MATERNAL POSTPARTUM DEPRESSION, FEEDING PRACTICES AND NUTRITIONAL STATUS OF INFANTS AGED 6 to 14 WEEKS AT ELDORET WEST MATERNITY HOSPITAL, UASIN GISHU COUNTY-KENYA

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A Thesis Submitted to the Institute of Postgraduate Studies of Kabarak University in Partial Fulfillment of the Requirements for the Award of the Master of Science in Human Nutrition and Dietetics Degree

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DECLARATION

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The thesis entitled **"Maternal Postpartum Depression, Feeding Practices and Nutritional Status of Infants Aged 6 to 14 weeks at Eldoret West Maternity Hospital, Uasin Gishu County-Kenya"** and written by **Rebecca Chepkemboi Kurui** is presented to the Institute of Postgraduate Studies of Kabarak University. We have reviewed the thesis and recommend it to be accepted in the partial fulfillment of the requirement for the award of the Master of Science in Human Nutrition and Dietetics Degree.

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DEDICATION

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ABSTRACT

Globally, the levels of malnutrition remain a significant concern, with approximately one in every three children under the age of five experiencing poor growth due to malnutrition. This leads to around 45% of child mortality. By reducing malnutrition rates, we can enhance the chances of child survival and prevent the loss of their lives' full potential. It is crucial to address malnutrition by identifying contributing factors, such as maternal postpartum depression, which affects 17.7% of mothers worldwide.Unfortunately, Postpartum Depression often goes undiagnosed or untreated, leading to inadequate documentation of its impact on infant care, feeding practices, and ultimately, nutritional status. The general objective of the study was to assess the prevalence of maternal postpartum depression, feeding practices and nutritional status of infants aged 6 to 14 weeks at Eldoret West Maternity Hospital, Uasin Gishu County-Kenya. The study was conducted utilizing a cross-sectional descriptive study design. The selection of the study area and the 257 samples of mothers-infant pairs 6-14 weeks postpartum was done through purposive and simple random sampling methods respectively. Data collection took place between July and August 2022 using a structured questionnaire after obtaining approval from various authorities. Statistical Package for Social Sciences (SPSS) version 20 was employed for data analysis, with descriptive analysis focusing on the prevalence of Postpartum Depression, maternal obstetric factors, sociodemographic characteristics, feeding practices, and nutritional status. Multivariate logistic regression was utilized to assess the factors associated with maternal Postpartum Depression, feeding practices and nutritional status of infants aged 6 to 14 weeks while adjusting for confounders. Data was presented using frequency tables, and interpretations were made based on the analysis results. At the Eldoret West Maternity Hospital, the prevalence of maternal postpartum depression was found to be 17.5% between 6 to 14 weeks after delivery. The study also discovered that Postpartum Depression had an impact on the 6-14week infant feeding in that 8.9% of mothers with Postpartum Depression practiced mixed feeding which consequently affected infant nutritional status resulting in 27.2% stunting, 6.8% wasting and 9.1% underweight after adjusting for confounding factors. The maternal prevalence of postpartum depression among mothers was found to be 17.5%, which is nearly equivalent to the global prevalence rate. The study found an association between maternal Postpartum Depression and infant feeding practices and nutritional status. These findings were consistent with those of previous studies. These findings may serve as a foundation for screening mothers for Postpartum Depression for early identification to enable them receive specialized care that will improve their mental health, enhancing their ability to provide responsive care and proper feeding for their infants, thus preventing malnutrition. it is crucial for the Ministry of Health to develop policies regarding maternal mental health. These policies will aid in the identification and treatment of Postpartum Depression, ultimately preventing its consequences on infant feeding and nutritional status, thereby reducing the risk of malnutrition.

Keywords: *Maternal Postpartum Depression, Infant Feeding Practices, Malnutrition*

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ABBREVIATIONS AND ACRONYMS

CDC	Center for Disease Control and prevention
EPDS	Edinburgh postnatal depression scale
FAO	Food and Agriculture Association
GDP	Gross Domestic Product
IYCF	Infant and Young Child feeding
KDHS	Kenya Demographic and Health Survey
LFA	Length For Age
MAM	Moderate Acute Malnutrition
MCH	Maternal and Child Health Clinic
MDGs	Millennium Development Goals
MRC	Medical Research Council
NACOSTI	Kenya National Commission for Science, Technology and Innovation
PCG	Primary Caregivers
PPD	Postpartum Depression
SAM	Severe Acute Malnutrition
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children's Fund
USA	United States of America.
USAID	United States Agency for International Development.
WHO	World Health Organization
WFA	Weight For Age
WFL	Weight For Length

OPERATIONAL DEFINITION OF KEY TERMS

Infant: is a young child between 6 to 14 weeks of age.

Nutritional Status: is an indicator for health in infants that is used to indicate presence or absence of malnutrition and is measured using growth indices that include; weight for length (WFL) which measures wasting, weight for age (WFA) which measures underweight/overweight or obesity and length for age (LFA) which measures stunting.

Malnutrition: is a condition where the nutritional status of infants aged 6-14 weeks is sub-optimal, manifesting itself through; low weight for length (wasting), low length for age (stunting), low weight for age (underweight) or high manifesting through weight for age (overweight and obesity.

Postpartum Depression: is a common childbirth complication that affects maternal mental health beginning at 4 to 6 weeks after delivery and persists upto one year. It is characterized by apathy, lack of attention to infant care and high temperament which interferes with the mother's ability to perform her roles that include infant feeding which affects the infant's nutritional status. It is described by a mother self- reporting how she has felt in the past seven days using the 10 item-Edinburgh postnatal depression scale and having a score of $\geq$10 in the scale.

Postpartum Period: is the period between 6 to 14 weeks after delivery.

Infant Feeding Practices: this involves the act of providing nourishment to an infant by a mother at 6-14 weeks postpartum which play an important role in determining the infant's nutritional status as it is affected by maternal PPD among other factors. During this early stage of life, infants depend on their mothers for exclusive breastfeeding to meet their nutritional needs.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Globally malnutrition levels are persistently alarming in that approximately 1 in every 3 children often in the initial 1000 days of life and beyond are not growing well due to malnutrition (UNICEF/World Bank/WHO, 2020). In under five year children, malnutrition is a severe risk factor for their mortality and it accounts for approximately 45% deaths globally (UNICEF/WHO/World Bank Group, 2019).

In Africa, 40% of all under-five year children are stunted (2 in every 5) while 27% are wasted (>1/4 of all under-five year children) (UNICEF/World Bank/WHO, 2020). On the other hand reports from Kenya indicate that the levels of stunting are at 18%, wasting at 5% and underweight at 10% among the under-five year olds, a factor that contributes to the high annual mortality rates among them (KDHS, 2022). Stunting inUasin Gishu among under-five is 16.9% which is lower than the national level, wasting is 4.9% which is equal to the national percentage and underweight is 7.4% which is also lower than the national prevalence (KDHS, 2022).

Malnutrition particularly undernutrition is a disorder that results from inadequate nutrient intake for healthy tissues and organs (WHO, 2013). It is a disorder that manifests itself in form of wasting, stunting and underweight and also overweight and obesity (WHO & UNICEF, 2009). Malnutrition contributory factors include socio-economic factors such maternal education level and age, family income, infection, environmental factors, food insecurity, inadequate dietary intake, poor caring and feeding practice (WHO, 2013) due to maternal factors such as maternal postpartum depression among others (Amipara et al., 2020).

The prevalence of malnutrition in the world is still high, meaning that the world is still far from being malnutrition free despite many strategies for meeting maternal and child nutrition targets of the World Health Assembly 2012-2013 (WHO, (2013) and UNICEF/World Bank/WHO, (2020). Many of these approaches have been directed towards addressing dietary, socioeconomic, cultural and environmental factors and yet high prevalence of malnutrition still persists UNICEF/World Bank/WHO, (2020).

One very important factor in the cause of malnutrition that may not be receiving the needed attention is maternal mental health (Madeghe et al. (2016) and Slomian et al., (2019). Recent studies have submitted that poor maternal mental health play an important contributory role to malnutrition (Nguyen et al. (2014) and Slomian et al, (2019) since a mother who is mentally unstable can not manage to properly feed and care for her child thus increasing the child's risk of being malnourished (Shewangzaw et al., 2018).

The major maternal mental matter that has been revealed to contribute to malnutrition in infants is postpartum depression (PPD). Madeghe et al. (2016) in their study established that mothers with PPD had 4.40 hugher odds of havng malnourished infants than non depressed mothers.Additionaly, Nguyen et al., (2014) in their study established that depression was associated with 1.2 odds of stunting in infants in Bangladesh and Vietnam. Maternal postpartum depression is a serious mental condition that a majority of women are vulnerable to during prepartum period upto 1 year postpartum (Amipara et al., (2020) and Kim and Dee, (2018) since the natal of an infant induces sudden and intense deviations in a woman's roles and responsibilities hence the risk for PPD (Slomian et al., 2019).

Maternal postpartum depression as a disorder has features that include; apathy, lack of attention, disturbed sleep patterns, and poor temperament (Agarwala et al., 2019); all of

which interferes with the mother's ability to perform her roles that include caring for her infant (Shewangzaw et al., 2018). Maternal PPD is thus a condition that has not gone unnoticed since it affects 17.7% mothers globally (Hahn-Holbrook et al., 2018) and 18.6% in the developing countries including Sub-Saharan countries (Woldeyohannes et al., 2021). Postpartum depression despite being a serious mental challenge in women is frequently undiagnosed, untreated and not well documented and hence not receiving the deserving attention despite its contribution to malnutrition with irreversible damages in the children's health (Farías-Antúnez et al., (2018).

Postpartum depression can be linked with negative consequences in both infants and mothers (Agarwala et al., 2019). Untreated maternal postpartum depression affects the infants' nutritional status (Nguyen et al., 2014) because a mother with PPD will not be able to; be responsive, sensitive and cannot fully concentrate on the nutritional needs of her infant (Madeghe et al., 2016); components in which World Health Organization (WHO) recommends as essential to infant feeding with its key determinant being a healthy mother (Haithar et al., 2018).

A number of studies have recounted that mothers with postpartum depression have greater odds of prompt cessation of breastfeeding and inappropriate feeding practices consequently leading to poor infant nutritional status. One such study done in Nairobi-Kenya by Madeghe et al. (2016) on infants aged 6-14 weeks reported that mothers with postpartum depression had 4.4 higher odds (95% CI) of having underweight infants than mothers without PPD this being attributed to maternal PPD's effects on infant breastfeeding associated with early cessation of breastfeeding and inappropriate feeding practices as evidenced in the study. Mothers without PPD had 6.14 times greater odds of performing exclusive breastfeeding than mothers with PPD at 95% CI while mothers

with postpartum depression were more probable to introduce complementary foods too early than those without PPD (Madeghe et al., (2016).

Malnutrition at infancy has permanent lifetime damages in that an infant with undernutrition has a compromised immunity which results in high morbidity; cannot grow well and is physically stunted and in most cases ends up with poor intellectual development (KDHS, 2022). These children are further less likely to perform well in school because of lack of attention, perception, learning and memory consequently resulting in them being individuals who get trapped in the poverty and malnutrition cycle, which is difficult to break without external support (KDHS, 2022). The effects of PPD on the infants feeding practices and nutritional status make it an imperativedisorder to detect, treat and avert (Madeghe et al., (2016). This is because its early identification and management is an essential intervention to help promote proper infant feeding at its early days which involves breastfeeding exclusively in the initial six months and subsequently proper complementary feeding upto two years of life (Shewangzaw et al., 2018).

The WHO's conception of mental wellbeing as a condition of health in which people comprehend their possibilities, can cope with usual life challenges, function efficiently and contribute to their society, is essentially what is vital to achieving sustainable development goals by 2030 (Haithar et al., 2018). This thus calls for maternal mental health to be given the obligatory consideration so that mothers can be able to wholly perform their very significant role of child caring, feeding and thus prevent malnutrition (Haithar et al., 2018). Due to this persistently high prevalence of malnutrition among infants despite the many inteventions, consideration is now being turned towards addressing PPD so as to reduce its prevalence and consequently improve child survival

chances and save on the wastage of potential of over 150 million children in their adult age (Mukuku et al., (2019a).

Prior to this study, the prevalenceof malnutrition among infants in Uasin Gishu County was almost equivalent to the national levels (KDHS, 2022) which prompted this study to be carried out to assess maternal postpartum depression as one of the underlying causes of malnutrition due to limited documentation on its prevalence.Further to the dearth of documented data on the association between maternal PPD, feeding practices and nutritional status of infants that existed, this study determined the prevalence of maternal postpartum depression at the hospital setting and its association with feeding practices and nutritional status of infants so as toaid in informing policy makers on the designing of specific interventions and formulation of guidelines that will help in the deterrence and management of PPD and therefore improve feeding and nutritional status of infantsthus reduce the prevalence of malnutrition in the county.

1.2 The Statement of the Problem

Inadequate care of infants is a contributor to development of malnutrition since it results in inadequate feeding of the infants and thus increased ill health and death rates (Junge et al., 2017) and (KDHS, 2022). Child birth is a very gratifying and thrilling time, but it can as well be a stage of intense emotional strain (Shewangzaw et al., 2018) leading to PPD. Approximately 17.7% of mothers suffer from postpartum depression globally (Hahn-Holbrook et al., 2018). When mothers are depressed, they affect the infant's nutritional status through inadequate feeding and nurturing (Madeghe et al., 2016).

Maternal PPD affects parenting abilities of mothers resulting in increased hostility, negative interaction, less responsiveness, communication and poorer mother-child bonding causing impaired infant care-giving and undernutrition in infants (Farías-

Antúnez et al., (2018) and Junge et al., (2017). Undernutrition in infants if not treated in turn become a cause of infant mortality which accounts for close to 45% in under-5 year children (UNICEF/WHO/World Bank Group, (2019) and Kerie et al., (2018). In severe cases, PPD may result in infanticide (WHO, 2018b). Not withstanding maternal PPD's negative impacts on infant nutritional status especially in low income countries where inadequate growth during childhood (Mukuku et al., 2019a) can result in low adult stature, low educational performance, reduced economic productivity, lower work capacity, increased disease vulnerability consequently resulting in high childhood mortality (Woldeyohannes et al., 2021) and poor adulthood's health (Mukuku et al., 2019a), it is worth to note that a small number of studies have concentrated on this condition.

Documented studies that have concentrated on PPD include; Agarwala et al. (2019) and Dubey et al. (2012) in India; Strobino et al. (2016) in America; Wemakor & Mensah (2016) in Ghana; Asaye et al. (2020), Kerie et al. (2018), Nguyen et al. (2014) and Shewangzaw et al. (2018) in Ethiopia; Khalifa et al. (2016) in Sudan and Holm-Larsen et al. (2019) in Tanzania which have reported that postpartum depression contributes to low nutritional status in infants. In Kenya, studies have been carried out in the urban settings of Nairobi such as those done by Madeghe et al. (2016) and Ongeri et al. (2018) and limited information exists in Uasin Gishu County of Kenya hence need for the study.

1.3 Purpose of the Study

This study was aimed at assessing maternal postpartum depression, feeding practices and nutritional status of infants aged 6 to 14 weeks at the maternal and child health immunization clinic of Eldoret West Maternity Hospital of Uasin Gishu County, Kenya.

