

# Knowledge, Attitudes and Practices of Pregnant Women towards Obstetric Ultrasound at Mulago Hospital: A Cross-sectional Survey

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## Research Article

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# Abstract

**Introduction:** Obstetric ultrasonography in antenatal care (ANC) is globally recognized as one of the ways through which maternal mortality can be reduced. Pregnant women's knowledge, perceptions, and attitudes are thought to influence their response towards obstetric ultrasonography. This study was conducted to assess the knowledge, attitudes, and practices of pregnant women towards obstetric sonography at Mulago hospital.

**Methods:** This was a descriptive cross-sectional study that involved 300 pregnant women who reported for obstetric sonography at Mulago hospital in Kampala, Uganda. Consecutive sampling technique was used to recruit participants into the study. The data was collected using interviewer-administered questionnaires and was analyzed quantitatively into descriptive statistical tables, percentages and graphs using Statistical Package for Social Scientists (SPSS) version 25.0 software.

**Results:** The study had a response rate of 100%. Most participants had good knowledge of obstetric ultrasound scan. However, there was a misconception that ultrasound has harmful effects. Generally, participants had a positive attitude but poor practices towards obstetric ultrasound scan. Long waiting time and lack of privacy were reported by most participants as leading factors that contributed to the poor practices.

**Conclusion:** This study shows that the knowledge and attitude of pregnant women towards obstetric ultrasound in Mulago hospital were good. However, their practices were poor. The concerns that need to be addressed in order to improve their practices include patient's privacy, waiting time and the misconception regarding the safety of ultrasound that it can cause cancer.

## Introduction

Ultrasound in regard to other existing obstetric imaging modalities like magnetic resonance imaging is non-invasive, cheaper and safe. It gives pregnant mothers the real-time images of their unborn babies<sup>1</sup>. Obstetric ultrasound is firmly embedded in ANC around the world. Clinical evidence suggests that it improves the effectiveness of the clinical management<sup>2</sup>.

Obstetric ultrasonography is important in determining the presence and location of the pregnancy, presence and viability of the embryo, estimating the age of pregnancy and the date of delivery, evaluation of the fetal presentation, placenta localization; amniotic fluid assessment, and assessing fetal anatomy<sup>3</sup>.

Socio-economic status and education have been shown to have an impact on the women's perception towards obstetric ultrasound<sup>4</sup>.

Uganda has a low literacy rate with the central region especially Kampala district having the highest literacy rate while Karamoja and west Nile sub regions have the lowest literacy rate<sup>5</sup>. Uganda also has a

25% prevalence of teenage pregnancy with rural areas having a higher rate than urban areas<sup>6,7</sup>. The median age for the first pregnancy is 18 ( $\pm$  2) years<sup>8</sup>.

Literature on pregnant women's knowledge, attitude and practices towards obstetric ultrasound remains scarce in the major tertiary hospitals of Uganda like Mulago hospital.

Mulago hospital is a national referral hospital located in Kampala metropolitan, the most populated area in the central region of Uganda. The central region has diverse tribes dominated by baganda followed by banyankole, basoga and then bagisu<sup>9</sup>, Other tribes including acholi, alur, bakiga, bafumbira, bakonzo, teso, lugbara, banyarwanda, madi and lango are the least frequent<sup>5,10</sup>. It also has diverse religious dominations. These, in their order from the most to the least dominant, include Catholics, Anglicans, Muslims, Pentecostals, Seventh Day Adventist, Jehovah's Witness and Orthodox<sup>5</sup>.

Knowledge, attitude and practices of pregnant women towards obstetric ultrasound have been explored globally.

Several studies have revealed a good knowledge of pregnant women regarding the use of ultrasound during pregnancy<sup>11-14</sup> which has been attributed to the wide use of ultrasound in health care as part of routine ANC and the unlimited access to information<sup>14</sup>. Some of these studies had a response rate of 100% and majority of their participants were within 21–30 years age group while few participants were aged 41 years and above<sup>2,11</sup>. These studies showed that pregnant women were aware of certain uses of ultrasound. These included assessing gestational age, estimating date of delivery and seeing abnormalities of the baby, monitoring growth of the baby, sex determination, detecting fetal anomalies, and confirming pregnancy or presence of multiple pregnancies<sup>11,13,15</sup>.

Main sources of information to the pregnant women regarding obstetric ultrasound revealed by various studies included health workers<sup>2,11,16</sup>, family, friends and mass media<sup>17</sup>. The information obtained from doctors avoids unnecessary misconceptions and information from friends usually lacks a scientific basis while those from media are generalized<sup>11</sup>.

Pregnant women experience antenatal ultrasound as a very safe procedure<sup>2,13,18</sup>. However, some women report doubts regarding safety of ultrasound<sup>2</sup>. They have considered that too many ultrasound scans may be harmful to the baby, could cause cancer and significant impairment to the mothers or their babies<sup>12,14,17</sup>. Many authors have recommended that there is need for health education regarding the safety of ultrasound to the public<sup>2,14</sup>. One study found out that most pregnant women did not know about diagnostic ultrasound safety during the prenatal period<sup>19</sup>.

