DEPRESSION DURING PREGNANCY AND PRETERM BIRTH; A PROSPECTIVE COHORT STUDY CARRIED OUT AMONG WOMEN ATTENDING ANTENATAL CLINIC AT PUMWANI MATERNITY HOSPITAL.

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Declaration

I declare that this dissertation is my original work and has not been presented for the award of a degree at any other university

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ABBREVIATIONS

ANC- Antenatal clinic

APA-American Psychiatric Association

CBT-Cognitive Behavioral Therapy

C/S-Cesarean Section

CES-D-Centre of Epidemiologic Studies Depression Scale

DSM 5-Diagnostic and Statistical Manual 5th edition

ECT-Electroconvulsive Therapy

EPDS-Edinburgh postnatal Depression scale

GBD-Gestation by Dates

HIV-Human Immunodeficiency Virus

IPT-Interpersonal Therapy

IPV-Intimate Partner Violence

KBNS-Kenya Bureau of National Statistics

KDHS-Kenya Demographic and Health Survey

KNH-Kenyatta National Hospital

KSH-Kenyan Shillings

LMP-Last Menstrual Period

MDD-Major Depressive Disorder

MDG-Millennium Development Goals

PPROM-preterm premature rapture of membranes

SCID-Structured Clinical Interview for DSM disorders

SES-Socioeconomic Status

STI-Sexually Transmitted Infection

SSRI-Selective serotonin reuptake inhibitor

TCA-Tricyclic Antidepressant

UNDP-United Nations Development Program

UTI-Urinary tract Infection

WHO-World Health Organization

DEFINITIONS

Preterm birth: Preterm birth refers to birth occurring at a gestation of 37 weeks or less. (World Health Organisation, 1977)

Antenatal Depression: *Depressive disorders are characterized by the presence of sad; irritable or empty mood accompanied by somatic and cognitive changes that significantly affect the individual's capacity to function.* When this condition occurs during pregnancy it is termed antenatal depression. (American Psychiatric Assosciation, 2013)

ABSTRACT

Background: Depression is a debilitating illness characterized by the presence of sad, irritable or empty mood. Prior studies have preempted that when it occurs during pregnancy, depression may lead to various adverse obstetric outcomes including preterm delivery.

Objective: To determine whether antenatal depression is significantly associated with preterm delivery.

Methods: 292 women attending the antenatal clinic at Pumwani Maternity Hospital in Nairobi, Kenya meeting the study criteria were recruited. The Edinburgh postnatal depression scale (EPDS) was administered to screen for depression. A clinical cutoff score of 10 and above was regarded as possible depression. Thereafter The Patient Health Questionnaire- 9 (PHQ-9) was administered to evaluate women on DSM-V criteria for major depressive disorder. Only 255 of the women were successfully followed up to delivery with an attrition rate of 12.7%. Records of gestation at delivery, birth weight and other related obstetric outcomes were collected.

Data Analysis: Preterm delivery was associated with various demographic, psychosocial and medical variables using chi square tests. To determine whether depression was an independent risk factors for preterm delivery, relative risks were estimated via log binomial regression analysis with adjustment for potential confounding variables.

Results: Of the 255 participants, 98(38.4%) had depression and 27(10.7%) delivered preterm. The risk of delivering preterm increased with severity of depression. Compared to pregnant women who scored low for depression, the relative risk of preterm delivery for women with mild depression (PHQ-9 score 5-9) was 3.43(95% C. I. =1.48-7.92) and for women with moderate depression (PHQ-9 score 10-19) was 4.45(C. I. =1.91-10.90). After controlling for potential confounders, depression (both mild and moderate) was still associated with preterm delivery with an aRR of 4.13(95% C. I. = 2.82-17.42).

Conclusion: There is a positive association between antenatal depression and preterm delivery. This highlights the importance of screening for mental health challenges in the antenatal period as a means to reduce adverse obstetric outcomes.

Keywords: **antenatal depression**, **prospective cohort**, **preterm delivery**, **low-income country**

1.0 INTRODUCTION

Ordinarily women have accentuated physical and emotional wellbeing at the time of pregnancy. However, it is a time that may be marked by an increase in the symptoms of depression and anxiety. These are considered normal reactions to a developmental process and are commonly related to first trimester adjustments and third trimester outcome uncertainty.

There is now convincing evidence that far and above the usual fears and adjustment, 8.5% to 11% of pregnant women suffer clinical depression which by definition is a disabling disorder leading to significant morbidity and mortality.(1)

Less than 10% of people with depression are correctly diagnosed and treated in low-income countries in general.(2) This is unfortunate as most antenatal psychiatric disorders perpetuate further if untreated into the postnatal period leading to a myriad of problems ranging from behavioral to physical adverse outcomes in the offspring. (3)

Research findings during the last decade on the links between antenatal depression and preterm births have revealed inconsistent and inconclusive data influenced by various factors including geographical location, socioeconomic status of the population studied and method of detection and classification of depression.

The purpose of this study based in Pumwani maternity Hospital was to determine whether there is an association between depression during pregnancy and preterm deliveries in the Kenyan set up.

Preterm birth is a major contributor to the under five-mortality rate in Kenya.(4) Identifying clinical depression as a potential determinant of preterm birth could offer an additional focus of attention in efforts to deal with the fifth millennium development goal, was to reduce the under five-mortality rate by two thirds by the end of 2015

2. LITERATURE REVIEW

2.1 Antenatal Depression

According to the 5th edition of the Diagnostic Statistical Manual (DSM5), major depressive disorder (MDD) has a diagnostic criteria that consists of at least 5 of the 9 listed symptoms having been present in the same 2 week period and representing a

change from previous functioning. It clearly notes that the symptoms should not be attributable to another medical condition and in this case pregnancy.

Antenatal depression falls under *the specifier* termed '*with peripartum onse*t'. These mood episodes may present with or without psychotic features. Diagnostic criteria include depressed mood, markedly diminished interest or pleasure in most activities, psychomotor retardation or agitation, feelings of worthlessness or inappropriate guilt, diminished ability to think or concentrate and recurrent thoughts of death. (5)

Somatic symptoms that include significant weight and appetite changes, changes in sleep patterns and fatigue, may also present in any normal pregnancy due to neuro-endocrine physiological changes. Delineating whether these symptoms are due to pregnancy or depression may be difficult.

In the African set up it is difficult to get a direct translation of the word *depression* and in cultural psychiatry literature it has been established that most patients tend to present with somatic symptoms.(6)

2.1.1 Prevalence

A systematic review of studies by Gavin et al estimated the point prevalence of both major and minor depression to range between 6.5%-12.9% at different trimesters in pregnancy and months in the first year post-partum. Period prevalence during pregnancy was estimated at 18.4%.(1) The prevalence rates differ by trimester with 7.4% in the first trimester, 12.8% in the second trimester and 12% in the third trimester.(7) Literature shows that 50% of postnatal depression actually begins in the antenatal period.(8)

Antenatal depression is noted to generally have a higher prevalence in low and middle-income countries as compared to high-income countries. (9)

Several studies have been conducted in sub-Saharan Africa and report varied results that are markedly higher than those conducted in other parts of the world. To note from the African studies is that some form of social or health vulnerability is accompanied in the women that presented with perinatal depression.

A study by Adewuya et al carried out in Nigeria(10) revealed a prevalence of 8.3% noted to be lower than international statistics among low-income countries possibly due to the small sample and specific isolated area of data collection that was in a semi-urban town in Western Nigeria called Illesa. A study conducted in Ghana and Cote d'Ivoire (11)

showed much higher prevalence rates of 26.6% and 32.9% respectively accounted for by the timing of the data collection. Cote d'Ivoire was noted to be undergoing a period of civil unrest whereas the Ghanaian population sampling was in an area with marked poverty, deficient of basic needs and with low levels of literacy. Provider scored tools had to be used to gather information.

A study conducted in South Africa by Rochat et al (12) reported a prevalence of 41% but was notably conducted in an area known to have a high prevalence of HIV infection and Intimate partner Violence. The sample size consisted mainly of unmarried women and being single together with a perceived lack of social support are known risk factor for depression during pregnancy.

2.1.2 Risk factors associated with depression during pregnancy

There are several risk factors associated with increased risk of developing depression during pregnancy that have been studied especially in low and middle-income countries. A study performed by Howard et al demonstrated that intimate partner violence (IPV) was significantly associated with depression during pregnancy(13). On the other hand Fischer et al found that life stress and major negative life events, low socioeconomic status, absence of perceived social or relationship support and unwanted or unintended pregnancies were key risk factors to developing depression in the antenatal period (14). Prior history of psychopathology that is mainly depression and anxiety pre-conception and young age are also associated with the risk of developing clinical depression during pregnancy (15).

Other factors thought to predispose to depression in the general population include genetic and hormonal susceptibility; chronic illnesses e.g. HIV; medical illness and personality traits (16). No evidence to support the strength of these factors during pregnancy has been published to date.

2.1.3 Screening for depression in pregnancy

The Edinburgh postnatal depression scale (EPDS) is a10 item self-reporting tool preferred in the screening for depression during the perinatal period. Though bearing the term postnatal it takes into consideration the somatic symptoms that are common both during pregnancy and in the postnatal period that may not be necessarily indicative of depression (17). The maximum score that one can receive is 30. Mothers who score

above 13 on the EPDS are likely to be suffering from depressive illness (sensitivity of 100%) of varying severity but this does not override clinical judgment. A score of 10 or above indicates possible depression and any woman that answers item no 10 positively requires further assessment and immediate management by a mental health specialist(18). A Swahili version is available and currently in use (19).

The EPDS is noted to have the highest sensitivity of 100% with a lower cut-off score of 10(20). It also has only 1 question relating to the somatic symptoms of depression i.e. *I have been unhappy that I have had difficulty sleeping,* in comparison to other tools used to assess for depression. Unfortunately it is only a screening tool and further assessment is required to make a clinical diagnosis.

The Patient Health Questionnaire (PHQ-9) is a provider-administered tool used to assess for depression in line with the DSM5 criteria. It is also used to classify severity levels of depression. It consists of 3 somatic symptom questions that require clarification not to be intertwined with symptoms of pregnancy(21)

The BDI-II has 5 and CES-D 4 somatic questions and being self-rating may lead the participants to give information that may be arising from the pregnancy other than depression. The CES-D and ZUNG self-rating depression scale have metaphoric language that is not commonly used in the Kenyan set-up and may be difficult to translate into Swahili the local language i.e. *Shaking off the blues* and *down hearted and blue*. The Hamilton rating scale has many questions that assess Anxiety, which is also quite common during pregnancy and may thus give a larger number of false positive results. EPDS is therefore the preferred tool for screening for depression in pregnancy and PHQ-9 that may take a bit of time and will require establishment of rapport by the researcher to confirm diagnosis and grade severity levels of depression(22)

2.1.4 Management of antenatal Depression

Treatment of depression generally depends on its severity. Psychotherapy may be used for mild to moderate depression using psychosocial approaches including group or individual psychotherapy. A large number of women will prefer to avoid pharmacotherapy and may benefit from cognitive behavioral therapy (CBT) and interpersonal therapy (IPT) (23). Supportive and psychodynamic therapies are also reasonable options if IPT and CBT are unavailable.

