FACTORS ASSOCIATED WITH PRENATAL DEPRESSION AMONG WOMEN ATTENDING THE ANTENATAL CLINIC AT COAST PROVINCIAL GENERAL HOSPITAL, MOMBASA COUNTY, KENYA

MIRIERI HARRIET KWAMBOKA

H57/87135/2016

A DISSERTATION SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH OF THE UNIVERSITY OF NAIROBI.

2019

DECLARATION OF ORIGINALITY FORM

Name of student: ……... Mirieri Harriet Kwamboka

Registration number: ……... H57/87135/2016

College: …… Health Sciences

Faculty/School/Institute: …… School of Public Health

Course name: …… Master of Public Health (MPH)

Title of the work: ……... Factors associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital, Mombasa County, Kenya

DECLARATION

1- I understand what plagiarism is and I am aware of the University's policy in this regard
2- I declare that this proposal is my original work and has not been submitted elsewhere for examination, award of degree or publication. Where other people's work or my own work has been used, this has properly been acknowledged and referenced in accordance with the University of Nairobi's requirements.
3- I have not sought or used the services of any professional agencies to produce this work
4- I have not allowed, and shall not allow anyone to copy my work with the intention of passing it off a his/her own work
5- I understand that any false claim in respect of this work shall result in disciplinary action, in accordance with the University plagiarism policy.

Signature: _____ Date: _____

APPROVAL OF SUPERVISORS

This dissertation has been submitted for examination with our approval as university supervisors:

Signature: _____ Date: _____

Dr. Marshal M. Mweu

BVetMed, PG Diploma, MSc., PhD

Lecturer, School of Public Health, University of Nairobi

Signature: _____ Date: _____

Professor Joyce Olenja

B.Ed, M. Phil, Ph.D.

Professor, School of Public Health, University of Nairobi.

Approved by the Director, School of Public Health, University of Nairobi.

Signature: _____ Date: _____

Mutuku A. Mwanthi, BSc; MSEH; PhD

DIRECTOR & PROFESSOR OF PUBLIC HEALTH (ENVIRONMENTAL HEALTH AND OCCUPATIONAL HEALTH AND SAFETY)

ACKNOWLEDGEMENT

I thank God for the abundant grace throughout my graduate studies. I am grateful to all who made the entire process successful. I am particularly indebted to my supervisors Dr. Marshal Mweu and Prof. Joyce Olenja for the guidance, mentorship and constructive feedback during the entire course of my dissertation. My sincere appreciation goes to the lecturers of University of Nairobi, School of Public Health for imparting the necessary knowledge and skills during the coursework period and the staff members of Coast Provincial General Hospital Antenatal clinic for their facilitation throughout the data collection process.

My warmest and deepest gratitude to my parents and siblings for supporting me throughout my education.

LIST OF ABBREVIATIONS

ANC – Antenatal Clinic

BDI – Beck Depression Inventory

CAS$_{R}$-SF – Composite Abuse Scale Revised - Short Form

CIDP – County Integrated Development Plan

CPGH – Coast Provincial General Hospital

DALYs–Disability Adjusted Life Years

EPDS– Edinburgh Postnatal depression Scale

HAM-D – Hamilton Depression Rating Scale

HIC – High Income Countries

IPTp – Intermittent Preventive Treatment of Malaria

KDHS– Kenya Demographic and Health Survey

KNBS – Kenya National Bureau of Statistics

KNH-UON ERC – Kenyatta National Hospital-University of Nairobi Ethics and Research Committee

LLIN – Long Lasting Insecticidal Nets

LMIC – Low- and Middle-Income Countries

LMP – Last Menstrual Period

MCH– Maternal and Child Health

MINI – Mini-International Neuropsychiatric Interview (MINI-Plus)

NACADA– National Authority for the Campaign against Drug Abuse

NCPD – National Council for Population and Development

PMTCT – Prevention of mother-to-child transmission

SGBV – Sexual-Gender based violence

SPS – Social Provisions Scale (SPS-10)

WHO – World Health Organization

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

OPERATIONAL DEFINITIONS

Antenatal/Prenatal period– Refers to the period from conception until birth

Negative Predictive Value – Probability of not having the disease if you test negative

Perinatal period – Refers to both antenatal and postnatal period

Positive Predictive Value – Probability of having a disease if you test positive

Postnatal depression– Refers to a form of clinical depression that occurs at any point in the first year after childbirth

Postnatal period– Refers to the period from delivery until 12 months after delivery

Prenatal depression – Refers to a form of clinical depression that affects a woman during pregnancy and is characterized by chronic anxiety, insomnia, guilt, fatigue, irritability, forgetfulness, headaches, isolation, relationship worries, incessant crying and fear to seek help

Sensitivity – Probability of having a positive test if a disease is present

Specificity – Probability of having a negative test if you do not have disease

ABSTRACT

Background:

Prenatal depression is a form of clinical depression that affects a woman during pregnancy. Despite being a public health burden and the major predictor of postnatal depression, prenatal depression has not been given as much attention as postnatal depression globally in research and policy. There is limited evidence on the factors associated with prenatal depression yet the adverse effects not only affect the mother but also the offspring.

Study objective:

The aim of the study was to establish the risk factors associated with prenatal depression among pregnant women who were attending the antenatal clinic at Coast Provincial General Hospital (CPGH) in Mombasa County, Kenya.

Methodology:

A hospital-based case control study design was employed to identify factors associated with prenatal depression. The outcome (prenatal depression) was assessed using the Edinburgh Postnatal Depression Scale (EPDS). Cases were pregnant women ≥15 years who had an EPDS score of ≥13 while controls were pregnant women ≥15 years but with an EPDS score of <13. All cases were recruited into the study while the controls were a simple random sample of prenatal depression free women. Data on the socio-demographic, social network and family factors, lifestyle and obstetric characteristics were collected using a semi structured questionnaire. 170 participants were enrolled over a study period of two months with the ratio of cases to controls being 1:4. Logistic regression was used to evaluate relationship between the risk

factors and prenatal depression. 20% and 5% levels of significance were used for the univariable and multivariable analysis respectively.

Results:

In the univariable analysis, age, marital status, occupation, alcohol and drug abuse, unplanned pregnancy, gestational age, social support and domestic violence were significantly associated with prenatal depression. From the multivariable analysis, only marital status (aOR=17.1; 95% CI:4.0-73.0), occupation (aOR=2.4; 95% CI:1.4-4.2), social support (aOR=0.2; 95% CI:0.05-0.8) and domestic violence (aOR=18.3; 95% CI: 5.7-58.7) were identified as statistically significant risk factors for prenatal depression.

Conclusion and recommendations:

In this setting, marital status, occupation, domestic violence experience and lack of social support were the major predictors of prenatal depression among pregnant women. Therefore, this necessitates for preventive and supportive interventions which include screening for prenatal depression in antenatal clinics to enable early detection and management, creation of employment opportunities and encouraging the youth to start income generating activities, enforcement of laws relating to gender-based violence to ensure perpetrators are punished and communities sensitized to deter new cases of gender-based violence and formation of social support networks by hospital psychiatry departments to provide an avenue for the prenatally depressed women to meet, share challenges and coping mechanisms.

CHAPTER 1:

INTRODUCTION

1.1 Background

The prevalence of depression in women is about 20% with pregnancy increasing the susceptibility to depression (Ajinkya et al., 2013). Depression related to child bearing can develop either during pregnancy (prenatal depression), after birth (postnatal depression) or both (perinatal depression) (Ogbo et al., 2018). Prenatal depression refers to a form of clinical depression which occurs during pregnancy and is characterized by chronic anxiety, insomnia, guilt, fatigue, irritability, forgetfulness, headaches and isolation (Madlala & Kassier 2018).

Despite prenatal depression being a significant health problem as postpartum depression, regrettably, it has not received as much attention as postpartum depression (Rahman et al., 2014; Ongeri et al., 2016; Biaggi et al., 2016). This is partly because there is a misconception that the existing socio-cultural structures and physiological changes that take place during pregnancy protect one from mental disturbance during this period (Bennett et al., 2004b). There is also more attention on the physical health of both the mother and fetus as compared to mental health during pregnancy. Moreover, some women are hesitant to speak out on melancholy symptoms during pregnancy because of societal expectations of happiness during this period (Marcus et al., 2003). Additionally, the emotional complaints during pregnancy are usually associated with hormonal changes that occur during this period (Biaggi et al., 2016).

Depression in pregnancy is an important public health concern because it is a major determinant of post-natal depression and it can lead to untoward maternal and fetal outcomes (Smith et al.,

2011). Prenatal depression increases the risk of adverse perinatal outcomes such as preterm births and low birth weight which in turn are predictors for neurocognitive and socio-developmental disorders in the growing individual (Dunkel et al., 2012; Rahman et al., 2014). Pregnant women who are depressed are at a high risk of using alcohol, tobacco and other substances of abuse and are unlikely to have adequate prenatal care, all of which contribute to poor neonatal outcomes (Bonari et al., 2004; Holden et al., 2012).

The estimated prevalence of prenatal depression in High Income Countries (HICs) is 10-15% while studies that have been conducted in Low and Middle Income Countries (LMICs) have reported higher rates (Bawahab et al., 2017; Thompson & Ajayi, 2016). The estimated prevalence of prenatal depression has been reported to be 29% in Bangladesh (Nasreen et al., 2011), 25 % in Pakistan (Fisher et al., 2012), 16% in Southern Brazil (Coll et al., 2017), 38.5% in South Africa KwaZulu-Natal (Manikkam & Burns, 2012), 24.94% in Ethiopia (Biratu & Haile, 2015) and 39.5 % in Tanzania (Rwakarema et al., 2015). In Kenya, a study conducted in an informal urban setting found the prenatal depression prevalence to be 18% (Ongeri et al., 2016).

Multiple risk factors for prenatal depression have been suggested as no single cause has been identified (Robertson et al., 2004). Predictors of prenatal depression can be categorized into three domains: social, psychological and biological risk factors. Social risk factors comprise low level of education, low social economic status, lack of social support, and stressors such as economic deprivation, unplanned pregnancy and cultural context which modulate adaptive responses to pregnancy (Bonari et al., 2004). Findings from a study conducted in India showed dissatisfaction with the baby's gender and poor relationship with the in-laws were key predictors of depression in pregnant women (Shidhaye & Giri, 2014). Gestational age, maternal age, genetic and hormonal

susceptibility and obstetric complications are some of the biological risk factors for prenatal depression (Howard et al., 2014; Shidhaye & Giri, 2014). Physiologically, the hormonal changes that occur during pregnancy increase the hypothalamus-pituitary-adrenal axis activation which can lead to depression (Gelman et al., 2015).

Psychological and psychiatric risk factors for prenatal depression include a history of mental disorder and anxiety. Possible neonatal development disorder, possible perineal trauma and the physical changes during pregnancy are some of the possible causes of anxiety during pregnancy (Deklava et al., 2015). Therefore, this study sought to investigate the factors associated with prenatal depression among women attending the antenatal clinic in Coast Provincial General Hospital, Mombasa County, Kenya.

1.2 Problem Statement

Prenatal depression is a public health concern that impacts negatively on an individual's life thus affecting the quality of work, family and health of the mother as well as development of the baby (Shidhaye & Giri, 2014).

The main factors associated with prenatal depression according to studies conducted in HICs and LMICs are domestic violence and physical abuse, lack of social support, unplanned pregnancy, history of mental disorder, negative life events and socioeconomic factors (Biaggi et al., 2016). In Mombasa County, the factors associated with prenatal depression could be similar to the above-mentioned settings but owing to the high poverty levels, prevalence of drug and substance abuse, HIV prevalence, teenage pregnancy rates and low education levels (CIDP, 2016; NCPD, 2015), prenatal depression may present as a more significant problem in this

setting. The high poverty levels and low education levels predisposes young girls to early marriages which in turn result to unplanned pregnancies that can lead to prenatal depression. Notably, the high levels of poverty in Mombasa predisposes young girls to sex tourism and thus unwanted pregnancies and HIV/AIDS which in turn may heighten the risk of prenatal depression.

As a consequence of prenatal depression, affected mothers are likely to have poor compliance to antenatal care, increased risk of developing preeclampsia, preterm delivery as well as greater risk of suicide (Ongeri et al., 2016). As for the offspring, prenatal depression is expected to negatively impact on the cognitive, behavioral, emotional and physical development (Grote et al., 2010); Ehsanpour et al., 2012). Additionally, poor immunization rates, higher health expenses and frequent hospitalization may be attendant in these depressed mothers (Minkovitz et al., 2005). Since prenatal depression is not screened for in any hospital in Mombasa County, it might be a silent epidemic. There is therefore need to understand the factors associated with prenatal depression in this setting in order to guide proper allocation of intervention strategies.

1.3 Justification

There is paucity of research in Africa on factors associated with prenatal depression (Biratu &Haile 2015; Hartley et al., 2011; Thompson & Ajayi, 2016). In Kenya, there are very few published research studies that have explored the factors associated with prenatal depression (Ongeri et al., 2016). Identification of the determinants of prenatal depression within Mombasa County will guide the prioritization of effective interventions for prenatal depression in this setting.

This study therefore aimed to identify the factors associated with prenatal maternal depression with a view to informing the design of specific interventions and formulation of guidelines for the effective prevention and control of prenatal depression particularly in high-risk regions in Kenya. The identification of these risk factors will also inform the surveillance of prenatal depression in these settings.

1.4 Research Questions

- Is age, marital status, level of education, occupation and level of income associated with prenatal depression among pregnant women attending the antenatal clinic at Coast Provincial General Hospital?
- Is lack of social support and intimate partner violence associated with prenatal depression among pregnant women attending the antenatal clinic at Coast Provincial General Hospital?
- Is smoking, use of alcohol and substance abuse associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital?
- Is there a relationship between unplanned pregnancy, current gestational age, having a history of stillbirths, history of miscarriages and prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital?

1.5 Study objectives

1.5.1 Broad Objective

- To investigate the factors associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital

1.5.2 Specific Objectives

1. To identify socio-demographic factors (age, level of education, occupation and marital status) associated with prenatal depression among women attending the ANC clinic at Coast Provincial General Hospital
2. To identify social network and family factors (lack of social support and domestic violence) associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital
3. To identify lifestyle factors (smoking, use of alcohol and substance abuse) associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital
4. To identify obstetric factors (unplanned pregnancy, history of stillbirths, history of miscarriages, parity and gestational age) associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital

1.6 Research Hypothesis

1.6.1 Null Hypothesis

- There is no association between socio-demographic factors and development of prenatal depression
- There is no association between social network and family factors and development of prenatal depression
- There is no association between lifestyle factors and development of prenatal depression
- There is no association between obstetric factors and development of prenatal depression

CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Depression

Depression is a mental disorder that affects how someone feels, acts, behaves and thinks. It is characterized by persistent feeling of sadness, disinterest in activities normally enjoyed and inability to perform normal day to day activities for at least two weeks. Depression is characterized by anxiety, restlessness, reduced concentration, lack of energy, reduced appetite, sleeping disturbances like sleeping too much or insomnia, indecisiveness; feelings of worthlessness or hopelessness and suicidal thoughts (WHO, n.d.).