Pregnant women have expressed a positive attitude and considered ultrasound as an essential component of ANC<sup>11,14,17,19-22</sup>. This has been attributed to friendly response of the health workers<sup>11</sup>. Many women want sonography and accept it uncritically when their doctors request for it. Others seek obstetric ultrasonography without referral by a clinician because of reliable results and high perceived

indication of its necessity during their antenatal period as it could assist them in planning for their pregnancies<sup>14,19</sup>.

Women's practices towards obstetric ultrasound are influenced by the level of satisfaction they get. Long waiting time before the scans has been reported as a major reason of dissatisfaction with obstetric ultrasound by pregnant women<sup>23</sup>.

Some studies have revealed good practices of women towards obstetric ultrasound where most pregnant women had done the ultrasound scan for their previous and current pregnancies, most of whom had done it more than two times<sup>2,11,13</sup>. This was attributed to the wide availability of ultrasound facilities<sup>11</sup>. Women also accept doing a scan as requested by the health workers due to the perceived benefits they expect to get from the scan such as knowing baby's sex, expected date of delivery and fetal well-being<sup>14</sup>.

Obstetric ultrasonography in ANC remains globally recognized as one of the ways through which maternal mortality can be reduced<sup>14</sup>.

The 2015 Uganda Demographic and Health Survey revealed that the major cause of death among pregnant women in Uganda is obstructed labor. Most causes of obstructed labor including fibroids, placenta previa, among others can be detected by obstetric ultrasound scan before they can cause fatality.

According to World Health Organisation<sup>24</sup>, it is recommended that the obstetric ultrasound scan should be done per antenatal visit. However, a study done at Mulago hospital revealed that the majority of pregnant women reported late for ANC because they were not well informed about the right time at which they should make their first antenatal visit and/or of the importance of early attendance at ANC<sup>25</sup>. However, knowledge, attitude, and practices of pregnant women towards obstetric ultrasound at Mulago hospital have not been previously explored. Therefore, this study was conducted to answer these questions: what knowledge did pregnant women at Mulago hospital have regarding obstetric sonography? What were their attitudes and practices towards obstetric sonography?

Therefore, the purpose of this study was to assess the knowledge, attitudes, and practices of pregnant women towards obstetric ultrasound at Mulago hospital. The information generated from the study could perhaps be used to improve the utilization of obstetric sonography by pregnant women, improving ANC in Mulago hospital and other health centers in Uganda as well as encouraging other related researches in the same field worldwide.

Several studies conducted worldwide have revealed that understanding pregnant women's knowledge, perception, and attitudes towards obstetric ultrasonography is very important in improving ANC<sup>2,3,12-14</sup> hence research in the same field especially where ultrasound has been newly introduced is warranted.

## Methods

This was a cross-sectional study whereby data was collected at a single point in time. The study was conducted at the Radiology department of Mulago hospital from January to April 2020 and targeted pregnant women attending obstetric ultrasound scan. Mulago hospital is located on Mulago hill, approximately 3.5 km north-east of Kampala city center in the central region of Uganda<sup>26</sup>. It is the national referral hospital for Uganda and a teaching hospital for the Makerere University College of Health Sciences. It also serves as a general hospital for the Kampala metropolitan.

Consecutive sampling technique was used to recruit 300 participants for the questionnaire survey. This technique allowed investigators to recruit participants who were at their exposure. It was a technique of choice because it was easy, convenient and less time consuming.

Pregnant women who presented for obstetric ultrasound scan within the study period met the inclusion criteria. Each participant was allowed to participate once. However, pregnant women with emergencies and those who later declined their participation and withdrew from the study were excluded.

Knowledge, attitudes, and practices were dependent study variables while religion, culture, age, social-economic status, level of education were independent study variables.

The data was collected using interviewer-administered semi-structured questionnaire which exhibited clarity and had no leading questions. The questionnaire was written in English but investigators translated into the local languages, mainly Luganda and Runyankole-rukiga for participants who did not know English. The data was collected daily from 9a.m to 5p.m, Monday to Friday for two months. The contact time was approximately 10minutes for each participant. The participants were recruited into the study at their convenience at the completion of the ultrasound scan examination. To ensure validity of the questionnaire, pre-testing was conducted. The questionnaire was piloted on four pregnant women, who were not later recruited into the study, and responses to the questions were reviewed and compared for consistency.

The data was collected by the principal investigators who filled participants' responses into the questionnaires. Translation into the local languages mainly Luganda and Runyankole-rukiga for participants who did not know English was done by the principal investigators who rehearsed prior to the data collection process in order to standardize the translation that matches original questions. Participants were given enough time to respond to the questionnaire to prevent answering erroneously due to panic. Each participant was approached at different time to avoid sharing of ideas and biased information. Each questionnaire was thoroughly checked for completion. Filled questionnaires were kept confidential under lock and key to prevent breach of confidentiality.

