

**PREVALENCE OF POST-PARTUM DEPRESSION AND ANXIETY AMONG
MOTHERS OF PRETERM INFANTS RECEIVING INTENSIVE CARE IN
NEWBORN UNIT AT KENYATTA NATIONAL HOSPITAL**

**DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR
THE AWARD OF DEGREE OF MASTERS OF SCIENCE
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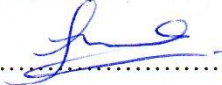
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ABBREVIATIONS

AIDS	-	Acquired immunodeficiency syndrome
DSM-IV	-	Diagnostic Statistical Manual of Mental Disorders
EC	-	Ethics Committee
ELBW	-	Extremely low birth weight
EPDS	-	Edinburgh Postnatal Depression Scale
FTI	-	Full term birth infant
K10	-	Kessler screening scale for psychological distress (K10)
HIV	-	Human Immunodeficiency Virus
HIC	-	High income countries
HC	-	Health Centre
KNH	-	Kenyatta National Hospital
LMIC	-	Low and middle income countries
LBW	-	Low birth weight
MDD	-	Major Depressive Disorder
MOH	-	Medical Officer of Health
M O	-	Medical Officer
NCC	-	Nairobi City County
NICU	-	Newborn Intensive Care Unit
NBU	-	Newborn Unit
PTB	-	Preterm birth
PTI	-	Preterm infant
PPD	-	Postpartum Depression
PND	-	Post Natal Depression
PHQ-4	-	Patient Health Questionnaire-4
WHO	-	World Health Organization
UON	-	University of Nairobi
VLBW	-	Very low birth weight

DEFINITION OF TERMS

Post partum depression- is a non psychotic disorder of variable severity characterised by feeling sad, lack of interest, change in sleep pattern and appetite, feelings of worthlessness, guilt, sense of insecurity and suicidal thoughts.

Anxiety – is a state of apprehension , uncertainty, fear or anticipation of realistic or imagined threatening event or situation or outcome, often impairing physical or psychological functioning.

Psychological distress – A general term used to describe unpleasant feelings or emotions that impact negatively on an individual's level of functioning.

ABSTRACT

Background

Maternal postpartum depression (PPD) is a common complication of child birth considered as a serious public health problem worldwide. Undetected and untreated, PPD can have adverse long-term effects on the mother, child(ren) and family. Mothers of preterm infants are particularly at high risk of poor postpartum functioning, with higher rates of depression and anxiety compared to mothers of healthy full term infants.

Objective: To determine the prevalence of postpartum depression and anxiety among mothers of preterm infants receiving intensive care in newborn unit at Kenyatta National Hospital (KNH), compared to mothers of fullterm healthy infants attending Mother Child Clinic(MCHC) at Umoja Health Center(UHC).

Study design: A descriptive comparison study

Method The recruited 172 mothers and their infants- 86 mothers of preterm infants in Neonatal intensive Care Unit (NICU)-KNH and 86 mothers of full term infants attending MCHC at Umoja H/C, completed the self-reporting Sociodemographic questionnaire to establish probable risk factors and EPDS, K 10 and PHQ4 to screen for levels of depression and anxiety.

Data analysis: The collected data was analyzed using SPSS software version 24.The three levels of statistical methods-descriptive, bivariate and multivariate logistic regression were conducted and summarized in form of tables and graphs.

Results:

The overall depression and anxiety among the NICU preterm mothers, and comparable group as measured by EPDS (≥ 13) was 44.2%. The NICU mothers had higher prevalence of PPD at 68.8% compared to comparison group 19.8%. As measured by Kessler 10 scale, the overall psychological distress in the both groups was rated at 26.3%,with NICU mothers 39.5% and compared to the cases 12.9%. The prevalence of depression and anxiety as measured by PHQ4, the overall in both groups was 31.6%, with NICU mothers with higher levels at 48.8% and comparison group at 14.1%. The overall anxiety among both groups was 35.1%, NICU mothers with higher levels at 52.3%, compared to comparamples at 17.6%. The overall prevalence of depression in

both groups was 33.3%, with NICU mothers reporting higher levels 47.7% and the comparable group 18.8%.

Conclusion: The current study found that, depression and anxiety co-exists. The mothers of preterm infants in NICU at KNH were at higher risk of PPD and anxiety compared to the comparable group. The study concluded that, not one causative or risk factor, but multiple risk factors contributed to the development of PPD and anxiety particularly among NICU cases. The identified risk factors included: Sociodemographic risk factors, stressful life events, NICU environment settings and infants' related risk factors. Interventions targeting psycho-social risk factors such as routine screening for depression and anxiety (psychological distress) and regular monitoring to all mothers with preterm infants in NICU should be considered as a priority preventive strategy.

CHAPTER ONE

INTRODUCTION

1.0 Introduction/ Background

The birth of an infant is ordinarily supposed to bring joy to the mother and her family. But to some women childbirth can be stressful and can alter their emotional wellbeing [1]. Based on culture, women are expected to adapt to their roles as new mothers as well their other responsibilities in the family [2]. The first few months after childbirth can be quite stressful and can predispose to the development of psychological or psychiatric symptoms to the vulnerable mothers [2]. Depression can be a debilitating disorder.

The diagnosis of post-partum depression (PPD) is complicated due to varying definitions of diagnosis itself. The diagnostic and statistical manual of mental disorders (DSM IV-TR) defines PPD as a major depressive disorder (MDD) subtype, which has onset one month after child birth. The criteria include five or more of the following symptoms lasting two weeks or longer: depressed mood, loss of interest, loss of energy, feelings of worthlessness or guilt, sleep disturbance, poor concentration and suicidal thoughts [3]. DSM 5 lists PPD as specifier of MDD (with peripartum onset) if the onset of mood symptoms presents during pregnancy or within four weeks after delivery [4] International classification of diseases and related health problems (WHO-ICD-10), PPD falls under code F53-mental and behavioral disorders associated with puerperium commencing within 6 weeks of delivery [5]. However, some researchers maintain that the first three months post-natal are a high risk period of developing PPD or other psychiatric illnesses [6]. Research has consistently shown that, of women who develop PPD, 60% have symptom onset within 6 weeks post-partum. The Centre for Disease Control and Prevention (CDC) reported that mothers of preterm infants have higher rates of PPD with rates between 14%-27% [7].

PPD also known as post-natal depression (PND) is a non-psychotic depressive disorder of variable severity, divided into three categories [3] (i) Postpartum blues or maternity blues which starts as early as two days after child birth and lasts for a few days – up to ten days. It affects up to 70% of postnatal mothers, it is characterized by symptoms such as

irritability, mild anxiety, mood swings, restlessness, poor concentration, sleep disturbance and crying spells[3]. (ii) Symptoms of PPD are the same as those of MDD but milder; which include depressed mood, lack of interest, sleep and or eating disturbance, fatigue, poor concentration, feelings of worthlessness, guilt, sense of insecurity, anxiety and suicidal thoughts [3] (iii) Postpartum psychosis (PPP)is a severe form of mood disorder which occurs within the first four weeks to one year after child birth. Mothers can be severely impaired as demonstrated by hallucinations, delusions, agitation, and excessive concern about the welfare of the infant, unjustified fears and delirium that is associated with physically injuring the infant. Hospitalization for treatment is usually a requirement [5,8].

PPD affects approximately 10-15% of women in general population. Undetected and untreated PPD can have adverse long-term effects on the mother, child(ren) and family; and can contribute to emotional, behavioral,cognitive and interpersonal problems to the child(ren)'s later life [9]. PPD affects both mothers of term and preterm infants. Mothers of preterm infants are particularly at high risk for poor postpartum functioning. Studies have shown that mothers of preterm infants admitted in Neonatal Intensive Care Unit (NICU) are 40% more likely to develop PPD compared to general population[10] Multiple studies examining psychological maladjustments in mothers with preterm infants in NICU have reported higher rates of PPD ranging between 28-70% compared to mothers of healthy full term babies[11,12].

1.1 Etiology

The etiology of PPD is not clearly understood, for there is no single causative factor that has been determined[13].However, several studies have shown that, genetic factors,biomedical/obstetrical, psychosocial, and infant factors may be associated with PPD[13,14] Some studies by Newport et al; showedmaternal hormonal level changes during postnatal period in combination with genetic make-up and psychological predisposition as well as sleep disturbance in the mothers are considered to represent a major vulnerability to the onset of PPD[6]. The birth of a preterm infant itself is considered to precipitate to the development of maternal PPD. A relationship between preterm birth and PPD may be partially explained by the stressful life events surrounding

the delivery of preterm infant, early maternal stress and mother infant interaction. The perinatal obstetrical complications responsible for preterm birth may directly or indirectly increase stress, thereby altering maternal hormonal functioning and thus contributing to increased risk of PPD for example preeclampsia/eclampsia [15]. The perception of these events as stressful may negatively impact the mother's ability to make appropriate adjustments to parenting and therefore increase the likelihood of developing PDD. Emotional distress as a result of delivering a premature baby itself, the mother's perception towards the baby, its small size and the appearance may affect the quality of the parenting role [16].

1.1.1 Preterm birth (PTB) and its mental health implications

Preterm birth is defined as a baby born alive before the completion of the 37th week of pregnancy, World Health Organization [18]. PTB can be subcategorized as late preterm delivery 34-36 completed weeks of gestation, moderately preterm 32-34 weeks, very preterm, less than 32 weeks and extremely preterm, less than 28 weeks [19] PTB also can be defined by birth weight; low birth weight (LBW) less than 2500g, very low birth weight (VLBW) 1500g and extremely low birth weight (ELBW) less than 1000g [19]. The emotional distress of the parents brought about by preterm birth and subsequent hospitalization of the infant remains substantial [13, 29, 37]. Mothers of preterm infants experience more severe levels of psychological distress in the postnatal period than mothers of full term infants [20]. Some recent studies in Qatar by Bener et al; have indicated that mothers of preterm infants exhibited high rates of PPD at 29.4% and anxiety at 26.5% compared to mothers of full term infants 17.3% versus 11.6% respectively [21].

1.1.2 Socio-demographic risk factors

Studies in general population, from high income countries (HICs) on maternal depression have indicated that various risk factors are responsible towards development of PPD such as: unplanned and or unwanted pregnancy, a prior history of depression, life stresses, lack of or poor social support, marital conflicts, single parent status, low socioeconomic status, and anxiety or depression during pregnancy [22]. In contrast

however, prior depression and anxiety has not been consistently found in cohorts of mothers with preterm infants or infants admitted to the NICU[23]. Some other studies by Kyrklund et al; indicate that smoking and other substances of abuse during pregnancy are risk factors known to be associated with maternal depression, and may have some adverse effects on the pregnancy and therefore may lead to preterm births[24]. Other studies have shown that medical and obstetrical complications such as hypertension, Preeclampsia, gestational diabetes, and Hiv/Aids, to be associated with PPD [25, 26, 27]. Being diagnosed with HIV during pregnancy increases the risk of depression among mothers in prenatal and postnatal period[28]. In his studies, Poehlmann et al; found that, poverty(low or none income), low educational level and maternal age, as risk factors that elevate depressive symptoms during post natal period[29]. However, some other researchers have shown that, maternal age and low educational level have not been consistently related to PPD[23]. Patel, et al; also found that, the baby's gender, marital violence, hunger(food insecurity) and maternal employment were contributors to maternal depression, while paternal employment was a protective factor[30].

The maternal socio-demographic risk factors associated with depression and anxiety in mothers of preterm infants are considered to be similar to some extent to those of mothers in general population [10]. Inclusive, this study was also interested to consider some other specific risk factors which were suggested as triggers of the development PPD and anxiety symptoms in mothers of preterm infants in NICU such as: risk factors surrounding the preterm birth, the overall condition and the survival of the preterm infants as well as maternal psychological/psychosocial risk factors related to NICU environment. These risk factors will be identified shortly in review of literature.

1.2 Problem statement

Studies have shown that, the birth of a preterm infant can trigger high levels of stress, anxiety and depression in parents [31]. The experience of preterm birth is regarded as a highly stressful event, and mothers may find it very difficult to establish relationship and bonding with their babies due to a long separation from them during the initial days of hospitalization into NICU [32]. This mother-infant physical separation can adversely affect the emotional well-being of both the mothers, infants and their bonding; feelings of

guilt for not carrying the pregnancy to term and fears for the infants survival [33,34]. Additionally, women report decreased confidence in their role as mothers. They have a tendency of becoming depressed and anxious and have trouble interacting with and responding their preterm infants cues [35]. They tend to be less sensitive and responsive to the specific infants needs and these can impact on child development with detrimental effects on cognitive and socio-emotional development [36]. Unfortunately maternal PPD generally goes unidentified, under diagnosed and undertreated thus, carrying a substantial risk [14]. This negative affective state can persist well beyond the time of the infant's discharge home [10, 35].

1.3 Research questions

- i) What is the prevalence of postpartum depression and anxiety among mothers of preterm infants receiving intensive care in new born unit at Kenyatta National Hospital (KNH) compared to mothers of full term healthy infants attending maternal child health clinic at Umoja health center?
- ii) Which of the prominent risk factors predict PPD and Anxiety?

1.4 Objective

1.4.1 Broad objective

The objective of this study was to determine the prevalence of maternal postpartum depression and anxiety among mothers of preterm infants receiving intensive care in new born unit at KNH, compared to mothers of full term healthy infants attending maternal child health clinic at Umoja health center.

1.4.2 Specific objectives

- i) To determine prevalence of depression and anxiety symptoms of the mothers- at the time of the infant's discharge and or up to 4-6 weeks after the infants admission into NICU, compared to mothers of normal full term infants attending postnatal mother child health clinic at Umoja Health Centre.

- ii) To develop a risk model that determines how the prevalence of PPD and anxiety is triggered by pre-premature delivery factors, infants' condition factors and sociodemographic characteristics in comparison to full term infants.

1.5 Justification of the study

Literature shows much study on maternal postpartum depression had been conducted in many countries worldwide particularly in HICs. PPD in mothers with preterm infants have attracted much study in those countries, however, in low and middle income countries (LMICs), studies are scanty especially in sub-Saharan Africa, compared to PPD on mothers of full term births. The researcher had not come across any published studies on PPD and or anxiety on mothers of preterm babies that had been carried out in Kenya. Much attention had been directed to the treatment and survival of the preterm infants while the mothers' mental health- the psychological, emotional and wellbeing was not sufficiently addressed by the medical staff in the newborn unit (NBU) and postnatal wards; and medical attention remained within the ambit of Obs/gynecological and pediatricians checks mostly. Most mothers of preterm neonates in new born unit (KNH) usually were discharged postnatal; - but they remained housed within the post natal wards-, as they waited for their infants to stabilize and arrive at the desired age and weight, before they were discharged home. Unless a mother had a serious medical/obstetrical condition, midwives and nurses in the post natal wards had limited contact with them. Hence, any psychological disturbance such as depression would go unnoticed by the staff; with an exception of the obvious situations where a mother developed the severe postpartum psychosis (PPP) also known as puerperal psychosis (discussed earlier).

The consequence of PPD in mothers with preterm infants affects the mother, the child(ren) and the family, whose effects are detrimental in child development. Depressed and anxious mothers have difficulties interacting, feeding and taking care of the children. Mild to moderate, undetected depression can sometimes progress to postpartum psychosis whose consequence can be infanticide, suicide or serious injuries.

1.5.1 Rationale of the study

Early detection and prevention of this debilitating disorder is possible, before the mothers take their infants home. By determining the prevalence of PPD and anxiety while the mothers of NICU infants were still within our hospital setting, could sensitize the medical team who are in constant contact with these mothers, especially in NBU and in postnatal wards. Understanding the signs and symptoms would equip the staff to be extra observant and attentive to the mothers' conversations and behavior. Their keen interest would help in guessing or making a diagnosis and therefore refer them for complete evaluation; psychiatric/psychotherapy/treatment and follow up.

The results finding of this study was expected to inform and add value to KNH key administrators and other key stake holders for the purpose of planning and strategizing methods of meeting the biopsychosocial and mental health needs of NICU preterm infants' mothers who were considered to be at risk, before they took their infants home. Visits to health facilities usually becomes scanty for the mothers after discharge due to their new responsibilities of child and home care; therefore the medical team could be sensitized about the risks of PPD and encourage mothers to go for regular post natal screening in the outpatient clinics to establish a decrease or increase of PPD symptoms. A continued mother/child safety could be maintained for a period of time.

1.6 Scope of the study

The study was carried out at Kenyatta national hospital. The sample was selected from a population of mothers of preterm infants admitted in NBU with age ranging between $\leq 19-50$ years. The comparison group of the same age brackets of mothers of full term healthy infants was carried out at Umoja Health Centre.

1.6.1 Newborn unit (KNH)

The Newborn Intensive Care Unit (NICU) at KNH admits between 150 to 180 preterm neonates per month. Full term infants who develop complications immediately after birth are also admitted in NICU. Both preterm and full term babies are provided with very highly specialized intensive care and treatment. The unit is well equipped with modern

equipment such as- incubators, ventilators, cardiovascular monitors, special and ordinary baby cots etc. In ideal setting, a baby is supposed to be nursed in one incubator per baby. However, due to high population of infants requiring intensive care, and limited space in the unit, two to three infants share one incubator. For example, two or three infants weighing $\geq 500\text{g}$ share an incubator at regulated temperatures that suits their weight and condition. Two infants per incubator for those weighing $\geq 1000\text{g}$; and one infant per incubator for those weighing $\leq 1500\text{g}$. Those with birth weight of, or after attaining $1600\text{g}-1650\text{g}$ and are in stable condition, are removed from the incubators and are nursed in special cots at $30-33^{\circ}\text{C}$. The ones weighing $1800\text{g}-2000\text{g}$ are nursed in ordinary baby cots at normal room temperature. Once the infants attain body weight of 1800g and have developed some sucking reflex, or can be fed by cup and spoon, they are discharged home from NICU to create space for more admissions. The preterm infants are usually slow in breast feeding and this can be tedious and frustrating to the mothers. (Information obtained from NICU Staff- KNH).

