PREVALENCE AND PATTERN OF CARDIAC DISORDERS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT THEIR FIRST CLINIC VISIT AT MUHIMBILI NATIONAL HOSPITAL.

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By

Happiness Lucas, MD

A dissertation submitted in partial of fulfillment of the Requirements for the Degree of Master of Medicine (Internal Medicine) of the Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
October, 2013

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Scienc**es** a thesis / dissertation entitled: **Prevalence and pattern of cardiac disorders among pregnant women attending antenatal clinic at their first clinic visit at Muhimbili National Hospital.** In fulfillment of the requirements of the degree of master of Medicine in internal medicine of Muhimbili University of Health and allied Sciences.

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Dr. Johnson M. Lwakatare (MBChB.MRCP)

(Supervisor)

_____

Date

DECLARATION AND COPYRIGHT

I, **Happiness Lucas** ,I declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature……. Date……..

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DEDICATION

This dissertation is dedicated to my beloved parents, my father Mr Lucas Kusima Simon and my mother Suzan John Sonda for laying an excellent foundation for totality of my life including a successful career.

ABSTRACT

Background: Increased cardiac demands during the course of pregnancy potentially increase morbidity and mortality in women with underlying heart diseases. In our setting, most women in child bearing age become pregnant without appraising their health particularly cardiac status and no effort are made at Antenatal clinic to screen for cardiac diseases. Improved quality of health care at delivery facilities in some countries (including Tanzania) has lead to improved survival rates for those with congenital and valvular heart disease leading to an increasing number of heart disease patients who are reaching child bearing age, problems in most young women remain un detected especially in those with minor cardiac disorders. It is consequently essential to thoroughly evaluate expectant women for underlying cardiovascular disease in order to provide optimal care during pregnancy.

Objective: To determine the prevalence and pattern of cardiac disorders among pregnant women attending Antenatal clinic at Muhimbili National Hospital (MNH) – Dar es Salaam.

Methods: A hospital based descriptive cross-sectional study done from June to December 2012. A total of 310 pregnant women attending their first antenatal clinic at Muhimbili National Hospital (MNH) were recruited using a systematic sampling technique. A standard structured questionnaire was used to collect demographic data and other cardiac related symptoms. Each participant also had a thorough cardiovascular examination; Electrocardiogram and Echocardiogram were performed to identify types of cardiac disorders.

Results: The overall prevalence of cardiac disorders among pregnant women attending antenatal clinic was found to be 29.7%. The prevalence of cardiac disorder (detected by ECHO) was found to be 20.6% .Of these pregnant women 30 (9.7%) had LVH likely due to chronic hypertension, followed by Mitral valve prolapse in 25(8.1%) pregnant women. The most frequent presenting symptoms and signs were easy fatigability in 221 (71.3%) followed by edema of the lower limbs in 190(63.1%) and palpitations 169 (54.9%).Majority of clinical findings were not significantly associated with the presence of ECHO abnormality.

Conclusion: The prevalence of cardiac disorders among pregnant women attending their first ANC at Muhimbili National Hospital was found to be high at 29.7%. Hypertension was found to be the most prevalent cardiac related disorder followed Mitral valve prolapse however the prevalence of congenital heart disease was found to be low and majority of pregnant women have not been screened before regarding their cardiac status

Recommendations: Screening for cardiac disease as part of ANC should be done and preferably women should be screened for cardiac disorders before pregnancy.

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LIST OF ABBREVIATIONS

ANC	Antenatal clinic
ASD	Atrial Septal Defect
CCF	Congestive cardiac failure
CHD	Congenital Heart Disease
ECG	Electrocardiogram
ECHO	Echocardiography
FBP	Full Blood Picture
LVEF	Left Ventricular ejection Fraction
LVH	Left ventricular hypertrophy
MNH	Muhimbili National Hospital
MoHSW	Ministry of Health and Social welfare
MUHAS	Muhimbili University of Health and Allied Sciences
MVP	Mitral valve prolapse
RHD	Rheumatic Heart disease
NYHA	New York Heart Association
VSD	Ventricular septal Defect
VHD	Valvular heart disease

CHAPTER ONE

1.0 INTRODUCTION AND LITERATURE REVIEW

1.1 CARDIAC DISEASES IN PREGNANCY

Normal pregnancy is associated with hemodynamic changes in the cardiovascular system. Similarly these physiological changes impose an additional load in a pregnant woman with preexisting cardiac disease [1].Although maternal mortality is low, pregnant women with heart disease are at risk for serious morbidity such as heart failure, arrhythmias, and stroke [2, 3]. The marked hemodynamic changes during pregnancy account for the development of several signs and symptoms during normal pregnancy that can mimic the heart disease [4].

It is consequently essential to thoroughly evaluate patients for underlying cardiovascular disease in order to provide optimal care during pregnancy. A working knowledge of the normal physiology of pregnancy is often helpful in the management of heart diseases [5]

1.1 .2Cardiovascular changes associated with pregnancy

Major hemodynamic alterations occur during pregnancy, labor, delivery and the postpartum period. These changes begin to take place during the first 5 to 8 weeks of pregnancy and reach their peak late in the second trimester. In patients with preexisting cardiac disease, cardiac decompensation often coincides with this peak [6].

Blood volume increases by 40% to 50% during normal pregnancy starting at 6^{th} week and peaking at second trimester. The increase in volume, in part is due to estrogen-mediated activation of renin angiotensin- aldosterone axis causing water retention. The increase in blood volume is therefore greater than the increase in red blood cell mass, thus contributing to the fall in hemoglobin concentration [6].

Cardiac output rises by 30% to 50% above baseline, peaking by the end of the second trimester and reaching a plateau at delivery. The increased cardiac output is a result of three factors: (1) an increase in preload because of greater blood volume; (2) reduced after load because of a decrease in systemic vascular resistance; and (3) a rise in the maternal heart rate by10 to 15beats/min.
The stroke volume increases during the first and second trimesters, but declines in the third trimester because of in-ferior vena caval compression by the bulky uterus [6].

Blood pressure typically falls about 10 mm Hg below baseline by the end of the second trimester because of reduction in systemic vascular resistance and the addition of new blood vessels in the uterus and placenta.

During labor and delivery, hemodynamic fluctuations are also profound. Each uterine contraction displaces 300 to 500 mls of blood into the general circulation. The stroke volume increases, with a resultant rise in cardiac output by an additional 50% with each contraction. Thus, it is possible for the cardiac output during labor and delivery to be 75% above the baseline. This may therefore precipitate acute cardiac decompensation in the presence of a pr-existing cardiac disease. Mean arterial pressure also rises, in part because of maternal pain and anxiety [6]. Blood loss during delivery (300 to 400 mL for a vaginal delivery and 500 to 800 mL for a cesarean section) can also contribute to hemodynamic stress.

Hemodynamic changes during the postpartum state are equally dramatic. Relief of inferior vena cava compression results in an increase in venous return, which augments cardiac output and causes a brisk diuresis. The hemodynamic changes return to the pre pregnant baseline within 2 to 4 weeks following vaginal delivery and within 4 to 6 weeks after cesarean section [6].

