare providers to image the fetus (Georgsson & Waldenstrom, 2008).

Enakpene et al. (2009) reported that the use of ultrasound is a safe technology that meets the World Health Organization guidelines (1994) because it is scientifically sound, accessible, affordable, and less expensive than other imaging modalities and in many cultures an acceptable non-invasive procedure.

The benefits of diagnostic ultrasound in both developed and poor resource settings are well known and undisputed (Ayers & Pickering, 1997). A report by Arney (2004) indicated that in South Africa, a community based ultrasound service significantly reduced referral to a regional center for fetal surveillance.

While Obstetric sonography has proven to be beneficial in situations where it is indicated, its role in being routine remains contentious (Tautz, 2000). Bashoura et al.(2005) and Georgsson et al.(2008) all reported that the ultrasound experience reassures the pregnant woman about fetal wellbeing, encourages women to abandon practices harmful to the fetus, facilitates early bonding between pregnant mother and fetus, detection of possible fetal malformation, placental localization and to a large extent, confirmation of multiple pregnancies just to mention a few. Tautz (2000) also emphasized that ultrasound helps with accurate assessment of gestational age, early detection

of an abnormal pregnancy and fetal growth monitoring among several advantages. Conversely, Tautz (2000) emphasized that sometimes pregnant women have gotten over expectations that may not be met during scanning which creates a different feeling for them after the scan.

It has been reported that innovative medical technologies like obstetric sonography have the potential to raise social, ethical and economic dilemmas for both health workers and recipients of health services (Tautz, 2000). Apart from the medical benefits of antenatal ultrasound, the procedure is also known to have psychological effects in terms of increase levels of anxiety, depression, hostility, somatic symptoms beforehand and reduction of these after the procedure (Mubuuke et al. 2009).

Bashour (2005), emphasized that ultrasound is one of the many technologies that were initially developed in affluent parts of the world but are now proliferating in the developing world. However, according to Ghana Maternal Health Survey (2007), most women fail to enjoy the benefits of this technology due to some negative attitudes and perception of expectant mothers.

Statistics from the survey revealed that a significant number would not go for this service because, some perceive the procedure to be expensive. Others also thought virtually knowing your unborn child before birth takes away the excitement and enthusiasm that comes with childbirth.

Most women again believed that spiritual threats were of concern to them and that spiritual attacks on pregnancy are partially dependent on the specific actions and inactions taken by a pregnant woman such early disclosure of pregnancy to others, contact with specific people and even going out in the night, just to mention a few. With the wide availability of ultrasound, the expectation of the general public towards ultrasound has dramatically increased but the actual knowledge regarding its use and its limitations are lacking among them.

In spite of media coverage, knowledge regarding the uses of ultrasound scans among antenatal women in studies from Rajasthan and Mumbai were found to be among only 52.4% and 34.3% of their study populations, respectively (Mann, 1997). The purpose of this study was to evaluate the knowledge of antenatal mothers regarding the uses of ultrasound during pregnancy and also to assess their perception towards ultrasound.

1.2. Problem statement

Ultrasound is one of the most utilized forms of modern reproductive technology. In many countries of the developed world, the use of ultrasound scanning as a means of imaging the fetus in utero is now a routine procedure during pregnancy and forms an integral part of a woman's prenatal care (Schei, 1992; Thrope et al., 1993). This visual image of the fetus, by the use of ultrasound, has profoundly changed how women and their families feel about their pregnancies and has raised many questions about the extensive use of technology in all aspects of reproductive healthcare (Dowswell & Hewison, 1994).

Nevertheless, several authors suggest limited knowledge about the perception and responses of women towards prenatal ultrasound, and there has been less effort towards the incorporation of these findings into a context for women and the governing bodies, agencies and individuals involved in setting health policy and services (Oakley, 1993), hence this research to assist with planning strategies to overcome any deficits women encounter during ultrasonography services.

1.3. Significance of the study

Having positive attitude and good knowledge is the most valuable precondition for any healthy behavior, including ultrasound services. Different studies have shown that women who had a positive attitude towards ultrasonography had a higher proportion of regular scans done than those with a negative attitude. Therefore knowing about prevalence of women who has positive attitudes

and good knowledge and identifying the associated factors in a given society has important contribution in addressing maternal health need of the women.

This study was intended to extract the knowledge and perception of pregnant women on the benefits of ultrasound during antenatal visit. The findings of this study will serve as a reference for giving intervention accordingly by the health care providers and others concerned; for conducting further researches; the findings of this study will have special importance for health care providers because it will serve as baseline for filling gaps of the actual practice of ultrasound. The findings with relevant recommendations will be also submitted to the management of Atua Government Hospital, and in advance to the Ghana Health Service (GHS).

1.4. Study objectives

1.4.1. General objectives

To assess the knowledge and perception of Ghanaian expectant mothers on ultrasound imaging

1.4.2. Specific objectives

- To assess the perception of risk associated with exposure to ultrasound
- To assess the expectations of pregnant women about ultrasound scanning with regards to determining the following:
 - Sex of the fetus
 - Estimate expected delivery date
 - Gestation of pregnancy
 - Congenital abnormalities
 - Fetal viability
- To rank the above expectations in terms of the priority of pregnant women

CHAPTER TWO

2.0. LITERATURE REVIEW

The literature reviewed for this study spanned a variety of sources: medicine, nursing, diagnostic imaging, psychology and literature on women's health movement. While there is abundance of literature related to use, risks, benefits and outcomes of ultrasound in pregnancy, there is limited literature related to the psycho-social attitudes women have towards ultrasound in pregnancy. The literature review will therefore be presented under the following main topics: a) medicalization of pregnancy and childbirth; (b) history of ultrasound use in pregnancy (d) The RADIUS study (e) The Psychology of Ultrasound; and e) The Educational Process in the Ultrasound Exam Room.

2.1. Medicalization of pregnancy and childbirth

Before any review of why pregnancy and childbirth today are so greatly influenced and controlled by the use of technology, there is value in understanding why and how this has happened. This premise is also known as the "medicalization theory". The influence of medicine in our lives and in women's lives in particular, has been an increasing trend during this century. This shift, broadly coined as "medicalization" has been described in the literature as an insidious and often undramatic phenomenon in which many aspects of life have come to be defined in medical terms and then defined as medical problems (Miles, 1991). As the domain of medicine expands, a wider range of human experiences such as aging, addiction and anxiety have come to be defined and treated according to the medical model.

Medical ideas, practices and products now pervade an ever increasing scope of our daily lives. Inherent in this trend is a preoccupation with our health, methods to control and or improve it and the resulting medicalization of human existence. For women, the impact of the growth of medical

influence has been considerable. Some aspects of increasing medical influence has been considerable. Some aspects of increasing medical control on the lives of women in relationship to human experience include the interpretation and labelling of women's social difficulties and unhappiness as psychiatric problems, the medicalization of natural female biological processes such as menopause and the intervention of health professionals in the sphere of childbirth and family care (Miles, 1991).