The data was analyzed with aid of SPSS version 25.0 software to generate percentages and frequencies. Statistical tables and graphs were used to present data into meaningful information.

This study was approved by the Mulago Hospital Research and Ethics Committee, Protocol No. MHREC 1629. Permission was also obtained from the management of Mulago Hospital and Department of

Radiology of Mulago hospital. Prior to the data collection, investigators introduced themselves to the respondents, and then gave a concise explanation regarding the study and a written informed consent was obtained from participants. Confidentiality of the respondents was maintained as neither name nor personal identification number was reflected in the questionnaire.

Filled questionnaires were kept under lock and key throughout the entire process to prevent breach of confidentiality.

Exclusion of the husbands and relatives who may influence the perceptions of the pregnant women was the major limitation of this study. The study was also unable to explore views of pregnant women by region of Uganda due to the significant variability of the distribution of participants where central region dominated other regions. This necessitates a further research into this area.

## Results

A total of 300 questionnaires were distributed to the pregnant women with the response rate of 100%. Most participants were within the age group of 20-29 years [Table 1] and had attained primary education [Table 2].

**Table 1: Distribution of study participants according to their age**

Age (in Years)	Number of participants	Percentage (%)
< 20	15	5.0
20-29	203	67.7
30-39	76	25.3
≥40	6	2.0

**Table 2: Distribution of participants according to their education status**

Highest level of education attained	Frequency	Percentage
Primary	147	49.0%
Secondary	37	12.3%
Tertiary	80	26.7%
None	36	12.0%

The distribution of participants according the regions of Uganda was as follows:

42.3% (n= 127) were from Central, 13.7% (n= 41) were from East, 28.7% (n= 86) were from West, 15.3 % (n= 46) were from North.

Figures 1 and 2 show graphical distribution of participants according to tribe and religion.

Of the participants, 85(28.3%) were employed while 215(71.7%) were not employed.

Eighty seven (29.0%) and 213 participants (71.0%) resided in the urban and rural areas respectively.

### **Knowledge of Obstetric Ultrasound**

Participants who had ever heard about ultrasound scan were 265 (88.3%) and obtained information from various sources [Figure 3]. Thirty five (11.7%) participants had never heard about ultrasound scan.

Most participants reported that obstetric ultrasound scan should be done between 4 and 6 months of pregnancy [Figure 4].

In addition, knowledge of the participants on various aspects concerning obstetric ultrasound scan were assessed [Table 3]. Most participants had a good knowledge regarding the use of ultrasound in ANC. However, the majority also reported a misconception that ultrasound has harmful effects.

### **Attitude towards Obstetric Ultrasound**

Generally, participants showed a positive attitude towards obstetric ultrasound scan [Table 4]. Most participants were willing to do an obstetric ultrasound, and were satisfied with the results of the ultrasound scan and health workers' care. The costs were also reported to be affordable by the majority. However, about 50% reported effects of ultrasound scan in pregnancy which included discomfort, cancer and hurting the baby.

### **Practices towards Obstetric Ultrasound**

Most participants, 266 (88.7%) had previous experience of pregnancy. Among these, 88(33.1%) had done ultrasound scan for the previous pregnancies while 178(66.9%) participants had not done ultrasound scan for the previous pregnancies.

Thirty four (11.3%) participants were prime gravida. Most participants had third trimester pregnancies [Table 5].

***Table 5: Distribution of participants according to the trimester of pregnancy***

Trimester	Frequency	Percentage
First trimester	26	8.7
Second trimester	66	22.0
Third trimester	208	69.3

Participants who reported to have had ultrasound scan done for the current pregnancy before were 123(41%) of whom 81(65.8%) had done an ultrasound scan once, 37 (30.1%) had done it twice and

5(4.1%) had done it three times and more. 177 (59%) participants had not done any ultrasound scan for the current pregnancy. Majority of the participants expressed willingness to attend to obstetric ultrasound scan only twice during pregnancy [Figure 6].

Requests for obstetric ultrasound scan were made by doctors for 113(63.5%) participants and self-requested for 65(36.5%) participants. Reasons for requesting ultrasound scan for the current pregnancy were previous pregnancy related issues, abdominal pain, urinary tract infection, estimating gestation age, and fetal lie.

Participants reported various concerns that influence their practices towards obstetric ultrasound scan. These concerns related to the circumstances that would require ultrasound scan [Table 6] and challenges with the use of ultrasound scan [Table 7].

Generally, participants had poor practices towards obstetric ultrasound scan. Long waiting time and lack of privacy were reported by most participants as leading factors that contributed to the poor practices. Other factors which were reported to negatively influence participants' practices were rough handling by health workers, being attended to by students and high cost.