Pharmacotherapy using tricyclic antidepressants (TCAs) like *amitriptyline* and selective serotonin re-uptake inhibitors (SSRIs) like *fluoxetine* are approved for use in pregnancy. The treatment choice depends on the safety profile of the medication; stage of gestation; and the patient's symptoms history and therapeutic preferences. Agents metabolized primarily by cytochrome P450 2D6 and 3A4 require to be increased in the second trimester of pregnancy (24). Patients with lack of sleep or agitated depression will benefit from agents with sedating effects like TCAs whereas patients with appetite problems will benefit from SSRIs keeping in mind the suicide potential for each. There are no antidepressant drug efficacy trials in depressed pregnant women due to ethical issues to date.

Electroconvulsive therapy is regarded as effective for the treatment of severe depression in pregnancy especially when life-threatening or rapid results are required or response to both pharmacotherapy and psychotherapy fails (25).

2.2. PRETERM DELIVERY

2.2.1 Prevalence and factors associated with higher risk of preterm delivery.

Preterm delivery may be due to Spontaneous preterm labor with intact membranes, preterm premature rupture of membranes (PPROM), labor Induction or caesarian section(26).

The rate of preterm delivery occurring per 100 births stands at 12.3 % of all live births in Kenya. Adolescent pregnancies, short birth spacing intervals (less than six months from delivery to conception) and underweight pre-pregnancy weights are shown to moderately predispose to preterm labor. Micronutrient deficiencies of both iron and folic acid also show weak evidence (4)

Previous preterm birth, multiple gestation*, in vitro* fertilization, anatomic anomalies on the uterus, cervix and placenta, multiple miscarriages and abortions, fetal anomalies, physical trauma and injuries are all associated with preterm labor (27) (26)

Poor mental health with focus on intimate partner violence (IPV) including physical, sexual and emotional abuse, stressful life events like death of a loved one and perceived lack of social support all predispose one (with strong evidence) to preterm labor (28) (29)

Studies have not conclusively highlighted the relationship between chronic illnesses like

hypertension and diabetes, anemia and infections like Malaria during pregnancy on preterm labor. These are however associated with low birth weight deliveries. (30) Premature birth occurs more commonly in women of African descent than other races for unknown reasons though it may occur in any woman .75% of preterm births occur with no clear risk factors identified (31).

A short cervical length and increased cervico-vaginal fetal fibronectin concentrations are the strongest predictors of spontaneous preterm delivery (26).

2.2.2 Assessment of pregnancy gestation

Gestation may be assessed using various methods. The most common is by dates that rely on a calculation made using the first day of the last menstrual period. This method has a bias based on the participant's memory. Another method involves an abdominal examination of the pregnant women and measuring the fundal height. This has an accuracy of +/- 3 weeks. An ultrasound carried out within the first trimester of pregnancy would yield the most accurate gestational age (+/- 5 days) but this is usually limited by economic factors, availability of ultrasound services and late presentation by most Kenyan women to the antenatal clinic for the first visit. (32) (4). Newborn examination using the Dubowitz-Ballard score and various other score charts may be conducted to determine the gestational age of the neonate but this is quite lengthy, requires well-trained personnel and is observer dependent (27) In our study, we focused on fundal height measurements and last menstrual period memory to calculate gestational age. Any participant that had undergone an ultrasound for whatever reason also had her gestation by ultrasound recorded to give more accurate data.

2.3 THEORETICAL FRAMEWORK

There are several hypotheses that are postulated to link clinical depression and preterm deliveries Physical or psychological stress is thought to activate inflammatory pathways involving maternal cortisol that may lead to premature delivery(33)

Various factors that are known to predispose to preterm delivery are also associated with depression in the general population. Patients with mental disorders have a tendency of engaging in risky behavior as well as poor self-care thereby smoking; alcohol abuse, poor nutrition and poor antenatal care attendance commonly as a result of their depressive

symptoms(34). All these may predispose to preterm labor and in this case may act as mediating confounders.

Thirdly patients with various mental disorders are likely to engage in risky sexual behavior that may result in unintended pregnancies which on its own right predisposes one to further depression during pregnancy. They may also get infected with sexually transmitted infections that predispose to preterm labor (35)

Women with good social support, high levels of education and high socio-economic status though suffering from depression may be able to still deliver term babies due to the moderating effect of these factors. These will enable them to avoid known risk factors, attend antenatal clinic diligently and also have good nutrition that may confound their outcome (32)

3. STUDY RATIONALE

There are about 15million babies born prematurely every year and this number has been increasing each year. In Kenya the neonatal mortality has only marginally reduced from 33/1000 live births in 2003 to 31/ 1000 live births in 2008/2009 (36) Prematurity contributes to 30% of neonatal mortality and morbidity Babies who survive after being born preterm have increased disability risk and their care is very costly and demanding in terms of finances, time and specialized health care resource both for the family and health care systems (37)

Reduction of preterm birth mainly focuses on improved antenatal care. Currently the Ministry Of Health has introduced free obstetric care for all Kenyan women.

Unfortunately this only centers on screening, early diagnoses and management of physical conditions, forgetting that *there is no health without mental health.*75% of preterm deliveries are idiopathic and no medical, obstetric or fetal risk factor can be directly identified (34) (38)

Poor mental health and intimate partner violence shows strong evidence for predisposing to preterm delivery in some studies. (13) (34)

There are currently no statistics on the prevalence of depression during pregnancy in Kenya as most studies focus on the postnatal period.

Studies conducted worldwide also reveal varying results thought to differ due to varying geographical location and level of income of each country.(9)

The researcher collected data on the impact of depression during pregnancy that may help in building evidence towards greater involvement by mental health specialists in maternity facilities. The hope is also to influence policy to consider including a screen for psychiatric morbidity as part of the antenatal care package for women in Kenya and open a doorway for further research on appropriate management of antenatal depression in our Kenyan set up e.g. culturally appropriate psychotherapy modifications as pharmacotherapy has so far showed not to improve the neonatal outcomes as has been adapted in some developed countries. (39) (40)

4. STUDY QUESTION

Is depression during pregnancy significantly associated with preterm births?

5. STUDY OBJECTIVES

Broad Objective:

To determine whether depression during the third trimester of pregnancy, is significantly associated with preterm birth.

5.1 Primary Objective:

To determine the relative risk of preterm delivery among women who are depressed and those who are not depressed during the third trimester of pregnancy.

5.2 Secondary Objectives:

1. To determine the relative risk of low birth weight in neonates born to mothers with depression and those with no depression during the third trimester of pregnancy.
2. To determine the prevalence and factors associated with depression among women attending antenatal clinic at Pumwani Maternity hospital.
3. To determine the prevalence and factors associated with preterm delivery among women attending antenatal clinic at Pumwani Maternity Hospital.

6. STUDY DESIGN AND METHODOLOGY

6.1. Study Design

The study was conducted using a prospective cohort design. Women attending antenatal clinic were screened for depression and later followed up to delivery to determine their obstetric outcomes.

6.2. Study Area Description

The study was conducted in Pumwani Maternity Hospital. This is a public hospital located in Kamkunji constituency in East lands Nairobi County (Kenya)

Pumwani maternity has a capacity of 350 beds and 150 baby cots

The antenatal clinic serves an average of 45 women per day and runs 5 days a week (Monday to Friday) from 8am to 3 pm.

Pumwani conducts a range of 50-70 deliveries per day.

The Nairobi county government currently runs the facility headed by the medical superintendent. The staff consists of 27 doctors (20 medical officers; 4 specialist obstetrics and gynecology; 3pediatricians) and 186 nurses. There is currently no psychiatrist or other mental health care professional attached to the facility.

The hospital mainly serves the low and middle-income population residing in Eastlands Nairobi. Low socioeconomic status and residing in an urban area are predisposing factors postulated to increase the risk of depression in the general population.(16) During the period of data collection, the hospital was undergoing a go-slow by the staff and only those women that could not afford other facilities attended the clinic with long waiting periods.

6.3. Study population:

The study population will involve pregnant women who will be attending Pumwani maternity Hospital in Nairobi for their antenatal Care.

6.3.1 Inclusion criteria:

- 28-36 weeks gestation (by dates and confirmed by fundal height)
- Planning to deliver at any known registered medical facility within Nairobi County

6.3.2Exclusion criteria:

- Inability to give informed consent
- In active phase of labor
- Lack of telephone access.
- Unable to understand English or Kiswahili

6.4.Sample size Determination

USING COMPUTER PROGRAM: **EPI INFO VERSION 7**

Two sided confidence interval: **95%**

Power: **80%**

Ratio: (unexposed: Exposed) statistics from study conducted in Ghana demonstrating a prevalence of 26.6% thus ratio of 73.4:26.6 = **2.759:1** (11)

% Outcome in unexposed group: **12.3%** (4)

Risk Ratio: **2.32** Estimated by the study conducted in Brazil. (41)

FLEISS WITH Continuity Correction: Total sample size of **262**(70 Exposed [depression] and 192 Unexposed [with no depression])

6.5. Sampling method:

All the women attending the clinic between August and October 2015 and satisfying the criteria were eligible for the study.

6.6 Definition of cases:

Cohort 1 (Exposed): depression by DSM 5 criteria (PHQ-9 Confirmation)

Cohort 2 (unexposed): No depression by EPDS score of 9 and below plus those with EPDS score of 10 and above but after re-evaluation by PHQ-9 depression is ruled out.

6.7 Recruitment and Consenting procedure

Nurses in the antenatal clinic were informed of the study and a chart set up at the registration point with the inclusion and exclusion criteria. They then directed pregnant women who fit the criteria to a set private consultation room where the researcher explained the purpose of the study and the ethical concerns associated with the study to each participant. Any participant willing to take part in the study then signed a written consent form and was left with a copy of the same.

6.8 Data Collection Procedures

6.8.1 Assessment of Socio-demographic data and Risks for Preterm Labor

A socio-demographic questionnaire was administered on first assessment.

Obstetric history and behavior during the pregnancy was also collected including antenatal care and substance abuse.

Questions centering on the attitude of the participant and her partner toward the pregnancy were asked.

Past psychiatric and medical history was taken. Antenatal records were recorded from the standardized free antenatal health care package book available in Kenya that each pregnant woman should have as a bare minimum. A physical examination was carried out to determine the gestation and general physical condition of each participant. This included the general appearance, pallor, edema and oral thrush. An abdominal examination that included only Leopold's maneuvers was carried out to compare with the records on the antenatal care book. No vaginal examination was carried out.