2.2. History of ultrasound use in pregnancy

Although there has been rapid development and application of ultrasound technology in obstetrics over the past twenty-five years, the roots of basic sonography do not lie in medicine but warfare (Oakley, 1993). Ultrasound was originally developed to detect the enemy submarine during warfare but was not introduced into medicine until the late 1940's. After the war in 1955, surgeon in Glassglow named Ian Donald began to experiment with it using beef steaks as "control" subjects, scanning the abdominal tumors he had removed from his patients, he found out that different tissues gave different patterns of sound wave echo, many of which turned to be pregnancies (Neilson and Grant, 1989). The potential of ultrasound for examining a growing baby in uterus was then realized and this brought about prenatal sonography.

Prenatal sonography is the use of ultrasound in the management of pregnancy (Lumar, 1997) The technique of sonography has evolved from the simple linear display of echoes reflected back to the equipment from tissue interfaces (A-mode) to the real-time systems with two dimensional moving images, which are particularly useful for the study of a continuous moving fetus (Neilson and Grant, 1989). Since its introduction in the 1950's, ultrasonography has become a very useful

diagnostic tool in obstetrics and has dramatically changed the practice of obstetrics by enabling visualization of the fetus and intrauterine environment.

2.3. The obstetrical ultrasound exam

Research continues to mount regarding the significant impact of ultrasound in the field of obstetrics. It continues to be used as a source of debate in both political and moral debates; it has enhanced fetal diagnosis, genetic testing and prognosis. “The embryo is now perceived as an individual, influencing patients’ attitudes towards various methods of prenatal diagnosis” (Jauniaux, 1997). Ultrasound itself can be defined as sound with a frequency of greater than 20,000Hz, which cannot be detected by the human ear.

Ultrasound emits intermittent high frequency sound waves through a transducer that is applied to the mother’s abdomen. The pulsed ultrasound beam is transmitted through the body where it is reflected off the various densities by human tissue, returned to the transducer that in turn receive these generated pulses. The image from these pulses is produced on the monitor screen. Since sound waves do not travel well through air, an ultrasound gel is applied to the maternal abdomen. Today, ultrasound machines provide “real time” ultrasonography, which produce pictures of the motion fetus as they actually occur. Fetal movement, heart motion, opening of the mouth, (appearing as talking, yawning, swallowing) fetal breathing, and blood flow can be viewed. Frank A. Chervenak, professor of Obstetrics and gynecology at Cornell University Medical College in New York feels: “All pregnant women should have access to ultrasound because it is the best tool that we have to pick up many fetal abnormalities” (Mann, 1997). Indications for fetal ultrasound include: estimation of gestational age, abnormal vaginal bleeding, unreliable dates, fetal growth, inability to hear fetal tones, pregnancy location, suspected multiple gestation and assistance with diagnostic procedures such as chorionic villi sampling or amniocentesis. In late pregnancy,

ultrasound is used to determine fetal wellbeing, the amount of amniotic fluid, fetal position and estimated fetal weight.

2.4. The RADIUS study

It is well known and often stated fact by the American College of Obstetrics and Gynecology, that routine ultrasound is not cost effective and does not appear to influence neonatal outcome. It would be unrealistic for no one to believe that all problems can be detected by ultrasound, although the idealistic goal holds a challenge for today's sonographer. The sensitivity of the ultrasound is dependent upon a number of factors; fetal gestational age, fetal positioning, full maternal bladder, and maternal body habitus, the type of ultrasound equipment and the skill and expertise of the operator. In 1993, the famous RADIUS (Routine Antenatal Diagnostic Imaging with Ultrasound Study) study was published in the New England Journal of Medicine. This study is forever quoted as advising against routine ultrasound unless there is valid medical reason for the test (Mann, 1997). The RADIUS study felt that while fetal ultrasound does not permit more accurate dating, (valid indication), the "screening ultrasound" does not detect a significant number of anomalies to prove to be cost effective (Ewigman et. al.1993). There appeared to be no advantage in low risk pregnancy.

A new European study, the Eurofetus study reports an increased pick up rate of fetal anomalies using routine ultrasound exams, where universal screening is an accepted mode of prenatal care (Levi, 1998). Seeds, in his study, "The Routine or Screening Obstetrical Ultrasound Examination" states "the analysis of the RADIUS data appeared to suggest bias by underestimating the diagnosis sensitivity of ultrasound for major anomalies and de-emphasizing those statistically significant obstetrical benefits that were recorded" (Seeds, 1996). The forthrightness is most intensely stated in an article in the Medical Tribune: "More ammunition may be needed to reverse the anti-

ultrasound trend set by the 1993 Routine Antenatal Diagnostic Imaging with Ultrasound Study (RADIUS)” (Mann, 1997). Is there more to be considered in the prenatal ultrasound exam than anomalies? What are the other benefits and could these other benefits serve as ammunition?” Could neonatal outcome be improved through the use of ultrasound as a means of maternal-fetal bonding and attachment? When the mother views her fetus as her baby and recognizes this tiny human being as an individual, could her dietary habits improve? The value of obstetrical ultrasound needs to be explored in terms of benefits in the area of psychological reassurance and bonding.

2.5. The psychology of ultrasound

Viewing and exploring on the psychological implications of the obstetrical ultrasound brings consideration of new terminology into focus. The author believes that the possibility of new nomenclature should be added to our existing vocabulary- Ultrasound Psychology. The definition of psychology is “the science of mental processes and behaviors” or “the science of human soul” (American Heritage Dictionary, 1992, p1000).

Behavioral processes such as verbal and non-verbal communication and conscious and unconscious thoughts entail actions and conduct in an assortment of environments, including the ultrasound exam room. The processes that can be observed during the fetal exam include speech (oohs and ahs), gestures (touching the ultrasound monitor) and expression of thoughts and dreams. The procedure is facilitating the mother’s journey through motherhood. Research indicates that “routine” ultrasound exams may have significant psychological effects on parental attitudes towards each other and the fetus (Zlotogorski et al, 1997).

During these years leading into a new millennium, humanity is witnessing profound changes at breath-taking speeds in the field of technological advances. We are seeing the consequences of this technological development and sophistication because the essence of human nature remains

the same. Proposing the term “ultrasound psychology” opens the door to discovery of a new thought process about a scientific procedure that involves a deeply personal aspect of humanity. At the dramatic moment the ultrasound captures the beginning of life, the psychology of ultrasound grows and changes.

The research would not be complete without a short commentary on Janelle Taylor, a noted anthropologist, and some of her rationalizations on the cultural impact of ultrasound in today’s world. She vividly portrays the experience of the obstetrical ultrasound exams with all its psychological and emotional implications (Taylor, 1992). She first became interested in the fetal ultrasound when she viewed the videotape, *The Silent Scream* (an anti-abortion video) and the advertisement for Volvo automobiles. It was at that point that she realized that the obstetrical ultrasound has become a routine part of prenatal care and an anticipated event in pregnancy (Craig, 1996). She continued her quest for knowledge about this new cultural occurrence with a research project that delved into the hopes, fears and expectations of the ultrasound exam. In her interview with Marveen Craig, Ms. Taylor poignantly summed up her feelings on the psychological implications of the obstetrical ultrasound exam: “To see the image of her expected baby on the screen can make a woman feel very happy, and to be told that the ultrasound examination seems to indicate that all is normal can make one feel very much relieved because these are not physical effects, they are then glossed as ‘psychological’ benefits.