**Table 3: Assessment of knowledge of participants on aspects concerning obstetric ultrasound scan**

<b>Statements/ options</b>	<b>Agree [n (%)]</b>	<b>Disagree [n (%)]</b>	<b>Neutral [n (%)]</b>	<b>Don't know [n (%)]</b>
An ultrasound scan is important in antenatal care	251 (83.7)	12 (10.3)	6 (2.0)	31 (4.0)
Ultrasound has harmful effects on your health or that of your unborn baby	200 (66.7)	21 (7.0)	44 (14.7)	35 (11.7)
<b>An antenatal Ultrasound scan can be used for the following:</b>				
Determine the age of pregnancy	260 (86.7)	5 (1.7)	12 (7.7)	23 (4.0)
Estimate the expected date of delivery	260 (86.7)	6 (2.0)	8 (2.7)	26 (8.7)
Predict the sex of the baby	196 (65.3)	0 (0)	35 (11.7)	69 (23.0)
Asses baby's well being	161 (53.7)	5 (1.7)	48 (16.0)	86 (28.7)
Assess the abnormalities of the baby	100 (33.3)	28 (9.3)	72 (24.0)	100 (33.3)
In the management of delivery	201 (67.0)	6 (2.0)	23 (7.7)	70 (23.3)

	Frequency	Percentage
<b>Participants:</b>		
who would do an obstetric ultrasound if advised or reminded	285	95
whose religions allow obstetric ultrasound	300	100
who were satisfied with the results of the ultrasound scan and health workers' care?	270	90
<b>What participants thought were the effects of ultrasound scan in pregnancy</b>		
Ultrasound scans causes discomfort	48	16
Ultrasound scan can cause cancer	27	9
Ultrasound scan causes pain	0	0
Other effects such as hurting the baby	78	26
No effect	147	49
<b>Participants' views on the cost of obstetric ultrasound scan</b>		
Cheap	13	4.3
Expensive but affordable	237	79
Not affordable	50	16.7

Circumstance	Frequency	Percentage
If there are complications of pregnancy	129	43
Determine the age of pregnancy	144	48
To assess the abnormalities of the baby	12	4
Sex determination	210	70
To confirm pregnancy	81	27

Challenge	Frequency	Percentage
Long waiting time	186	62.0
No privacy	202	67.3
High cost	23	7.6
Rough handling by health workers	51	17
Being attended to by students	45	15

## Discussion Of Results

The response rate to the questionnaire was 100%. This was achieved because the consecutive sampling was the technique used to recruit participants into the study. The investigators selected participants at their exposure until the predetermined sample size was obtained. In addition, the questionnaire was interviewer- administered which made it easy for those who were illiterate to participate into the study.

This increased the response rate as well as minimizing errors that would result from misinterpretation of questions. Similarly, 100% response rate has also been reported in related studies<sup>2,11</sup>.

In this study, most participants (63.5%) were within age group 21–30 years which agrees with results of other studies<sup>2,11</sup>. This is a typical finding especially in developing countries such as Uganda probably because females marry at younger age, most commonly in early 20's unlike in developed countries. A similar reason has been previously suggested<sup>7</sup>. This trend in age may also be related to low literacy rate of our participants in that most of them could have got married early due to school dropouts. The fact that most of the participants were from rural areas could be another reason why majority were within 21-30 years age group in that the average prevalence of teenage pregnancy in Uganda has been reported to be higher in rural areas than in urban areas<sup>6</sup>.

The age group 40 years and above were the least because this is an age group of less reproduction as people approach menopause.

The reported trends of our participants' tribes and religions are probably related to the distribution of population and religions in the central region where Mulago hospital is located.

Baganda dominated other tribes followed by banyankole and basoga. This is in line with the previous survey findings<sup>5</sup> which also reported that indigenous tribes of Northern, west Nile and South western regions were the least. This explains why tribes such as alur, acholi, bakiga, bagisu, bafumbira, bakonzo, teso, lugbara, banyarwanda, madi and lango were the least frequent in our study. This trend has also been observed in related studies carried out in central region<sup>10,14</sup>. Similarly, Christians Roman Catholics dominated other religions followed by Anglicans, Muslims and Pentecostals. The least religions included Seventh Day Adventist, Jehovah's Witness and Orthodox. This matches with the previous literature<sup>5</sup>.

Most participants resided in the rural areas possibly because majority of people who reside in urban areas could go to private hospitals which are perceived by people to offer better services than Mulago hospital. Those from rural areas have too low income to seek for services from private hospitals, hence going for relatively cheaper services at Mulago hospital. These findings correlate with findings of another study<sup>16</sup> which reported that most participants were rural residents, which was possibly due to the perceived cheaper services that were being offered at the government hospital. Most participants attained primary education possibly because of the low income levels of the majority of participants who might have failed to afford secondary and tertiary education. This also relates to the fact that most participants were from rural areas where the rate of illiteracy is higher than in urban. The highest number of participants was not employed possibly because most had attained low level education up to primary level, yet most defined jobs require a minimum of secondary education. Similar findings were reported by other studies<sup>8,10</sup>.