Preterm infants born at 32 weeks and below, usually develop severe respiratory distress syndrome (RDS) due to the immaturity of their lungs. The extremely immature ones with serious breathing complications are usually connected to respiratory ventilators to assist their breathing, the moderately severe ones receive oxygen via masks; until they are mature enough to breathe freely on their own. (Information obtained from a NICU Staff- KNH).

1.7 Hypothesis

1.7.1 Null hypothesis

There is no difference in levels of PPD and anxiety between mothers of preterm births in NICU-KNH compared to mothers of normal full term babies at Umoja H/C.

1.7.2 Alternative hypothesis

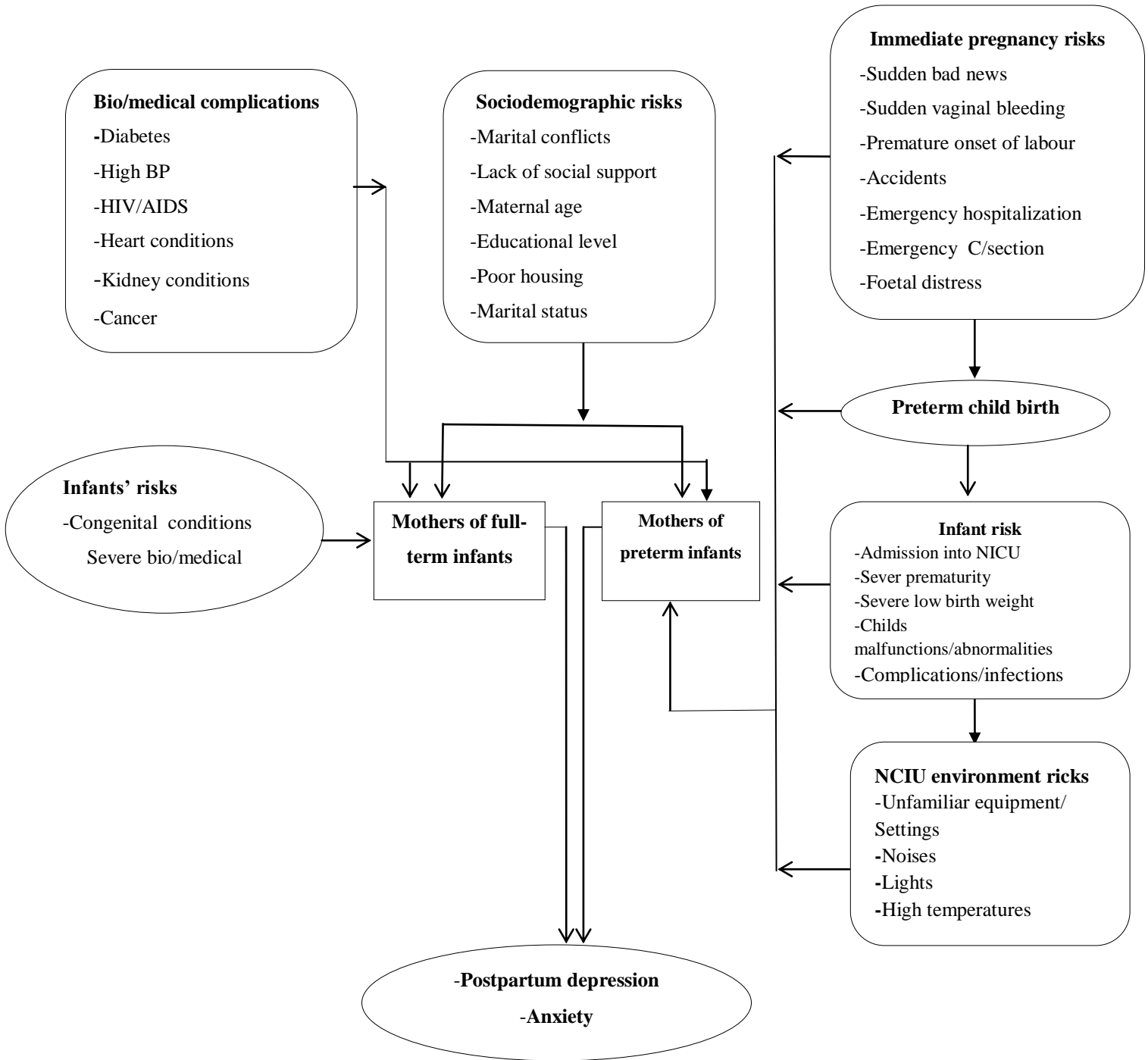
There is a difference in levels of PPD and anxiety in mothers of preterm births in NICU-KNH compared to mothers of normal full term at Umoja H/C.

1.8 Conceptual framework

1.8.1 Theory change

The etiology of PPD and risk factors of mothers of preterm infants in NICU is not clearly understood for there is no single causative factor that has been determined [13]. However, it is considered to be as a result of multiple factors that may be influenced by a combination of factors involving interactions between the mother's biopsychosocial and or medical characteristics and the infant's biological, immaturity and behavioral characteristics [14,6]. Perinatal complications responsible for preterm birth may directly or indirectly increase the maternal stress level, thereby altering her hormonal state and contributing to increased risk of developing PPD [15]. Some biomedical and obstetrical conditions are considered to be risk factors (both in the mothers and the infants) such as gestational diabetes, hypertension, renal complications and others [26], infants' congenital deformities/malfunctions, severe illness and others. The biomedical complications were controlled and the study focused more on psychological, psychosocial, NICU environmental and infants' conditional stressors. The preterm infant admission to the NICU is considered to be associated with stressful environmental and psychological factors. Emotional distress due to delivery of a preterm infant may affect the mother's perception towards the baby and affect the quality of the parenting role [16]. Also, the socio-demographic characteristics observed on PPD in mothers of full term infants in general population are likely to be predictors of the same, on mothers of preterm infants, such as marital conflicts, poor or lack of support, low educational level, low or none income [13]. Inclusive, the study also focused on the immediate maternal risks just before delivery, considered to trigger preterm births.

Figure 1: Conceptual framework



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview of maternal postpartum depression

Maternal PPD varies widely from country to country and region to region worldwide due to differences in instrument measures [36], study design, methods, sample sizes, timing and the studied population [37].

PPD is considered to be the most common mental health complication of childbirth and a serious public health concern because of its devastating effects on mothers, their children and families [14]; as discussed below under effects of PPD.

Significant progress has been made in the care and treatment of preterm infants but not in reducing the prevalence of preterm births. Advances in neonatal medicine in HICs have improved survival rates of preterm infants, even those of extremely low birth weight (≤ 1000 g)[38]. But there exists a dramatic survival gap of approximately 90% of infants born before 28 weeks gestation in HICs do survive, while only 10% or less survive in low and medium income countries(LMICs)[69]. The prevalence of preterm births in developed countries is approximately between 5% and 13%.[65].

The Global estimation of the prevalence of PPD ranges from 5% to above 60.8%. The highest estimate reported in Taiwan at 73.7% and Pakistan 63.3% among the Asian countries [39]. In United States of America (USA), it is estimated approximately 15% of all mothers experience symptoms that meet criteria for diagnosis of PPD [7]. As many as 50%-80% of new mothers experience typical PPD symptoms including fatigue and mood swings [40].

Fewer studies have been carried out on prevalence of PPD among mothers of preterm births in LMICs compared to HICs. Some studies conducted in Pakistan reported PPD to range between the rate of 28.8% to 94% [41,42,43]. Some recent studies carried on Pakistan mothers of preterm infants, were reported to be at high risk of developing PPD at the rate of 35.3% compared to mothers of term infants at 15.3% respectively[36]. Other researchers have reported that, accurate estimates of the prevalence rates of PPD

among Pakistan women and most Asian countries, (which also may apply to most LMICs), are difficult to obtain due to cultural norms that may influence women's accuracy of reporting their symptoms in the self-report measures; lack of reliable as well as use of different screening tools, may result in under diagnosis or over diagnosis [44,45]. Some other studies related to this study carried out in India, showed maternal depression rates at 78%; of which 23% of the women had PPD during the 6-8 weeks period postnatal [28].

The accessed published studies that have been carried out in Africa are few. PPD studies on mothers in general population carried out in ten countries sub-Saharan Africa by (Parsons et al showed no clear differences in prevalence rates between northern and southern sub-Saharan countries [46]. The lowest average rates were reported in Uganda at (7.1%) and highest in Zimbabwe at [33%]. The majority of African countries have estimated prevalence rates of PPD at 18% higher than those found in HICs [46]. The studies conducted in Nigeria by Ukpong et al; indicated higher rates of PPD among mothers of preterm infants at 27.3% compared to 3.71% in mothers of full term babies [47]. Other studies on mothers after preterm births in Malawi showed PPD at the rate of 21.3%. [48].

In Kenya, no published or unpublished studies were accessed by this researcher particularly on prevalence of PPD and/or anxiety among mothers of preterm infants. However; three thesis reports on maternal PPD in general population related to this study were accessed. One report was by University of Nairobi (UON) MMed student Musau, [49] showed the prevalence of PPD in postnatal mothers attending comprehensive care clinic at KNH at rate of 10.2%. Another thesis study report by UON MSc Clinical Psychology student Yator et al, reported the prevalence of PPD at 48% among HIV positive women attending prevention of mother to child transmission clinic at KNH [50]. Another study on PPD carried out in Kenya, Nairobi County by (Madeghe et al which looked at mothers' infant feeding practices, indicated PPD rate at 13% among mothers attending MCHC at Kariobangi North health Centre [51].

2.2 Specific risk factors considered to contribute to the development of depression and anxiety on mothers of preterm infants

2.2.1 Preterm birth and PPD

The prevalence of PPD following a premature delivery has been estimated between 28% and 70% [13,12,52]. Anxiety symptoms are also elevated following preterm birth [53,20]. Preterm infants can have a prolonged hospitalization in NICU resulting to physical separation from their mothers which can adversely affect the emotional wellbeing of both mother and the infant [55,56]. The symptoms of maternal depression and anxiety have been associated with concerns about infants' appearance, general condition, and fears for overall outcome as well as infant's survival [34] Mothers' feelings of limitations about their ability to care for the infant and feelings of helplessness [13]. Perceptions of losses in carrying out maternal roles to the infant have been one of the most contributors to PPD in mothers [57] These affective symptoms may persist beyond the infants discharge home [58,10]. Depressed and anxious mothers have difficulty interacting and responding to cues from their preterm infants [35].

2.2.2 Neonatal intensive care unit- environmental risk factor

Having an infant in the NICU is associated with stressful environmental and psychological factors. The environment of the NICU is often unfamiliar, highly technological and many aspects of the experience can be frightening and distressing to the mothers, including equipment, lights, sounds and others [13]. The infants' physical appearance in the incubators connected to multiple tubes, wires and monitors can be quite distressing to the mothers [13]. The perception of a limited support from health care personnel [nurses], the unresponsive fragile appearance and or ill looking condition of the infants, prolonged separation, parental role alteration, feelings of incompetency and helplessness may increase high levels of psychological stress, anxiety and depression on mothers [13].

2.2.3 Immediate risk factors surrounding pregnancy and premature delivery

A relationship between preterm birth and PPD may be explained partially by the:(i) stressful life events surrounding the delivery of the preterm infant (ii) early maternal stress and mother- infant interaction among mothers of preterm infants (iii) prenatal complications responsible for premature delivery may directly or indirectly increase stress, which can contribute to risk of PPD and anxiety.(e.g. failed expectations, encountering more than two perinatal complications such as preeclampsia and hospitalization during pregnancy, emergency cesarean delivery, fetal distress, multiple preterm births e.g (twins) [54] and hospitalization of the infant(s) immediately after birth are associated with an increased risk of developing PPD and anxiety [15].

Stressful life events surrounding delivery and immediate post-partum period may impact a woman's ability to make the appropriate adjustments during transition to motherhood and therefore increase the likelihood of anxiety and PPD. Emotional distress due to delivery of preterm infant may affect maternal perceptions towards the infant and affect the quality of parenting role [16, 54].

2.2.4 Socio-demographic risk factors

According to Vigod et al; some sociodemographic factors are considered as very strong predictors of PPD in mothers of preterm infants, such as- depression or anxiety during pregnancy, personal and family history of depression and lack of social support [10]. Also very low birth weight of ($\leq 1000\text{g}$) is considered as a strong risk factor to development of maternal anxiety [54,23]. Poverty (low or no income) and low educational level have been indicated to elevate depressive symptoms during post natal period [29]. However, some other studies by Rogers et al; showed that, maternal age and education level werenot consistently related to PPD [23].Previous studies also indicate that, the mothers' perception of lack of support and or poor relations with the nurses in NICU as a strong predictor to the development of PPD and anxiety [13].

2.3 Effects of maternal post-partum depression on the mothers and the children

The non-psychotic PPD which is characterized by loss of interest, fatigue, sleep disturbance, loss of energy, feelings of sadness or low moods [9], has been shown to result in adverse effects on mothers, their children and families, including all dimensions of child development- emotional, cognitive, language, attention and social interactions [59, 60]. According to Stern et al; Preterm infant's immaturity which includes, suckling pressure, swallowing and coordination, combined with inconsistent feeding behaviour may create challenges and frustrations for the mothers' efforts to breastfeed/feed effectively, thus increasing likelihood of developing anxiety and PPD[61]. A meta-analysis report by Beck showed that mothers with PDD exhibited several distinct patterns of behaviour; which included less affectionate behaviour towards the infants, less responsiveness to the infant's cues, withdrawn, irritability, flat affect, hostility and intrusiveness with their infants [22]. As a result of difficulty in identifying and or interpreting the infants' cues, the mothers may experience more frustrations, stress, anger, sense of incompetency and helplessness in dealing with their infants [62, 63]. The interplay between the preterm infant's characteristics and mother's state of mind may create a vicious cycle that reinforces instability in mother-infant interaction perpetuating parental stress and PPD. Depressed mothers feel sad and anxious and this creates communication difficulties; with the mothers assuming that their infants are fussy and more demanding. They do not express pleasure when interacting with their infants; they show less concern on infant's needs, and have a tendency to neglect or reject them. They exhibit less positive behaviour such as continued breast feeding, playing with their children, and taking safety precautions [35, 57, 65,]. Given their increased developmental vulnerability, increased need for stimulation, and their decreased responsiveness, preterm infants in NICU are especially at risk. Due to maternal PPD and parenting behaviours, infants' safety and wellbeing may not totally be guaranteed [57, 64].

Based on the outcome, the researcher hoped the dissemination of the results of this study/information to the key stake holders such as the administrators of KNH would be beneficial into developing some strategies which would enhance the appropriate mental healthcare to these mothers silently considered to be in great need.

CHAPTER THREE

3.0 STUDY METHODOLOGY

3.1 Study design

This was a descriptive comparison study. It employed purposive sampling for mothers of preterm babies and simple random sampling for mothers of full term infants to recruit mother-infant dyads. All consenting mothers of stable preterm infants whose birth weight (BW) was 2500g and below, in NICU-KNH were enrolled three times a week continuously until the desired number of 86 participants was attained. The consenting mothers of full term infants were randomly recruited once a week on MCH Clinic day until the desired number of 86 participants was attained.

3.2 Strengths

Based on the information (by NICU staff 2016 in NICU-KNH), the survival rate of preterm infants of BW 2500g and below ranges from approximately 70% and above. The higher mortality rates are seen in the category of BW 1000g and below. This is due to complications of severe immaturity and other bio-medical complications. This is strength to NICU-KNH compared to only 10% of preterm infant survive in most LMICs (Blencome et al 2012).

The eligibility criterion of inclusion in the study was that the mother had delivered a preterm infant at KNH maternity ward or had been referred from elsewhere. The infants were admitted at NICU while the mothers during this time remained and continued to receive the necessary care at postnatal wards as they awaited for their babies' discharge.

3.2.1 Weakness

If no complications, the mothers of full term births at KNH are usually discharged home within 12-24 hours. Since KNH does not provide postnatal MCHC (well mother-child) services for normal deliveries, these mothers are referred, to the MCHCs near their residential places for follow up. Therefore, in reference to this study the researcher met with the mothers and their infants during the MCHC 6 weeks post natal, once per week at Umoja H/C.

3.3 The Study area description

The study was conducted at KNH newborn unit and post natal wards for mothers of preterm infants and Umoja H/C for mothers of full term normal infants.

(i) KNH is a teaching and a referral hospital which receives patients from all over the country, as well as from the other African countries neighboring Kenya. The reason for high patient population turn up is because of an ensured optimum treatment and service provisions to different types of patients' ailments, including preterm infants' specialized care.