Some practitioners, apparently even consider ‘psychological benefits’ alone sufficient reason to order an ultrasound examination” (Craig, 1996). The social and cultural context then relates to the concept of psychological benefits, which necessitates two different subjects: reassurance and maternal-fetal bonding. Her continued efforts to reflect on fetal ultrasound in today’s society will resound again.

2.6. The educational process in the ultrasound exam room

The educational process that occurs during the obstetrical exam is an interaction that instills current scientific knowledge, clinical experience and the visual impact of the unborn baby. Lumley (1990) referred to the educational process in her research as “sonographer feedback” and felt it was a critical factor since it accounted for discussion, explanation and interpretation of the ultrasound images.

According to Lumley (1990), sonographers play a major role in the impact of the obstetrical ultrasound, whilst alluding to the fact that it can also have a negative impact in the form of “slips of the tongue, incorrect diagnosis, identification of structures that cannot be deciphered and language that is unfamiliar and alarming to mothers.” She referred to this as “diagnostic toxicity” of the obstetrical ultrasound. The educational process itself stimulates learning by stirring interest, intrigue and bonding and thereby accelerating the learning curve.

The ultrasound room could be considered an interactive teaching environment where significant discussion with questions and answers occur. The ultrasound machine is enhancing the learning process, with its state-of-the-art technology in audio and video capabilities. The mother influences both the structure and content of what she will learn. The sonographer strives for excellence in the academics and other aspects in the promotion of a healthy pregnancy. This educational process results in implemented change in improved lifestyle and nutrition effecting the outcome of the newborn. The fetal ultrasound exam offers the realization of pregnancy as well. The photograph or images the mother receives of her fetus (baby) becomes a record of the beginning. The ultrasound pictures are referred to as “baby pictures.” These photos are the beginning of many photo albums in their lives. With parents so engrossed in this learning environment, it is an opportunity to educate patients and their families.

Basler (1995) in his article, “Patient Education with Reference to the Process of Behavioral Change” found that “behavioral change is a non-stable condition with distinct stages called precontemplation, action, and maintenance with a relapse at any stage which should be interpreted as a natural part of the change process”. It is with growing interest that this author proposes the possibility of the fetal ultrasound as the “precontemplation stage of change.”

With the “educational process” involved in sonography, consequence is put upon the professional capabilities and educational background of the individual performing the exam. The sonographer could have either a negative or a positive influence. The quality of the ultrasound procedure both physically and psychologically lies in the hands of the person executing the exam.

Professional standards for sonography need to be reviewed and maintained. The challenge into today’s intense health care market is to maintain high quality care through continued education and maintenance of academic standards. Professionals need to acquire and persevere in skills leading to problem solving, communication, excellence in sonography and prenatal care, as well as be committed to life-long learning.

A study done over fifteen years ago emphasized the need for high quality education in sonography with a noted correlation. The authors suggested a demonstration of “positive attitudes toward the scan and fetus contingent upon receiving high feedback, suggesting that feedback should become an integral part of scanning procedure if the therapeutic potential of ultrasound in antenatal care is to be realized” (Reading & Cox, 1998)

2.7. Knowledge of women towards ultrasound use

Health knowledge is considered to be one of the key factors that enable women to be aware of their right and health status in order to seek appropriate health services. Study conducted in

different part of the world has discovered that level of knowledge of mothers toward routine use of ultrasound is important during antenatal services. The level of knowledge of pregnant mothers also varies in different part of the world (Effendi et.al. 2008)

An institutional based cross sectional study conducted in North central Nigeria to investigate knowledge and attitudes of ultrasound service revealed that 88% of women in child bearing age were aware of the benefits of ultrasonography, out of which 26% had fair knowledge about the activities carried out during the scan services, 70% had good knowledge while only 4.2% had poor knowledge (Igbokwe, 2009). Similarly, a study conducted in Accra to investigate Ghanaian woman's experience and perception of ultrasound use indicated that 92% of women knew the importance of routine antenatal examination (Mensah et al., 2014)

Different to these findings, a cross-sectional study conducted at the Naguru Health Center, Kampala district Uganda, found that most of the respondents 73.9%, lacked sufficient knowledge towards ultrasonography (Schei, 1992). In another cross sectional study conducted in Metekel zone, North West Ethiopia, 66% women interviewed knew at least half of the knowledge questions on ultrasound and so labelled as knowledgeable (Hofmeyr, 2009)

2.8. Determinants of knowledge of expectant mothers towards ultrasound use

Knowledge of women towards ultrasonography services can be influenced by different factors. A study conducted on knowledge and experience of expectant mothers on ultrasound in an urban area of India revealed that the primipara had more knowledge than the multipara although it was not statistically significant.

The study also revealed that women having adequate knowledge on ultrasound use were found to be statistically associated with their educational status, religion, age and marriage. With increase

in the educational status, the adequacy of knowledge also increased correspondingly (Georgsson et al, 2008). However, the multipara were found to have poorer knowledge on the use of ultrasound in a study done in Shanghai, China (Mubuuke et al., 2009)

2.9. Perception of expectant mothers on ultrasound use

Perception is a state of belief or opinion, often held by many people and based on how things seem (Schei, 1992). In JhalMagsi District of Balochistan province of Pakistan community-based survey on provision and utilization of routine antenatal care has described that perception towards ultrasound use at government health facilities was mostly negative, 57.7%.

In another cross-sectional study conducted using two-stage cluster sampling at 24 selected villages in the Kham District of Xiengkhouang Province, Nagoya, Japan, 62% of study participants had harbored a negative perception towards the use of ultrasound (Whynes, 2002). Previous studies in rural areas of the developing world have shown an association of specific attitudes and perception with utilization of ultrasound services during antenatal care.

The attitude towards ultrasound use at government health facilities was significantly associated negatively with ultrasound use and shows low utilization of this service. Studies have reported negative perception as a major barrier to ultrasound use (Effendi et.al, 2008).

Based on Kham District of Xiengkhouang Province, Nagoya, Japan, women who had a positive perception were 3.0 times more likely to receive ultrasound services than those who had a negative perception. Other studies in Indonesia has also reported similar finding in which respondent's perception was a critical factor in encouraging pregnant women to receive ultrasound services (Oakley,1993).

Level of education has a significant influence on the perception of pregnant women to ultrasound use during antenatal services. Pregnant women with basic education usually manifest positive perception (Mann, 1997)). Pregnant mothers with secondary and tertiary education qualification had positive perceptions on ultrasound services while perception by pregnant women with no formal education and primary education showed negative (Huang et al, 2012).

