

Emotional Responses and Mother-Infant Interactions of Mothers with Early-Preterm,  
Late-Preterm, and Full-Term Infants in Malawi

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Dissertation submitted in partial fulfillment of  
the requirements for the degree of Doctor  
of Philosophy in  
Nursing in the Graduate School  
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ABSTRACT

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## **Abstract**

Malawi has the highest preterm birth rate in the world and preterm birth contribute to more than one-third of the neonatal deaths annually. Malawi is also faced with limited resources, both human and material. The lack of incubators led to the adoption of Kangaroo Mother Care (KMC) as routine care for preterm infants. Families also provide support, physical and emotional during this entire period. Evidence from developed countries has shown that preterm birth contributes to maternal emotional distress (depressive, anxiety, and posttraumatic stress symptoms and maternal worry about child's health) and fewer maternal and infant interactive behaviors. The majority of published research globally has also focused on early-preterm infants and little research has been done on late-preterm infants. Studies in Malawi have also largely focused on postpartum depression and no published literature could be located on mother-infant-interactions. The purpose of this study was to explore emotional distress and mother-infant interactions of mothers with early-preterm, late-preterm, and full-term infants in Malawi.

This mixed method study and three-part investigation was conducted at Queen Elizabeth Central Hospital. The first part of the investigation was translation and validation of the Perinatal PTSD Questionnaire and the Child Health Worry Scale as measures for posttraumatic stress symptoms and maternal worry about child's health,

respectively. I conducted a focus group discussion with Malawian nurse-midwives (N=8) to assess content of translations in relation to original. I also tested the instruments on mothers in the perinatal period (N=30; 10 mothers of early-preterm infants, 10 mothers of late-preterm infants, and 10 mothers of full-term infants). Validated instruments from first phase were used in the second phase of the study. The second phase of the investigation compared emotional distress and mother infant interactions among 85 mother-infant dyads (28 mothers with their early-preterm, 29 mothers with their late-preterm, and 28 mothers with their full-term infants). Baseline assessments were done following birth for the three groups and follow-up assessments were conducted for mothers of the preterm groups. I also recorded and coded videos of mothers and infants to assess mother-infant interactions. The third phase of the investigation was qualitative (N= 19; 7 mothers with early-preterm infants, 7 mothers with late-preterm infants, and 5 mothers of full-term infants) and explored maternal perceptions of sources of concerns and social support following birth of their infants. In-depth interviews were conducted at the end of the study.

Findings showed that mothers of early-preterm infants experienced higher levels of emotional distress than mothers of full-term infants, with mothers of late-preterm infants being intermediate between the two. Cesarean birth was also associated with more anxiety and depressive symptoms. Kangaroo Mother Care had minimal effects on the change of emotional distress in mothers of the preterm groups. However, KMC

interruptions were associated with an increase in emotional distress. Minimal differences were seen in mother-infant interactions among the mothers and infants of the three groups. KMC had no impact on the interactive behaviors. Mothers' concerns during infant hospitalization were personal and family factors; prenatal and perinatal experiences; infant illness, treatments, and appearance; concerns about the infant's outcome; loss of parental role; health care workers and the healthcare system; infant care including breastfeeding concerns; and provision of KMC. Types of support received during the hospitalization included instrumental/tangible support, emotional support including spiritual support, and financial support. Mothers also preferred to have their own family as their caregivers during hospitalization.

Future studies need to focus on longitudinal methods to explore whether emotional distress experiences change over time and also to explore maternal and infant interactive behaviors as the babies mature. The Malawi healthcare system needs to provide support for mothers throughout the prenatal and perinatal period in order to lower maternal distress symptoms and promote positive mother-infant interactions.

## **Dedication**

I dedicate this dissertation to my late mother Doreen Mulichi Katete-Gondwe to whom I owe my courage and hard work and to my late father Macknon Chamumono Gondwe. You both live on through me.

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# 1. Introduction and Background

The world has an estimated 15 million preterm infants born each year, and one million of these infants die from complications of prematurity (World Health Organization, 2016). The highest preterm birth rate was recorded for Malawi, estimated at 18.1 per 100 live births (Blencowe et al., 2012; World Health Organization, 2016). Preterm birth is birth before 37 completed weeks gestation and full-term birth is birth from 37 completed weeks to 42 weeks gestation (World Health Organization, 1977, 2016). The World Health Organization (2016) has classified preterm infants into three groups; extremely preterm (<28 weeks gestation), very preterm (28 to 32 weeks gestation), and moderate to late-preterm (32 to 36 weeks gestation). Researchers have also classified preterm infants into early-preterm (<34 weeks gestation) and late-preterm (34 0/6 to 36 6/7 weeks) infants (Brandon et al., 2011; Ghorbani, Dolatian, Shams, Alavi-Majd, & Tavakolian, 2014). The mortality of preterm infants is high in infants less than 32 weeks and rates are even higher in low-income countries due to the lack of feasible and cost-effective interventions to promote warmth, breastfeeding support, and the basic infant care to prevent complications such as neonatal infections and breathing difficulties (World Health Organization, 2016).

Childbirth is an emotionally intense experience that can trigger negative maternal emotional responses such as posttraumatic stress and postpartum depression

(Davies, Slade, Wright, & Stewart, 2008), but preterm birth increases the risk of maternal emotional distress more than full-term birth (Brandon et al., 2011; DeMier, Hynan, Harris, & Manniello, 1996; Ghorbani et al., 2014). Mothers of preterm infants have described motherhood as mentally stressful and filled with interruptions, while mothers of full-term infants found the experience after childbirth more straightforward (Brandon et al., 2011). In addition, maternal emotional distress due to preterm birth contributed to less positive mother-infant relationship (Holditch-Davis, Cox, Miles, & Belyea, 2003; Holditch-Davis, Schwartz, Black, & Scher, 2007; Spinelli, Poehlmann, & Bolt, 2013).

Malawian mothers also worry about pregnancy. The vernacular term of 'pakati' for a pregnant woman literally means being "in between," as in between life and death (Stewart, Umar, Gleadow-Ware, Creed, & Bristow, 2015). However, available research on maternal emotional responses and preterm birth in the perinatal period is limited and mainly focusing on postpartum depression and perinatal distress regardless of gestation (Dow, Dube, Pence, & Van Rie, 2014; Stewart et al., 2015; Stewart et al., 2008). In addition, published literature comparing emotional responses among Malawian mothers with early-preterm, late-preterm, and full-term infants does not yet exist. Thus, a gap exists in literature on emotional distress in mothers of preterm infants (early or late) and mother-infant interactions in both preterm and full-term dyads in Malawi. The lack of extensive research on maternal emotional distress and mother-infant interactions in a

country with the highest preterm birth rate in the world is a challenge because if Malawian mothers do experience emotional distress and less positive mother-infant interactions after preterm birth, means mothers are not receiving comprehensive care in the postpartum period. This chapter discusses the burden of preterm birth in Malawi, how preterm birth affects maternal mental health and mother-infant interactions, and the need for research in Malawi on mothers and their preterm and full-term infants.

### ***1.1 The situation in Malawi***

In Malawi, the lack of resources to care for the extremely preterm infants (<28 weeks) dictates in the viability of fetuses to be set at 28 weeks gestation and a birth weight of at least 1000g (Metaferia, Kafulafula, & Malunga, 2005). The American College of Obstetricians and Gynecologists defines a periviable birth as birth between 20 0/7 to 25 6/7 weeks gestation (The American College of Obstetricians and Gynecologists et al., 2017). In addition, Research among members of the American College of Obstetricians and Gynecologists showed that obstetricians/gynecologist considered 24 weeks gestation as viable fetus (Morgan, Goldenberg, & Schulkin, 2008). Thus, preterm birth in Malawi might be higher than reported because extremely preterm infants (<28 weeks) who would be counted as preterm births in developed countries are considered miscarriages. I utilized Brandon et al. (2011) classification of preterm infants for this

study; early-preterm infants (<34 weeks gestation) and late-preterm infants (34 0/6 to 36 6/7 weeks).

The risk of preterm birth in Malawi has been associated with a history of preterm birth, persistent malaria despite malaria prophylaxis, young maternal age (less than 20 years of age), anemia, underweight mothers, and previous preterm delivery (van den Broek, Jean-Baptiste, & Neilson, 2014). Levison et al. (2014) also found that young maternal age was a factor associated with preterm birth in Malawi in addition to domestic violence, overwork, maternal illnesses, sexually transmitted diseases, multiple pregnancies, and short interval between pregnancies. These high rates of preterm birth and the accompanying complications associated with preterm birth are concerning for a country with limited resources and high infant mortality.

### **1.1.1 The burden of preterm birth in Malawi**

In Malawi, preterm birth account for more than 5,800 neonatal deaths annually and in 2010 alone complications of prematurity contributed to 37% of the 18,000 neonatal deaths in the country (Zimba et al., 2012). A study in Lilongwe, Malawi found that the survival rate for extremely low birthweight preterm infants (weighing less than 1000g) was only 7%, for very low birthweight infants (weighing between 1000 to 1499g) was 52%, and for low birthweight preterm infants (1500–2499g) was 90% (Ahlsen, Spong, Kafumba, Kamwendo, & Wolff, 2015). A similar study at Queen Elizabeth

Central Hospital in Blantyre, Malawi found that preterm infants weighing less than 1500 grams accounted for almost half of the neonatal deaths in the neonatal nursery and only 42% of these very low birth weight infants survived to discharge (Rylance & Ward, 2013). In addition, 58% of the deaths occurred in the first 48 hours of life, and infants who survived had longer hospitalizations (Rylance & Ward, 2013). The length of the hospitalization was negatively correlated with infant birthweight, thus infants who had lower birthweights stayed longer in the hospital than infants with higher birthweights (Rylance & Ward, 2013). Managing the above complication is also a challenge in Malawi where keeping preterm infants warm is difficult because incubators are often limited and the available ones are often broken, a fact that led to the introduction of Kangaroo Mother Care (KMC) (Zimba et al., 2012).

### **1.1.2 Care of full-term and preterm infants in Malawi healthcare system**

In Malawi, mothers in preterm labor are referred to secondary level (district hospitals) or tertiary level (central hospitals) of care that have the capacity to manage high-risk mothers and also Neonatal Nurseries for admission of high-risk infants. Malawian full-term and stable late-preterm infants are admitted with their mothers to the postnatal ward and discharged within 24 hours of birth for spontaneous vertex delivery and at least 72 hours for cesarean sections with no complications. The postnatal wards are open space units with a few side wards where more than one mother is

admitted. Stable late-preterm infants weighing 2000-2499 grams are discharged within 24 hours on KMC as outpatients and they come for follow-up visits until they weigh 2,500 grams. Late-preterm infants weighing more than 2,500 grams are treated as full-term infants and this generalization prevents understanding whether mothers notice any challenges or if their experience with full-term infants is indeed similar.

On the other hand, high risk preterm infants, early or late, are cared for in the Neonatal Nursery. Neonatal Nursery Units usually have a critical care section where high-risk infants are admitted for observation under the nurses' care, and a KMC ward where mothers live-in with their stable early-preterm and low birth weight infants. However, these neonatal nurseries are also open-space units where multiple infants are nursed in one room and mother and infants are constantly aware of the presence of other mothers and their infants. During admission to the KMC ward, the healthcare workers and family members provide emotional support and occasionally assist mothers in offering kangaroo care to allow mothers to rest or provide continuous kangaroo care when mothers are medically ill.

Kangaroo Mother Care is a maternally administered intervention during which an infant is placed on the mother's chest, continuously or intermittently, naked except for a diaper and hat, in skin-to-skin contact (Davanzo et al., 2013). Kangaroo Mother Care is now a routine intervention for caring of preterm infants in Malawi (A. Gondwe,

Munthali, Ashorn, & Ashorn, 2016; Zimba et al., 2012). The implementation of KMC in Malawi has been effective in keeping infants warm and reducing overcrowding in the neonatal nursery (Zimba et al., 2012). It has also helped to reduce infant deaths from preterm birth by 50% (Zimba et al., 2012).

In order to promote effective utilization of KMC, mothers of preterm infants and low-birth weight infants in Malawi are counselled prior to initiation of KMC to help the mothers understand the benefits of skin-to-skin contact for their infants (Chisenga, Chalanda, & Ngwale, 2015). These benefits include provision of natural warmth to the infant, promotion of exclusive breast feeding, ability of the mother to frequently observe the infant, infant weight gain, and maternal and infant bonding (Chisenga et al., 2015). However, despite these benefits, implementation of KMC is a challenge and mothers still request early discharge against medical advice because of the long hospital stays; cultural influence on mothers' decisions that give spouses and in-laws more decision-making power which impedes the empowerment of mothers to make decisions on their own (Chisenga et al., 2015). In addition, the lack of assistance implementing skin-to-skin contact, discomfort with the KMC position, and mothers' preferences for incubator care over KMC impedes the implementation of KMC (Chisenga et al., 2015). Regardless of these challenges, mothers still felt that KMC is beneficial and they would recommend it to other mothers (Chisenga et al., 2015).