1.4 Objectives of the Study

1.4.1 General objectives of the study

To assess maternal postpartum depression, infant feeding practices and nutritional status among mother-infant pairs attending immunization clinic, 6 to 14 weeks after delivery at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya.

1.4.2 Specific objectives of the study

i. To determine the prevalence of maternal postpartum depression among mothers attenting MCH immunization clinic 6-14 weeks after delivery at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya.
ii. To assess socio-demographic characteristics of mothers attenting MCH immunization clinic, 6-14 weeks after delivery at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya.
iii. To assess obstetric factors of mothers attenting MCH immunization clinic, 6-14 weeks after delivery at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya.
iv. To evaluate the feeding practices of infants aged 6-14weeks attending MCH immunization clinics at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya
v. To assess the nutritional status of infants aged 6-14weeks attending MCH immunization clinics at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya.

1.5 Research Questions

i. What is the prevalence of postpartum depression among mothers attending MCH immunization clinic, 6-14 weeks after delivery at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya?

ii. What are the socio-demographic characteristics of mothers attending MCH immunization clinic, 6-14 weeks after deliveryat Eldoret West Maternity Hospital of Uasin Gishu County?

iii. What are the obstetric factors of mothers attending MCH immunization clinic, 6-14 weeks postpartum at Eldoret West Maternity Hospital of Uasin Gishu County**?**

iv. What are the feeding practices of infants aged 6-14 weeks attending MCH immunization clinics at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya?

v. What is the nutritional status of infants aged 6-14 weeks attending MCH immunization clinics at Eldoret West Maternity Hospital of Uasin Gishu County, Kenya?

1.6 Justification of the Study

Globally malnutrition levels are still on the rise with 21.9% under-five year old children being stunted while 7.3% being wasted (UNICEF/WHO/World Bank Group, 2019) a situation that reflects unacceptably high levels and far from being solved (UNICEF/World Bank/WHO, (2020), with malnutrition accounting for more than 45% under-five year child mortality globally more often in developing countries (WHO, 2018a). In Kenya, malnutrition among infants under 6 months stands at 15.3% stunting, 4.4% wasting and 7.0% underweight, a factor that accounts for infant mortality of 32 deaths per 1000 live births (KDHS, 2022). Postpartumdepression in mothers has been associated with infant malnutrition as described by Madeghe et al., (2016) who stated

that mothers with PPD had 5.79 higher odds of having underweight infants than mothers without PPD same to Wemakor & Mensah (2016) who reported that mothers with PPD had 2.48 higher odds of having stunted infants compared to mothers without PPD hence it can be an indirect cause of infant mortality (Mukuku et al., 2019a).

The information realized from this study will contribute towards the achievement of the 2nd and the 3rd sustainable development goals (SDG) that aims at improving nutrition and promoting good health and wellbeing of the infants since mothers who will be screened positive for PPD will be referred for treatment hence improve their mental health resulting in improved infant feeding practices and nutritional status and consequently reduction in infant mortality (UN Department of Global Communication, (2019) and WHO, (2016).

It may also help the Government of Kenya to achieve its Vision 2030 targets of reducing stunting to 14% and underweight to 8.4% by 2030 (African Union and World Food Program, 2021) and its strong commitment of reducing hunger and malnutrition thus being able to achieve freedom from hunger and malnutrition enshrined in the 2010 Constitution (Republic of Kenya Strategic Plan, 2017) and realize the objectives of eradication of hunger and attainment of the universal health coverage under the Agriculture and Health care pillars in the “Bottom-Up Economic Tranformation Approach" of the Government of Kenya (Parliamentary Service Commision, 2022). If nothing is done to correct the current malnutrition situation which is contributed by factors including maternal postpartum depression, Kenya will not achieve its Vision 2030 targets of reducing stunting to 14% and underweight to 8.4% by 2030 (African Union and World Food Program, 2021) and consequently not be able to achieve human development goals which is important not just for survival, but for children to develop to

their full potential and be people who will bring significant contribution to the socio-economic development of the country in general (KDHS, 2022).

1.7 Significance of the Study

Currently, there is a scarcity of data in Uasin Gishu County regarding the evaluation of postpartum depression, infant feeding practices, and nutritional status, highlighting a clear information deficit. Consequently, the results of the research on the occurrence of maternal postpartum depression will serve to raise awareness among healthcare professionals at Eldoret West Maternity Hospital about the importance of incorporating regular screening for all postpartum mothers during maternal and child health as well as postnatal clinics in order to promptly identify and treat those suffering from PPD.

The outcomes of the study will also be significant to the Ministry of Health and Uasin Gishu County in that it will inform efforts towards promoting exclusive breastfeeding of infants in the initial six months and thus help prevent malnutrition. Additionally the findings of the study will provide evidence base which other studies can be done and the findings compared, in that publications from the study in peer reviewed journals will provide researchers and scholars in the area with reference.

1.8 Scope of the Study

The study involved mother-infant pairs of 6 to 14 weeks postpartum, attending maternal and child health clinics for immunization at only one hospital- Eldoret West Maternity Hospital of Uasin Gishu County, Kenya since the facility caters for both urban and rural mothers though the outcomes from the study will be generalized for Uasin Gishu County with caution. Six to fourteen weeks is the period that was chosen because it coincides with the times for the National Immunization Schedule thus was an appropriate time to get a sampling frame to obtain the required sample size (Kenya National Immunization Schedule modified from WHO, 2018). Six to fourteen weeks is also the appropriate

period to screen mothers for PPD so as to identify those suffering and treat them early to prevent it from affecting infant feeding practices and nutritional status because several studies have reported that it persists upto 1 year which if it is screened later, the effects on the mother or the infant may be irreversible (Amipara et al., 2020) .

1.9 Limitations of the Study

The study used a cross-sectional research design. As such the study was unable to capture the long term association between maternal postpartum depression and infant feeding practices and nutritional status.The other limitation was that the study was done in one health facility therefore generalization of the outcomes within Uasin Gishu county will be cautiously done.

1.10 Assumptions of the Study

The assumption of the study was that the subjects of the study would give honest and truthful responses given the confidentiality that was ensured during data collection process.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter summarizes, compares and critiques the relevant scholarly resources on the research problem. It aims to highlight the outcomes of the previous studies in regard to infant malnutrition, the prevalence of postpartum depression, the determinants of maternal postpartum depression, the infant feeding practices of mothers with postpartum depression, the nutritional status of infants of mothers with postpartum depression and the association between postpartum depression and the nutritional status of infants.

2.2 Literature Review of the Study Variables

2.2.1 Infant Malnutrition

Malnutrition is a condition that arise due to the body being unable to obtain adequate amounts of nutrients for healthy tissue and organs (WHO, 2013). Malnutrition manifests itself in form of wasting, stunting and underweight as well as overweight and obesity (WHO & UNICEF, 2009). This condition results due to contributory elements such as infection, food insecurity,poor dietary intake, poor caring and feeding practices (WHO, 2013).

World Health Organization & UNICEF (2009) describes wasting as a short term response to lack of adequate dietary intake which is best used in severely malnourished children (SAM) who are at increased risk of death; stunting as a long term response that reflects decline or cessation of linear progression which reflects a long-term cumulative effects resulting from inadequate diet and or recurrent illness and underweight as a reflection of either stunting or wasting. Malnutrition robs children their survival and future potential in that it results in increased mortality and morbidity rates, adverse effects on their intellectual abilities and poor school performance which produces

irreversible loses to human capital that consequently result in missed opportunities in economic productivity later in life (Pereira, 2016).

Globally malnutrition levels are persistently alarming, approximately 1 in every 3 children often in the initial one thousand days of life and beyond are not growing well due to malnutrition (UNICEF/World Bank/WHO, 2020). In children, malnutrition is a devastating risk factor for infant mortality and it accounts for approximately 45% deaths in under-five year children globally (UNICEF/WHO/World Bank Group, 2019).

Current studies have submitted that poor maternal mental health plays an important contributory role to malnutrition since it interferes with caring practices including the provision of nutritional needs (Haithar et al., 2018). Maternal postpartum depression is a serious mental condition that a majority of women are vulnerable to during antenatal period upto 1 year postpartum (Amipara et al., (2020) and Kim and Dee, (2018). The disease has features that include; apathy, lack of attention, disturbed sleep patterns, and poor temperament (Agarwala et al., 2019); all of which interfere with the mother's ability to perform her roles that include caring for her infant (Shewangzaw et al., 2018).

2.2.2 Prevalence of Maternal Postpartum Depression

Motherhood is a transition period that is difficult, it involves changes in physiological, social and psychological wellbeing of a mother which increase her vulnerability to developing postpartum depression (PPD) (Shitu et al., 2019). Postpartum depression is described as a key maternal mental health problem that occurs during the first year postpartum described by scores ≥10 in the Edinburgh Postnatal Depression Scale (EPDS) (Agarwala et al., 2019). It reveals itself through indicators that include; lack of interest, low self-esteem, easily fatigability, sadness, sleep disturbances, loss of appetite, low concentration, inability to make decisions, meaninglessness of life, withdrawal from

loved ones, reduced sex drive, negative attitude towards the baby and feeling of guilt and shame (Agarwala et al., 2019). In severe cases, it may result in weird behaviours, confusion, hallucination and delusions which require urgent treatment due the threat of suicide or infanticide (CDC, (2015).

Maternal PPD is divided into three categories (Stewart et al., 2003) as indicated in the Table 1 below;

Table 1

Forms of Maternal Postpartum Depression

Disorder	Onset	Duration	Treatment
"Baby blues" (mild form)	Day two after delivery	Two weeks after delivery	No treatment required
Postpartum depression	During pregnancy	Upto one year after delivery	Treatment usually required
Postpartum/puerperal psychosis (most severe form)	Within four weeks after delivery	Weeks to months	Hospitalization is usually required because it is dangerous due to increased risk for suicide and infanticide

Source: Adopted from Stewart et al., (2003)

Stewart et al. (2003) explains that maternal postpartum depression leads to either intrusive or withdrawal interactive patterns where intrusive pattern is characterized by hostility while withdrawal pattern is characterized by maternal disengagement and unresponsiveness. There is currently no identified etiology for PPD, although several risk factors have been associated with it. These factors encompass personal susceptibility and characteristics, hormonal fluctuations, as well as social elements like experiencing stressful life events, having an unplanned pregnancy, being a mother to twins or triplets,

facing occupational instability, lacking social support, being a single parent, and encountering marital instability, among other factors (Hahn-Holbrook et al., 2018).

Maternal postpartum depression (PPD) poses a significant risk to almost every woman within the first year after giving birth. This issue has been extensively studied and documented by researchers such as (Kerie et al., (2018) and Kim and Dee, (2018). Numerous studies, including those conducted by Holm-Larsen et al. (2019) and Madeghe et al. (2016), have provided evidence of the detrimental impact of PPD on both infant feeding practices and nutritional status. It is a weighty public health problem that affects 17.7% mothers globally and 19% in developing countries (Hahn-Holbrook et al., (2018). It's prevalence in India is at 19% -21.5% (Agarwala et al., 2019), in Syria, 1 in every 3 women has PPD (Roumieh et al., 2019) while Saudi Arabia's prevalence is 14% (Al-Muhaish et al., 2018). Moreover, South Africa, has a prevalence of 34.7% while East Africa accounts for a prevalence rate of 18.6% (Woldeyohannes et al., 2021). Moreover, the prevalence of maternal PPD in Kenya is 18.7%, which is nearly 1 in every 5 women (Ongeri et al., 2018).

Untreated maternal postpartum depression can hinder the progress towards achieving the Sustainable Development Goals of eradicating all forms of malnutrition by 2030 (Haithar et al., 2018). This is because it increases the likelihood of maternal mortality by negatively affecting women's physical well-being. Women suffering from postpartum depression may struggle to maintain proper nutrition, personal hygiene, and self-care, and may even resort to suicide as a result (Agarwala et al., 2019). The research indicates that malnutrition significantly impacts children's growth and future prospects as a result of insufficient mother-child bonding, lack of exclusive breastfeeding or premature cessation of breastfeeding, and inadequate care including substandard feeding practices identified as direct contributors to malnutrition (Kerie et al., (2018) and Madeghe et al.,

(2016) which have been shown to impact infant nutritional well-being leading to a high incidence of malnutrition (Holm-Larsen et al., 2019).

2.2.3 Feeding Practices of Infants of Mothers with Postpartum Depression

Breastfeeding plays a critical role in a child's survival. The Infant and Young Child Feeding Practices (IYCF) guidelines recommend exclusive breastfeeding for infants under 6 months old (Hajeebhoy et al., 2013). This practice is essential for their health and overall well-being, promoting optimal growth and development, especially during the first one thousand days of life (UNICEF, 2020). Breast milk provides infants with essential nutrients and antibodies, offering protection against infections, making it a cost-effective and safe feeding option (UNICEF, 2020). It should be noted that less than half of newborns worldwide initiated breastfeeding within one hour after birth in 2018, while 41% of infants under six months were exclusively breastfed (WHO & UNICEF, 2018).

Moreover, the exclusive breastfeeding rate in Kenya stands at 60% (KDHS,2022), which falls short of the global target of 70% by 2030. This shortfall hinders both the mother and the infant from reaping the advantages of breastfeeding (WHO & UNICEF, 2018). Breastfeeding plays a crucial role in promoting infant growth and health, as well as fostering maternal and infant attachment through interaction. It also aids in reducing maternal mental health issues, stress levels, and inflammatory response. Infants rely on their mothers for both social and nutritional needs during their early stages of life, making them vulnerable to undernutrition.

The World Health Organization (WHO) emphasizes the importance of responsive and sensitive feeding, with a healthy mother being a key determinant in this process. Deviating from WHO recommendations can have negative impacts on the physical growth and overall development of children (WHO, 2019). Various studies have

highlighted the significance of optimal feeding practices and the mental wellbeing of mothers, particularly in relation to postpartum depression, which can affect infant feeding patterns and subsequently impact infant growth. For instance, a study by (Madeghe et al., 2016) revealed that mothers without postpartum depression were more likely to engage in exclusive breastfeeding compared to those with PPD. Additionally, mothers experiencing postpartum depression were more inclined to introduce supplementary foods earlier, leading to potential implications on their infants' nutritional status. It is essential for mothers to prioritize the feeding and nurturing of their infants, especially during the critical early stages of development when infants rely solely on them for care.

Mothers with postpartum depression also faced challenges such as early cessation of breastfeeding and inappropriate feeding practices, further underscoring the importance of maternal mental health in infant feeding practices (WHO, 2019) and Mukuku et al., 2019b) and (Woldeyohannes et al., 2021). Likewise, a study conducted by Figueiredo et al. (2014) in Porto, Portugal, three months after childbirth revealed that depressed mothers struggle to effectively breastfeed their infants due to their inability to fully concentrate on nurturing and feeding them. Similarly, Hurley et al. (2015) conducted a study on 689 mother-infant pairs, which found that mothers with postpartum depression (36.9%) introduced solid foods before the age of 4 months. The reason behind this early introduction remains unclear. Additionally, Sha et al. (2019) conducted a prospective study on a Chinese birth cohort of 956 mother-infant pairs, reporting a significant association between postpartum depression (PPD) and reduced breastfeeding duration, early introduction of formula feeds, and an increased risk of discontinuing breastfeeding ($p<0.005$) compared to mothers without PPD.