Generally different studies in different countries showed that there was similarity and differences on knowledge and perception of pregnant women on the benefits of ultrasound use. The study conducted in same area found good knowledge and perception and other findings were the opposite. There for these review helps to compare the finding of our study.

2.10. Conceptual framework

Based on review of literature done in Ethiopia and other part of the world, knowledge and perception of women towards ultrasonography can be affected by socio demographic characteristics, socio economic information and media exposure, Obstetric history and previous health service utilization.

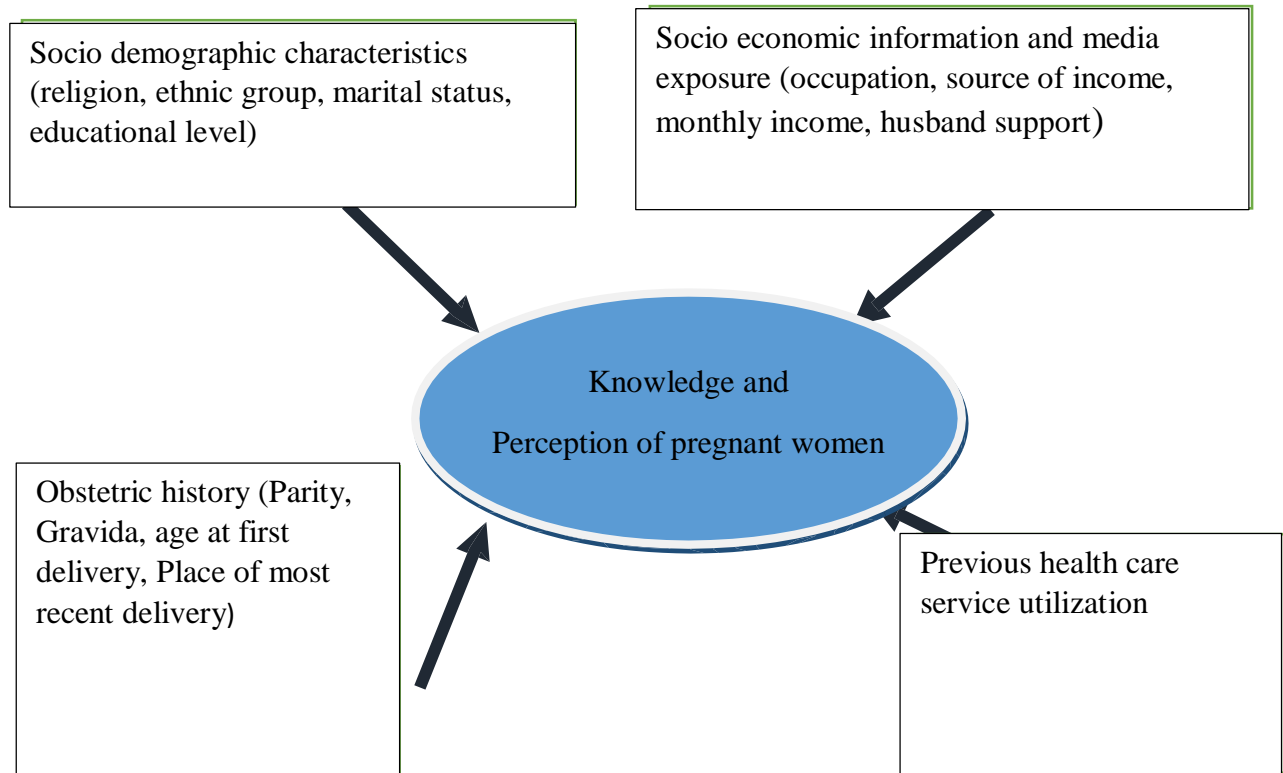


Figure 1. Conceptual framework showing factors affecting knowledge, and perception of pregnant women towards ultrasonography (constructed after reviewing literature).

CHAPTER THREE

3.0. METHODOLOGY

3.1. Study site

The study was conducted at the Atua Government Hospital in the Lower Manya Krobo Municipality of the Eastern Region of Ghana. The major towns in the Municipality includes Odumase township (which incorporates Atua, Agormanya and Nuaso), Akuse and Kpong in the Lower Manya area.

Atua Government Hospital is one of the of the two government district hospitals located in the Municipality. Established in 1977, it offers out patients services, general theater services, inpatients services and maternity services, just to mention a few. On average, the hospital records 62,7721 OPD attendance annually. It has an annual antenatal attendance of 1,540 and conducts about 1,150 deliveries a year. An average of 1,027 obstetric scans are also performed annually.

The hospital serves as a referral center to the only polyclinic in the Yilo Krobo Municipality, the maternity homes and other CHPs compounds and zones located in the Municipality. The catchment area of the hospital includes Manya Krobo Municipality, Yilo Krobo Municipality, Dangbe West District, Asuogyaman Municipality and North Tongu District in the Volta Region.

3.2. Study design

An Institution based cross-sectional study with quantitative methods was conducted to assess the knowledge, attitudes and perception of pregnant women on the use of ultrasound in Atua Government Hospital.

3.3. Study population

Potential participants were drawn from a convenience sample of women who had attended for a prenatal ultrasound in the Atua Government Hospital based on their ease of access and availability from December 2016 to March 2017.

3.4. Inclusion and exclusion criteria

3.4.1. Inclusion criteria

The inclusion criteria for the target group were primigravida and multiparous expectant mothers who are antenatal attendees.

3.4.2. Exclusion criteria

Expectant mothers who are non-antenatal attendees were excluded.

3.5. Sample Size determination

A total of 306 expectant mothers referred for scan between the stipulated research periods were interviewed. This was based on the background that the total population of expectant mothers taking ultrasound scan annually is 1,540, therefore with an acceptance rate of 50%, a confidence level of 95% and a margin error of 5%, the sample size was obtained.

3.6. Data collection and study instruments

The study utilized a questionnaire as a source of data collection. The questionnaire was designed to test the research questions formulated in line with the objectives of the study. The questionnaire exhibited good qualities such as brevity and clarity. To ensure cooperation, objectivity and sincerity, anonymity of respondents and confidentiality of their responses were guaranteed. Five women who met the criteria were interviewed as a pilot test for the interview process. Revisions

of the questionnaire such as expansion of the demographic information, were addressed at this time (Lo Biondo-Wood & Haber, 1994).

The questionnaire was structured and in English and contained a total of 24 questions, consisting of one open-ended question. The questionnaire was divided into 3 sections. Section A contained 7 questions on the demographic characteristics of the respondents; section B contained 9 questions and one open ended question aimed at assessing the knowledge of prenatal ultrasonography; section C contained 7 questions aimed at assessing respondents perception on how service rendered during prenatal ultrasound can be improved. The instrument was validated on the background of a previous study on maternal perspective on prenatal ultrasound (Stephens et al., 2000). Three hundred and six questionnaires were produced, distributed and collected by the researcher. The questionnaire was completed by respondents after undergoing the obstetric scan.

3.7. Data collectors

A total of 2 National Service personnel and a health aide who were not working in the antenatal clinic administered the questionnaires. One day training was given for data collectors on the objective and relevance of the study, how to gather the appropriate information, procedures of data collection techniques and the whole contents of the questionnaire. The supervisor monitored the overall data collection process.