(ii) Umoja H/C is a Local Authority Health Centre located in Umoja estate in Nairobi Eastlands, Embakasi West Constituency of Nairobi City County. It offers curative services, family planning, MCH Clinic, ante/postnatal care, immunization, HIV counseling and testing and antiretroviral therapy.

3.4 Study population and sampling

Though the preterm infants were the focus of the medical interventions and therefore, were undergoing intensive care and treatment, the target populations of interest to this study were their mothers; who were assumed to be well and healthy.

The Mother-baby dyads study consisted of mothers of ages between $\leq 19 - 50$ years old groups. Therefore, the mothers of preterm infants whose BW was 2500g and below, admitted in NBU at KNH and mothers of full term healthy infants at Umoja H/C, were recruited on specified days and continuously in the study, till the required sample size of 86 in each group, was attained within the set period of the study.

3.5 Inclusion criteria

The study included mothers from age ≤ 19 yrs to 50 who were medically stable, (HIV positive mothers whose conditions were stable were included) and whose their preterm infants in NBU were stable though still undergoing specialized care. In the comparison group, were healthy mothers (who like the preterm infants mothers) had a normal vaginal delivery or any other mode of delivery, to full term normal healthy infants. Inclusion in both groups, were mothers who understood both English and Kiswahili languages, were willing to participate in the study and gave consent voluntarily.

3.6 Exclusion criteria

The study excluded mothers who were medically unfit; that is- (those who had serious post natal complications, who had undergone a surgical procedure of any sort(apart from Caesarian section), those with chronic medical conditions, with psychosis or any other kind of intellectual impairment or already on psychopharmacological treatment). The study also excluded mothers whose infants were critically ill, those with serious deformities or malfunctions and those who were on continuous life support ventilation.

3.7 Sample size determination

The sample size determination was calculated using a formula cited by Sheetz (2014):

$$n = \frac{2 p (1-p)(z_{\alpha} + z_{\beta})^2}{(p_1 - p_2)^2}$$

Where;

n – is the sample size in each study group of mothers.

$p_1 - p_2$ – Clinically meaningful difference in PPD prevalence between the two groups

p – is the average of p_1 and p_2 .

$p(1 - p)$ – is the variance of the anticipated prevalence difference.

$\frac{z_{\alpha}}{2}$ - corresponds to two tailed significance level (1.96 for $\alpha = 5\%$)

z_{β} – corresponds to a power of 80% (0.84).An effect size of 17.9% derived from guiding studies, and a standard deviation of 0.42. These result in a total sample size of:

$$\frac{4 (0.42)^2 (1.96 + 0.84)^2}{(0.179)^2} = 172 \text{ (86 in each study group)}$$

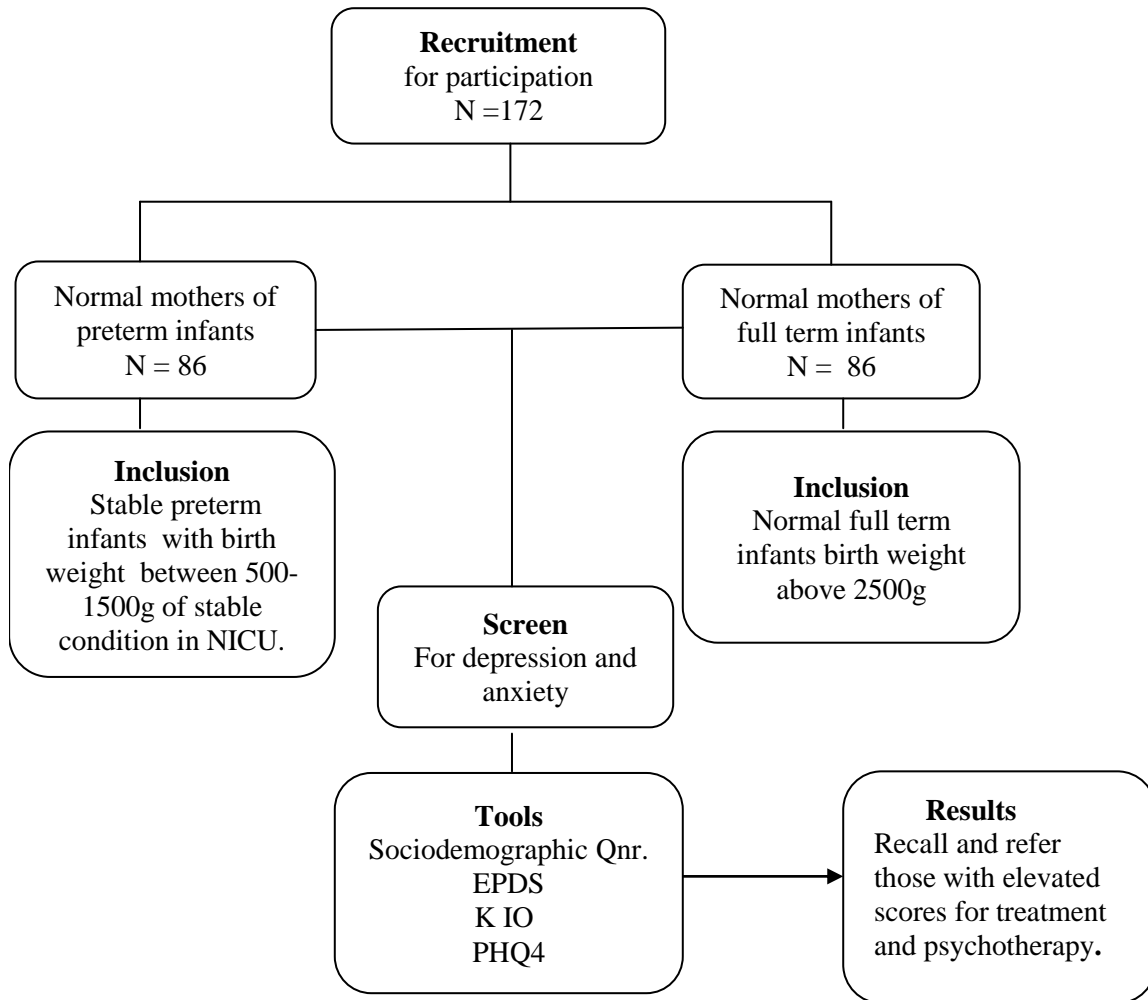
For this study a total of 176 mothers were selected (86 mothers of preterm and 86 mothers of full term infants respectively).

3.8 Sampling procedure

The study consisted of all mothers who met the inclusion criteria. The first 86 mothers in each group (mothers of preterm and full term infants) who presented during the period of this study were included, after they voluntarily agree and gave a signed consent to participate in the study. The mothers of preterm infants whose BW was 2500g and below, having survived till the time of their discharge from NICU with no complications and or up to 4-6 weeks, were recruited in the study three times per week, continuously until the desired number of 86 was attained.

3.9 Flow chart

Figure 2: Flow chart



3.10 Data collection procedure

The researcher obtained permission from the ethics committee to conduct research at KNH and Umoja H/C. The officers in charge of the newborn unit, post natal wards and Umoja H/C were approached and explained of the intention to carry out a research within the facility. Permission was sought after presenting a copy of the approved research proposal, a letter from both university of Nairobi (UON)/Kenya National Hospital (KNH) and Ethics and Research Committee (ERC). For Umoja H/C, protocol was

observed. Permission was sought from the Medical Officer of Health (MOH) in the department of Public Health City Hall after presenting the letters. After his approval, the authorized letters were presented to Medical Officer(MO) in charge of Embakasi West Constituency for final endorsement. This was then submitted to the Officer in charge of Umoja H/C.

3.11 Study selection procedure

The researcher with the assistance of the overall unit/department officer in charge was introduced to the subunit/section in charge on duty and to the participants as following:

(a) Newborn Unit at KNH is subdivided into smaller units where neonates are admitted based on birth weight category and general condition of the infants. Through this arrangement, the subunit in charge provided the researcher with the required information from the daily register record workbook- about the infants' birth weight, the health condition and stability, age (4- 6 weeks after birth)or at time of discharge (for only those who met the inclusion criteria). She also connected the researcher with each infant's mother and the name of the ward they were residing.

b) In the postnatal wards, the officer in charge provided the researcher with the health condition information of each mother who had preterm infant in NICU. Those who met the inclusion criteria were directed to a specific room which was used for this study; two or three times per week. The researcher explained to the mothers about the study and informed consent. Those who agree to participate and gave a signed consent were recruited and were given the questionnaires to complete.

c) At Umoja H/C, the subunit/ section in charge, after she identified mothers of full term healthy infants attending MCHC six weeks postnatal, who had no medical or any other complications, she introduced the researcher to them. All the mothers were explained about the study and that; they all qualified to participate, however only a limited number was required once each week. The selection criterion was done through simple random selection once per week on the clinic days (Thursdays). 40 pieces of paper with writings on them, that is, 20 pieces with a "Yes" and 20 pieces with a "No" were folded and properly mixed in a container. Those who picked a "Yes" were directed to a room set

aside for the study. On meeting the mothers, the researcher welcomed them, explained about the study and informed consent. Those willing to participate and signed the consent form were recruited and were given the questionnaires to complete.

3.12 Quality assurance measures

A pre-test of the questionnaires was carried out first on a few participants (15 in number) in consultation with my supervisors to establish the suitability and identify any challenges that could arise during the data collection in the sample population. The questionnaires yielded three types of information for the mothers of preterm infants: (a) The socio-demographic risk factors and background information (b) Information related to pregnancy's immediate preterm delivery, (c) The infant's afterbirth outcome-related information. The comparison group required only socio-demographic risk factors and background information. Depression and anxiety screening questionnaires were the same for both groups mothers. The participants were explained about the study and informed consent. Those who agree to participate were given a written consent form to sign in the presence of the researcher. Those who declined to participate were excluded from the study. Those who agreed to participate in the study, met all the inclusion criteria and signed up the consent form were recruited. Ample time (about 15-20 minutes) was given to each participant to complete the questionnaires. The participants were explained not to discuss their answers with each other during the exercise.

3.13 Data collection instruments

3.13.1 Sociodemographic interview questionnaire

The researcher designed questionnaire was used as interview instrument for the 86 mothers of the preterm infants in NICU at KNH and 86 mothers of full term infants at Umoja H/C. The aim was to capture personal information that of the family and other background information which the literature has suggested to be risk factors of PPD in mothers of both groups.

3.13.2 Edinburgh Postnatal Depression Scale (EPDS) - screening tool

In order to screen for post-partum depression, Edinburgh Post natal Depression Scale (EPDS) was used. EPDS is a 10 question self-rating scale. It is a validated tool used to identify mothers at risk of perinatal depression. It is usually a self-rated scale, except where literacy level or language is a problem then, the mother can be assisted. Mothers respond by checking off one out of four statements in each question that best describes how she has felt within the past seven days. Mothers scoring 12 or 13 and above are likely to be suffering from a depressive illness of varying degree. (66). EPDS is a screening and not a diagnostic tool, and where scores are moderate to severe; further evaluation by a mental health practitioner is required. Each participant completed EPDS and where a mother's understanding of certain areas of the scale was not clear to them, assistance was availed and clarification made by the researcher. This study used the recommended cut off score of ≥ 13 and above which was taken as a positive sign of active PPD.

3.13.3 Kessler psychological distress scale (K10) - screening tool

Kessler psychological distress scale (K10) was also used. K10 is a 10 item reliable and validated self-reporting instrument intended to yield a global measure of distress based on questions of anxiety and depressive symptoms a person experienced in the recent 4 weeks period. A cut off score of between 20 and 29 are indicative of mild to moderate mental disorder. Scores above 30 are indicative of severe mental disorder of a varying degree of anxiety and depression [67]. All the participants were administered the self-rating K10 screening scale

3.13.4 Patient Health Questionnaire (PHQ4)-screening tool

The Patient Health Questionnaire (PHQ4) was also used. PHQ4 is ultra-brief validated two-item screener. It was developed to screen for depression and anxiety in an outpatient setting during pregnancy and postnatal period up to one year. It is a simple self-reporting tool but also it can be administered by health practitioner. High scores can be associated with functional impairment; and an individual can have a level of either one mood disturbance or both [68]. The level of depression or anxiety is determined by adding up

the scores. Scores are rated as normal (0-2) mild (3-5) moderate (6-8), and severe (9-12)[68].All participants were administered the PHQ4 self-rating measure

3.13.5 Data management and quality control

The researcher cross checked the completed forms and corrected any omissions as much as was possible, as the participants handed them in.

3.14 Ethical considerations

The study was conducted after it had been approved by research and ethics committee-university of Nairobi/Kenyatta national hospital. The study was guided by ethical obligations pertaining human research.

*Consent form:*The subjects gave informed consent in order to participate in the study. The participation was purely voluntary and no monetary gain was rewarded to them. A participant was free to withdraw from participating at any time during the study with no consequences attached to it.

Confidentiality: All information given by the subjects was treated in strict confidence. The data collection tools were kept under key and lock and only the researcher had the access to them. The data was coded with no participants' names on them.

The collected data tools are waiting to be destroyed after the research results have been disseminated to the designed authorities.

Results: The information obtained from this study was to be shared by University of Nairobi and KNH pediatrics and obstetrics/gyno departments, as well as Umoja H/C.

The information of the findings was expected to inform and add value to KNH key administrators and other key stake holders for the purpose of planning and strategizing methods of meeting the biopsychosocial and mental health of NICU preterm infants mothers while still within the hospital wards.

3.15 Data analysis and presentation

The collected data was coded; cleaned and analyzed using statistical package for social sciences (SPSS) software version 24. The coding was treated as a unique code number only for each particular respondent. This new unique code number was matched on the

database with the completed instruments to ensure that analysis was done only for those who consented and participated in the study.

3.15.1 Data Scoring

For PHQ4, Kessler10 and EPDS were scored using the standardized developed procedures by the authors of the instruments which give both scores and categories based on the population under study.

3.15.2 Statistical analysis

Three levels of analysis (descriptive statistics, Bivariate, and multivariate logistic regression) were conducted.

Univariate Analyses: Exploratory data analysis techniques were used to uncover the distribution structure of the study variables as well as identify outliers or unusually entered values. Descriptive statistics was used to examine the general distribution of the hypothesized factors and outcomes by means of means, median, standard deviations and range for continuous variables and proportions for categorical variables. These were summarized in form of tables, frequency distribution, tables and charts. Prevalence of anxiety and depression was reported with their corresponding 95% confidence intervals.

Bivariate Analyses:The association between the participants' socio-demographics and psychological characteristics (participant's anxiety and depression) was conducted using chi-square and Fisher's exact tests for continuous variables and student's t-test; and ANOVA for dependent continuous variables to identify the differences between the groups.

Multivariable Analyses:Multivariate logistic regression was conducted to determine unique contribution of the associated variables at the bivariate level after adjusting for all significant variables. The measures of association were reported as adjusted odds ratio and their 95% confidence intervals. The level of significance was set at $p < 0.05$. All tests were two sided. All the Analyses were carried out using SPSS version 24.

CHAPTER FOUR

4.0 DATA ANALYSIS AND RESEARCH FINDINGS

4.1 Results

The period of data collection got stretched longer than was anticipated, from late November 2016 to early May 2017 due to the effects of the country wide Doctors and lecturers industrial action in public hospitals and universities that was in place at the time. This affected data collection activities of mothers of preterm babies in NICU at KNH in particular. Nevertheless during that period of data collection, a total of 172 mothers and their infants were successfully enrolled, with 86 from each group both the full term and preterm mothers. All participants gave their full consent and completed the questionnaires appropriately. The mothers who had high scores for depression with suicidal ideation were contacted on phone. Those who came from Umoja area were referred to Umoja health Centre or to Mama Lucy hospital. Those who came from other different places were referred to their nearest hospitals or health centers.

The Table 1 presents the socio-demographic characteristics of the respondents.

There were equal proportion of mothers of preterm and full term infants 86 in each group. Majority of the participants (41%) were aged between 20-25 years followed by those aged 26-30 years (32.0%). Those aged 19 years and below and 36 and above represented the least proportion accounting for 6.4% and 5.8% respectively. A large number of the participants (43%) had secondary level of education, while 33.7% had University/College level of education. About 22.7% of our sample had primary level of education. More than a half of the participants, 56.4% were employed or self-employed or otherwise; while the remaining 43.6% at that point were unemployed. About 22.1 % of the participants had the least monthly income of between 1000 and 5000 Kenya shillings, while 14.0% were between 5001-10000 Kenya Shillings. A big number, 58% of participants were between 10001-20000, and those above 20000 Kenya shillings were 15.1%. About 52.9% had a partner who had some kind of employment, while 47.1% had partners without any kind of gainful employment at that time of study. Majority, 77% of the participants indicated that they had some form of partners support while 15.7% indicated that they were not

supported by their partners at all. About 7.6% did not say whether they were supported or not. About 19.8% of the participants had a partner who abused substances (including psychoactive drugs and alcohol) and 9.3% of the participants had partners who abused them physically, emotionally or sexually. Majority of the respondents 78.5% , had normal (vaginal) delivery while the rest had caesarian section delivery. About 11.6% of the participants did not have any support from the family while the remaining participants felt they were supported. Around 66.5% of the respondents' pregnancies were planned while at the same time 85% of the pregnancies were wanted as opposed to 15% which were not wanted. Majority of the births (90.7%) were singletons as compared to 9.3% which were (multiple) twins. About 2.3% of the participants indicated that they were not happy with the gender of the baby. Around 13.4% of the respondents indicated that they had family members who had been diagnosed with mental illness and 28.5% of the participants indicated they had experienced some depressive mood symptoms during the pregnancy.