Furthermore, Nguyen et al. (2014) conducted a study on maternal PPD in three countries: Bangladesh, Vietnam, and Ethiopia. The study revealed that women with depression exhibited irritability and hostility towards their children, leading to neglect of their infants' hunger and inadequate breastfeeding. These mothers also neglected infant hygiene and sanitation practices, resulting in diarrhea and impaired nutritional status. Moreover, a systematic review by Madlala & Kassier (2018) highlighted that one-third of childhood malnutrition was attributed to inappropriate and insufficient feeding practices, which were associated with poor maternal and infant bonding and attachment. These factors ultimately led to shorter breastfeeding duration and early termination.

Moreover, three separate research studies have highlighted a reciprocal relationship between postpartum depression (PPD) and breastfeeding. Al-Muhaish et al. (2018) conducted a cross-sectional study on 300 mothers in Saudi Arabia, Figueiredo et al. (2014) carried out a cohort study on 181 mothers in Portugal, and Hamdan & Tamim (2012) conducted a prospective study on 137 mothers. These studies revealed that breastfeeding can lower the risk of PPD, while PPD can lead to a decreased likelihood of mothers intending to breastfeed, initiate breastfeeding, continue breastfeeding, or prematurely stop breastfeeding. However, Sharmin et al. (2019) in Bangladesh and Lima et al. (2017) in Sao Luis, Brazil did not find any association between maternal postpartum depression and child feeding practices or nutritional status. Moreover, (Woldeyohannes et al., 2021) conducted a systematic review of 26 studies in Sub-Sahara Africa involving 30,021 participants and concluded that there was no significant impact of PPD on breastfeeding practices.

2.2.4 Nutritional Status of Infants of Mothers with Postpartum Depression

Nutritional status is the physiological state of an individual as it is influenced by the intake and utilization of nutrients (WHO, 2013). It is among the indicators of health

status in children and may result in long term health impact in future. It is affected by numerous elements that are interrelated that include food (availability, accessibility and utilization); health (infection and dietary intake) caring and feeding practices (associated with time, attention and support so as not only meet physical needs but also mental and social needs) (FAO, 2007).

Infant nutritional status can be measured using growth indices such as weight for height/length (WFH/L) which measures wasting, weight for age (WFA) which measures underweight/overweight or obesity and height/length for age (H/LFA) which measures stunting (WHO & UNICEF, 2009). Growth is the world's best indicator of an infant's health and nutritional status that is influenced by how an infant's body respond to infection, lack of food or unsatisfactory feeding practices or a combination of aspectsthat in turn affect physical growth, mental and emotional development (Pearson et al., 2016). Poor child growth is a foremost public health problem in developing countries (WHO, 2018a).

The 2018 reports on global under-nutrition among children under the age of five, published by the United Nations Children's Fund (UNICEF)/WHO/World Bank Group, (2019), revealed alarming statistics. Stunting affected 21.9% of children, with Africa accounting for over a third of these cases. Wasting affected 7.3% of children, with Africa accounting for more than a quarter of the cases. Overweight affected 5.9% of children, and once again, Africa accounted for over a quarter of all the cases. These figures highlight the persistently high levels of undernutrition that remain far from being resolved. World Health Organization (WHO), (2018a) emphasized that undernutrition is a significant risk factor, contributing to over 45% of child mortality among children under the age of five in 2018, particularly in developing countries where feeding practices are inadequate. Additionally, reports from Kenya indicate that 18% of children

suffered from stunting, 5% from wasting, and 10% from underweight among the under-five age group. These factors have contributed to an increase in child mortality rates among this population (KDHS, 2022). Identifying and addressing the contributing factors of malnutrition is crucial in order to reduce its prevalence and improve child survival rates (Motlhatlhedi et al., 2017). One of the most common factors leading to malnutrition is maternal postpartum depression (PPD) (Woldeyohannes et al., (2021) and Amipara et al., (2020).

This is particularly significant during the early stages of infancy when infants are highly dependent on their mothers and experience rapid physical growth, making them more vulnerable to the effects of maternal PPD (Madeghe et al., 2016). Numerous studies have highlighted the impact of maternal postpartum depression on infant nutrition. For instance, Strobino et al., (2016) found a statistical relationship between postpartum depression and lower length-for-age in their study on mothers-infants pairs. Similarly, Holm-Larsen et al. (2019) reported a decrease in linear height among infants of mothers with PPD in their Tanzanian prospective study. Hassan et al. (2016) also discovered that infants of depressed mothers had lower weight-for-height and weight-for-age compared to non-depressed women at six months.

Malnutrition has severe consequences, including weakened immunity leading to higher childhood mortality rates from common illnesses like diarrhea and respiratory conditions. It also results in reduced adult stature, impacting productivity in both manual and non-manual tasks. Additionally, malnutrition is associated with lower educational performance, decreased economic productivity, reduced work capacity, and poor adult health (Mukuku et al., 2019a). These factors ultimately diminish the contribution of malnourished individuals to the national economy (African Union and World Food Program, 2021). Haithar et al. (2018) emphasized the significance of addressing poor

growth and undernutrition as a major public health concern in developing countries. Therefore, it is crucial to identify and address all contributing factors of malnutrition in order to effectively combat it (Motlhatlhedi et al., 2017).

2.2.5 Maternal Postpartum Depression, Infant Feeding Practices and Nutritional Status

Maternal postpartum depression has a negative impact on a mother's ability to adequately care for her infant, including providing sufficient food and establishing a strong bond. This, in turn, affects the nutritional status of the infant (Madeghe et al., 2016) and (Madlala & Kassier, 2018). A mother experiencing PPD may exhibit irritability and hostility towards her child, leading to neglect of their needs, particularly when the infant is hungry or having difficulty breastfeeding. This can result in interruptions or complete cessation of breastfeeding, as well as neglect of sanitation and hygiene practices during food preparation and feeding, which can contribute to diarrhea and respiratory issues (Madeghe et al., 2016) and (Madlala & Kassier, 2018). Ultimately, these factors contribute to poor nutritional status in infants (Nguyen et al., 2014). In severe cases of PPD, mothers may even stop breastfeeding altogether, putting their infants at a higher risk of malnutrition.

Numerous studies have shed light on the correlation between postpartum depression (PPD) and the nutritional status of infants. The research conducted byHassan et al. (2016) and Nasreen et al. (2013) revealed a positive association between PPD and impaired nutritional status in infants at six and eight months. This impairment is primarily attributed to the increased risk of breastfeeding interruption, which hinders the infants' weight gain progress. Additionally, Madeghe et al. (2016) conducted a study in Nairobi, Kenya, which found that mothers with PPD had 4.40 times higher odds (95% CI) of having underweight infants compared to non-depressed mothers during the 6-14

week period of their infants' lives. Furthermore, a systematic review of 17 studies conducted by Surkan et al. (2011) reported that maternal postpartum depression was associated with early infant underweight and stunting. The odds ratio (OR) for underweight was 1.5 (95% CI), while the OR for stunting was 1.4 (95% CI). Similar findings were observed in studies such as Ashaba et al. (2015) in Uganda, where a statistical association between PPD and malnutrition (OR=2.4) was identified in mother-infant pairs aged 1 to 5 years. Saeed et al. (2017) also conducted a study on socially disadvantaged mothers with children under 2 years in Pakistan, which revealed that mothers with postpartum depression had significantly higher odds of having stunted infants (OR 3.15, 95% CI 1.91–5.18, p value < .001) and underweight infants (OR 3.26, 95% CI 1.99–5.34, p value < .001) compared to non-depressed mothers.

Furthermore, the study conducted by Wemakor & Mensah (2016) on postpartum mothers-infant pairs at 0-59 months attending maternal and child health clinic in Northern Ghana revealed that mothers with postpartum depression (PPD) were three times more likely to have children who were stunted compared to non-depressed mothers (A OR = 2.48, 95% CI 1.29–4.77, p = 0.001). Similarly, Holm-Larsen et al. (2019) conducted a study in Tanzania on a cohort of antenatal mothers who were tracked up to 2 to 3 years postpartum with their infants and found that mothers with postpartum depression were three times more likely to have infants who were stunted (36.6% or OR=3.15; 95% CI) and underweight (35.4% or OR=3.2; 95% CI) compared to non-depressed mothers. Additionally, Farías-Antúnez et al. (2018) conducted a systematic review of 20 longitudinal studies on the first year of life of infants and discovered that depressed mothers had a higher chance of having stunted and underweight infants.

2.3 Summary of Literature Gaps

Based on the findings of the literature search, it became apparent that physical growth serves as a significant indicator of a child's nutritional status. Furthermore, it was observed that rapid physical growth and development take place during the first 1000 days of a child's life, during which the child heavily relies on the care provided by the mother.Different studies have reported variations in the prevalence of postpartum depression (PPD) across different countries. These variations can be attributed to differences in the research designs employed. Some researchers utilized case control studies, while others opted for cohort studies or cross-sectional study designs.

Moreover, there is also diversity in the screening tools used to assess postpartum depression. The majority of studies utilized the Edinburgh Postnatal Depression Scale (EPDS), although there were discrepancies in the cut-off points employed (≥9, ≥10, ≥12, or ≥13). Additionally, some studies utilized alternative tools such as the Patient Health Questionnaire-9 (PHQ), Mini International Neuropsychiatry Interview tool (MINI), Schedules for Clinical Assessment in Neuro-psychiatry (SCAN), General Health Questionnaire-12 (GHQ), and a few employed the Aga Khan University Anxiety and Depression Scale. There was a wide range in the timing of the studies conducted, with some taking place within less than 6 months after delivery, others within 1 year, and some even up to 5 years post-delivery. This resulted in diverse findings.

Numerous studies on postpartum depression (PPD) have highlighted a significant link with socio-demographic factors such as low levels of education for both mothers and husbands, unemployment, low household income, early marriage, unplanned pregnancies, and living in shared households. However, factors like birth weight, child's gender, mother's age, and occupation did not show statistical significance.

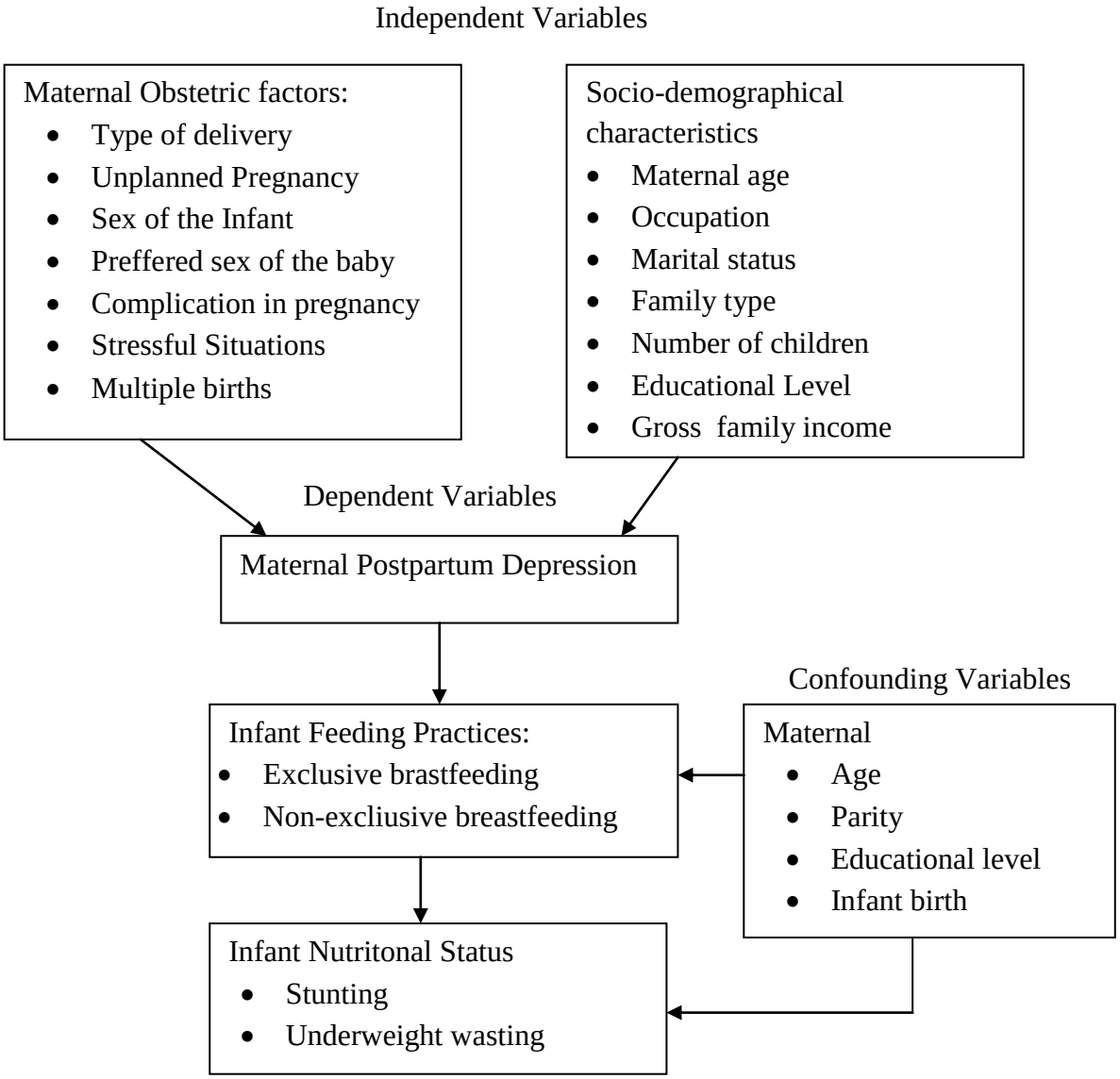
The literature on the impact of maternal postpartum depression on infant nutrition status is conflicting. While some studies have shown a clear connection between PPD and infant nutrition, others have not found any significant association. To address this, the study aimed to assess maternal postpartum depression, infant feeding practices and nutritional status at 6 to 14 weeks after delivery at Eldoret West Maternity Hospital in Uasin Gishu County, Kenya.

2.4 Conceptual Framework

The researcher used a conceptual framework in the study that was adapted from a study carried out by Lima et al. (2017) in Sao Luis, Brazil on the association between maternal postpartum depression and child feeding practices and nutritional status. The conceptual framework outlines the association between the independent variable which are the maternal sociodemographic and obstetric factors and the dependent variables which are maternal postpartum depression, the infants feeding practices such as exclusive breastfeeding or non-exclusive breatfeeding and infant nutritional status such as stunting, wasting and underweight. The conceptual framework further demonstrates the confounding factors comprising maternal age, parity, education level and infant low bith weight which were controlled so as not to influence the outcome of the study as indicated in Figure 1.