1.1.3. Cardiovascular symptoms and signs in pregnancy

Normal pregnancy is typically associated with fatigue, dyspnea, and decreased exercise capacity. Examination of the precordium reveals a diffuse apical impulse and a palpable systolic pulsation along the left sternal border. This is caused by displacement of the heart by the gravid uterus occasionally the second heart sound is palpable just to the left of the sternal border at the level of the second intercostals space [7].

Auscultation of the heart in a healthy pregnant woman often reveals the first heart sound to be increased in intensity and widely split. In the third trimester the splitting of the second heart sound widens less than normal with inspiration [8].Cutforth and MacDonald, [8] in their series of 50 normal primigravidas found that 84% of gravid patients developed a loud third heart sound and 92% developed an ejection systolic murmur usually heard along the left sternal border.

Diastolic murmurs can occasionally be heard. The most common is a tricuspid valve inflow murmur. Pulmonary regurgitation murmur associated with physiologic dilatation of the pulmonary artery may also be detectable. Both of these resolve after delivery [8, 9].

Murmurs associated with mitral and aortic regurgitation and the midsystolic click and murmur of the prolapsing posterior leaflet of the mitral valve often decrease during pregnancy. This is thought to be secondary to the decrease in systemic vascular resistance. [10, 11]. Prominent neck veins or inspiratory wheezes may normally be identified .Pedal edema is a very common finding in normal pregnancy, with 50% to 80% of women affected starting at end of first trimester [8].

One of the challenges for the clinician is to distinguish between these normal symptoms and signs of pregnancy and similar symptoms that may indicate underlying heart disease in the mother. This may necessitate cardiovascular investigations to distinguish the real underlying

clinical condition. Non invasive testing of the heart may include an Electrocardiogram, echocardiogram and chest radiography)

1.1.4 Electrocardiographic and Echocardiography changes in normal pregnancy

Electrocardiographic Changes during normal pregnancy include; shortening of PR and QT intervals and these may accompany the increase in the heart rate. Frontal lead axis changes are rare despite significant elevation of the diaphragm; when seen, slight rightward shifts are more common than left ward deviations. Non specific abnormalities of the ST segments and T waves appear in 4 to 14 percent of pregnancies. These changes predominate in the precordial leads and resolve in the majority of patients after delivery, but may recur during subsequent pregnancies [8].

The diagnosis of paroxysmal arrhythmia in pregnancy is by standard 12 Lead ECG, Electrocardiography and holter monitoring [8].

The Echocardiography changes in normal pregnancy includes an increase in left and right atrial dimensions at 17 ±4 (mean ± standard deviation) and 14 ±3 cm, respectively[11].Mitral and tricuspid ring diameters are also significantly increased at 24 ±0.5 and 2.7 ±3.2 cm, respectively. This is associated with a significantly increased maximal velocity of atrial contribution to mitral inflow in the pregnant population of 57 ±10 cm/second. These changes associated with the third trimester of pregnancy may represent the cardiac adaptation to a significantly increased preload [12].

1.2. SCREENING, RISK ASSESMENT AND DIAGNOSIS OF CARDIAC DISEASE

Cardiac diseases in pregnancy can be divided into three main groups: (1) Pre-existing disease. The disease antedates and is known before pregnancy, example includes; congenital heart disease or rheumatic heart disease; (2) Disease that is first recognized or has its onset during pregnancy, such as hypertension, myocardial infarction; and (3) Pregnancy specific disease like peripartum cardiomyopathy.

The diagnosis and assessment of heart disease in pregnancy may be difficult because the physiological changes of normal pregnancy can mimic pathological cardiac symptoms and signs and lead to the over diagnosis of cardiac diseases. Appreciation of these changes, a high index of clinical suspicion, and timely referral for cardiological assessment and investigations is often very important.

Ideally screening and risk assessment should be done before a patient becomes pregnant. The data needed for risk assessment can be acquired from: A thorough cardiovascular history and physical examination, a 12-lead electrocardiogram, a transthoracic echocardiogram, an arterial oxygen saturation measurement by percutaneous oximetry (in patients with cyanosis) [13].

Echocardiography is very useful diagnostic tool in pregnant cardiac patients as it is non-invasive and safe to detect congenital structural abnormalities, determination of cardiac functional status including chamber size, pulmonary artery pressure, ventricular contractility, presence of mural thrombus, valvular function, and myocardial ischemia [13,14].Transoesophageal echocardiography may be useful in selected cases, such as in the assessment of infective endocarditis, mitral valve disorders, aortic dissection, or a technically difficult transthoracic study because of its higher sensitivity and specificity compared with transthoracic echocardiography[13,14].Diagnosis of paroxysmal arrhythmias in pregnancy is by an Electrocardiography and holter monitoring.

Whenever possible women found to have cardiac lesion before pregnancy should receive preconception counseling, including discussion of contraception, maternal and fetal risks during pregnancy and potential long term morbidity and mortality. If possible, surgery to correct critical cardiac lesions example mitral stenosis should be done before pregnancy in order to improve maternal and fetal outcomes. During pregnancy, cardiovascular surgery is more dangerous, involving a 6% risk of maternal mortality and a 30% risk of fetal mortality. [15]

1.3. EPIDEMIOLOGY AND PATTERN OF CARDIAC DISEASES IN PREGNANCY

The prevalence of heart disease in pregnant women is estimated to be between 0.1 and 4%; although the prevalence has not changed for decades, the relative contribution of different types of heart disease varies according to the study population and the study period [16].

In developed countries the largest group of females with an underlying heart disease consists of women with congenital heart defects (70–80%), followed by patients suffering from valvular sequelae of rheumatic fever which accounts for 15% of cardiac complications in pregnant women. Hypertension is common and contributes 12-22% of pregnant related cardiac disorders. Whereas in developing countries 90% of all heart disorders in women of child bearing age are of rheumatic origin [17]. Worldwide rheumatic mitral stenosis is the most common acquired valvular abnormality encountered in pregnancy and may be the cause of pulmonary oedema and atrial arrhythmias during pregnancy or soon after delivery.

The spectrum of cardiac disease complicating pregnancy was illustrated in a large series from Brazil that described 1000 patients cared at a single referral centre. The types and frequency of cardiac disease found included; RHD (56%), Congenital heart disease (19%), Chagas disease (9%), cardiac arrhythmias (5%), cardiomyopathy (4%) and others [18].

In a retrospective hospital based study involving 320 pregnant women referred for cardiovascular evaluation at ANC in West London, 23% were found to have clinically significant structural heart disease. The majority (95%) of these structural lesions had already been diagnosed prior to the index pregnancy, RHD was found in 39% of all cases and 2/3 of all cases had congenital heart disease. Only 3% were found to have significant cardiac lesions de novo in pregnancy [19].