3.8. Data processing and analysis

The data was analyzed using IBM SPSS Statistics for Windows, Version 20.0 (IBM, 2011, Armonk, NY). Each questionnaire had an identification number to ensure each corresponded with the case number in the data view interface of the SPSS software. The data captured were validated. In the validation process, the responses on each questionnaire were compared with data captured

into the software to ensure data accuracy and consistency, likewise the responses of some variables. The data was analyzed using descriptive statistics of tables, percentages and diagrams.

3.9. Ethical considerations

The researchers introduced themselves to the respondents and then gave a concise explanation of the objectives of the research. A written informed consent was obtained. Confidentiality of the respondents were assured as neither names nor person identification number was reflected on the questionnaire. Ethical approval was obtained from Ethics Review Board of Ensign College of Public Health and Management of Atua Government Hospital

3.10. Limitation of the study

As the study is conducted in Atua Government Hospital only, generalization of the finding to the Municipality may not apply.

CHAPTER FOUR

4.0. RESULTS

4.1. Demographic characteristics

A total of 306 women recruited over the stipulated research period agreed to participate in the study. The ages of the clients ranged between 14 years and 47 years; the mean age was 25.86 (SD± 6.3) years. About 15% were aged 19 years and below, 56% were between the ages of 20 to 29 years, and 25% fell between the ages of 30 to 39 years.

Most of the respondents, (35.6%) were married. About 10% of respondents had not had any formal education, 21% respondents had primary education, 25% had middle / Junior Secondary School education, 28% had Senior Secondary / vocational education, and the rest had tertiary education. With regards to parity, majority of the respondents (47%) had not had any child.

Regarding their ethnicity, majority (58.8%) of the respondents were Krobos, followed by 25.5% respondents being Akans, and Ewes, 12%. A total of 18% of the respondents were hairdressers, 27% were dressmakers, and 23% were traders.

Majority (88.6%) of the respondents were followers of orthodox Christianity. About 40% of the respondents resided in Somanya; 28% of respondents were from Odumase; and 21% from Atua.

Table 4.1.: Socio-demographic characteristics of women referred for ultrasound at the Atua Government Hospital, 2017 (N=306)

| Characteristic | Category | Number (%) |
|--------------------------------|-------------------------------|-------------------|
| Age category | 19 years ad below | 47 (15.4) |
| | 20-29 years | 171(55.9) |
| | 30-39years | 77 (25.2) |
| | 40 years and above | 11 (3.6) |
| Educational level | None | 31 (10.1) |
| | Primary | 63 (20.6) |
| | Middle School/JHS | 76 (24.8) |
| | SHS/Vocational School | 87 (28.4) |
| | Tertiary | 49 (16.0) |
| Ethnicity | Akan | 78 (25.5) |
| | Krobo | 180 (58.8) |
| | Ewe | 36 (11.8) |
| | Hausa | 10 (3.3) |
| | Other | 2 (0.7) |
| Religious background | Christianity | 271 (88.6) |
| | Muslim | 29 (9.5) |
| | Other | 6 (2.0) |
| Occupational background | None | 2 (0.7) |
| | Hairdresser | 55 (18.0) |
| | Dressmaker | 81 (26.5) |
| | Housewife | 23 (7.5) |
| | Trader | 83 (27.1) |
| | Formal employee | 56 (18.3) |
| | Student | 6 (2.0) |
| Parity | None | 144 (47.1) |
| | Less than 3 children | 129 (42.2) |
| | 3 children or more | 33 (10.8) |
| Marital status | Married | 109 (36.6) |
| | Engaged, yet to be married | 49 (16.0) |
| | Co-habiting (living together) | 42 (13.7) |
| | Divorced/Separated/Windowed | 5 (1.6) |
| | Single | 101 (33) |
| Place of residence | Somanya | 123(40.2) |
| | Atua | 63 (20.6) |
| | Odumase | 84 (27.5) |

| | | |
|--|-----------|----------|
| | Agormanya | 3 (10.1) |
| | Other | 5 (1.6) |

Source: Field survey, 2017

4.2. Knowledge of pregnant mothers

Majority (69.6%) of the respondents reported having knowledge about obstetric sonography; 93(30.4%). Again, knowledge levels varied depending on the level of education; 22% of the tertiary respondents had knowledge about ultrasound, followed by 36% of the SHS/Vocational respondents; and 20% of the Middle/J.S.S respondents.

Few (6.5%) respondents claimed ultrasound could lead to cancer; 46.1% of respondents said no to ultrasound leading to cancer whilst 47.4% had no idea of ultrasound leading to cancer, regardless of their level of education. About 10% of the respondents believed that ultrasound could be harmful to their fetus; and 41% respondents claimed ultrasound was not harmful to their pregnancy.

All the respondents went for scan because they had been referred by a doctor or midwife. The most common reasons for which respondents had scan taken were to; estimate the expected delivery date (33%), assess gestational age and fetal well-being (31.4%) and the sex of fetus (17.3%)

Table 4.2. Reasons for request of ultrasound among pregnant women referred for scan at the Atua Government Hospital (N=306)

| No. | Response | Frequency (%) |
|-----|--|---------------|
| 1 | Estimate the expected date of delivery | 102 (33) |

| | | |
|---|--|---------|
| 2 | To assess the gestational age and fetal well being | 96 (31) |
| 3 | Sex of the fetus | 53 (17) |
| 4 | Number of fetus | 46 (15) |
| 5 | Check for congenital abnormalities | 9 (3) |

Source: Field Survey, 2017

Women older than 25years were 2.52 times more likely to believe that ultrasound scan was harmful to their fetus.

Table 4.3. Relationship between socio-demographic characteristics of respondents and the perception that ultrasound is harmful to their fetus

| Variable | Category | Perception of harm | OR (95% CI) | p |
|---------------------------|------------------|--------------------|--------------------|------|
| | | Yes | | |
| Highest educational level | beyond JHS | 16 (11.8%) | 1.38 (0.65 -2.90) | 0.4 |
| | up to JHS | 15 (8.8%) | 1 | |
| Age | >25yrs | 21 (14.4%) | 2.52 (1.13 -5.600) | 0.02 |
| | <25yrs | 10 (6.3%) | 1 | |
| Religion | Christian | 28(10.3%) | 1.23 (0.35 -4.28) | 1 |
| | Muslims & others | 3(8.6%) | | |
| Occupation | Formal | 10 (16.1%) | 2.04 (0.90 – 4.62) | 0.08 |
| | Informal | 21 (8.6%) | | |
| Number or times pregnant | 1 or more | 21 (13%) | 2.00 (0.90 – 4.42) | 0.88 |
| | none | 10 (6.9%) | | |
| Marital Status | single | 9 (8.9%) | 0.99 (0.27 – 1.61) | 0.36 |
| | married | 14 (12.8%) | | |

About a quarter (23.5%) of the respondents estimated the gestational age of their pregnancy to be in 1st trimester, most (52.9%) estimated their 2nd trimester and about a quarter (23.5%) their 3rd trimester. When asked the first time scan was taken with respect to their current pregnancy, most (66%) of the respondents had taken their first scan in the 1st trimester, most of them being respondents in the tertiary category. When the first scan was taken differed with respect to religious background. Muslims preferred to announce their pregnancy lately, avoiding the 1st trimester scan.