Figure 1

Conceptual Framework



Source: Lima et al., (2017)

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design

The study employed a cross-sectional descriptive study design. This design was considered suitable because it describes the prevalence of the disease and/or exposure at one time and provides a "snapshot" of the percentage of individuals in the population who are diseased and non-diseased at one point in time (Alexander et al., 2015). This design assisted in getting the prevalence of maternal PPD and its association with infant feeding practices and nutritional status at a snapshot. This research design was used by similar studies to establish the association between maternal postpartum depression with infant feeding and nutritional status such as Amipara et al. (2020) and Madeghe et al., (2016).

3.2 Location of the Study

The study was conducted at Eldoret West Maternity Hospital's Postnatal, Maternal And Child Health Clinics, a facility that is located in Uasin Gishu County headquarters-Eldoret, Kenya; next to 64 Stadium along Muyodi Road. It is a facility with 70-bed capacity which offers services among them; maternity, postnatal clinic, maternal and child welfare clinic, family planning, HIV testing and outpatient medical services to both rural and urban mothers with approximately 500 mother-infant pairs attending maternal and child health and postnatal clinics monthly.

Eldoret is the headquarters of Uasin Gishu County. It is a cosmopolitan town which is the 5^{th} most populated town in Kenya with a population of 475,716 according to the Kenya Population and Housing Census of 2019. It is an area that lies at more than 2000m above the sea level with a temperature of approximately 16^{o}c, 82% humidity and a rainfall of 1103 mm per year.

The town is a trading center and is surrounded by prime agricultural farms where large scale grain, dairy and horticultural farming is practiced. It is also a manufacturing center with factories such as Rivatex, Raiply Woods, Kenya Co-operative Creameries, Unga Millers, Eldoret Millers among others (Badoux, 2018) (The location map is indicated in the Appendix IV).

3.3 Population of the Study

The target population consisted of women in their reproductive years along with their infants who were between 6 and 14 weeks old after childbirth. The group that was easily accessible included mothers between the ages of 18 and 49, along with their infants who were 6 to 14 weeks old after delivery. The study samples included mother-infant pairs visiting the maternal and child health clinic for immunization at 6-14 weeks postpartum at Eldoret West Maternity Hospital. In a span of one month, it is estimated that there were 1289 mothers aged 18-49 years who were 6-14 weeks postpartum and attending the maternal and child health clinic for infant immunization at Eldoret West Maternity Hospital.

To align with the study's objectives, the research included all mothers between the ages of 18 and 49, with their infants aged 6 to 14 weeks, who were attending maternal and child healthclinic for infant immunization at Eldoret West Maternity Hospital. The exclusion criteria comprised of mother-infant pairs 6 to 14 weeks postpartum with chronic illnesses, infants with congenital issues, infants 6 to 14 weeks old brought for immunization by non-maternal relatives, and mothers who do not regularly visit EWMH for postnatal care.

3.4 Sample Size Determination

The sample size was determined using the Fischer's formula which is a formula with a 95% confidence interval and 0.05 sampling error that helped in estimating the true proportion of the population that possess a particular characteristic with the requisite confidence level and margin of error (Daniel & Cross, 2013). This formula has been utilized in other similar studies such as (Ongeri et al., 2018) and (Motlhatlhedi et al., 2017).

The formula is as indicated;

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

N=Sample size.

Z=Standard error from the mean corresponding to 95% confidence level=1.96

P=18.7% taken to be estimated prevalence of postpartum depression in Kenya (Ongeri et al., 2018).

d=Precision/ reliability with which to determine p =5%

The sample size calculated using the above formula will be;

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

$$N=\frac{1.96x1.96x0.187 (1-0.187)}{0.05x0.05}$$

$$=\frac{3.8416x0.187x0.813}{0.0025}$$

$$=\frac{0.583951071}{0.0025}$$

Sample size = 233.58 + 10% non-response (23.4) = 257 Subjects

The total number of mothers studied were 257 but the infants were 260 since 3 of the mothers had multiple births (twins).

3.5 Sampling Procedure

The study area was selected using purposive sampling method, while the mother-infant pairs were chosen through simple random sampling method. To elaborate on the process, random numbers were generated from a random number table and assigned to the names of the mothers present each day during data collection. Subsequently, the names were selected based on the assigned numbers until the required sample size was achieved. This method was chosen randomly for participants who met the inclusion criteria, ensuring that all individuals had an equal opportunity of being selected. By employing this method, a broader coverage of sample elements was obtained, resulting in a lower standard error (Ingsathit et al., 2016). The utilization of this method increases the likelihood of the sample representing the study population accurately, as demonstrated in similar studies conducted by Anokye et al. (2018) and Wemakor & Iddrisu (2018).

3.6 Data Collection Instruments

Instrumentation is the means used by researchers to measure variables of interest during data collection process. It is describes the tools used in collecting data in the study (Salkind, 2010). The data was collected using a structured questionnaire with both open and closed ended questions which were administered and filled while the respondents were being interviewed by the principal researcher assisted by trained research nurse and research nutritionist.

The questionnare had four sections which included; determinants of Maternal Postpartum depression which are maternal sociodemographic characteristics such as age,

occupation, marital status, family type, education level and income; and maternal obstetric factors such as mode of delivery, whether the last pregnancy was planned, whether the current infant was the desired sex or not, number of children, whether she had complications during the current pregnancy or not, whether the mother has had some unresolved issues in the past three months, whether the infant is of a single or multiple birth (such as twins).

Moreover, the second section contained the Swahili version of validated Edinburgh Postnatal depression Scale (EPDS) for screening postpartum depression that was developed by Cox et al. (1987) and translated to Swahili by Kumar et al. (2015). The EPDS is a scale used to evaluate the presence and the magnitude of the symptoms of depression in the last seven days in postpartum mothers. It is a 10-item scale, each addressing a clinical symptom of depression. Each item is scored from 0-3 points with 3 representing most severe option leading to a maximum of 30 points. The study used a cut off of $\geq$ 10 points to indicate maternal depression while 0-9 points to mean less likely to have postpartum depression (Cox et al., 1987). It was the most appropriate method to use in diagnosing for maternal PPD since it has been widely used in Sub-Saharan Africa (Kumar et al., 2015) and used successfully in the previous in Kenya by (Ongeri et al., 2018) and Madeghe et al., (2016).

Additionally, the third section of the questionnare contained items on the infant feeding practices which were collected through the use of a 24 hour recall adopted from Kenya Demographic and Health Statistics, (KDHS, 2022) with questions on what the infant was fed in the past 24 hours from among the choices of; breast milk only, no breast milk, breast milk with either sugar/glucose added water, cow's milk, powder milk, infant formula, porridge or any other liquid or solid food and if the infant took any other food

or drink other than breast milk, whether it was given using a bottle with teat/nipple or a cup and spoon.

lastly, the fourth section of the questionnare consisted of items to help gather data on the nutritional status of the infants. The data collected here included the infant's date of birth, birth weight, age, sex, their current weight and current length.

3.6.1 Pilot Study

Section I, III and IV of the questionnaire was pretested using 10% of the sample size of 6-14 weeks postpartum mothers-infant pairs at Uasin Gishu District Hospital's Maternal and Child Health Clinic so as to check and helpestimate the total time taken to complete the questionnaire of which it took around ten minutes. The pretesting also helped to check on language clarity and ambiguity and correction made. After data collection during pretesting, the data was analyzed using the Coefficient Alpha and Successor procedure for determining the level of random error of which it was less than 0.7 (Cronbach, 2014) which had no conflicting issues to be resolved before the final data collection. (See Questionnaire in Appendix I).

3.6.2 Validity and Reliability of the Study Instruments

The EPDS scale that was employed in this study is extensively employed and validated assessment tool for screening for the symptoms of postpartum depression in many countries and settings. This tool has a sensitivity of between 34-100% and a specificity of between 44-100% (Cox, (1983). This wide discrepancy of sensitivity and specificity is due to the differences in the studies such as difference in methodology used, cut off point, diagnostic criteria and the period between delivery and the moment of screening. The tool was also tested for validity and reliability by Green et al. (2018) which gavesensitivity/ specificity value of 0.70/0.72.

3.7 Data Collection Procedures

Prior to data collection, two research assistants, one nurse and one nutritionist, both with at least a diploma qualification, underwent a comprehensive 2-day training session. During this training, they were provided with detailed explanations and practical demonstrations regarding the study's objectives, research methodology, terminology, as well as instructions on how to accurately complete the questionnaires and conduct anthropometric assessments in a standardized and consistent manner. To ensure impartiality and minimize bias, the research assistants were kept unaware of the research objectives, thus maintaining a single-blinded approach.

Throughout the study period, the research team enrolled participants who met the inclusion criteria on each clinic day. The research team, and mothers all adhered to Covid-19 guidelines for disease prevention. This included wearing face masks, maintaining a minimum distance of 1 meter between researchers and respondents, as well as among the respondents themselves. Additionally, the researchers ensured that the respondents handled research tools minimally and that shared tools were sanitized after each use. To recruit participants, mother-infant pairs who were 6 to 14 weeks post-delivery and attending maternal and child health clinics for infant immunization at Eldoret West Maternity Hospital were selected. Their names were chosen using numbers from a random number table. After providing an explanation about the study, they were asked to fill out a written informed consent form. This process continued until the desired number of 257 participants was reached. Data collection took place over a one-month period, from mid-July to mid-August 2022.

The information was gathered by utilizing a structured questionnaire, with the respondent being guided by the lead researcher and two research assistants. Maternal postpartum depression data was obtained through the second part of the questionnaire,

which included questions from the validated Kiswahili version EPDS scale. Mothers were required to self-report their feelings over the past seven days, under the guidance of a trained research nurse. Measures were put in place to prevent participants from discussing their responses in order to maintain the authenticity of their mental state assessment. Data on infant feeding practices was collected through 24-hour recall questions adapted from the Kenya Demographic and Health Statistics, (KDHS, 2022) in the third section of the questionnaire. Mothers were asked to recall what they fed their infants, including breast milk only, no breastfeeding, breast milk with additives like sugar or glucose water, cow's milk, powdered milk, infant formula, porridge, or any other liquid or solid food. Additionally, mothers were asked if their infants consumed any food or drink other than breast milk, and if so, whether it was given through a bottle with a teat/nipple or a cup and spoon.

Information on anthropometric data was collected through the measurements of the infants' body dimensions by the principal researcher and the assistants where by their weights and lengths were measured using standard techniques and equipment (SECA 354 Electronic baby weighing scale by UNICEF for weight measured to the nearest 0.1kg and SECA 210 mobile measuring mats for babies and toddlers for recumbent length to the nearest 0.1cm). The date of birth, birth weight, age and the sex of the infants were obtained from the infants' clinic cards. There were no incentives given to the participants although mothers with infants who were found to be malnourished were counseled and those mothers with higher scores on the EPDs and who answered yes to item 10 on suicidal thoughts were referred to a mental clinic for further management and excluded from the next step of assessment of infant feeding practices and nutritional status.

3.8 Data Analysis and Presentations

After every data collection, the questionnaires were checked for completeness and any entries missing were corrected and the questionnaires kept safely in a lockable cabinet.

On prevalence of maternal postpartum depression, the EPDS scale item responses were scored and interpreted as either having PPD symptoms or normal. All the responses to the 10 item scale of EPDS were scored, where each item is scored from 0-3 points with 3 representing most severe option leading to a maximum of 30 points. Items 1, 2 and 4 are scored 0, 1, 2, and 3 while items 3, 6, 5, 7, 8, 9 and 10 are reversely scored (3-0) because they evaluate negative aspects about the mothers' depressive state. The study used a cut off of ≥ 10 points to indicate maternal postpartum depression while 0-9 points to mean less likely to have postpartum depression similar cut off point to the EPDS cutoff used by (Ongeri et al., 2018) in their Kenyan study.

Data on infant feeding practices collected using the 24 hours food recall modified from Kenya Demographic and Health Statistics (KDHS, 2022) was appliedin assessing infants feeding practices and to classify them as either being exclusively breastfed or non-exclusively breastfed; their mothers have ceased breastfeeding or still ongoing; whether the infants are formula fed or mixed fed; if early introduced to complementary feeds, then number of feeds per day.

The nutritional status anthropometric data was analyzed using WHO Anthro 3.2 Software for z-score WFL, WFA and LFA (WHO, 2011). The software was employed to categorize the infants' nutritional status into; those with Z scores >-2 S.D classified as well-nourished (normal); those with Z scores between -3 and -2 S.D classified as moderately malnourished and those <-3 S.D classified as severely malnourished (WHO,

2006). The infants' birth weight was categorized as normal if between 2.5kgs to 3.8kgs and low birth weight if less than 2.5kgs (WHO, 2006).

Then the data collected was checked for completeness. The incomplete data was cleaned while the complete ones where coded and entered in the Statistical Package for Social Sciences (SPSS) version 20 which was used to analyze the data ,where; descriptive statistics was used to analyze data on the prevalence of maternal postpartum depression, the determinants of postpartum depression (maternal obstetric factors and sociodemographic characteristics), feeding practices and nutritional status. Multivariate logistic regression (p-value <0.05; 95% CI) was used to determine unadjusted and adjusted odds ratio to test the association between independent variables (maternal factors and sociodemographic characteristics) and the dependent variable (maternal postpartum depression) and the association between maternal postpartum depression and infant feeding practices and nutritional status and the strength of this association while adjusting for confounding factors which can be a direct predictor of the the dependent variables. The data wasthen presented using frequency tables. Interpretations were drawn from the results of the analysis (Table 2 summarizes the analysis of the study's data).

Upon conclusion of the study, data shall be kept for a minimum period of 10 years as per the Medical Research Council (MRC) regulations (2017) for basic research for the reasons of transparency, for good governance and to enable future research opportunities through data sharing. The filled questionnaires and the analyzed data will be kept at the Kabarakuniversity's archives until the elapse of the stated period.

Table 2

Summary of data analysis (measurements of variables)

Objectives	Independent variable	Dependent variable	Statistical Tests
To determine the prevalence of Maternal Postpartum depression among mothers at 6-14 weeks postpartum		Prevalence of Maternal Postpartum depression among mothers	Frequencies and percentages of Present or absent.
To assess maternal socio-demographic characteristics at 6-14 weeks postpartum	Age Education level Marital status Maternal income Occupation Family type		Mean and ranges Percentages Percentages Mean and ranges Percentages Percentages
To assess maternal factors at 6-14 weeks postpartum	Mode of delivery Unplanned pregnancy Desired sex of infant Multiple births Stressful situations Parity		Frequencies and Percentages Percentages Percentages Percentages Percentages Percentages
To evaluate the feeding practices of infants aged 6-14weeks		Breastfeeding or not Early ceasation of breastfeeding Formula feeding Mixed feeding Early introduction of complementary feeding Number of feeds per day	Frequencies and means
To assess the nutritional status of infants aged 6-14weeks		The nutritional status of infants (Weight-for-age, weight-for-height and Height-for-age)	Frequencies and means
To determine the association between maternal factors, socio-demographic characteristics, postpartum depression	Maternal factors and socio-demographic characteristics	Maternal Postpartum depression	Multiple logistic regression
To determine association between maternal postpartum depression and infant feedingand nutritional status	Maternal postpartum depression	Infant feeding practices Infants' nutritional status (Weight-for-age, weight-for-height and Height-for-age)	Multivariate logistic regression

3.9 Ethical Considerations

Approval to proceed for data collection and Ethical clearance was obtained from the Kabarak University Institute of Postgraduate Studies and the Kabarak University Ethical Review committee (*KABU01/KUREC/001/03/03/2022)* respectively. A Research Permit (NACOST/P/22/16790)was obtained from the Kenya National Commission for Science, Technology and Innovation (NACOSTI) after which an approval for data collection was also obtained from the Uasin Gishu County Government (*UGC/ADM.1/31/GEN/2022/VOL.1*). Written informed consent was obtained from the study participants and an explanation was made to them that the study was voluntary and the information collected will solely be used for the purpose of the study and no incentives shall be given in that the study will be conducted during the normal clinic visits.