Table 1: Socio-Demographic Characteristics of the Respondents

Variable	Category	Frequency	Percentage
Age in years	19 and below	11	6.4
	20-25Years	71	41.3
	26-30Years	55	32.0
	31-35Years	25	14.5
	36 and above	10	5.8
Highest Level of education	Primary	39	22.7
	Secondary	74	43.0
	university/college	58	33.7
	Missing	1	0.6
Occupation	Unemployed	75	43.6
	Employed	97	56.4
Monthly Income	No Income	73	42.4
	1000-5000	38	22.1
	5001-10000	24	14.0
	10001-20000	10	5.8
	Above 20000	26	15.1
	Missing	1	0.6
Partners employment status	Employed	91	52.9
	Unemployed	80	46.5
	Missing	1	0.6
Partner's support	yes a lot	84	48.8
	Yes a bit	48	27.9
	Can't say	13	7.6
	Not at all	27	15.7
Partner abuse substance	Yes	34	19.8
	No	134	77.9
	Missing	4	2.3
Partner abuse you (Physical, emotion, sexually)	Yes	16	9.3
	No	150	87.2
	Missing	6	3.5
HIV Positive	Yes	20	11.6
	No	151	87.8
	Missing	1	0.6
Partner HIV positive	Yes	12	7.0
	No	149	86.6
	don't know	11	6.4
Type of delivery	vaginal delivery	135	78.5
	caesarian section	37	21.5

Family support	yes a lot	99	57.6
	yes a little bit	51	29.7
	no not at all	20	11.6
	Missing	2	1.2
Pregnancy planned	Planned	112	65.1
	not planned	58	33.7
	Missing	2	1.2
Pregnancy wanted	Wanted	146	84.9
	not wanted	25	14.5
	Missing	1	0.6
Number of babies delivered	One	156	90.7
	Twins	16	9.3
Happy with gender	yes a lot	159	92.4
	yes a little bit	8	4.7
	no not all	4	2.3
	Missing	1	0.6
Mental illness in the family	Yes	23	13.4
	No	148	86.0
	Missing	1	0.6
Depressed mood symptoms	Yes	49	28.5
	No	122	70.9
	Missing	1	0.6

The Table 2 presents the prevalence of anxiety and depression and their severity among the participants disaggregated by the NICU and comparison groups measured with different tools.

The overall prevalence of depression as measured by EPDS (≥ 13) was 44.2% with 68.6% of NICU mothers depressed as compared to 19.8% among the comparison. About 26.3% of the respondents had high risk of psychological distress as detected by K10 scale, with NICU mothers reporting higher levels (39.5%) of distress as compared to comparisons (12.9%). The prevalence of depression and anxiety as measured by PHQ 4 was 31.6% with higher levels reported among the NICU mothers 48.8%, as opposed to the comparison group 14.1%. The overall prevalence of anxiety as detected by PHQ4 was 35.1% with higher levels among the NICU mothers such that, 52.3% of NICU mothers as compared with 17.6% of the comparison sample experienced these. The overall prevalence of depression as measured by PHQ4 was 33.3% among the participants, with NICU mothers reporting higher levels 47.7%, as compared to the comparisons 18.8%.

Table 2: Prevalence of Depression and Anxiety Symptoms of the Mothers

Tool	Status	Overall		Control		NICU	
		Frequency	Percentage (95%C.I)	Frequency	Percentage (95%C.I)	Frequency	Percentage (95%C.I)
EPDS-depression(>=13)	No depression	96	55.8(48.3-63.4)	69	80.2(70.9-88.4)	27	31.4(20.9-41.9)
	Depressed	76	44.2(36.6-51.7)	17	19.8(11.6-29.1)	59	68.6(58.1-79.1)
Kessler Psychological distress 1	Low or no risk	32	18.7(12.9-24.6)	28	32.9(23.5-43.5)	4	4.7(1.2-9.3)
	Medium risk	94	55.0(48.0-62.6)	46	54.1(43.5-64.7)	48	55.8(45.3-66.3)
	High risk	45	26.3(19.9-32.7)	11	12.9(5.9-20.0)	34	39.5(29.1-50.0)
Kessler Psychological distress 2	Normal	55	32.2(25.1-39.8)	44	51.8(41.2-63.5)	11	12.8(5.8-19.8)
	Mild	34	19.9(14.0-25.7)	15	17.6(10.6-25.9)	19	22.1(12.8-32.6)
	Moderate	37	21.6(15.8-28.1)	15	17.6(10.6-25.9)	22	25.6(16.3-34.9)
	Severe	45	26.3(19.9-32.7)	11	12.9(5.9-20.0)	34	39.5(29.1-50.0)
PHQ4-Depression and Anxiety (Levels)	None	69	40.4(32.7-47.4)	51	60.0(49.4-69.4)	18	20.9(12.8-30.2)
	Mild	48	28.1(21.1-35.1)	22	25.9(17.6-35.3)	26	30.2(20.9-39.5)
	Moderate	29	17.0(11.7-22.8)	8	9.4(3.5-15.3)	21	24.4(16.3-33.7)
	Severe	25	14.6(9.4-19.9)	4	4.7(1.2-9.4)	21	24.4(16.3-33.7)
PHQ4-Depression and Anxiety	Negative	117	68.4(61.4-75.4)	73	85.9(77.6-92.9)	44	51.2(40.7-61.6)
	Positive	54	31.6(24.6-38.6)	12	14.1(7.1-22.4)	42	48.8(38.4-59.3)
PHQ4-Anxiety Subscale	Negative	111	64.9(57.9-71.9)	70	82.4(72.9-90.6)	41	47.7(37.2-58.1)
	Positive	60	35.1(28.1-42.1)	15	17.6(9.4-27.1)	45	52.3(41.9-62.8)
PHQ4-Depression Subscale	Negative	114	66.7(59.6-73.7)	69	81.2(72.9-89.4)	45	52.3(41.9-62.8)
	Positive	57	33.3(26.3-40.4)	16	18.8(10.6-27.1)	41	47.7(37.2-58.1)

The Table 3 Presents results of bivariate socio-demographic factors associated with preterm deliveries.

There were significant differences in preterm births outcomes between the comparison group and the NICU mothers in terms of their level of education. The results established that those with the primary level of education were about 5.5 times more likely to have preterm births as compared to those with higher education such as University or College level of education. The risk of having a preterm baby was 3.9 and 5.2 times higher among mothers who had no income or who had low income of below 5000 Kenya shillings respectively, as compared to mothers who had income of 20,000 Kenya shillings and above. The risk of having a preterm birth was 0.4 times less among the mothers who were employed as compared to those who were unemployed. The odds of having a preterm birth was 0.4 times less among the mothers who received partner's support as compared to the mothers who were not supported by their partners. No significant differences were found between those who received a little support and those who did not respond to this question as compared to those who received no support at all. The risk of having a preterm birth was 2.6 times more among the mothers whose partner's abused substances (drugs and alcohol) as compared to those who did not. The risk of having a preterm birth was 2.2 times more among the normal(vaginal) deliveries as compared to caesarian section deliveries.

The risk of having a preterm birth was 0.3 times less among the mothers who received a lot of family support as compared to those who did not receive any form of family support. No significant differences were found between those who received a little support as compared to those who did not receive any support at all.

The risk of having a preterm birth was 0.4 times less among the mothers whose pregnancy was planned as compared to the mothers who had unplanned pregnancies. Subsequently the risk of having a preterm birth was 0.4 times less among the mothers whose pregnancy was wanted as compared to those whose pregnancies were unwanted. There were no significant differences in terms of age, occupation, partners abuse (physically sexually or emotionally), HIV status of the mother and partner, number of

babies delivered, happy with gender, mental illness in the family and depressed mood symptoms during pregnancy among the cases and comparison group.

Table 3: Socio-Demographic Characteristics of the Mothers Disaggregated By NICU and Control Group (N=172)

Variable	Category	Overall N=172	Control n=86	NICU n=86	O.R(95% C.I)	P-Value
Age in years	19 and below	11(6.4)	2(18.2)	9(81.8)	4.5(0.6-32.3)	0.135
	20-25Years	71(41.3)	32(45.1)	39(54.9)	1.2(0.3-4.6)	0.770
	26-30Years	55(32.0)	35(63.6)	20(36.4)	0.6(0.1-2.2)	0.419
	31-35Years	25(14.5)	12(48.0)	13(52.0)	1.1(0.2-4.7)	0.915
	36 and above	10(5.8)	5(50.0)	5(50.0)	1	Ref.
Highest Level of education	Primary	39(22.7)	10(25.6)	29(74.4)	5.5(2.2-13.6)	<0.0001
	Secondary	74(43.0)	37(50.0)	37(50.0)	1.9(0.9-3.9)	0.075
	University/college	58(33.7)	38(65.5)	20(34.5)	1	Ref.
	Missing	1(0.6)				
Occupation	Unemployed	75(43.6)	34(45.3)	41(54.7)	1.4(0.8-2.6)	0.282
	Employed	97(56.4)	52(53.6)	45(46.4)		Ref.
Monthly Income	No Income	73(42.4)	30(41.1)	43(58.9)	3.9(1.5-10.4)	0.007
	1000-5000	38(22.1)	13(34.2)	25(65.8)	5.2(1.7-15.6)	0.003
	5001-10000	24(14.0)	15(62.5)	9(37.5)	1.6(0.5-5.4)	0.425
	10001-20000	10(5.8)	8(80.0)	2(20.0)	0.7(0.1-4.0)	0.669
	Above 20000	26(15.1)	19(73.1)	7(26.9)	1	Ref.
	Missing	1(0.6)				
Partners employment status	Employed	91(52.9)	54(59.3)	37(40.7)	0.4(0.2-0.8)	0.008
	Unemployed	80(46.5)	31(38.8)	49(61.3)	1	Ref.
	Missing	1(0.6)				
Partner's support	yes a lot	84(48.8)	47(56.0)	37(44.0)	0.4(0.2-1.0)	0.044
	Yes abit	48(27.9)	26(54.2)	22(45.8)	0.4(0.2-1.1)	0.086
	Can't say	13(7.6)	4(30.8)	9(69.2)	1.1(0.3-4.7)	0.871
	Not at all	27(15.7)	9(33.3)	18(66.7)	1	Ref.
Partner abuse substance	Yes	34(19.8)	11(32.4)	23(67.6)	2.6(1.2-5.7)	0.020
	No	134(77.9)	74(55.2)	60(44.8)	1	Ref.
	Missing	4(2.3)				
Partner abuse you (Physical, emotion, sexually)	Yes	16(9.3)	5(31.3)	11(68.8)	2.3(0.7-6.8)	0.148
	No	150(87.2)	76(50.7)	74(49.3)	1	Ref.
	Missing	6(3.5)				
Self HIV status	Yes	20(11.6)	8(40.0)	12(60.0)	1.6(0.6-4.1)	0.330
	No	151(87.8)	78(51.7)	73(48.3)	1	Ref.
	Missing	1(0.6)				

Partner HIV status	Yes	12(7.0)	4(33.3)	8(66.7)	0.8(0.1-4.5)	0.753
	No	149(86.6)	79(53.0)	70(47.0)	0.3(0.1-1.3)	0.114
	don't know	11(6.4)	3(27.3)	8(72.7)	1	Ref.
Type of delivery	Vaginal delivery	135(78.5)	62(45.9)	73(54.1)	2.2(1.0-4.6)	0.044
	Caesarian section	37(21.5)	24(64.9)	13(35.1)	1	Ref.
Family support	Yes a lot	99(57.6)	59(59.6)	40(40.4)	0.3(0.1-0.8)	0.020
	Yes a little bit	51(29.7)	19(37.3)	32(62.7)	0.7(0.2-2.2)	0.566
	No not at all	20(11.6)	6(30.0)	14(70.0)	1	Ref.
	Missing	2(1.2)				
Pregnancy planned	Planned	112(65.1)	64(57.1)	48(42.9)	0.4(0.2-0.8)	0.010
	Not planned	58(33.7)	21(36.2)	37(63.8)	1	Ref.
	Missing	2(1.2)				
Pregnancy wanted	Wanted	146(84.9)	80(54.8)	66(45.2)	0.3(0.1-0.7)	0.007
	Not wanted	25(14.5)	6(24.0)	19(76.0)	1	Ref.
	Missing	1(0.6)				
Number of babies delivered	One	156(90.7)	86(55.1)	70(44.9)	0.0(0.0-)	0.998
	Twins	16(9.3)	0(0.0)	16(100.0)	1	Ref.
Happy with gender	Yes a lot	159(92.4)	80(50.3)	79(49.7)	0.3(0.0-3.2)	0.340
	Yes a little bit	8(4.7)	4(50.0)	4(50.0)	0.3(0.0-4.7)	0.417
	No not all	4(2.3)	1(25.0)	3(75.0)	1	Ref.
	Missing	1(0.6)				
Mental illness in the family	Yes	23(13.4)	15(65.2)	8(34.8)	0.5(0.2-1.2)	0.115
	No	148(86.0)	70(47.3)	78(52.7)	1	Ref.
	Missing	1(0.6)				
Depressed symptoms	Yes	49(28.5)	21(42.9)	28(57.1)	1.5(0.8-2.9)	0.257
	No	122(70.9)	64(52.5)	58(47.5)	1	Ref.
	Missing	1(0.6)				

The Table 4 Presents the results of bivariate Psychological factors associated with preterm deliveries.

As measured in terms of the presence or absence, severity and scores from different tools. As shown in table 4, the NICU mothers had significantly higher scores of depression anxiety and psychological distress as compared to the comparison group. The risk of having a preterm baby was about 9 times more in mothers with depression (EPDS \geq 13) as compared to mothers without depression. Similarly the risk of having a preterm baby was 4.5 times in mothers with psychological distress as compared to those who did not appear to have distress (as assessed by K10 scale). The risk of having preterm baby

was 5.8, times more in mothers who scored positive for anxiety and depression (as assessed by PHQ4 Overall) and 5.1 times more in mothers who scored positive for anxiety (assessed by PHQ4-Anxiety subscale) and 3.9 times more in mothers who scored positive for depression (as assessed by PHQ4-depression subscale) as compared to those who score negative.

Table 4: Psychological Adjustment of NICU and Comparison Mothers

Tool	Categories	Control n(%)	NICU n(%)	OR(95% C.I)	P-value
EPDS scores	Mean(SD)	8.3(5.6)	15.1(5.8)	1.22(1.15-1.31)	<0.001
Kessler scores	Mean(SD)	20.2(7.2)	28.0(8.2)	1.14(1.09-1.19)	<0.001
PHQ 4 Total	Mean(SD)	2.5(2.6)	5.6(3.4)	1.38(1.23-1.55)	<0.001
PHQ4 Anxiety sub-scale	Mean(SD)	1.2(1.4)	2.8(1.8)	1.77(1.43-2.19)	<0.001
PHQ4 Depression sub-scale	Mean(SD)	1.2(1.5)	2.8(2.0)	1.64(1.35-2.00)	<0.001
Levels of depression and Anxiety					
EPDS depression	No depression	69(71.9)	27(28.4)	0.11(0.06-0.23)	<0.001
	Depressed	17(22.4)	59(77.6)	1	Ref.
PHQ4-Depression and Anxiety	None	51(73.9)	18(26.1)	0.07(0.02-0.22)	<0.001
	Mild	22(45.8)	26(54.2)	0.23(0.07-0.76)	0.016
	Moderate	8(27.6)	21(72.4)	0.50(0.13-1.92)	0.312
	Severe	4(16.0)	21(84.0)	1	Ref.
PHQ4-Anxiety	Negative	70(63.1)	41(36.9)	0.20(0.10-0.39)	<0.001
	Positive	15(25.0)	45(75.0)	1	Ref.
PHQ4-Depression	Negative	69(60.5)	45(39.5)	0.25(0.13-0.51)	<0.001
	Positive	16(28.1)	41(71.9)	1	Ref.
Kessler Psychological distress 1	Low or norisk	29(87.9)	4(12.1)	0.04(0.01-0.16)	<0.001
	Medium risk	46(48.9)	48(51.1)	0.34(0.15-0.74)	0.007
	High risk	11(24.4)	34(75.6)	1	Ref.
Kessler Psychological distress 2	Normal	45(80.4)	11(19.6)	0.08(0.03-0.20)	<0.001
	Mild	15(44.1)	19(55.9)	0.41(0.16-1.07)	0.068
	Moderate	15(40.5)	22(59.5)	0.47(0.18-1.22)	0.122
	Severe	11(24.4)	34(75.6)	1	Ref.
Presence of depression and Anxiety					
EPDS depression	Negative	69(71.9)	27(28.4)	1	Ref.
	Positive	17(22.4)	59(77.6)	8.87(4.41-17.85)	<0.001
Kessler Psychological distress	Negative	75(59.1)	52(40.9)	1	Ref.
	Positive	11(24.4)	34(75.6)	4.46(2.07-9.59)	<0.001
PHQ4-Depression and	Negative	73(62.4)	44(37.6)	1	Ref.