2.2 Screening Instruments for Prenatal depression

The Edinburgh Postnatal Depression Scale (EPDS) is one of the most commonly used instruments for screening for depression in both the antenatal and post-partum periods in LMICs and has been validated in 20 languages. It is a 10-item questionnaire which scores women's feelings and experiences of the last 7 days on a likert scale. The lowest score is 0 while the maximum score is 30.

The cut off score for determining prenatal depression in women differs depending on the language version of EPDS used. The recommended cut offs for the English, version is ≥13. A cut off of 13 or more is used for screening of antepartum depression. A British validation study that was conducted in primary health care setting found the specificity of the EPDS scale to be 78% while the sensitivity was 86% (Cox et al., 1987).

Besides the EPDS scale, there are other instruments that are available for assessment of prenatal depression which include Beck Depression Inventory (BDI), Mini-International Neuropsychiatric Interview (MINI-Plus) and Hamilton Depression Rating Scale (HAM-D). The Beck Depression Inventory is a self-report inventory with 21 questions that was designed to determine the attitudes and symptoms of depression. The BDI instrument is designed for individuals aged above 13 years. It has a sensitivity of 81% and specificity of 92%. BDI instrument items are rated on a likert scale ranging from 0 to 3 with a maximum total score of 63 (Beck et al., 1961).

The Hamilton Depression Rating Scale is used to assess the change in depressive symptoms in the course of treatment. It's administered by a clinician and the items are rated on a likert scale ranging from 0 to 4. The HAM-D scale has two versions that is the original version which contains 17 items (HDRS17) assessing symptoms of depression experienced over the past week and a later 21-item version (HDRS21) which added 4 items intended to subtype the depression. It has a sensitivity of 86.4% and specificity of 92.2% (Hamilton, 1960).

The Mini-International Neuropsychiatric Interview (MINI-Plus) is a structured interview that was designed for the clinical practice and research in primary care settings. It takes about 15 minutes to administer and it is the tool of choice for clinical trials and epidemiologic studies. It is the standard tool used for diagnosis of prenatal depression in the second semester (Amorim, 2000).

In conclusion, the most commonly used instruments for evaluation of prenatal depression are the Edinburgh Postnatal Depression Scale and Beck Depression Inventory (Castro e Couto et

al., 2015). The EPDS scale has shown to be the most reliable instrument used for screening of antenatal depression in resource constrained settings because of the reported specificity, sensitivity and reliability (Chorwe-Sungani and Chipps, 2017)

2.3 Global Burden of Prenatal Depression

2.3.1 Prevalence of Prenatal Depression

Prenatal depression affects 10-15% of pregnant women in HICs (Collins et al. 2013). A systematic analysis of 714 studies and surveys in HICs found the prevalence rates of prenatal depression to be 7.4%, 12.8% and 12.0% in the first, second and third trimester respectively (Bennett et al., 2004). The prevalence of prenatal depression is slightly higher in LMICs as evidenced by a meta-analysis by Fischer et al., (2012) which reported a prevalence of 15.6%. A systematic review on prenatal and postnatal psychological wellbeing in Africa found the mean prevalence of prenatal depression to be 11.3% and 18.3% postnatally (Sawyer et al., 2010).

A study on prenatal depression in Southern Brazil reported the prevalence of prenatal depression to be 16% (Coll et al., 2017). Findings from a study in Northern Ethiopia found that prenatal depression in the population occurred at a frequency of 31.1% (Mossie et al., 2017). In another study in Addis Ababa public health centers, the prevalence of prenatal depression was 24.94 % (Biratu and Haile, 2015). In Kenya, a study done at Kenyatta National Hospital found prenatal depression to be 29% among mothers attending the antenatal clinic (Mwakio, 2015).

2.3.2 Economic Burden of Prenatal Depression

Being a public health concern if prenatal depression is left untreated it cause detrimental effects on families (Bauer et al., n.d.). Untreated prenatal depression poses financial burden not only to individual families but also to countries. A report on the cost of prenatal depression on the Australian economy in 2012 indicated that a total of $56.98 million was spent on prenatal depression alone which roughly translates to a cost of $2213 per woman. Of this, $53.22 million were attributed to productivity losses. Additionally, the total cost of disability adjusted life years as a result of prenatal depression in Australia in 2012 were 4991 which accounted for 24.1% of all perinatal depression cases (Deloitte, 2012).

2.4 Impact of Prenatal Depression on Fetal Outcomes

The adverse outcomes of prenatal depression affect the pregnant woman as well as the baby (Leigh & Milgrom, 2008). Antenatal maternal depression has been found to cause restricted growth in utero especially in LMICs. Other reported adverse fetal outcomes include preterm labor, low birth weight, diarrheal episodes, sub-optimal infant feeding patterns and adverse implications for fetal neurodevelopment (Grote et al. 2010). Prenatal depression is a predictor for shorter breastfeeding duration and premature delivery which have adverse effects on growth of the newborn (Dias and Figueiredo 2015; Grigoriadis et al. 2013). Additionally, poor immunization rates, higher health expenses and frequent hospitalization have also been reported in children who are born of depressed mothers (Minkovitz et al., 2005).

A review by Gentile (2017) reported that maternal depression caused irregular fetal heart rate in the growing fetus, decreased dopamine levels, depressive-like behaviors, altered

electroencephalography patterns, increased salivary cortisol levels and central adiposity in children. A meta-analysis by Stein et al., (2014) found that prenatal depression was linked to greater risk of offspring's poor motor and regulation skills, anti-social behavior and increased risk of depression and attention problems. Moreover, prenatal depression was associated with poor cognitive development in children (Stein et al., 2014).

2.5 Risk factors for Prenatal Depression

2.5.1 Socio-demographic Risk factors for Antenatal Maternal Depression

These include age, level of education and level of income. Prenatal depression has been reported by many studies to be significantly associated with age. In a study done in India among pregnant women, the results showed that depression was higher among participants who were less than thirty years compared to those who were 30 years and above (Bhat et al., 2015). Similarly, another study that was done in Hungary reported that prenatal depression was high in women under the 20 years compared to those above 20 years (Bödecs et al., 2013). Another study reported that women who were below the age of 25 years had 2.6 times higher odds of developing prenatal depression in pregnancy compared to women who were above the age of 25 years (Rubertsson et al., 2014). This trend is likely to be as a result of young mothers being more vulnerable as they are not financially stable and this may lead to depression in pregnancy. However, other research studies have reported that increasing maternal age increases the likelihood of developing prenatal depression. A study conducted in Pakistan reported that women who were above the age of 30 years had 3 times higher odds of prenatal depression in comparison with women who were below the age of 30 years (Ali et al., 2012). This may be attributed to high prevalence of psychological distress with increased age which may result in prenatal depression (Aasheim et al., 2012). However, other studies have

not found statistical significance between maternal age and depression in pregnancy (Husain et al., 2012).

Low education levels have been shown to be a determinant of prenatal depression in most studies. Women who have low education level have been found to be at higher risk of depression in pregnancy compared to those that had high level of education qualification (Bhat et al., 2015). This may be attributed to the fact that education encourages adoption of healthy lifestyles like regular exercise, improved diet, improved sleeping habits and avoiding alcohol which in turn help in control of depression symptoms during pregnancy (Feinstein et al., 2006). Educated women are likely to have a good psychosocial support system which has been identified to be protective against prenatal depression (Dennis et al., 2002). Furthermore, literacy improves an individual's level of self-confidence and dignity which in turn reduces the risk of prenatal depression (Francis et al., 2007). Contrary to these findings, a study in Malawi found that women with a higher education level were more at risk of developing prenatal depression compared to those with low level of education (Stewart et al., 2014). This may partly be explained by the fact that educated individuals are more conscious of depression symptoms and they have a high probability of reporting depressive symptoms compared to uneducated women (Zimmerman & Katon, 2005). However, some studies have found that the level of education is not a significant determinant of prenatal depression (Husain et al., 2012; Ongeri et al., 2016).

A review of literature has shown that women who had low income or were not employed experienced more anxiety and depressive symptoms in pregnancy compared to those who were employed (Dibaba et al., 2013; Bödecs et al., 2013). Moreover, other studies have reported that women whose spouses are unemployed or are unskilled workers were at a higher risk of being

depressed antenatally compared to women whose husbands are skilled workers or professionals (Akçalı et al., 2014; Babu et al., 2018). A study conducted in Italy found a strong association between unemployment and prenatal depression with an adjusted odds ratio of 2.17 ($P<0.05$) (Giardinelli et al., 2012). A similar study that was done in Kenya among adolescents in an informal urban setting also revealed that unemployment was associated with high probability of developing depression during pregnancy (Osok et al., 2018).

2.5.2 Social Network and Family Risk factors for Antenatal Maternal Depression

Social support refers to the different types of support that individuals receive from spouses, relatives and friends (Harandi et al., 2017).

According to Adewuya et al., (2007) in a study conducted in Nigeria absence of social support was a major determinant of prenatal depression with an adjusted odds ratio (aOR) of 6.08 ($P<0.031$). Another study conducted in Ethiopia reported that social support was protective against prenatal depression with an odds ratio of 0.23 (Dibaba et al., 2013). Social support during pregnancy protects one from stressful life events during pregnancy hence reducing the chances of developing prenatal depression during pregnancy (Golbasi et al., 2010; Groves et al., 2012; Hartley et al., 2011).

Marital satisfaction and perceived social support have been found to be protective factors against prenatal depression with an adjusted odds ratio of 0.62 ($P<0.009$) (Omidvar et al., 2018). On the other hand, a hostile or poor relationship with the spouse has been identified as a risk factor for prenatal depression (Martini et al., 2015). A study conducted in Italy reported 4 times the odds of developing prenatal depression in those with a strained relationship with the spouse compared to those with a good relationship with spouse (Giardinelli et al., 2012). Strong social support by the

spouse and close family members during pregnancy provides emotional and mental support that enables pregnant women to easily cope with anxiety and stressors enabling easy transition into motherhood (McLeish and Redshaw, 2017; Zeng et al., 2015).

Marital status has been shown to influence the degree of social support received during pregnancy. Some studies have shown that being single, divorced/widowed or not cohabiting with the partner are risk factors for prenatal depression (Jeong et al., 2013; Brittain et al., 2015; Weobong et al., 2014). This is likely to be as a result of lack of a spouse to provide support during pregnancy. Furthermore, in the African culture, single parenting is not socially acceptable and women who are single and pregnant are viewed as promiscuous (Adewuya et al., 2007).

2.5.3 Lifestyle Risk factors for Antenatal Maternal Depression

Smoking and past or current use of alcohol has been linked with prenatal depression (Gelman et al., 2015). Despite the fact that most women stop alcohol intake when they get pregnant, the prevalence of alcohol use during pregnancy is still high. A study by Floyd & Sidhu (2004) estimated the prevalence of alcohol consumption during pregnancy to be 12.9% while the prevalence of binge drinking was 5%.

Smoking before or during pregnancy is associated with prenatal depression (Abuidhail and Abujilban, 2014). A study conducted in European countries established that there was an association between smoking during pregnancy and prenatal depression with an adjusted odds ratio of 2.02 ($P<0.05$) and women who continued smoking during pregnancy were at a high risk of developing prenatal depression in comparison to those who stopped in pregnancy (Smedberg et al., 2015). Contrary to Smedberg et al., (2015) findings, another study reported that despite some women having stopped smoking in pregnancy, this did not reduce the risk of developing prenatal

depression (Jeong et al., 2013). Another study reported that the quantity of cigarettes smoked per day determined the risk of development of prenatal depression that is a higher rate of cigarette consumption was related to a high probability of developing prenatal depression (Bottorff et al., 2014) while in another study by Luke et al., (2009) found no relationship between smoking during pregnancy and prenatal depression.

2.5.4 Obstetrics related risk factors

Multiparity increases the likelihood of developing prenatal depression according to some studies. A research study conducted among Jordanian women found that multiparous women were more likely to be depressed than primiparous women (Abuidhail & Abujilban, 2014). Similarly, another study conducted in England reported that multiparous women had 1.4 higher odds of developing prenatal depression compared to primiparous women ($P<0.05$) (Redshaw & Henderson, 2013). This was likely to be because multiparous women have a higher care burden hence greater strain on financial and social resources and this could increase the probability of developing depression symptoms. These findings were similar to findings by Golbasi et al., (2010) who found that multiparous women were more depressed compared to primiparous women ($P=0.000$). On the contrary, some studies have found a greater risk of prenatal depression among primiparous women compared to multiparous women due to the anxiety of being first time mothers (Räisänen et al., 2014; Ali et al., 2012).

In an Indian study, participants who were less than three months gestational age showed higher depression rates compared to those above the gestational age of 3 months i.e those with short experience of pregnancy had higher chances of being depressed compared to those with long experience of pregnancy. This is partly because of the first trimester pregnancy symptoms like fatigue, nausea, food aversions and heartburn that most women find difficult to cope with (Bhat et

al., 2015). These findings are contrary to the findings on another study which found that women in the third trimester of pregnancy were more likely to be depressed compared to women in the first and second trimester because of the proximity to delivery (Babu et al., 2018).

A history of still birth, miscarriage or other pregnancy related complications have been shown to be predictors of prenatal depression. Among Turkish women, the EPDS score of pregnant women with a history of still birth was higher compared to those who did not have a history of still birth (Golbasi et al., 2010a). In another study, women who had a history of still birth had 5 times higher odds of prenatal depression compared to women who had not experience a still birth (Gravensteen et al., 2018). This findings are in agreement with the findings of (Adewuya et al., 2007) who found an relationship between depression in third trimester of pregnancy and a history of still birth.

Unplanned pregnancy has been demonstrated to be a risk factor for developing prenatal depression in pregnancy (Weobong et al., 2014; Jeong et al., 2013; Martini et al., 2015;). A study conducted in Italy reported a strong association of unplanned pregnancy and prenatal depression with an adjusted odds ratio of 3.83 ($p<0.05$) (Giardinelli et al., 2012) . This may be explained by the fact that uncertainties associated with pregnancy are likely to be more pronounced if the pregnancy is unplanned. Moreover Ratcliff et al., (2015), reported that in the first trimester women find it difficult to cope with unexpected pregnancy hence there is a high likelihood of developing depression but as pregnancy progresses the pregnancy becomes accepted hence reducing the depression symptoms. According to Rubertsson et al., (2014) the fear or negative thoughts about childbirth are also associated with development of depression in pregnancy with an adjusted odds ratio of 2.7 which means women who had negative thoughts about childbirth had almost 3 times odds of developing prenatal depression compared to those who had positive thoughts about child

birth. Contrary to that, a study conducted in South Africa did not find a statistically significant association between unplanned pregnancy and prenatal depression (Hartley et al., 2011).