Upon screening, only those with severe levels of PPD were excluded from further assessment and referred for further diagnosis and treatment in a mental health facility since they could not consent. (See Appendix II for informed consent form). Confidentiality, privacy as well as anonymity was ensured and maintained on information obtained from the study participants. No names were used on the questionnaires; only unique codes were allocated to the participants to ensure privacy and for ease of analysis of data. To ensure data privacy, the questionnaires were kept in a lockable cabinet and were only accessed by the lead researcher and the research assistants. No risk was anticipated for the participantssince no drugs were administered, no procedures performed and no specimens were taken.

The participants who wish to be given their feedback after the interview were requested to offer their mobile phone numbers to be contacted. Service provision in the clinics was not affected if a mother declined to participate in the study and advice on the importance

of general postpartum health was given to the mothers who declined. The researcher ensured that reports of the study were precise and authentic portrayals of the procedures used in the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

The chapter analyses, presents and discusses the respondent's profile investigation findings, followed by descriptive and inferential assessments of the study objectives.

4.2 Response Rate

The study included all 257 mothers and 260 infants (due to multiple births) who were sampled, leading to a 100% response rate.

4.3 Study Findings

4.3.1 Prevalence of Maternal Postpartum Depression among Mothers at 6-14 weeks

Out of the 257 mothers who were studied 6-14 weeks after giving birth, 45 of them (17.5%) were found to have postpartum depression based on the EPDS scale (scoring ≥10), as shown in Table 3.

Table 3

Prevalence of Postpartum Depression

Prevalence of Postpartum depression	N=257	
Variables	n	%
Mothers without postpartum depression (<10 scores)	212	82.5
Mothers with postpartum depression (≥10 scores)	45	17.5

The prevalence rate of 17.5% suggests that approximately 1 out of every 6 mothers in the 6-14 weeks postpartum period experienced postpartum depression.

4.3.2 Maternal Socio-Demographic Characteristics

The study established that the age range of the participants varied from 18 to 49 years, with an average age of 27.6±5.7 and a median age of 27 years.

Table 4

Socio-Demographic Characteristics of mothers at 6-14 weeks postpartum

Variable	Category	N(257)	
		n	%
Age of respondents	18-20 years	20	7.8
	21-25years	78	30.4
	26-30years	77	30.0
	31-35 years	60	23.3
	36-40years	18	7.0
	41-49years	4	1.6
	Mean± SD	27.6±5.7	
Marital status of respondents	Single	44	17.1
	Married	209	81.3
	divorced/separated	2	0.8
	Widowed	2	0.8
Education level of respondents	Primary	34	13.2
	Secondary	124	48.2
	Tertiary	67	28.2
	University	32	12.5
Occupation of respondents	Housewife	58	22.6
	Student	17	6.6
	self employed	93	36.2
	casual worker	36	14.0
	formal employment	53	20.6
Gross income of respondents	no income	73	28.4
	<5000	34	13.2
	5001-10000	63	24.5
	10001-15000	23	8.9
	15001-20000	13	5.1
	20001-25000	12	4.7
	>25000	39	15.2
	Mean± SD	9451±9228	
Family type of the respondents	Nuclear	223	86.8
	Extended	34	13.2

Out of all the participants, 209 (81.3%) were married, and 124 (48%) had completed secondary education. Additionally, 93 (36.2%) reported being self-employed. Moreover, approximately 73 (28.4%) of the participants had no income, while the average income for all participants was found to be Kshs. 9451±9228. Furthermore, 223 (86.3%) of the participants belonged to a nuclear family type, as indicated in Table 4.

4.3.3 The Maternal Obstetric factors of Mothers

The results of the study on maternal obstetric factors revealed that 77(30%) of the mothers had a gravidity of two (2) with an average gravidity of 2.4±1.2SD, and 85(33.1%) of them had 2 living children. Furthermore, 37(14.4%) of the mothers mentioned having experienced a miscarriage in the past, as shown in Table 5.

Table 5

Maternal Obstetric Factors at 6-14 Weeks Postpartum

Variable	Category	(N=257) n	%
Gravidity (number of times of pregnancy)	1	73	28.4
	2	77	30.0
	3	62	24.1
	4	36	14.0
	5	7	2.7
	6	2	0.8
If had a miscarriage	Yes	37	14.4
	No	220	85.6
Number of living children	1	81	31.5
	2	85	33.1
	3	61	23.7
	4	26	10.1
	5	3	1.2
	6	1	0.4
If the pregnancy was planned	Yes	151	58.8
	No	106	41.2
If had a complication	Yes	50	19.5
	No	207	80.5
Type of complication	Premature rupture of the amniotic membrane	2	4
	Antepartum hemorrhage (APH)	8	16
	Hypertension	15	30
	Swollen feet	3	6

	Anaemia	4	8
	UTI	4	8
	General body weakness	3	6
	Others	11	22
Type of delivery	Vaginal	227	88.3
	C-Cesearian Section	30	11.7
Preferred sex of the infant	Male	83	32.3
	Female	71	27.6
	Any	103	40.1
Sex of current infant	Male	132	51.4
	Female	122	47.5
	twins (male and female)	2	0.8
	twins (male)	1	0.4
Nature of current birth	Single	254	98.8
	Twins	3	1.2
Sex of the infants	Male	136	52.3
	Female	124	47.7
Total infants		260*	100

** Total number of participant mothers was 257 and that of infants was 260 since there were 3 multiple births.*

Variable	Category	(N=257)	
		n	%
If had unresolved issues	No	219	85.2
	Yes	38	14.8
Types of unresolved issues	None	219	85.2
	Incompatible with family planning method	2	0.8
	Stress due to unplanned pregnancy	2	0.3
	Lost her job due to pregnancy	1	0.4
	Complication after C-section	2	0.8
	Delivered prematurely so was worried of the baby	1	0.4
	Financial constraints	9	3.5
	Family conflict	10	3.9
	Neglect by partner	6	2.3
	Lost a child	1	0.4
	Neglect by hospital	1	0.4
	Lost husband	1	0.4
	A wound that has not healed for more than 15 years	1	0.4
	Husband arrested and in jail	1	0.4

In addition, 151(58.8%) of the mothers stated that the current pregnancy was planned. The study also found that 50(19.5%) of the mothers faced complications during the current pregnancy, with hypertension 15(30%) and antepartum hemorrhage 8(16%) being the most common complications.

Out of all the mothers, 227(88.3%) had a normal vaginal delivery, while 103(40.1%) did not have a preference for the sex of the unborn child. Moreover, 136(52.3%) of the infants were male, and 3(1.2%) of the current births were multiple (twins) in this study. The total number of infants in the study was 260, including 3 mothers who had multiple births (twins). Additionally, 38(14.8%) of the mothers reported unresolved issues in the past three months, with family conflicts 10(3.9%), financial constraints 9(3.5%), and neglect by partner 6(2.3%) being some of the problems mentioned by the mothers, as illustrated in Table 5.

4.3.4 Maternal Socio-Demographic and Obstetric Characteristics of Mothers with Postpartum Depression

The findings of the study on maternal sociodemographic and obstetric characteristics of mothers with PPD indicated that 12(26.7%) of them were aged between 31-35 years with the mothers having an average age of 28.7±5.7 with 33(73.3%)of them being married and 25(55.6%) of them having attained secondary education as their highest education level. Furthermore, 15(33.3%) of the mothers were self employed with an average income of 8442±8773 with 39(86.7%) coming from nuclear families as indicated in Table 6.

Table 6

Maternal socio-demographic and obstetric characteristics of mothers with Postpartum Depression

Variable	Category	N(45)	
		n	%
Age of respondents	18-20 years	3	6.7
	21-25years	11	24.4
	26-30years	11	24.4
	31-35 years	12	26.7
	36-40years	7	15.6
	41-49years	1	2.2
	Mean± SD	28.7±5.7	
Marital status of respondents	Single	9	20.0
	Married	33	73.3
	divorced/separated	2	4.4
	Widowed	1	2.2
Education level of respondents	Primary	9	20.0
	Secondary	25	55.6
	Tertiary	6	13.3
	University	5	11.1
Occupation of respondents	Housewife	10	22.2
	Student	2	4.4
	self employed	15	33.3
	casual worker	10	22.2
	formal employment	8	17.8
Gross income of respondents	no income	10	22.2
	<5000	11	24.4
	5001-10000	10	22.2
	10001-15000	6	13.3
	15001-20000	2	4.4
	>25000	6	22.2
	Mean± SD	8442±8773	
Family type of the respondents	Nuclear	39	86.7
	Extended	6	13.3

Maternal Obstetric Factors

Variable	Category	(N=45)	
		n	%
Gravidity (number of times of pregnancy)	1	11	24.4
	2	10	22.2
	3	11	24.4
	4	9	20.0
	5	3	6.7
	6	1	2.2

Variable	Category	(N=45)	
		n	%
If had a miscarriage	Yes	9	20.0
	No	36	80.0
Number of living children	1	11	24.4
	2	12	26.7
	3	14	31.1
	4	6	13.3
	5	1	2.2
	6	1	2.2
Planned pregnancy	Yes	21	46.7
	No	24	53.3
If had a complication	Yes	17	37.8
	No	28	62.2
Type of complication	Premature rupture of the amniotic membrane	1	5.9
	Antepartum hemorrhage (APH)	3	17.6
	Hypertension	10	58.8
	Swollen feet	1	5.9
	Anaemia	1	5.9
	UTI	1	5.9
Type of delivery	Vaginal	39	86.7
	c-cesearian section	6	13.3
If had a preferred sex of the infant	Yes	28	62.2
	No	17	37.8
Sex of current infant	Male	23	51.1
	Female	21	46.7
	twins (male and female)	1	2.2
Nature of current birth	Single	44	97.8
	Twins	1	2.2
Sex of the infants	Male	24	52.2
	Female	22	47.8
Total infants		46*	100

** Total number of infants born to mothers with PPD was 46 since there was 1 multiple birth.*

Additionly, it was established 32(71.1%) of mothers with PPD had a gravidity of between one and three and a parity of between one to three accounting for 37(82.2%). Of all the mothers with PPD, 24(53.3%) of them admitted that their pregnancies were not planned. In addition, 9(20.0%) of the mothers mentioned having experienced a miscarriage in the past, as shown in Table 6.

The study also found that 17(37.8%) of the mothers faced complications during the current pregnancy, with hypertension 10(58.8%) and antepartum hemorrhage 3(17.6%) being the most common complications. Out of all the mothers with PPD, 17(86.7%) had a normal vaginal delivery, while 28(62.2%) did not have a preference for the sex of the unborn child. Moreover, 23(51.1%) of the infants were male, and 1(2.2%) of the current births were multiple (twins) in this study. The total number of infants born to mothers with PPD in the study was 46, including 1 mother who had multiple births (twins). Additionally, 17(37.8%) of the mothers with PPD reported of having unresolved issues in the past three months, with family conflicts 6(35.3%), financial constraints 5(29.4%), and neglect by partner 3(17.6%) being some of the problems mentioned by the mothers with PPD, as illustrated in Table 6.

4.3.5 The Infant Feeding Practices

According to Table 7, this study found that 202 (95.3%) of the mothers without PPD and 41(91.1%) of the mothers with PPD practiced exclusive breastfeeding. However, out of the 4 mothers with PPD who practiced mixed feeding, 50.0% of them fed their infants' at 6-14 weeks old with cow’s milk, 25.0% fed their infants porridge, 25.0% fed their infants with plain water in addition to breastmilk, as shown in Table 7.

Table 7

Infant Feeding Practices at 6-14 Weeks Postpartum

How infants were fed in the last 24 hours				
Variables	Mothers without PPD N=212	%	Mothers with PPD N=45	%
Exclusive breastfeeding	202	95.3	41	91.1
Mixed feeding	10	4.7	4	8.9

Types of mixed feeds given to infants aged 6 to 14 weeks of mothers with PPD

What infants mixed fed were given in 24hrs		
Variables	Mothers with PPD N=4	%
Porridge and breastmilk	1	25.0
Cow's milk and breast milk	2	50.0
Plain water and breast milk	1	25.0

Reasons for mixed breastfeeding by mothers

What infants of mothers with PPD who were mixed fed were given in 24hrs		
Variables	Mothers with PPD N=4	%
Inadequate breastmilk for the baby	1	25.0
To relieve the baby's thirst	0	0
Sore nipples	1	25.0
Inadequate breast milk for twins	1	25.0
No time to breastfeed due to work	0	0
No knowledge on breastfeeding	1	25.0

Mothers with PPD who reported to have supplemented their infants' diet gave reasons for mixed feeding, such as inadequate breast milk, sore nipples, lack of knowledge on breastfeeding, and being busy at work, as depicted in Table 7.

4.3.6 The Nutritional Status of Infants Aged 6-14weeks

The study findings revealed the following information regarding the nutritional status of infants aged 6-14 weeks attending MCH for immunization.

Table 8

Birthweight of Infants Aged 6-14 Weeks

Infant's Birthweight	N-=260	%
Normal Birthweight	242	93.1
Low Birthweight	18	6.9

As indicated in Table 8, in terms of birthweight, 242 (93.1%) infants had a normal birthweight, while 18 (6.9%) had low birthweight.

Further, the research established that at 6-14 weeks the nutritional status of the infants was as indicated in Table 9 .

Table 9

Nutritional Status of Infants Aged 6-14 Weeks Using WFL Z-scores

WFL Z-Scores	N-=260	%
SAM (<-3)	4	1.5
MAM (-3 to -2)	6	2.3
At risk (-2 to -1)	9	3.5
Normal (=1 to +1)	210	80.8
Overweight (>+1)	31	11.9
Nutritional Status of Infants Aged 6-14weeks using WFA Z-sores		
WFA Z-Scores	N=260	%
Severely underweight (<-3)	7	2.7
Moderately underweight (-3 to -2)	11	4.2
At risk of underweight (-2 to -1)	35	13.5
Normal weight (-1 to + 1)	205	78.8
Overweight (>+1)	2	0.8
Nutritional status of infants aged 6-14weeks using LFA Z-sores		
LFA Z-Scores	N=260	%
Stunted (<-2)	71	27.3
Normal (>-2)	189	72.7

**Total number of infants was 260 since there were 3 multiple births.*

Using the WFL Z-score, it was observed that 210 (80.8%) infants were within the normal range, 4 (1.5%) were severely malnourished (SAM), 6 (2.3%) were moderately malnourished (MAM), and 9 (3.5%) were at risk of malnutrition. Furthermore, 11.9% of the infants were overweight, as indicated in Table 9.