### **1.1.3 Patient provider relationships in the perinatal period**

Healthcare workers are a critical component of perinatal care because in addition to physical care they assist mothers to cope with maternal and infant needs during hospitalization (Holditch-Davis & Miles, 2000). However, in Malawi patient-provider relationships are at times strained because mothers are dissatisfied with healthcare workers whom some mothers described as being rude,, shouting or being disrespectful to the mothers (Kumbani, Bjune, Chirwa, Malata, & Åyvind Odland, 2013; Levison et al., 2014). In addition, the mothers reported that health workers left them unattended to, provided inadequate information, and offered inadequate care such as not providing medications for pain (Kumbani et al., 2013; Kumbani, Chirwa, Malata, Odland, & Bjune, 2012). Despite the mothers' concerns, it should also be noted that Malawi has a critical shortage of nursing and midwifery staff with the nurse staffing ratio estimated at 25 nurses per 100,000 of population (Hall, 2010). With these inadequate staffing numbers, mothers are often provided information in groups regardless of their specific needs or educational backgrounds, the use of group education resulted in some mothers understanding while others failed to grasp the concepts and reporting a lack of information (Chimtembo, Maluwa, Chimwaza, Chirwa, & Pindani, 2013).

## ***1.2 Global literature on the challenges of preterm birth***

### **1.2.1 Impact of preterm birth on maternal mental health**

Preterm birth, early or late, is associated with maternal emotional distress.

Studies in the United States showed that early and late-preterm birth posed a higher risk of maternal emotional distress than full-term birth (Brandon et al., 2011; Holditch-Davis et al., 2009). The sudden nature of the birth and having a fragile preterm infant was associated with the risk of maternal postpartum depressive, anxiety, and posttraumatic stress (PTS) symptoms and maternal worry about child's health (Brandon et al., 2011; Dudek-Shriber, 2004; Lasiuk, Comeau, & Newburn-Cook, 2013). Thus, preterm birth denied mothers psychological preparation for the birth and motherhood (Brandon et al., 2011; DeMier et al., 1996). Therefore, mothers with preterm infants experience an interruption in their childbirth trajectory and had to accept an early labor and an altered role as mother by needing to care for a fragile newborn infant.

Studies on early-preterm infants showed that mothers experienced more depressive, anxiety, and PTS symptoms and they worried more about the child's health than mothers with full-term infants (Callahan, Borja, & Hynan, 2006; Callahan & Hynan, 2002; Holditch-Davis et al., 2009; Miles, Holditch-Davis, Schwartz, & Scher, 2007). The poor prognosis of the early-preterm infants' condition and mothers' fear of infant death also led to worsened maternal emotional distress (Holditch-Davis & Miles, 2000). In

addition, mothers of early-preterm infants felt overwhelmed with the responsibility of infant care and guilt that they might have caused the preterm delivery (Garel, Dardennes, & Blondel, 2007).

Similarly, Brandon et al. (2011) reported higher levels of depressive, anxiety, and PTS symptoms and more worry about child's health that continued to be high even at 1 month after birth in mothers with late-preterm infants as compared to mothers with full-term infants. Baker, McGrath, Pickler, Jallo, and Cohen (2013) also found significantly higher levels of stress at delivery and 6 weeks postpartum in mothers with late-preterm infants than mothers with full-term infants (Baker et al., 2013). However, literature on emotional distress in mothers of late-preterm infants is limited even in developed countries. Comparative studies to full-terms are also limited and this lack of literature is concerning because such data is needed to determine whether mothers of late-preterm infants require more psychological support or if they should be treated in a similar manner to mothers of full-terms.

### **1.2.2 Impact of preterm birth on mother-infant relationship**

International research on mother-infant relationship following a preterm birth has largely focused on early-preterm infants. Hospitalized early-preterm infants are separated from their mothers and denied opportunities for constant interaction with their mothers and their mothers are temporarily unable to fulfill their role as primary

caregiver (Holditch-Davis & Miles, 2000). Mother-infant interactions include verbal and non-verbal behaviors between mother and infant (Leitch, 1999) and promote infant social, emotional, and cognitive development (Harrist & Waugh, 2002). Studies on mother-infant interactions during hospitalization also showed that interactions are important for infant growth (Miller & Holditch-Davis, 1992). Upon reunion with their infant, mothers initially take a long time to initiate interactions, but with subsequent visits the waiting period before interacting with their infant decreased as mothers became more comfortable (Minde, Ford, Celhoffer, & Boukydis, 1975). The mothers also touched, held and provided more interactive stimulation to their infants than nurses, and they were seen to spend more time talking, moving and touching the child affectionately (Miller & Holditch-Davis, 1992).

Nurses' activities were also viewed as more energy consuming than mothers. Nurses spent more time feeding, changing, and bathing while mother's activities were viewed as more calming as preterm infants slept and smiled more (Miller & Holditch-Davis, 1992). Mothers who initially failed to adapt to early interaction with their children were predicted to experience future parenting disorders (Minde et al., 1975). While there is significant information about how mothers interact with their infants in the home, information regarding how mothers engage in interactive behaviors during their infant's

hospitalization is limited. Additional research would provide more understanding of the challenges mothers face with interactions with their infants during hospitalization.

In home studies, mothers of early-preterm infants also showed less positive mother-infant interactions than mothers with full-term infants (Holditch-Davis, Cox, et al., 2003). In addition, maternal emotional distress affected mother-infant interactions. Research on mothers with early-preterm infants also found a positive correlation between maternal worry and infant irritability (Holditch-Davis et al., 2007). In addition, high PTS symptoms in mothers of early-preterm infants is associated with more maternal controlling behaviors than shown by mothers with low PTS symptoms (Forcada-Guex, Borghini, Pierrehumbert, Ansermet, & Muller-Nix, 2011). Mothers with early-preterm infants were less sensitive in their interactions and early-preterm infants were less cooperative than infants who were full-term (Forcada-Guex et al., 2011). Early-preterm infants also showed less alertness, attentiveness, and activity and they were less responsive to their mothers than full-term infants (Forcada-Guex et al., 2011).

Alternatively, research on mothers of late-preterm infants and mothers of full-term infants research showed no significant group differences in maternal perception of mother-infant responsiveness following delivery and at 6 weeks postpartum (Baker et al., 2013). However, this study used self-report from the mothers, observational studies on mother-infant interactions with late-preterm infants are limited. Since mothers with

both early and late-preterm infants are at risk for emotional distress, this distress could potentially affect mother-infant interactions. Thus, researchers need to explore whether mothers and their late-preterm infants might interact less than mothers and their full-term infants, and also if their experiences are similar to those of mothers and their early-preterm infants.

### **1.2.3 Benefits of kangaroo care on emotional distress and mother-infant interactions**

Studies on kangaroo care in the United States found more positive mother-infant interactions and lowered maternal psychological distress in mothers using kangaroo care (Holditch-Davis et al., 2014a; Ludington-Hoe et al., 1999). Evidence among South Korean mothers showed that kangaroo care increased maternal-infant attachment, the infants displayed more rapid increases in height and head circumference (Ahn, Lee, & Shin, 2010), and mothers had higher maternal self-esteem (J. Lee & Bang, 2011). Mothers in the US and Italy administering kangaroo care also had lower psychological distress than other mothers of preterm infants on routine care (Holditch-Davis et al., 2014a; Tallandini & Scalembra, 2006). Thus, providing kangaroo care can assist mothers to adapt to parenting their preterm infants.

### **1.2.4 The role of family members on mother's mental wellbeing**

Support from family and healthcare workers during this period might also be necessary for transitioning and adapting to motherhood. Emotional and physical

support in the postpartum period promotes maternal psychological wellbeing and for lowers mothers' emotional distress (Heh, Coombes, & Bartlett, 2004; Lau & Wong, 2008). Sources of maternal support during the postpartum period can include the spouse/partner, extended family, and healthcare workers (Holditch-Davis & Miles, 2000; Lau & Wong, 2008). Spousal support and family support are both influenced by cultural values, and mothers may perceive the support as either positive or negative (Heh et al., 2004; Lau & Wong, 2008). Asian mothers who perceived family support as positive had lower depressive symptoms than mothers who perceived support as negative (Heh et al., 2004; Lau & Wong, 2008).

### **1.2.5 The healthcare system and mother's perinatal experiences**

The health care system has also shown to have an effect on maternal experiences in the Neonatal Intensive Care Units (NICUs). In the United states, open space NICU have been described as distressing as mothers and their infants are exposed to other mothers and their fragile infants that made parents feel like they are constantly fighting for personal space (Beck, Weis, Greisen, Andersen, & Zoffmann, 2009). Thus, the mothers had to control joyful feelings in the presence of other mothers who are grieving (Beck et al., 2009). Exploring mothers' experiences with the NICU environment is necessary to understand the sources of emotional distress during hospitalization.

Support from the healthcare professionals may also be perceived as positive or negative (Holditch-Davis & Miles, 2000). Healthcare workers may help mothers cope positively with postpartum emotional distress and provide information about their infant's condition and prognosis (Holditch-Davis & Miles, 2000). Conversely, miscommunication and conflicting or inadequate information from healthcare providers may contribute to maternal emotional distress (Harbaugh & Brandon, 2008; Holditch-Davis & Miles, 2000). However, some mothers who fail to initiate positive interaction may fail to sustain their interactions with their infant despite nurses encouragement to touch and hold their baby (Minde et al., 1975). More research is required on emotional support in the postpartum period, during hospitalization and after discharge, to understand how to manage emotional distress and mother-infant interactions and to provide guidance to the education, research, leadership, and practice of nurses and midwives in maternal and newborn care.

### ***1.3 The need to compare mothers of early-preterm, late-preterm, and full-term infants in Malawi***

Malawi is not isolated from the challenges of preterm birth, maternal emotional distress, and mother-infant interactions during hospitalization. Comparing the three groups of infants, early-preterm, late-preterm, and full-term infants, will assist in understanding the risk factors for maternal emotional distress and less positive mother-infant interactions in all three groups of infants. Considering that kangaroo care is the

core strategy for managing early-preterm infants and other low birth weight infants in Malawi, studying Malawian mothers of early-preterm infants will require exploring the impact of KMC on maternal emotional distress and mother-infant interactions. Studying the relationships among emotional distress, mother-infant interactions, and preterm birth will also help healthcare workers in Malawi to understand the gaps in maternal and newborn care and their role in supporting mothers with preterm infants.

#### ***1.4 Overall purpose of the dissertation and research objectives***

The purpose of this dissertation was to explore the experiences of Malawian mothers with early-preterm, late-preterm, and full-term infants. Studying the three groups together should help understand their unique experiences and contribute to the development of interventions to promote maternal emotional health and the mother-infant relationship.

#### ***1.5 Research aims and hypotheses***

1. The aim of chapter one was to discuss the burden of preterm birth in Malawi, the impact of preterm birth on maternal mental health and mother-infant interactions, and the need for research on emotional distress and mother infant interactions in Malawian mothers. Global literature was used to explain the risks and challenges of preterm birth.

2. The aim of chapter two is to describe the literature on emotional responses and mother infant interactions and identify gaps for future research.
3. The aim of chapter three is to present findings on the validation of the translated Chichewa modified Perinatal PTSD questionnaire (PPQ-II) and Chichewa Child Health Worry Scale (CHWS), for assessment of PTS symptoms and worry symptoms about child health among Malawian women. The specific objectives were to:
  - i. Translate and adapt the Chichewa PPQ-II and Chichewa CHWS.
  - ii. Assess validity of the Chichewa PPQ and Chichewa CHWS. The Chichewa Self Reporting Questionnaire was used as the gold standard for validation.
  - iii. Assess reliability of the Chichewa-PPQ and Chichewa-CHWS
4. The aim of chapter four is to present findings on emotional distress (depressive and anxiety, PTS, and worry) mothers with early-preterm (28 0/6 to 33 6/7 weeks gestation), late-preterm (34 0/7 to 36 6/7 weeks gestation), and full-term infants (38 0/6 to 41 6/7 weeks gestation) in Malawi. The specific objectives were to:

- i. Compare early emotional distress among Malawian mothers with early-preterm infants, late-preterm infants, and full-term infants following delivery.

**Hypothesis 1.** Mothers of early-preterm infants would have greater emotional distress following childbirth than mothers of full-term infants. Mothers of late-preterm infants would be intermediate between the other two groups.

- ii. Compare early emotional distress mothers with early-preterm infants and mothers of full-term infants and mothers of late-preterm infants and mothers of full-term infants following delivery before and after controlling for covariates.

**Hypothesis 2.** Both Mothers of early and late-preterm infants would have greater emotional distress than mothers of full-term infants.

- iii. Examine how the length KMC exposure (days of KMC) affects maternal on the difference in emotional distress from baseline to follow-up in mothers of preterm infants (combined early and late).

**Hypothesis 3.** The decrease in emotional distress at follow-up from baseline in mothers of preterm infants would be higher in mothers whose infants had more days of exposure to KMC.

5. The aim of chapter five was to explore mother-infant interactions of Malawian mothers with early-preterm, late-preterm, and full-term infants. The specific objectives were to:

i. Compare early mother-infant interactive behaviors among Malawian mothers with early-preterm infants, late-preterm infants, and full-term infants following delivery.

**Hypothesis 1.** Mothers of early-preterm infants would have less positive early mother-infant interactions following delivery than mothers of full-term infants. Mothers of late-preterm infants will be intermediate between the other two groups

ii. Examine the relationship between emotional distress and mother-infant interactions in mothers with early-preterm infants, late-preterm infants, and full-term infants.