In an Indian retrospective hospital based study involving 207 pregnant women, Rheumatic heart disease was found to be the predominant cardiac disease with a prevalence of 88%.

Septal defects were the most common form of congenital heart disease observed in 13.52% women [20].

In a retrospective hospital based study done in Srilanka between 1998-2000 involving 152 pregnant women aiming at evaluating the pattern of heart diseases in pregnant women, rheumatic valvular heart disease was observed in 46%, a mixed MS-MR (45.7%) and MS (34.2%) were the leading cardiac pathologies in the category of rheumatic heart disease, congenital heart disease was observed in 30% and 24% were found to have MVP. [21]

In a hospital based retrospective study done in Senegal between 1996-2004 involving 50 pregnant women aiming at evaluating pregnancy outcome in women with heart disease, Rheumatic VHD was found to be the most predominant cardiac condition, observed in 46(92%), of whom seven (16%) had previously been surgically treated with prosthetic mechanical valve replacement, and 6% were found to have congenital heart diseases [22].

The National committee on Confidential Enquiries into Maternal Deaths (NCCEMD) of South Africa reported a prevalence of 0.65% heart disease among pregnant women, and there was an unacceptably high morbidity and mortality rate (9.5%). Rheumatic heart disease accounted for most of this mortality, mitral stenosis being the commonest lesion and about 50% of non-obstetric maternal deaths in South Africa were due to cardiac disease[23].Several preventable factors were also identified that precipitated decompensation and could have accounted for this high mortality.Among them were lack of adequate antenatal evaluation and failure to identify the patient at risk [23].

In Tanzania, a hospital based study done by H.Mwandolela, revealed that 47.8% had ECHO features consistent with chronic hypertension, 15.5% had dilated cardiomyopathy, 16.5% had RHD, 3.2% had Mitral valve prolapse and 2.12% were found to have Atrial Septal defect [24].

1.4. CLINICAL PRESENTATIONS OF PREGNANT WOMEN SUSPECTED TO HAVE CARDIAC DISEASE.

Benign ejection systolic murmurs have been reported in up to 96% of pregnant women [25] and in one retrospective hospital based study done involving 320 pregnant women referred for cardiovascular evaluation at ANC in West London, 43% were referred for evaluation of heart murmurs. When ECHO was performed in these patients only 3% were found to have significant cardiac lesions and 97% were believed to have physiological murmurs [19].

In a retrospective study done in Singapore involving 77 pregnant women with heart disease from 1983-1986 aiming at investigating the clinical presentations and outcome of these women, majority 81.8% were asymptomatic with respect to cardiovascular system and only 16.9% had significant dyspnoea. By New York Heart Association 58 were class I, 6 patients were class II, 4 were class III, 9 class IV, and two patients were found to have signs of Congestive Cardiac failure [26].

In a hospital based retrospective study done between 1996-2004 in the sub-Saharan Africa involving 50 pregnant women aiming at evaluating pregnancy outcome in women with heart disease; 22% were found to be asymptomatic, 72% presented with Pulmonary edema, 36% had Cardiac arrhythmia [22].

1.2 PROBLEM STATEMENT

It is estimated that heart disease occurs among 0.1-4% of pregnant women [16] and it is the most common non obstetric cause of maternal death, among the preventable factors identified include adequate antenatal evaluation and identification of patients at risk [23].

There is lack of health seeking behaviour in our setting and most of the women in child bearing age become pregnant without knowing their cardiovascular health status and no efforts are made at ANC to screen for cardiac disease.

In our local set up improved access to corrective cardiac surgery to those with congenital and valvular heart disease has lead to an increasing number of post operative patients who are reaching child bearing age. But, a large number of young women remain un detected with regard to presence of cardiac problems especially those with minor disorders. Many of these women have a good quality of life before they conceive and may not appreciate the risks that pregnancy and delivery can impact upon them with their undetected cardiac problems. Early detection allows proper antenatal care to reduce morbidity and mortality.

Many investigators have recommended that, mothers with known cardiac disease need to be seen early in pregnancy or preferably pre conception so they can be counseled on potential complications and mortality.

This study, therefore aims at investigating the magnitude and describing the patterns of cardiac diseases among pregnant women at their first antenatal visit.

1.3 RATIONALE

The magnitude and types of cardiac disease in Africa is not well documented and in Tanzania there are no published data on the prevalence of cardiac disease among pregnant women presenting at the antenatal clinic on their first visit.

This study will reveal the magnitude and patterns of cardiac disease in pregnant women. It is therefore justifiable to have this study, because screening of pregnant women as part of Antenatal care services and early detection of cardiac diseases in pregnancy has been shown to reduce maternal mortality and morbidity through targeted and improved care of the affected pregnant mothers.

This may call for a change in policy to include cardiac screening in the Antenatal clinic services.

1.4 OBJECTIVES

1.4.1 Broad Objective

To determine the prevalence and pattern of cardiac disorders among pregnant women attending Muhimbili National Hospital ANC at their first clinic visit.

1.4.2 Specific objectives

1. To determine the pattern of presenting cardiac symptoms and signs among pregnant women at presentation at Muhimbili National Hospital.

2. To determine the prevalence of clinical cardiac diagnosis among pregnant women attending Antenatal clinic at Muhimbili National Hospital.

3. To determine the prevalence of cardiac disorders diagnosed by ECHO among pregnant women attending Antenatal clinic at Muhimbili National Hospital.

4. To determine relationship between the clinical and ECHO findings among pregnant women attending Antenatal clinic at Muhimbili National Hospital.

CHAPTER TWO

2.0 METHODOLOGY

2.1 Study Design

Descriptive hospital based cross sectional study.

2.2 Study Site

This study was conducted at ANC, at Muhimbili National Hospital (MNH), Dar es Salaam. Dar es Salaam with a population of about 3,500,000 (estimated 2003), is the economic centre and former capital of Tanzania. It has three districts each with a municipal hospital. MNH is the biggest and the tertiary referral and teaching hospital located in Ilala district in Dar es Salaam region. In practice it also serves as a regional hospital for Ilala, Temeke and Kinondoni municiparity.

The ANC is under department of obstetrics and Gynaecology. The clinic is conducted in the maternity block where services are provided daily from Tuesday to Friday, thus a total of four clinics per week. About 120 women (40 public and 80 private) attend the clinic on daily basis. About 75% women attend in view of their current pregnancy while 25% are post natal follow ups. At each clinic about 20 pregnant women are attending for their first time these are the women who are referred from other public hospital or those who attends as private.

2.3 Study Duration

The study was conducted in a period of 7 months, from June 2012 to December 2012

2.4 Study Population

Pregnant women who attended Antenatal clinic visit at Muhimbili National Hospital who gave consent to take part in the study

2.5 Inclusion Criteria

Pregnant women at their first Antenatal clinic visit

2.6 Sample Size Calculation

Sample size was calculated from the following formula.

$$n = \frac{Z^2 p(1-p)}{d^2}$$

Whereas:

Z = statistic for a level of confidence = 1.96

P = prevalence of cardiac disease (Estimated prevalence 0.1-4%) [16]

d = precision = 0.2% [27]

n = minimum sample size= 280

A minimum sample of 280+28(10%) for incomplete data =310

2.7 Sampling Technique

All eligible pregnant women, who gave consent for participation, were recruited into the study. Recruitment of participants was conducted exclusively during clinic days.The MNH-ANC clinic attends 20 new pregnant women on each clinic day**.** Systematic sampling was used among those attending clinic for the first time (1^{st} ANC visit).