6.8.2Assessment of Depression during Pregnancy

All women recruited in the study were requested to complete Edinburgh postnatal depression Scale (EPDS) in the language they were comfortable with i.e. English or Swahili individually. However, clarification was sought from the researcher.

Those who scored below 10 were assumed to have no depression but those that scored 10 and above or answered the question on self-harm/ suicidality (no. 10) affirmatively underwent a provider initiated screen using the patient Health Questionnaire (PHQ-9) as recommended in DSM 5 to confirm diagnosis and grade severity of depression.

All women with depression were referred to Mama Lucy Hospital for appropriate management. Contact was made with the psychiatrist and mental health nurses attached to the facility to facilitate expedited care as prioritized cases being pregnant women. Care was however be sought at the participants own cost.

6.8.3Outcome Measures

All the women were followed up to delivery. Each participant was contacted on phone by the researcher 2 weeks after her expected date of delivery and details of date of birth; sex of baby; birth weight; mode of delivery, time of rupture of membranes in relation to

delivery and Apgar scores were requested as recorded on her outcome sticker. Any malformations, incidents or accidents during delivery were also reported.

6.9 Variables

Dependent Variables:

- NO DEPRESSION: EPDS score below 10 and EPDS score above 10 but ruled out depression with PHQ-9.
- DEPRESSION: EPDS score of 10 and above and confirmed and severity level graded by PHQ-9.

Independent Variables:

- Birth Weight (in grams)
- Gestation at delivery (preterm/ severe preterm/ very severe preterm)
- Apgar score at 5 minutes (out of 10)
- Mode of delivery (SVD; Breech extraction; Caesarian section; others)
- Sex of baby (male or female)
- Presence or absence of malformations.

6.10 Materials

1. Socio-demographic questionairres-300
2. Edinburg postnatal depression scale copies-300
3. Pencils100HB/ erasers and sharpeners.
4. Safe (lock and key cabinet)
5. Obstetric Record and Outcome forms- 300
6. Stickers (placed on the antenatal books of recruited women with detail of researcher and involvement in the study) -300
7. Consent explanation and signing forms-300
8. PHQ-9 questionnaires- 100
9. Study Criteria List
10. Standardized Physical Examination List.

6.11 Quality Assurance Procedures

-PHQ-9 was used to assess women who score 10 and above on the EPDS to confirm diagnosis of depression and classify according to severity. The provider-initiated form was employed.

-Clinical examination and records based on laboratory investigations were taken to ensure the study criterion was adhered to. Antenatal books were looked at for previous records.

- Gestation of delivery was calculated by an obstetric estimate. (Fundal height; last menstrual period; dates by ultrasound if available and birth weight)

7. ETHICAL CONSIDERATIONS

Institutional review bodies: Approval to carry out the study was obtained from the Kenyatta National Hospital/University of Nairobi/ Ethics Research Committee. Written authorization to carry out the study was also further obtained from the medical superintendent of Pumwani maternity Hospital.

Recruitment Strategy: Participants were informed that participation in the study was voluntary and information collected during the study would be used solely for the purposes of the study. Those who refused to participate and those who withdrew midway suffered no loss and continued to receive the standard medical care they deserve at Pumwani Maternity Hospital.

Subjects: The study was carried out on human subjects namely pregnant women.
All women attending Pumwani maternity antenatal clinic meeting the eligibility criteria had an equal opportunity to participate in the study irrespective of their race; religion; political affiliations; sexual orientation or physical disabilities.

Consenting process: Proper explanation of the study process; objectives and purpose was given to every eligible woman at the clinic and was offered a chance to participate in the study as per the Consent explanation. (Appendix 14.1) There was no coercion.

Confidentiality: Guided by the Hippocratic oath and the mental Health Act, all information realized in the study has been kept confidential to date. Serial (Unique study) numbers were used instead of names assigned to participants to ensure anonymity. Information in the participants' files has been kept under lock and key and computer data stored in password-protected locations.

Potential risks and protection against risk: Potential risks included discussion of potentially sensitive topics. Participants were inconvenienced due to length of interview and invasion of privacy by phone call from the researcher at a time following delivery. Patients found to have depression were referred to Mama Lucy Kibaki Hospital whereby they were to be seen by a mental health professional and treated according to the latest approved guidelines on the treatment of antenatal depression.

Dissemination of Results: The results of the study are to be shared with the University of Nairobi, Kenyatta National Hospital and Pumwani maternity Hospital and presented in scientific conferences. Further dissemination of findings will be through publication in peer-reviewed journals.

8. RESULTS

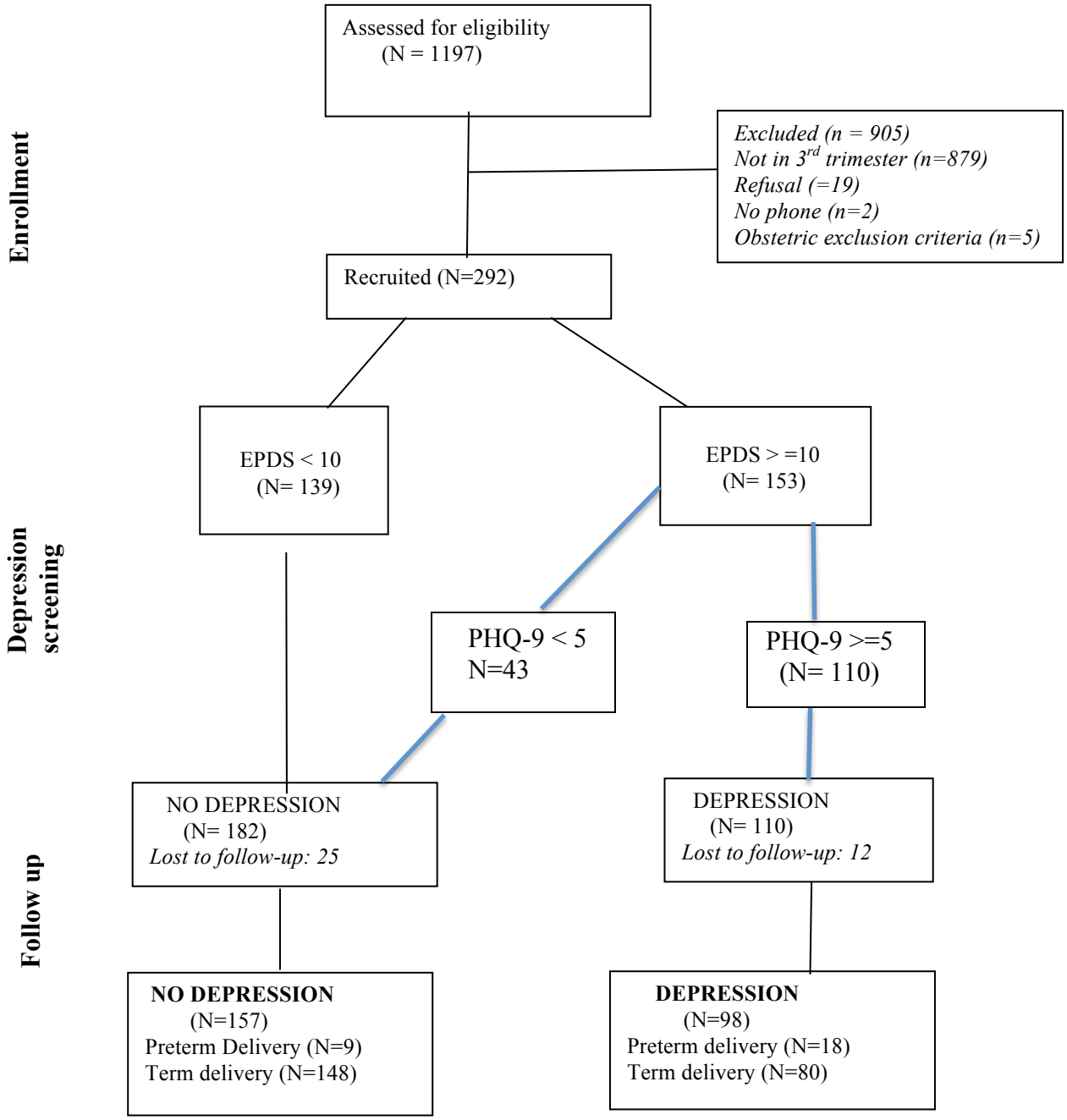
8.1 Recruitment of study participants.

Between August and October 2015 all the women attending antenatal clinic at Pumwani maternity Hospital (N=1197) were approached and screened for inclusion into the study; 905 did not meet the study criteria as 879 were in their first or second trimester, 19 preferred not to take part, 2 did not have reliable telephone access, 3 were carrying multiple gestation and 2 had conceived in less than 6 months from the prior pregnancy. A total of 292 women were recruited into the study demonstrated on the consort flow diagram (see figure 1).

The Edinburgh postnatal scale used to screen for depression and a cut off of 10 points employed with those scoring below 10(n=139) were considered to have no depression symptoms. Those that scored 10 and above (n=153) underwent a provider administered PHQ-9 depression scale scoring as follows: -*No depression (below 5 [n=43]), mild depression (between 5-9 [n=84]), moderate depression (10-19[n=26]) and severe depression (>19 [n=0]).* A total of 182 had no depression and 110 had depression after both tools were employed. Out of these 37(12.7%) were lost to follow-up and 255 were successfully followed and analyzed. Among these, 25(13.7% of those with no depression) and 12(10.9% of those with depression) were lost to follow-up. These did not differ in socio-demographic; psychosocial or medical characteristics to influence the analysis after

applying chi square tests. In sum total, out of the 255 participants in the analysis 157 had no depression and 98(38.4%) had depression as demonstrated in figure 2.

Figure 1. A consort diagram showing the flow of participants through each stage of the prospective cohort study on depression and preterm delivery at Pumwani Maternity Hospital



8.2 Socio-Demographic Characteristics

In this study sample, as shown in table 1 the women belonged to ages 20-24(N=103); 25-29(N=83) and 30-34(N=41) categories making 89% of our participants fall in the range between 20-34 years. There were 18 participants who were less than 19 years (pregnant adolescents) and 10 of these were above 35 years of age. Two hundred and twelve participants (83.9%) were married and 193(75.7%) had attained an education level of secondary school and above. Two hundred and seventeen (85.4%) practiced Christianity. Two hundred and one (78.8%) had a total family monthly income of between 5,000 and 34,999 Kenyan shillings (USD 50.00-349.99). One hundred and three participants (40.4%) were unemployed whereas 106(41.6%) were proclaimed self-employed.

Table 1. Socio-demographic characteristics.