**Hypothesis 2.** Mothers of early and late-preterm infants with greater emotional distress will have less positive early maternal-preterm infant interactions than mothers with lower emotional distress.

- iii. Determine how the length of KMC exposure affects maternal emotional distress and mother-infant interactions in mothers of early and late-preterm infants.

**Hypothesis 3.** Mothers of preterm infants with longer exposure to KMC (days of KMC) will have a greater increase in mother-infant interactive behaviors at follow-up than mothers with shorter exposure to KMC.

6. The aim of chapter six was to explore Malawian mothers' perceptions of their birth experiences, caring for infants, and family and hospital support following preterm and full-term births. The chapter also explored how the support received from family and healthcare workers was perceived by mothers during hospitalization.
7. The aim of chapter seven was to discuss the findings and issues arising from the overall research project.

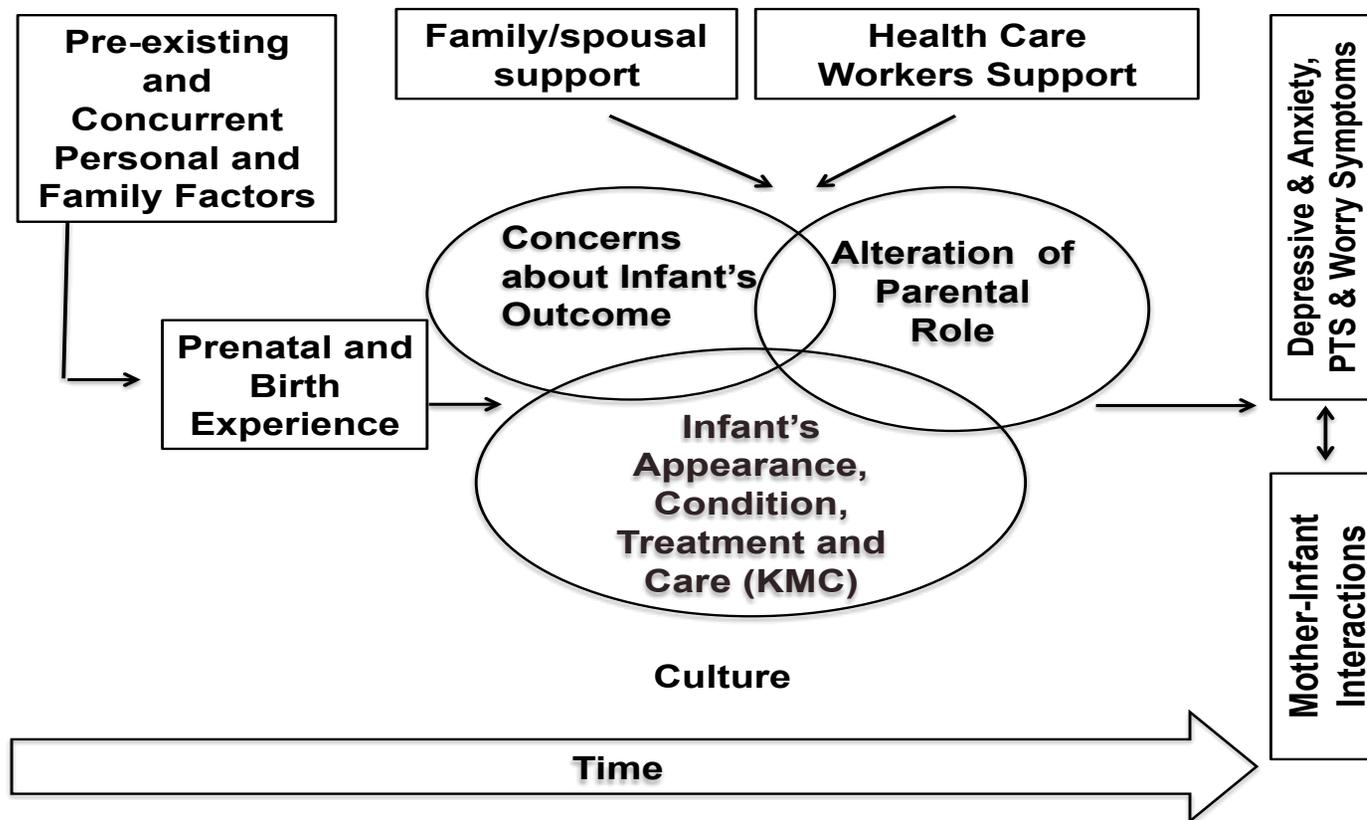


Figure 1: Adaptation of the Preterm Parent Distress Model

## **1.6 Theoretical framework**

This study was framed using an adaptation of the Preterm Parental Distress Model (Holditch-Davis & Miles, 2000). Figure 1 above shows the sources of emotional distress and their impact on maternal psychological wellbeing and mother-infant interactions. In this model the sources of maternal emotional distress are viewed as pre-existing and concurrent personal and family factors; prenatal and perinatal experience; infant's illness, treatments, and appearance; concerns about outcome; loss of parental role; and healthcare providers (Holditch-Davis & Miles, 2000). Personal and family factors such as maternal age, ethnicity, socio-economic status, social support, and family configuration influence how mothers respond to stress and interpret the neonatal intensive care unit experience (Holditch-Davis & Miles, 2000). Prenatal and perinatal experiences include experiences with past or current births, obstetric complications, and subsequent relationships with infants. The model also includes the effects of severity of the infant's illness, treatments, and appearances following birth and hospitalization, including the impact of KMC for early-preterm infants. In addition, the model includes an exploration of family, spousal, and healthcare provider support following childbirth.

This model was used to explore sources of distress, including maternal characteristics (personal demographic characteristics including culture and family factors, prenatal and perinatal experiences, separation from infant following hospitalization, and concerns about infant outcome), infant factors (gestation, illness,

treatments, appearance, and exposure to KMC), maternal-infant dyad factors (mothers' experiences in interacting with the infant), and other external factors (support from healthcare providers, family, and spouse). All these factors are known to influence the risk for postpartum emotional distress in mothers of early-preterm infants (Holditch-Davis & Miles, 2000). Mother infant interactions were also compared in mothers with higher and lower emotional distress symptoms in the preterm groups.

The modified Preterm Parental Distress Model was important to understanding sources of distress in Malawian mothers of preterm infants. While this model has been tested in United States mothers (Holditch-Davis & Miles, 2000), Malawian mothers experience differs in the cultural and socio-economic conditions, as well as a healthcare delivery and infrastructure that may either trigger or relieve maternal distress. For example, as noted earlier Malawians view pregnancy as 'pakati' literally translated to mean the mother is "in between" life and death (Stewart et al., 2015). Malawian men are also not fully involved in childbirth and childbirth is largely controlled by women (Kamwendo, 2009). Thus, fathers may not always be conversant about how to best support for mothers or they may not see the need to learn how to support their spouses. Malawian mothers married in patrilineal tribes might also experience distress as they are often blamed for not giving birth to children to continue the lineage. This study will focus on the maternal emotional responses; depressive, PTSD and anxiety symptoms and worry about child's health in Malawian mothers, and the relationship of distress to

mother-infant interactions. As mothers describe their experiences during hospitalization, the six sources of maternal distress in the model will be used to explore Malawian mothers' experiences with early and late-preterm birth and having a preterm infant.

## **2. Maternal Emotional Responses and Interactions of Mothers with Early-preterm, Late-preterm, and Full-term Infants**

### **2.1 Introduction**

Globally, an estimated 15 million preterm infants are born each year, spontaneously or as a result of labor induction or cesarean section (World Health Organization, 2016). One million of these infants die from complications of prematurity (World Health Organization, 2016). Researchers classify preterm infants as either early-preterm (<34 weeks gestation) or late-preterm infants (34 0/6 to 36 6/7 weeks) (Brandon et al., 2011). The majority of these preterm births are in Africa and South Asia (approximately 60%), with the largest number occurring in mothers from low-socioeconomic backgrounds (Blencowe et al., 2012; World Health Organization, 2016). Among the top 10 countries with the highest preterm birth rate, seven are from the sub-Saharan African region and three are from South Asia (Blencowe et al., 2012; World Health Organization, 2016). Malawi is a low-income country in sub-Saharan Africa and has an estimated preterm birth rate of 18.1 per 100 live births, which is the highest preterm birth rate in the world (Blencowe et al., 2012; World Health Organization, 2016). India has the greatest number of preterm births estimated at 3,519,100 annually (Blencowe et al., 2012; World Health Organization, 2016).

The most common causes of preterm birth include multiple pregnancies, infections, chronic conditions such as high blood pressure and diabetes, although often

there is no identified cause (Esplin et al., 2008; World Health Organization, 2016). In the United States, causes include maternal tobacco use, cardiac disease, short intervals between pregnancies, prior infant death, and prior preterm birth (Esplin et al., 2008; Simonsen et al., 2013). In Western China, the risk of preterm birth has been associated with low family income; maternal age more than 35 years; less than four antenatal visits; low education level; abnormal vaginal discharge; having a history of preterm birth; and pregnancy complications such as premature rupture of membranes, pre-eclampsia, placenta previa and oligohydramnios (Zhang, Zhou, Chen, Hao, & Zhao, 2015). In Germany, the risk of preterm birth increased with multiple pregnancies, nulliparity, low socio-economic status, and immigration status mostly among the Turkish, Middle Eastern, and North African immigrants (Weichert et al., 2015). Wisansoonwong, Fahy, and Hastie (2011) found that Australian women had multiple and interactive factors that increased the risk for preterm birth and most of these factors were embedded in the socio-economic status of mother. Most of the factors were modifiable and included poverty, level of education, nutrition status, smoking, weight, activity level, levels of stress, and immune system functioning (Wisansoonwong et al., 2011).

In sub-Saharan Africa, a Malawian study found that the risk of preterm birth was increased with maternal history of preterm birth, persistent malaria despite malaria prophylaxis, young maternal age (less than 20 years of age), and anemia (van den Broek et al., 2014). Another Malawian study found an association between preterm birth with

HIV infection, irregular attendance of antenatal services, lack of intermittent preventive treatment for malaria, low maternal weight, and Chorioamnionitis (Abrams et al., 2004).

The risk of preterm birth in Zimbabwe increased with lack of prenatal care, malnutrition, rural residence, eclampsia, anemia, antepartum hemorrhage, malaria, having a female child, anemia, premature rupture of membranes, having no live children, prior history of abortion and stillbirth and alcohol use (Feresu, Harlow, & Woelk, 2015). In addition, preterm birth in Zimbabwe was associated also with HIV infection, history of malaria, and other infections (Noble, Ning, Woelk, Mahomed, & Williams, 2005). Very few Zimbabwean mothers reported drinking alcohol and using tobacco, and smoking was not related to preterm birth (Feresu et al., 2015).

Preterm birth contribute to maternal psychological distress, infant medical complications and long term developmental challenges, and the costs associated with caring for a preterm infant pose economic burdens to the families whose productivity lowers as they focus on the frail infant and to the society at large (Hodek, von der Schulenburg, & Mittendorf, 2011; Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes, 2007; Lasiuk et al., 2013). Thus, the large numbers of preterm births are concerning because of these negative effects.

## **2.2 Effects of preterm birth on infants**

Preterm infants have a wide range of complications that contribute to high morbidity and mortality and a greater variety of health and developmental problems than full-term infants (Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes, 2007; Platt, 2014). These complications include a greater risk of infectious and non-infectious respiratory, gastrointestinal, immunological, central nervous system, auditory, and visual problems (Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes, 2007; March of Dimes, The Partnership for Maternal Newborn and Child Health, Save the Children, & World Health Organization, 2012; Platt, 2014).

In the long-term, neurodevelopmental disability, epilepsy, cognitive impairment, chronic lung disease, and developmental co-ordination disorder commonly occur in infants born preterm (March of Dimes et al., 2012; Platt, 2014). Longer-term problems include motor, cognitive, visual, auditory, behavioral, social-emotional, health, and growth problems (Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes, 2007; March of Dimes et al., 2012; Platt, 2014). Early-preterm infants also require intensive care and their long-term hospitalizations further separate them from their parents (Harbaugh & Brandon, 2008). Late-preterm infants experience slightly longer hospitalization than full-term infants (Brandon et al., 2011; McDonald et al., 2013).

Infant mortality is also high in preterm infants less than 32 weeks. This burden is higher in low-income countries because of the unavailability of feasible and cost-effective care interventions to promote of warmth, breastfeeding support, and the care of infant medical complications such as infections and breathing difficulties (World Health Organization, 2016).

### ***2.3 Effects of preterm birth on maternal emotional distress***

All mothers of infants, regardless of when they give birth, are potentially at risk for maternal emotional distress (Davies et al., 2008). Serious psychological distress has been observed in all trimesters of pregnancy and in the postpartum period (Glasheen, Colpe, Hoffman, & Warren, 2015). In addition, some of the risk factors for preterm birth such as mother's individual characteristics, past and present prenatal and perinatal complications, and severity of the infants condition further increase the risk of emotional distress (Holditch-Davis & Miles, 2000). All sources of stress, whether from the mother, infant, or hospitalization, increase risk for emotional distress in mothers with early-preterm infants (Holditch-Davis & Miles, 2000). While some mothers might be potentially at higher risk than others, postpartum emotional distress is a public health issue because it not only affect mothers but also their families (Robertson, Celasun, & Stewart, 2003).