2.5.5 Adverse life events

Stressful life events aggravate the onset of prenatal depression (Abujilban et al., 2014; Brittain et al., 2015). Stressful events vary in magnitude and the ability to cope depends on the perception of the stress. These events include relationship breakdown, job loss, assault or rape, and death or illness of a relative all of which increase the likelihood of depression in pregnancy. Additionally, pregnancy is also a stressful period owing to the physical and hormonal changes that take place hence the increased probability of developing depression during this period. However, the impact of these negative life events can be reduced if someone has a strong social support system (Glazier et al., 2004).

Physical partner violence or violence during pregnancy is a strong predictor of depression (Martini et al. 2015; Nasreen et al. 2011). Exposure to domestic violence especially by an intimate partner and a history of sexual assault increases the probability of developing depression in pregnancy (Dibaba et al., 2013a; Gavin et al. 2005; Grote et al., 2010; Nasreen et al., 2011; Stewart et al., 2014). In Tanzania women who experienced intimate partner violence had 3.31 higher odds of prenatal depression compared to those who did not have domestic violence experience (Mahenge et al., 2013).

2.5.6 Psychiatric Risk factors for Antenatal Maternal Depression

A history of depression, suicidal ideations, anxiety or psychiatric illness is a risk factor for development of prenatal depression (Akçalı et al., 2014; Marcus et al., 2003; Martini et al.,

2015; Nasreen et al., 2011). In a study that was conducted in Sweden, there was a strong association between a self-reported psychiatric history and prenatal depression with an adjusted odds ratio of 3.8 ($p<0.05$). In the same study, women who had experienced anxiety had 5.2 higher odds of prenatal depression compared to those who did not have a history of anxiety (Rubertsson et al., 2014). A study conducted in Germany reported a strong association between a history of depression and prenatal depression with an adjusted odds ratio of 2.4 ($P=0.001$) (Martini et al., 2015).

Following the structured review of literature related to prenatal depression, generally, there was paucity of research on prenatal depression especially in Africa. In Kenya, there were very few published studies on prenatal depression which meant that prenatal depression had not been given as much attention as postnatal depression in the developing world. This research aimed at adding to the limited body of evidence. According to the reviewed literature most developed countries did not routinely screen for prenatal depression during pregnancy for women attending ANC clinics. This research study therefore recommends screening for prenatal depression as one of the routine procedures at antenatal clinics.

CHAPTER 3

METHODOLOGY

3.1 Study Area

The study was conducted at the Coast Provincial General Hospital (CPGH) which is a level five public health facility located in Mombasa County, Kenya. CPGH is a teaching and referral hospital with a 700-bed capacity whose main catchment population comprises the six counties in Coast region. The facility's total catchment population is roughly four million people (Temmerman et al., 2019). The hospital offers both inpatient and outpatient services which include general outpatient clinics, specialized outpatient clinics, maternal child health clinic, diagnostic services, dental services, palliative care services, gender-based violence services and physiotherapy and occupational therapy services.

Essential Maternal Child Health (MCH) services offered in the hospital comprise antenatal clinic services (ANC), family planning services, child welfare and immunization services, prevention of mother to child transmission of HIV (PMTCT) services and health education. Services specific to ANC clinic are health education and promotion of healthy behavior, physical examination of pregnant women, recognition and management of pregnancy-related complications, recognition and treatment of concurrent illness, PMTCT services, reproductive health consultation services and preventive services including iron and folic acid supplementation, deworming, tetanus toxoid immunization, issuing of long-lasting insecticidal bed nets (LLIN) and intermittent preventive treatment of malaria (IPTp). The ANC clinic visits are scheduled monthly with the average number of clinic visits per pregnant woman being four. The number of first-time antenatal visits per month is on average 140. The antenatal clinic is operated by four nurses and four consultant gynecologists. Notably, prenatal depression is not screened for during ANC visits.

The total population of Mombasa County in 2009 was 939,501 people and is projected to increase to 1.4 million by year 2030. The maternal mortality rate in Mombasa is 304 per 100,000 live births which is higher than the national maternal mortality rate of 135 per 100,000 live births. The infant mortality is 44 deaths per 10,000 live births which is higher than the national infant mortality rate of 39 deaths per 10,000 live births (KDHS, 2014). The main economic activity is tourism which accounts for 68% of the wage employment. Others are fishing, farming of sisal, sugarcane, cashew nuts, coconuts and livestock farming (Akama & Kieti 2007).

Mombasa County has poverty levels at 38% compared to the national average of 45.2% (KNBS, 2014). It is also characterized by low literacy levels which is evidenced by low primary school enrolment rate at 69%. Furthermore, the secondary school enrolment rate is 28% which is much lower than the average national school enrolment rate of 85% (KNBS, 2017). The main health issues affecting young people in the county are HIV/AIDs (with a prevalence rate of 7.4% which is higher than the national level of 6.4%) and drug and substance abuse (with 51% of the total population having abused at least substance) (NACADA, 2016). The other issues affecting young people in the county are gender-based violence and teenage pregnancy with approximately 26% of girls getting married before the age of 18 years (NCPD, 2017).

3.2 Study Design

A hospital-based case control study design was employed to identify the factors associated with prenatal depression. The rationale for the choice of study design owed to its suitability in the investigation of rare outcomes that may be missed through random sampling. Although a population-based study would have been more optimal, a hospital-based design was selected due to the ease of recruitment of pregnant mothers (cases and controls) presenting to the antenatal

clinic for care. Additionally, due to the likely differences in health seeking behavior between hospital-based and population-based controls, controls were recruited from the same antenatal clinic as cases.

3.3 Study Population

The study population comprised pregnant women above the age of 15 years routinely attending the antenatal clinic at the Coast Provincial General Hospital during the data collection period between mid-April 2019 and mid-June 2019. Pregnant women are regarded as emancipated minors in Kenya and can legally give consent. Cases and controls were selected from this population as specified in Section 3.5.

3.4 Case and Control Definition

Case Definition

A case was a pregnant woman aged ≥15 years residing in Coast region attending the antenatal clinic at the Coast Provincial General Hospital during the two-month study period with an Edinburgh Postnatal depression Scale (EPDS) score of ≥13. EPDS is a 10-item questionnaire which scores women's feelings and experiences of the last 7 days on a likert scale. The lowest score is 0 while the maximum score is 30. A score of ≥13 is the cut-off score indicating a high likelihood of depression (Cox et al., 1987). The EPDS was not routinely administered in the ANC clinic.

Control Definition

A control was a pregnant woman similarly defined a case but with an EPDS score of <13 (Cox et al., 1987) who was attending the antenatal clinic at the Coast Provincial General Hospital during the same period.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

i. Pregnant women above 15 years residing in Coast region and attending the ANC clinic at the Coast Provincial General Hospital

ii. Pregnant women who are willing to provide written informed consent

3.5.2 Exclusion Criteria

i. Women who had already been diagnosed with depression prior to pregnancy

ii. Women who have concurrent chronic illness like cancer, diabetes, hypertension, congestive cardiac failure

3.6 Sample Size Determination and Sampling Strategy

3.6.1 Sample Size Determination

A defined by Kelsey et al. (1996) for case control studies, the sample size was computed:

$$n_1 = \frac{\left(Z_\alpha + Z_\beta\right)^2 \bar{\mathrm{p}}\bar{\mathrm{q}}(\mathrm{r}+1)}{r(p_1 - p_2)^2}$$

$$n_2 = rn1$$

$p_1 = \text{proportion of cases exposed} = \frac{p_2 \text{OR}}{1+p_2\,(\text{OR}-1)}$

$$\bar{\text{p}} = \frac{p_1 + \text{r}p_2}{r+1}$$

$$\bar{\text{q}} = 1 - \bar{\text{p}}$$

Whereby:

n_1 = number of prenatal depression cases and n_2= number of controls. p_1= proportion of cases with previous history of intimate partner violence and p_2 = proportion of controls with previous history of intimate partner violence depression (primary exposure) that was set at 0.40 (Djamba and Kimuna 2008). $Z_{\alpha/2}$ (1.96) is the required value which specifies the two-tailed confidence level of 95% value and $Z_{1-\beta} = -0.84$ is the required value which specifies the statistical power of 80%. The primary exposure (domestic violence) odds ratio was hypothesized to be 3.41 (Djamba and Kimuna 2008). The ratio of cases to controls was considered to be 1:4 to enhance the statistical power. A sample size of 34 cases and 136 controls was used.

3.6.2 Sampling Strategy

The EPDS scale was administered to all women attending ANC clinic to determine their prenatal depression status. All women who met the case definition (as spelt out in section 3.4) were prospectively recruited into the study as cases until the estimated number of 34 cases was achieved. Controls were a simple random sample of prenatal depression free women (as discussed in section 3.4) who were attending ANC clinic at Coast Provincial General Hospital selected on the day of recruitment of cases.

3.7 Study variables and method of measurement

The dependent variable was prenatal depression which was a binary variable: presence or absence. The predictor variables were demographic characteristics, lifestyle, social network and family risk factors and obstetrics and pregnancy related factors. The demographic factors included age, level of education, occupation and marital status. Social network and family related factors consisted of social support and domestic violence. Lifestyle factors comprised smoking, use of alcohol and substance abuse. Obstetric related factors were unplanned pregnancy, gestational age, history of still birth, history of miscarriage/pregnancy loss and parity. Table 1 shows the method of assessment of the study variables. Figure 1 displays the relationship between the predictor and outcome variables.

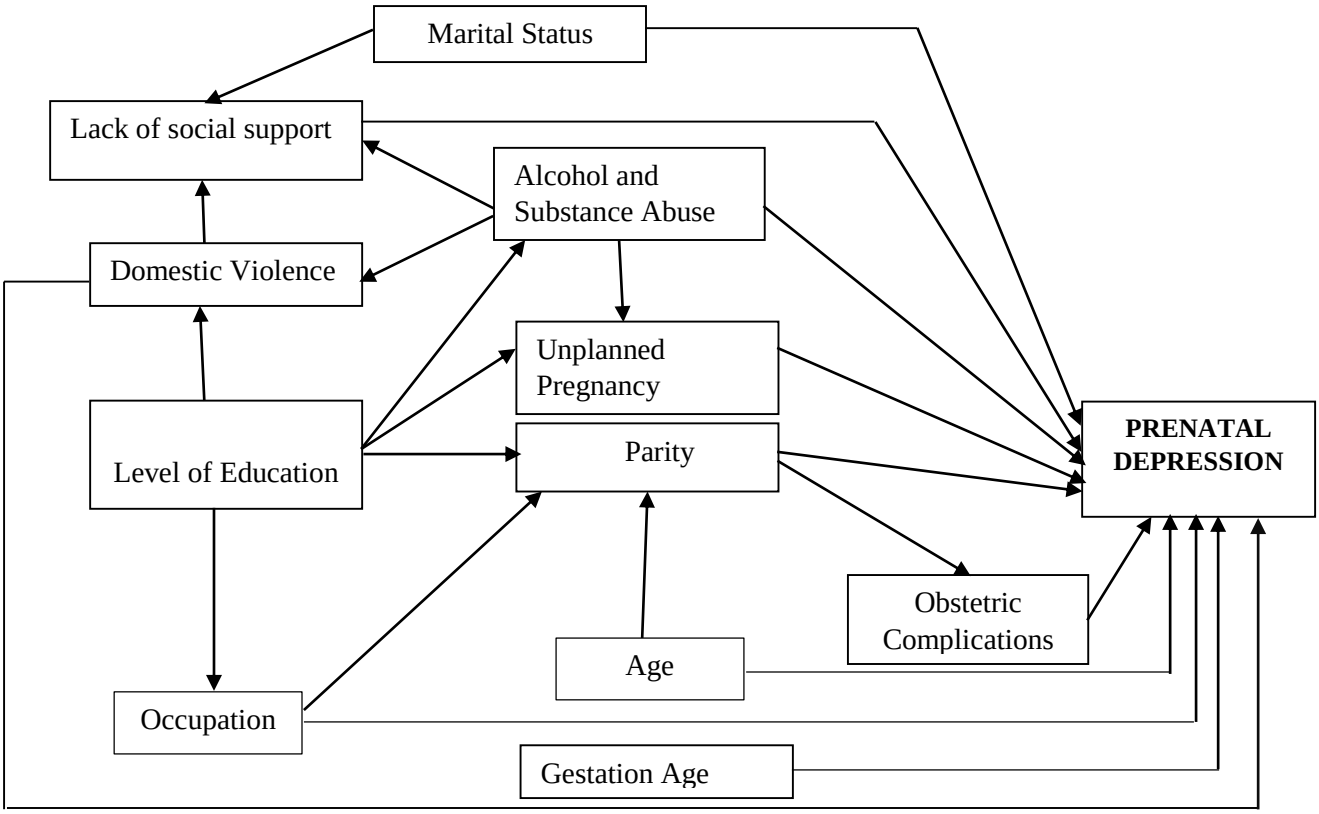
Table 1: Study variables and their assessment methods

Variable	Method of assessment
Prenatal depression (nominal)	This was measured using the Edinburgh Postnatal Scale (EPDS) which is a 10-item questionnaire which scores women's feelings and experiences of the last 7 days on a likert scale. The lowest score is 0 while the maximum score is 30. The recommended cut offs for the English, version is ≥13. The sensitivity and specificity of EPDS in the African setting has been shown to be 94% and 77% respectively (Tsai et al., 2013). The scale had a good level of internal consistency as evidenced by Cronbach's alpha of 0.84. A score of 13 or more denoted presence of prenatal depression while

	a score of <13 denoted absence of prenatal depression (Cox et al., 1987)
Age (continuous)	This was captured in years
Marital status (nominal)	This was captured as: Single, married, divorced or widowed
Level of education (ordinal)	The level of education achieved by the mothers attending ANC. It was categorized into three levels: Primary school, secondary school and tertiary level
Occupation (nominal)	This was assessed in two levels: Employed or Unemployed
Tobacco use (ordinal)	This was through smoking or chewing and it was graded into 3 groups: Non user, rare user or regular user (Smedberg et al. 2015)
Alcohol intake (ordinal)	This was graded into 3 groups: Non user, rare user or regular user (Smedberg et al. 2015)
Substance abuse (ordinal)	Substances that were assessed under substance abuse included cannabis, cocaine, heroin, valium, rohypnol, muguka, miraa, codeine and glue. This was graded into 3 groups: Non user, rare user or regular user (Smedberg et al. 2015)
Current gestational age (continuous)	The pregnant woman's gestational age was abstracted from the ANC booklet based on the LMP. This was captured in weeks

Parity (nominal)	The pregnant woman's parity was abstracted from the ANC booklet. This was captured as either primiparous or multiparous
Unplanned pregnancy (nominal)	The respondents were asked if their current pregnancy was planned or not. This was captured as either planned or unplanned
Obstetric complications (nominal)	These comprised a history of either of the following: abortion, miscarriage, still birth, premature birth or fistula. They were assessed as either being present or absent.
Social support (ordinal)	This was assessed using the Social Provisions Scale (SPS-10) which is a 10-item questionnaire of perceived social support that is administered by the interviewer. Responses are rated on a 4-point Likert scale ranging from 1 "strongly disagree" to 4 "strongly agree". The maximum possible score is 40 with higher scores indicating more perceived social support (Cutrona & Russell, 1987).
Domestic violence (ordinal)	This was assessed through the Composite Abuse Scale (CAS_R-SF) which is an account of intimate partner violence experiences by women. This includes the psychological, physical and sexual abuse experiences. It consists of 15 items presented in a six-point format requiring respondents to answer the frequency of occurrence. This was then categorized as 0 for 'no lifetime experience of abuse' and 1 'lifetime experience of abuse present' (Ford-Gilboe et al. 2016)

3.8 Conceptual framework



The arrows symbolize direction of causality

Figure 1: Causal diagram of factors thought to be associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital, Mombasa County, Kenya

3.9 Recruitment, consenting procedures and data collection

Recruitment of participants was done by two hospital-based research assistants (registered nurses). They underwent training by the principal investigator on study content, administration of EPDS scale, ethical considerations and filling the pretested questionnaire with an aim to meet study objectives and minimize deviations in data collection. Data was collected during the morning hours since most pregnant women attended their ANC clinic between 9am and 1pm. Pregnancy was first

confirmed by the research assistant by checking through the woman's ANC booklet for evidence of pregnancy (a positive PDT test or ultrasound). The research assistant gave information on the eligibility, study purpose and study procedures prior to obtaining consent. For those women who voluntarily consented to participate in the study, the EPDS was administered to determine their depression status. Thereafter, a predetermined questionnaire (Appendix B) was administered to both cases and controls to determine their exposure. A maximum number of four controls for each case were selected. A study flow chart illustrating the enrollment process is shown in Figure 2.