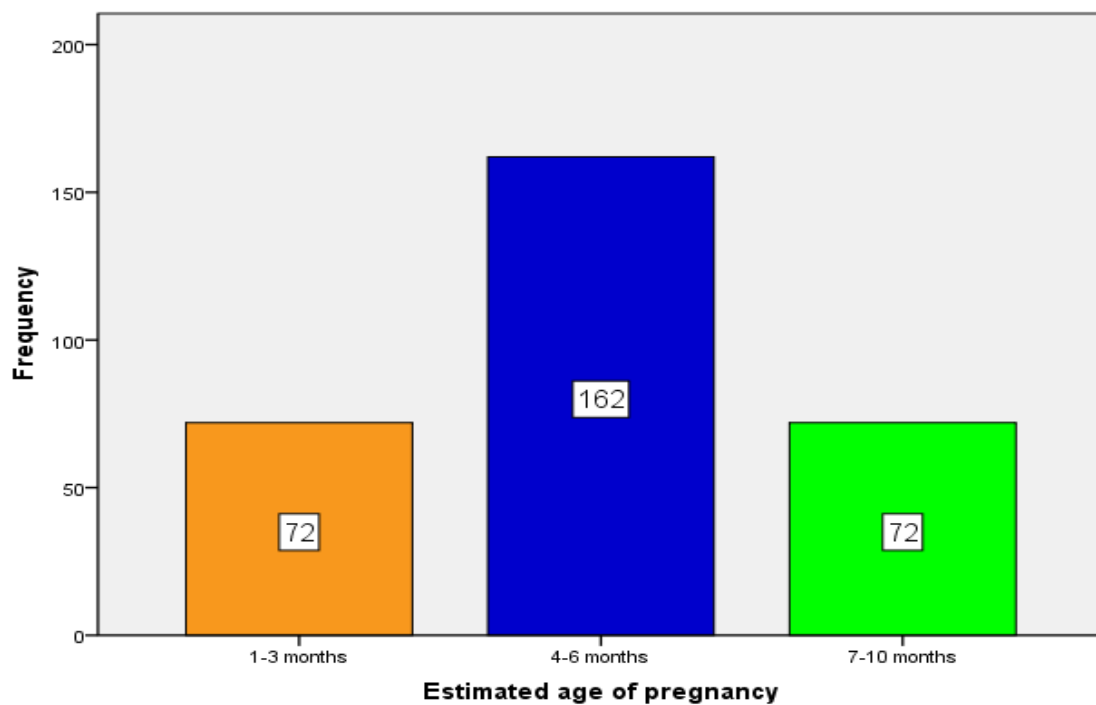


Figure 2. Estimated age of pregnancy among the respondents referred for ultrasound at Atua Government Hospital (N=306)

Source: Field Survey, 2017

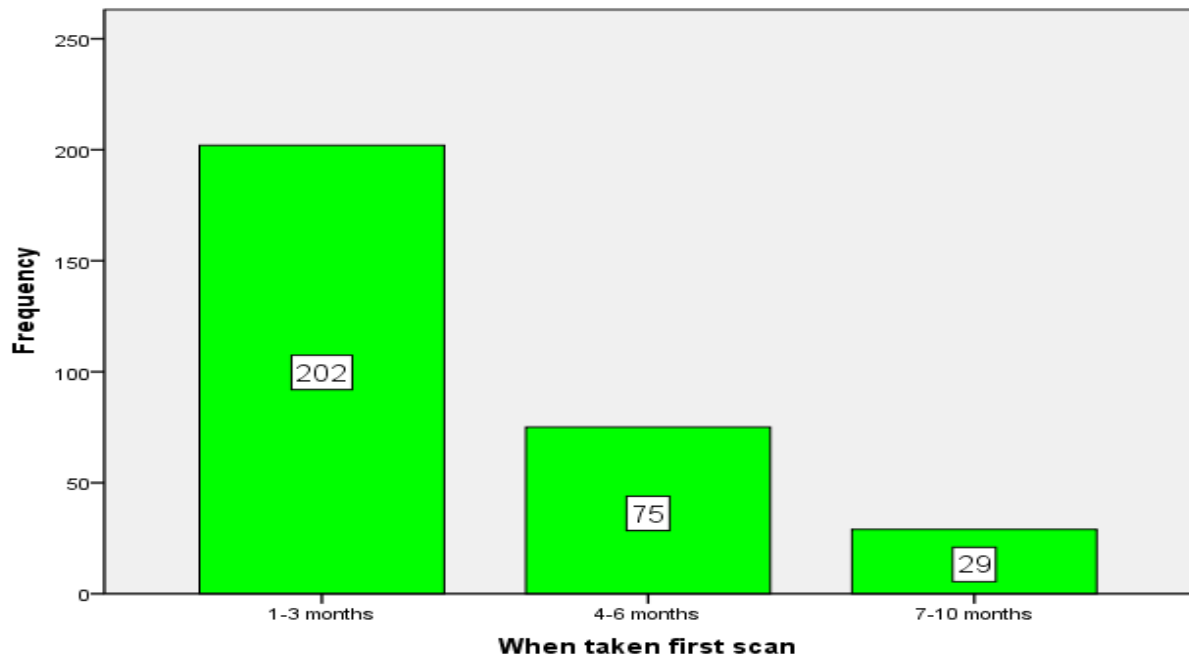


Figure 3. Period when first scan was taken among the respondents referred for ultrasound at Atua Government Hospital (N=406)

Source: Field Survey, 2017

The women had had between 0 to 4 scans with a mean of 1. About 30% of respondents had taken an ultrasound scan just once, majority (49.3%) of respondents twice. About 30% had never taken ultrasound scan.

Most (65%) of the respondents knew about ultrasound through the midwife, about 9% through doctors, and a quarter (25%) through friends.

Table 4.4. Source of knowledge of ultrasound among respondents

| No. | Response | Frequency (%) |
|-----|-----------------|---------------|
| 1 | Nurse (Midwife) | 199 (65) |
| 2 | Doctor | 26 (8) |
| 3 | Friends | 75 (25) |
| 4 | Internet | 4 (1) |
| 5 | Advertisement | 2 (0.7) |

Source: Field Survey, 2017

All the respondents went for scan because they had been referred by a doctor or midwife. For most of these respondents (81.4%), the doctor or midwife indicated the reason for which they were asked to go for scan.

Majority (97.4%) of the respondents had the scan as requested because, they felt it was important component of antenatal care.

Most (94.4%) respondents were insured. The cost of the scan was GHC30.00. Most 53% of the respondents felt the cost of the scan was not affordable. Majority (89.5%) preferred to take scan again if the need arises.