New patients per clinic -20

Total number of clinic in a week -4

Total number of attendees is 20*4=80

Total number of attendees per month will be 80*4=320

Duration of study will be 6 months

Total number of attendee 320*7=2240

Total number of attendees divided by sample size=7

Where 7 is the width of the interval

Every 7th new attendee on a registration form was included in a study making an enrollment of 4-5 pregnant women per clinic

2.8 Data Collection Procedure

A structured questionnaire was used to collect data on eligible patients who consented for the study. Collected information included; demographic data, age, occupation, parity status, marital status, educational levels.

A detailed cardiac history was taken that also covered prior cardiac events and therapy and the previous history of cardiac disease was self reported and the pregnant women provided either their previous ECHOES or their discharge forms.

Full cardiac physical examination was done by the investigator when reviewing the patient at ANC to determine signs of cardiac disease, where in doubt the signs were verified by a cardiologist at time of doing an echocardiogram..

2.8.1 Blood Pressure measurement

The BP was recorded after five minutes of rest. Three Blood Pressure measurements were taken at 5 minutes intervals using a mercury sphygmomanometer with cuff of appropriate size (The medium adult cuff for arm circumference 22 to 35cm was used). The average of the three readings was recorded and the patients BP and used in the analysis.

2.8.2 Electrocardiography

A standard 12- lead resting electrocardiogram (ECG) was performed by the ECG technician at Muhimbili National Hospital ECG room using Standard PHILIPS (PAGER), ECG machine. The ECG results were printed and interpreted by investigator and the findings verified by a cardiologist.

2.8.3 Echocardiogram

The investigator under assistance of a cardiologist performed trans thoracic ECHOES at the Muhimbili National Hospital ECHO room using PHILIPS, model HP 7550 ECHO machine and a 2.5MHz transducer. Standard ECHO views and measurements were taken.
ECHO images of all patients were printed on papers and recorded on Videotapes.
Patient's Echocardiography done within past 3 months at MNH was considered as a recent ECHO, and was accepted (taken) for analysis.

2.8.9 Laboratory investigation

A venopuncture was done: 10mls of blood was collected for haematological investigations,s pecifically to determine the haemoglobin level. The laboratory investigation was done at the Central Pathology Laboratory (CPL) of the Muhimbili National Hospital (MNH).

2.9 Definition of Terms for the Study

2.9.1 Hypertension:

According to National institute for health and clinical excellence (NICE) criteria [28]
The average blood pressure range for a pregnant woman is between 110/70 to 120/80.

Hypertension is defined as Systolic Blood Pressure $\geq$ 140 mmHg and/or Diastolic blood pressure $\geq$ 90 mmHg on three readings or if patient is known to be hypertensive or is on treatment for hypertension.

2.9.2 Hypotension

Hypotension is defined as Systolic blood pressure $\leq$ 90 mmHg and diastolic blood pressure$\leq$ 60 mmHg.

2.9.3 Left ventricular Hypertension on Electrocardiogram (ECG)

The diagnosis of Left ventricular hypertrophy on Electrocardiogram was done using the Sokolow lyon index, which require the presence of one of the following;

S in V1 plus V5 or V6 $\geq$ 35mm or R in AVL $\geq$ 11 mm.

2.9.4 Anaemia in pregnancy

Haemoglobin concentration below which anaemia is likely to be present at sea level are usually defined in pregnant women as 11g/dl

Mild anaemia between 9-10.9g/dl, Moderate anaemia 7-9.9g/ and severe less than 7g/dl according to WHO (criteria).

2.9.5 Heart Failure

The diagnosis of heart failure was done using Framingham criteria

The criterion requires the simultaneous presence of at least 2 major criteria or 1 major criteria in conjunction with 2 minor criteria.

The Framingham criteria

Major criteria

Paroxysmal nocturnal Dyspnoea

Neck vein distension

Rales

Radiographic cardiomegally

Acute pulmonary edema

S3 gallop

Increased central venous pressure >16 cmH_2 at right atrium

Hepatojugular reflux

Weight loss>4.5kg in 5 days in response to treatment with diuretics

Minor criteria

Bilateral ankle edema

Nocturnal cough

Dyspnoea on ordinary activity

Hepatomegally

Pleural effusion

Tachycardia (heart rate >120 beats/min)

Decrease in vital capacity by one third from maximum recorded

2.9.6 Rheumatic heart diseases

Rheumatic heart disease in this study was defined as:

A history of valvular disease self reported by the patient

An ECHO with features suggestive of Rheumatic heart diseases

Clinically if the patient was found to have murmurs from more than two auscultatory areas

2.10 Data Entry and Analysis

EPI data Software version 3 was used for data entry and SPSS (Statistical Package for Social Sciences) version 18.0 statistical software was used for data analysis. Frequency distribution and two way tables was used to summaries the data.

A Univariate analysis was used to calculate mean values and standard deviations for continuous data, and percentages for categorical data.

$\chi 2$- Tests was used for categorical variables and unpaired t-tests for continuous variables. P value of < 0.05 be was considered statistically significant.

2.11 Ethical Issues

Ethical clearance was sought from the Chairperson, Research and Publications Committee of Muhimbili University of Health and Allied Sciences (MUHAS).

The permission to conduct the study was obtained from the ethical board of Muhimbili National Hospital. The information about the study was given to the participants prior the interview and collection of samples.

The consent form were in both Kiswahili and English clearly stating the purpose, risks, benefits and rights of participants in the whole study. Before the study, verbal and written consent were obtained from each participant.

All information from patient was handled with maximum confidentiality. Information obtained was communicated to the patient and no patient name or information was publicly disseminated.

2.12 Disposal of Study Participants

Information on patients found to have cardiac disease was given to the primary obstetrician looking after the patient and also advised to be seen by a cardiologist for joint care during pregnancy and post delivery

CHAPTER THREE

3.0 RESULTS

2.1.1 Demographic and maternal characteristics

During a period of 7 months (from June 2012 to December 2012) there was a total of 9912 pregnant women who attended Antenatal clinic at MNH; of these 22 %(2184) pregnant women were attending as their first ANC visit.

A total of 310 pregnant women were recruited in this study. Their age ranged from 15 to 42 years with a mean of 28 years. Most of these pregnant women were in the second144 (46%) and third trimester152 (49%), their gravidity ranged from 1 to 8 and parity ranged from 1 to 6 with majority being primiparous 117(37.7%) followed by nullparous101 (32.6%).