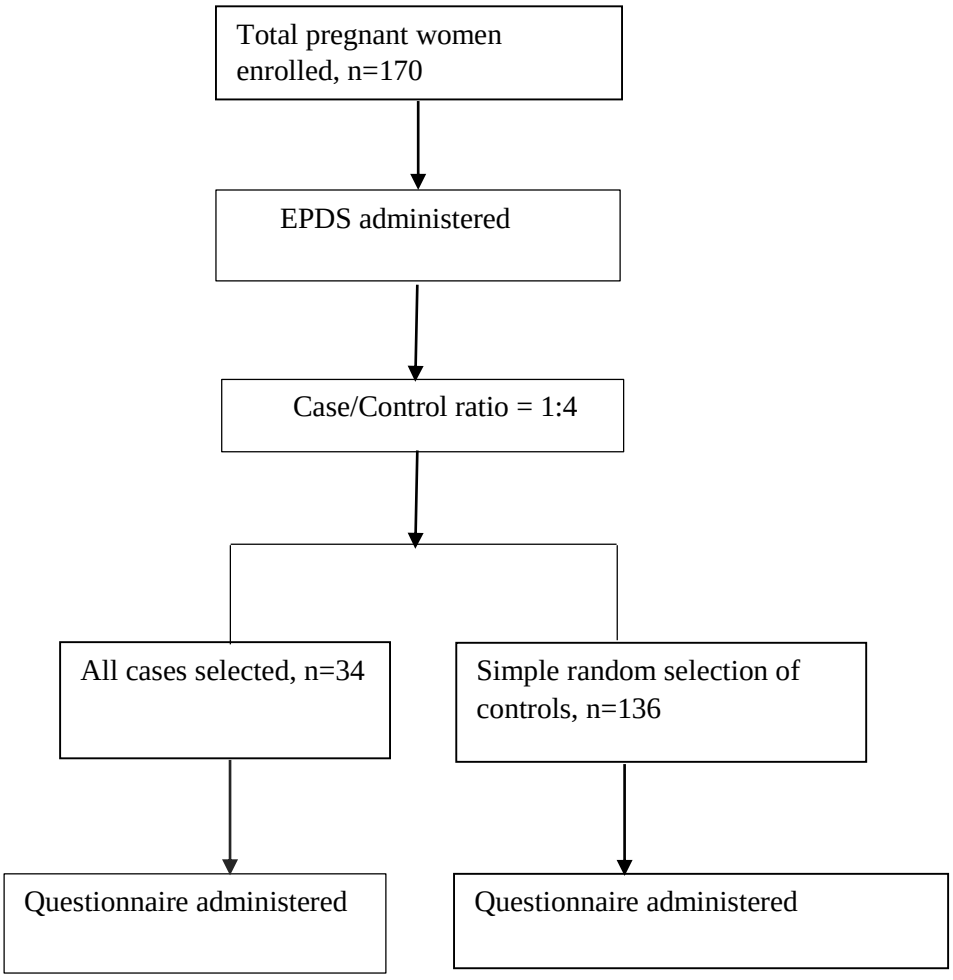


Figure 2: Study flow chart

3.10 Data processing and Analysis

The questionnaires were checked for completeness and accuracy and then coded. Data entry was done in an Excel Spreadsheet (Windows 10). The dataset was then exported to Stata software, version 13.0 for cleaning and analysis.

For continuous variables data were summarized using descriptive statistics (means, medians, standard deviations and inter-quartile ranges). Proportions and percentages were used to generate descriptive data for categorical variables.

In the univariable analysis, logistic regression was employed to assess the association between each predictor on odds of prenatal depression (outcome) at a P value ($P<0.2$) (Dohoo et al., 2012). Since inclusion of age as a continuous variable was insignificant in the univariable analysis, it was categorized into three: 18-25 years, 26-29 years and 30-34 years and reassessed for significance as a categorical variable.

Significant variables in the univariable analysis were included in a multivariable model where a backward step-wise approach was applied to remove variables from the model at $P>0.05$. Of note, the non-significant variables were only eliminated from the model if their exclusion from the model did not result in a greater than 30% change in the regression coefficients of the remaining variables (Dohoo et al., 2012). Two-way interactions were fitted between the remaining variables in the final model and their significance assessed. A Hosmer-Lemeshow goodness of fit was used to assess how well the model fitted the data with a p value of >0.05 being suggestive of a good fit.

3.11 Minimization of Errors and Bias

Before entry into the software the questionnaires were checked for completeness and accuracy via visual scanning. Data was double entered by the data entry clerk and principal investigator who were independent to minimize data entry errors.

Information bias was minimized by thoroughly training the research assistants on the standard operating procedures (SOPs) to ensure consistency in elicitation of information from the respondents.

3.12 Ethical Considerations

Ethical clearance to carry out the research was sought from the KNH-UON Ethics and Research Committee. Before data collection, permission was also sought from the Mombasa County Department of Health. Participants acted independently without coercion or inducement to participate. The purpose and nature of the research was explained to participants, questions by the participant clarified and informed consent (Appendix A) sought before the beginning of the study. Respondents' particulars did not appear in the researcher administered questionnaires and the patients were only identified by the study identification number. The study did not involve any experimental procedures on respondents and no specimen was required from the participants. All data obtained was kept under lock and key to restrict access. During all the steps of the study the participants' rights, privacy, dignity and safety was respected. The participants were at liberty to leave the study at any point and there was no direct remuneration for participating in the study.

CHAPTER 4

RESULTS

4.0 Descriptive statistics of the study data

One hundred and seventy pregnant women attending the ANC clinic at Coast Provincial General Hospital were consented and enrolled in study of which 34 were cases and 136 were controls. Table 2 shows the descriptive statistics of the participants.

The mean age of the respondents was 27.8 years with the mean age of cases being 27.0 years (range: 19-36 years) and the mean age of controls being 28.0 years (range: 18-44 years). Notably, the mean gestational age of the respondents was 28.3 weeks, with the cases and controls having an average gestational age of 26.8 (range: 20-38) and 28.8 (range: 13-38) weeks respectively.

Socio-demographic factors

In this population, majority of the participants were married (88.2%, n=150) of which 67.7% (n=23) were cases and 93.4% (n=127) were controls. On the level of education, 44.1% (n=75) of the respondents had attained tertiary level of education and this comprised 50.0% (n=17) of the cases and 42.7% (n=58) of the controls. Only 45.3% (n=77) of the respondents were employed of which 26.5% (n=9) were cases and 50% (n=68) were controls.

Lifestyle factors

Respondents who reported to have consumed alcohol, tobacco or used a substance of abuse during the pregnancy period constituted 14.7% (n=25) of the population. Amongst these 29.4% (n=10) were cases and 11% (n=15) were controls. Roughly, two-fifths (39.4%, n=67) of the respondents were primiparous with approximately two fifths (38.2%, n=13) being cases and similarly about two-fifths being controls (39.7%, n=54).

Obstetric factors

Roughly, two-fifths (39.4%, n=67) of the respondents were primiparous with approximately two fifths (38.2%, n=13) being cases and similarly about two-fifths being controls (39.7%, n=54). A fifth (20%, n=34) of the respondents reported that the current pregnancy was unplanned. Of these, 38.2% (n=13) were cases while 15.4% (n=21) were controls. Approximately, 19% (18.8%, n=32) of the participants reported to have experienced obstetric complications in previous pregnancies. Of these 26.5% (n=9) were cases and 16.9% (n=23) were controls.

Social network and family factors

Majority of the participants had perceived social support (88.2%, n=150). In particular, 61.8% (n=21) reported to have had social support compared to 94.9% (n=129) of the controls. The proportion of women who experienced domestic violence was 27.6% (n=47), with the proportion of domestic violence among cases being higher 64.7% (n=22) than in controls 18.4% (n=25).

Table 2: Descriptive statistics of women attending the antenatal clinic at the Coast Provincial General Hospital, Mombasa County, Kenya, N=170

Variable	**Category**	**All pregnant women (n=170) N (%)**	**Cases (n=34) n (%)**	**Controls (n=136) n (%)**
Age (Years)	18-25	59 (34.7)	10 (29.4)	49 (36.0)
	26-29	55 (32.4)	17 (50.0)	38 (27.9)
	30-44	56 (32.9)	7 (20.6)	49 (36.0)
Mean	-	-	27.0	28.0
Range	-	-	19-36	18-44
Marital status	Married	150 (88.2)	23 (67.7)	127 (93.4)
	Single	20 (11.8)	11 (32.3)	9 (6.6)

Level of education	Tertiary	75 (44.1)	17 (50.0)	58 (42.7)
	Secondary	63 (37.1)	9 (26.5)	54 (39.7)
	Primary	32 (18.8)	8 (23.5)	24 (17.6)
Occupation	Employed	77 (45.3)	9 (26.5)	68 (50.0)
	Unemployed	93 (54.7)	25 (73.5)	68 (50.0)
Alcohol and drug use	User	25 (14.7)	10 (29.4)	15 (11.0)
	Non-user	145 (85.3)	24 (70.6)	121 (89.0)
Gestational age	2nd trimester	56 (32.9)	15 (44.1)	41 (30.1)
	3rd trimester	114 (67.1)	19 (55.9)	95 (69.9)
Mean	-	-	26.8	28.8
Range	-	-	20-38	13-38
Parity	Primiparous	67 (39.4)	13 (38.2)	54 (39.7)
	Multiparous	103 (60.6)	21 (61.8)	82 (60.3)
Unplanned pregnancy	Yes	34 (20)	13 (38.2)	21 (15.4)
	No	136 (80.0)	21 (61.8)	115 (84.6)
Obstetric complications	Yes	32 (18.8)	9 (26.5)	23 (16.9)
	No	138 (81.2)	25 (73.5)	113 (83.1)
Social support	Yes	150 (88.2)	21 (61.8)	129 (94.9)
	No	20 (11.8)	13 (38.2)	7 (5.1)
Domestic violence experience	Yes	47 (27.6)	22 (64.7)	25 (18.4)
	No	123 (72.4)	12 (35.3)	111 (81.6)
Prenatal depression	No	136 (80.0)	0 (0.0)	136 (100.0)
	Yes	34 (20.0)	34 (100.0)	0 (0.0)

4.1 Results of Univariable regression analyses

Of the factors assessed, the socio-demographic factors that were significantly associated with prenatal depression were age (p=0.045), marital status (p<0.001) and occupation (p=0.012). Alcohol, drug use and substance abuse (p=0.012) was only the lifestyle variable that was significantly associated with prenatal depression. The obstetric factors that were significantly associated with prenatal depression in this study were unplanned pregnancy (p=0.005) and gestational age (p=0.03). With reference to social network and family factors, social support (p<0.001) and domestic violence (p<0.001) registered a significant association with prenatal depression at 20% significance level (Table 3). These variables were subsequently included in the multivariable model.

Table 3: Univariable analysis of factors associated with prenatal depression among women attending the antenatal clinic at Coast Provincial General Hospital, Mombasa County, Kenya, n=170

Variable	**Value**	**Odds Ratio**	**95% CI**	**P-Value**
			Lower Upper	
Age *	18-25	Ref	-	0.045
	26-29	2.2	0.9 – 5.3	
	30-44	0.7	0.3 – 1.9	
Education	Primary	Ref	-	0.335
	Secondary	0.5	0.2 – 1.5	
	Tertiary	0.56	0.3 – 2.3	
Marital status *	Married	Ref	-	<0.001
	Single	6.7	2.5 – 18.1	

Occupation *	Employed	Ref	-	0.012
	Unemployed	1.7	1.1 – 2.5	
Alcohol and drug use *	Non-user	Ref	-	0.012
	User	3.4	1.3 – 8.4	
Gestational age *	3rd trimester	Ref	-	0.030
	2nd trimester	1.8	0.8 – 0.9	
Parity	Primiparous	Ref	-	0.875
	Multiparous	1.1	0.5 – 2.3	
Unplanned pregnancy *	No	Ref	-	0.005
	Yes	3.4	1.5 – 7.8	
Obstetric complications	No	Ref	-	0.217
	Yes	1.8	0.7 – 4.3	
Social support *	No	Ref	-	<0.001
	Yes	0.08	0.03 – 0.2	
Domestic violence *	No	Ref	-	<0.001
	Yes	8.1	3.5 – 18.6	

* Variables for inclusion in the multivariable model (P≤0.20)

4.2 Results of the multivariable regression analysis

From the multivariable analysis, only marital status, occupation, domestic violence and social support were shown to be statistically significant predictors of prenatal depression at 5% significance level (Table 4). The exclusion of the non-significant variables from the model did not result in greater than >30% change in the regression coefficients of the remaining variables.

Compared to participants who were married, those who were single had 17.1 times the odds (OR=17.1; 95% CI 4.0-73.0) of prenatal depression controlling for their occupation, domestic violence and social support status.

Unemployed respondents had 2.4 times the odds of prenatal depression (OR=2.4; 95% CI:1.4-4.2) as employed participants holding their marital status, domestic violence experience and perceived social support constant.