## **Knowledge of Obstetric Ultrasound**

The knowledge regarding the use of ultrasound during pregnancy was generally good among the participants. This finding has been reported by similar studies<sup>11-14</sup>.

Most participants reported the importance of ultrasound in ANC such as assessing baby's well-being, determining the age of pregnancy and sex of the baby, estimating date of delivery and in the management of delivery. This is possibly due to the current wide use of ultrasound in the country and also compares to the fact that the majority had obtained information from the hospital whereby ultrasound is usually requested as part of routine ANC. Similar finding has been previously reported by some studies<sup>11,12,16</sup> where main source of information were health workers but contrary to other studies<sup>14,17</sup> where commonest source of information was family, friends and mass media.

The awareness was least for assessing abnormalities of the baby. This is probably because the majority did ultrasound late in the third trimester of pregnancy when ultrasound scan is less indicated for this purpose. This is contrary to the findings from the previous literature<sup>12,13</sup> where detecting fetal anomalies was the most common reported indication of ultrasonography in pregnancy.

There existed a misconception regarding the safety of ultrasound implying that awareness regarding the safety of ultrasound was lacking. This finding was also reported in other studies<sup>12,14</sup>. Although previous literature suggested that information obtained from health workers avoided unnecessary misconceptions from friends and relatives<sup>11</sup>, this misconception from our participants, most of whom obtained information from the hospital, was possibly because the information regarding the safety of ultrasound was not provided by health workers to pregnant women. This necessitates provision of information regarding the safety of ultrasound in health education during ANC.

### **Attitude towards Obstetric Ultrasound**

Generally, participants had a positive attitude towards obstetric ultrasound scan. Related studies<sup>11,14,17,19-22</sup> reported a similar finding.

Participants' satisfaction for the results of the ultrasound scan and health workers' care, affordable costs could have been leading factors contributing to the positive attitude. Dasan et al<sup>11</sup> reported that participants wished to undergo more scans because of friendly health workers' response, satisfaction for the scan done and relatively cheap costs. Furthermore, the need to know the sex of the baby, the expected date of delivery and the well-being of baby by some participants could have also influenced their attitude towards obstetric sonography. Positive attitude also explains why some participants did the scan on self-request, a similar finding that was previously reported<sup>14</sup>.

The negative attitude that was reported by few participants were possibly related to what was wrongly perceived as harmful effects of ultrasound such as causing cancer, discomfort, and hurting the baby. This is in line with findings of previous studies<sup>12,14</sup> but contradicts with the findings of another related study<sup>2</sup>.

## Practices towards Obstetric Ultrasound

The participants' practices towards obstetric ultrasound scan were generally very poor, as opposed to the finding reported by Gonzaga et al<sup>14</sup> where the compliance of women to do the scan was likely due to perceived benefits they expected to get from the scan.

In our study, most participants had done only one ultrasound scan for the current pregnancy and over 50% had no ultrasound scan done whereas very few had done it three times and more, yet the majority were in the third trimester of pregnancy. These findings are most likely due to the perceived poor services characterized by long waiting time and lack of privacy which discourages women from attending obstetric ultrasound routinely. This is in line with the finding of a similar study<sup>23</sup> in which long waiting time before the scans was a major reason of dissatisfaction with obstetric ultrasound by pregnant women.

The majority of participants had not done any ultrasound scan for the previous pregnancies as opposed to the findings of Dasan et al<sup>11</sup>. Despite the availability of many ultrasound facilities in the country, this big number of participants who had not done any ultrasound scan for the previous pregnancies may be attributed to the weaknesses in other health centers in the country regarding the use of ultrasound scan since some had been referred to Mulago hospital from other health centers for further management.

## Conclusion

Obstetric ultrasound has been globally accepted to play a vital role in ANC. This study shows that the knowledge and attitude of pregnant women towards obstetric ultrasound in Mulago hospital were fairly good. Although pregnant women considered prenatal sonography to be very useful and necessary during the ANC, their practices were poor. The misconception regarding harmful effects of ultrasound especially cancer concern needs to be addressed through health talks during ANC meetings and encouraging interaction between sonographers and pregnant women. Other concerns that need to be addressed include improving patient's privacy and minimizing patients' waiting time.

## Declarations

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## Contribution of authors

<sup>1,2</sup>Principal investigators; designed the study; developed the questionnaire; sought for the study approval; performed data collection and analysis; and prepared research report.

<sup>3,4</sup>Supervised entire process of the study.

All authors have contributed to and

approved the final manuscript.