When considering the WFA z-score, 205(78.8%) infants were classified as normal, 7(2.7%) were severely underweight, 11(4.2%) were moderately underweight, and 35 (13.5%) were at risk of being underweight. These findings are presented in Table 9. Additionally, based on the LFA z-score, 71 (27.3%) infants were stunted, while 189 (72.2%) infants were within the normal range, as depicted in Table 9.

4.3.7 The Nutritional Status of Infants Aged 6-14 Weeks of Mothers with Postpartum Depression

The study established the following information regarding the nutritional status of infants aged 6-14 weeks born to mothers with PPD attending MCH for immunization.

Table 10

Birthweight of Infants Aged 6-14 Weeks of Mothers with Postpartum Depression

Infant's Birthweight	N=46	%
Normal Birthweight	44	95.7
Low Birthweight	2	4.3

In terms of birthweight, 44 (95.7%) infants had a normal birthweight, while 2 (4.3%) had low birthweight, as shown in Table 10 .

Further, the research established that at 6-14 weeks Postpartum, Maternal Depression affects infant feeding practices consequently affecting their nutritional status, as manufested in form of wasting, underweight and stunting as indicated in Table 11.

Table 11

Nutritional Status of Infants Aged 6-1 4weeks of Mothers with *Postpartum Depression using WFL Z-scores*

WFL Z-Scores	N=46	%	After adjusting for low birthweight N=44	%
Normal	43	93.5	41	93.2
Wasted	3	6.7	3	6.8

Nutritional status of infants aged 6-14weeks using WFA Z-sores

WFA Z-Scores	N=46	%	After adjusting for low birthweight N=44	%
Normal	42	91.3	40	90.9
Underweight	4	8.7	4	9.1

Nutritional status of infants aged 6-14weeks of mothers with PPD using LFA Z-sores

LFA Z-Scores	N=46	%	After adjusting for low birthweight N=44	%
Normal	32	69.6	32	72.7
Stunted	14	30.4	12	27.2

**Total number of infants was 46 since there were 1 multiple births and 44 after adjusting for confounding factor-low birthweight.*

Using the WFL Z-score, it was observed that 41 (93.2%) infants were normal while 3 (6.8%) were wasted after adjusting for confounding factors such as low birthweight as indicated in Table 11. Furthermore, the study established while using WFA Z-score that 40 (90.9%) of the infants of mothers with PPD were normal while 4 (9.1%) were underweight after adjusting for the condounding factors such as low birthweight. Additionaly, LFA Z-score revelaed that 32 (72.7%) of the infants aged 6-14weeks of mothers with PPD were normal while 12(27.2%) were stunted after adjusting for confounding factors such as low birthweight.

4.4 Discussion of Findings

This section presents a summary of the main findings by objectives it relates it to existing literature while highlighting the similarities and differences.

4.4.1 Prevalence of Postpartum Depression

This study demonstrated that the period between 6 to 14 weeks postpartum poses a higher risk for postpartum depression (PPD) due to the significant changes in a woman's roles and responsibilities following childbirth. The study revealed a prevalence rate of 17.5%, indicating that approximately 1 in every 6 mothers experienced PPD during this timeframe. This prevalence aligns closely with the global estimate of 17.7% reported by Hahn-Holbrook et al. (2018) in their comprehensive analysis of 291 studies involving 296,284 mothers from 56 countries.

Furthermore, it is close to the prevalence rates of Sub-Saharan Africa, particularly East Africa, which was found to be around 18.6%, as established by Woldeyohannes et al. (2021) in a meta-analysis of 26 studies involving 30,021 mothers. This figure is also consistent with Kenya's estimated prevalence of 18.7%, as reported by Ongeri et al. (2018) in their study involving 171 mothers from the antenatal stage up to 6-10 weeks postpartum. The similarity in findings across these studies can be attributed to the common focus on the 6-14 weeks postpartum period, similar maternal sociodemographic characteristics, and the use of comparable screening tools such as the EPDS scale with a cut-off score of ≥10 for identifying maternal PPD.

Nevertheless, the results of this investigation indicate a higher prevalence of maternal postpartum depression (PPD) compared to the findings of Madeghe et al. (2016) in their study conducted in Nairobi, Kenya, which involved 200 mothers at 6-14 weeks postpartum which reported a prevalence of 13.0%. The variance in prevalence rates can

be attributed to the utilization of different cut-off scores on the EPDS scale, with a threshold of ≥13 in their study. Similarly, Amipara et al. (2020) conducted a study in Gujarat, India, involving 116 mothers between 1 week to 1 year postpartum, which reported a PPD prevalence of 6.8% using a cut-off point of >10.5 on the EPDS scale. The difference in prevalence rates can be attributed to variations in the study duration and the setting, as their study was community-based.

Furthermore, the outcomes of this investigation were lower than those reported by Kerie et al. (2018) in their study conducted in Southwest, Ethiopia, which included 422 mothers within one year postpartum and reported a prevalence of 33.82% on the EPDS scale with a cut-off score of ≥10.5. This higher prevalence rate could be attributed to the longer study duration of 12 months postpartum.

It is worth noting that the EPDS scale is widely used as a screening tool for maternal PPD, with standard cut-off scores ranging from ≥10 to ≥13. If the cut-off score in this study had been set at ≥13, the prevalence of maternal PPD would have been found to be 9.7% (25 mothers).

4.4.2 Maternal Socio-Demographic Characteristics

The study reported that the age range of the mothers involved in the research was between 18 and 49 years, with an average age of 27.6±5.7 and a median age of 27 years. These findings align with similar studies conducted by Adamu and Adinew, (2018), Hassan et al. (2016) and Roumieh et al. (2019). Additionally, it was determined that 209 (81.3%) of the mothers were married, which is consistent with the results of Adamu and Adinew, (2018) and Madeghe et al. (2016). Furthermore, out of all the mothers, 124 (48%) had completed secondary education, which is in line with the findings of Agarwala et al. (2019) and Roumieh et al. (2019), but contradicts the

findings of Madeghe et al. (2016), who observed that a significant number of mothers had only attained primary education. Moreover, 93 (36.2%) of the mothers reported being self-employed, which is similar to the findings reported by Sharmin et al.(2019).

Additionally, approximately 73 (28.4%) of the participants had no income, and the average income of the mothers was found to be Kshs. 9451±9228, which is comparable to the findings of Madeghe et al. (2016), but differs from the outcomes of Agarwala et al. (2019), who noted that a large number of mothers had higher incomes. Furthermore, 223 (86.3%) of the mothers in the study belonged to nuclear families, which aligns with the findings of Sharmin et al. (2019), but contradicts the reports of Agarwala et al. (2019), who found that a significant number of mothers came from extended families. This variation may be attributed to regional differences.

4.4.3 The Maternal Obstetric Factors of Mothers

The results of this study on maternal obstetric factors revealed that 77(30%) mothers had a gravidity of two (2) with an average gravidity of 2.4±1.2SD, while 85(33.1%) mothers had 2 living children, aligning with the conclusions drawn by Agarwala et al. (2019). Furthermore, the study identified that 37(14.4%) of the mothers had experienced miscarriages in the past, which is consistent with the findings of Agarwala et al. (2019).

Moreover, the study highlighted that 106(41.2%) mothers reported that their current pregnancy was unplanned, a result that is in line with various other studies such as Adamu and Adinew, (2018), Kerie et al.(2018), Khalifa et al. (2016) and (Shitu et al., 2019). Additionally, it was discovered that 50(19.5%) mothers faced complications during the current pregnancy, mirroring the results of Adamu and Adinew, (2018),

Roumieh et al. (2019) and Agarwala et al. (2019), with hypertension (15, 30%) and antepartum hemorrhage (8, 16%) being the most common complications reported.

The study also found that 227(88.3%) mothers had a normal vaginal delivery, while 103(40.1%) did not have a specific preference for the sex of the unborn child, consistent with the findings of Mathisen (2013) and contradicting the results of Hassan et al. (2016) who noted a preference for male infants among the majority of mothers. Furthermore, 136(52.3%) infants were male, and 3(1.2%) of the births were multiple (twins).

Furthermore, a total of 38 mothers (14.8%) stated that they had unresolved issues in the past three months. This finding aligns with the research conducted by Adamu and Adinew, (2018), Roumieh et al. (2019), Kerie et al.(2018) and Khalifa et al. (2016). The reported issues by the mothers included family conflicts (10 or 3.9%), financial constraints (9 or 3.5%), and neglect by their partners (6 or 2.3%). The agreement in these findings can be attributed to the similar sociodemographic characteristics of the mothers, the comparable study timeframe, and the utilization of the same screening tool.

4.4.4 The Infant Feeding Practices

This study demonstrated that 94.6% of mothers practiced exclusive breastfeeding, a rate higher than the global prevalence of exclusive breastfeeding (41%) (WHO & UNICEF, 2018) and national prevalence of exclusive breastfeeding (60%) among infants less than 6 months of age (KDHS, 2022). Additionally, among the mothers who supplemented their infants' diet with other substances, they feed them with; cow’s milk (50%), plain water (25%), and porridge (25%) in addition to breast milk. The reasons cited for mixed feeding were insufficient breast milk, sore nipples, lack of breastfeeding knowledge, and

being a working mother. Introducing infants to foods other than breast milk puts them at risk of illnesses like diarrhea, which can impact their nutritional well-being. These results align with similar studies, such as Shewangzaw et al. (2018) in East Ethiopia, where exclusive breastfeeding prevalence was reported at 95.9% among postpartum mothers. The similarities in maternal sociodemographic characteristics between the two East African countries may explain these findings. Furthermore, the study by Amipara et al., (2020) in Gujarat, India, revealed that 100% of postpartum mothers exclusively breastfed their infants for 4-8 weeks. The high rate of exclusive breastfeeding at EWMH is attributed to enhanced maternal knowledge resulting from ongoing health education at the facility.

4.4.5 The Nutritional Status of Infants

The nutritional status of infants aged 6-14 weeks at Eldoret West Maternity Hospital was assessed using weight for length (WFL) Z-score. The study found that 80.8% of the infants were classified as normal, 11.9% were overweight, 3.5% were at risk of wasting, 2.3% were moderately malnourished (MAM) and 1.5% were severely malnourished (SAM). This resulted in an acute malnutrition prevalence of 3.8%, which is lower than both the prevalence in Uasin Gishu county (4.9%) and the national prevalence level (5%) (KDHS, 2022).

Furthermore, when weight for age Z-score was used, 78.8% of the infants were normal, 13.5% were at risk of being underweight, 4.2% were moderately underweight and 2.7% were severely underweight. This led to an underweight prevalence of 6.9%, which is lower than the prevalence in Uasin Gishu county (7.4%) and the national prevalence (10%) (KDHS, 2022).

In terms of length for age (LFA) Z-score, 72.7% of the infants were normal, while 27.3% were stunted. This stunting prevalence is higher than the prevalence in Uasin Gishu county (16.9%) and the national prevalence of 18% (KDHS, 2022). The researchers suggest that this may be due to intrauterine growth retardation caused by poor maternal nutrition and inadequate infant feeding practices.

These findings are similar to a study conducted by Wemakor & Mensah (2016) on postpartum mothers-infant pairs in Northern Ghana, which reported a stunting prevalence of 16%. However, the prevalence is lower than the findings of Saeed et al. (2017) in their study on socially disadvantaged mothers with infants under 2 years in Pakistan, where the prevalence of stunting and underweight was 36.6% and 35.4% respectively. This difference may be attributed to the social disadvantage of the mothers in the Pakistan study compared to the socioeconomic level of the women at Eldoret West Maternity Hospital.

4.4.6 The Association Between Maternal Postpartum Depression and Infant Feeding Practices

This research demonstrated that postpartum depression (PPD) has an impact on the feeding practices of infants, which in turn affects their nutritional status. However, it should be noted that this association is not statistically significant in that out of 45 mothers with PPD, only 4(8.9%) had practiced mixed feeding compared to 41(91.1%) who practiced exclusive breastfeeding. The prevalence of exclusive breastfeeding among mothers with PPD (91.1%) exhibits a high prevalence compared to the global prevalence (41%) and the national prevalence in Kenya of exclusive breastfeeding (60%) among infants less than 6 month of age (KDHS, 2022).

Additionally, mothers experiencing postpartum depression were more inclined to introduce supplementary foods earlier, leading to potential implications on their infants'

nutritional status as evidenced by the 8.9% of mothers with PPD who practiced mixed feeding of their 6-14 week old infants, findings that is similar to the findings of other studies such as one by Figueiredo et al. (2014) in Porto, Portugal, three months after childbirth who revealed that depressed mothers struggle to effectively breastfeed their infants due to their inability to fully concentrate on nurturing and feeding them. It similarly agrees with Hurley et al. (2015) findings from a study conducted in the United States of America that found out that mothers with postpartum depression (36.9%) introduced solid foods before the age of four months and also findings from a study carried out by Sha et al. (2019) in China which reported a significant association between postpartum depression (PPD) and early introduction of formula feeds.

Additionaly, the findings concurred with the findings of Nguyen et al. (2014) in studies conducted in three countries: Bangladesh, Vietnam, and Ethiopia which revealed that women with depression exhibited irritability and hostility towards their children, leading to neglect of their infants' hunger and inadequate breastfeeding. It also agrees with the findings of a study by Madeghe et al., (2016) which revealed that mothers with postpartum depression were significantly more likely to practice mixed feeding.

However, the findings of this study conflicted with the findings of Sharmin et al. (2019) in Bangladesh and Lima et al. (2017) in Sao Luis, Brazil which did not find any association between maternal postpartum depression and child feeding practices. Moreover, the study findings negated the findings of a systematic review of 26 studies in Sub-Sahara Africa by Woldeyohannes et al., (2021) which concluded that there was no significant impact of PPD on breastfeeding practices.

4.4.7 The Association between Maternal Postpartum Depression and Infant Nutritional Status

The study found out an association between maternal postpartum depression and malnutrition in infants aged 6-14 weeks at Eldoret West Maternity Hospital. Malnutrition in the form of stunting among infants 6-14 weeks of age of mothers with PPD was found to be 27.2%, a level that is higher than the global prevalence of stunting among under five years (21.9%) (UNICEF/World Bank/WHO, 2020) and Kenyan prevalence of stunting among less than 6 months (24.3%) as well as the prevalence of stunting among infants under five years of age in Uasin Gishu County (16.9%) (KDHS, 2022).

The study further, established the levels of wasting among infants 6-14weeks of mothers with PPD at Eldoret West Maternity Hospital to be 6.8%, a level that is lower than the global prevalence among underfive year children (7.3%) (UNICEF/World Bank/WHO, 2020), but higher than the national prevalence of wasting in Kenya among in infants less than 6 months of age (4.4.%) and the prevalence in Uasin Gishu County among under five years children (4.9%) (KDHS, 2022).

Moreover, the study established malnutrition level in form of underweight in infants aged 6-14 weeks of mothers with PPD to be 9.1%. underweight. A level higher than the prevalence of underweight in both Kenya among infants less than 6 months (7%) and Uasin Gishu County among underfive year children (7.4%) (KDHS, 2022).