Participants who experienced domestic violence had 18.3 times the odds of prenatal depression (OR=18.3; 95% CI: 5.7-58.7) compared to those who did not experience domestic violence regardless of their marital status, occupation and social support level.

Respondents who had social support had one-fifth the odds of prenatal depression (OR=0.2; 95% CI:0.05-0.8) in comparison to those who did not have social support controlling for their marital status, occupation and domestic violence experience.

The model had a good fit (Pearson chi-square=4.02, P value = 0.403).

Table 4: Multivariable analysis of factors associated with prenatal depression among women attending antenatal clinic in Coast Provincial General Hospital, Mombasa County, Kenya, n=170

Variables	**Values**	**aOR**	**95% CI**	**P value**
			Lower Upper	
Marital status	Married	Ref	-	<0.001
	Single	17.1	4.0 – 73.0	
Occupation	Employed	Ref	-	0.002
	Unemployed	2.4	1.4 – 4.2	
Domestic violence	No	Ref	-	<0.001
	Yes	18.3	5.7 – 58.7	
Social support	No	Ref	-	0.020
	Yes	0.2	0.05 – 0.8	

aOR, adjusted odds ratio

CHAPTER 5

DISCUSSION

Marital status was shown to be a significant risk factor for prenatal depression among women in this study with single women having 17.1 times higher odds of prenatal depression compared to married women (Table 4). This is corroborated by other studies (Adewuya et al., 2007; Patel et al., 2002; Thompson and Ajayi, 2016). A possible explanation could be that being single as a result of a break up or abandonment by a partner can result in emotional problems and lack of social support from the male partners and this could lead to depression. Moreover, single parenting is stigmatized and is not socially acceptable in the African culture and this may predispose one to antenatal depression (Bello et al., 2018; Hartley et al., 2011).

Occupation was associated with prenatal depression with unemployed respondents having 2.4 times higher odds of prenatal depression. The current finding is similar to that reported by a study in Italy which found that participants who were unemployed had 2.17 times the odds of prenatal depression compared to those who were employed (Giardinelli et al., 2012). Another study conducted among Japanese women revealed that employment is protective against prenatal depression (Miyake et al., 2012). A likely explanation for this would be that pregnant women who are unemployed have fewer financial resources which may not be enough to meet the increasing financial demands of pregnancy and this may result to prenatal depression.

Domestic violence (psychological, physical and sexual abuse experiences) was highly associated with prenatal depression with those who experienced domestic violence having 18.3 times odds of prenatal depression. These findings are consistent with those from other studies (Dibaba et al., 2013a; Njim and Mbolingong, 2018). A study in Pakistan described gender-based violence as an

important predictor of prenatal depression with women who experience psychological, physical and sexual violence being prone to antenatal depression (Mezey et al., 2005). Similarly, a study in Ethiopia reported a strong association between partner violence and prenatal depression with an adjusted odds ratio of 3.41 (Dibaba et al., 2013). This is likely to be because domestic violence may cause physical injury with attendant emotional and psychological trauma that can lead to depression (Metheny and Stephenson, 2017). Besides, domestic violence could result to lack of social support which could further lead to depression (Machisa et al., 2018).

Social support was protective against prenatal depression with those who had social support having a fifth the odds of prenatal depression. These findings support those of other studies that found presence of social support to be a safeguarding factor against prenatal depression (Rodriguez et al., 2010; Elsenbruch et al., 2007; Golbasi et al., 2010; Groves et al., 2012; Hartley et al., 2011). This could be due to the fact that social support from the spouse, friends or relatives provide psychosocial resources during pregnancy and these act as a cushion against difficulties that may be experienced during pregnancy hence protect one from antenatal depression. In contrast, women who lack social support are likely to have little emotional support from their spouses, family and friends and this can lead to social instability which subsequently leads to prenatal depression (Golbasi et al., 2010a; Husain et al., 2012b; Rashid and Mohd, 2017).

After accounting for other variables, age was not found to be a risk factor for prenatal depression in this study. These findings are consistent with results from Geneva study (Ratcliff et al., 2015). This could partly be explained by the presence of more important risk factors than age in the final model. However, other studies have revealed that age is a significant determinant of prenatal depression and a likely explanation for this observation would be that young pregnant women have a high likelihood of being financially unstable and they may not be socially and psychologically

prepared to cope with pregnancy demands and this may predispose them to depression. Contrarily, some studies have demonstrated that older women have a higher risk of developing prenatal depression as ageing increases the possibility of experiencing difficulties in conceiving and anxiety of experiencing obstetric complications. Besides, there is a high likelihood of experiencing stigma when you conceive later in life (Muraca and Joseph, 2014; Weobong et al., 2014). In contrast, some studies have found older age to be protective against prenatal depression and this could be related to older women being more financially stable and having stable relationships therefore reducing the possibility of being depressed when pregnant (Williams et al., 1997; McMahon et al., 2011).

Use of alcohol and other drugs of abuse did not significantly predict a participant's probability of developing prenatal depression taking into account the effect of other variables. The results of this study concur with the findings of a study conducted among African American women (Luke et al., 2009). This finding could possibly be due to the fact that for this study the relationship between substance abuse and prenatal depression is mediated through domestic violence and social support so that when they are adjusted for in the presence of substance abuse, this relationship ceases to exist. On the contrary, a study conducted in Nigeria among women attending antenatal clinic reported a relationship between alcohol consumption and development of prenatal depression ($P < 0.004$) (Thompson & Ajayi, 2016). This is likely to be due to the fact that alcohol is a depressant and it inhibits the neurotransmitters that regulate mood such as serotonin and norepinephrine and this can lead to depression (Banerjee, 2014). A study that was conducted among Jordanian women showed that smoking increased the risk of prenatal depression (Abuidhail & Abujilban, 2014). Similarly, a Chinese study that examined the relationship between smoking and pregnancy demonstrated that women who had a history of smoking were likely to develop antenatal

depression (Jeong et al., 2013). This is attributable to the fact that nicotine causes imbalance in the hypothalamic-pituitary-adrenal system leading to hypersecretion of the stress hormone cortisol which is considered a risk factor for depression. Furthermore, nicotine alters the monoamine neurotransmitter system which regulates reactions to stressors and this predisposes one to depression (Fluharty et al., 2017).

After accounting for other variables, unplanned pregnancy was not found to be significantly related to developing prenatal depression in this study. These findings were similar to a study conducted in Cape Town (Hartley et al., 2011). This is partly ascribable to the fact that although an unplanned pregnancy might be unwanted at first, as the pregnancy progresses the shock associated with the undesired occurrence decreases and it becomes more accepted hence reducing the symptoms of depression (Lee et al., 2007). Besides, when a pregnant woman has social support from the spouse, family and friends an unplanned pregnancy is less likely to result into depression. However, other studies have reported a significant relationship between unplanned pregnancy and prenatal depression. This is related to the fact that unplanned pregnancy is associated with lack of preparedness to deal with the financial and psychological demands of pregnancy. Likewise, the uncertainties associated with pregnancy such as perinatal complications are likely to be heightened when the pregnancy is not planned (Ajinkya et al., 2013a; Dibaba et al., 2013a; Lancaster et al., 2010; Leigh and Milgrom, 2008).

Gestational age was not found to be a predictor of prenatal depression after controlling for other variables. This could partly be explained by the presence of other variables more important than gestational age in the final model. Another study conducted in KwaZulu-Natal reported similar findings (Manikkam and Burns, 2012). Nonetheless, other studies have demonstrated that women who are in the second or third trimester are less likely to be depressed antenatally compared to

women in the first trimester (Thompson and Ajayi, 2016). This can be explained by the fact that during the first trimester some women find it difficult to cope with pregnancy symptoms like nausea and food aversions and this can lead to depression. Another reason for this observation could be that some women might be apprehensive when they realize that they are pregnant especially if the pregnancy was unplanned. However, as the pregnancy progresses the pregnancy is accepted and the symptoms of depression subside (Biaggi et al., 2016). Contrary to these findings, a study conducted in England revealed that symptoms of depression in pregnancy increased with increase in gestational age with the highest level of depression reported in the third trimester. This can be explained by the fact that as the pregnancy progresses, anxiety related to childbirth increases due to proximity to delivery (Evans et al., 2001).

Limitations of the study

Assessment of prenatal depression using the Edinburgh Postnatal Depression Scale which is a screening tool was a possible limitation of the study. Differential recall of past exposures between the cases and controls was a limitation in this study with cases having more complete recalls than controls. Moreover, cases were more likely to over-report the exposures and this could lead to bias in the effect estimates. This was minimized by training the interviewers to ask questions in a similar manner for both cases and controls to minimize the influence on the participants' responses, to allow for sufficient time for recall of long-term memory when asking questions and to verify some of the responses given with the mother and child health ANC booklet. There was the possibility of reverse causality in instances where prenatal depression may have preceded the exposure therefore making it difficult to establish causality.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study established that marital status and occupation were the socio-demographic factors that were associated with prenatal depression among women attending ANC clinic at CPGH while the social and family related factors that were significantly associated with prenatal depression were domestic violence and lack of social support. Notably, none of the lifestyle and obstetric factors considered in this study were found to be significantly related to prenatal depression. Many other studies have explored the predictors of prenatal depression and identified a multiplex risk factor aetiology in addition to the factors identified in this study. As an important public health concern, prenatal depression supportive and preventive interventions that take into consideration pregnant women's occupation, marital status, exposure to domestic violence and availability of social support should be formulated as part of maternal child health policies and implemented in health facilities. Early and correct recognition of women who are likely to develop prenatal depression will enable close monitoring throughout pregnancy to enable early recognition of depression symptoms and provision of appropriate interventions.

6.2 Recommendations

Based on the findings of this study the following recommendations are made to reduce the occurrence of prenatal depression among pregnant women in Mombasa:

- The county government of Mombasa should consider implementation of screening for prenatal depression among pregnant women attending ANC clinics in the county into policy as part of the routine antenatal care package. Early detection will enable timely

interventions and therefore minimize the effects of prenatal depression on the pregnant woman as well as the fetus

- Given that unemployment was a major predictor of prenatal depression, and our study population comprised of mostly youth (95%), the county government of Mombasa should facilitate engagement of the youth in income generating activities. The county government should carry out business opportunities mapping within the county and disseminate the information so that the youth can identify the business opportunities. The county government should also set up youth polytechnics and promote courses that will instill in the youth necessary skills to enable them gain meaningful employment or get self-employed.
- Hospitals psychiatric departments in collaboration with the reproductive health departments to establish social support networks and spaces to provide an avenue for the prenatally depressed women to meet, share challenges and coping mechanisms
- In consideration of gender -based violence being a predictor of prenatal depression in this setting, the county government in Mombasa in collaboration with the National Gender and Equality Commission should implement the county government policy on sexual and gender based violence (SGBV) that aims to expedite and strengthen efforts towards elimination of all forms of SGBV and improvement the quality of life the victims. This can be achieved by developing a preventive, supportive and protective environment, sensitization of communities and taking of legal action against the perpetrators.

7.0 REFERENCES

Abuidhail, J., Abujilban, S., 2014a. Characteristics of Jordanian depressed pregnant women: a comparison study: Antenatal depression. J. Psychiatr. Ment. Health Nurs. 21, 573–579.

Abujilban, S.K., Abuidhail, J., Al-Modallal, H., Hamaideh, S., Mosemli, O., 2014. Predictors of antenatal depression among Jordanian pregnant women in their third trimester. Health Care Women Int. 35, 200–215.

Adewuya, A.O., Ola, B.A., Aloba, O.O., Dada, A.O., Fasoto, O.O., 2007a. Prevalence and correlates of depression in late pregnancy among Nigerian women. Depress. Anxiety 24, 15–21.

Ajinkya, S., Jadhav, P.R., Srivastava, N.N., 2013a. Depression during pregnancy: Prevalence and obstetric risk factors among pregnant women attending a tertiary care hospital in Navi Mumbai. Ind. Psychiatry J. 22, 37–40.

Akama, J.S., Kieti, D., 2007. Tourism and socio-economic development in developing countries: A case study of Mombasa Resort in Kenya. J. Sustain. Tour. 15, 735–748.

Akçalı Aslan, P., Aydın, N., Yazıcı, E., Aksoy, A.N., Kirkan, T.S., Daloglu, G.A., 2014. Prevalence of depressive disorders and related factors in women in the first trimester of their pregnancies in Erzurum, Turkey. Int. J. Soc. Psychiatry 60, 809–817.

Ali, N.S., Azam, I.S., Ali, B.S., Tabbusum, G., Moin, S.S., 2012. Frequency and Associated Factors for Anxiety and Depression in Pregnant Women: A Hospital-Based Cross-Sectional Study. ScientificWorldJournal. 2012;2012:653098.

Amorim, P., 2000. Mini International Neuropsychiatric Interview (MINI): validação de entrevista breve para diagnóstico de transtornos mentais. Rev. Bras. Psiquiatr. 22, 106–115.

Babu, G.R., Murthy, G.V.S., Singh, N., Nath, A., Rathnaiah, M., Saldanha, N., Deepa, R., Kinra, S., 2018. Sociodemographic and Medical Risk Factors Associated With Antepartum Depression. Front. Public Health 6.

Banerjee, N., 2014. Neurotransmitters in alcoholism: A review of neurobiological and genetic studies. Indian J. Hum. Genet. 20, 20–31.

Bauer, A., Pawlby, S.J., Plant, D.T., King, D., Pariante, C.M., Knapp, M., 2015. Perinatal depression and child development: exploring the economic consequences from a South London cohort. Psychol. Med. 45, 51–61.

Bawahab, J.A., Alahmadi, J.R., Ibrahim, A.M., 2017. Prevalence and determinants of antenatal depression among women attending primary health care centers in Western Saudi Arabia. Saudi Med. J. 38, 1237–1242.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J., 1961. An Inventory for Measuring Depression. Arch. Gen. Psychiatry 4, 561–571.

Bello, C.B., Irinoye, O., Akpor, O.A., 2018. Health status of families: A comparative study of one-parent and two-parent families in Ondo State, Nigeria. Afr J Prm Health Care Med. 2018;10(1), a1550.

Bennett, H.A., Einarson, A., Taddio, A., Koren, G., Einarson, T.R., 2004a. Prevalence of depression during pregnancy: systematic review. Obstet. Gynecol. 103, 698–709.

Bhat, N.A., Hassan, R., Shafiq, M., Sheikh, S., 2015. Sociodemographic factors: A major predictor of anxiety and depression among pregnant women. Delhi Psychiatry Journal 2015;18 (1).

Biaggi, A., Conroy, S., Pawlby, S., Pariante, C.M., 2016a. Identifying the women at risk of antenatal anxiety and depression: A systematic review. J. Affect. Disord. 191, 62–77.