	Frequency n=255	Percent (%)
Age		
<=19 years	18	*7.1*
20-24	103	*40.4*
25-29	83	*32.5*
30-34	41	*16.1*
35-40	10	*3.9*
Marital status		
Single	40	*15.7*
Married	212	*83.1*
Cohabiting	2	*0.8*
Separated	1	*0.4*
Education level		
No formal education	5	*2*
Primary school	57	*22.4*
Secondary school	142	*55.7*
Tertiary	51	*20*
Occupation		
Unemployed	103	*40.4*
Formal employment	35	*13.7*
Informal	10	*3.9*
Self employed	106	*41.6*
Religion		
Catholic	80	*31.5*
Protestant	137	*53.9*
Muslim	10	*3.9*
Hindu	1	*0.4*
Other	26	*10.2*
Monthly family income		

<4,999/=	26	*10.2*
5,000-9,999/=	60	*23.5*
10,000-34,999/=	141	*55.3*
35,000-99000/=	25	*9.8*
>100000/=	3	*1.2*

8.3 Health and Behavior

Out of the study sample as shown in table 2, forty-three (16.9%) recorded a known chronic illness for example asthma; cardiac disease, hypertension or Diabetes. Two hundred and forty-six (97.6%) were appropriately taking hematinic (Iron and folic acid supplements) and three participants (1.2%) reported that they were on antidepressants for a long-term diagnosis of depression (*amitriptyline* which is a tricyclic antidepressant). These had been started before the participants were recruited into the study. Six participants (2.4%) were on other medication including antiretroviral and antihypertensive medication. Two hundred and fourteen (83.9%) had their first antenatal visit during their second trimester of pregnancy (12-28weeks gestation). Thirty participants (11.8%) had experienced a preterm delivery previously

Table 2. Medical characteristics of the study sample

	Frequency (n)	Percent (%)
History of chronic illness		
Yes	43	*16.9*
No	207	*81.2*
Current medication		
Iron and/or folic acid	246	*97.6*
Anti-depressant	3	*1.2*
Others (ARVs/anti-hypertensive)	6	*2.4*
Week of gestation at first ANC visit		
<12weeks (less than three months)	33	*12.9*
12-28weeks (3-7months)	214	*83.9*
28weeks (more than 7 months)	8	*3.1*
Previous preterm delivery		
Yes	30	*11.8*
No	225	*88.2*

8.4 Psychosocial characteristics of the sample

Table 3 highlights other questions asked about other experiential factors associated with pregnancy. Sixty-two (24.3%) women shared that their pregnancy was not planned and thirty-one (12.2%) reported that they did not want to be pregnant. Two hundred and twenty six (88.6%) had partners who had a positive attitude towards their pregnancy and two hundred and forty one (94.5%) reported good social support either from their partners; a relative; a friend or a nearby religious congregation. Fourteen participants (5.5%) perceived a lack of social support. Forty-nine participants (58.4%) reported no stressful life event during pregnancy whereas 45 participants (17.6%) cited economic; 28(11%) marital; 18(7.1%) family related (e.g. disputes with in-laws or parents) and 15(5.9%) social stressors such as stigma in adolescent single pregnancy. Thirty (11.8%) women experienced intimate partner violence during the pregnancy in the form of physical or emotional abuse mainly. None reported severe physical trauma. Nine (3.5%) consumed alcohol, five (2 %) smoked cigarettes during the pregnancy and sixty-two (24.3 %) had partners who regularly smoked either cigarettes or cannabis in their presence.

Table 3. Psychosocial factors related to the pregnancy.

	Frequency (n)	Percent (%)
Pregnancy was planned		
NO	62	*24.3*
YES	193	*75.7*
Pregnancy is wanted		
NO	31	*12.2*
YES	223	*87.5*
Attitude of partner towards pregnancy		
Positive	226	*88.6*
Negative	21	*8.2*
Ambivalent	8	*3.1*
Presence of social support		
Yes	241	*94.5*
No	14	*5.5*
Experience of Intimate partner Violence		
YES	13	*5.1*
NO	242	*94.9*

Alcohol use during pregnancy	9	*3.5*
Cigarette Smoking during pregnancy	5	*2*
Inhaled substance use by partner	62	*24.3*

8.5 Antenatal characteristics of the sample

As demonstrated on table 4, twenty participants (7.8%) were anemic with a hemoglobin level below *10g/dl*; 246(96.9%) had appropriate random glucose levels between 3.5-6.9mmol/l and only one (0.4%) mother tested positive for VDRL. Fourteen participants (5.5%) tested HIV positive of which two were on anti-retroviral medication (ARVs). Twenty-five (9.8%) had raised blood pressure above 140/90mmHg.

Table 4: Antenatal characteristics of the sample

	Frequency (n)	**(%)**
Lowest hemoglobin level		
<8g/dl	2	*0.8*
8-10g/dl	18	*7.1*
10g/dl	235	*92.2*
Highest sugar level (RBS)		
<3.5mmol/l	2	*0.8*
3.5-6.9mmol/l	246	*96.9*
7-11.1mmol/l	3	*1.2*
>11.1mmol/l	3	*1.2*
VDRL		
Positive	1	*0.4*
Negative	254	*96.5*
HIV		
Positive	14	*5.5*
Negative	241	*92.5*
Blood Pressure		
Above 140/90mmHg	25	*9.8*
Below 140/90mmHg	230	*90.2*

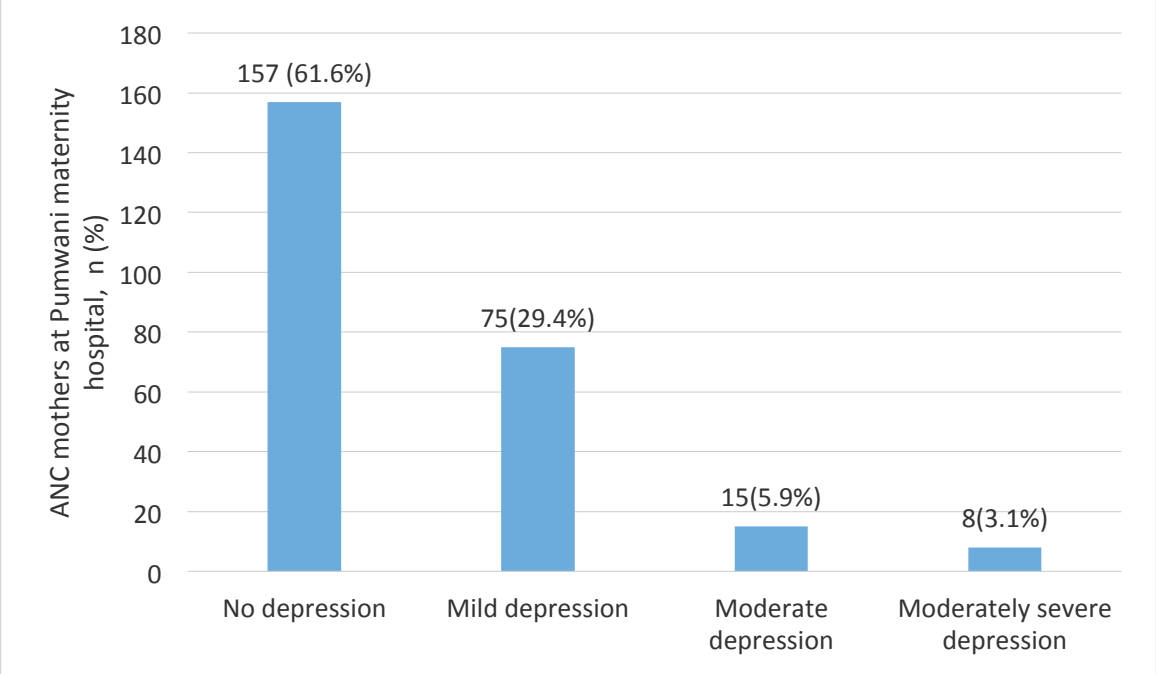
8.6 Major Depressive Disorder among the women attending Pumwani Maternity Antenatal clinic

Of the 255 participants that had completed data for analysis, screening using EPDS gave a depression prevalence of 32.8%(n=82) by acquiring a total score of 13 and above; with 118 participants (47.2%) scored 0-9 and 50(20%) scored 10-12. Question 10 of the EPDS revealed that 39 participants (15.3%) had some form of suicidal ideation.

On the other hand, 157of the women (61.6%) attending antenatal clinic screened negative for depression whereas 98(38.4%) had depression according to the PHQ-9.

As illustrated in figure 2, out of those with depression 75participants (29.4%) had mild depression; 15(5.9%) had moderate depression and 8 demonstrated (3.1%) moderately severe depression symptoms. They were all referred to Mama Lucy hospital for further management. None was started on antidepressants or managed to undergo appropriate psychotherapy but the three who were already on *amitriptyline* continued.

Figure 2: Depression severity among Women attending antenatal Clinic at Pumwani Maternity Hospital using PHQ-9 scores.



8.7 Risk factors associated with Antenatal depression.

The participants that were below 19 years of age; those that were single and those with a monthly income below 4,999 Kenyan shillings had higher odds of being depressed than their non-depressed counterparts with odds ratios of 1.97 (95%C.I 1.23-3.14), 1.14(0.76-1.70) and 1.28(0.80-2.04) respectively; those that had a stressful life event occurring during pregnancy, those experiencing intimate partner violence and those with partners with a negative attitude toward their pregnancy also had higher odds of being depressed with OR of 1.24(95% C. I. 0.91-1.69), 1.43(95%C. I. 0.84-2.43) and 1.57(C.I. 1.05-2.37)but with no statistical significance. Those that had not planned their pregnancies also had higher odds of being depressed with O.R-1.10 (95% C. I. 0.49-2.47). Depression was not more prevalent among the participants who did not want their pregnancies and only 2 of participants with depression that perceived a lack of social support thereby no further analysis could be carried out on this aspect.

The participants that had a history of a known chronic illness (e.g. diabetes, asthma or hypertension) and those that tested HIV positive had slightly higher odds of being depressed at O.R-1.03 (95% C. I. 0.69-1.56) and 1.12(0.60-2.10) still at no statistical significance. Alcohol use and cigarette smoking was also more prevalent among those that were depressed at O.R-1.47 (0.08-2.70) and 2.13(1.33-3.40). Out of the 98 participants with depression, 4((4.1%) had a previous psychiatric diagnosis of the same, 2(2.1%) were on antidepressant medication and 8(8.1%) admitted to a positive family history of mental illness. (One out of the 3 participants on antidepressant medication was well controlled and had no depression during assessment).

Table 5. Associating various demographic, psychosocial and medical characteristics with depression.