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## Figures

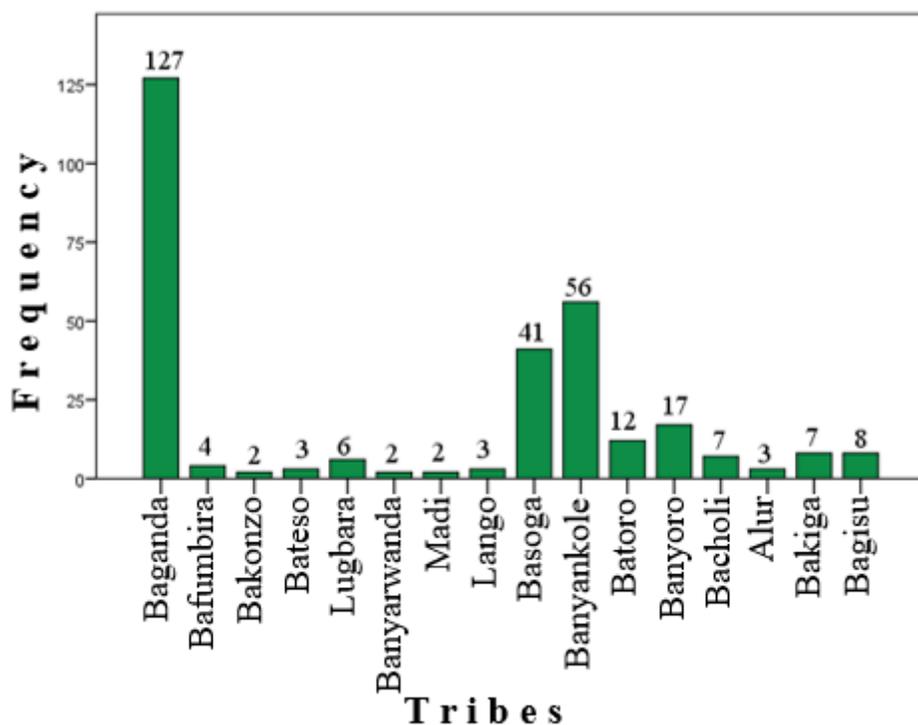


Figure 1

Distribution of study participants according to tribe

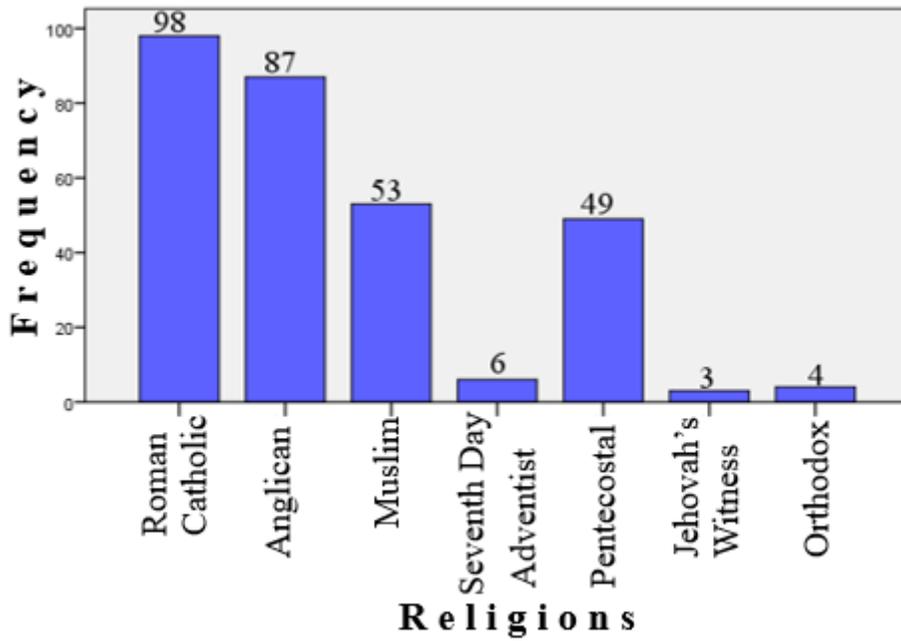
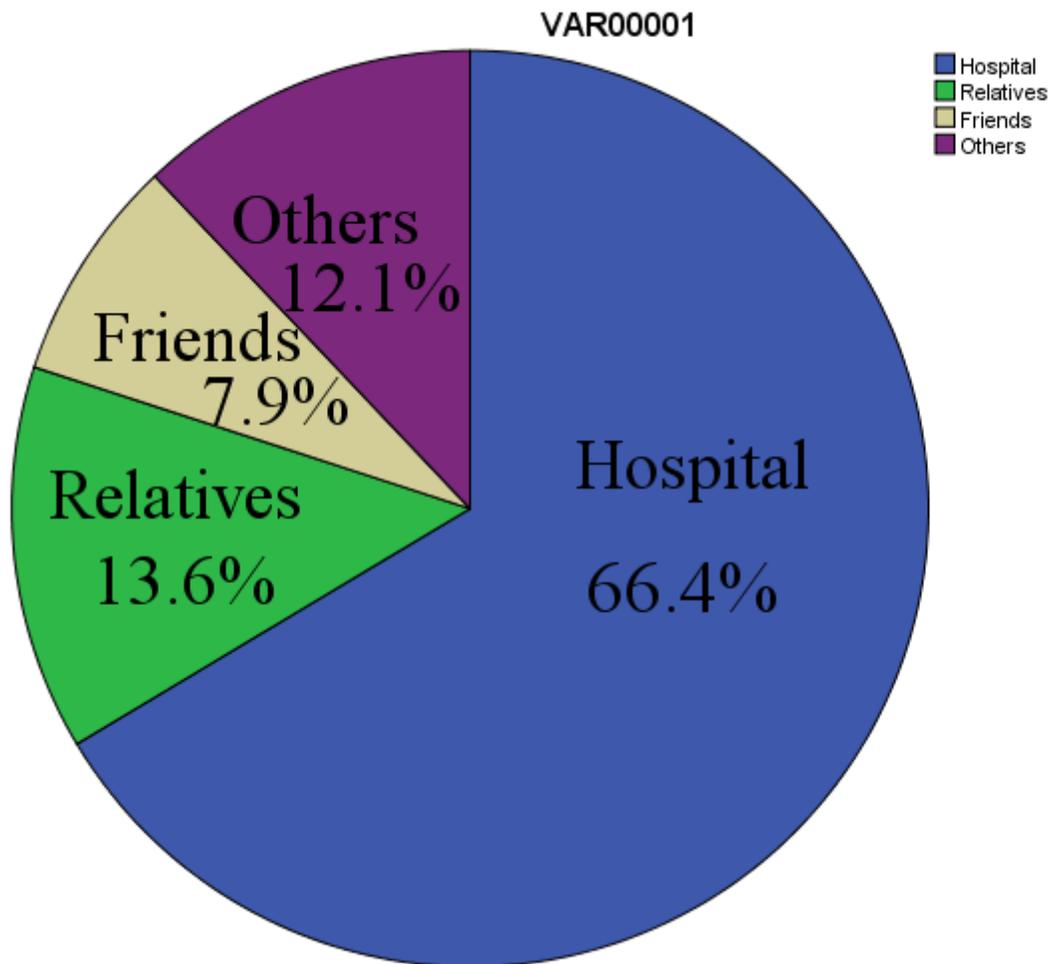