During preterm infant hospitalizations, parents' control over their child and opportunities for caregiving are limited. Parents feel helpless, are concerned about their

infant's health, and are uncertain about their infant's outcome (Miles & Holditch-Davis, 1997). Mothers with fragile early-preterm infants were shocked by the infant's birth weight (Feeley et al., 2011) and the infant's physical appearance at the initial contact (Goutaudier, Lopez, Séjourné, Denis, & Chabrol, 2011). Maternal emotional distress was also triggered by the sight of a fragile early-preterm infant attached to medical equipment and presence of infant medical problems indicated by color changes, jaundice, and respiratory distress (Miles & Holditch-Davis, 1997). Longer hospitalizations of early-preterm infants also contributed to maternal anxiety, helplessness, and fear of the infant's outcome (Feeley et al., 2011; Goutaudier et al., 2011; Muller-Nix et al., 2004). Late-preterm infants' continued hospitalization after maternal discharge also increased the mother's perception of the severity of the infant's condition (Brandon et al., 2011). Mothers felt stripped of their role, and some of them cried (Brandon et al., 2011).

Postpartum emotional distress includes depressive, anxiety, and posttraumatic stress (PTS) symptoms and maternal worry about child's health (Brandon et al., 2011; Dudek-Shriber, 2004; Lasiuk et al., 2013). Stress following early-preterm birth resulted in emotional responses such as feelings of helplessness and loss of control, fear, guilt and shame, and a sense of failure (Miles & Holditch-Davis, 1997). The sudden nature of preterm birth denied mothers the chance to psychologically prepare psychologically for birth and transition to motherhood (Brandon et al., 2011; DeMier et al., 1996).

In the United States, the risk of emotional distress increases with young maternal age, history of smoking, alcoholism and substance abuse (Glasheen et al., 2015); being a Black woman (Gavin et al., 2011); low socio-economic status (Beeghly et al., 2003); and low educational level and length of infant mechanical ventilation (Holditch-Davis et al., 2009). Emotional distress is also high in mothers with a history or current diagnosis of a mental health/psychiatric disorders or a greater number of concurrent stressors (Holditch-Davis, Bartlett, Blickman, & Miles, 2003; Lefkowitz, Baxt, & Evans, 2010; Shaw et al., 2009; Shaw, Bernard, Storfer-Isser, Rhine, & Horwitz, 2013; Verreault et al., 2012). High positive correlations also existed among postpartum PTS, depressive and anxiety symptoms (Holditch-Davis et al., 2009; 2015), acute stress disorder with history of depressive symptoms, family history of depression, and parent worry that the child might die (Lefkowitz et al., 2010). Therefore, research on depressive, anxiety, and PTS symptoms and maternal worry about the child's health in mothers of preterm infants compared to mothers of full-term infants is necessary to understand emotional distress and its effects on the mother and infant relationship.

### **2.3.1 Depressive Symptoms**

Postpartum depression, a common postpartum mental-health problem, is experienced by approximately 10-20% of women in developed countries (Brummelte & Galea, 2015; Sanger, Iles, Andrew, & Ramchandani, 2015; Wisner et al., 2013). Mothers may present with depressed mood, decreased interest in things they found pleasurable

in the past, decreased energy, decreased concentration or decisiveness, changes in sleep patterns (insomnia or hypersomnia), feeling guilty or worthless, psychomotor retardation or agitation, and having suicidal ideas (Brummelte & Galea, 2015).

Depressive symptoms appear as early as 2 days after birth or as late as 12 months following birth (Cabrera & Schub, 2017).

Research on mothers with early-preterm infants in the United States showed that mothers experience high levels of depressive symptoms (Callahan et al., 2006; Callahan & Hynan, 2002; Holditch-Davis et al., 2009; Miles et al., 2007). Mothers of late-preterm infants also averaged higher levels of depressive symptoms than mothers of full-term infants (Brandon et al., 2011). Another United States study found that mothers with late-preterm infants had significantly higher levels of stress at delivery and 6 weeks postpartum compared with mothers who had full-term infants (Baker et al., 2013). In Nigeria, mothers of preterm infants, early and late weighing less than 2,500 grams scored higher on the Beck Depression Inventory and General Health Questionnaire about possible diagnosable psychiatric disorders than mothers of full-term infants (Ukpong, Fatoye, Oseni, & Adewuya, 2003). However, research on maternal depression following late-preterm infants is limited in developed countries and none could be located in developing countries. Research on late-preterm infants is important because the lack of understanding of such infants may result in healthcare professionals

assuming that mothers of late-preterm infants have lowered risk of distress than mothers of early-preterm infants.

### **2.3.2 Anxiety symptoms**

Anxiety in the postpartum period has not been as extensively studied as depression, and most studies on anxiety explored it together with depression. While both are neurotic symptoms, anxiety is characterized by persistent, excessive, and realistic worry about an event (Anxiety and Depression Association of America, 2015). Most postpartum women who present with anxiety symptoms present with depressive symptoms as well (Wenzel, Haugen, Jackson, & Brendle, 2005). In the United States, mothers of early-preterm infants have more anxiety than mothers of full-term infants (Holditch-Davis et al., 2009; Miles et al., 2007). Research on late-preterm birth in the United States showed that mothers with late-preterm infants also presented with higher levels of postpartum anxiety than mothers of full-term infants (Brandon et al., 2011). In Canada, McDonald et al. (2013) found that mothers of late-preterm infants had a greater risk for excessive anxiety symptoms than with mothers of full-term infants. Similarly, in Brazil, mothers of early and late-preterm infants showed higher anxiety than mothers of full-term infants (Padovani, Carvalho, Duarte, Martinez, & Linhares, 2009). However, research on anxiety on mothers of late-preterm infants is limited and no research on postpartum anxiety in mothers of late-preterm infants could be located from developing countries or countries with high preterm birth rates.

### **2.3.3 Posttraumatic Stress Symptoms**

Another common form of distress in the postpartum period is PTS symptoms. Higher levels of PTS symptoms result in a clinical diagnosis of posttraumatic stress disorder. Posttraumatic stress disorder is an anxiety disorder that occurs when one experiences, witnesses, learns about family members, or experiences first-hand repeated or extreme exposure to a traumatic event (American Psychiatric Association, 2013). PTS symptoms of mothers of preterm infants include re-experiencing the preterm birth through thoughts and dreams as if it is happening again; avoiding thought or events that remind them about the birth, thus denying the reality of the event; and hyperarousal about the traumatic experience through overprotectiveness, heightened fear and generalized anxiety (Habersaat et al., 2014; Holditch-Davis, Bartlett, et al., 2003).

Studies in United States and Switzerland have shown that mothers with early-preterm infants experienced higher PTS symptoms compared with mothers of full-term infants (Callahan et al., 2006; Callahan & Hynan, 2002; Ghorbani et al., 2014; Lasiuk et al., 2013; Pierrehumbert, Nicole, Muller-Nix, Forcada-Guex, & Ansermet, 2003). In the United States, Brandon et al. (2011) found that mothers of late-preterm infants also experienced more PTS symptoms than mothers of full-term infants. However, studies of PTS symptoms following preterm birth in developing countries are limited (K. W. Gondwe & Holditch-Davis, 2015). No studies on PTS symptoms following preterm birth

could be located in Malawi, but such research is needed to guide resource mobilization to manage PTS following childbirth.

### **2.3.4 Worry about child's health**

Mothers of preterm infants worry about the infant's medical condition and hospitalization (Holditch-Davis & Miles, 2000; Miles et al., 2007). Worry, which is related to anxiety, is an individual's cognitive response to a negative event during which the individual becomes aware of the situation and at the same time shield their verbal-linguistic processes [expresses self] (Greenberg & Pascual-Leone, 2006). Mothers of medically fragile infants and preterm infants worry about the infant's condition, health problems and hospitalization (Docherty, Miles, & Holditch-Davis, 2002; Holditch-Davis & Miles, 2000). Docherty et al. (2002) found the greatest source of maternal worry following preterm birth was concerns about the infant's medical problems followed by concerns about whether the child would be normal, come home, always be sick, or might die. In the United States, mothers of early-preterm infants experienced extensive worry (Holditch-Davis et al., 2009; Holditch-Davis et al., 2014a). In Spain, mothers with early-preterm infants reported that having a preterm infant was worrisome and the major sources of worry included physical wellbeing of their baby and the coordination of tasks between parents (Saenz et al., 2009).

Mothers of late-preterm infants have also reported higher levels of worry than mothers of full-term infants (Brandon et al., 2011). Maternal worry is a concept that has

not been studied extensively either in developed or developing countries. The challenges might stem from its close relationship to anxiety. Thus, researchers need to explore whether worry can be studied separately or should be studied together with anxiety. The sources of maternal worry might differ in different settings and in different countries. People in developing countries might worry about the lack of basic resources to care for their infant rather than the high technological equipment to monitor and care for infants in developed countries. In addition to overcrowding and high infant mortality rates in low-income countries, fear of an infant dying might cause more worry than the infant's specific medical condition.

#### ***2.4 Interactions of mothers with their early- and late-preterm infants compared with mothers with full-term infants***

Research on preterm birth, emotional distress, and mother-infant interactions is growing. Mother-infant interactions include verbal or nonverbal behaviors that produce verbal or behavioral responses of the infant and mother (Leitch, 1999). Mothers' affectionate behaviors include visual (gaze), tactile (touch), physical activity, facial expressions, vocalizations (talking), gesture, rocking, and playing (Bagner et al., 2009; Boyd, Zayas, & McKee, 2006; Bystrova et al., 2009; Holditch-Davis, Cox, et al., 2003; Holditch-Davis et al., 2007). Infant behaviors including visual (gaze), sleep-wake states (level of activity and arousal), head orientation, vocalizations (crying), gestures, playing with an object as opposed to person, and alertness/drowsiness communicate infant

needs to the mother (Boyd et al., 2006; Bystrova et al., 2009). Infants observe and mimic communication patterns that are useful for social interaction with other people in their environment (Tamis-LeMonda, Song, Leavell, Kahana-Kalman, & Yoshikawa, 2012). The mother can interpret these infant behaviors as either positive or negative (Boyd et al., 2006; Bystrova et al., 2009; Holditch-Davis et al., 2007).

Maternal sensitivity involves the mother's ability to identify and appropriately respond to infant cues in a timely manner (Baker & McGrath, 2011; Forcada-Guex, Pierrehumbert, Borghini, Moessinger, & Muller-Nix, 2006; Lindhiem, Bernard, & Dozier, 2011). Maternal sensitivity and responsiveness are required to promote infant engagement and cooperativeness (Forcada-Guex et al., 2006). To better understand infants' interactive behaviors, infants are assessed by their ability to take turns in the interaction (turn-taking), control the preferred activity, or the infants' developmental appropriateness for the task (Forcada-Guex et al., 2011; Forcada-Guex et al., 2006; Kenny, Conroy, Pariente, Seneviratne, & Pawlby, 2013). Infants are, thus, described as being cooperative, difficult, compulsive, or passive (Forcada-Guex et al., 2011; Forcada-Guex et al., 2006; Kenny et al., 2013).

Mother-infant interactions are the foundation of a quality mother and infant relationship and contribute to maternal wellbeing and infant's development (Forcada-Guex et al., 2006; Harrist & Waugh, 2002; Muller-Nix et al., 2004). Mother-infant interactions also promote social, emotional, and cognitive development of infants

(Harrist & Waugh, 2002) and this relationship continues throughout childhood (Bystrova et al., 2009).

A significant relationship exists between emotional distress and the mother-infant relationship (Forcada-Guex et al., 2011; Forcada-Guex et al., 2006). Maternal depression decreases smiling in mothers and contribute to fewer infant interactive behaviors (Field, Hernandez-Reif, et al., 2005; Field, Nadel, et al., 2005). High levels of stress also contribute to the mother's inability to establish a positive interaction with her infant (Holditch-Davis et al., 2007; Spinelli et al., 2013). In addition, maternal anxiety and depressive symptoms result in less positive mother and infant interactions (Murray, Fiori-Cowley, Hooper, & Cooper, 1996; Reissland, Shepherd, & Herrera, 2003; Zlochower & Cohn, 1996) and distressed mothers are described as controlling or unresponsive in their interactions with their infants (Forcada-Guex et al., 2011).

Mothers with early-preterm infants have less positive maternal-infant interactions than mothers with full-term infants (Forcada-Guex et al., 2011). In Switzerland, early-preterm infants were found to be less responsive to their mothers than full-term infants (Forcada-Guex et al., 2011). The immaturity and fragility of early-preterm infants contributed to their lower responsiveness to interactions (Forcada-Guex et al., 2006; Habersaat et al., 2014). Early-preterm infants were less alert, less attentive, and less responsive than full-term infants (Forcada-Guex et al., 2011). However, early-preterm infants were more vocally responsive than full-term infants (Schmücker et al.,

2005). Mothers with early-preterm infants were also described as being less sensitive to interactions than mothers with full-term infants (Forcada-Guex et al., 2011). Mothers with early-preterm infants were less facially responsive to their infants than mothers of full-term infants (Schmücker et al., 2005) and even at 6 months after birth, mothers of high-risk early-preterm infants were more controlling and less sensitive than mothers of healthy full-term infants (Muller-Nix et al., 2004). Interactions of mothers with low-risk preterm infants were intermediate mothers with early-preterm and mothers with full-term infants (Muller-Nix et al., 2004).