Anxiety	Positive	12(22.2)	42(77.8)	5.81(2.76-12.20)	0.0001
PHQ4-Anxiety	Negative	70(63.1)	41(36.9)	1	Ref.
	Positive	15(25.0)	45(75.0)	5.12(2.54-10.31)	<0.001
PHQ4-Depression	Negative	69(60.5)	45(39.5)	1	Ref.
	Positive	16(28.1)	41(71.9)	3.93(1.97-7.83)	<0.001

Figure 3: Levels of Anxiety and Depression as measured by PHQ4

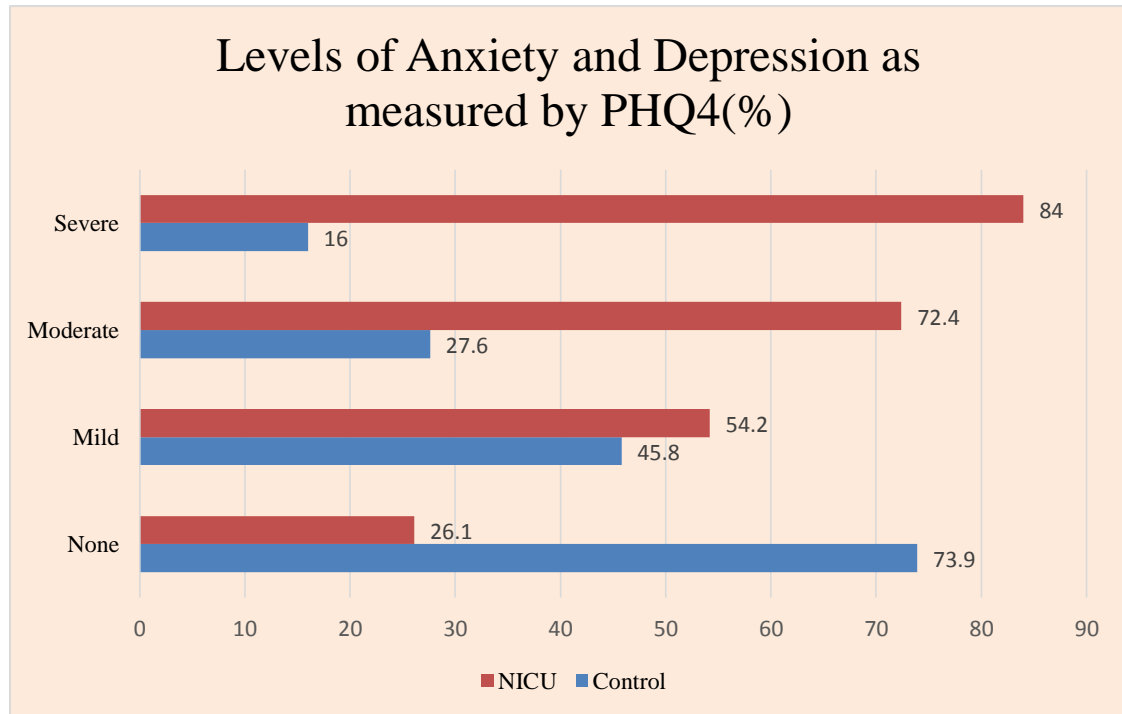
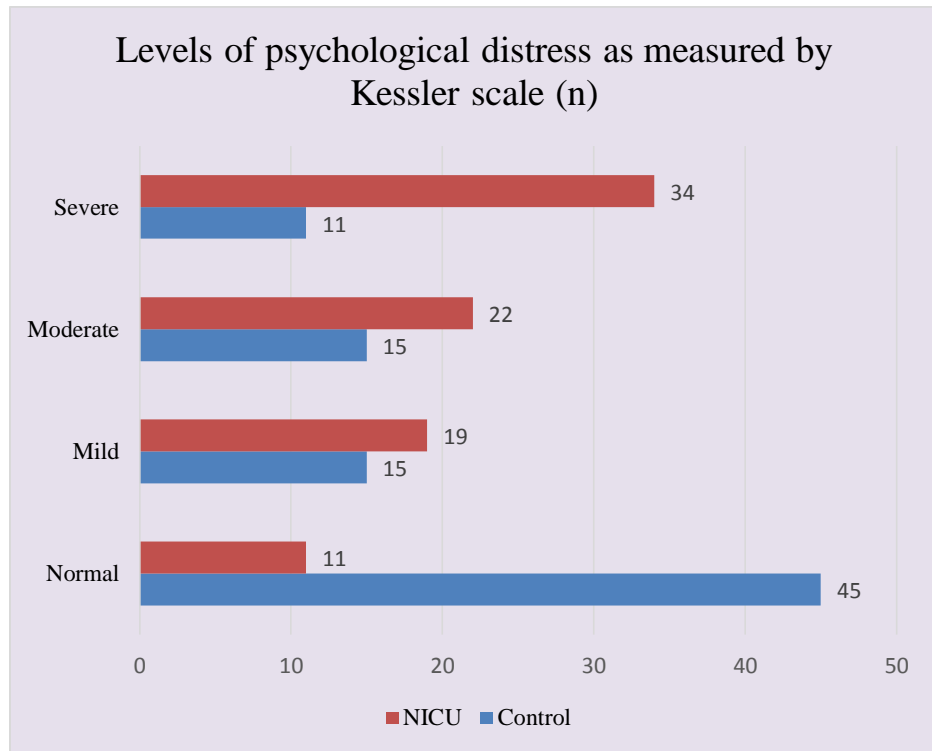


Figure 4: Levels of psychological distress as measured by Kessler scale



The Table 5 Presents the multivariate analysis of factors associated with preterm delivery. After controlling for all factors that were associated with preterm delivery ($P < 0.05$) The risk of preterm delivery was 5.5 times higher among those mothers with depression as compared to those without depression. The risk of preterm delivery was 3.7 times higher among the mothers with depression and anxiety ($P = 0.015$) as compared to those without.

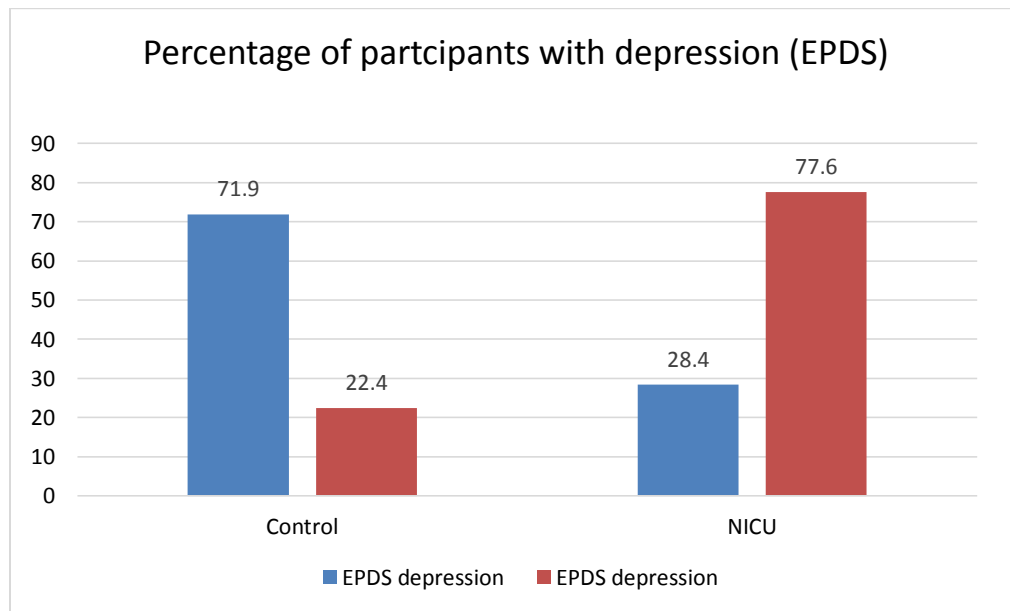
Table 5: Multivariate Analysis of Factors Associated With Preterm Delivery

Variable	Category	Control (N=86)	NICU (N=86)	C.O.R (95% C.I)	P-Value	A.O.R (95% C.I)	P-Value
Highest Level of education	Primary	10(2.6)	29(74.4)	5.5(2.2-13.6)	<0.001	2.8(0.8-10.2)	0.117
	Secondary	37(50.0)	37(50.0)	1.9(0.9-3.9)	0.075	1.1(0.4-3.0)	0.785
	University/college	38(65.5)	20(34.5)	1	Ref.	1	Ref.
Monthly Income	No Income	30(41.1)	43(58.9)	3.9(1.5-10.4)	0.007	1.1(0.3-4.7)	0.877
	1000-5000	13(34.2)	25(65.8)	5.2(1.7-15.6)	0.003	1.7(0.4-7.4)	0.491
	5001-10000	15(62.5)	9(37.5)	1.6(0.5-5.4)	0.425	0.9(0.2-4.1)	0.855
	10001-20000	8(80.0)	2(20.0)	0.7(0.1-4.0)	0.669	0.6(0.1-4.9)	0.613
Above 20000	19(73.1)	7(26.9)	1	Ref.	1	Ref.	
Partners employment status	Employed	54(59.3)	37(40.7)	0.4(0.2-0.8)	0.008	0.5(0.2-1.4)	0.209
	Unemployed	31(38.8)	49(61.3)	1	Ref.	1	Ref.
Partner's support	Yes a lot	47(56.0)	37(44.0)	0.4(0.2-1.0)	0.044	0.8(0.2-4.6)	0.849
	Yes a bit	26(54.2)	22(45.8)	0.4(0.2-1.1)	0.086	0.2(0.0-1.4)	0.109
	Can't say	4(30.8)	9(69.2)	1.1(0.3-4.7)	0.871	0.6(0.1-4.6)	0.616
	Not at all	9(33.3)	18(66.7)	1	Ref.	1	Ref.
Partner abuse substance	Yes	11(32.4)	23(67.6)	2.6(1.2-5.7)	0.020	1.2(0.4-3.6)	0.805
	No	74(55.2)	60(44.8)	1	Ref.	1	Ref.
Type of delivery	Vaginal delivery	62(45.9)	73(54.1)	2.2(1.0-4.6)	0.044	2.8(0.9-8.3)	0.070
	Caesarian section	24(64.9)	13(35.1)	1	Ref.	1	Ref.
Family support	Yes a lot	59(59.6)	40(40.4)	0.3(0.1-0.8)	0.020	1.0(0.2-6.1)	0.966
	Yes a little bit	19(37.3)	32(62.7)	0.7(0.2-2.2)	0.566	1.7(0.3-10.4)	0.552
	No not at all	6(30.0)	14(70.0)	1	Ref.	1	Ref.

Pregnancy planned	Planned	64(57.1)	48(42.9)	0.4(0.2-0.8)	0.010	0.6(0.2-1.5)	0.267
	Not planned	21(36.2)	37(63.8)	1	Ref.	1	Ref.
Pregnancy wanted	Wanted	80(54.8)	66(45.2)	0.3(0.1-0.7)	0.007	1.4(0.3-6.7)	0.654
	Not wanted	6(24.0)	19(76.0)	1	Ref.	1	Ref.
EPDS depression	Negative	69(71.9)	27(28.4)	1	Ref.	1	Ref.
	Positive	17(22.4)	59(77.6)	8.87(4.41-17.85)	<0.001	5.5(2.1-14.2)	<0.001
PHQ4-Depression and Anxiety	Negative	73(62.4)	44(37.6)	1	Ref.	1	Ref.
	Positive	12(22.2)	42(77.8)	5.81(2.76-12.20)	0.0001	3.7(1.3-10.8)	0.015
Kessler Psychological distress	Negative	75(59.1)	52(40.9)	1	Ref.	1	Ref.
	Positive	11(24.4)	34(75.6)	4.46(2.07-9.59)	<0.001	0.8(0.3-2.7)	0.766

Note: C.O.R-Crude Odds Ratio; A.O.R-Adjusted Odds Ratio; Ref-Reference category.

Figure 5: Percentage of participants with depression



The Table 6: Presents the bivariate results on factors associated with anxiety and depression among the mothers with preterm babies.

The risk of anxiety and depression was 2.2 times higher among the mothers who had partners without stable income as compared to those with partners with stable income. There was a statistically significant difference among the mothers who had partners support with the risk of depression and anxiety being 2.9 times higher among those who did not have partners support as compared to those who were supported.

The risk of anxiety and depression was 3.0 higher among the women whose partners abused drugs and substances as compared to those whose partners did not abuse substances. The risk of anxiety and depression was 13.9 times higher among the women with partners who abused them physically, emotionally and or sexually, as compared to those who were not abused. The risk of anxiety and depression was 8.3 times higher among mothers whose partners were HIV positive, as compared to those whose partners were HIV negative.

The risk of anxiety and depression was 2.1 times higher among mothers who received a little support from family and 6.8 times higher among those who received no support at all from the family, as compared to those who had a lot of family support.

Those who had depressive symptoms during the pregnancy were 7 times more likely to suffer from anxiety and depression as compared to those who didn't have depressive moods.

Table 6: Socio-Demographic Factors Associated With Anxiety and Depression among NICU Mothers

Variable	Category	PHQ 4 (Anxiety & Depression)		O.R(95% C.I)	P-Value
		Negative	Positive		
Age in years	19-25 Years	26(59.1)	22(52.4)	1.1(0.4-3.1)	0.520
	26-30 years	8(18.2)	12(28.6)	1.9(0.5-6.8)	
	31 and above	10(22.7)	8(19.0)	Ref	
Highest Level of education	Primary	14(31.8)	15(35.7)	1.3(0.4-4.1)	0.898
	Secondary	19(43.2)	18(42.9)	1.2(0.4-3.4)	
	University/college	11(25.0)	9(21.4)	Ref	
Occupation	Unemployed	19(43.2)	22(52.4)	1.4(0.6-3.4)	0.393
	Employed	25(56.8)	20(47.6)	Ref	
Monthly Income	No Income	21(47.7)	22(52.4)	2.1(0.5-9.5)	0.770
	1000-5000	12(27.3)	13(31.0)	2.2(0.4-10.7)	
	5001-10000	5(11.4)	4(9.5)	1.6(0.2-10.8)	
	Above 10000	6(13.6)	3(7.1)	Ref	
Partners employment status	Employed	23(52.3)	14(33.3)	Ref	0.076
	Unemployed	21(47.7)	28(66.7)	2.2(0.9-5.2)	
Partner's support	Yes	35(85.4)	24(66.7)	Ref	0.053
	No	6(14.6)	12(33.3)	2.9(1.0-8.8)	
Partner abuse substance	Yes	7(17.1)	16(38.1)	3.0(1.1-8.3)	0.032
	No	34(82.9)	26(61.9)	Ref	
Partner abuse you (Physical, emotion, sexually)	Yes	1(2.3)	10(24.4)	13.9(1.7-114.1)	0.002
	No	43(97.7)	31(75.6)	Ref	
Tested positive for HIV	Yes	5(11.4)	7(17.1)	1.6(0.5-5.5)	0.450
	No	39(88.6)	34(82.9)	Ref	
Partner positive for HIV.	Yes	1(2.6)	7(17.9)	8.3(1.0-71.2)	0.025
	No	38(97.4)	32(82.1)	Ref	
Type of delivery	Vaginal delivery	38(86.4)	35(83.3)	Ref	0.695
	Caesarian section	6(13.6)	7(16.7)	1.3(0.4-4.1)	

Family support	Yes a lot	26(59.1)	14(33.3)	Ref	0.016
	Yes a little bit	15(34.1)	17(40.5)	2.1(0.8-5.4)	
	No not at all	3(6.8)	11(26.2)	6.8(1.6-28.5)	
Pregnancy planned	Planned	25(58.1)	23(54.8)	Ref	0.754
	Not planned	18(41.9)	19(45.2)	1.1(0.5-2.7)	
Pregnancy wanted	Wanted	35(79.5)	31(75.6)	Ref	0.663
	Not wanted	9(20.5)	10(24.4)	1.3(0.5-3.5)	
Number of babies delivered	One	37(84.1)	33(78.6)	Ref	0.511
	Twins	7(15.9)	9(21.4)	1.4(0.5-4.3)	
Happy with gender	Yes a lot	43(97.7)	36(85.7)	Ref	0.101
	Yes a little bit	1(2.3)	3(7.1)	3.6(0.4-36.0)	
	No not all	0(0.0)	3(7.1)	(UD)	
Mental illness in the family	Yes	2(4.5)	6(14.3)	Ref	0.120
	No	42(95.5)	36(85.7)	3.5(0.7-18.4)	
Depressed symptoms	Yes	6(13.6)	22(52.4)	Ref	<0.001
	No	38(86.4)	20(47.6)	7.0(2.4-20.0)	

The Table 7 Presents Psychological factors associated with anxiety and depression among NICU mothers.

The EPDS scores and Kessler scores were significantly high among those who scored positive for anxiety and depression as compared to those who scored negative. The risk of anxiety and depression was 3.2 times higher among women who had depression (EPDS) as compared to those who did not.

The risk of anxiety and depression was 10.3 times higher among women who had severe psychological distress as compared to those who had normal levels of psychological distress. However no significant differences were found between those who had mild and moderate psychological distress as compared to those that had no psychological distress.

The risk of anxiety and depression was 9.5 times higher among those who scored positive for psychological distress as compared to those who did not have.