Variable	Depression N=98(%)	No depression N=157(%)	OR (95% CI)	P value
Below 19 years old	11(11.2)	7(4.5)	1.97(1.23-3.14)	0.036*
20-24years old	32(32.7)	71(45.2)	Ref	
Single	17(17.3)	23(14.6)	1.14(0.76-1.70)	0.548
Married	79(80.6)	133(84.7)	Ref	
<4,999/= per month	12(12.2)	14(8.9)	1.28(0.08-2.04)	0.519
10,000-34,999/= per month	51(52.0)	90(57.3)	Ref	
Stressful life event presence	46(46.9)	60(38.2)	1.24(0.91-1.69)	0.169
No stressful life event	52(53.1)	97(61.8)	Ref	
Unplanned pregnancy	28(28.6)	34(21.7)	1.25(0.89-1.74)	0.210
Planned pregnancy	70(71.4)	123(78.3)	Ref	
Unwanted Pregnancy	15(15.3)	16(10.2)	1.30(0.87-1.94)	0.357
Wanted Pregnancy	83(84.7)	140(89.2)	Ref	
Negative attitude by partner	12(12.2)	9(5.7)	1.57(1.05-2.37)	0.135
Positive attitude by partner	82(83.7)	144(91.7)	Ref	
IPV experience	7(7.1)	6(3.8)	1.43(0.84-2.43)	0.241
No IPV experience	91(92.9)	151(96.2)	Ref	
Perceived lack of social support	2(2.0)	12(7.6)	0.36(0.10-1.31)	0.056*
Perceived social support	96(98)	145(92.4)	Ref	
Known chronic illness	17(17.3)	26(16.6)	1.03(0.69-1.56)	0.870
No known chronic illness	81(82.7)	131(83.4)	Ref	
HIV positive	6(6.1)	8(5.1)	1.12(0.60-2.10)	0.942
HIV negative	90(91.8)	145(92.4)	Ref	
Alcohol use	5(5.1)	4(2.5)	1.47(0.80-2.70)	0.282
No alcohol use	93(94.9)	153(97.5)	Ref	
Cigarette smoking	4(4.1)	1(0.6)	2.13(1.33-3.40)	0.054*
No cigarette smoking	94(95.9)	156(99.4)	1.00(Ref)	
First ANC after the1st Trimester	88(87.8)	134(85.4)		
First ANC in the 1st Trimester	10(10.2)	23(14.6)	1.00(Ref)	

**p value: <0.05*

8.8 Associations between depression and neonatal outcomes

A total of 27women (10.7%) delivered before completing 37 weeks of gestation with 11(4.3%) of these delivering even before getting to 36 weeks (demonstrated on fig 4.) Table 6 demonstrates, the relative risk of delivering between 36-37 weeks gestation when depressed as opposed to when not depressed is 2.01 at a significant level $p<0.001$ whereas the risk delivering before 36 weeks gestation is even higher at 2.13 at the same significance level. 27(10.7%) of the women delivered underweight babies (<2500gms) with a relative risk of delivering an underweight baby being 2.24 higher among those with depression as compared to those with no depression at a significant level $p<0.01$. There were no significant associations between depression and Apgar score, mode of delivery or congenital malformations in the baby.

Table 6. Associating presence of depression during pregnancy to various neonatal outcomes.

	Depression n (%)	No depression n (%)	RR (95% CI)	P
Birth weight				
<2500 gms	*21(21.4)*	*6(3.8)*	*2.24(1.68-2.99)*	*<0.001*
2500-3500 gms	60(61.2)	113(72.0)	1.00(ref)	
>3500 gms	17(17.3)	38(24.2)	0.89(0.57-1.39)	0.613
APGAR score				
>8	92(93.9)	141(89.8)	1.00(ref)	
<8	5(5.1)	16(10.2)	0.60(0.28-1.32)	0.205
Gestation at delivery				
>37weeks	77(78.6)	148(94.3)	1.00(ref)	
36-37 weeks	*11(11.2)*	*5(3.2)*	*2.01(1.38-2.93)*	*<0.001*
<36 weeks	*8(8.2)*	*3(1.9)*	*2.13(1.42-3.19)*	*<0.001*
Mode of delivery				
SVD	74(75.5)	118(75.2)	1.00(ref)	
Induced	0(0.0)	2(1.3)	Na	<0.001
Cesarean	24(24.5)	37(23.6)	1.02(0.71-1.46)	0.911
Congenital malformations				
No	96(98.0)	156(99.4)	1.00(ref)	
Yes	1(1.0)	1(0.6)	1.31(0.32-5.31)	0.703

8.9 The association between various demographic, medical, psychosocial variables and preterm delivery.

A log regression was run in a generalized linear model to determine the association of various variables to preterm delivery demonstrated in table 7.There was a higher risk of delivering a preterm for those that earned a monthly income below 4,999 Kenyan shillings (RR=2.49) at a confidence level between 1.04-5.96 (*p=0.041*); those who had experienced a stressful life event during the pregnancy (RR=1.32) at a C.I. of 0.65-2.70 *(p=0.04);* those with a raised systolic blood pressure above 190mmHg (RR=2.06) at 95% C.I. 0.86-4.98 *(p=0.017)* ; those who used alcohol (RR=2.44) at a 95% C.I. 0.69-8.59 *(p=0.015)* ; and also those who experienced suicidal ideation during the pregnancy (RR=2.46) at a 95% C.I. of 1.55-11.43 *(p=0.022).* Mild depression was also positively associated with a relative risk of 3.43 at 95% C.I. of 1.48-7.92*(p=0.004)* and moderate

depression at an even higher relative risk of 4.56 at a confidence interval of 1.91-10.90 *(p< 0.001).* Having a tertiary education (college/ university) by contrast was a protective factor reducing the risk of delivering preterm by half (RR=0.54) at 95% C. I. of 0.16-1.78 *(p=0.031).*

Table 7. The associations between various demographic, psychosocial and medical characteristics to preterm delivery.

	Preterm	Term	Unadjusted RR (95% CI)	P
Age				
<19 years	1(3.7)	17(7.6)	0.57(0.08-4.18)	0.577
20-24 years	10(37.0)	92(40.9)	1.00(Ref)	
25-29 years	9(33.3)	73(32.4)	1.12(0.48-2.63)	0.796
30-34 years	6(22.2)	34(15.1)	1.53(0.59-3.94)	0.378
35-40 years	1(3.7)	9(4.0)	1.02(0.14-7.20)	0.984
Education level				
No formal education	1(3.7)	4(1.8)	1.76(0.29-10.84)	0.541
Primary school	7(25.9)	50(22.2)	1.08(0.47-2.49)	0.853
Secondary/ high school	16(59.3)	125(55.6)	1.00(Ref)	
Tertiary (university/college)	*3(11.1)*	*46(20.4)*	*0.54(0.16-1.78)*	*0.031**
Monthly income				
<4 999	*6(22.2)*	*20(8.9)*	*2.49(1.04-5.96)*	*0.041**
5 000-9 999	5(18.5)	55(24.4)	0.90(0.33-2.41)	0.83
10 000-34 999	13(48.1)	127(56.4)	1.00(Ref)	
>35,000	3(11.1)	23(10.2)	1.40(0.43-4.56)	0.572
Attitude of partner towards pregnancy				
Positive	22(81.5)	201(89.3)	1.00(ref)	
Ambivalent/Negative	5(18.5)	24(10.7)	1.93(0.73-5.09)	0.423
Unwanted Pregnancy				
Not wanted	24(88.9)	196(87.1)	1.00(Ref)	
Wanted	3(11.1	28(12.4)	0.89(0.28-2.78)	0.921
Intimate partner violence				
No	26(96.3)	214(95.1)	1.00(Ref)	
Yes	1(3.7)	11(4.9)	0.77(0.11-5.22)	0.788
Stressful event during pregnancy				
No	14(51.9)	134(59.6)	1.00(Ref)	
Yes	*13(48.1)*	*91(40.4)*	*1.32(0.65-2.70)*	*0.044**

Social support				
No	0(0.0)	14(6.2)	0.00	n/a
Yes	27(100.0)	211(93.8)	1.00(ref)	
Chronic illness				
No	23(85.2)	187(83.1)	1.00(Ref)	
Yes	4(14.8)	38(16.9)	0.87(0.32-2.39)	0.786
Iron Supplementation				
No	1(3.7)	8(3.6)	1.00(Ref)	
Yes	26(96.3)	217(96.4)	0.96(0.12-7.97)	0.969
Hemoglobin level				
>10 mmol/l	25(92.6)	207(92.0)	1.00(Ref)	
<10 mmol/l	2(7.4)	18(8.0)	0.93(0.24-3.65)	0.915
Systolic blood pressure				
< 140 mmHg	22(81.5)	205(91.1)	1.00(Ref)	
>=140 mmHg	*5(18.5)*	*20(8.9)*	*2.06(0.86-4.98)*	*0.017**
First Antenatal visit				
First Trimester	10(37.0)	23(10.2)	1.00(ref)	
Second Trimester	17(63.0)	194(86.2)	????	
Third trimester	0(0.00)	8(3.6)	0.00	n/a
Alcohol use during pregnancy				
No	25(92.6)	219(97.3)	1.00(Ref)	
Yes	*2(7.4)*	*6(2.7)*	*2.44(0.69-8.59)*	*0.015**
Cigarette use in pregnancy				
No	26(96.3)	221(98.2)	1.00(Ref)	
Yes	1(3.7)	4(1.8)	1.90(0.32-11.42)	0.480
HIV Status				
Negative	23(85.2)	168(74.7)	1.00(Ref)	
Positive	4(14.8)	57(25.3)	0.54(0.20-1.52)	0.245
Mode of delivery				
SVD	19(70.4)	172(76.5)	1.00(Ref)	
Cesarean	8(29.6)	53(23.6)	1.30(0.60-2.83)	0.502
Previous Preterm Delivery				
No	24(88.9)	198(88.0)	1.00(ref)	
Yes	3(11.1)	27(12.0)	0.92(0.26-3.25)	0.893
Suicidal Ideation				
Never	18(66.7)	19586.7)	1.00(ref)	
Sometimes and Yes	*9(33.3)*	*30(13.3)*	*2.46(1.55-11.43)*	*0.022**
Depression				
No depression	8(29.6)	148(65.8)	1.00(Ref)	
Mild depression	*13(48.1)*	*61(27.1)*	*3.43(1.48-7.92)*	*0.004**
Moderate depression	*6(22.2)*	*16(7.1)*	*4.56(1.91-10.90)*	*<0.001**

A multiple regression was thereafter performed to control for potential confounders that may predispose to preterm delivery (see table 7) and those earning less than 4,999 Kenyan shillings per month presented a higher risk (adjusted RR=2.22) at 95% C.I of 0.91-5.41 *(p=0.049);* having a raised systolic blood pressure (adjusted RR=2.13) at 95%C.I. of 0.91-4.99 *(p=0.038)* and depression (adjusted RR=4.13) at a 95% C. I. of 2.82-17.42 *(p<0.001).* A stressful life event occurring during pregnancy may also be independent risk associated with preterm delivery at almost significant level with adjusted RR of 1.21 at 95% C.I. of 0.43-2.74*(p=0.053).*

Table 8. The association between various variables and depression after adjusting for potential confounders.