Research on interactive behaviors of mothers with late-preterm infants is limited. Baker et al. (2013) found no difference in maternal perceptions of mother-infant responsiveness between mothers and their late-preterm infants and that of mothers and their full-term infants following delivery and at 6 weeks postpartum. Maternal perception that their infant had a difficult temperament was related to lower maternal self-reported responsiveness (Baker et al., 2013). However, Baker et al. (2013) utilized maternal self-report measures. Studies utilizing observational methods to study mother and late-preterm infant interactive behaviors are limited. Research on the interactive behaviors of mothers with late-preterm infants is important because current evidence shows that mothers with late-preterm infants experience higher levels of emotional distress than mothers with full-term infants (Brandon et al., 2011). In addition,

researchers have not conducted comparisons of interactive behaviors among mothers of early-preterm, late-preterm, and full-term infants.

## ***2.5 Care of preterm infants and infants of low birthweight in Malawi: Kangaroo Mother Care (KMC)***

In the postpartum period, interventions to promote positive psychological and physiological outcomes in mothers and infants have been implemented. Kangaroo care is one intervention that provides warmth for infants, promotes positive mother-infant interactions, and improves maternal psychological wellbeing (Holditch-Davis et al., 2014a; Ludington-Hoe et al., 1999; March of Dimes et al., 2012). Kangaroo care is a maternally administered intervention for preterm infants that involves placing the infant on mother's chest naked except for a diaper and hat, in skin-to-skin contact (Ludington-Hoe, Nguyen, Swinth, & Satyshur, 2000; Ludington-Hoe, Thompson, Swinth, Hadeed, & Anderson, 1994). As noted earlier, early- and late-preterm infants often require long hospitalizations that separate them from their mothers (Brandon et al., 2011; Harbaugh & Brandon, 2008). This separation results in fewer opportunities for mother-infant interactions (Forcada-Guex et al., 2006; Habersaat et al., 2014). In South Korea, kangaroo care improved maternal-preterm infant attachment, promoted infant growth (Ahn et al., 2010), and maternal self-esteem (J. Lee & Bang, 2011). In United States and Italy, kangaroo care also reduced the psychological distress of mothers with preterm infants (Holditch-Davis et al., 2014a; Tallandini & Scalembra, 2006)

In low-income countries, KMC was developed to promote care of preterm infants in the absence of resources such as incubators (Cattaneo, Davanzo, Bergman, & Charpak, 1998; Zimba et al., 2012). Kangaroo mother care involves continuous and prolonged kangaroo care throughout the day except when the mothers needed to bathe, go to the toilet, or receive medical treatment (Cattaneo et al., 1998; Davanzo et al., 2013). The infant is positioned in an upright or semi-oblique position on the mother's chest and the room temperature is set above 20°C (Cattaneo et al., 1998). Mothers are required to wear a cotton shirt when the room temperature falls below 20°C (Cattaneo et al., 1998). In India, mothers have shown willingness to participate in KMC (Kadam, Binoy, Kanbur, Mondkar, & Fernandez, 2005). In this study, no significant differences were seen in the incidence of hypothermia, sepsis, apnea, and onset of breastfeeding between KMC and conventional methods of infant care, demonstrating that KMC is an effective, feasible, and cost-effective method for preterm infant care (Kadam et al., 2005).

In Malawi, KMC has addressed the issue of keeping infants warm with limited availability of incubators, reduced infant mortality from complications of preterm birth by 50%, and reduced overcrowding in the neonatal nursery (Zimba et al., 2012). Mothers administer KMC all day except for bathroom breaks, expressing milk, feeding the infant, and receiving medications. Effective utilization of KMC is achieved by healthcare workers counseling mothers of preterm infants and low-birth weight infants prior to admission into KMC to increase the mothers' understanding of the benefits of skin-to-

skin contact including provision of warmth to the infant, promoting exclusive breast feeding, improving the ability of the mother to frequently observe the infant, and promoting infant weight gain (Chisenga et al., 2015). Discharge requests against medical advice due to the long hospital stay of preterm infants continue to be a challenge as mothers are not culturally empowered to make independent decisions and the responsibility for major decisions making continues to rest on spouses and in-laws (Chisenga et al., 2015). In addition, the lack of assistance for implementing skin-to-skin contact, discomfort with the KMC position, and mothers preferring the use of an incubator care over KMC also contribute to early infant discharge requests against medical advice (Chisenga et al., 2015). Regardless of the challenges, mothers still favor KMC as an approach to managing preterm infants and they would recommend KMC to other mothers (Chisenga et al., 2015).

## ***2.6 Postpartum support***

Family involvement is a significant part of infants' care during hospitalization and is necessary for maternal mental health (Gooding et al., 2011; Harrison, 2010). Emotional and physical support in the postpartum period is necessary for maternal psychological wellbeing and for lowering mothers' emotional distress (Heh et al., 2004; Lau & Wong, 2008). Sources of maternal social support during the postpartum period can include the spouse/partner and extended family (Holditch-Davis & Miles, 2000; Lau & Wong, 2008). Healthcare workers also support mothers during the preterm infant's

hospitalization to cope with postpartum demands and infant needs (Holditch-Davis & Miles, 2000).

Family and spousal support in the postpartum period is also necessary for maternal psychological wellbeing (Heh et al., 2004; Lau & Wong, 2008). Lack of social support following birth increased mothers' risk for stress (Verreault et al., 2012). In Hong Kong, China, and Taiwan, mothers who perceived their family support as positive experienced lower levels of depressive symptoms than mothers who perceived their family support as negative (Heh et al., 2004; Lau & Wong, 2008). Family or spousal support was perceived as negative when there was marital conflict or conflict with a mother-in-law (Lau & Wong, 2008). Partner support was also necessary for positive interactions as mothers from poor, disengaged marital relationships demonstrated challenges in effectively connecting with their infants (Mäntymaa et al., 2006).

Healthcare workers can be a source of support or distress for the mothers since maternal distress during hospitalization may be influenced by the mothers' relationship with the healthcare team (Brandon et al., 2011; Holditch-Davis & Miles, 2000) and stress from sights and sounds of the NICU (Shaw et al., 2009). Mothers in France described the hospital atmosphere as 'cold', 'austere', and 'scary' and their fear of infant death was overwhelming (Goutaudier et al., 2011). Although healthcare workers were perceived as a source of support, their communication styles, interactions, and behaviors can contribute to emotional distress (Holditch-Davis & Miles, 2000). Healthcare workers

may help mothers cope with postpartum emotional distress and provide information about infant's condition and prognosis (Holditch-Davis & Miles, 2000). On the other hand, miscommunications with healthcare providers were a common source of emotional distress and mothers were concerned about conflicting or inadequate information (Harbaugh & Brandon, 2008; Holditch-Davis & Miles, 2000). However, a study in Canada showed that even though nurses tried to encourage mothers to touch the baby, mothers who were initially expected to delay interaction still failed to establish positive interactions with their infant (Minde et al., 1975). Therefore, research need to focus on mothers' experiences to gain their perspective on the challenges and interventions that they regard as positive.

## **2.7 Summary**

The world continues to struggle with a rising birth rate of preterm infants; meanwhile, Malawi has the highest preterm birth rate in the world (World Health Organization, 2016). The postpartum period combines maternal distress and challenges in caring for the infant that can negatively affect the mothers experience with motherhood. Mothers of preterm infants, early or late, have shown an increased risk for emotional distress (Brandon et al., 2011; Lasiuk et al., 2013) and mothers of early-preterm infants have shown less positive mother-infant interactions than mothers of full term infants (Donovan, Leavitt, Taylor, & Broder, 2007; Forcada-Guex et al., 2006; Habersaat et al., 2014). Emotional distress in mothers with early-preterm infants has

been extensively studied using both cross-sectional and longitudinal methods, for example, Holditch-Davis et al. (2009). However, very few longitudinal studies compared interactive behaviors of mothers with early-preterm infants and late-preterm infants to those of mothers of full-term infants. Longitudinal studies comparing emotional distress and mother-infant interactions among the three groups could not be located. Future studies need to explore emotional distress in mothers of early-preterm, late-preterm, and full-term infants from developing countries, specifically the sub-Saharan region, which has high preterm birth rates. More research needs to explore which aspects of cultural beliefs and values and the presence of family member (whether from mother's or father's side) would be regarded as positive support. Understanding the definition of positive support from the mothers' perspective would reduce factors that would trigger stress and delay positive mother-infant interactions.

### **3. Validation of the Chichewa Modified Perinatal PTSD Questionnaire and Chichewa Child Health Worry Scale**

#### **3.1 Introduction**

Malawian mothers, regardless of gestation at birth, regard pregnancy as a stressful period that triggers worry due to fear of maternal death (Stewart et al., 2015). However, research in Malawi has mostly focused on perinatal depressive symptoms regardless of gestation with very little research done on anxiety (Stewart et al., 2010; Stewart et al., 2009; Stewart et al., 2015; Stewart et al., 2008; Stewart, Umar, Tomenson, & Creed, 2013). In addition, no literature about posttraumatic stress (PTS) symptoms or maternal worry following preterm birth in Malawi could be located. Yet Malawi is a country with the highest preterm birth rate in the world, estimated at 18.1 per 100 live births (World Health Organization, 2016). Preterm birth, birth at less than 37 weeks gestation, is a known risk factor for maternal emotional distress in the postpartum period (Lasiuk et al., 2013; Pierrehumbert et al., 2003). The majority of literature on PTS symptoms following preterm birth were conducted in developed countries (K. W. Gondwe & Holditch-Davis, 2015). This lack of understanding of the trauma faced by women in low-income countries might contribute to inadequate psychological support following traumatic birth experiences including preterm birth.

The available Chichewa translated and validated screening instruments for depressive symptoms during perinatal period include the Self-Reporting Questionnaire (SRQ) for neurotic symptoms and the Edinburgh Postnatal Depression Scale (Stewart et al., 2009; Stewart et al., 2013). The SRQ was developed by the World Health Organization to assess neurotic disorders (World Health Organization, 1994) and was translated and validated into Chichewa, one of Malawi's native languages, by Stewart et al. (2009, 2013). The Chichewa SRQ has been adapted for assessing depressive symptoms and anxiety symptoms, including somatic symptoms of depression (sleep, appetite, fatigue) and other somatic complaints like headache and non-specific gastrointestinal symptoms (Stewart et al., 2013). Posttraumatic Stress Disorder is also a neurotic condition, but it remains the least explored perinatal negative psychological response following childbirth in Malawi. In addition, instruments to assess maternal worry about her child's health could not be located for either preterm or high-risk full-term infants.

Perinatal PTSD is marked by three classical symptoms: re-experiencing the preterm birth through thoughts and dreams as if it is happening again; avoiding thoughts or events that remind one of the birth and, thus, denying the reality of the event; and hyper-arousal about the traumatic experience that is seen in overprotectiveness, heightened fear, and/or generalized anxiety (Habersaat et al., 2014; Holditch-Davis, Bartlett, et al., 2003). The modified Perinatal PTSD Questionnaire (PPQ-

II) is one of the most commonly used instruments to assess PTS symptoms in the perinatal period (K. W. Gondwe & Holditch-Davis, 2015). The dichotomized PPQ-I was developed by DeMier et al. (1996) and Quinnell and Hynan (1999) and later modified into 5-point Likert scale PPQ-II by Callahan et al. (2006). The PPQ-II has not been translated and validated for use among Malawian postpartum mothers.

Maternal worry is related to anxiety and it is a cognitive response to an event that indicates an individual's awareness of a threat (Greenberg & Pascual-Leone, 2006). The Child Health Worry Scale (CHWS) is an instrument that has been used to assess maternal concerns following birth of a high-risk infant and it measures how much mothers worry about infant medical problems, infant development, whether the infant might get sick or die, and whether baby is eating and sleeping enough (Docherty et al., 2002; Miles, Holditch-Davis, Burchinal, & Nelson, 1999). The CHWS was developed by Miles and colleagues (Miles et al., 1999) and was tested on American mothers of preterm infants (Miles et al., 1999). The CHWS has also not been translated and adapted for use in other languages including Chichewa.

The purpose of this study was to translate and validate the PPQ-II and CHWS for assessment of PTS symptoms and maternal worry about the child's health, respectively, among Malawian women. The instruments were translated into Chichewa and back translated into English. Expert agreement was sought to compare the back-translated instruments against the original US instruments. Expert opinion on the Chichewa

instruments was also sought from Malawi nurse-midwives and then instruments were tested on mothers of preterm and full-term infants. Validity of the Chichewa PPQ-II and Chichewa-CHWS was assessed using the Chichewa-SRQ. Findings from this study should contribute to research on negative emotional responses in the perinatal period in Malawi.

### **3.2 Method**

This study involved descriptive quantitative and qualitative methods to assess the validity and reliability of the translated Chichewa PPQ-II and Chichewa CHWS.