With regard to their cardiac status, there were74 (23.8%) pregnant women who reported to have been diagnosed to have cardiac disease which included; hypertension was reported in 59(19%) ,Mitral valve prolapse 6(1.9%) rheumatic heart disease 5(1.6%) and dilated cardiomyopathy 4(1.3%).Only 2(0.7%) reported history of cardiac surgery. (Table 1)

Table1. Demographic and Maternal Characteristics of pregnant women attending antenatal clinic at their first clinic visit at MNH (n=310)

Variable	N (%)
Age in years (mean, sd)*	28 (5.2)
Min-Max	15-42
Education	
Primary	128 (41%)
Secondary/college	155 (50%)
Post-secondary	27 (9%)
Marital status	
Single	57 (18.4)
Married/cohabiting	253 (81.6)
Gravidity	
Median (IQR)	2 (2, 3)
Min – Max	1-8
Parity	
0	101 (32.6)
1	117 (37.7)
2	65 (21)
3	23 (7.4)
4	2 (0.7)
5	1 (0.3)
6	1 (0.3)
Gestational age (weeks)	
Median(IQR)**	28(20.80)
Min-Max	12-40
Trimester	
First	14 (4.5)
Second	144(46)
Third	152(49)
Hemoglobin level (g/dl)	
Median (IQR)**	11.2 (10.1, 12.1)
Anemia (Hb in g/dl)	
Normal	171 (55.2)
Mild	77 (24.8)
Moderate	61 (19.7)

Severe	1(0.3)
Cardiac status	
Self Reported to have cardiac problem	74(23.8)
Hypertension	59(19)
Mitral valve prolapse	6(1.9)
Rheumatic heart disease	5(1.6)
Dilated cardiomyopathy	4(1.3
Previous cardiac surgery	2(0.7)

*__Data are mean (sd) for continuous variable (Age in years)__

__**Data are median IQR)__

3.1.2 Pattern of presenting cardiac symptoms and signs

The most frequent presenting symptom was easy fatigability in 221 (71.3%) followed by edema of the lower limbs 190 (63.1%) and palpitations164 (54.4%).Syncope was the least common presenting symptom occurred only in 55 (17.7%) pregnant women. (Table 2)

Murmurs were present in 193(62.26%) with systolic murmur presenting in 162(52.3%) and the gallop rhythm was detected in 218(70.3%) women. During examination 34(11%) of the study participants were found to be hypertensive. The systolic and diastolic Blood pressures for the study participant were 122.26±16.6 and 80.13± 12.2 respectively. (Table 2)

Table 2: Pattern of presenting cardiac symptoms and signs in the pregnant women attending antenatal clinic at their first clinic visit at MNH (n=310)

Variable (n=310)	N (%)
Clinical symptoms at presentation	
Easy fatiguability	221 (71.3)
Lower Limb swelling	190 (63.1)
Palpitations	169 (54.4)
Exertional dyspnoea	97 (31.2)
Precodial pain	80 (25.8)
Syncope	55 (17.7)
Clinical signs at presentation	
Tachycardia	143(46.1)
Bradycardia	5(1.6)
Ectopics	11 (3.6)
Atrial fibrillation	2 (0.7)
Collapsing pulse	73 (23.55)
Low volume pulse	8 (2.58)
Blood pressure (mmHg)	
Systolic, mean(sd) **	122.26(16.6)
Diastolic, mean (sd) **	80.13(12.2)
Hypertensive	34(11)
Hypotensive	34(11)
Presence of murmur	193 (62.3)
Systolic	162(52.3)
Diastolic	11(3.5)
Both Diastolic and systolic	20(6.5)
Gallop rhythm(S3)	218(70.3)

****Data are mean (sd) for continuous variable (Blood pressure in mmHg**

3.1.3 Echocardiography findings

There were 64 abnormal Echocardiographic findings making a prevalence of cardiac disorder (detected by ECHO) to be 20.6%.

Hypertensive cardiac disease was the most frequent Echocardiographic cardiac disorder 30 (9.7%) followed by mitral valve prolapse 25 (8.1%) and others were rheumatic heart disease 5(1.6%), dilated cardiomyopathy 4(1.3%) and congenital heart diseases 4(1.3%).ASD was the most common detected congenital disorder (Table 3).

Table3. ECHO findings in pregnant women attending antenatal clinic at their first clinic visit at MNH (n=310)

ECHO diagnosis	**N (%)**
Normal ECHO	246(79.3)
LVH 2nd Chronic Hypertension	30(9.7)
Mitral Valve Prolapse	25(8.1)
Rheumatic Heart Disease	5(1.6)
Mitral valve	2(0.7)
*Multivalvular lesions	3(1.0)
Dilated Cardiomyopathy	4(1.3)
Congenital Heart disease	4(1.3)
ASD	3(1.0)
Bicuspid aortic valve	1(0.3)

***Combination of MR, MS or TR or AR**

3.1.4 Electrocardiogram (ECG) findings

Majority of ECG showed sinus rhythm 287(92.6%), only 23 ECG showed arrhythmia with majority 14(4.5%) showing paroxysmal arrhythmia, followed by atrial fibrillation in 4(1.2%), Wolf Parkinson white 3(0.9%) and atrial flutter 2(0.6%).

Other findings included left ventricular hypertrophy seen in 82 ECG (26.5%), ST-T changes in 41(13.2%) short PR interval 39 (12.6%) and 2 ECGs showing right bundle branch block (Table 4).

Table 4: Electrocardiogram (ECG) findings in pregnant women attending antenatal clinic at their first clinic visit at MNH (n=310).

VARIABLE	N (%)
Rhythm	
Sinus rhythm	287 (92.6)
Arrhythmia	23 (7.4)
Atrial fibrillation	4(1.2)
Woff Parkinson White	3(1.0)
Atrial flutter	2(0.7)
Others	14(4.5)
PR interval	
Short	39 (12.6)
Prolonged	2 (0.7)
Left ventricular hypertrophy*	82 (26.5)
Bundle branch Block	2(0.7)
RBBB	2(0.7)
LBBB	0(0)
ST-T changes	41 (13.2)

***By Sokolow-Lyon citeria**

3.1.5 Prevalence of clinical cardiac diagnosis

In this study 59(19%) pregnant women reported a history of been diagnosed to have hypertension but during examination only 20(33.9%) were found to be hypertensive and 14(5.6%) of those who did not report a history of hypertension were found to be hypertensive. According to NICE criteria a total number of pregnant women with hypertension were 73 making a prevalence of 23.5%

A total of 34(11%) pregnant women were found to be hypotensive and majority 242(78%) were normotensive. (Table 5)

Pregnant women who were found to have a clinical diagnosis of rheumatic heart diseases were 27(8.7%) and 63(20.3%) were clinically found to have the diagnosis of heart failure according to Framingham criteria.

Table 5. Proportion of pregnant women with hypertension in pregnant women attending antenatal clinic at their first clinic visit at MNH (n=310).