Variable	Unadjusted RR (CI)	P value	Adjusted RR (CI)	P value
Adolescence (<19years)	0.57(0.08-4.18)	0.577		
Poverty (<4,999/=p.m.)	*2.49(1.04-5.96)*	*0.041**	*2.22(0.91-5.41)*	*0.049**
Intimate partner Violence	0.77(0.11-5.22)	0.785		
Alcohol Use in pregnancy	2.44(0.69-8.59)	0.015*	1.11(0.49-2.52)	0.807
Cigarette Smoking in pregnancy	1.90(0.32-11.42)	0.483		
Stressful life event	1.32(0.65-2.70)	0.044*	1.21(0.43-2.74)	0.053
Chronic illness	0.87(0.32-2.39)	0.786		
HIV positive	1.38(0.36-5.28)	0.716		
Anemia	0.93(0.24-3.65)	0.915		
Hypertension	*2.06(0.86-4.98)*	*0.017**	*2.13(0.91-4.99)*	*0.038**
Previous preterm delivery	0.93(0.30-2.89)	0.893		
Suicidal ideation	2.46(1.55-11.43)	0.022*	2.02(0.94-13.22)	0.544
Depression	*4.24(2.43-17.42)*	*<0.001**	*4.13(2.82-17.42)*	*<0.001**

9. DISCUSSION

9.1 Study participants

The range of age among the study participants was between 20-34 for 89%(n=227), which is considered an ideal child bearing age marred by minimal avoidable pregnancy related complications.(27)

The literacy levels of the study participants was at 98% (n=250) having completed primary school education which surpassed the national rate that stands at 78% and 75.7%(n=193) having completed secondary school possibly because this was a predominantly urban population.(36)

The study was conducted at Pumwani a government run maternity hospital that offers free maternity care to the public. During the time of data collection the hospital staff were on a go slow and only those women that could not afford other facilities were attending their clinics at the facility thereby 89.0%(n=227) had a family income below 4,999 Kenyan Shillings per month (less than USD 1.25 per day) that mirrors the economic picture of the country with 78% living below the poverty line.(KDHS 2008/09) . Of these women 40.4% (n=103) were unemployed thereby dependents for their basic needs.

9.2 The prevalence and screening for depression among women attending Antenatal Clinic at Pumwani Maternity Hospital.

The prevalence of depression among the study participants was 38.4%(n=98) almost matching a similar study carried out in Cote devoir (32.9%) and Ghana (26.6%) using the PHQ-9.(11) Depression during pregnancy has a higher prevalence rate among countries of low socio-economic status (6) with even higher prevalence of 41% being reported in some countries like South Africa (12) in contrast to the western world that affords low rates of 12.3 (42) making this a bigger problem for sub-Saharan Africa. The prevalence of depression using the EPDS at a score of above 12 was 32.8%(n=82) comparable to a study carried out in South Africa with a prevalence of 38.5%.(22) (43) Suicidal ideation is prevalent in the perinatal period at 5-14% and was detected among 15.3%(n=39) of the study participants using Question 10 of the EPDS (44) markedly lower than a prevalence of 38.3% in a study in South Africa using the same methodology. (43)

Diagnosis and management of depression among the study participants was very low with 4.1%(n-4) of those noted to have depression having been known their diagnosis

earlier and 2.6%(n=3) being on antidepressants. The PHQ-9 may be used for improvement assessment while on treatment for depression and one participant on antidepressants had no symptoms of depression attributed to adequate treatment during the time of data collection symptom control. The rate of diagnosis and appropriate management of mental health disorders in Africa remains low at below 10%.(2)
Depression has a genetic predisposition and tends to run in families with 8.1%(n=8) of those with depression symptoms admitting to family history of mental illness. Other factors associated with the development of depression during pregnancy among the study participants included poverty (less than USD50 monthly family income), single marital status and adolescent pregnancies, unintended pregnancies, stressful events occurring during the pregnancy, the experience of intimate partner violence and a negative attitude by the partner towards the spouses pregnancy similar to several studies. (10)(14)(43)
Adewuya et al described the perceived lack of social to predispose to depression upto 6 times more than those with good social support but this could not be assessed in our study as the participants that were depressed and reported a lack of social support were only two. (10)
The participants who were HIV positive had a 12% higher chance of being depressed than those that were HIV negative echoing finding by Mannikam et al that relate HIV during pregnancy with a higher risk of depression. This may also be due to the fact that in Kenya many women first discover their HIV status during their antenatal visits. (43)(36)
The prevention of mother to child guidelines recommend all women diagnosed to be HIV positive in pregnancy be started on complete Anti-retroviral medication for life regardless of their CD4 count and several women may be resistant to this recent adaptation as only three out of the 14 HIV positive women were on medication. (45)
Substance abuse is prevalent among those with depression in the general population and a few women continue to smoking cigarettes or taking alcoholic drinks during pregnancy despite the documents ills of the practice to the fetus. (46) Nine (3.5%) of the study participants were using alcohol and five (2.1%) smoking 1.47 and 2.13 times more common among the participants with depression than those with no depression.
Good clinical obstetric practice entails an antenatal visit during the first trimester of pregnancy to for early detection of pregnancy complications but this has not been

achieved in the Kenyan population (32)(36) with similar findings in our study as only 33(12.9%) appropriately began antenatal clinic in the first trimester. Depression has been noted to delay most women fro attending antenatal clinic early as reported in a Tanzanian study (28) with similar findings in our study with a 22% higher chance of those who are depressed attending their first ANC after the first trimester as compared to those that are not depressed.

9.3 Depression during Pregnancy and Neonatal outcomes.

Low birth weight deliveries (<2500gms) were 2.24 times more among the participants with depression than those with no depressive symptoms. Studies on the association have reveled conflicting results with those conducted in Ghana and Ethiopia showing no association whereas a study in Brazil and South Africa revealed a higher risk of low birth weight deliveries among depressed women as compared to those with no mental health pathology.(41)(47)(48)(49)The mechanism associating depression and low birth weight may be complex relating to both nutrition, acute infections, chronic medical conditions and preterm deliveries resulting in either intrauterine growth retardation thus Small for gestational age babies or preterm deliveries.(9)

There was no association between depression and Apgar score, mode of delivery and fetal malformations similar to a study by Grigoridias. (50)

9.4 The prevalence and risk factors associated with preterm delivery among the women attending ANC at Pumwani Maternity Hospital

Among the study participants, 27(10.7%) delivered before 37 completed weeks comparable to the national statistics of 12.3% (4)The prevalence may have been slightly lower as participants with glaring complications were being referred to Kenyatta National Hospital due to the afore mentioned hospital go-slow.

Also, during the enrollment process those with risk factors that predispose to preterm delivery including multiple gestations; short birth spacing (conception in less than 6 months of previous delivery) and multiple abortions or miscarriages (31) were excluded from the study. None of the participants reported physical trauma and none had undergone in vitro fertilization also known to predispose to preterm delivery but rare in Kenya due to the cost implication.

The participants that had used alcohol, experienced stressful life events and had suicidal ideation during pregnancy had a 2.44,1.32 and 2.46 times higher risk of delivering preterm but after adjusting for confounders these factors were not significant. This may be due to their association with depression directly. (46)

Intimate partner violence, cigarette smoking, known chronic illnesses such as diabetes and asthma revealed no association to preterm delivery probably due to small sample size. Admitting IPV requires good rapport that the study could not achieve with a self-administered questionnaire. Cigarette smoking among women in Kenya is uncommon.(36) There is no association between HIV and preterm delivery and the study revealed the same results. (51)The study did not show an association between previous preterm deliveries and adolescent pregnancies with current preterm delivery though these are known major risk factors due to a small sample size not calculated with an objective to pick these rare phenomena. Previous preterm delivery is known to predispose to another preterm delivery but this was not the finding in our study possibly due to a sample size. Recurrent preterm deliveries are thought to occur due to anatomic anomalies on the uterus and cervix that are permanent that was difficult to assess. The exclusion of these participants strengthened the results of the study. (34)

Those that earned less than 4,999 Kenyan shillings were 2.22 times more at risk of preterm delivery after controlling for potential confounders. Those with high systolic blood pressure were also at a 2.13times higher risk of preterm delivery especially in case of development of pre-eclampsia. (38)(30)

Micronutrient deficiencies which increase the risk of preterm delivery including anemia which was prevalent among 7.9%(n=20) of the study participants was not a risk of delivering preterm possibly because this readings were done in the first or second trimester of pregnancy and 97.6%(n=246) were on Iron and folic supplements to counter the effects and correct the deficiency. (52)

The risk of delivering preterm among the participants with depression was 4.13times higher than among those with no depression. Studies have revealed conflicting results on this association for example prospective cohort studies by Brittain et al and Bindt et al found no association in South Africa (depression was assessed using BDI-II with a prevalence of 21% in 2015) and Ghana (depression assessed using PHQ-9 with a

prevalence of 28.9% in 2013) respectively.(49)(47) On the other hand, In the same country of Ghana Weobong et al in 2014 using PHQ-9 in a nested cohort study with a prevalence of depression of 9.9% found appositive association putting depressed women at a 32% higher risk of preterm delivery(RR-1.32; 95% C.I. 0.98-1.76) (53) two systematic reviews concluded that depression during pregnancy increased the likelihood of preterm delivery. The first was conducted in USA in 2010 and the other in Australia in 2015.(9) (54)

10. CONCLUSION

There is a strong association between depression and preterm delivery an adverse obstetric outcome in Kenya that has been the focus of reducing under five mortality rates in Kenya. Women who are depressed during pregnancy have a 4 times higher risk of delivering preterm than those who are not depressed. Addressing the mental health of women as they attend antenatal clinic may aid in reduction of preterm delivery and other grave obstetric outcomes yet to be researched.

11.STUDY LIMITATIONS

The study was carried out in a hospital located in an urban low socioeconomic area in Kenya and thus may not be an accurate representation of all pregnant Kenyan women but the larger majority.

Hospital based sampling frame may be biased as a severely depressed woman may not present to antenatal clinic at all throughout her pregnancy and this may not be represented in the study. There was no woman found to have severe depression.

The study had no accurate way of confirming gestation to the exact date. The study relied on memory (recall bias) of the woman for her last menstrual period to determine gestation. Fundal height at the time of interview and examination of the neonate at delivery will be used to correlate this.

Preconception weight, which is a risk factor for preterm delivery, could not be objectively ascertained. Preconception clinics are not the norm in Kenya.