#### **3.2.1 Study setting**

The study was conducted in Blantyre, Malawi at Kamuzu College of Nursing (KCN) Blantyre Campus and Queen Elizabeth Central Hospital (QECH). Kamuzu College of Nursing trains undergraduate and graduate level nurses and midwives in the masters programs in Reproductive Health, Midwifery, and Child Health. Queen Elizabeth Central Hospital is a referral hospital located in the southern region of Malawi and has the Chatinkha Maternity Unit. The maternity unit also has a neonatal nursery for high-risk infants including a separate Kangaroo Mother Care ward for preterm infants and two adjacent large postpartum wards that admit postpartum mothers, both with and without obstetric complications. The neonatal nursery admits all high-risk infants and the Kangaroo Mother Care ward admits mothers and preterm/low birth weight infants for continuous skin-to-skin contact.

### 3.2.2 Study population

**Nurses/midwives.** Eight nurse-midwives were recruited from the graduate programs, masters in midwifery and masters in reproductive health at Kamuzu College of Nursing. One nurse-midwife had experience working in maternity and the other seven had experience working in both maternity and neonatal units. Five nurses had 5 to 6 years' experience and three nurses had more than 6 years' experience. The nurse-midwives were fluent in both Chichewa (native language of Malawi) and English.

**Postpartum mothers.** Table 1 provides demographic characteristics of the postpartum mothers. Thirty postpartum mothers at QECH were recruited for the study. The inclusion criteria for the mothers was fluency in Chichewa, being 18 years or older, delivering a live full-term or preterm infant, and having no history of mental illness to control for other risk factors for emotional distress. The participants included 10 mothers of early-preterm infants (28 0/7 to 33 6/7 weeks gestation), 10 mothers of late-preterm infants (34 0/7 to 36 6/7 weeks gestation), and 10 mothers of full-term infants (37 0/7 to 41 6/7 weeks gestation). The mothers were relatively young ( $M= 25.50$ ,  $SD= 6.31$ ) and had some education ( $M= 9.57$ ,  $SD = 3.36$ ). Only 20% of the mothers had either a job or a business, 46.67% were first-time mothers. Also, 80% of the births were spontaneous vertex deliveries, 20% were cesarean births.

### 3.2.3 Translation of study instruments

Permission to translate and validate the instruments was obtained from the original authors. A bilingual Malawian nurse-midwife fluent in English and Chichewa translated the English PPQ-II and CHWS into Chichewa. Four bilingual Malawians discussed the translations: two nurse-midwives, a psychologist, and curriculum development graduate student. Modifications were made until the team reached a consensus. Another bilingual person, a lecturer for primary school teachers, back translated the instruments into English. The translation and back translation was repeated until the closest translation was obtained.

**Table 1: Demographic characteristics of the 30 postpartum mothers**

	N	Mean	SD	<i>f</i>	%
Age	30	25.50	6.31	–	–
Education (in years)	30	9.57	3.36	–	–
Gestational age	30	33.77	4.22	–	–
% Married	30	–	–	25	83.33%
% with Family Support	30	–	–	19	63.33%
Tribe	30				
% Hlomwe		–	–	8	26.67%
% Chewa		–	–	5	16.67%
% Ngoni		–	–	6	20%
% Yao		–	–	6	20%
% Other		–	–	5	16.67%
Occupation	30				
% Stay at home		–	–	24	80%
% Business/Working		–	–	6	20%
% Cesarean section	30	–	–	6	20%
First time mothers	30	–	–	14	46.67%

Note: N= sample size; SD=standard deviation; *f* = frequencies; % = percentage

### **3.2.4 Expert agreement**

Five mother-child relationship and neonatal care researchers, PhD prepared nursing professors, and native English speakers checked the back translations against the original English instruments to assess consistency between the original and back translation. The original and back-translated instruments items were compared, and the experts rated the back-translated version on a 3-point Likert scale (1=disagree, 2=somewhat agree, or 3=agree) to indicate whether the instrument retained the meaning. I dichotomized the rating as disagreeing (1 or 2) and agreeing (3). Items that scored 1 or 2 were revised and sent back to the experts. The experts submitted comments for each item and the process of translation and back translation was repeated. A face-to-face discussion was conducted with three of the professors to discuss their comments and clarifications were made using examples from the original instrument.

### **3.2.5 Study instruments**

Instruments were all interviewer guided self-report questionnaire administered once to postpartum mothers in the postpartum period (birth to 6 weeks)

**The Self Reporting Questionnaire (SRQ).** The SRQ is 20-item yes/no instrument used to measure depressive and anxiety symptoms (World Health Organization, 1994). The Chichewa SRQ was designed for use by lay interviewers and has a high internal consistency with a Cronbach alpha of 0.85 (Stewart et al., 2009). The Chichewa-SRQ is highly correlated with the Chichewa-Edinburgh Postnatal Depression Scale

(Stewart et al., 2013). The SRQ has a total score of 20 with higher scores indicating more depressive and anxiety symptoms and the optimal cut-off point for diagnosis of depression was set at 7 or 8 (Stewart et al., 2009). The Malawi validation of the SRQ split the SRQ into a sub-scale of somatic symptoms (items 1, 2, 3, 4, 7, 18, 19, 20) and the psychological sub-scale that include the rest of the items focusing on mood, cognitive symptoms of depression, cognitive and emotional symptoms of anxiety, and self-perception of functional impairment (Stewart et al., 2009). The Cronbach alpha of the psychological subscale for this study was .90.

**Modified Perinatal PTSD Questionnaire (PPQ-II).** The modified English PPQ-II is a 14-item instrument that measures intrusive thoughts since delivery (e.g., bad dreams of giving birth), avoidance, or numbing (e.g., inability to remember parts of the hospitalization), and increased arousal (e.g., irritability or anger) (Callahan et al., 2006; Quinnell & Hynan, 1999). The PPQ-II is rated on a 5-point Likert scale from 0 (not at all) to 4 (often for more than a month). The PPQ-II has a total score ranging from 0 to 56 with higher scores indicating elevated PTS symptoms and a clinical range was set at 19 or above, indicating the need for psychotherapy (Callahan et al., 2006). The PPQ-II showed higher internal consistency than the dichotomized PPQ-I with Cronbach alpha of 0.90 (Callahan et al., 2006). The English version of PPQ-II also showed high internal consistency in other studies with a Cronbach alpha ranging from 0.80 to 0.87 (Brandon et

al., 2011). The instrument was translated into Chichewa and back translated before validation among Malawian mothers (see Appendix A).

**Chichewa Child Health Worry Scale (CHWS).** The CHWS is a 7-item instrument that measures the extent to which mothers worry about infant medical problems, development, whether the infant will get sick or might die, and whether baby is eating and sleeping enough (Miles et al., 1999). The instrument is rated on a 5-point Likert scale from 1 (*not at all*) to 5 (*very much*), with higher scores indicating more worry (Miles et al., 1999). The English CHWS shows high internal consistency with Cronbach alpha ranging from 0.89 to 0.90 (Brandon et al., 2011). The CHWS has a total score of 35. The instrument was also translated into Chichewa and back translated before validation among Malawian mothers (see Appendix B).

### **3.2.6 Procedures**

Approval was obtained from Duke University Institutional Review Board and the Malawi College of Medicine Research Committee. Also, the study was authorized by Kamuzu College of Nursing and hospital administration. The data collector referred mothers to the unit staff for further assessment when mothers scored 7 or more on the SRQ. The study was conducted from July to December 2015.

### **3.2.7 Data Collection**

**Nurses and midwives.** Demographic characteristics were collected using a survey questionnaire, which included area of expertise and number of years in practice.

Audio-recorded focus group discussion was conducted to discuss each translated instrument and obtain comments on each item. The focus group discussion lasted 45 minutes.

**Mothers.** Demographic and family characteristics were obtained using a questionnaire. Medical records were reviewed for mode of delivery and prenatal and perinatal complications. The study instruments were administered and thereafter audio-recorded interviews were conducted using an interview guide to ask all the mothers the ease or difficulty and cultural sensitivity of each item on the instrument.

### **3.2.8 Data analysis**

Descriptive statistics were calculated for the participants. I assessed item-level content validity index (I-CVI) by calculating the interrater agreement among the experts. Interrater agreement was calculated by dividing the number in agreement by the total number of raters. Using the Chichewa SRQ-20 as the standard, I examined associations between the PPQ-II with the total Chichewa SRQ-20 and CHWS with the total Chichewa SRQ-20 and psychological subscale. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for each potential cut-off for elevated PTS and worry symptoms were calculated. Using the Chichewa SRQ-20 I divided the groups into two, high depressive and anxiety symptoms ( $\geq 7$ ) and low depressive and anxiety symptoms (score  $< 7$ ) and the Receiver Operating Characteristics (ROC) and the area under the curve (AUC) and its 95% confidence interval were also calculated to

assess the diagnostic ability of the test instruments. Area under the curve (AUC) values that are  $\geq 0.75$  are regarded as clinically useful and values of  $> 0.96$  are regarded as excellent discrimination (Fan, Upadhye, & Worster, 2006). Akobeng (2007) also describes that AUC values between 0.70 to 0.90 as moderate accuracy. Internal consistency for each measure was reported using Cronbach alpha. All quantitative analyses were conducted in SAS version 9.4. Qualitative data from the mothers and nurses/midwives were transcribed, translated, and organized into common observations regarding the instruments. All qualitative analysis was conducted in NVIVO 10.

### **3.3 Results**

#### **3.3.1 Individual-item content validity index: Interrater agreement**

Table 2 presents the expert agreement for PPQ-II. The initial I-CVI ranged from 0.60 to 1.00 with a mean I-CVI of 0.84. Items with the lowest agreement on Chichewa PPQ-II were items 11, 12 and 13 which scored 0.60. After following up with experts and revisions the final I-CVI on all items was 1.00, indicating that 100% of the experts agreed that the back translation retained the content that the original English instrument intended to measure. Experts that initially disagreed on Chichewa PPQ-II items 11, 12 and 13 expressed that some back-translation terms did not mean exactly the same as the original word.

Table 3 presents the expert agreement for Chichewa CHWS. The initial I-CVI ranged from 0.60 to 1.00 with a mean I-CVI of 0.94. The item with the lowest I-CVI was

item 2 which scored 0.60. After following up with the experts the final I-CVI on all items was 1.00, indicating that 100% of the experts agreed that the back translation retained the content that the original English instrument intended to measure. Experts that initially disagreed on item 2 on CHWS the item, one expressed that items 1 and 2 would be confused as conveying the same meaning. Thus, it would help letting mothers know that one meant physical growth and the other meant developmental milestones and the other agreed with the content but stated that the question was long.

**Table 2: Individual-item content validity index for Modified Perinatal PTSD Questionnaire**

Item #	Expert Agreement Score			
	<i>f</i> N (5)	Initial I-CVI	<i>f</i> N (5)	Final I-CVI
1 (bad dreams)	4	0.80	5	1.00
2 (upsetting memories)	4	0.80	5	1.00
3 (feeling of giving birth)	5	1.00	5	1.00
4 (avoid thinking of birth)	5	0.80	5	1.00
5 (avoid things that reminds one of birth)	5	1.00	5	1.00
6 (unable to remember)	5	1.00	5	1.00
7 (lose interest in things)	4	0.80	5	1.00
8 (feeling alone)	4	0.80	5	1.00
9 (lack of tenderness/love)	5	1.00	5	1.00
10 (insomnia)	5	1.00	5	1.00
11 (irritability)	3	0.60	5	1.00
12 (poor concentration)	3	0.60	5	1.00
13 (hyper sensitivity)	3	0.60	5	1.00
14 (guilt)	5	1.00	5	1.00
Mean I-CVI (SD)		0.84 (0.16)		1.00 (0)

Note. N= sample size; SD = standard deviation; *f*= frequencies; PTSD = Posttraumatic Stress Disorder; I-CVI = item-level content validity index

### 3.3.2 Content validity: Focus group discussion with nurses-midwives' perspective

The nurse-midwives agreed that the items on Chichewa PPQ-II and Chichewa CHWS retained the content that the original English instrument intended to measure. The nurse-midwives also recommended minor revisions to the instruments that focused on the spelling of words and removal of words that were redundant, but no changes were made to the content of the instruments. The nurse-midwives commended use of examples to clarify some questions as Chichewa vocabulary is limited and one word could be back translated into more than one English word.

**Table 3: Individual-item content validity index for Child Health Worry Scale**

Item #	Expert Agreement Score			
	<i>f</i> N (5)	Initial I-CVI	<i>f</i> N (5)	Final I-CVI
1 (baby's growth)	5	1.00	5	1.00
2 (baby's development)	3	0.60	5	1.00
3 (possible medical complications)	5	1.00	5	1.00
4 (baby feeling poorly)	5	1.00	5	1.00
5 (baby's eating)	5	1.00	5	1.00
6 (baby's eating)	5	1.00	5	1.00
7 (baby's death)	5	1.00	5	1.00
Mean I-CVI (SD)		0.94 (0.15)		1.00 (0)

Note: N= sample size; SD=standard deviation; *f*= frequencies; I-CVI = item-level content validity index

The PPQ-II item number 6 (unable to remember parts of hospitalization) and 14 (feelings of guilt) were identified as more distressing than the other items as these questions could possibly trigger negative memories with which the mothers had already

dealt. However, all nurse-midwives agreed with the flow of the items on the PPQ-II. The nurse-midwives felt that this instrument was necessary because PTSD exists in the communities and there is lack of interventions to manage PTSD because of lack of awareness.