Biratu, A., Haile, D., 2015. Prevalence of antenatal depression and associated factors among pregnant women in Addis Ababa, Ethiopia: a cross-sectional study. Reprod. Health 12, 99.
Bödecs, T., Szilágyi, E., Cholnoky, P., Sándor, J., Gonda, X., Rihmer, Z., Horváth, B., 2013. Prevalence and psychosocial background of anxiety and depression emerging during the first trimester of pregnancy: data from a Hungarian population-based sample. Psychiatr. Danub. 25, 352–358.
Bonari, L., Pinto, N., Ahn, E., Einarson, A., Steiner, M., Koren, G., 2004. Perinatal risks of untreated depression during pregnancy. Can. J. Psychiatry 49, 726–735.
Bottorff, J.L., Poole, N., Kelly, M.T., Greaves, L., Marcellus, L., Jung, M., 2014. Tobacco and alcohol use in the context of adolescent pregnancy and postpartum: a scoping review of the literature. Health Soc. Care Community 22, 561–574.
Bowen, A., Stewart, N., Baetz, M., Muhajarine, N., 2009. Antenatal depression in socially high-risk women in Canada. J. Epidemiol. Community Health 63, 414–416.
Brittain, K., Myer, L., Koen, N., Koopowitz, S., Donald, K.A., Barnett, W., Zar, H.J., Stein, D.J., 2015a. Risk Factors for Antenatal Depression and Associations with Infant Birth Outcomes: Results From a South African Birth Cohort Study. Paediatr. Perinat. Epidemiol. 29, 505–514.
Castro e Couto, T., Martins Brancaglion, M.Y., Nogueira Cardoso, M., Bergo Protzner, A., Duarte Garcia, F., Nicolato, R., Lopes P. Aguiar, R.A., Vitor Leite, H., Corrêa, H., 2015. What is the best tool for screening antenatal depression? J. Affect. Disord. 178, 12–17.
Cheng, E.R., Bauer, N.S., Downs, S.M., Sanders, L.M., 2016. Parent Health Literacy, Depression, and Risk for Pediatric Injury. Pediatrics. 2016 Jul;138(1).
Chorwe-Sungani, G., Chipps, J., 2017. A systematic review of screening instruments for depression for use in antenatal services in low resource settings. BMC Psychiatry. 2017 Mar 24;17(1):112.
Coll, C. de V.N., da Silveira, M.F., Bassani, D.G., Netsi, E., Wehrmeister, F.C., Barros, F.C., Stein, A., 2017. Antenatal depressive symptoms among pregnant women: Evidence from a Southern Brazilian population-based cohort study. J. Affect. Disord. 209, 140–146.
Collins, P.Y., Insel, T.R., Chockalingam, A., Daar, A., Maddox, Y.T., 2013. Grand Challenges in Global Mental Health: Integration in Research, Policy, and Practice. PLOS Med. 10, e1001434.
Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. Br. J. Psychiatry 150, 782–786.
Deklava, L., Lubina, K., Circenis, K., Sudraba, V., Millere, I., 2015. Causes of Anxiety during Pregnancy. Procedia - Soc. Behav. Sci. 205, 623–626.
Dias, C.C., Figueiredo, B., 2015. Breastfeeding and depression: a systematic review of the literature. J. Affect. Disord. 171, 142–154.
Dibaba, Y., Fantahun, M., Hindin, M.J., 2013a. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural Southwestern Ethiopia. BMC Pregnancy Childbirth 13, 135. https://doi.org/10.1186/1471-2393-13-135
Djamba, Y.K., Kimuna, S.R., 2008. Intimate Partner Violence among Married Women in Kenya. J. Asian Afr. Stud. 43, 457–469.
Ehsanpour, S., Shabangiz, A., Bahadoran, P., Kheirabadi, G.R., 2012. The association of depression and preterm labor. Iran. J. Nurs. Midwifery Res. 17, 275–278.

Elsenbruch, S., Benson, S., Rücke, M., Rose, M., Dudenhausen, J., Pincus-Knackstedt, M.K., Klapp, B.F., Arck, P.C., 2007. Social support during pregnancy: effects on maternal depressive symptoms, smoking and pregnancy outcome. Hum. Reprod. 22, 869–877.

Evans, J., Heron, J., Francomb, H., Oke, S., Golding, J., 2001b. Cohort study of depressed mood during pregnancy and after childbirth. BMJ 323, 257–260.

Fisher, J., Cabral de Mello, M., Patel, V., Rahman, A., Tran, T., Holton, S., Holmes, W., 2012. Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: A systematic review.

Floyd, R.L., Sidhu, J.S., 2004. Monitoring prenatal alcohol exposure. Am. J. Med. Genet. C Semin. Med. Genet. 127C, 3–9.

Fluharty, M., Taylor, A.E., Grabski, M., Munafò, M.R., 2017. The Association of Cigarette Smoking With Depression and Anxiety: A Systematic Review. Nicotine Tob. Res. 19, 3–13.

Ford-Gilboe, M., Wathen, C.N., Varcoe, C., MacMillan, H.L., Scott-Storey, K., Mantler, T., Hegarty, K., Perrin, N., 2016. Development of a brief measure of intimate partner violence experiences: the Composite Abuse Scale (Revised)—Short Form (CASR-SF). BMJ Open. 2016 Dec 7;6(12):e012824.

Gavin, N.I., Gaynes, B.N., Lohr, K.N., Meltzer-Brody, S., Gartlehner, G., Swinson, T., 2005a. Perinatal depression: a systematic review of prevalence and incidence. Obstet. Gynecol. 106, 1071–1083.

Gelman, P.L., Flores-Ramos, M., López-Martínez, M., Fuentes, C.C., Grajeda, J.P.R., 2015. Hypothalamic-pituitary-adrenal axis function during perinatal depression. Neurosci. Bull. 31, 338–350.

Gentile, S., 2017. Untreated depression during pregnancy: Short- and long-term effects in offspring. A systematic review. Neuroscience 342, 154–166.

Giardinelli, L., Innocenti, A., Benni, L., Stefanini, M.C., Lino, G., Lunardi, C., Svelto, V., Afshar, S., Bovani, R., Castellini, G., Faravelli, C., 2012a. Depression and anxiety in perinatal period: prevalence and risk factors in an Italian sample. Arch. Womens Ment. Health 15, 21–30. https://doi.org/10.1007/s00737-011-0249-8

Glazier, R.H., Elgar, F.J., Goel, V., Holzapfel, S., 2004. Stress, social support, and emotional distress in a community sample of pregnant women. J. Psychosom. Obstet. Gynaecol. 25, 247–255.

Golbasi, Z., Kelleci, M., Kisacik, G., Cetin, A., 2010a. Prevalence and Correlates of Depression in Pregnancy Among Turkish Women. Matern. Child Health J. 14, 485–491.

Gravensteen, I.K., Jacobsen, E.-M., Sandset, P.M., Helgadottir, L.B., Rådestad, I., Sandvik, L., Ekeberg, Ø., 2018. Anxiety, depression and relationship satisfaction in the pregnancy following stillbirth and after the birth of a live-born baby: a prospective study. BMC Pregnancy Childbirth 18.

Grigoriadis, S., VonderPorten, E.H., Mamisashvili, L., Tomlinson, G., Dennis, C.-L., Koren, G., Steiner, M., Mousmanis, P., Cheung, A., Radford, K., Martinovic, J., Ross, L.E., 2013. The impact of maternal depression during pregnancy on perinatal outcomes: a systematic review and meta-analysis. J. Clin. Psychiatry 74, e321-341.

Grote, N.K., Bridge, J.A., Gavin, A.R., Melville, J.L., Iyengar, S., Katon, W.J., 2010a. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. Arch. Gen. Psychiatry 67, 1012–1024.

Groves, A.K., Kagee, A., Maman, S., Moodley, D., Rouse, P., 2012. Associations Between Intimate Partner Violence and Emotional Distress Among Pregnant Women in Durban, South Africa. J. Interpers. Violence 27, 1341–1356.

Hahn, R.A., Truman, B.I., 2015. Education Improves Public Health and Promotes Health Equity. Int. J. Health Serv. Plan. Adm. Eval. 45, 657–678.

Hamilton, M., 1960. A Rating Scale for Depression. J. Neurol. Neurosurg. Psychiatry 23, 56–62.

Harandi, T.F., Taghinasab, M.M., Nayeri, T.D., 2017. The correlation of social support with mental health: A meta-analysis. Electron. Physician 9, 5212–5222. 2

Hartley, M., Tomlinson, M., Greco, E., Comulada, W.S., Stewart, J., le Roux, I., Mbewu, N., Rotheram-Borus, M.J., 2011a. Depressed mood in pregnancy: prevalence and correlates in two Cape Town peri-urban settlements. Reprod. Health 8, 9.

Hartley, M., Tomlinson, M., Greco, E., Comulada, W.S., Stewart, J., le Roux, I., Mbewu, N., Rotheram-Borus, M.J., 2011b. Depressed mood in pregnancy: prevalence and correlates in two Cape Town peri-urban settlements. Reprod. Health 8, 9.

Holden, K.B., McKenzie, R., Pruitt, V., Aaron, K., Hall, S., 2012. Depressive Symptoms, Substance Abuse, and Intimate Partner Violence among Pregnant Women of Diverse Ethnicities. J. Health Care Poor Underserved 23, 226–241.

Husain, N., Cruickshank, K., Husain, M., Khan, S., Tomenson, B., Rahman, A., 2012a. Social stress and depression during pregnancy and in the postnatal period in British Pakistani mothers: a cohort study. J. Affect. Disord. 140, 268–276.

Husain, N., Cruickshank, K., Husain, M., Khan, S., Tomenson, B., Rahman, A., 2012b. Social stress and depression during pregnancy and in the postnatal period in British Pakistani mothers: a cohort study. J. Affect. Disord. 140, 268–276.

Jeong, H.-G., Lim, J.-S., Lee, M.-S., Kim, S.-H., Jung, I.-K., Joe, S.-H., 2013a. The association of psychosocial factors and obstetric history with depression in pregnant women: focus on the role of emotional support. Gen. Hosp. Psychiatry 35, 354–358.

Jeong, H.-G., Lim, J.-S., Lee, M.-S., Kim, S.-H., Jung, I.-K., Joe, S.-H., 2013b. The association of psychosocial factors and obstetric history with depression in pregnant women: focus on the role of emotional support. Gen. Hosp. Psychiatry 35, 354–358.

Lancaster, C.A., Gold, K.J., Flynn, H.A., Yoo, H., Marcus, S.M., Davis, M.M., 2010. Risk factors for depressive symptoms during pregnancy: a systematic review. Am. J. Obstet. Gynecol. 202, 5–14.

Lee, A.M., Lam, S.K., Sze Mun Lau, S.M., Chong, C.S.Y., Chui, H.W., Fong, D.Y.T., 2007. Prevalence, course, and risk factors for antenatal anxiety and depression. Obstet. Gynecol. 110, 1102–1112.

Leigh, B., Milgrom, J., 2008a. Risk factors for antenatal depression, postnatal depression and parenting stress. BMC Psychiatry 8, 24.

Luke, S., Salihu, H.M., Alio, A.P., Mbah, A.K., Jeffers, D., Berry, E.L., Mishkit, V.R., 2009a. Risk Factors for Major Antenatal Depression among Low-Income African American Women. J. Womens Health 18, 1841–1846.

Machisa, M.T., Christofides, N., Jewkes, R., 2018. Social support factors associated with psychological resilience among women survivors of intimate partner violence in Gauteng, South Africa. Glob. Health Action 11, 1491114.

Madlala, S., Kassier, S., 2018. Antenatal and postpartum depression: effects on infant and young child health and feeding practices. South Afr. J. Clin. Nutr. 31, 1–7.

Manikkam, L., Burns, J.K., 2012a. Antenatal depression and its risk factors: An urban prevalence study in KwaZulu-Natal. S. Afr. Med. J. 102, 940–944.

Marcus, S.M., Flynn, H.A., Blow, F.C., Barry, K.L., 2003. Depressive Symptoms among Pregnant Women Screened in Obstetrics Settings. J. Womens Health 12, 373–380.

Martini, J., Petzoldt, J., Einsle, F., Beesdo-Baum, K., Höfler, M., Wittchen, H.-U., 2015a. Risk factors and course patterns of anxiety and depressive disorders during pregnancy and after delivery: A prospective-longitudinal study. J. Affect. Disord. 175, 385–395.

McLeish, J., Redshaw, M., 2017. Mothers' accounts of the impact on emotional wellbeing of organised peer support in pregnancy and early parenthood: a qualitative study. BMC Pregnancy Childbirth 17, 28.

McMahon, C.A., Boivin, J., Gibson, F.L., Fisher, J.R.W., Hammarberg, K., Wynter, K., Saunders, D.M., 2011. Older first-time mothers and early postpartum depression: a prospective cohort study of women conceiving spontaneously or with assisted reproductive technologies. Fertil. Steril. 96, 1218–1224.

Metheny, N., Stephenson, R., 2017. Intimate Partner Violence and Uptake of Antenatal Care: A Scoping Review of Low- and Middle-Income Country Studies. Int. Perspect. Sex. Reprod. Health 43, 163–171.

Mezey, G., Bacchus, L., Bewley, S., White, S., 2005. Domestic violence, lifetime trauma and psychological health of childbearing women. BJOG Int. J. Obstet. Gynaecol. 112, 197–204.

Minkovitz, C.S., Strobino, D., Scharfstein, D., Hou, W., Miller, T., Mistry, K.B., Swartz, K., 2005. Maternal depressive symptoms and children's receipt of health care in the first 3 years of life. Pediatrics 115, 306–314.

Miyake, Y., Tanaka, K., Arakawa, M., 2012. Employment, income, and education and prevalence of depressive symptoms during pregnancy: the Kyushu Okinawa Maternal and Child Health Study. BMC Psychiatry 12, 117.

Muraca, G.M., Joseph, K.S., 2014. The Association Between Maternal Age and Depression. J. Obstet. Gynaecol. Can. 36, 803–810. https://doi.org/10.1016/S1701-2163(15)30482-5

Nasreen, H.E., Kabir, Z.N., Forsell, Y., Edhborg, M., 2011. Prevalence and associated factors of depressive and anxiety symptoms during pregnancy: A population based study in rural Bangladesh. BMC Womens Health 11, 22.

Njim, T., Mbolingong, F.N., 2018. Intimate partner violence and depression among pregnant women in the North west region of Cameroon: a research proposal. BMC Res. Notes 11.

Ogbo, F.A., Eastwood, J., Hendry, A., Jalaludin, B., Agho, K.E., Barnett, B., Page, A., 2018. Determinants of antenatal depression and postnatal depression in Australia. BMC Psychiatry 18, 49.

Omidvar, S., Faramarzi, M., Hajian-Tilak, K., Amiri, F.N., 2018. Associations of psychosocial factors with pregnancy healthy life styles. PLOS ONE 13, e0191723.