12. RECOMMENDATIONS

All women attending antenatal care should be screened for depression using a basic tool like EPDS as they wait to be served at each clinic. A further study that will follow-up women from the preconception stage; record preconception weights and monitor its rate; include all socioeconomic classes of women; include a compulsory first trimester ultrasound and follow-up these women into the post-partum period is recommended. This will eliminate all the study limitations cited above and deliver a more concrete conclusion.

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APPENDIX

A. CONSENT DOCUMENT

ENGLISH VERSION

Title: Depression and preterm birth; a prospective study among women attending antenatal clinic in Pumwani maternity Hospital, Nairobi

Investigator: Dr Kingi Kemunto Mochache
Supervisors: Dr Kumar Manasi
Dr Muthoni Mathai
Dr Onesmus Gachuno

I Dr. Kingi Kemunto Mochache a postgraduate student at the University of Nairobi wishes to conduct a research study on maternal depression in Pumwani maternity Hospital.
I would like to invite you to participate in this study

Introduction to Research Activities:
The activity is a research that will seek to understand the prevalence of depression among pregnant women and its effects on gestation at delivery. It will have approximately 262 participants and will take about 6 months to collect data from various participants.
In this research you will be asked questions regarding your feelings, thoughts and behavior.
On first contact we will enquire about your socio-demographic information and screen for symptoms of depression. We will also record the information on your antenatal profile book. We will carry out a basic clinical physical examination that will include general appearance and abdominal examination. No vaginal examination will be conducted. All this is expected to take about 20min of your time. Participants found to have a higher score on the screening tool (EPDS), will undergo further clinical assessment to confirm a diagnosis of depression that may take another 20minutes. If this is confirmed the participant will be appropriately referred to Mama Lucy Kibaki Hospital Outpatient Clinic for further management.
The researcher will later contact you at the time of delivery requesting for information from your delivery record. There are no invasive procedures.
During these 2 contacts you may ask any questions of concern and are allowed to use either Swahili or English.

Entry Requirements:

1. Above 28 weeks gestation of pregnancy
2. Plan to delivery in a registered medical institution within Nairobi.
3. Have a registered telephone line.

Risks and Discomfort
The potential for adverse effects from this study arises from the participant experiencing inconvenience due to length of the interview and the discussion of potentially sensitive topics. A medical doctor will take you through this process.

Benefit
There are no direct benefits from participating in this study. However the results of the study may help us implement better interventions and comprehensive care for women in Kenya that suffer depression during pregnancy.
Women found to have depression will be referred for specialized care.

Anonymity and Confidentiality
All information obtained from this study will remain confidential and your privacy will be upheld.
Identification will be by a unique study number only and names will not be used in this study or in future publications.

Compensation for participation
There will be no payment for taking part in this study.

Participation:
It is very important that you understand the following general principles, which apply to all participants in our study.

1. Participation is entirely voluntary
2. Refusal to participate will involve no penalty or loss of benefits to which you are entitled at this clinic.
3. After you read/ listen to the explanation please feel free to ask any questions that will allow you to understand the nature of the study.
4. You can withdraw from the study at any point.
5. All participants will be given a copy of the signed and dated consent form to keep.
6. Participants found to have depression will be referred for specialized care available in Mama Lucy Kibaki Hospital outpatient department at the patient's own expense.
7. The researcher may terminate this research if it is found to be harmful to you in any way.

Should you have any concerns about this project; you may call Dr Kingi Kemunto Mochache on **+254722234368**.
Should you have any questions concerning your rights as a research subject you may contact KNH/UON/ERC (chairperson tel no +**2542726300 ext 44102**)

B. INFORMED CONSENT FORM

I .....(name of participant) have read/heard and understood the explanations given to me about this study entitled "depression and preterm birth among women attending antenatal clinic in Pumwani Maternity Hospital; Nairobi ".
I have had the opportunity to ask questions that have been clarified to my satisfaction by .....(name of person taking consent/researcher) in the language I understand.

I understand that my participation in this study is entirely voluntary and I can withdraw my participation at any time I want to without giving an explanation for doing so. I understand that if I withdraw my participation, it will not affect my livelihood in any way.

I understand that all the information I give, including private information will be kept confidential. I accept to give information that will help in this study and also that whatever information is received will be reported and published confidentially.

I agree to participate in this study.

Name of participant:.....
Signature of participant:..... Date:.....
Signature of witness:..... Date:.....

Name of person taking consent:.....
Signature:..... Date:.....

You will receive a copy of the signed consent form to take away with you.

C. HATI YA RIDHAA

SWAHILI VERSION

Andiko: Unyongovu na kujifungua mapema:Utafiti kati ya wanawake wanohoudhuria kliniki za wajawzito katika Hospitali ya Pumwani , Nairobi.

Mpelelezi: Dr Kingi Kemunto Mochache

Wasimamizi: Dr Kumar Manasi
Dr Muthoni Mathai
Dr Onesmus Gachuno

Mimi Dr kingi Mochache mwnanfunzi wa uzamili katika chuo kikuu cha Nairobi ningependa kutekeleza utafiti juu ya unyongevu katika wajawazito ambao utafanyika katika Hospitali ya Pumwani. Ningependa kukukaribisha kushiriki katika utafiti huu.

Utangulizi wa Shughuli za Utafiti

Utafiti huu unalenga kuelewa ukubwa ulio kati ya wanawake wajawazito na madhara yake katika wakati wa kujifungua .

Italenga takriban washiriki 262na itachukua miezi 6 kukamilisha kukusanya habari itakikanayo.

Katika utafiti huu tutakuuliza maswali kuhusu hisi, mawazo na tabia zako.

Tutakapowasiliana mara ya kwanza, tutakuuliza maswali kuhusu ubinafsi wako; jamii yako na maisha yako ya kila siku. Utapewa chombo cha uchunguzi cha EPDS ambacho utajaza. Pia tutarekodi maelezo ya kliniki kutoka kitabu/ kadi yako .Utapimwa kimwili kwa njia ya ujumla tukiangalia haswa tumbo yako. Hautapimwa katika njia ya uke.

Atakayepatikana na dalili za unyongovu ataelekezwa kuenda hospitali ya Mama Lucy Kibaki atakopokea huduma inayotakikana

Mawasiliano yatakayofuta yatakuwa katika simu, msajili atakapokupigia simu ili kurekodi utakapojifungua.

Hakutakuwa na taratibu vamizi katika mawasiliano haya.

Utakapokuwa na maswala yoyote ya wasiwasi utaweza kuuliza mpelelezi na unaruhusiwa kutumia lugha ya Kiswahili au kiingereza

Mahitaji ya Kujiunga na Utafiti

Ili kujiunga na utafiti huu unatakiwa:

- Uwe na ujauzito wa wiki ishirini na nane (miezi saba) kuendelea
- Uwe na mpango wa kujifungua katika hospitali yoyote iliyosajiliwa humu Nairobi
- Uwe na nambari ya simu iliyoandikishwa.

Hatari na Usumbufu

Uwezekano wa adhari kutokana na utafiti huu utatokana na mshiriki kupitia usumbufu kutokanana na urefu wa mahojiano na majadiliano ya mada nyeti.

Daktari ndiye atakayekuchukua kupitia mchakato huu.

Faida
Hakuna faida ya moja kwa moja kutokana na ushiriki katika utafiti huu. Hata hivyo matokeo ya utafiti yataweza kusaidia kutekeleza hatua bora na huduma ya kina kati ya wanawake wa Kenya ambao huteseka na Ungogevu katika ujauzito

Faragha
Taarifa zote zitakazopatikana katika utafiti huu zitabaki siri na faragha yako itazingatiwa. Utambulisho utatumia nambari ya kipekee ya utafiti na majina yako hayatatumika katika utafiti huu wala katika machapisho ya baadaye.

Fidia
Hakutakuwa na malipo kwa ajili ya kushiriki katika utafiti huu.

Ushiriki
Tutakapowasiliana siku ya kwanza ; tutakuuliza kuhusu ubinafsi wako ; jamii yako na maisha ya kila siku. Utapewa chombo cha uchunguzi cha EPDS ambacho kinalenga kuthamini dalili za unyongovu. Ni muhimu sana kwamba uelewe kanuni zifuatazo kwa ujumla ambazo zinahusu washiriki wote katika upelelezi huu.

1. Ushiriki ni kwa hiari kabisa
2. Kukataa kushiriki hakutakuletea adhabu wala hasara ya faida ambazo ni haki yako kupokea katika kliniki ya wajawazito ya Pumwani.
3. Baada ya kusoma/ kusikiliza maelezo tafadhali jisikie huru kuuliza maswali ya kufafanua na kukusaidia kuelewa lengo la utafiti huu.
4. Unaweza kuondoka kutoka utafiti huu katika hatua yoyote.
5. Washiriki watakaopatikana na ugonjwa wa unyongonyevu wataelekezwa katika huduma maalum ipatikanayo katika hospitali ya Mama Lucy Kibaki ambapo watashugulikiwa ifaavyo katika gharama yao wenyewe.
6. Mtafiti anaweza kusitisha utafiti huu ambapo kutapatikana madhara kwako kwa njia yoyote.

Atakayehitaji majibu au ufafanuzi katika tukio au tatizo linalohusiana na utafiti huu anweza kuwasiliana na mtafiti Dr Kingi Kemunto Mochache katika nambari **+254-722-234-368**.
Ukiwa na maswali yoyote kuhusu haki yako kama somo la utafiti unaweza kuwasiliana na KNH/UON/ERC (mwenyekiti +**2542726300 ext 44102)**

D. FOMU YA RIDHAA

Mimi .....(jina la mshiriki) nimesoma/nimeskiza na kuelewa yaliyotolewa kuhusu utafiti huu " Depression and preterm labor among women attending antenatal clinic in Pumwani Maternity Hospital; Nairobi". Nilikuwa na nafasi ya kuuliza .....(jina la anyechukua ridhaa); maswali katika lugha ninayoelewa na sasa ni wazi na nimeridhika.

Naelewa kwamba ushiriki wangu katika utafiti huu nihiari yangu kabisa na naweza kutoa ushiriki wangu wakati wowote nataka bila ya kutoa maelezo kwa kufanya hivyo. Mimi ninaelewa kwamba kuondoa ushiriki wangu, hutaathiri huduma yangu kwa njia yoyote.

Naelewa kwamba taarifa zote nitakazotoa, pamoja na taarifa binafsi itakuwa siri.

Mimi ninakubali kushiriki katika utafiti huu.

Jina la mshiriki: .....
Sahihi la mshiriki:.....Tarehe:.....
Sahihi la shahidi:.....Tarehe:.....

Jina la anyechukua ridhaa:.....
Sahihi :..... Tarehe: .....

Utapokea nakala ya fomu hii.