Table 7: Psychological adjustments Factors Associated with Anxiety and Depression among NICU Mothers

Tool	Categories	PHQ 4 (Anxiety & Depression)		OR(95% C.I)	P-value
		Negative	Positive		
EPDS scores	Mean(SD)	12.2(4.6)	18.2(5.5)	1.3(1.1-1.4)	<0.001
Kessler scores	Mean(SD)	24.0(5.8)	32.3(8.3)	1.2(1.1-1.3)	0.000
EPDS depression	No depression	19(43.2)	8(19.0)	1	Ref.
	Depressed	25(56.8)	34(81.0)	3.2(1.2-8.6)	0.018
Kessler Psychological distress 1	Low or no risk	2(4.5)	2(4.8)	1	Ref.
	Medium risk	35(79.5)	13(31.0)	0.4(0.0-2.9)	0.346
	High risk	7(15.9)	27(64.3)	3.9(0.5-32.4)	0.214
Kessler Psychological distress 2	Normal	8(18.2)	3(7.1)	1	Ref.
	Mild	16(36.4)	3(7.1)	0.5(0.1-3.1)	0.453
	Moderate	13(29.5)	9(21.4)	1.8(0.4-8.9)	0.446
	Severe	7(15.9)	27(64.3)	10.3(2.1-49.2)	0.004
Kessler Psychological distress	Negative	37(84.1)	15(35.7)	1	Ref.
	Positive	7(15.9)	27(64.3)	9.5(3.4-26.5)	<0.001

The Table 8 presents stressful events and characteristics surrounding the premature delivery and the NICU environment.

The majority (73.3%) of the NICU respondents reported that sudden onset of labor pains triggered the sudden onset of premature delivery. About 12.8% of NICU mothers attributed premature delivery to sudden onset of vaginal bleeding or a form of accident. About 9.3% of the respondents attributed the premature delivery to preeclampsia. Bad news and domestic violence was attributed for premature delivery by 1.2% of the respondents respectively. Other causes of premature delivery accounted for 2.3% of the total preterm delivery.

More than half (62.8%) of the respondents said that they were destabilized due to preterm delivery. 45.3% were comfortable with the experience in the NICU environment while 29.1% found it disturbing and 25.6% found it frightening. About 91% of the respondents had babies that weighed less than 2000 grams. Around 66.3% were worried about

infants' physical appearance, while 69.8% of the mothers were worried about infants' survival. About 64% of the participants were worried a lot about mother infant separation. While 48.8% of the mothers felt like they blamed themselves for the premature birth and 22.1% felt like other people blamed them for the premature birth. More than half (70.9%) of the respondents felt that they received a lot of support from the nurses in the NICU ward while 24.4% felt they receive a bit of support from the nurses and the remaining 4.7% felt that they are not receiving any kind of support from the NICU nurses. A low proportion of the respondents 64.0% felt that they received a lot of support from the nurses in the postnatal ward as compared to that of nurses in NICU. About 26.7% of the respondents felt that they received a bit of support and 9.7% felt they did not receive any kind of support from the nurses in the postnatal wards.

With regard to NICU environment factors associated with anxiety and depression.

The risk of depression and anxiety was 3.7 times more among the mothers who were worried about infant mother separation as compared to those who were not. The risk of depression and anxiety was about 6 times more in mothers who felt that other people blamed them for the premature birth as compared to those who did not feel so. The risk of depression and anxiety 5.7 times more among the mothers who felt that they were not receiving any kind of support from the nurses at NICU as compared to those who felt that they were receiving a lot of support.

The risk of anxiety and depression was 5.8 and 14.4 times higher among the mothers who felt that they received a little bit of support and no support at all respectively as compared to those who felt that they received a lot a of support from the nurses at the postnatal ward.

Table 8: NICU Environment Factors Associated With Anxiety and Depression among Mothers with Babies in NICU

Condition	Category	Overall (N=86)	PHQ 4 (Anxiety &Depression)		O.R(95% C.I)	P-value
			Negative (n=44)	Positive (n=42)		
Stressful events surrounding delivery	Vaginal bleeding/accident	11(12.8)	7(15.9)	4(9.5)	0.6(0.0-11.8)	0.718
	Bad news	1(1.2)	0(0.0)	1(2.4)	UD(0.0-)	1.000
	Severe preeclampsia	8(9.3)	1(2.3)	7(16.7)	7.0(0.2-226.0)	0.272
	Sudden onset of labor pains/broken water	63(73.3)	35(79.5)	28(66.7)	0.8(0.0-13.4)	0.877
	Domestic violence	1(1.2)	0(0.0)	1(2.4)	UD(0.0-)	1.000
	Other causes	2(2.3)	1(2.3)	1(2.4)	1	Ref
	Destabilized due to preterm birth	Yes	54(62.8)	26(59.1)	28(66.7)	1.4(0.6-3.3)
No		32(37.2)	18(40.9)	14(33.3)	1	Ref
Experience in the NICU environment	Comfortable	39(45.3)	21(47.7)	18(42.9)	0.9(0.3-2.4)	0.773
	Disturbing	25(29.1)	12(27.3)	13(31.0)	1.1(0.3-3.4)	0.891
	Frightening	22(25.6)	11(25.0)	11(26.2)	1	Ref
Birth weight	500-2000g	78(90.7)	40(90.9)	38(90.5)	1.0(0.2-4.1)	0.945
	2001-2500g	8(9.3)	4(9.1)	4(9.5)	1	Ref
Infant's physical appearance	Yes a lot	57(66.3)	26(59.1)	31(73.8)	2.0(0.8-4.9)	0.152
	No not all	29(33.7)	18(40.9)	11(26.2)	1	Ref
Infant's survival	Yes a lot	60(69.8)	29(65.9)	31(73.8)	1.5(0.6-3.7)	0.426
	No not all	26(30.2)	15(34.1)	11(26.2)	1	Ref
Mother /infant's separation	Yes	55(64.0)	22(50.0)	33(78.6)	3.7(1.4-9.4)	0.007
	No	31(36.0)	22(50.0)	9(21.4)	1	Ref
Self-blame for premature birth	Yes quite often	42(48.8)	18(40.9)	24(57.1)	1.9(0.8-4.5)	0.134
	No not at all	44(51.2)	26(59.1)	18(42.9)	1	Ref
Others blame you	Yes	19(22.1)	4(9.1)	15(35.7)	5.6(1.7-18.6)	0.005
	No	67(77.9)	40(90.9)	27(64.3)	1	Ref
Support from NICU	Yes a lot	61(70.9)	39(88.6)	22(52.4)	1	Ref
	Yes a little bit	21(24.4)	5(11.4)	16(38.1)	5.7(1.8-17.6)	0.003
	No not at all	4(4.7)	0(0.0)	4(9.5)	UD(0.0-)	0.999
Support from WARD	Yes a lot	55(64.0)	37(84.1)	18(42.9)	1	Ref
	Yes a little bit	23(26.7)	6(13.6)	17(40.5)	5.8(2.0-17.3)	0.002
	No not at all	8(9.3)	1(2.3)	7(16.7)	14.4(1.6-126.0)	0.016

Table 9 Presents factors associated with anxiety and depression among the control group. The risk of anxiety and depression was 5.8 times higher among the mothers who were unemployed as compared to the mothers who were employed. The risk of anxiety and depression increased with the decrease in monthly income. The risk of anxiety and depression was 5.4 times higher among the mothers whose partners abuse substances (alcohol and drugs) as compared to those with partners who did not abuse substances. The risk of anxiety and depression was 17.7 times higher among mothers whose pregnancy was unwanted as compared to those whose pregnancy was wanted.

The risk of anxiety and depression was 7.0 higher among the mothers with family members who had a history of mental illness as compared to those who did not have and 3.8 times higher among the mothers who had depressive symptoms during pregnancy as compared to those who did not have depressive symptoms.

Table 9: Socio-Demographic Factors Associated with Anxiety and Depression among control-Mothers

Variable	Category	PHQ 4 (Anxiety & Depression)		O.R.(95% C.I)	P-Value
		Negative	Positive		
Age in years	19-25 Years	27(37.0)	6(50.0)	1.0(0.2-4.8)	0.469
	26-30 years	32(43.8)	3(25.0)	0.4(0.1-2.4)	
	31 and above	14(19.2)	3(25.0)	Ref	
Highest Level of education	Primary	7(9.7)	3(25.0)	3.5(0.6-19.4)	0.301
	Secondary	32(44.4)	5(41.7)	1.3(0.3-5.2)	
	University/college	33(45.8)	4(33.3)	Ref	
Occupation	Unemployed	25(34.2)	9(75.0)	5.8(1.4-23.2)	0.010
	Employed	48(65.8)	3(25.0)	Ref	
Monthly Income	No Income	22(30.6)	8(66.7)	9.1(1.1-78.5)	0.079
	1000-5000	11(15.3)	2(16.7)	4.5(0.4-55.5)	
	5001-10000	14(19.4)	1(8.3)	1.8(0.1-30.8)	
	Above 10000	25(34.7)	1(8.3)	Ref	
Partners employment status	Yes	46(63.9)	7(58.3)	Ref	0.473
	No	26(36.1)	5(41.7)	1.3(0.4-4.4)	
Partner's support	Yes	63(90.0)	9(81.8)	Ref	0.353
	No	7(10.0)	2(18.2)	2.0(0.4-11.2)	
Partner abuse substance	Yes	7(9.6)	4(36.4)	5.4(1.3-23.1)	0.034
	No	66(90.4)	7(63.6)	Ref	
Partner abuse you (Physical, emotion, sexually)	Yes	3(4.3)	2(18.2)	4.9(0.7-33.3)	0.137
	No	66(95.7)	9(81.8)	Ref	
Tested positive for HIV	Yes	7(9.6)	1(8.3)	0.9(0.1-7.7)	1.000
	No	66(90.4)	11(91.7)	Ref	
Partner positive for HIV.	Yes	3(4.2)	1(9.1)	2.3(0.2-24.0)	0.444
	No	68(95.8)	10(90.9)	Ref	
Type of delivery	vaginal delivery	52(71.2)	9(75.0)	Ref	1.000
	caesarian section	21(28.8)	3(25.0)	0.8(0.2-3.4)	
Family support	yes a lot	51(71.8)	7(58.3)	Ref	0.364
	yes a little bit	16(22.5)	3(25.0)	1.4(0.3-5.9)	
	no not at all	4(5.6)	2(16.7)	3.6(0.6-23.7)	
Pregnancy planned	Planned	56(77.8)	7(58.3)	Ref	0.164
	not planned	16(22.2)	5(41.7)	2.5(0.7-8.9)	
Pregnancy wanted	Wanted	71(97.3)	8(66.7)	Ref	0.003
	not wanted	2(2.7)	4(33.3)	17.7(2.8-112.7)	
Number of babies delivered	One	73(100.0)	12(100.0)	Ref	UD

Happy with gender	Twins	0(0.0)	0(0.0)	UD	0.760
	yes a lot	68(94.4)	11(91.7)	Ref	
	yes a little bit	3(4.2)	1(8.3)	2.1(0.2-21.6)	
	no not all	1(1.4)	0(0.0)	0.0(0.0-)	
Mental illness in the family	Yes	9(12.5)	6(50.0)	Ref	0.006
	No	63(87.5)	6(50.0)	7.0(1.9-26.5)	
Depressed symptoms	Yes	15(20.8)	6(50.0)	Ref	0.031
	No	57(79.2)	6(50.0)	3.8(1.1-13.5)	

As shown in table 10 the risk of depression was associated with significantly high scores of EPDS and Kessler scores.

Table 10: Psychological adjustments Factors Associated with Anxiety and Depression among Comparison Mothers

Tool	Categories	PHQ 4 (Anxiety & Depression)		OR(95% C.I)	P-value
		Negative (n=73)	Positive (N=12)		
		EPDS scores	Mean(SD)		
Kessler scores	Mean(SD)	18.8(6.1)	29.8(5.9)	1.3(1.1-1.5)	0.000267
EPDS depression	No depression	62(84.9)	6(50.0)	1	Ref.
	Depressed	11(15.1)	6(50.0)	5.6(1.5-20.7)	0.009
Kessler	Negative	68(93.2)	6(50.0)	UD	Ref.
Psychological distress	Positive	5(6.8)	6(50.0)	13.6(3.2-58.0)	0.000

The Table 11 Presents the multivariate analysis of factors associated with anxiety and depression among NICU mothers.

After controlling for all factors that were associated with anxiety and depression, (P<0.05). The mothers with anxiety and depression had significantly high scores of depression compared to those who did not (A.O.R=1.2; 95% C.I. 1.0-1.5).

The risk of anxiety and depression was 14.0 times higher among those who felt that others were blaming them for preterm delivery as compared to those who did not feel so (P=0.038). The risk of anxiety and depression was 55.7 times higher among women who

did not receive support from the nurses in the wards as compared to those who received a lot of support (P=0.01)

Table 11: Independent Predictors of Anxiety and Depression among the NICU Mothers (N=86)

Variable	Category	PHQ 4 (Anxiety & Depression)		A.O.R(95% C.I)	P-Value
		Negative	Positive		
Partners employment status	Employed	23(52.3)	14(33.3)	Ref.	0.159
	Unemployed	21(47.7)	28(66.7)	4.5(0.6-37.3)	
Partner's support	Yes	35(85.4)	24(66.7)	Ref.	0.280
	No	6(14.6)	12(33.3)	3.5(0.4-33.5)	
Partner abuse substance	Yes	7(17.1)	16(38.1)	3.8(0.4-34.9)	0.239
	No	34(82.9)	26(61.9)	Ref.	
Partner abuse you (Physical, emotion, sexually)	Yes	1(2.3)	10(24.4)	UD(0.0-)	0.999
	No	43(97.7)	31(75.6)	Ref.	
Partner HIV status	Yes	1(2.6)	7(17.9)	11.3(0.2-600.4)	0.230
	No	38(97.4)	32(82.1)	Ref.	
Family support	Yes a lot	26(59.1)	14(33.3)	Ref.	0.455
	Yes a little bit	15(34.1)	17(40.5)	0.5(0.1-3.2)	
	No not at all	3(6.8)	11(26.2)	0.1(0.0-6.8)	
Depressed symptoms	Yes	6(13.6)	22(52.4)	Ref.	0.704
	No	38(86.4)	20(47.6)	0.7(0.1-4.4)	
EPDS scores	Mean(SD)	19.8(4.2)	19.4(5.3)	1.2(1.0-1.5)	0.029
Kessler scores	Mean(SD)	24.0(5.8)	32.3(8.3)	1.0(0.9-1.2)	0.765
Mother /infant's separation	Yes	22(50.0)	33(78.6)	4.2(0.5-33.9)	0.178
	No	22(50.0)	9(21.4)	Ref.	
Others blame you	Yes	4(9.1)	15(35.7)	14.0(1.2-170.0)	0.038
	No	40(90.9)	27(64.3)	Ref.	
Support from NICU	Yes	39(88.6)	22(52.4)	Ref.	0.672
	No	5(11.4)	20(47.6)	0.6(0.0-8.7)	
Support from WARD	Yes	37(84.1)	18(42.9)	Ref.	0.014
	No	7(15.9)	24(57.1)	55.7(2.3-1370.6)	

The Table 12 Presents the multivariate analysis of factors associated with anxiety and depression in the mothers of full term infants

After controlling for all factors that were associated with anxiety and depression (P<0.05).The mothers with anxiety and depression had significantly high scores of psychological distress as compared to those who did not (A.O.R=1.3; 95%C.I. 1.1-1.6; P=0.008).

Table 12: Independent Predictors of Anxiety and Depression among the Comparison group mothers (N=86)

Variable	Category	PHQ 4 (Anxiety & Depression)		A.O.R(95% C.I)	P-Value
		Negative	Positive		
Occupation	Unemployed	25(34.2)	9(75.0)	2.0(0.2-18.9)	0.533
	Employed	48(65.8)	3(25.0)	Ref.	
Partner abuse substance	Yes	7(9.6)	4(36.4)	1.7(0.2-17.0)	0.660
	No	66(90.4)	7(63.6)	Ref.	
Pregnancy wanted	Wanted	71(97.3)	8(66.7)	Ref.	0.952
	not wanted	2(2.7)	4(33.3)	1.1(0.1-12.5)	
Mental illness in the family	Yes	9(12.5)	6(50.0)	Ref.	0.161
	No	63(87.5)	6(50.0)	0.2(0.0-1.8)	
Depressed symptoms	Yes	15(20.8)	6(50.0)	Ref.	0.783
	No	57(79.2)	6(50.0)	0.8(0.1-5.1)	
EPDS scores	Mean(SD)	22.2(5.8)	18.8(6.1)	0.9(0.7-1.2)	0.514
Kessler scores	Mean(SD)	17.7(3.3)	29.8(5.9)	1.3(1.1-1.6)	0.008

CHAPTER FIVE

5.0 DISCUSSION, CONCLUSION LIMITATIONS AND RECOMMENDATIONS

5.1 Discussion

Maternal PPD varies widely in different countries and regions worldwide due to different instrument measures, study design methods, sample sizes, timing and studied population (36, 37,38).

This was a descriptive comparison hospital based study for the mothers of preterm infants and community (outpatient clinic) based for the mothers of full term infants. The objective of the study was to determine the prevalence of PPD and anxiety among mothers of preterm infants in NICU at KNH, compared to mothers of normal full term infants at Umoja H/C; using self-reported sociodemographic questionnaire, EPDS at cut off (≥ 13) Kessler 10 at a cutoff(≥ 20) and PHQ4 at a cutoff(≥ 3) screening instruments.

5.2 Depression and anxiety in cases and in comparison group

In literature the prevalence of PPD in HICs has been estimated at 10% -15%; and 0.5% - 60% in LIMCs. In most African countries, it has been estimated at 0.7% -18% (40).