4.3. Perception of respondents

For 38.2% of the women, their healthcare givers (doctors and midwives) explained the reason for asking them to go for scan

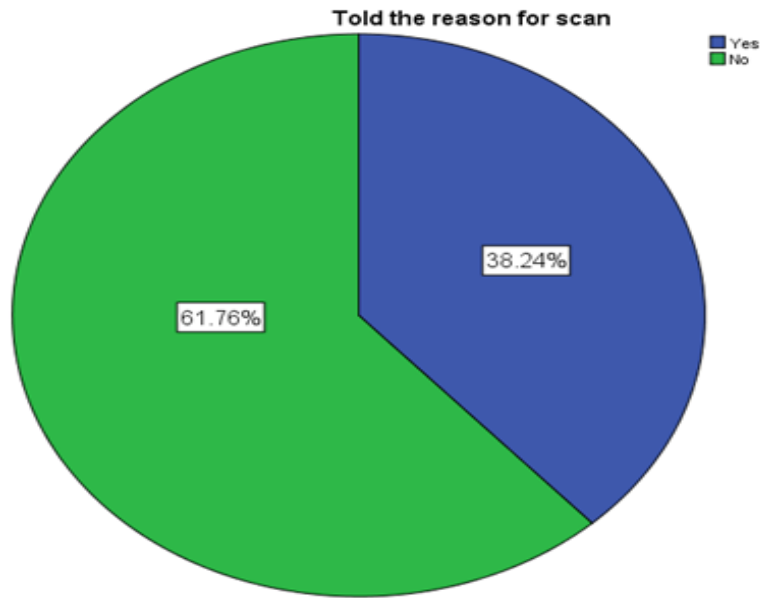


Figure 4. Diagram showing whether respondents were told reasons for scan by their prescribers at the Atua Government Hospital (N=306)

Source: Field Survey, 2017

For the vast majority of respondents, (77.5%), the sonographer explained the procedure to them before examination. About 20% of respondents were allowed to see their fetuses on the monitor during ultrasound scan. Asked if the sonographer was receptive, most (88.6%) respondents said the sonographer was friendly.

CHAPTER FIVE

5.0. DISCUSSION

Ultrasound technology is particularly important in antenatal surveillance in obstetrics where routine screening by ultrasound has become an integral part of antenatal care provision. The total population studied were 306 pregnant women who were predominantly Christians. Most women had some knowledge about obstetric sonography irrespective of their level of education, religion, marital status, age distribution and occupation; however their level of knowledge varied depending on the level of formal education. This can be as a result of widespread usage of diagnostic ultrasound, its versatility, safety and cost effectiveness, consistent with a study by Hofmeyr (2009).

The mean number of scans in this study was 1.0 which is low compared to 2.6 reported in Nottingham, UK (Whynes, 2002) and 2.55 in rural China (Huang et al, 2012). It may also be mentioned that whereas in this study less than a tenth of the respondents had 3 or more scans, in Hanoi two-thirds had more than 4 and a one-fifth had more than 10 scans (Gammeltoft, 2007)

Some of the reasons that may have accounted for the situation in our environment were that most of the women thought the cost of having a scan was high and also almost all the scans were done at the request of a doctor or midwife. This is in contrast to the situation in Hanoi where 30% of women went for scans without doctors' or midwives' referral, just to reassure themselves that their fetuses were fine (Craig, 1995)

Again, while general doctors in Ghana usually ask for a scan in uncomplicated pregnancies only when necessary, and midwives asked for scan report in each trimester of pregnancy, in other countries, doctors in both private and public institutions asked pregnant women to attend each antenatal visit with a new scan report (Gammeltoft, 2007). It is also worth noting that all the

women in this study attended antenatal clinic in public health institutions where there was no motivation for the doctors/sonographer to overuse the ultrasound technology for their own financial gain as was the case in some facilities mentioned in similar studies in Syria and Hanoi (Bashoura et al., 2005).

The gestational age for the first scan for respondents in this study was within the first trimester, thus 0 to 12 weeks gestation. This is identical to what was reported in Denmark (11 weeks) and comparable to the 14.3 weeks reported in Nottingham (UK) (Whynes, 2002). The early gestational age may be explained by the fact that Ghanaian pregnant women book for antenatal care early enough and goes contrary to the results reported by Mensah et al.(2014) that most Ghanaian pregnant women book for antenatal care late, usually in their second trimester.

The three most common indications/reasons for prenatal sonography as mentioned by respondents, estimating the expected delivery date, assessing the gestational age and fetal well-being and determination of sex of fetus are comparable to findings made in studies in Ibadan (Nigeria), Uganda and Tanzania (Enakpene, 2009). It is significant to note, however, that studies in Karachi (Parkistan), Nnewi (Nigeria) and Japan revealed that detection of congenital anomalies featured predominantly among the top three uses of ultrasound as mentioned by mothers (Munin et. al., 2004). However in this study, detection of fetal anomalies is much further down the order, with less than a tenth of women being aware of it. This may be a reflection of poor knowledge of the occurrence of fetal anomalies among the women.

Most of the respondents did not know whether there was any risk associated with sonography, and out of these, women older than 25 years were found to be 2.52 more likely to believe that ultrasound was harmful to their fetuses. In addition, most respondents had no idea whether ultrasound could lead to cancer. This is in line with the study by Ugwu et al (2009).

Encouragement of patients' interaction with the sonographer and others before the procedure could be beneficial in enlightening the patients on the safety level of medical sonography to both the mother and the fetus.

Although most of the women had the procedure explained to them by the sonographer before the scan, less than one-fifth were allowed to see their fetus on the monitor. A quarter were allowed to ask questions during the process. Visualization of fetus on the monitor has been a source of pleasure, comfort and emotional reassurance for pregnant women and has been reported by Bashoura (2005) to enhance feelings of bonding between women and their fetuses. The lack of opportunity to ask questions during the ultrasound procedure has also been reported from Uganda where women's questions were either not responded to or were responded to rudely; this lack of communication led to most of the women being dissatisfied with the sonographer (Mubuuke et al, 2009). Communication between the sonographer and the clients before, during and after the ultrasound examination has been described as a major issue that influences women's experiences and affects client's cooperation during the procedure and her perception of the adequacy of the procedure at the end of the examination (Tautz, 2000).

The study showed that most women felt the cost of the scan was not reasonable, but they preferred to pay for the service. This is in line with the reports of Stephens et al. (2000) and Ugwu et al. (2009) that many women want sonography and are willing to pay for the examination even when accustomed to free healthcare. This may be the result of high perceived indication of the necessity of prenatal sonography by pregnant women during their antenatal period which is consistent with Mubuuke (2009) who reported that a majority of the respondents found obstetric sonography necessary as it could help them plan better for their pregnancy.

It is important to know that majority of the client thought the sonographer was receptive. This reveals an appropriate and good medical practice, which is consistent with a study by Ugwu et al (2009). It is therefore very important for managers of facilities to ensure that they provide the right ambience and encourage members of staff to exhibit right attitudes towards clients who report for ultrasound scanning.