*Personally, I feel that posttraumatic stress is out there and women have not been assisted.*

*Therefore, if these women are asked, we will know how they can be assisted.*

*It also determines how we are going to take care of the child because if you are stressed post birth then the care of the baby will be compromised.*

Other nurse-midwives also reported that exploring PTS symptoms in the postpartum period was significant for the mobilization of resources for supporting mother. As one stated:

*I think exploring this concept will also help identify support systems for mothers because birth is really stressful . . . When I was reading it, I was reminded of my own experiences for which I was never supported so this is important.*

The CHWS also required minor corrections of spelling and removal of redundant words. However, the nurse-midwives felt that item 1 (my baby growing the way he/she should) and item 2 (baby is developing and learning) would be confusing as the Chichewa terms would overlap. The nurse-midwives recommended that the questions specify to mothers that one is about physical growth in relation to age (*kukula molingana ndi msinkhu*) and the latter is about learning and developmental milestones expected at a

particular age (*kuphunzila zinthu zogwirizana ndi msinkhu wake*). The nurse-midwives agreed that the flow of the questions was correct and that item number 7, which was last, was the most distressing as it asks about the possibility of a child's death.

### **3.3.3 Reliability and validity of the instruments**

These questionnaires were completed by 30 postpartum mothers. Table 4 describes the internal consistency of the Chichewa PPQ-II and the item analysis of the instrument. The results show that internal consistency for the whole Chichewa PPQ-II instrument was high with the Cronbach alpha of 0.82. Individual item analysis for Chichewa PPQ-II showed that the items all were consistent with the rest of the questionnaire in the Chichewa PPQ-II with Cronbach alphas after removal of each specific item ranging from 0.77 to 0.89. The Chichewa PPQ-II also showed high convergent validity with strong correlation with the Chichewa SRQ-20,  $r = 0.74$ ,  $p = < .001$ .

Table 5 presents internal consistency of the Chichewa CHWS and item analysis for each item on Chichewa CHWS. The Chichewa CHWS had high internal consistency of the with Cronbach alpha of 0.86. Item analysis for the Chichewa CHWS also showed that the individual items were consistent with the rest of the questionnaire with Cronbach alphas ranging from 0.80 to 0.85 after removal of each specific item. Convergent validity of the Chichewa CHWS was also high with moderate correlations

with the psychological sub-scale on the Chichewa SRQ-20 of  $r = .55, p = .001$  and with the Chichewa SRQ-20 of  $r = 0.59, p = <.001$ .

**Table 4: Item analysis of Modified Chichewa Perinatal PTSD Questionnaire**

Item	N	Raw Cronbach Alpha after Item Removal	Standardized Cronbach Alpha after Item Removal
1 (bad dreams)	30	.81	.81
2 (upsetting memories)	30	.80	.80
3 (feeling of giving birth)	30	.81	.82
4 (avoid thinking of birth)	30	.81	.81
5 (avoid things that remind of birth)	30	.81	.82
6 (unable to remember)	30	.81	.82
7 (lose interest in things)	30	.80	.80
8 (feeling alone)	30	.81	.80
9 (lack of tenderness/love)	30	.80	.80
10 (insomnia)	30	.80	.80
11 (irritability)	30	.78	.78
12 (poor concentration)	30	.82	.83
13 (hyper sensitivity)	30	.79	.80
14 (guilt)	30	.78	.78

Note. N = sample size; PTSD = posttraumatic stress disorder

**Table 5: Item analysis of Chichewa Child Health Worry Scale Questionnaire**

Item	N	Raw Cronbach Alpha after Item Removal	Standardized Cronbach Alpha after Item Removal
1 (baby's growth)	30	.82	.83
2 (baby's development)	30	.81	.82
3 (possible medical complications)	30	.82	.84
4 (baby feeling poorly)	30	.80	.82
5 (baby's eating)	30	.85	.86
6 (baby's eating)	30	.83	.82
7 (baby's death)	30	.85	.86

Note. N = sample size

### 3.3.4 Test characteristics of the instruments

Table 6 presents the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for the Chichewa PPQ-II. The optimal cut-off point for elevated PTS symptoms was at 5. This cut off had a sensitivity of 71% and specificity of 100% at that score. PPV and NPV values showed that at a cut-off of 5 for Chichewa PPQ-II of those that tested negative, 92% did not have elevated symptoms, and of those who tested positive, 50% had elevated symptoms. Figure 2 shows ROC curves for Chichewa PPQ. The AUC for PPQ-II was 0.85 [SE = 0.10, 95% CI = 0.65 – 1.00, X = 12.02,  $p = .001$ ].

**Table 6: Test characteristics of the Modified Chichewa Perinatal PTSD Questionnaire**

Cut-off	Sensitivity	Specificity	PPV	NPV
1	0.14	1.00	1.00	0.79
2	0.29	1.00	1.00	0.82
3	0.43	1.00	1.00	0.85
4	0.57	1.00	1.00	0.88
5	0.71	1.00	1.00	0.92
6	0.71	0.91	0.71	0.91
7	0.71	0.87	0.63	0.91
8	0.71	0.78	0.50	0.90
9	0.71	0.70	0.43	0.89
10	0.71	0.57	0.33	0.87
11	0.86	0.52	0.35	0.92
12	0.86	0.43	0.33	0.91
13	1.00	0.39	0.33	1.00
14	1.00	0.30	0.30	1.00

Note: PTSD= Posttraumatic Stress Disorder; PPV = positive predictive value; NPV = negative predictive value

Table 7 presents the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for CHWS. The optimal cut-off point for elevated worry was 7 on the CHWS. This cut-off had a sensitivity of 71% and a specificity of 83%. PPV and NPV values showed that at a cut-off of 7 for Chichewa CHWS, of those who tested negative 90% did not have elevated symptoms, and of those who tested positive, 56% had elevated symptoms. Figure 3 shows the ROC curves for Chichewa CHWS. The AUC for Chichewa CHWS was 0.83 [SE = 0.08, 96% CI - 0.66 – 0.99,  $\chi^2 = 15.43$ ,  $p < .0001$ ].

**Table 7: Test characteristics of the Chichewa Child Health Worry Scale**

Cut-off	Sensitivity	Specificity	PPV	NPV
1	0.14	1.00	1.00	0.79
2	0.29	1.00	1.00	0.82
3	0.29	0.96	0.67	0.81
4	0.29	0.91	0.50	0.81
5	0.57	0.87	0.57	0.87
6	0.57	0.83	0.50	0.86
7	0.71	0.83	0.56	0.90
8	0.71	0.74	0.45	0.89
9	0.71	0.65	0.38	0.88
10	0.86	0.61	0.40	0.93
11	0.86	0.57	0.38	0.93
12	1.00	0.52	0.39	1.00

Note: PPV = positive predictive value; NPV = negative predictive value

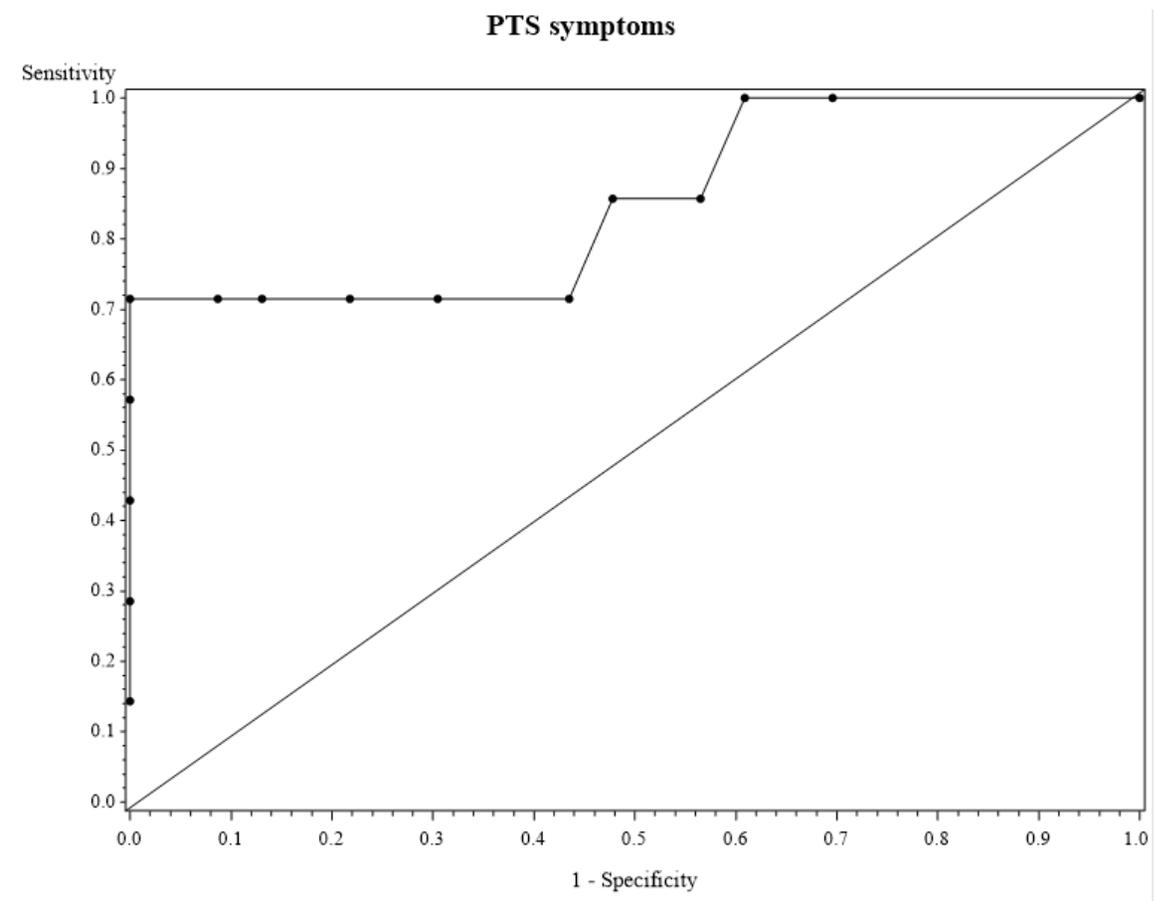


Figure 2: Receiver Operating Characteristic (ROC) curve for Chichewa Perinatal PTSD Questionnaire (PPQ-II)

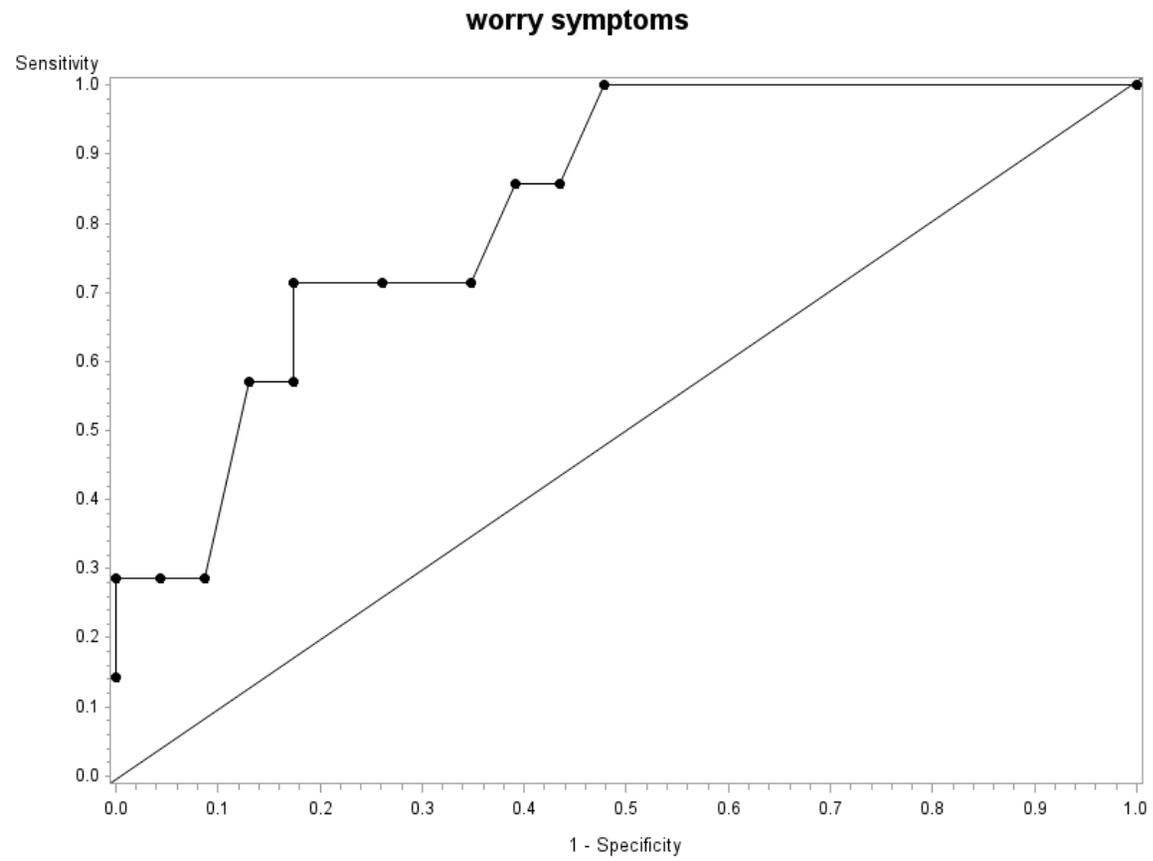


Figure 3: Receiver Operating Characteristic (ROC) curve for Chichewa Child Health Worry Scale (CHWS)

### 3.3.5 Mothers' perception of the Perinatal PTSD Questionnaire

During the interview, mothers described the Chichewa PPQ-II as easy to understand and respond. They also stated that the phrasing was culturally sensitive. The majority of the questions caused no discomfort. However, some mothers perceived some question as uncomfortable. One of those items was number 2 that explores any upsetting memories about birth or hospitalization. One mother said the item was upsetting because,

*Hospital admission is not a good, you get concerned about the condition one is suffering from and you start to worry – (kugonekedwa mchipatala sichinthu chabwino umaganizila matenda, umathanso kumadandaula)*

Mothers also perceived the Chichewa PPQ-II as an important instrument for assessing mothers in the postpartum period. Mothers expressed that this was an opportunity to express how one is feeling in case they do not have an opportunity to express to anyone else. One mother said,

*A person may have concerns, but there could be no one to talk to so they can help you – (chifukwa chokuti mwina munthu ukhonza kukhala ndi nkhawa koma kusowa munthu oti ungamuuze kuti akuthandize)*

Another mother said,

*There are some people who have concerns, but they keep it to themselves to the point of getting sick. They won't even tell the doctor during ward rounds – (pali anthu ena*

amakhala ndi zovuta zawo eti, amangokhala nazo duuu osamamuuza munthu, mwina kumakhala ndi nkhawa ... mwina akumadwala kumene osamuuza munthu. osawauza mwina abwera adokotala eti).