Ongeri, L., Otieno, P., Mbui, J., Juma, E., Mathai, M., 2016. Antepartum Risk Factors for Postpartum Depression: A Follow up Study among Urban Women Living in Nairobi, Kenya. J. Pregnancy Child Health 2016;03(05).

Osok, J., Kigamwa, P., Stoep, A.V., Huang, K.-Y., Kumar, M., 2018. Depression and its psychosocial risk factors in pregnant Kenyan adolescents: a cross-sectional study in a community health Centre of Nairobi. BMC Psychiatry. 2018 May 18;18(1):136.

Patel, V., Rodrigues, M., DeSouza, N., 2002. Gender, poverty, and postnatal depression: a study of mothers in Goa, India. Am. J. Psychiatry 159, 43–47.

Rahman, K., Bowen, A., Muhajarine, N., 2014a. Examining the Factors that Moderate and Mediate the Effects on Depression during Pregnancy and Postpartum. J. Pregnancy Child Health 1, 1–8.

Räisänen, S., Lehto, S.M., Nielsen, H.S., Gissler, M., Kramer, M.R., Heinonen, S., 2014. Risk factors for and perinatal outcomes of major depression during pregnancy: a population-based analysis during 2002-2010 in Finland. BMJ Open 4, e004883.

Rashid, A., Mohd, R., 2017. Poor social support as a risk factor for antenatal depressive symptoms among women attending public antennal clinics in Penang, Malaysia. Reprod. Health 14.

Ratcliff, B.G., Sharapova, A., Suardi, F., Borel, F., 2015. Factors associated with antenatal depression and obstetric complications in immigrant women in Geneva. Midwifery 31, 871–878.

Redshaw, M., Henderson, J., 2013. From Antenatal to Postnatal Depression: Associated Factors and Mitigating Influences. J. Womens Health 22, 518–525.

Robertson, E., Grace, S., Wallington, T., Stewart, D.E., 2004. Antenatal risk factors for postpartum depression: a synthesis of recent literature. Gen. Hosp. Psychiatry 26, 289–295.

Rodriguez, M.A., Valentine, J., Ahmed, S.R., Eisenman, D.P., Sumner, L.A., Heilemann, M.V., Liu, H., 2010. Intimate Partner Violence and Maternal Depression During the Perinatal Period: A Longitudinal Investigation of Latinas. Violence Women 16, 543–559.

Rubertsson, C., Hellström, J., Cross, M., Sydsjö, G., 2014. Anxiety in early pregnancy: prevalence and contributing factors. Arch. Womens Ment. Health 17, 221–228.

Rwakarema, M., Premji, S.S., Nyanza, E.C., Riziki, P., Palacios-Derflingher, L., 2015. Antenatal depression is associated with pregnancy-related anxiety, partner relations, and wealth in women in Northern Tanzania: a cross-sectional study. BMC Womens Health. 2015 Sep 2;15:68.

Shidhaye, P.R., Giri, P.A., 2014. Maternal Depression: A Hidden Burden in Developing Countries. Ann. Med. Health Sci. Res. 4, 463.

Smedberg, J., Lupattelli, A., Mårdby, A.-C., Øverland, S., Nordeng, H., 2015. The relationship between maternal depression and smoking cessation during pregnancy--a cross-sectional study of pregnant women from 15 European countries. Arch. Womens Ment. Health 18, 73–84.

Smith, M.V., Shao, L., Howell, H., Lin, H., Yonkers, K.A., 2011. Perinatal Depression and Birth Outcomes in a Healthy Start Project. Matern. Child Health J. 15, 401–409.

Srivastava, K., 2012. Women and mental health: Psychosocial perspective. Ind. Psychiatry J. 21, 1–3.

Stein, A., Pearson, R.M., Goodman, S.H., Rapa, E., Rahman, A., McCallum, M., Howard, L.M., Pariante, C.M., 2014. Effects of perinatal mental disorders on the fetus and child. The Lancet 384, 1800–1819.

Stewart, R.C., Umar, E., Tomenson, B., Creed, F., 2014. A cross-sectional study of antenatal depression and associated factors in Malawi. Arch. Womens Ment. Health 17, 145–154.

Temmerman, M., Ogbe, E., Manguro, G., Khandwalla, I., Thiongo, M., Mandaliya, K.N., Dierick, L., MacGill, M., Gichangi, P., 2019. The gender-based violence and recovery centre at Coast Provincial General Hospital, Mombasa, Kenya: An integrated care model for survivors of sexual violence. PLOS Med. 16, e1002886.

Thompson, O., Ajayi, I., 2016a. Prevalence of Antenatal Depression and Associated Risk Factors among Pregnant Women Attending Antenatal Clinics in Abeokuta North Local Government Area, Nigeria. Depress Res Treat. 2016;2016:4518979.

Tsai, A.C., Scott, J.A., Hung, K.J., Zhu, J.Q., Matthews, L.T., Psaros, C., Tomlinson, M., 2013. Reliability and validity of instruments for assessing perinatal depression in African settings: systematic review and meta-analysis. PloS One 8, e82521.

Weobong, B., Soremekun, S., Ten Asbroek, A.H., Amenga-Etego, S., Danso, S., Owusu-Agyei, S., Prince, M., Kirkwood, B.R., 2014a. Prevalence and determinants of antenatal depression among pregnant women in a predominantly rural population in Ghana: the DON population-based study. J. Affect. Disord. 165, 1–7.

Weobong, B., Soremekun, S., Ten Asbroek, A.H., Amenga-Etego, S., Danso, S., Owusu-Agyei, S., Prince, M., Kirkwood, B.R., 2014b. Prevalence and determinants of antenatal depression among pregnant women in a predominantly rural population in Ghana: the DON population-based study. J. Affect. Disord. 165, 1–7.

Zeng, Y., Cui, Y., Li, J., 2015. Prevalence and predictors of antenatal depressive symptoms among Chinese women in their third trimester: a cross-sectional survey. Zeng Y, Cui Y, Li J. Prevalence and predictors of antenatal depressive symptoms among Chinese women in their third trimester: a cross-sectional survey. BMC Psychiatry. 2015 Apr 2;15:66.

Zimmerman, F.J., Katon, W., 2005. Socioeconomic status, depression disparities, and financial strain: what lies behind the income-depression relationship? Health Econ. 14, 1197–1215.

8.0 APPENDICES

A. CONSENT TO PARTICIPATE IN A RESEARCH STUDY

(To be administered in both English and Swahili)

Title of the Study: Factors associated with prenatal depression among women attending the antenatal clinic in Coast Provincial General Hospital, Mombasa County, Kenya

Principal Investigator and Institutional Affiliation: Harriet Mirieri, University of Nairobi's School of Public Health.

Introduction

You are being requested to take part in a research being conducted by Harriet Mirieri. The purpose of this consent form is to provide information that will assist you decide whether you will participate in this study or not. Please read through the form carefully and ask about anything you don't understand. Feel free to ask any questions about the purpose of the study, the possible risks and benefits, your rights as a participant and anything else about the research or this form that you do not understand. You are free to decide to join the study or not. If you decide to join the study, I will request you to sign this form and I will give you a copy of this form for your records. The decision to join this study is voluntary and you are free to leave at any point. Withdrawal from the study will not affect your right to receive services from the hospital.

This study has been approved by The Kenyatta National Hospital-University of Nairobi Ethics and Research Committee

What is this study about?

The research is being done to learn more about prenatal depression and the researchers will be interviewing pregnant women attending ANC clinic at Coast Provincial General Hospital. The

purpose of the interview is to establish the factors associated with prenatal depression among women attending ANC clinic at CPGH. You will be asked questions about your experience or exposure to some factors thought to be associated with prenatal depression. This study will comprise of approximately **170** participants in this study randomly chosen.

We are asking for your consent to participate in this study.

What will happen if you decide to be in the research study?

If you agree to participate in this study, in a private area where you will feel comfortable answering questions, a trained interviewer will ask you a few questions to determine whether you have symptoms of depression in pregnancy. Depending on whether you have these symptoms or not, the interviewer will administer a questionnaire and ask you further questions about your pregnancy, social support, life style, past medical history and daily life experiences. We are recruiting pregnant women who are potentially depressed in pregnancy and some who are not. By recruiting you into the study, it does not necessarily mean that you have prenatal depression. The interview will take approximately twenty (30) minutes. Participation in this study is voluntary and there will be no compensation for participation.

Are there any risks, benefits, harms, discomforts associated with this study?

The risks of being part of this study are low. The study staff will ask you questions about yourself and your medical history. Some of these questions might make you feel uncomfortable. If this happens, feel free not to answer the questions

Will the information I give you be kept private?

The data for this study will be kept confidential with access to only members of the study team. We will protect your privacy in the following ways by using a participant identification number

instead of your name on the forms, we will store study forms in a locked file cabinet that only study staff can access and when presenting the results of this study we will not include any information that could identify you.

Are there any benefits to me if I am in this study?

You will have access to information on prenatal depression. If you take part in this study the results may contribute to understanding of prenatal depression and the associated factors and prenatal depression screening and prevention programs. This information will also contribute to science and health policy making.

What are my rights as a study volunteer?

Your participation in this research study is completely voluntary. You are free to stop participating at any time and this will not affect your health care.

Will participating in this study cost you anything?

Participating in this research study will not cost you anything unless in the case where you will call or text the provided telephone numbers for questions or concerns related to your participation in the study. Participation in this study is voluntary and there will be NO compensation for participation.

Who can I talk to if I have questions?

In case of any questions regarding your participation in this study please call the principal investigator Harriet Mirieri, Phone: 0712831278. For more information about your rights as a research participant, you may contact the Secretary or Chairperson, **Kenyatta National Hospital-**

University of Nairobi Ethics and Research Committee Telephone No. **2726300** Ext. **44102**, E-mail: uonknh_erc@uonbi.ac.ke.

Statement of Consent

Participant's statement

The contents of this document have been discussed with me in a language that I understand and all my questions have been answered satisfactorily. I understand that my participation in this research is voluntary and I can withdraw at any time. I also understand that the information that I give will be kept confidential. I will be given a copy of this consent document for my records.

I therefore give my voluntary consent to take part in this study.

Name of participant _____ Date _____

Signature of participant: _____

Name of witness (if participant is illiterate) _____ Date_____

Signature of witness_____

Statement of person obtaining informed consent

I have explained to the person participating in the study the purpose of the research study and I and I certify that she has understood what the study entails and she has willingly given her consent to participate in the study.

_____ _____

Name of study staff obtaining consent **Date**

_____

Signature

B. QUESTIONNAIRE

Section A: SOCIO DEMOGRAPHIC FACTORS

Instructions: Kindly answer all the following questions by writing in the provided space or by putting a cross (x) or tick in the appropriate box.

EPDS Score …….

Case ☐ Control ☐

1. **What is your age in completed years?** …….
2. **Marital status**
   - Single ☐
   - Married ☐
   - Other ☐
3. **Religion**
   - Christianity ☐
   - Islam ☐
   - Hindu ☐
   - Other ☐
4. **What is your highest level of education?**
   - Primary school ☐
   - Secondary school ☐
   - Tertiary ☐
5. **What is your occupation?**
   - Employed ☐
   - Unemployed ☐
6. **Who do you live with?**

Family ☐

Spouse ☐

Alone ☐

Friends ☐

SETION B: LIFESTYLE RISK FACTORS FOR ANTENATAL MATERNAL DEPRESSION

7. **How often per week did you consume alcohol during the last 12-months (either before pregnancy or during this pregnancy)?** (Select only 1 answer by putting a cross in one of the boxes)

   Non-user (i.e. zero time per week) ...…… ☐

   Rare user (1 – 3 times per week) …… ☐

   Regular user (4 - 7 times per week) …… ☐

8. **How often per week did you usually use tobacco (smoking or chewing) during the last 12-months (either before pregnancy or during pregnancy)?** (Select only 1 answer by putting a cross in one of the boxes)

   Non-user (i.e. zero time per week) ☐

   Rare user (1 – 3 times per week) .. ☐

   Regular user (4 - 7 times per week) ☐

9. **How often per week did you use any of the drugs listed below during the last 12-months (either before pregnancy or during pregnancy)?** (Tick where appropriate)

Drug	Frequency		
	Non-user (i.e. zero time per week)	Rare user (1 – 3 times per week)	Regular user (4 - 7 times per week)
Cannabis			
Heroin			
Valium			
Rohypnol			
Cocaine			
Muguka			
Miraa			
Codeine			
Glue			

SECTION C: OBSTETRICS AND PREGNANCY RELATED RISK FACTORS

10. What is your current gestational age? ……weeks

11. How many clinic visits have you attended so far? ……

12. Do you have any other living children?

    Yes ☐ No ☐

    If yes, how many ……

    If No, skip to number 11

13. Is this a pregnancy that you had planned for?

    Yes ☐ No ☐

    If no, why ……

14. Did you experience any complications in your previous pregnancies?

    Yes ☐ No ☐

    If Yes, which one?

    Miscarriage ☐

    Still Birth ☐

Fistula ☐

Premature birth ☐

Abortion ☐

Other……

SECTION D: SOCIAL NETWORK AND FAMILY RISK FACTORS FOR PRENATAL DEPRESSION

SOCIAL PROVISIONS SCALE

Instructions: In answering the following questions, think about your current relationships with friends, family members, co-workers, community members, and so on. Please indicate to what extent each statement describes your current relationships with other people. Use the following scale to indicate your opinion.

STRONGLY DISAGREE – 1 DISAGREE – 2 AGREE – 3 STRONGLY AGREE – 4

So, for example, if you feel a statement is very true of your current relationships, you would respond with a 4 (strongly agree). If you feel a statement clearly does not describe your relationships, you would respond with a 1 (strongly disagree).

1. There are people I can depend on to help me if I really need it. _____
2. I feel that I do not have close personal relationships with other people* _____
3. There is no one I can turn to for guidance in times of stress* _____
4. There are people who enjoy the same social activities I do. _____
5. I do not think other people respect my skills and abilities* _____
6. If something went wrong, no one would come to my assistance*_____

7. I have close relationships that provide me with a sense of emotional security and well-being _____
8. I have relationships where my competence and skill are recognized. _____
9. There is no one who shares my interests and concerns* _____
10. There is a trustworthy person I could turn to for advice if I were having problems. _____

Scoring:

A score for each social provision is derived such that a high score indicates that the individual is receiving that provision. Items that are asterisked should be reversed before scoring (i.e., 4=1, 3=2, 2=3, 1=4).

COMPOSITE ABUSE SCALE (CAS) REVISED – SHORT FORM (CAS_R-SF)

In this section we will ask about your relationships because it is an important part of your life that may influence your health. We ask you about your experiences in adult intimate relationships. By adult intimate relationship we mean husband/wife, partner or boy/girlfriend for longer than 1 month.