History of hypertension	**Blood pressure levels**			
	Hypertension	**Normotensive**	**Hypotensive**	**Total**
Yes	20(33.9%)	35(59.3%)	4(6.8%)	59(100%)
No	14(5.6%)	207(82.5)	30(11.9)	251(100%)
Total	**34(11%)**	**242(78%)**	**34(11%)**	**310(100%)**

3.1.6 Proportion of pregnant women with cardiac disorders based on Clinical, ECHO and ECG findings

In this study the prevalence of cardiac disorders based on ECG, ECHO and clinical findings was found to be 29.7 %(n=92).

3.1.7 Relationships between clinical and ECHO findings

With regard to murmurs, there was a statistically significant relationship between the presence of murmurs and ECHO abnormality, whereby among 193(62.26 %) pregnant women who were found clinically to have murmurs, among 51(26 %) were found to have abnormal ECHO findings with majority 142(74 %) having normal ECHO findings($P < 0.05$)

Other clinical findings (gallop rhythm, rheumatic heart disease and Heart failure) showed no relationship with the presence of abnormal ECHO findings in pregnant women. (Table 6)

Table 6: Relationships between Clinical and ECHO findings in pregnant women attending antenatal clinic at their first clinic visit at MNH (n=310).

GALLOP RHYTHM	ECHOCARDIOGRAM			p-value [a]
	Abnormal	**Normal**	**Total**	
Present	42 (19%)	176 (81%)	218 (100%)	
Absent	22 (24%)	70 (76%)	92 (100%)	
Total	**64 (21%)**	**246 (79%)**	**310(100%)**	0.356
MURMURS				
Yes	51 (26%)	142 (74%)	193 (100%)	
No	13 (11%)	104 (89%)	117 (100%)	
Total	**64 (21%)**	**246 (79%)**	**310 (100%)**	0.001
RHD				
Yes	5(18%)	23(82%)	28 (100%)	
No	59(21%)	224(79%)	282(100%)	
Total	**64(21%)**	**246(79%)**	**310(100%)**	0.709
HEART FAILURE				
Yes	9(14%)	54(86%)	63(100%)	
No	55(22%)	192(78%)	247(100%)	
Total	**64(21%)**	**246(79%)**	**310(100%)**	0.159

Note: [a]Chi square test, *p<0.05

CHAPTER FOUR

4.0 DISCUSSION

This study reflects on the magnitude and pattern of cardiac diseases in pregnant women at tertiary care centres in Tanzania. In developed countries, the diagnosis and management of cardiac disease starts early while in developing countries, the sub optimal health network and poor health seeking behaviour of patients' results in late diagnosis and even diagnosis in pregnancy when hemodynamic compromise has already begun.

In this study a total of 310 pregnant women were evaluated; thorough history, physical examination, electrocardiogram and echocardiogram were done to identify the pattern of cardiac disease in these women. Of the 310 pregnant women there were74 (23.8%) pregnant women who reported to have been diagnosed to have cardiac disease which included; hypertension was reported in 59(19%) ,Mitral valve prolapse 6(1.9%) rheumatic heart disease 5(1.6%) and dilated cardiomyopathy 4(1.3%).Only 2(0.7%) reported history of cardiac surgery.

4.1 Prevalence of cardiac diseases

Overall prevalence of cardiac diseases was 29.7%. In contrary in all the studies mentioned above only selected group of patients already diagnosed to have cardiac disease (excluding hypertensive patients). Previous studies have indicated the prevalence of heart disease in pregnant women to be between 0.1 and 4%, with the global figure of around 1%. [16].The prevalences have varied in terms of types of heart disease; the study population and study period.

Though the magnitude of cardiac diseases in pregnancy in Africa is not well documented, the data available from South Africa show that only 0.65% of all pregnant women have heart diseases [23]

The higher prevalence in this study was probably due to the fact that the study population was highly selective and not representative of the general population in Tanzania. It was conducted in a tertiary hospital were pregnant women with complicated cases are referred for proper evaluation and antenatal care. However even then it is only 23.8% of women who self reported to have cardiac problems before they became pregnant.

4.2 Pattern of cardiac diseases in pregnant women

This study revealed that echocardiographically detected LVH due to hypertension was the most common cardiac disorder 30(90.7%). The second most frequent diagnosis was Mitral valve prolapse 25 (8.1%) followed by Rheumatic Heart disease 5 (1.6%), Dilated cardiomyopathy 4 (1.3%) and congenital Heart diseases 4 (1.3%)

These findings are different from other studies from some developed and developing world. In one retrospective study done by Maboury Diaoa et al [22] in Senegal between 1994-2004 involved 50 pregnant women with cardiac disease .In that study they found that almost 92% of the patients had Rheumatic heart disease. In another retrospective study done by Bhatla et al [20] in 2002 in India involving 207 pregnant women with cardiac disease, the most frequent diagnosis was rheumatic heart disease in 88% of patients.Other studies done in West London [21] and Brazil [18] also showed similar trend.

These different findings could be attributed to the fact that the quoted studies differed in study design. Contrary to this study these studies selected groups of patients already diagnosed to have cardiac disease while excluding hypertensive patients. In this study symptomatic or self reported hypertensive patients who made a large proportion of the study patients, were included

It has estimated the overall prevalence of hypertension in Dar es Salaam is also high 30% in men and 28.6% in women [29].

In this study, Mitral valve prolapse was the pattern seen in 25(8.1%), It has been stated that Mitral valve prolapse (MVP) is the most common condition of the heart valves. With prevalence estimates generally ranging from 5 to 15 percent and up to 35 percent in some studies [30]. And in Africa Cohen et al [30] reported prevalence rate of 14/1000 after examining 12,050 black school children.

The high prevalence was also observed in a In a retrospective hospital based study done in Srilanka [21] involving 152 pregnant women aiming at evaluating the pattern of heart diseases in pregnant women where apart from the high prevalence of Rheumatic Heart disease observed 24% were found to have Mitral valve prolapse.[21].

The prevalence of congenital heart disease in this study was found to be low 4(1.3%). This is similar to other studies. AnIndian retrospective stud [20] and another retrospective study done in Senegal by Maboury et al [22].

This can be explained by the fact that most of the congenital heart diseases are picked up early as they tend to present with symptoms. The observed prevalence is only those which are minor congenital disorder which could only be picked up by ECHO.

4.3 Pattern of presenting symptoms and signs

The diagnosis and assessment of cardiac disease in pregnancy may be difficult because of the physiological changes associated normal pregnancy that can mimic pathological cardiac symptoms and signs and lead to over diagnosis of cardiac disease.

In this study, the most frequent presenting symptom and signs were easy fatigability in 221 (71.3%) followed by edema of the lower limbs 190(63.1%) and palpitations in 169 (54.9%)

Systolic murmurs were common and were detected in 192 (62.3%) while the gallop rhythm was detected in 218(70.3%) pregnant women.