The higher prevalence of malnutrition in infants aged 6-14 weeks at Eldoret West Maternity Hospital can be attributed to the influence of PPD on infant feeding practices. This often leads to the early introduction of complementary feeds before six months, which may result in infants developing childhood illnesses like diarrhea and receiving inadequate nutrients, ultimately compromising their nutritional status. The results are consistent with those of other research studies. For example, in Tanzania, Holm-Larsen

et al. (2019) found that infants born to mothers with postpartum depression were more likely to be stunted and wasted.

Similarly, in Ghana, Wemakor & Mensah. (2016) observed a higher prevalence of stunting (16%) in infants of mothers with PPD. Additionally, a study in Brazil by Hassan et al. (2016) also noted that infants of mothers with PPD were more likely to be wasted. These findings are also in line with a study conducted in Bangladesh, Vietnam, and Ethiopia by Nguyen et al. (2014), which showed an association between PPD and stunting in infants born to depressed mothers. The similarities in findings regarding the impact of PPD on infants' nutritional status can be attributed to the comparable socio-demographic characteristics between Kenya and the countries where the studies were conducted.

Moreover, the results are inconsistent with studies such as Wemakor & Iddrisu (2018) in Ghana, who found no statistically significant relationship between maternal PPD and infants' nutritional status. This lack of significance was attributed to the similar levels of stunting in infants of mothers with postpartum depression and those without. Furthermore, the findings were in contrast with a study in Sao Luis, Brazil by Lima et al. (2017), which also reported no statistically significant association between maternal PPD and malnutrition (stunting) and a study in Nairobi, Kenya by Madeghe et al. (2016) which revealed elevated levels of underweight among infants 6-14weeks (34%) of mothers with PPD compared to infants of mothers without PPD, possibly due to the socioeconomically disadvantaged backgrounds of the mothers in those regions and the Nairobi study being a community-based study as well as the researchers including at risk infants as part of those with underweight which was not the case with this current study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings and the conclusions drawn from them, and makes recommendations for stakeholders that can be implemented to help address the problem identified in the study.

5.2 Summary of the Findings

The study sought to determine the prevalence of maternal postpartum depression among mothers 6-14 weeks after delivery, to assess maternal socio-demographic characteristics at 6-14 weeks after delivery, to assess maternal obstetric factors at 6-14 weeks postpartum, to evaluate the feeding practices of infants aged 6-14weeks and assess the nutritional status of infants aged 6-14. The study used a structured questionnaire with both open and closed ended questions. A summary of the major findings arising from the analysis of these variables is presented in this section according to these objectives.

5.2.1 To Determine the Prevalence of Maternal Postpartum Depression among Mothers 6-14 Weeks after Delivery

The research conducted at Eldoret West Maternity Hospital revealed that the rate of maternal postpartum depression (PPD) was 17.5%, which is consistent with global levels and close to the prevalence of Sub-Saharan Africa, particularly East Africa.

5.2.2 To Assess Maternal Socio-Demographic Characteristics at 6-14 weeks after Delivery

The research reported the sociodemoghraphic characteristcis of the 6 to 14 weeks postpartum mothers to include; the age range of between 18 and 49 years, with an average age of 27.6±5.7 and a median age of 27 years. Findings that align with

findings of similar studies such as; Adamu and Adinew, (2018), Hassan et al. (2016) and Roumieh et al. (2019). On the marital status, 209 (81.3%) of the mothers were married, which is consistent with the results of Adamu and Adinew, (2018) and Madeghe et al. (2016). Furthermore, 124 (48%) had completed secondary education, which is in line with the findings of Agarwala et al. (2019). Moreover, on employment status, 93 (36.2%) of the mothers reported being self-employed, which is similar to the findings reported by Sharmin et al.(2019). Approximately 73 (28.4%) of the participants had no income, and the average income of the mothers was found to be Kshs. 9451±9228, which is comparable to the findings of Madeghe et al. (2016). Furthermore, 223 (86.3%) of the mothers in the study belonged to nuclear families, which aligns with the findings of Sharmin et al. (2019).

5.2.3 To Assess Maternal Obstetric Factors at 6-14 Weeks Postpartum

The research established the maternal obstetric factors of 6-14 weeks postpartum mothers at Eldoret West Maternity Hospital to include; a gravidity of two (2) among 77(30%) mothers with an average gravidity of 2.4±1.2SD, and a parity of 2 living children among 85(33.1%) which align with the conclusions drawn by Agarwala et al. (2019). Furthermore, miscarriages were reported to have been experienced in the past by 37(14.4%) of the mothers, which is consistent with the findings of Agarwala et al. (2019). The current pregnancy was reported to be unplanned by 106(41.2%) mothers, concurring with findings of studies such as Adamu and Adinew, (2018), Kerie et al.(2018), Khalifa et al. (2016) and (Shitu et al., 2019). Additionally, complications during the current pregnancy was reported by 50(19.5%) mothers, which mirror the results of Adamu and Adinew, (2018), Roumieh et al. (2019) and Agarwala et al. (2019), with hypertension (15, 30%) and antepartum hemorrhage (8, 16%) being the most common complications reported.

Normal vaginal delivery was reported by 227(88.3%) mothers while 103(40.1%) of the mothers did not have a specific preference for the sex of the unborn child, consistent with the findings of Mathisen (2013). Furthermore, 136(52.3%) infants were male, and 3(1.2%) of the births were multiple (twins). Furthermore, 38 mothers (14.8%) stated that they had unresolved issues in the past three months, which aligns with findings of Adamu and Adinew, (2018), Roumieh et al. (2019), Kerie et al.(2018) and Khalifa et al. (2016). The reported issues by the mothers included family conflicts (10 or 3.9%), financial constraints (9 or 3.5%), and neglect by their partners (6 or 2.3%).

5.2.4 To Evaluate the Feeding Practices Of Infants Aged 6-14weeks

The research reported that 94.6% of 6-14weeks postpartum mothers at Eldoret West Maternity Hospital practiced exclusive breastfeeding, a rate higher than the global (WHO & UNICEF, 2018) and national prevalence of exclusive breastfeeding among infants less than 6 months of age (KDHS, 2022). The mothers who supplemented their infants' diet with other substances, fed them with; cow's milk (50%), plain water (25%), and porridge (25%) in addition to breast milk. The reasons cited for mixed feeding were insufficient breast milk, sore nipples, lack of breastfeeding knowledge, and being a working mother. These results align with similar studies, such as Shewangzaw et al. (2018). The high rate of exclusive breastfeeding at EWMH is attributed to enhanced maternal knowledge resulting from ongoing health education at the facility.

5.2.5 To Assess the Nutritional Status of Infants Aged 6-14weeks

The research established the following on the nutritional status of infants aged 6-14 weeks at Eldoret West Maternity Hospital; acute malnutrition prevalence of 3.8%, which is lower than both the prevalence in Uasin Gishu county and the national prevalence level (KDHS, 2022). Further more, underweight prevalence of 6.9%, which is

lower than the prevalence in Uasin Gishu county and the national prevalence (KDHS, 2022). Additionaly, stunting prevalence of 27.3%, a prevalence that is higher than the prevalence in Uasin Gishu county and the national prevalence (KDHS, 2022). These findings are similar to those of studies such as Wemakor & Mensah (2016).

5.2.6 To Assess the Association between Postpartum Depression and Feeding Practices of Infant Aged 6-14 Weeks

The research demonstrated that postpartum depression (PPD) impacts on the feeding practices of infants though the association is not statistically significant in that out of 45 mothers with PPD, only 4(8.9%) had practiced mixed feeding compared to 41(91.1%) who practiced exclusive breastfeeding. A higher prevalence of exclusive breastfeeding compared to the global and the national prevalence in Kenya among infants less than 6 month of age (KDHS, 2022). Additionally, mothers with postpartum depression were more inclined to introduce supplementary foods earlier, as evidenced by the 8.9% of mothers with PPD who practiced mixed feeding of their 6-14 week old infants, findings that is similar to other studies such Figueiredo et al. (2014), Hurley et al. (2015), Sha et al. (2019), Nguyen et al. (2014) and Madeghe et al., (2016) which revealed that mothers with postpartum depression were significantly more likely to practice mixed feeding. However, the 8.9% of mothers with PPD who practiced mixed feeding of their infants aged 6-14weeks, cited reasons such as insufficient breast milk, sore nipples, inadequate knowledge about breastfeeding, and being occupied with work as a working mother as the reasons for the mixed feeding.

5.2.7 To Assess the Association between Postpartum Depression and Nutritional Status of Infants Aged 6-14weeks

The study found out an association between maternal postpartum depression and malnutrition in infants aged 6-14 weeks at Eldoret West Maternity Hospital. Malnutrition

in the form of stunting was found to be 27.2%, a level that is higher than the global prevalence of stunting among under five years (UNICEF/World Bank/WHO, 2020) and Kenyan prevalence of stunting among less than 6 months as well as the prevalence of stunting among infants under five years of age in Uasin Gishu County (KDHS, 2022).

It further, established the levels of wasting to be 6.8%, a level that is lower than the global prevalence among underfive year children (UNICEF/World Bank/WHO, 2020), but higher than the national prevalence of wasting in Kenya among in infants less than 6 months of age and the prevalence in Uasin Gishu County among under five years children (KDHS, 2022). Moreover, the prevalence of underweight was found to be 9.1%, a level that is higher than the prevalence of underweight in both Kenya among infants less than 6 months and Uasin Gishu County among underfive year children (KDHS, 2022).

The higher prevalence of malnutrition in infants aged 6-14 weeks at Eldoret West Maternity Hospital can be attributed to the influence of PPD on infant feeding practices which often lead to the early introduction of complementary feeds before six months, resulting in infants developing childhood illnesses like diarrhea and receiving inadequate nutrients, ultimately compromising their nutritional status. The results are consistent with other studies such as; Holm-Larsen et al. (2019), Wemakor & Mensah. (2016), Hassan et al. (2016) and Nguyen et al. (2014), which showed an association between PPD and malnutrition among infants born to depressed mothers.

5.3 Conclusions

The research established that the prevalence of maternal postpartum depression among mothers 6-14 weeks postpartum at Eldoret West Maternity Hospital, Uasin Gishu County is 17.5%, which aligns with the global prevalence rate and is close to the national

average. The study revealed that PPD can impact infant feeding practices, this is because depressed mothers may struggle to recognize and respond to their infants' hunger cues, hindering proper feeding. Additionally, these mothers may experience negative emotions that interfere with nurturing and feeding their infants, potentially leading to the early introduction of other foods and premature cessation of breastfeeding, which is recommended exclusively during the 6-14 week period and can result in infant malnutrition. These research findings will enhance our understanding of the prevalence of PPD and its association with infant feeding practices and nutritional status, serving as a foundation for identifying and screening mothers at risk of PPD based on specific determinants.

5.3 Recomendations

5.3.1 Recommendation for Policy

Screening of mothers for postpartum depression (PPD) should form an essential part of the routine screening at maternal and child health clinics. This will help identify early signs of depressive symptoms in mothers for referral and early treatment.

The Ministry of Health should develop policies that integrate mental health into the reproductive health care of postpartum mothers. This will ensure that mental health issues, including postpartum depression, are given the necessary attention and support within the broader framework of reproductive health services.

The Ministry of Health be tasked with creating and executing specific breastfeeding education and support initiatives to tackle the obstacles faced by mothers who are not exclusively breastfeeding.

5.3.2 Recommendation for Further Research

Further investigation should be conducted using various research methodologies and at community-based levels rather than facility-based levels in order to uncover additional factors that may be influencing depressive symptoms in postpartum mothers.

Additionally, research using longitudinal research design should be undertaken to examine the impact of postpartum depression on infant feeding practices and nutritional status.

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APPENDICES

Appendix I: Questionnaire

Questionnaire: Maternal Postpartum Depression,Feeding Practices and Nutritional Status of Infants aget 6 to 14 weeks at Eldoret West Maternity Hospital, Uasin Gishu County, Kenya

Date of the study_____

Respondents' code_____

Section I: Determinants of Maternal PPD (Maternal factors and Socio-demographic characteristics);

1. Age in years?

Age group	**Tick(√)**
18-20	
21-25	
26-30	
31-35	
36-40	
41-44	

2. Marital status?

Marital status	**Tick(√)**
Single	
Married	
Divorced/separated	
Widowed	

3. Highest education level?

Highest Education level	**Tick(√)**
No formal education	
Primary	
Secondary	
Tertiary College	
University	

4. Current occupation?

Current Occupation	**Tick(√)**
Housewife	
Student	
Self employed	
Casual labourer	
Formal employed	
Others (specify)……..	

5. Maternal gross income in Kenya shillings per day?

Gross income (Kshs)	**Tick(√)**
Less than 5,000	
5,001-10,000	
10,001-15,000	
15001-20,000	
20,001-25,000	
Above 25,000	

6. Type of family?

Type of family	**Tick(√)**
Nuclear	
Extended	

7. How many times have you been pregnant?_____
8. How many living children do you have?_____
9. Had you planned for the current pregnancy?

You planned for the pregnancy	**Tick(√)**
Yes	
No	

10. Did you have any complications in the last pregnancy?

Complications in pregnancy	**Tick(√)**
Yes	
No	

11. If yes, which complication?_____
12. Type of delivery of the last baby?

Type of delivery	**Tick(√)**
Normal (vaginal)	
Caesareansection	
Others (specify)……	

13. Which was your preferred sex of new baby?

Preferred sex of baby	**Tick(√)**
Boy	
Girl	
Any	

14. What is the sex of your current baby?

Sex of baby	**Tick(√)**
Boy	
Girl	
Any	

15. What is the nature of your current birth?

Nature of Current birth	**Tick(√)**
Single	
Twin	
Triplet	

Other (specify)_____

16. In the last three months, have you had some unresolved issues that have been troubling you?

Any unresolved issues	**Tick(√)**
Yes	
No	

17**.** If yes in 16 above,kindly tell us what it was:

_____

_____

_____

Section II: Edinburgh Postnatal Depression Scale (EPDS)

Date of the study_____

Respondents' code_____

Maagizo;

Kwa vile umejifungua hivi karibuni, tungependa kujuana mnaunavyo hisi. Tafadhali WEKA ALAMA YA MVIRINGO nambari ambayo iko umbavuni wajibu ambalo linalo karibiana na vile ulivyokuwa ukijihisi SIKU SABA ZILIZOPITA, nasi vile tuunavyo hisi leo.

Maswali yote kumi yanastahili yajibiwe.