1. Have you ever been in an adult intimate relationship? (Since you were 16 years of age)
    a. Yes
    b. No – Skip out of remaining questions
2. Are you currently in a relationship?
    a. Yes
    b. No – Go to Q4
3. Are you currently afraid of your partner?
    a. Yes
    b. No

4. Have you ever been afraid of any partner?
    a. Yes
    b. No

We would like to know if you experienced any of the actions listed below and from any current or former partner or partners. If it ever happened to you, please tell us *how often* it usually happened in the past 12 months *(Please tick one box on each line)*

My partner(s)	**Has it ever happened to you**		**If YES, how often did it happen in the past 12 months?**					
Blamed me for causing their violent behavior	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/almost daily
Shook, pushed, grabbed or threw me	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Tried to convince my family, children or friends that I am crazy or tried to turn them against me	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily

Used or threatened to use a knife or gun or other weapon to harm me	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Made me perform sex acts that I did not want to perform	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Followed me or hung around outside my home or work	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Threatened to harm or kill me or someone close to me	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Choked me	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Forced or tried to force me to have sex	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Harassed me by phone, text, email or using social media	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Told me I was crazy, stupid or not good enough	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily

Hit me with a fist or object, kicked or bit me	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Kept me from seeing or talking to my family or friends	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Confined or locked me in a room or other space	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily
Kept me from having access to a job, money or financial resources	No	Yes	Not in the past 12 months	Once	A few times	Monthly	Weekly	Daily/Almost daily

Interviewer's name: _____ **Signature: _____**

*** End of questionnaire***

Thank you very much for your time and for your participation in this study. **ASANTE SANA**!

C. EDINBURGH POSTNATAL DEPRESSION SCALE (EPDS)

Name: _____ Address: _____

Date of Birth: _____

Baby's Date of Birth: _____ Phone: _____

As you are pregnant or have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt **IN THE PAST 7 DAYS**, not just how you feel today.

Here is an example, already completed.

I have felt happy:		
	☐ Yes, all the time	
	☐ Yes, most of the time	This would mean: "I have felt happy most of the time" during the past week.
	☐ No, not very often	Please complete the other questions in the same way.
	☐ No, not at all	
In the past 7 days:		
1.	I have been able to laugh and see the funny side of things	*6. Things have been getting on top of me
	☐ As much as I always could	☐ Yes, most of the time I haven't been able to cope at all
	☐ Not quite so much now	
	☐ Definitely not so much now	☐ Yes, sometimes I haven't been coping as well as usual
	☐ Not at all	

		☐ No, most of the time I have coped quite well
2.	I have looked forward with enjoyment to things	☐ No, I have been coping as well as ever
	☐ As much as I ever did	
	☐ Rather less than I used to	*7 I have been so unhappy that I have had difficulty sleeping
	☐ Definitely less than I used to	☐ Yes, most of the time
	☐ Hardly at all	☐ Yes, sometimes
		☐ Not very often
*3. I have blamed myself unnecessarily when thingswent wrong		☐ No, not at all
	☐ Yes, most of the time	*8 I have felt sad or miserable
	☐ Yes, some of the time	☐ Yes, most of the time
	☐ Not very often	☐ Yes, quite often
	☐ No, never	☐ Not very often
		☐ No, not at all
4.	I have been anxious or worried for no good reason	*9 I have been so unhappy that I have been crying
	☐ No, not at all	☐ Yes, most of the time
	☐ Hardly ever	☐ Yes, quite often
	☐ Yes, sometimes	☐ Only occasionally
	☐ Yes, very often	☐ No, never

* 5	I have felt scared or panicky for no very good reason	*10 The thought of harming myself has occurred to me
	☐ Yes, quite a lot	☐ Yes, quite often
	☐ Yes, sometimes	☐ Sometimes
	☐ No, not much	☐ Hardly ever
	☐ No, not at all	☐ Never

Administered/Reviewed by

_____ Date _____

[1] Source: Cox, J.L., Holden, J.M., and Sagovsky, R. 1987. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry* 150:782-786 .

[2] Source: K. L. Wisner, B. L. Parry, C. M. Piontek, Postpartum Depression N Engl J Med vol. 347, No 3, July 18, 2002, 194-199

D. SWAHILI VERSION OF EPDS

FOMU YA MIZANI YA EDINBURGH (EPDS)

Vigezo vya unyogovu wa ujauzito kati ya wanawake wanaohudhuria kliniki ya ujauzito katika Hospitali kuu ya Mkoa wa Pwani, Kaunti ya Mombasa, Kenya

Nambari ya utafiti:……**Tarehe ya Kuzaliwa**:…….

Ulivyo mja mzito tungependa kujua jinsi unavyojisikia(hisi). Tafadhali tia alama katika jibu linalokaribia kabisa kueleza jinsi umejiskia katika kipindi cha **siku saba zilizopita** sio tu unavyosikia leo.

1. Nimeweza kucheka na kuona jambo la kuchekesha katika mambo
    - ☐ Ndio, kama kawaida
    - ☐ Sio, kama hapo mbeleni (awali)
    - ☐ Kwa hakika, sio kama hapo mbeleni
    - ☐ La, hasha
2. Nimetarajia mambo kwa furaha
    - ☐ Kama tu hapo mbeleni
    - ☐ Imepunguka kidogo
    - ☐ Imepunguka kabisa
    - ☐ Mara chache sana
3. *Nimejilaumu bila sababu wakati mambo yalipoenda vibaya
    - ☐ Ndio, mara nyingi
    - ☐ Ndio, mara kadhaa
    - ☐ Sio, kawaida
    - ☐ La, sijawahi

4. Nimekuwa na wasiwasi bila sababu nzuri
    - ☐ La, sijawahi
    - ☐ Sio, kwa kawaida
    - ☐ Ndio, mara kwa mara
    - ☐ Ndio, mara nyingi
5. *Nimeshikwa na woga au hofu bila sababu
    - ☐ Ndio, mara nyingi
    - ☐ Ndio, mara kwa mara
    - ☐ La, si sana
    - ☐ La, sijawahi
6. *Mambo yamekuwa yakinilemea

- ☐ Ndio, mara nyingi nimeshindwa kukabiliana nayo
- ☐ Ndio, mara kwa mara sijaweza kukabilian nayo
- ☐ La, mara nyingi nimeweza kukabiliana vyema
- ☐ La, mara nyingi nimeweza kukabiliana vyema kama hapo mbeleni/awali

7. *Nimekuwa na huzuni sana hadi nimekuwa na ugumu kupata usingizi
    - ☐ Ndio, mara nyingi
    - ☐ Ndio, mara kwa mara
    - ☐ Sio kila wakati
    - ☐ La, hapana
8. *Nimekuwa na huzuni sana na kutokuwa na furaha
    - ☐ Ndio, mara nyingi
    - ☐ Ndio, mara kwa mara
    - ☐ Sio, kila wakati
    - ☐ La, hapana
9. *Sijakuwa na furaha kabisa hadi nimetokwa na machozi
    - ☐ Ndio, mara nyingi
    - ☐ Ndio mara kwa mara
    - ☐ Mara moja moja
    - ☐ La, sijawahi

10. *Nimekuwa na mawazo ya kujitendea mabaya
    - ☐ Ndio mara nyingi
    - ☐ Ndio, mara kwa mara
    - ☐ Sio kwa kawaida
    - ☐ La, sijawahi

Maagizo

Mama anaulizwa kupigia mstari jibu moja tu kati ya majibu manne aliyopewa, jibu lililokaribia zaidi kuhusu jinsi amekuwa akihisi kwa kipindi cha siku saba zilizopita. Maswali yote kumi lazima yajibiwe

Lazima kuwe na uangalifu kuzuia uwezekanayo wa mama kujadili majibu yake na wengine.

Mama lazima ajibu maswali haya mwenyewe, atasaidiwa iwapo hawezi kusoma au kufahamu lugha hii

E. SWAHILI VERSION OF INFORMED CONSENT FORM

RIDHAA NA RUHUSA YA WAMAMA WAJAWAZITO KUSHIRIKI KATIKA UTAFITI

Mada ya Utafiti: Vigezo vya unyogovu wa ujauzito kati ya wanawake wanaohudhuria kliniki ya ujauzito katika Hospitali kuu ya Mkoa wa Pwani, Kaunti ya Mombasa, Kenya

Mpelelezi Mkuu: Harriet Mirieri, Chuo Kikuu cha Nairobi

Kianzishi

Unaulizwa kushiriki katika utafiti unaofanywa na mtafiti aliyeorodheshwa hapo juu. Umuhimu wa fomu hii ni kukupa maelezo yanayohusiana na utafiti huu na mchangio wako iwapo utaamua kushiriki. Tafadhali chukua muda wako kusoma fomu hii kwa makini. Mwuulize mtaalamu wa afya anayesimamia utafiti huu kukueleza chochote huelewi. Unaweza kuamua kutojiunga katika utafiti. Iwapo utaamua kujiunga na utafiti, unaweza kubadili msimamo wako baadaye na kujiondoa wakati wowote. Ikiwa utaamua kutoshiriki katika utafiti au kuondoka kabla utafiti uishe hautaathiri huduma ya afya unayofaa kupokea. Jisikie huru kuuliza maswali yoyote kuhusu madhumuni ya utafiti, nini kitakachotokea ikiwa utashiriki katika utafiti, hatari na faida za kushiriki, haki zako kama mshiriki na kitu kingine chochote kuhusu utafiti au fomu hii ambacho huelewi.

Utafiti huu umeidhinishwa kwa binadamu kushiriki na Kamati ya Maadili na Utafiti ya Hospitali Kuu ya Kenyatta na Chuo Kikuu cha Nairobi.

Tutakupa nakala ya fomu hii kwa rekodi zako.

Naweza kuendelea? **NDIO/ LA**

Utafiti huu unahusu nini?

Utafiti huu unafanywa ilikujifunza zaidi kuhusu unyogovu wa ujauzito. Mtafiti mkuu atawahoji wanawake wajawazito wanaohudhuria kliniki ya ujuzito katika Hospitali ya Mkoa wa Pwani. Madhumuni ya mahojiano ni kubainivigezo vya unyogovu wa ujauzito miongoni mwa wanawake wajawazito wanaohudhuria kliniki. Washiriki katika utafiti huu wataulizwa maswali kuhusiana na haliambazo zinafikiriwa kuchangia vigezo vya unyogovu wa ujauzito.Tunatarajia kuandikisha washiriki mia moja sabini.

Tunaomba ridhaa yako kushiriki katika utafiti huu. Huwezi kushiriki katika utafiti huu ikiwa uko chini ya miaka 15 au hauwezi kutoa idhini.

Nini nitaulizwa kufanya ikiwa nitashiriki katika utafiti huu?

Ikiwa utakubali kushiriki, mtafiti msaidizi atakuuliza maswali yanayohusiana na utafiti huu faraghani.

Utaratibu huu utachukua muda wa dakika thelathini (30).

Je, kuna hatari yoyote nikiamua kushiriki katika utafiti huu?

Hatari ya kuhusika katika huu utafiti ni chini mno. Wafanyakazi wa utafiti watawauliza maswali ya kibinafsi na historia yako ya matibabu. Unaweza kuonelea maswali mengine ni ya aibu ama ya kibinafsi sana. Hali hii ikitokea una uamuzi wa kutojibu maswali haya.

Je, maelezo nitakayowapa yatawekwa faragha?

Maelezo yote utakayopeana kutokana na utafiti huu yatawekwa kwa siri kwa kiasi kinachoruhusiwa na sheri na kanuni zilizoko. Tutazingatia faragha yako kwa njia zifuatazo:

- Tutatumia nambari maalum badala ya jina lako kwa dodoso
- Tutahifadhi fomu zote kuhusu utafiti huu kwa kabati inayofungwa na ambayo funguo wake umewekwa na wafanyikazi wa utafiti huu pekee
- Tutakapowakilisha matokeao ya utafiti huu hayatakuwa na taarifa yoyote ambayo inaweza kukutambua wewe

Je, kuna faida yoyote kwangu kama mimi ni katika hii kujifunza?

Utapata maelezo kuhusu unyogovu wa ujauzito. Ikiwa utashiriki, matokeo ya utafiti huu yatakuwezesha kuelewa zaidi kuhusu mambo yanayohusiana na unyogovu wa ujauzito, uchunguzi na miradi zuizi. Taarifa hii pia itasaidia kuunda sera za sayansi na afya.

Je, kuna gharama zzozote au malipo ikiwa nitashiriki katika utafiti huu?

Hakutakuwa na gharama yoyote iliwa utashiriki katika utafiti.

Ninaweza kuzungumza na nani nikiwa na swali?

Nani ninaweza kuzungumza naye a ikiwa nina maswali?

Ikiwa una maswali kuhusu kushiriki katika utafiti huu ama kuhusiana na maelezo ya fomu hii somo hili au maelezo katika fomu hii, tafadhali piga simu au tuma ujumbe kwa mpelelezi mkuu Harriet Mirieri, Simu: 0712831278. Kwa maelezo zaidi kuhusu haki zako kama mshiriki wa utafiti, unaweza kuwasiliana na Katibu au Mwenyekiti wa Hospitali ya Taifa ya Kenyatta-Chuo Kikuu cha Nairobi Kamati ya Maadili na Utafiti Namba ya simu 2726300 Ext. 44102, E-mail: uonknh_erc@uonbi.ac.ke

Je, sahihi yangu kwenye fomu hii inamaanisha nini?

Sahihi yako kwenye hii fomu ina maana kwamba:

• Wewe umeelewa maelezo uliyopewa katika fomu hii

• Umeweza kumwuliza maswali mtafiti au kusema wasiwasi wowote ulionao

• Mtafiti amejibu maswali yako kikamilifu

• Unaamini unaelewa utafiti na uwezekano wa faida na hatari ya kushiriki

Maelezo ya Makubaliano

Mimi ninatoa idhini yangu kwaa hiari kushiriki katika utafiti huu. Nitapewa nakala ya hati hii ya ridhaa kwa ajili ya kumbukumbu yangu.

Sahihi ya Mshiriki_____ Tarehe _____

Jina la Mshiriki: _____

_____ Tarehe _____

Sahihi ya Mshahidi

(ikiwa mshiriki hajui kusoma na kuandika)

Jina la Mshahidi_____

Kauli ya Mtu Anayeomba Ridhaa

Nimemuelezea kwa makini mshirika katika utafiti huu yale anaweza kutarajia.

Ninathibitisha kwamba wakati mshiriki anaweka sahihi fomu, kwa kadri ya ufahamu wangu, yeye anaelewa leno, taratibu, faida na uwezekano wa hatari ya kushiriki.

Ninathibitisha pia kuwa yeye:

- Anazungumza lugha niliyotumia kuelezea utafiti huu
- Anaweza kusoma kutosha kuelewa fomu hii au, kama sivyo, yuko na uwezo wa kusikia na kuelewa fomu ikisomwa kwake
- Hana matatizo yoyote ambayo yanaweza kufanya asielewe nini maana ya kushiriki katika utafiti huu

_____ _____

Sahihi ya mfanyikazi wa utafitiTarehe

_____

Jina la mfanyikazi wa utafiti