E. SOCIO-DEMOGRAPHIC/ CLINICAL QUESTIONAIRRE

Circle the option that best applies to you. For example:
Gender: A) Male
B) Female
You may ask for clarifications.
A midwife will confirm your answers.

SERIAL NO:.....

1,Age:
a)<19years
b) 20-24
c) 25-29
d) 30-34
e) 35-40
f) > 41 years

2. Marital status:
a) Single
b) Married
c) Cohabiting
d) Separated
e) Divorced
f) Widowed

3. Highest level of education
a) No formal education
b) Primary school
c) Secondary/High school
d) Tertiary (university/college):

4. Occupation:
a) Unemployed
b) Formal employment
c) Informal (casual)
d) Self-employed

5. Religion
a) Catholic
b) Protestant
c) Muslim
d) Hindu
e) Other

6. Monthly family income:
a)<4,999/=
b) 5000-9999/=
c) 10,000-34,999/=
d) 35,000-99,000/=
e) >100,000/=

7. Stressful life event during pregnancy:
a) Marital
b) Family:
c) Economic
d) Societal
e) None:

8. History of chronic illness (Hypertension; asthma; cardiac dx; diabetes etc.)
a) Yes. Specify:.....
b) No.

9. Current Medication:-
a) Iron and/or Folic acid
b) Anti-depressants:
c) Others. Specify:.....

10. Week of gestation of first ANC visit
a)< 12 weeks (less than 3 months)
b) 12-28 weeks (3-7months)
C) >28weeks(more than 7 months)

11. Unplanned pregnancy:
a) Yes
b) No

12. Unwanted pregnancy:
a) Yes
b) No

13. Attitude of partner towards pregnancy:
a) Positive
b) Negative
c) Ambivalent

14. Presence of social support (Partner; mother; friend; church etc.)
a) Yes
b) No

15. Present use of alcohol during pregnancy:
a) Yes
b) No

16. Use of other substance of abuse
a) None
b) Cigarette
c) Other. Specify:.....

17. Use of substance by partner (Smoking tobacco, Bhang, Heroine or other inhaled)
a) Yes
b) No

18. History of Mental illness:
a) No
b) Yes.
Specify:.....

19. Family history of mental illness:
a) Yes
b) No

20. Experience of Intimate partner violence in pregnancy
a) Yes
b) No

21. Previous preterm delivery:
a) Yes
b) No
If yes
gestation:.....weeks.

ANTENATAL RECORD
(FROM ANC PROFILE BOOK/CARD by Midwife/ Researcher)
Indicate if new diagnosis (within pregnancy)
22.Highest BP reading:.....

23.Lowest Hemoglobin level
a) < 8 mmol/l
b) 8-10mmol/l
c)> 10mmol/l

24. Highest sugar level/RBS:
a)< 3.5mmol/l
b) 3.5-6.9mmol/l
c) 7-11.1mmol/l
d) > 11.1mmol/l

25. VDRL:
a) Positive
b) Negative

26.HIV
a) Positive
b) Negative

27.Urinalysis:
a) Clear
b) Unclear (pus cells/ protein/nitrites etc.)

28. Parity:.....+.....

29. No of living children:.....

30. LMP (first date of last menstrual period):.....
.....
31. Fundal Height:.....

32. Dates by ultrasound:
.....

33. Estimated date of delivery by:
Dates:.....

F. EDINBURGH POSTNATAL DEPRESSION SCALE (EPDS)

Serial number: .....Tel no.....

Planned place of Delivery..... Other tel no.....

As you are pregnant 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.

In the past 7 days.....

1.I have been able to laugh and see the funny side of things
a) As much as I always could
b) Not quite so much now
c) Definitely not as much now
d) Not at all.

2. I have always looked forward with enjoyment to things
a) As much as I ever did
b) Rather less than I used to
C) Definitely less than I used to
d) Hardly at all

3. *I have blamed myself unnecessarily when things went wrong
a) Yes, most of the time
b) Yes some of the time
c) Not very often
d) No, never

4. I have been anxious or worried for no good reason
a) No, not at all
b) Hardly ever
c) Yes, sometimes
d) Yes, very often

5.* I have felt scared or panicky for no good reason
a) Yes, quite a lot
b) Yes, sometimes
c) No, not much
d) No, not at all

6. * Things have been getting on top of me
a) Yes, most of the time I haven't been able to cope
b) Yes, sometimes I haven't been coping as well as usual
c) No, most of the time I coped quite well
d) No, I have been coping as well as ever

7. * I have been unhappy that I have had difficulty sleeping
a) Yes, most of the time
b) Yes, sometimes
c) Not very often
d) No, not at all

8. * I have felt sad or miserable
a) Yes, most of the time
b) Yes, quite often
c) Not very often
d) No, not at all

9. * I have been so unhappy that I have been crying
a) Yes, most of the time
b) Yes, quite often
c) Only occasionally
d) No, never

10. *The thought of harming myself has occurred to me
a) Yes, quite often
b) Sometimes
c) Hardly ever
d) Never

SCORING
Questions 1,2 and 4 (without an *)
Are scored 0,1,2 or 3 with the top box scored as 0 and the bottom scored as 3.

Questions 3, 5-10 (marked with an *)
Are reverse scored, with the top box scored as 3 and the bottom box scored as 0

Maximum score is 30
Possible depression: 10 or greater
Always look at item 10(suicidal thoughts)

Instructions for Using The Edinburgh Postnatal Depression Scale:

1. The mother is asked to check the response that comes closest to how she has been feeling in the previous 7 days.
2. All items must be completed
3. Care should be taken to avoid the possibility of the mother discussing her answers with others. (Answers come only from the pregnant woman)
4. The mother should complete the scale herself, unless she has limited English or has difficulty reading.

G. FOMU YA MIZANI YA EDINBURGH (EPDS)

Namba ya Utambulisho: **Namba ya simu**:

Unapotarajia kujifungua:

Ulivyo mja mzito tungependa kujua jinsi unavyojiskia(hisi). Tafadhali tia alama katika jibu linalokaribia kabisa kueleza jinsi umejiskia katika kipndi cha siku & zilizopita sio tu unavyosikia leo.

Kwa kipindi cha siku saba zilizopita:

1. **Nimeweza Kucheka na kuona jambo la kuchekesha katika mambo**
   a) Ndio, kama kawaida
   b) sio, kama hapo mbeleni(awali)
   c) Kwa hakika, sio kama hapo mbeleni
   d) La, hasha
2. **Nimetarajia mambo kwa furaha**
   a) Kama tu hapo mbeleni
   b) Imepunguka kidogo
   c) Imepunguka kabisa
   d) Mara chache sana
3. ***Nimejilaumu bila sababu wakati mambo yalipoenda vibaya**
   a) Ndio, mara nyingi
   b) Ndio, mara kadhaa
   c) sio, kawaida
   d) La, sijawahi
4. **Nimekuwa na wasiwasi bila sababu nzuri**
   a) La, sijawahi
   b) Sio, kwa kawaida
   c) Ndio , Mara kwa mara
   d) Ndio, mara nyingi
5. ***Nimeshikwa na woga au hofu bila sababu njema**
   a) Ndio, mara nyingi
   b) Ndio, mara kwa mara
   c) La, si sana
   d) La, sijawahi
6. ***Mambo yamekuwa yakinilemea**
   a) Ndio, mara nyingi nimeshindwa kukabiliana nayo
   b) Ndio, mara kwa mara sijaweza kukabiliana nayo
   c) La, mara nyingi nimeweza kukabiliana vyema
   d) La, mara nyingi nimeweza kukabiliana vyema kama hapo mbeleni/awali
7. ***Nimekuwa na huzuni sana hadi nimekuwa na ugumu kupata usingizi**
   a) Ndio, mara nyingi
   b) Ndio, mara kwa mara
   c) sio kila wakati
   d) la, hapana
8. ***Nimesikia huzuni sana na kutokua na furaha**
   a) Ndio, mara nyingi
   b) Ndio, mara kwa mara
   c) sio, kila wakati
   d) La, hapana
9. ***Sijakuwa na furaha kabisa hadi nimetokwa na machozi**
   a) Ndio, mara nyingi
   b) Ndio, mara kwa mara
   c) mara moja moja
   d) La, sijawahi
10. ***Nimekuwa na mawazo ya kujitendea mabaya**
    a) Ndio, mara nyingi
    b) Ndio, mara kwa mara
    c) sio, kwa kawaida
    d)La, sijawahi

ALAMA

Maswali ya 1,2 and 4 (bila *)

Yana alama 0,1,2 au 3, huku chaguo la juu(a) likipewa alama 0 na la chini (d) likipewa alama 3

Maswali 3 na 5-10 (imewkwa *)

Inapewa alama zilizogeuzwa, huku chaguo la juu (a) likipewa alama 3 na chaguo la chini(d) likipewa alama 0

Alam ya juu zaidi ni 30

Uwezekano wa ugonjwa wa unyongevu ni alama ya 10 au zaidi

Kila mara ni muhimu kutazama swali #10 ambalo linaonyesha mawazo kuhusu kutaka kujiua.

MAAGIZO

1. Mama anulizwa kupigia mstari jibu moja tu kati ya majibu manne aliyopewa, jibu lililokaribia zaidi kuhusu jinsi amekuwa akihisi kwa kipindi cha siku saba zilizopita.
2. Maswali yote 10 lazima yajibiwe
3. Lazima kuwe na uangalifu kuzuia uwezekanayo wa mama kujadili majibu yake na wrngine.
4. Mama lazima ajibu maswali haya mwenyewe, atsaidiwa iwapo hawezi kusoma au kufahamu lugha hii.

H. PHQ-9 Depression

Over the last 2 weeks, how often have you Been bothered by any of the following problems?	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things.....……	0	1	2	3
2. Feeling down, depressed, or hopeless.……..……	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.....…….……..	0	1	2	3
4. Feeling tired or having little energy.....……...……	0	1	2	3
5. Poor appetites or overeating.....……	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down……..	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television……..	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.....……..	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way.....……	0	1	2	3

=Total Score _____

I. OUTCOME FORM/STICKER

Unique Study Number:…….....

Birth weight: -.....(in grams)

Apgar score at 5 min.....(out of 10)

Date of delivery:.....(dd/mm/yy)

Did membranes rapture before onset of labor: (yes/no)

Mode of delivery: a) SVD (spontaneous vertex delivery)
b) Induced-vaginal
c) Breech extraction
d) Cesarean Section

Sex of baby: Male / Female

Does baby have any malformations: Yes/ No

J. CLINICAL EXAMINATION PROCEDURE

Physical Examination:

1. General Appearance
2. Vitals: Temperature; Blood Pressure; Respiratory Rate; Heart Rate
3. Pallor presence/ absence; Edema Presence/ Absence: Oral Thrush Presence/ absence
4. Leopold's Maneuvers

- Fundal Height (in cm)
- Lie
- Presentation
- Engagement.