These symptoms and signs, though common they did not reflect presence of cardiac disorder. These findings are similar to the reports and findings from other studies. It has been stated that normal pregnancy is associated with fatigue and a decrease in exercise tolerance [7] and this is mostly observed in the second and third trimesters. Lower limb edema is also a very common finding in normal pregnancy, with 50% to 80% of women affected starting at end of first trimester [8].Thus without investigations ,such as echocardiography it may be difficult to ascertain the significance of the symptoms and signs.

A study done by Cutforth and MacDonald [8] in their series of 50 normal primigravidas found that 84% of gravid patients developed a loud third heart sound and 92% developed an ejection systolic murmur usually heard along the left sternal border. In another retrospective hospital based study involving 320 pregnant women referred for cardiovascular evaluation at ANC in West London also found that about 97% of pregnant women who were referred were found to have physiological murmurs [19].

Higher proportions of pregnant women presenting with easy fatigability and palpitations could also be attributed by a higher number of pregnant women with moderate and severe anaemia, who accounted for 20% of pregnant women in the study.

4.4 Relationship between clinical and Echocardiography findings.

One of the challenges for the clinician is to distinguish between symptoms and signs of pregnancy and similar symptoms that may indicate underlying heart disease in the mother.

In this study there was a significant relationship between Presence of murmurs and the presence of ECHO detectable abnormalities ($p=0.001$).Other clinical findings did not show any significant relationship. These findings are different from a retrospective hospital based

study involving 320 pregnant women who presented with murmurs who were referred for cardiovascular evaluation at ANC in Western London [19], when ECHO was performed in these patients only 3% were found to have significant cardiac lesions and 97% were believed to have physiological murmurs [19].

The relationship between presence of murmurs and ECHO abnormality in this study could also be explained as follows; first the study was done in a highly selected group of people, these are pregnant women who were referred from different primary health care, so creating a highly selection bias. Second within the community there is high prevalence of valvular heart disease including Mitral valve prolapse and Rheumatic heart disease [31]

In a retrospective study done in Singapore involving 77 pregnant women with ECHO diagnosis of heart disease majority 81.8% were asymptomatic with respect to cardiovascular system and only 16.9% had significant dyspnoea and only two patients were found to have signs of Congestive Cardiac failure [26].

These findings shows that the diagnosis and assessment of cardiac disease in pregnancy may be difficult because of the physiological changes associated normal pregnancy thus Echocardiography is very useful diagnostic tool in pregnant cardiac patients as it is non-invasive and safe to detect congenital structural abnormalities, determination of cardiac functional status including chamber size, pulmonary artery pressure, ventricular contractility, presence of mural thrombus, valvular function, and myocardial ischemia [13,14].

CHAPTER FIVE

5.0 CONCLUSION

- The prevalence of cardiac disorders among pregnant women attending their first ANC at Muhimbili National Hospital was found to be high 27.9%.

- Hypertension was found to be the most prevalent cardiac related disorder followed by Mitral valve prolapse.

- The prevalence of congenital heart disease was found to be low.

- Echocardiography is a useful diagnostic tool in screening for cardiac disorders in pregnant women.

- Majority of women become pregnant without prior screening for presence of cardiac disorders.

5.1 RECOMMENDATIONS

- Screening for cardiac disease should be part of ANC at first visit..
- Preferably women should be screened for cardiac disorders before pregnancy.
- Education to care givers especially the midwives on signs and symptoms of heart disease in pregnant women

5.2 LIMITATIONS OF THE STUDY

- This was a hospital based study done in a tertiary hospital where most of the complicated cases associated with pregnancy are referred. Thus it is possible to recruit only very sick women, hence the high prevalence of cardiac disorders.

- Inclusion of women with hypertensive cardiac disease who formed large part of the study subjects would be a reason for different results.

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APPENDICES

Appendix i: Questionnaire – English

PREVALENCE AND PATTERN OF CARDIAC DISORDERS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT THEIR FIRST CLINIC VISIT AT MUHIMBILI NATIONAL HOSPITAL

Date of interview ……/……/……

Serial number …….

Part I: **DEMOGRAPHIC CHARACTERISTICS**

1. Names: …….
2. Date of birth……/……/……
3. Residency……..
4. Telephone……..
5. Gravida…….Para……..
6. Gestational age……
7. Highest Education level achieved.....
8. Marital status.....

Part II: **HISTORY**

9. Have you been previously diagnosed to have heart disease?

1. YES…….. 2. NO…….

If yes, are you on any drug treatment for heart disease?

1. YES…….. 2. NO……

10. Have you previously had heart operation?

1. YES…….. 2. NO……

11. If YES

What operation was done (documents)…….

12. Have you experienced shortness of breath on exertion for the past one month?

1. YES……... 2.NO……

13. Have you ever experienced syncope (sudden loss of consciousness?) in the past one month?

1. YES……... 2.NO…… .

14. Have you experienced awareness of your heart beats in the past one month?

1. YES……..... 2.NO…….

15. Have you experienced easy fatigability in the past one month?

1. YES……... 2.NO……

16. Have you experienced precodial pain in the past one month?

1. YES……... 2.NO……

17. Have you noted any swelling of your lower extremities in the past one month?

1. YES……... 2.NO……

18. Have you been diagnosed to have high blood pressure?

1. YES……... 2.NO……

Part III: PHYSICAL EXAMINATION

19. Clinical anaemia 1.YES..... NO.....

20. (a) Radial pulse (rate)/min.

1. Normal..... 2. Bradycardia..... 3.Tachycardia.....

(b)Radial pulse rhythm

1. Regular.....2.Atrial fibrillation.....3.Ectopic beats.....

(c)Radial pulse character

1. Collapsing.....2.small volume pulse.....3.other.....

21. Blood pressure (mmHg)…….

1. Normal..... 2. Low..... 3.High.....

22. Jugular venous pressure

1. Normal..... 2.Raised.....

23. Heart sounds: describe

1st……..2nd……..3rd……4th……..

24. Murmur

1. YES..... 2. NO.....

25. If there is a murmur- indicate source and Grade

MV……..AV……TV……..PV……..

I..... II.....III.....IV.....V.....VI.....

26. Type of murmur

1. Systolic ..... 2. Diastolic..... 3. Both.....

27. NYHA Functional state of heart failure

I.....II.....III.....IV.....