	KISWAHILI
	Huunimfano, tayariumeshajazwa. Nimehisifuraha: A. Ndio, wakatiwote. B. Ndio, wakatimwingi. C. La, siokilamara D. La, hata. Hii ingemaanisha "nimehisi furaha kwa wakati mwingi" katika juma iliyopita. Tafadhali kamilisha maswali haya mengine kwa utaratibu huo huo.
	KISWAHILI
	KATIKA SIKU SABA ZILIZOPITA:
1.	Nimeweza kucheka na kuona jambo la kuchekesha katika mambo. A. Kama vile nilivyokuwa. B. Sio vile sanakwasasa. C. Kwa hakikasivyo vile kwasasa D. Hatakamwe.
2.	Nimetarajia mambo kwafuraha. A. Kama vile nilifanyadaima. B. Afadhali kidogo kuliko nilivyokuwa. C. Kwa hakika kidogo kuliko nilivyokuwa D. Hatakabisa.
*3.	Nimejilaumu bila sababu wakati mambo yalipoenda vibaya.. A. Ndio, wakatimwingi. B. Ndio, wakatimwingine. C. Siomaramingi D. La, kamwe.
4.	Nimekuwa na wasiwasi bila sababu nzuri. A. La, hatakamwe. B. Hatakabisa

	C. Ndio, wakati mwingine. D. Ndio, maranyingi.
*5.	Nimeshikwa na woga au hofu bila sababu njema. A. Ndio, hakika mara nyingi. B. Ndio, wakatim wingine. C. La, siosana. D. La kamwe.
*6.	Mambo yamekuwa yakinilemea. A. Ndio, wakati mwingi sijaweza kuvumilia kabisa. B. Ndio, wakati mwingine sijaweza kuvumilia kama kawaida. C. La, wakati mwingi nimevumilia hakika vizuri. D. La, nimevumilia vizuri kama kila wakati.
*7.	Nimekuwa na huzuni sana hadi nimekuwa na ugumu kupata usingizi. A. Ndio, wakati mwingi. B. Ndio, wakati mwingine. C. Sio kila mara. D. La, kamwe.
*8.	Nimesikia huzuni sana na kutokua na furaha. A. Ndio, wakatimwingi. B. Ndio, marakwamara. C. Siokilamara. D. La, kamwe.
*9.	Sijakuwa na furaha kabisa hadi nimetokwa na machozi. A. Ndio, wakati mwingi. B. Ndio, mara kwa mara. C. Mara chachetu. D. La, hasha.
*10.	Nimekuwa na mawazo yakujitendea mabaya. A. Ndio, mara kwa mara. B. Wakati mwingine. C. Kwa na dradaima. D. Hata.

Adopted and translated from English to Kiswahili by; Kumar M., Ongeri L., Mathai M., & Mbwayo, A. (2015). Translation of EPDS questionnaire into Kiswahili; Understanding the cross-cultural and translation issues in mental health research. Journal of Pregnancy and Child Health. 2:1, 1–5.

N/B: SCORING

Questions 1, 2 and 4 are scored 0,1,2,3 while questions 3*, 5*-10* are scored in the reverse of 3,2,1,0.

Maximum score is =30.

Depressive symptoms if scores are ≥10.

Normal if scores are <10.

Always look at item 10 (suicidal ideation).

Total score_____

Section III: Infant Feeding Practices Using A 24 Hour Recall

Date of the study_____

Respondent's code_____

1. Date of birth of the child_____
2. Since this time yesterday what did you feed your baby on? **(***circle whether yes or no*)

Other foods/solutions	**Responses**	
Plain water	Yes	No
Sugar/glucose added water	Yes	No
Fruit juice	Yes	No
Tea	Yes	No
Powdered/tinned milk	Yes	No
Cow's milk	Yes	No
Infant formula e.g. Nan	Yes	No
Porridge	Yes	No
Breast milk	Yes	No
Others(specify)……	Yes	No

3. Since this time yesterday, how did you give the foods to your baby?

You gave food to the baby using?	**Tick(√)**
A bottle and teat	
A cup and spoon	
Others(specify)……	

4. Give reason for introducing other foods to the baby other than breast milk
   _____
   _____
   _____

5. If not breastfeeding, when did you stop?_____ and why_____

Section IV: Infant Nutritional Status Data

Date of the study_____

Respondent's code_____

We request you to allow us to measure the weight and the length of your child with minimum clothing so that we may be able to tell if the child is growing normally or not.

1. Date of birth of the infant_____
2. Age of the infant in months_____
3. Infant's sex _____ Male ☐ Female ☐
4. Infant's birth weight _____
5. Infant's current weight in Kgs._____
6. Infant's current Length in cms. _____

-END-

We would like to thank you for your time and cooperation.

Note: WHO Anthros 3.2 analysis

WFL=

WFA=

LFA=

Birth weight interpretation

Birth weight	**Tick(√)**
Low birth weight;	
Normal	
Overweight	

Appendix II: Informed Consent Form

How are you? My name is _____ working with Ms. Rebecca ChepkemboiKurui a Postgraduate Student at Kabarak University Department of Human Nutrition.

I am requesting your permission to participate in the research study that is assessing Maternal Postpartum depression, feeding practices and nutritional status of infantsaged 6-14 weeksattending the maternal and child health (MCH) clinics for immunization here at Eldoret West Maternity Hospital.

I am requesting you to read (be read to) this consent form carefully. Participation into this study is voluntary. You are free to or not to accept to participate and you may choose to withdraw at any time. There will be no any form of payments or rewards for participation and your service provision in the clinic will not be affected if you choose to or not to participate in the study.

All the information that you will provide will be treated with high level of confidentiality and only the researchers will have access to the records that will be kept private. If in any way we should make public the study findings, any information that you will provide will not be included in a way that will make it possible for you to be identified. You have a right to asks questions at any point concerning the study and if you wish to be provided with the results of your interview, you are requested to provide us with your mobile number on this form.

If you agree to participate in the study, we shall provide you with a questionnaire with questions about yourself, your last pregnancy, your baby and how you and your baby are doing. There is also a section on the Edinburgh Postnatal Depression Scale (EPDS) that you will be required to complete on your own or with the assistance of the principal researchers or research assistants which will ask you about how you have been feeling in the past 7 days, a section on how you have been feeding your baby and the last section on the information about the measurements of your baby's weight and length so as to check on how your baby is growing.

In case where a participant will be positive for postpartum depression, she will benefit by being referred to a psychiatrist for further treatment. The results of this study can be used by the policy makers to improve on maternal mental health after delivery and infant nutritional status and health in general.

I have read the above information and having been informed about the study and understood all that it entails, I do willfully consent to take part in the study.

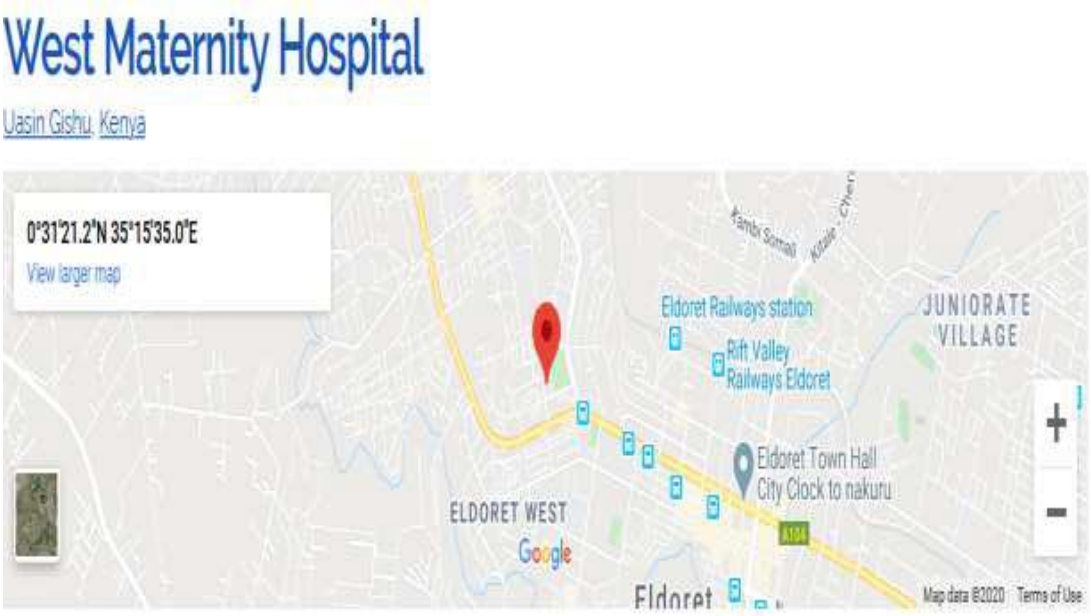
Respondent's code_____

Respondent's signature_____ Date _____

Researcher's Name _____ Signature _____

Date_____

Appendix III: Eldoret West Maternity Hospital Map



Appendix IV: KUREC Clearance Letter

KABARAK UNIVERSITY RESEARCH ETHICS COMMITTEE

Private Bag - 20157
KABARAK, KENYA
Email: kurec@kabarak.ac.ke

Tel: 254-51-343234/5
Fax: 254-051-343529
www.kabarak.ac.ke

OUR REF: KABU01/KUREC/001/03/03/22

Date: 14th March, 2022

Rebecca Chepkemboi Kurui,
Kabarak University,

Dear Rebecca,

RE: DETERMINANTS OF MATERNAL POSTPARTUM DEPRESSION AND ITS EFFECTS ON INFANT FEEDING PRACTICES AND NUTRITIONAL STATUS AT ELDORET WEST MATERNITY HOSPITAL, UASIN GISHU COUNTY-KENYA

This is to inform you that ***KUREC*** has reviewed and approved your above research proposal. Your application approval number is ***KUREC-030322.*** The approval period is ***14/03/2022 – 14/03/ 2023.***

This approval is subject to compliance with the following requirements:

i. All researchers shall obtain an introduction letter to NACOSTI from the relevant head of institutions (Institute of postgraduate, School dean or Directorate of research)
ii. The researcher shall further obtain a RESEARCH PERMIT from NACOSTI before commencement of data collection & submit a copy of the permit to **KUREC.**
iii. Only approved documents including (informed consents, study instruments, MTA Material Transfer Agreement) will be used
iv. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KUREC***:
v. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KUREC*** within 72 hours of notification;
vi. Any changes, anticipated or otherwise that may increase the risk(s) or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KUREC*** within 72 hours;
vii. Clearance for export of biological specimens must be obtained from relevant institutions and submit a copy of the permit to KUREC;
viii. 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 and;
ix. Submission of an executive summary report within 90 days upon completion of the study to ***KUREC***

Sincerely,

Prof. Jackson Kitetu PhD.
KUREC-Chairman

KABARAK UNIVERSITY
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
29 MAR 2022
APPROVED
P.O PRIVATE BAG - 20157, KABARAK

Cc Vice Chancellor
DVC-Academic & Research
Registrar-Academic & Research
Director-Research Innovation & Outreach
Institute of Post Graduate Studies

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)
Kabarak University is ISO 9001:2015 Certified

Appendix V: County Government of Uasin Gishu Authorization Letter

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF UASIN GISHU

Tel. NOs:direct line:053-2016215
053-2016000
053-2016125

Fax: +254-053-2062884
Website:www.uasingishu.go.ke
Email:info@uasingishu.go.ke

When Replying, Please Address to:
County Secretary
Uasin-Gishu County
P.O. Box 40 – 30100
Eldoret, Kenya.

REF: UGC/ADM.1/31/GEN/2022/VOL.I

27 May, 2022

Ms. Rebecca Chepkemboi Kurui,
Kabarak University,
P.O. Box Private Bag - 20157,
KABARAK.

APPROVAL TO CARRY OUT RESEARCH
WITHIN THE COUNTY GOVERNMENT

Your letter of 20 May, 2022 on the above subject is in reference.

Authority is hereby granted to you to carry out your research within Uasin Gishu County Government, for your academic use and we request you to share your findings with the Office of the undersigned. Your findings may be useful in addressing the Determinants of Postpartum Depression and its Effects on Infant Feeding Practices and Nutritional Status in the County.

By copy of this letter, the Ag. Chief Officer, Health Services is requested to assist you accordingly.

Edwin Bett
COUNTY SECRETARY/
HEAD OF COUNTY PUBLIC SERVICE

Copy: Chief Officer, Health Services.

Appendix VI: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **674441**

Date of Issue: **09/April/2022**

RESEARCH LICENSE

This is to Certify that Ms.. REBECCA CHEPKEMBOI KURUI of Kabarak University, has been licensed to conduct research in Uasin-Gishu on the topic: Determinants of Maternal Postpartum Depression and its Effects on Infant Feeding Practices and Nutritional Status at Eldoret West Maternity Hospital, Uasin Gishu County-Kenya for the period ending : 09/April/2023.

License No: **NACOSTI/P/22/16790**

674441

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix VII: Evidence of Conference Participation

NUTRITION ASSOCIATION OF KENYA
NUTRITION AND DIETETICS ACADEMY (LTD)

Awards this

CERTIFICATE OF PRESENTATION

To

REBECCA CHEPKEMBOI KURUI

For successfully presenting a Research Abstract during the
5th Scientific and Health Annual Conference held on 30th-31st October, 2023.
at Kenyatta National Hospital Training and Resource Centre - Nairobi

Chairman

Secretary General

Appendix VIII: List of Publication

AFRICAN JOURNAL OF NUTRITION AND DIETETICS

https://doi.org/10.58460/ajnd.v1i1.49

ORIGINAL ARTICLE

Open Access

MJM BIOLABS

Evaluating the Relationship Between Maternal Postpartum Depression, Infant Feeding Practices, and Infant Nutritional Status at a Maternity Hospital in Uasin Gishu County, Kenya

Rebecca KURUI[*1], **Wesley BOR**[1] and **Dorothy MITUKI**[2]

[1] *Department of Nutrition & Dietetics, School of Medicine & Health Sciences, Kabarak University*

[2] *Department of Human Nutrition and Dietetics, Faculty of Health Science, Egerton University*

Corresponding Author: *rkurui2014@gmail.com*

Article History

Submitted: 23rd September 2023

Accepted: 29th October 2023

Published Online: 31st October 2023

To read this paper online, please scan the QR code below:

ABSTRACT

Postpartum depression is a major maternal mental problem that has been shown to contribute to malnutrition in infants. This cross-sectional study explores the association between maternal postpartum depression (PPD) and infant feeding practices as well as infant nutritional status among infants aged 6-14 weeks at Eldoret West Maternity Hospital (EWMH) in Uasin Gishu County, Kenya.

The study involved 257 women of reproductive age with infants aged 6-14 weeks postpartum attending postnatal and maternal and child health clinics at EWMH. Data was collected using a modified Edinburgh Postnatal Depression Scale (EPDS) to screen for PPD and other questionnaires to gather sociodemographic information, feeding practices, and infant nutritional status. Multivariate logistic regression analyses were conducted to assess associations between maternal PPD, infant feeding practices, and nutritional status.

The prevalence of maternal PPD was 17.5%, with 1 in 6 mothers affected. Exclusive breastfeeding was practiced by 94.6% of mothers, exceeding the national level of 60%. Mothers with PPD were more likely to practice non-exclusive breastfeeding and were 1.4, 1.8 and 1.6 times more likely to have stunted, wasted and underweight infants respectively than mothers without PPD though the association was not statistically significant after adjusting for confounders.

Maternal PPD is prevalent among mothers at EWMH and is more likely to influence infant feeding practices particularly non-exclusive breastfeeding and nutritional status. Stunting, wasting and underweight were prevalent in infants of mothers with PPD.

These findings underscore the importance of integrating mental health and nutritional support services for mothers and infants in maternal healthcare settings. Early identification and intervention for maternal PPD can help improve infant feeding practices and nutritional outcomes, promoting the well-being of both mothers and their infants.

Keywords: maternal, postpartum depression, infants, malnutrition