In spite of some of the negative experiences in the process of having ultrasound scan, most of the women saw the whole scan experience as a good one and were willing to go through it in their subsequent pregnancy. It is possible that with a bit of effort to address the issues raised in this study, almost all the women will want to have antenatal ultrasound scans in their next pregnancies.

CHAPTER SIX

6.0. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

There is inadequate information flow from doctors, midwives and sonographers to clients concerning the indications for ultrasound, the processes involved and the results of the procedure. However, pregnant women considered prenatal sonography to be a very useful and necessary test during their antenatal care. They had a good knowledge and understanding of the clinical ground for diagnostic sonography, despite their high level of ignorance of diagnostic ultrasound safety, such as probability of risk to the fetus.

6.2. Recommendations

- Doctors and midwives should educate their clients (especially older women above 25 years) on the reasons for scan, benefits and risks associated with the use of ultrasound.
- Sonographers should take time to educate and communicate with their clients before, during and after the scan.
- Diagnostic imaging rooms should have policies around “feedback” during a scan to allow for informed decision making, clients’ satisfaction and proper care during scan.

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APPENDICES

APPENDIX B; INFORMED CONSENT FORM

Part 1: Participation information

I am a student of Ensign College of Public Health in Kpong. I am conducting a study that involves routine use of ultrasound in antenatal care- a survey to assess the knowledge and perception of pregnant women at Atua Government Hospital. If you agree to be part of the study, a trained project staff will ask you series of survey questions alone for approximately 10-15 minutes.

I anticipate no risk to you. There is no direct benefit to you for being in the study; however, study outcomes may lead to better understanding of knowledge and perception of expectant mothers while enhancing interventions to improve healthcare in this hospital.

All data will be de-identified and will be kept private. Your identifiable data such as name or date of birth will not be used in documents, reports, or publications related to this research. . The information you provide will be kept strictly confidential and will be available only to persons related to the study (myself and my supervisors) The Office of Ethical Review Board of Ensign College may also have access to study records upon their request.

Your responses will not be shown to other participants or community members. The original paper survey forms will be destroyed once data entry is complete.

Your participation in the study is completely voluntary and you reserve the right not to participate, even after you have taken part, to withdraw. There will be no negative consequences if you choose not to participate in the study.

Your participation in this study will not lead to you incurring any monetary cost during or after the study. This study has been approved by the Institutional Review Board of Ensign College.

If you have any concern about the conduct of this study, your welfare or your rights as a research participant or if you wish to ask questions, or need further explanations later, you may contact me Gladys Gyanwah Baah (0242 769592) of Ensign College of Public Health, or My supervisor Dr. Frank Baiden (0244591181) You may also contact the Administrator of the Institutional Ethics Committee of the Ensign College of Public Health at (+233245762229).

Thank you.

Part 2. CONSENT DECLARATION

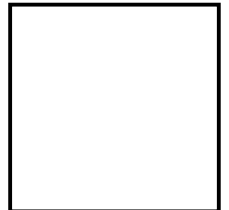
“I have read the information given above, or the information above has been read to me. I have been given a chance to ask questions concerning this study; questions have been answered to my satisfaction. I now voluntarily agree to participate in this study knowing that I have the right to withdraw at any time without affecting future health care services”

Name of **participant** _____

Left thumbprint of participant

Signature of **Participant** _____

Date: / / 2016



Name of **witness** _____

Signature of **witness** _____

Date: / / 2016

Name of **investigator** _____

Signature of **investigator** _____

Date: / / 2016

APPENDIX C; QUESTIONNAIRE

SOCIODEMOGRAPHIC CHARACTERISTICS

| | | | | |
|---|-------------------------------------|---|---------|------|
| | Age | | I__I__I | AGE |
| 1 | Highest completed educational level | 1. None 2. Primary 3. Middle/JSS 4.SSS/SHS/Vocational 5. Tertiary 6. Other _____ | _____ | EDU |
| 2 | Ethnic group | 1. Akan 2. Krobo 3. Ewe 4. Hausa 5. Other _____ | _____ | ETHI |
| 3 | Religion | 1. Christian 2. Muslim 3. Traditionalist 4. Other _____ | _____ | RELI |
| 4 | Occupation | 1. Hairdresser 2. Dress maker 3. House wife 4. Other _____ | _____ | OCU |
| 5 | Parity | 1. None 2. <3 children 3. >3 children | _____ | PAR |
| 6 | Marital Status | 1. Married 2. Engaged, yet to be married 3. Co-habitation (living together) 4. Divorced/separated/widowed 5. single 6. Other _____ | _____ | MAS |
| 7 | Place of residence | 1. Somanya 2. Atua 3. Odumase 4. Agormanya 5. Other _____ | _____ | RES |

KNOWLEDGE

| | | | | |
|---|--|---|-------|------|
| 1 | Do you know what an ultrasound is? | 1. Yes 2. No | _____ | KNOW |
| 2 | If yes, what is it? _____ _____ | | _____ | |
| 3 | What in your opinion do you think the ultrasound does? | 1. To assess the gestational age 2.Number of fetus 3. Estimate the expected delivery date 4. Sex of the fetus 5. To check for congenital abnormalities 6.To confirm fetal viability 7. Don't know | _____ | THI |
| 4 | When did you take your first scan | 1. 1 - 3 month 2. 4-6 month 3. 7 - 10 month | _____ | TAK |

| | | | | |
|----|---|--|-------|-------|
| 5 | Does ultrasound lead to cancer? | 1. Yes 2. No 3. Don't know | _____ | CANC |
| 6 | Are you a health insurance subscriber? | 1. Yes 2. No | _____ | INSUR |
| 7 | If No, was the cost affordable | 1. Yes 2. No | _____ | COS |
| 8 | Is ultrasound harmful to your foetus? | 1. Yes 2. No 3. Don't know | _____ | HARM |
| 9 | How did you hear about the ultrasound (source of knowledge) | 1. Nurse 2. Doctor 3. Friends 4. Advertisement 5. Other_____ | _____ | HEAR |
| 10 | What in your opinion do you think ultrasound does? | 1. To assess the gestational age 2. Number of foetus 3. Estimate the expected delivery age 4. Sex of the foetus | _____ | OPI |

PERCEPTION

| | | | | |
|---|--|---------------------------|-------|------|
| 1 | Did the sonographer explain procedure? | 1. Yes 2. No | _____ | EXP |
| 2 | Was the explanation helpful? | 1. Yes 2. No | _____ | HELP |
| 3 | Were you told the reason for the scan by the prescriber? | 1. Yes 2. No | _____ | REA |
| 4 | Were results explained? | 1. Yes 2. No | _____ | RES |
| 5 | Were you allowed to see your fetus on the monitor? | 1. Yes 2. No | _____ | SEE |
| 6 | Were you allowed to ask questions during procedure? | 1. Yes 2. No | _____ | QUES |
| 7 | How receptive was the sonographer? | 1. Friendly 2. Unfriendly | _____ | RECP |