In this study (as shown Table 2), using EPDS, the overall prevalence of PPD and anxiety in both groups of mothers was estimated at 44.2%. This finding was lower than that of Ethelwynn et al study in South Africa that rated PPD at 50.3% in a rural community health centre sample (75). Ethelwynn's higher findings may be explained by the study design method, setting and timing different from the current study. Also the results of this study were comparable to Muliira et al study conducted in rural Uganda, which rated PPD 43 % (72). The finding of the current study was slightly lower than that of Yator et al (Thesis) UON/KNH in Nairobi, which estimated PPD at 48 % (50). The reason for Yator's study higher rate may be explained by the fact that, his study sample was mainly on postnatal women living with HIV unlike to the current study sample.

The findings of this study concur with several studies conducted in some LIMCs (11, 12, 40, and 41).

The prevalence of PPD among NICU mothers in our study was estimated at 68.6% compared to the comparison group at 19.8%. The PPD rates of the comparison group was slightly higher than that of Ghubash and Abousaleh study conducted in Dubai which estimated PPD 17.3% among postnatal Arab women sample (71). In Owoeye et al study done in Nigeria which looked into postnatal risk factors, rated PPD at 23%. Owoeye findings were slightly higher than that of the comparison group in the current study (70). Possible reason for Owoeye's higher PPD rates could be explained by the timing and study design used; different from this study, as well as lower EPDS cut mark of ≥ 12 . Owoeye's study was a cross sectional hospital based within the first week postnatal, unlike the current study, which was clinic based for the comparison group at six weeks postnatal.

In another similar study by Ukpang et al, in Nigeria, found that the NICU mothers' had psychological distress rated at 27.3% and PPD 15.1% compared to mothers of FTI 3.7% (48). Ukpang's findings were lower than the current study findings. This may be explained by different screening tools used in his study (GHQ-30 and BDI).

The current study overall PPD rate 44.2% was higher than that of Gulamani et al, Pakistan study; which found mothers of PTI had higher PPD 35.3% compared to mothers of FTI and 15.3% respectively. Gulamin's lower rates could be explained by the different region and design methods used. Gulamin's was a cohort study, with smaller PTI mothers' and larger FTI mothers' sample sizes different than that of the current study samples. All Gulamin's study respondents were out patient (clinic based) [37].

The prevalence rate of PPD and anxiety in both groups in the current study as measured by Kessler-10 scale was estimated at 26.3%. The NICU PTIs mothers had higher PPD and anxiety levels 39.5% compared to 12.9% in the comparison group. The overall rates in this study were slightly lower than that of Tesfaye et al study conducted in Ethiopia where psychological distress was rated 29% using K10 scale. Tesfaye's findings were slightly

higher than that of the overall rates and of comparison group, but lower than that of NICU cases in this study. This difference could be explained by the methods used in his study (73).

In another community based study conducted in rural India by Prost et al (74) using K10, estimated prevalence of psychological distress at 11.5%. This was close to that of the comparison group but much lower than that of NICU cases and of the overall rates in the current study.

5.3 Risk factors for depression and anxiety in the overall sample

The current study found that, some socio-demographic risk factors for PPD and anxiety were common in both NICU cases and comparison group, while other risk factors were unique to each group.

Lack of employment, low social economic status, were common risk factors to developing PPD and anxiety in both groups. However, the NICU cases had higher rates of depression and anxiety than the comparison group. At the same time, NICU group had more women with low level of education and less age (< 19-25) category) than in comparison group. The study found a good number of NICU women had little or no support from their partners and family compared to the comparison group.

Higher rates of PPD and anxiety in NICU PTIs mothers could be explained by several factors. The preterm mothers were separated from their babies for a prolonged time. They were retained within the hospital during the time their infants were in NICU. They could not attend to their jobs or businesses or any other thing that brought some income to them. They were also separated from their older child (ren) and families. The study found that, compared to the comparison group, more NICU mothers had partners who were unemployed, and or had no other source of income. A large number of the NICU women indicated that they were not receiving any financial or any other kind of support from partners and from other family members. Being in the hospital and their infants in NICU, meant they had pending hospital bills to be paid. Obviously these predicaments aroused psychological distress, anxiety and depression on top of uncertainty of their infants' outcome. These findings concur with multiple studies, that indicated that

prolonged mother–child separation, infants condition, poor social support, poor socioeconomic status were some of risk factors to PPD and anxiety (10,20,22,29,30).

The NICU women who had partners with HIV were found to be having high degree of depression and anxiety compared to comparison group with similar partners. This could be explained that, the NICU women with HIV positive partners were also living with HIV; and most likely were worried whether their infants had HIV and if so, possibly were uncertain of their survival on top of the prematurity. Such worries predisposed the women to more PPD and anxiety symptoms. The findings were in line with studies by Roehl et al, which indicated that, being diagnosed with HIV during pregnancy predisposed women to preterm births and PPD (28).

The study also found that, there was an association between PPD and anxiety with having partners who abused alcohol and substance, as well as with being physically, emotionally and or sexually abused by partners in both groups. However, the NICU women had higher levels of PPD and anxiety compared to the comparison group with similar partners. These findings could be explained as some of the reasons there was lack of support from partners; thus predisposing the women to more anxiety, psychological distress, and depression. The current findings were in agreement with Vigod et al, Beck et al, who found that, marital conflicts or intimate partner violence were strong predictors to PPD and anxiety (10,22)

5.4 Psychological problems prevalence in cases and in the comparison group

This study found there was an association between preterm delivery and PPD and anxiety among NICU mothers. This could be explained by the fact that, premature delivery almost always was sudden; the mothers were caught unexpectedly and unprepared for child birth at that particular point in time. This study found that, a large number (62.8%) of mothers were destabilized by their preterm birth and majority of them (70%) were worried about the infant's survival. Studies have found that, preterm babies have a high mortality rate than normal full term babies particularly in LMICs (19).

The study found that, most mothers were worried about prolonged mother – child separation. These findings with a mixture of other stressors such as frightening and

unfamiliar NICU environment and settings, fragile unresponsive, small size looking infants in incubators, were indicated as triggers to psychological distress, anxiety and depression among NICU cases. These findings concur with several studies that found that stressful life experiences surrounding the preterm births, stressful NICU unfamiliar, frightening settings, infants' small size, appearance and general condition predisposed to high levels of distress, anxiety and PPD in mothers (13, 20, 34, 55, and 56).

After controlling for all factors associated with depression and anxiety in logistic regression, ($P < 0.05$), the NICU mothers who felt other people blamed them for their premature delivery had higher degree of anxiety and depression. This could be explained by the fact that, about a half (52.4%) of NICU mothers indicated they had low or no income. A good number of the mothers had indicated they performed heavy tasks during pregnancy to fend for themselves and their families. They felt guilt for not taking advices given to them at antenatal clinics to avoid heavy tasks; hence feelings that other people blamed them as responsible for the preterm delivery. This observation is in line with Ezech et al (2003) that heavy duties and heavy object lifting in pregnancy was a risk factor to preterm births [.

The study also found that the NICU mothers who felt that they were not receiving any support from nurses in NBU and in the postnatal wards had depression and anxiety. Their emotional distress could be explained by the fact that, a big number of NICU mothers were very young age ($\leq 19-25$) and had low level of education. This could have contributed to their apprehension, in asking nurses for clarification and or assistance in handling their premature infants; hence feelings of incompetence and helplessness.

As a result of their emotional/psychological state of mind, it may be assumed that, some of these young mothers were slow in learning new procedures. On the other hand, possibly some nurses were also not patient enough with some mothers. Their responses towards the mothers possibly made them unapproachable, causing the mothers feel, sad, helpless and detached from their infants, limited in carrying out their maternal roles; hence becoming more anxious and depressed. Davis et al, and other researchers found that NICU mothers who perceived poor relationship with or poor support with medical personnel (nurses) showed elevated levels of anxiety and PPD (10, 13,52).

5.5 Risk model

The current study found that there was not just one risk factor, but multiple factors contributed to the development of PPD and anxiety, particularly among the NICU mothers, as compared to the comparison group. These were identified as:

Sociodemographic factors which included- physical, emotional and or sexual abuse by partner, partner's substance abuse, lack of social support, unwanted pregnancy, individual and partner's poor socio-economic status, perception of poor support from nurses.

Stressful events surrounding the preterm birth risk factors: included- sudden onset of labour, sudden vaginal bleeding, emergency Caesarian section procedures. premature delivery itself and others.

Nicu frightening environment / settings factors and infants' general condition risk factors: which included- uncomfortable high temperatures, equipments, noises, and lights. The infants' severity of prematurity, low birth weight, among other stressors.

The findings of this study concurs with several studies that found multiple risk factors as predictors to PPD and anxiety in mothers of preterm births in NICU (6,10,13,14, 15,16,17).

5.6 Conclusion

This study has found that PPD and anxiety coexists. The mothers of preterm deliveries in NICU at KNH were at higher risk of PPD and anxiety rated at (68.8%) compared to the comparison group (19.8%). Multiple risk factors to PPD and anxiety were identified which included: Sociodemographic risks- such as mothers perception that others blamed them for premature delivery, perception of lack of support by the family and by the nurses in the hospital among other factors. Stressful life events risk factors surrounding the delivery and the preterm birth in itself. NICU frightening settings, premature infant general condition and related risk factors.

5.7 Limitations

1. Delays in data collection as a result of country wide doctors' and lecturers' industrial action in public hospitals and universities- in particular at KNH and Umoja H/C where the study was carried out

2. This study was hospital based for the preterm mothers who were also separated from their own families, compared to community based, for full term mothers (Well mother baby clinic).The results of the study may be generalised as a true representation of the larger population only in the public hospitals with similar settings as KNH, because the pre-term mothers would be in hospital facilities for long periods.

3. Self-reporting by the respondents may have over or under reported their true self rating picture; however, the researcher was present all through at the time of data collection and she tried to ensure that the few participants who needed any clarification were helped in understanding the questions and purpose of the study.

5.8 Recommendations

1. Routine screening for depression and anxiety(psychological distress) to all mothers with preterm infants in NICU
2. The health care team (nurses, doctors and counselors) in Newborn Unit and in postnatal wards at KNH to be sensitized on how to identify early signs of psychological disturbance among mothers of preterm infants in NICU.
3. Routine group psychological counselling to NICU mothers soon after admission, and thereafter, to allay their fears and anxieties.
4. NICU mothers to be afforded with sufficient rest in the wards, between the three hourly feeding programme to take care of mental and physical drain
5. More research on PPD, psychological distress and dissatisfactions among NICU mothers and follow up mother-infant outcome after discharge.

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APPENDICES

Appendix I: Prevalence of postpartum depression and anxiety among mothers of preterm infants with low birth weight receiving intensive care in new born unit at KNH

Date of participation _____

Patients' study number _____

Date of delivery _____

1. Researcher designed Questionnaire (RDQ)

SECTION A: Socio-demographic characteristics of the client

Instruction: Tick (√) or (X) on the correct answer appropriately.

1. Among the categories where do you see yourself age wise?

- ≤ 19 years
- 20-25 years
- 26-30 years
- 31-35 years
- 36-40 years
- 41-45 years
- 46-50 years

2. What is your marital status?

- Single
- Married
- Separated
- Divorced
- Widowed
- Cohabiting

3. What is your highest level of education?

- Primary
- Secondary
- University/ College

4. What is your current work/occupation?

- Student
- Housewife
- Employed
- Self-employed (business)
- Casual labourer
- Unemployed

Any other please specify _____

5. What is your income per month in Kenya shillings?

- No income.....
- 1,000 - 5,000
- 5,000 - 10,000
- 11,000 -19,000
- 20,000 -30,000
- 30,000 -40,000
- 40,000 -50,000
- Above 50,000
6. **Housing** Do you live in a rented house or you live in your own purchased house with
- Parents
- Husband/Partner
- Relatives
- On my own
- Any other, kindly specify _____
7. What kind of a house do you live in?
- Permanent house (yamawe)
- Semi-permanent house (yamabati)
- Single Room
8. Which part of Nairobi (estate) do you live? _____
9. Does your Partner/husband have a stable job?
- Yes
- No
10. What kind of a job does he do? _____
11. Do you feel he gives you good support financially, emotionally and socially?
- Yes a lot
- Yes a bit
- Can't say
- No not all
12. Does your partner abuse alcohol or drugs?
- Yes
- No
13. Does your partner abuse you physically (beats you), emotionally (insults, threats), sexually?
- Yes
- No
14. During the pregnancy of this newborn baby, did you frequently take
- Alcohol Yes No
- Drugs Yes No
- Smoking Yes No
15. During the antenatal clinic, were you found to be HIV positive?
- Yes No
16. Is your partner HIV positive?
- Yes
- No
- Don't know

17. Do you feel you are getting enough support from your family?
Yes a lot
Yes a little bit
No not at all
18. Apart from your family members, do you get some assistance from others e.g. neighbors and friends? Yes No
19. Have you had premature childbirth in the past? Yes No
20. How many living children do you have including this newborn? _____
21. What can you say about the pregnancy of this delivery? It was
Planned Not planned
22. What else can you say? The pregnancy was wanted not wanted
23. With this recent delivery, how many babies did you get?
One
Two (twins)
Three (triplets)
Four (quadruplets)
24. Are you happy with the gender (sex) of your baby/babies?
Yes a lot
Yes a little bit
No not all
25. Does any of your relatives suffer from a mental illness e.g. depression?
Yes
No
26. Did you suffer from depressive mood symptoms (e.g feeling sad almost always, lack of interest) during the pregnancy of this newborn baby?
Yes
No
- If your answer is yes, were you on any treatment for depression?
Yes No

B. Stressful events surrounding (just before) the delivery

27. What do you think triggered your premature delivery of your newborn baby/babies?

- Sudden onset of vaginal bleeding, accident, etc any other kindly specify _____
- Sudden bad news(e.g death of a loved one, loss of a job etc kindly specify_____
- Severe illness (e.g Hiv/Aids) Please specify _____
- Severe preeclampsia, uncontrolled high blood pressure etc, kindly specify_____
- Sudden onset of labour pains, rapture of membranes (broken waters)_____
- Domestic violence (intimate partner violence)_____
- Other causes, kindly Specify _____

N/B You can tick as many as possible, that describes what you experienced

28. How did you deliver? Vaginal delivery emergency C/section vacuum extraction

29. Do you feel like, the birth of your premature baby has destabilized you and you have difficulties adjusting as a mother? Yes No

C. Related to Newborn unit environment

30. How can you describe your experience in the newborn unit (environment) where your baby is / babies are/ admitted? In a scale of 0 to 5, where 0 is--

- 0- very comfortable
- 1 - a bit comfortable
- 2 - Disturbing
- 3 – a bit stressful
- 4 - Frightening
- 5 - Very frightening

D. Related to the preterm baby

31. Of the following categories, where does your baby’s birth weight fit?

- 500g - 1000g
- 1100g - 1500g
- 1501g - 2500g

32. Does your baby’s small size, fragile appearance and general condition worry you a lot?

- Yes a lot
- No not at all

33. Are you worried about the general condition, survival and well-being of your baby/babies?

Yes a lot

No not at all

34. You have been separated from your baby since birth, does this make you feel like you are not competent enough (not well prepared) to feed and take care of your small premature baby?

Yes No

35. Do you often find blaming yourself, for not carrying the pregnancy of this newborn to term?

Yes quite often

No not at all

36. Do you feel like other people blame you (e.g family, partner) for not carrying the pregnancy to term?

Yes No

37. Based on your own judgment, do you feel that, you are getting enough encouragement and support from the nurses?

(a) In newborn unit?

Yes a lot

Yes a little bit

No not at all

(b) In your ward?

Yes a lot

Yes a little bit

No not at all

Recommendations

i) Based on your own opinion, what would you recommend, so as to help us improve the service delivery by the nurses and other medical staff to both, the babies and mothers in new born unit?

.....
.....
.....

ii) What would you recommend for the improvement of our care to the mothers in the wards after delivery; and as they wait for their babies to be discharged from newborn unit?

.....
.....
.....

Appendix II: Prevalence of postpartum depression and anxiety among mothers of full term infants attending postnatal MCH Clinic at Umoja Health Centre

Date of participation _____

Patients' study number _____

Researcher designed Questionnaire (RDQ)

SECTION B: Socio-demographic characteristics of the client

Instructions: Kindly Tick (√) or (X) on the correct answer appropriately.