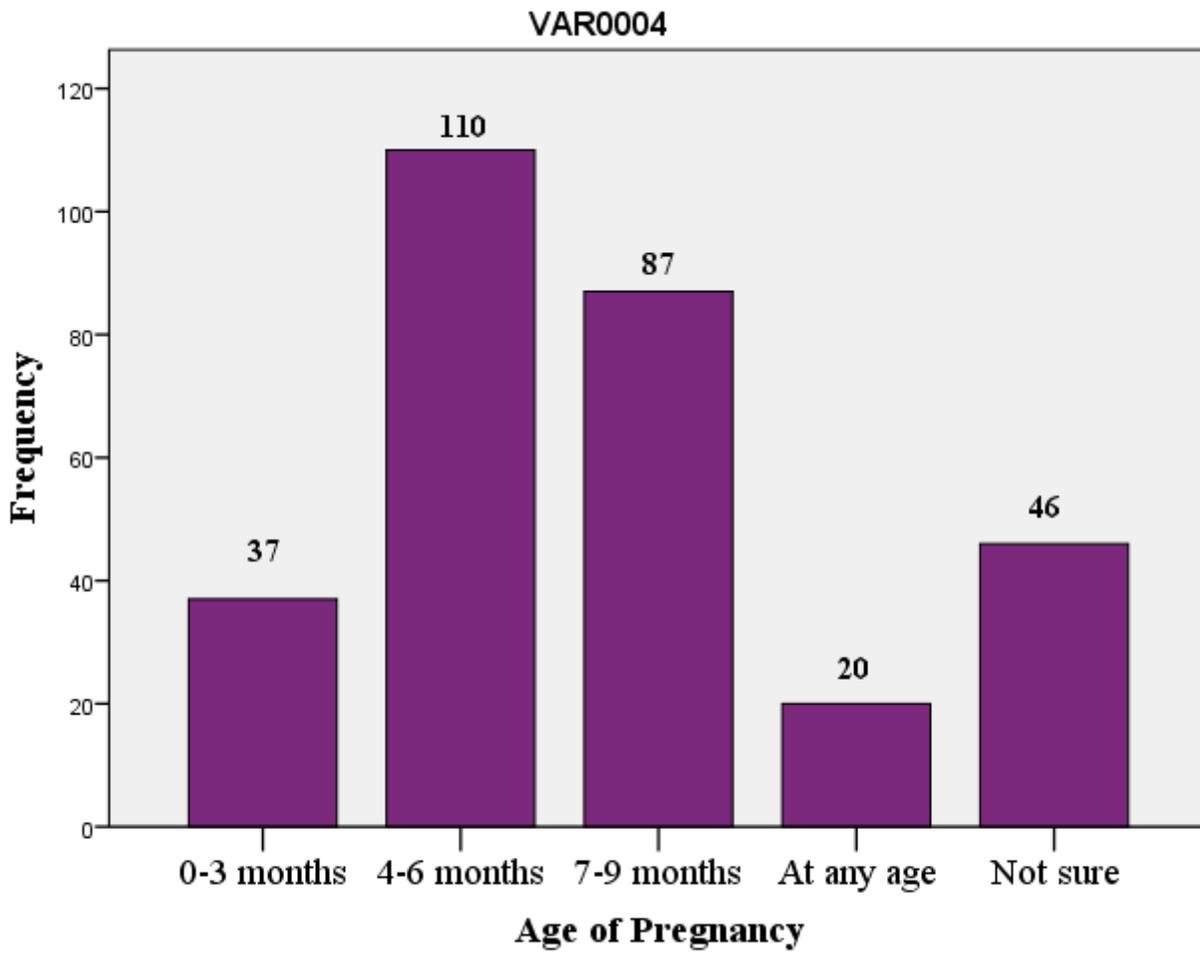
Figure 2

Distribution of study participants according to religion



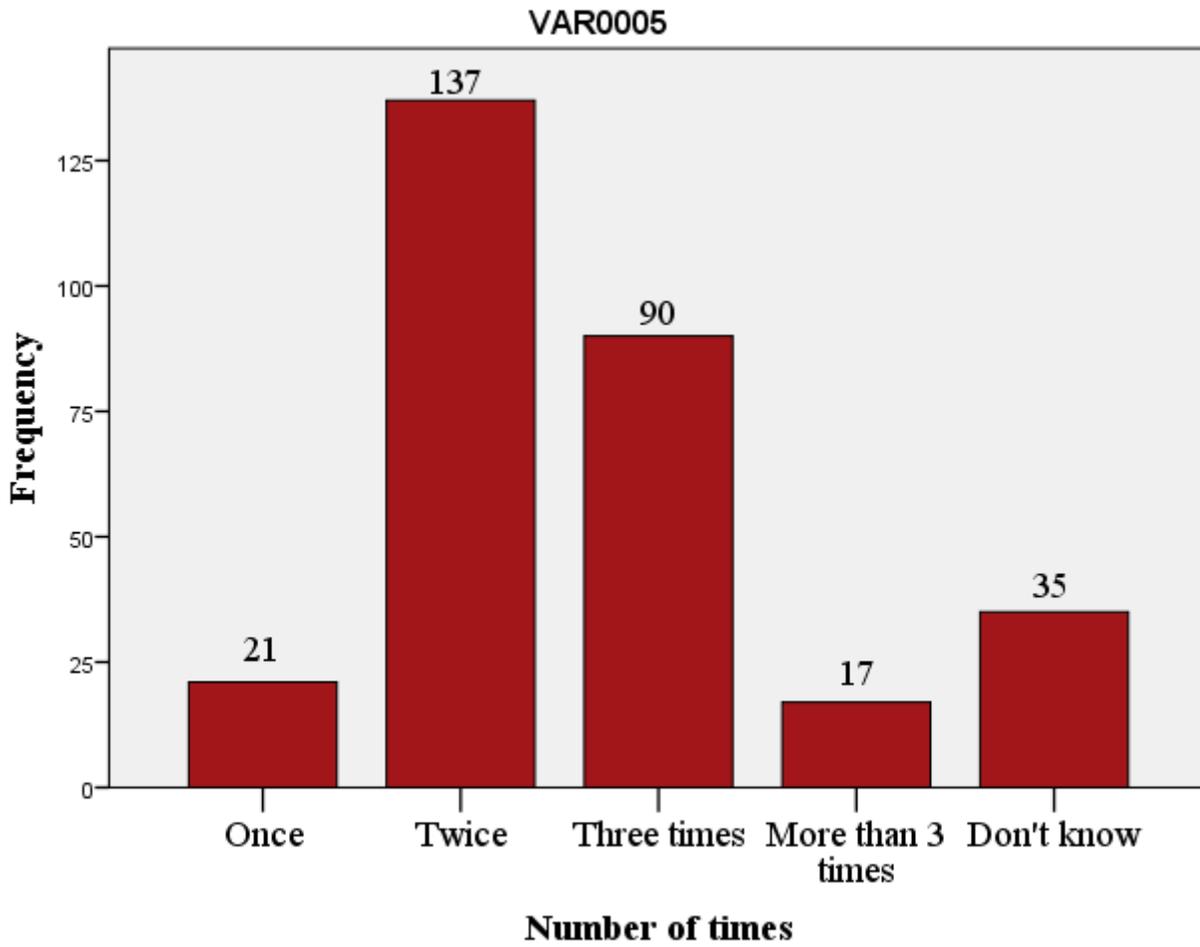
**Figure 3**

Distribution of participants according to how they obtained information about ultrasound



**Figure 4**

Distribution of participants according to their opinions on when obstetric ultrasound scan should be done



**Figure 5**

Distribution of participants according to the number of times they would attend to obstetric ultrasound scan during pregnancy