Part IV: INVESTIGATIONS

28. Haemoglobin level (g/dl)-Anaemia

1. Normal.....2.Mild.....3.Moderate.....4.Severe.....

29. Electrocardiography

1. RHYTHM: 1. SR…….2.ARRYTHMIA……

2. PR INTERVAL 1.NORMAL……2.SHORT……..3.PROLONGED….

3. LVH 1. YES……2.NO……..

4. BUNDLE BRANCH BLOCK: TYPE……

5. ST-T CHANGES 1.YES……2.NO…….

6. OTHERS……..

30. Echocardiography

1. RHD AFFECTED VALVE: MV…….AV……..TV……..PV……..

2. LVH 2nd HYPERTENSION

3. HYPERTROPHIC CARDIOMYOPATHY

4. DILATED CARDIOMYOPATHY

5. CONGENITAL HEART DISEASE

6. MITRAL VALVE PROLAPSE

7. OTHERS.....

Appendix ii: Consent Form – English

ID no……

Consent to participate in the study on the "**Prevalence and pattern of cardiac disorders among pregnant women attending antenatal clinic at their first clinic visit at Muhimbili national hospital**"

Greetings! My name is Happiness Lucas, a postgraduate student at MUHAS, investigating on the prevalence and patterns of cardiac diseases among pregnant woman attended at MNH - Dar es Salaam Tanzania

The purpose of the study; Investigating on the prevalence and patterns of cardiac diseases among pregnant woman attending ANC at MNH - Dar es Salaam Tanzania

What participation involves:

If you agree to participate in the study, you will be interviewed, and a detailed clinical history regarding your health will be requested. Also ECG and ECHO will be done

Confidentiality:

All information collected on questionnaires will be entered into computer with special identification number. The questionnaires will be handled with greater secrecy in order to maintain confidentiality.

Risks: There is no risk associated with this study

Right to withdraw and alternatives: Taking part in this study is completely a voluntary choice. If you choose not participate in the study, you will continue to receive all services that are normally provided in the hospital.

Benefits: If you agree to take part in this study, you will benefit by knowing the type of cardiac disease, and If found to be symptomatic, appropriate medications will be prescribed and you will be advised accordingly.

In case of any injury: We do not expect any harm.

Whom to contact: If you have any question about the study or in case of further information, you can contact Happiness Lucas on 0713 354998. If you have questions about your rights as a participant you may contact Prof M. M. Aboud, Chairman of MUHAS Research and Publications Committee.

P.O.BOX 65001 Dar es Salaam. Tel 2150302-6

Signature

Do you agree?

Participant agrees…….. Participant does NOT agree……

I …… have read and understood the content of this form .My questions have been answered and I voluntarily agreed to participate in this study.

Signature of participant…….

Signature of witness…… Date of signed consent…….

Appendix iii: Consent Form - Swahili

Nambari ya usaili …….

Salaam! Mimi naitwa Happiness Lucas, ni mwanafunzi wa shahada ya udhamili - Chuo Kikuu cha Sayansi za Afya na Tiba – Muhimbili. Nafanya utafiti kuhusu kuchunguza Ukubwa wa tatizo na aina za magonjwa ya moyo kwa wamama wajawazito

Madhumuni ya utafiti

Kusajili baadhi ya kina mama wajawazito na kuchunguza ukubwa wa tatizo la magonjwa ya moyo na kufanya vipimo vya moyo ECG na ECHOCARDIOGRAPHY ili kujua ni aina gani ya ugonjwa wa moyo alionao na unaathiri vipi afya yake

Jinsi ya kushiriki

Kama utakubali kushiriki katika utafiti huu, utaombwa kujibu maswali kadhaa na pia kufanyiwa vipimo vya moyo.

Utunzaji wa siri

Taarifa zote zitatunzwa kwa siri kwa kutumia herufi au nambari badala ya jina la mgonjwa.

Madhara / Athari

Hakuna athari au madhara yoyote yanayotegemewa kutokana na ushiriki wako katika utafiti huu.Vipimo hivi ni salama kwa afya ya mama na mtoto na wala hakitoi mionzi inayohatarisha afya.

Uhuru wa kushiriki

Una uhuru wa kushiriki au kutoshiriki kwenye utafiti huu, pia unaweza kujitoa wakati wowote. Kama utachagua kutoshiriki, utaendelea kupata huduma katika hospitali hii kama kawaida.

Faida ya utafiti

Mgonjwa atafaidi kwa kuhudumiwa na mtafiti pindi mgonjwa anapohitaji utaalamu maalumu wa magonjwa ya moyo.Pia afya ya mshiriki itafuatiliwa kwa ukaribu na mtafiti kwenye clinic maalumu ya magonjwa ya moyo katika hospitali ya Taifa Muhimbili

Ni matumaini yangu kwamba utafiti huu utasaidia kuboresha tiba kwa wagonjwa wengine siku za baadae.Kuna kamati ya kusimamia udhibiti wa utafiti Kamati hii hutoa taarifa za matokeo ya utafiti ambayo huytoa elimu kubwa kuhusu tatizo hili.

Taarifa

Endapo unahitaji kupata maelezo kuhusu haki zako au taarifa zaidi ,wasiliana na Happiness Lucas, Mtafiti, kupitia namba ya simu 0713354998 au Prof M M Aboud Mwenyekiti wa Kamati ya Utafiti, MUHAS S.L.P 65001,Dar es salaam, Simu 2150302-6. Je unakubali kushiriki kwenye utafiti? weka alama ya vema(√)

Ndiyo..... **Hapana .....**

Mimi ....., nimeelezwa na nimesoma maelezo haya hapo juu na kuyaelewa na Ninakubali kwa hiari yangu kushiriki kwenye utafiti huu

Sahihi ya mgonjwa .....

Sahihi ya ndugu/shahidi .....

Sahihi ya Mtafiti ..... Tarehe……

Appendix IV: Introduction Letter

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

Directorate of Postgraduate Studies

P.O. BOX 65001
DAR ES SALAAM
TANZANIA.

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Tel: +255-(0)22-2150302 Ext 207.
Tel (Direct): +255-(0)22-2151378
Telefax:255-(0)22-2150465
E-mail: *dpgs@muhas.ac.tz*

Ref. No. HD/MUH/T.91/2010

23rd May, 2012

Executive Director,
Muhimbili National Hospital
P.O. Box 65000,
DAR ES SALAAM.

Re: INTRODUCTION LETTER

The bearer of this letter Dr. Happiness Lucas is a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing a MMed. Internal Medicine.

As part of his studies her intends to do a study titled: ***"Prevalence and pattern of Cardiac Diseases among pregnant women attending Antenatal Clinic at Muhimbili National Hospital".***

The research has been approved by the Chairman of our Muhimbili University Senate.

Kindly provide her the necessary assistance to facilitate the conduct of her research.

We thank you for your cooperation.

A. Ndyeikiza
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dr. Happiness Lucas
cc: Dean, School of Medicine

Appendix v: Ethical Clearance

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
DIRECTORATE OF POSTGRADUATE STUDIES

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Ref. No. MU/PGS/SAEC/Vol. VI/

23rd May, 2012

Dr. Happiness Lucas,
MMed. Internal Medicine,
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED "PREVALENCE AND PATTERN OF CARDIAC DISEASES AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT MUHIMBILI NATIONAL HOSPITAL"

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has on behalf of the Senate approved ethical clearance for the above-mentioned study.

Thus ethical clearance is granted and you may proceed with the planned study.

Please liaise with bursar's office to get your research fund.

Dr. J.R. Masalu
Ag: DIRECTOR, POSTGRADUATE STUDIES

/emm

c.c. Vice Chancellor, MUHAS
c.c. Deputy Vice Chancellor – ARC, MUHAS
c.c. Dean, School of Medicine - MUHAS