1. Among the following categories where do you see yourself age wise?

- ≤ 19 years
- 20-25 years
- 26-30 years
- 31-35 years
- 36-40 years
- 41-45 years
- 46-50 years

2. What is your marital status?

- Single
- Married
- Separated
- Divorced
- Widowed
- Cohabiting

3. What is your highest level of education?

- Primary
- Secondary
- University/ College

4. What is your current work/occupation?

- Student
- Housewife
- Employed
- Self-employed (business)
- Casual labourer
- Unemployed

Any other please specify _____

5. What is your income per month in Kenya shillings?

- No income....
- 1,000 - 5,000
- 5,000 - 10,000
- 11,000 - 19,000
- 20,000 - 30,000
- 30,000 - 40,000
- 40,000 - 50,000
- Above 50,000

6. **Housing** – you live in a rented house or you live in own purchased house
with

Parents

Husband/Partner

Relatives

On my own

Any other, kindly specify _____

7. What kind of a house do you live in?

Permanent house (yamawe)

Single room

Semi-permanent house (yamabati)

8. Which part of Nairobi (estate) do you live? _____

9. Does your Partner/husband have a stable job?

Yes

No

10. What kind of a job does he do? _____

11. Do you feel he gives you good support financially, emotionally and socially?

Yes a lot

Yes a bit

Can't say

No not all

12. Does your partner abuse alcohol or drugs?

Yes

No

13. Does your partner abuse you physically (beats you), emotionally (insults, threats),
sexually?

Yes

No

14. During the pregnancy of this newborn baby, did you frequently use

Alcohol Yes No

Drugs Yes No

Smoking Yes No

15. During the antenatal clinic, were you found to be HIV positive?

Yes

No

16. Is your partner HIV positive?

Yes

No

Don't know

17. How did you deliver? vaginal delivery Caesarian section Vacuum extraction

18. How many living children do you have including this newborn? _____
19. What can you say about the pregnancy of this baby? It was
 Planned Not planned
20. What else can you say? The pregnancy was
 Wanted
 Not wanted
21. With this recent delivery, how many babies did you get?
 One
 Two (twins)
 Three (triplets)
 Four (quadruplets)
22. Are you happy with the gender (sex) of your baby/babies?
 Yes a lot
 Yes a little bit
 No not all
23. Do you feel you are getting enough support from your family?
 Yes a lot
 Yes a little bit
 No not at all
24. Apart from your family members, do you get some assistance from others e.g. neighbors, friends?
 Yes a lot
 Yes a little bit
 No not at all
25. Does any of your relatives suffer from a mental illness e.g. depression?
 Yes
 No
26. Did you suffer from depressive mood symptoms (e.g. feeling sad almost always, lack of interest) during the pregnancy of this newborn baby?
 a) Yes
 b) No
- ii) If your answer is yes, were you on any treatment for depression? Yes No

Appendix III: Edinburgh Postnatal Depression Scale (EPDS)

As you have recently had a baby, we would like to know how you are feeling. Please **CIRCLE** the number next to the answer which comes closest to how you have felt **IN THE PAST 7DAYS**, not just how you feel today. Here is an example, already completed.

I have felt happy:

- a. Yes, all the time.
- b. Yes, most of the time.
- c. No, not very often.
- d. No, not at all.

This would mean: "I did not feel happy very often" during the past week. Please complete the other questions in the same way.

In the last 7 day

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 so much now.
- d. Not at all.

2. I have 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 very 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 at all.
- b. Yes, sometimes I haven't been coping as well as usual.
- c. No, most of the time I have coped quite well.

- d. No, I have been coping as well as ever.
- *7. I have been so 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.

Edinburgh Postnatal Depression Scale 1 (EPDS)

Postpartum depression is the most common complication of childbearing. 2 The 10-question Edinburgh Postnatal Depression Scale (EPDS) is a valuable and efficient way of identifying patients at risk for “perinatal” depression. The EPDS is easy to administer and has proven to be an effective screening tool.

Mothers who score above 13 are likely to be suffering from a depressive illness of varying severity. The EPDS score should not override clinical judgment. A careful clinical assessment should be carried out to confirm the diagnosis. The scale indicates how the mother has felt during the previous week. In doubtful cases it may be useful to repeat the tool after 2 weeks. The scale will not detect mothers with anxiety neuroses, phobias or personality disorders.

SCORING

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

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

Maximum score: 30

Possible Depression: 10 or greater

Always look at item 10 (suicidal thoughts)

Users may reproduce the scale without further permission, providing they respect copyright by quoting the names of the authors, the title, and the source of the paper in all reproduced copies.

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 the items must be completed.
3. Care should be taken to avoid the possibility of the mother discussing her answers with others. (Answers come from the mother or pregnant woman.)
4. The mother should complete the scale herself, unless she has limited English or has difficulty with reading Cox et al [66], Wisner et al [77].

Appendix IV: Kessler scale for screening psychological distress

Patient's study number _____

Date _____

Instructions: These questions below, concern how you have been feeling over the past 4 weeks before and after delivery. Tick(√)in the box across each question that best represents how you have been

1. During the last 30 days about how often did you feel tired out for no good reason?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
2. During the last 30 days, about how often did you feel nervous ?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
3. During the last 30 days, about how often did you feel so nervous that nothing could calm you down?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
4. During the last 30 days about how often did you feel hopeless?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
5. During the last 30 days, about how often did you feel restless or fidgety?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
6. During the last 30 days, about how often did you feel so restless you could not sit still?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
7. During the last 30 days, about how often did you feel depressed?				
1. None of the time	2. A little of the time	3. Some of the time	4. Most of the time	5. All the time
8. During the last 30 days, about how often did you feel that everything was an effort?				

1.None of the time	2.Alittle of the time	3.Some of the time	4.Most of the time	5.All the time
9. During the last 30 days, about how often did you feel so sad that nothing could cheer you up?				
1.None of the time	2.Alittle of the time	3.Some of the time	4.Most of the time	5.All the time
10.During the last 30 days, about how often did you feel worthless?				
1.None of the time	2.Alittle of the time	3.Some of the time	4.Most of the time	5. All the time

Kessler Psychological Distress Scale (K10) Instructions & Scoring

This is a 10-item questionnaire intended to yield a global measure of distress based on questions about anxiety and depressive symptoms that a person has experienced in the most recent 4 week period.

Why use the K10

The use of a consumer self-report measure is a desirable method of assessment because it is a genuine attempt on the part of the clinician to collect information on the patient's current condition and to establish a productive dialogue. When completing the K10 the consumer should be provided with privacy.

How to administer the questionnaire

As a general rule, patients who rate most commonly "Some of the time" or "All of the time" categories are in need of a more detailed assessment. Referral information should be provided to these individuals. Patients who rate most commonly "A little of the time" or "None of the time" may also benefit from early intervention and promotional information to assist raising awareness of the conditions of depression and anxiety as well as strategies to prevent future mental health issues.

(Information sourced from the NSW Mental health Outcomes and Assessment Training (MH-OAT) facilitator's Manual, NSW Health Department 2001)

Scoring

This is a questionnaire for patients to complete. It is a measure of psychological distress. The numbers attached to the patients 10 responses are added up and the total score is the score on the Kessler Psychological Distress Scale (K10). Scores will range from 10 to 50. People seen in primary care who * score under 20 are likely to be well * score 20-24 are likely to have a mild mental disorder * score 25-29 are likely to have moderate mental disorder * score 30 and over are likely to have a severe mental disorder 13% of the adult population will score 20 and over and about 1 in 4 patients seen in primary care will score 20 and over. This is a screening instrument and practitioners should make a clinical judgment as to whether a person needs treatment. Scores usually decline with effective treatment. Patients whose scores remain above 24 after treatment should be reviewed and specialist referral considered, Kessler et al [78], Andrews & Slade [79].

Appendix V: Patient Health Questionnaire (PHQ-4)

Read each item carefully, and Tick your response.

Over the <u>last 2 weeks</u>, how often have you been bothered by the following problems? (Use “✓” to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

An Ultra-Brief Screening Scale for Anxiety and Depression: the PHQ-4

The Patient Health Questionnaire for Depression and Anxiety (PHQ-4) was developed to create an ultra brief screener for depression and anxiety for use during outpatient or home visits any time during pregnancy or up to one year postpartum. The PHQ-4 can be administered by health care personnel or it can be self-administered. The PHQ-4 combines two validated two-item screeners. A recent study found that increasing PHQ-4 scores were strongly associated with functional impairment, disability days, and health care use, and that anxiety had a substantial effect on functional status that was independent of depression (Kroenke et al.). Total score is determined by adding together the scores for each of the 4 items. Scores are rated as normal (0-2), mild (3-5), moderate (6-8), and severe (9-12). Any woman with a positive screen (mild, moderate or severe) should be assessed for suicidal ideation. A positive score, the presence of suicidal ideation and/or your clinical judgment can indicate that further assessment is warranted. Immediate referral is recommended for those with suicidal ideation and/or a severe score. Women with a mild or moderate screen could be provided with education and resource information, and re-screened at a later visit as appropriate. The PHQ-4 is only a screening tool and does not diagnose depression – that is done by appropriately licensed health care personnel [68].

Appendix VI: Consent form

My name is Joyce Mutua, a postgraduate Clinical Psychology student from University of Nairobi, Department of Psychiatry. I am conducting a study on mental and psychological, mood disturbances on mothers of premature babies with low birth weight admitted in Newborn unit at Kenyatta National Hospital and mothers of normal full term babies attending mother child health clinic (MCHC) at Umoja Health Centre.

General Information:

I am asking for permission from you and your baby to participate in this study. I kindly request you to read through this consent form carefully. Acceptance to participate in the study is voluntary. You are free to choose to or not participate. There will be no any form of payments or incentives to be given to the participants. Your choice to participate or not to, will not change anything. You and your baby will continue to receive the care and services in the hospital and in the clinic as usual. All the information you give to us will be kept as confidential. Therefore do not write your names on the forms. In case we find your results of the interview are higher than normal, we would like to inform you. We therefore request you to provide us with your mobile phone number on this form. Once you have chosen to willingly participate in this study, I kindly request you to put your signature down in the indicated space below. As you read through and find something you don't understand, kindly ask us and we will make it clear to you.

How to participate

Participants in this study are mothers of normal preterm infants admitted in newborn unit at KNH and mothers of full term normal babies attending MCHC at Umoja Health Centre six weeks after delivery. After accepting to participate in the study, you will be given four different forms: one form will ask you about your background information, during delivery time, your general condition and that of your baby. The three other forms will ask about how your mood has been since delivery up to now. They are very simple questions and you are asked to answer all of them appropriately.

Risks: There are no risks expected in this study to you and your baby because no drugs or injections will be given, no laboratory tests or any other procedure will be done. There will be no payments to or by participants to be paid.

Benefits

The benefits of your participation in the study are: incase the results of this interview are found to be high above the normal, and require further checkup or specialized assessment or possible treatment, you will be contacted through your phone and you will be instructed where to go for follow-up review. You may write your phone number below your signature. The results of this study may be used by the key stakeholders to improve the mothers' mental health care during and after delivery and their babies.

I participant **Code number**_____ I have been explained and have also read all the above information and understand what this research entails. I willingly consent to participate in the study.

Client signature _____ Date _____

Mobile phone number _____

Chief investigator/assistant who informed/discussed with the client

Phone number 0722915814

Signature __JN_____

In case of any questions or further information the following can be contacted:

1. **The principal investigator:** Joyce Mutua

Phone number 0722915814

University of Nairobi

2. **Supervisors:**

(i) Dr. Pius Kigamwa

Senior lecturer, department of psychiatry

University of Nairobi

Telephone number: 27263300/20 ext 43562 (KNH)

(ii) Dr. Manasi Kumar

Senior lecturer, department of psychiatry

University of Nairobi

Telephone: 27263300/20 ext 43562 (KNH)

(iii) Dr. Pauline Nganga

Teaching fellow, department of psychiatry

University of Nairobi

Telephone: 27263300/20 ext 43562 (KNH)

3. **KNH/UON Ethics and Research Board**

Kenyatta National Hospital

Telephone: 020-2726300 ext 44102

Appendix VII: Work plan

Activity	Duration	Dates
Proposal development and presentation	4 months	Feb-2016 –May 2016
Seeking approval from REC KNH/UON	4 months	June – October 2016
Data collection	2 month	Dec 2016 – January 2017
Data analysis	1 month	February– 2017
Report writing	2 months	March- April 2017
Defense and submission	1 month	May – June 2017

Appendix VIII: Budget

Breakdown of the financial implications of the study

Description	Item	Duration /Number	Cost (Kshs)	Total
a) Researcher Assistants	3	2 month(60) days	400 per day	40,000
Statistician for data analysis	1	1 month (30 days)	40,000	40,000
Materials			Sub total	80,000
b) Supplies and equipment				
A4 fullscaps	1 rim		500.00	500.00
A 4 Printing papers	3 rims		600.00	1,800.00
Biro pens	12 pieces		200.00	200.00
Hp pencils	12 pieces		250.00	250.00
Rubber	2 pieces		100.00	100.00
Ruler	1 piece		50.00	50.00
Felt pen	2 pieces		150.00	300.00
Stapler	1 piece		500.00	500.00
Staples	1 packet		250.00	250.00
Paper punch	1 piece		300.00	500.00
External disc	1 piece		7,000.00	7,000.00
CD-RW	10 pieces		50.00	500.00
Consent form printing 2 pages	135pieces		3.00	600.00
Screening instruments 10 pages	135 pieces		3.00	3,000.00
			Subtotal	15,850.00
c) Travel expenses				
From residence to KNH and Umoja H/C return trips	60 days		@200.00 per day	12,000.00
Lunches – per day	60 days		@150.00 per day	9,000.00
			Subtotal	21,000.00
d) Operating expenses				
Typing services	90pages		@30.00	2,700.00
Printing services	90 pages		@10.00	1000.00
Photocopying services of copies	200 questionnaires		@3.00 per copy	1,250.00
Binding services of 9 copies	90 pages		@ 500 per copy	5000.00
Miscellaneous expenses				15000.00
			Sub total	10000.00
			Grand total	137,000.00



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Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



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Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/439

9th November 2016

Joyce Mutua
Reg. No.H56/74755/2014
Dept. of Psychiatry
School of Medicine
College of Health Sciences
University of Nairobi

Dear Joyce

REVISED RESEARCH PROPOSAL- PREVALENCE OF POSTPARTUM DEPRESSION AND ANXIETY AMONGST MOTHERS OF PRETERM INFANTS RECEIVING INTENSIVE CARE IN NEWBORN UNIT AT KENYATTA NATIONAL HOSPITAL (P544/07/2016)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above revised proposal. The approval period is from 9th November 2016- 8th November 2017.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation.
- c) Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- f) Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study.

Protect to discover

This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website <http://www.erc.uonbi.ac.ke>

Yours sincerely,



PROF M. L. CHINDIA
SECRETARY, KNH-UoN ERC

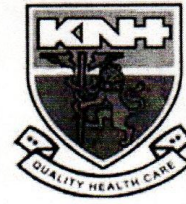
c.c. The Principal, College of Health Sciences, UoN
 The Deputy Director, CS, KNH
 The Chairperson, KNH- UoN ERC
 The Assistant Director, Health Information, KNH
 The Dean, School of Medicine, UoN
 The Chair, Dept.of Psychiatry, UON
Supervisors: Dr. Pius Kigamwa, Dr. Manasi Kumar, Dr. Pauline Nganga

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Twitter: [@UONKNH_ERC](https://twitter.com/UONKNH_ERC) https://twitter.com/UONKNH_ERC



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Ref: KNH-ERC/ Mod&SAE/23

24th January 2017

Joyce N. Mutua
Dept. of Psychiatry
School of Medicine
College of Health Sciences
University of Nairobi

Dear Joyce

Re: Approval of modifications – Prevalence of postpartum depression and anxiety amongst mothers of preterm infants receiving intensive care in Newborn Unit at Kenyatta National Hospital (P544/07/2016)


Refer to your communication received on 13th December 2016.

Upon review of the modifications, the KNH-UoN ERC has **approved** the following:

1. Amendment of the specific objective on the time of study has been modified from 5-6 weeks to the time of infants discharge and up to 4-6 weeks after the infants admission into NICU.
2. Study design - infants birth weight alternation from 1500gm and below to 2500gm and below.
3. Amendment of study population to include addition of the moderately preterm category of infants whose birthweight is 2500gm and below
4. Amendment of sampling procedure to capture the addition of preterm infants of birthweight 2500gm and below category
5. Amendment of sociodemographic questionnaire to include addition of birthweight 2500 and below

The documents are hereby endorsed and stamped for use.

Yours sincerely,


PROF. M.L. CHINDIA
SECRETARY, KNH-UON ERC

c.c. The Principal, College of Health Sciences, UoN
The Deputy Director, CS, KNH
The Chair, KNH- UoN ERC

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Nairobi
Kenya

DEPARTMENT OF HUMAN RESOURCES DEVELOPMENT

Ref: HRD/3/4/2656/HO/ 2016

DATE; 18th November, 2016

JOYCE MUTUA
REG. No. H56/74755/2014

UNIVERSITY OF NAIROBI
P.O BOX 30197
NAIROBI

RE: RESEARCH AUTHORIZATION

Reference is hereby made to your application letter dated 9th November, 2016 on the above subject;

The Nairobi city county has approved your request subject to the following:

1. The period of research will be from November, 2016 to March 2017.
2. You will be attached to Health Services Sector.
3. You are expected to adhere to the rules and regulations pertaining to your research.
4. That during your research there will be no costs devolving on the county.
5. That you undertake to indemnify the county against any claim that may arise from your research study.
6. You are required to submit a copy of the final research document to the undersigned one week after completion.
7. Research will be on "prevalence of postpartum depression and anxiety amongst mothers of preterm infants receiving intensive care in newborn unit at Kenyatta National Hospital compared to mothers of full term normal infants at Umoja Health Centre".
8. You are expected to pay research fee of five thousand shillings kshs. (5,000/=)
The Chief Administrative Officer; Health Services Sector is requested to accord you the necessary assistance.

A handwritten signature in blue ink, appearing to read 'Henry Omido'.

HENRY OMIDO
FOR: DIRECTOR HUMAN RESOURCE DEVELOPMENT