Another important factor mentioned by the mothers was that learning about maternal stress would help health care workers find interventions to assist them. One mother said,

*Mothers who have just given birth have different concerns, therefore health workers would know what concerns we have and how to help us – (munthu akabeleka kumene pena timakhala kuti ali ndinkhawa zosiyanasiyana, nde umatha kudziwa nkhawa za mayiyo ndi m'mene ungate kumuthandizira).*

### **3.3.6 Mothers perception of the Child Health Worry Scale**

Similarly, with Chichewa CHWS, mothers reported that it was easy to understand and respond and that the phrasing was culturally sensitive. Very few mothers mentioned having discomfort with some of the items. One mother found the first item that explores if the mother worries about the baby's growth uncomfortable:

*It is sad when a baby is not growing as expected for their age. If it happened, it wouldn't be good for that to happen – (Amakhumudwitsa chifukwa choti, mwanayo kuti asakule ndi msinkhu wake, sizingakhale bwino)*

Another mother stated that item number 3 that explored whether mother was worried about her inability to know if a child was ill made her feel uncomfortable:

*I was also thinking that nowadays there are variety of diseases so when you asked me that question it was hard for me to respond – (Komanso ineyo ndimaganza kuti masiku anowa kukubwera nthenda zosiyanasiyana, nde ndim'mene munayankhula muja, munandifunsila muja, ndinaona kuti linandibvutabe kuyankha).*

A few mothers found item number 7 that explored whether a mother was worried that her child might die made her feel uncomfortable:

*As one lives, it is not good to be negative about things – (sinanga munthu ukamakhala, sumafunika uzikhala negative)*

Despite these few concerns mothers still felt that asking them about the worries they have about their child was important because the provider would now know the mothers' concerns and know how to help them.

*It is good for health workers to know these concerns because some doctors do not have time to ask the mother because they are overwhelmed with the large number of patients.*

*But if health workers asked these questions they will know her concerns and be able to help the mother – (ndibwino kuti muziziwa eti, kuti mwina anthu ena ngati ma doctor ena samakhala nazo busy kuti adziwe kuti munthu watani chifukwa choti amakhala ndi anthu ambiri eti, m'mene mwafunsamu inuyo muziwa, mumuthandiza munthu uja).*

Another mother said;

*The questions were important because when a mother has a preterm baby she wonders whether the baby will be fine. These questions would help to offer encouragement to the mother – (Mafunso amene aja eti, ndiothandiza chifukwa choti, mwana oti wabadwa masiku osakwana, zimakhaladi zokhumudwitsa kuti koma mwanayu akhala bwino? Nde ndiothandiza kumulimbitsa mtima mzimayi).*

### **3.4 Discussion**

My findings showed high I-CVI for both Chichewa PPQ-II and Chichewa CHWS. The nurse-midwives also acknowledged the accuracy of the translation with minor corrections and modifications that were done to improve the translation. Both the Chichewa PPQ-II and Chichewa CHWS had high internal consistency and they showed strong to moderate correlations with the Chichewa SRQ-20. Mothers also agreed that the questions were easy to understand and culturally sensitive although a few questions were regarded as distressing. Despite both the nurse-midwives and the mothers reporting that some questions would potentially cause discomfort, these instruments were still considered important as they could contribute to identification and management of maternal mental health concerns. Leaving distressing questions at the end of the questionnaire was considered helpful to avoid influencing responses to the other questions.

All items had high expert agreement on both the PPQ-II and CHWS with I-CVI of 1.0 and all midwives agreed with the content of the translations. An I-CVI of 1.0 is

recommended for item-level content validity index (I-CVI) (Polit & Beck, 2006) although a minimum of 0.78 is acceptable (Lynn, 1986). A 3 or 4-point rating scale is advised, although a 4-point scale is frequently used to avoid a neutral score in the middle (Lynn, 1986; Polit & Beck, 2006). I used a 3-point rating scale in this study, future adaptations should consider a 4-point rating scale when calculating I-CVI. The disagreements occurred because some English words were not back-translated to the exact original word, rather the word closest to it. For example, on Chichewa PPQ-II the word angry on item 11 when translated into Chichewa and back-translated it would come back as either anger or upsetting. On the Chichewa CHWS the words growth and development when translated into Chichewa yielded the same word '*kukula*', which when back translated them yielded one English word, growth. Revisions were incorporated to retain the meaning and longer descriptions were required on the Chichewa version to insure clarity. Future researchers and linguists should also work with the communities to identify the best way to express some vocabulary that overlap in Chichewa. Use of examples when administering the instrument that depicts the differences would help mothers provide the correct responses.

My test statistics showed that Chichewa-PPQ-II and Chichewa CHWS were consistent in their screening for presence of PTS symptoms and maternal worry respectively. To determine the cut-off point, the specificity and sensitivity of each instrument the best cut-off point was achieved by finding a balance between specificity

and sensitivity (Akobeng, 2007; Stewart et al., 2009). The ROC curve is also significant in assessing the diagnostic ability of a test to distinguish the true cases and is important in determining the cutoff point (Akobeng, 2007; Hajian-Tilaki, 2013). My study demonstrated moderate diagnostic test discriminatory power with AUC for Chichewa PPQ-II was 0.85 and for Chichewa CHWS was 0.83. To ensure clinically significant diagnostic test discriminatory power, an AUC of >0.75 is recommended (Fan et al., 2006). I decided on a cut-off of 5 for the Chichewa PPQ-II and 7 for the Chichewa CHWS after a trading off sensitivity and specificity. Despite the low positive predictive value, the instrument had a high AUC indicating that the instruments are still clinically significant, but they should not replace clinicians' diagnostic assessment. Stojanovic et al. (2014) explained that predictive values are more significant when disease prevalence was known. Therefore, when the prevalence of a condition is unknown, specificity and sensitivity can be used to determine the accuracy of the tests. Considering that the prevalence of perinatal posttraumatic stress disorder and maternal worry among Malawian mothers is unknown, I utilized specificity and specificity to determine cut off points.

The strength of my study was that experts in the field were engaged to review the content of the instruments during the translation and back translation process. Also, I engaged bilingual nurse-midwives to review the Chichewa versions. Mothers were also allowed to express their opinions about the instrument including their importance.

Use of qualitative methods was helpful in obtaining information about the instruments that could not have been obtained using the surveys. The limitation of my study was that I used the SRQ as my gold standard for screening for neurotic symptoms. This was considered a limitation because the SRQ is a self-reporting questionnaire measuring neurotic symptoms as opposed to provider assessment using the DSM-V which would aid in identifying specific disorders. Despite this limitation, my findings are still valid because the SRQ is a validated instrument for measuring neurotic symptoms including anxiety and depression. Research has also shown a high positive correlation among postpartum PTS, depressive and anxiety symptoms (Holditch-Davis et al., 2009; 2015) Considering that these are both self-report measures, the PPQ-II and CHWS should be used with caution as brief screening tools and further clinical assessments need to be conducted to diagnose PTSD or any other stress disorder. In future adaptations of the instrument the DSM-V classification could be used as a gold standard. Another limitation of my instruments was that validation was only conducted among women immediately after birth and during hospitalization. However, this timing was also a strength because in my study the instruments were to be used to assess symptoms immediately after delivery. Caution should also be taken in future utilization of these instruments and further validation is necessary to use them throughout the perinatal period and infancy. These instruments should not replace clinical diagnosis through

medical assessment by experts, rather they should be used to identify potential risk in mothers who can be referred for diagnosis.

### **3.5 Conclusion**

The Chichewa PPQ-II and Chichewa SRQ are both significant questionnaires for assessing trauma and worry respectively among postpartum mothers in Malawi. These findings are significant because this was the first translation and adaptation of both instruments for Malawi as such this will assist future researchers interested in assessing maternal mental health. Thus, findings from this study will contribute to the literature on negative emotional responses in the perinatal period. The process showed areas in which translation is challenging due to limited vocabulary in Chichewa. Adding an example that clarifies the concept would be a good way to help mothers understand what each question intends to communicate. The findings from this study are also key to future research on emotional distress in perinatal period and throughout infancy in Malawi. Considering that Malawi has only limited data on mental health challenges in perinatal period, researchers need to explore the prevalence of perinatal emotional distress beyond anxiety and depression.

## **4. Emotional Distress in Mothers of Early-Preterm Infants, Late-Preterm Infants, and Full-Term Infants in Malawi**

### ***4.1 Introduction and background***

Each year approximately 15 million preterm infants are born worldwide and one million of these infants die from complications of prematurity (World Health Organization, 2016). Preterm infants can be described as early-preterm [born before 34 weeks gestation] and late-preterm [34 0/6 to 36 6/7 weeks] (Brandon et al., 2011; Holditch-Davis et al., 2009; Miles et al., 1999). Malawi, a low-income country in sub-Saharan region of Africa, has the highest preterm birth rate in the world – estimated at 18.1 per 100 live births (World Health Organization, 2016). In Malawi, limited resources necessitated the viability of a fetus being set at 28 weeks gestation and a birth weight of 1000 g (Metaferia et al., 2005). Thus, this definition of viability excludes extremely preterm infants born at less than 28 weeks gestation. Evidence shows that having a fragile preterm infant who required long-term hospitalization also contributes to elevated maternal depressive, anxiety, and posttraumatic stress (PTS) symptoms and maternal worry about the child's health (Brandon et al., 2011; Dudek-Shriber, 2004; Lasiuk et al., 2013). However, postpartum depression among Malawian mothers is the most common studied emotional response in the postpartum period regardless of gestation at birth as seen in Stewart et al. (2008) and Stewart et al. (2010). Yet, little is

known about other emotional responses such as postpartum anxiety, posttraumatic stress, and worry among Malawian mothers.

The differences in emotional responses between mothers of preterm infants compared to full-term infants has not been explored in the published literature about Malawi. In the United States, mothers of early and late-preterm infants reported more emotional distress than mothers of full-term infants (Brandon et al., 2011; Holditch-Davis et al., 2009; Miles et al., 1999). Research in the US, Canada, and France also showed that hospitalization separated early-preterm infants from their mothers who felt anxious and experienced helplessness and fear about the possibility of the infant's loss (Feeley et al., 2011; Garel et al., 2007; Goutaudier et al., 2011; Holditch-Davis, Bartlett, et al., 2003). In France, mothers reported feeling overwhelmed with responsibility, worried that something might happen to the infant, and guilty that they might have caused the preterm delivery (Garel et al., 2007). Similarly, in the United States, mothers of late-preterm infants in the United States also required slightly longer hospitalization than full-term infants (Brandon et al., 2011). The physical separation made mothers feel emotionally separated and heartbroken over the loss of parental role as nurses took care of their infants (Brandon et al., 2011). However, late-preterm infants are understudied globally because most researchers have focused on mothers of early-preterm infants and no study on emotional responses of mothers with late-preterm infants could be located from Malawi.

Malawi also has limited material resources, for example, incubators to care for preterm infants, and thus utilizes Kangaroo Mother Care (KMC) to keep stable preterm infants warm and discharge infants early with continuation of KMC at home to reduce overcrowding in the Neonatal Nursery Units (Zimba et al., 2012). Kangaroo Mother Care is maternal administration of continuous kangaroo care that involves placement of a naked infant except for the diaper, a hat and socks in skin-to-skin contact between mothers' breast (Cattaneo et al., 1998; Davanzo et al., 2013). Intermittent kangaroo care has been shown to reduce psychological distress in mothers (Holditch-Davis et al., 2014a; S. B. Lee & Shin, 2007; Tallandini & Scalembra, 2006). There is also limited published literature in Malawi on how the length of KMC affects emotional distress in the mothers of preterm infants.

Therefore, the purpose of this study was to compare early emotional responses (depressive and anxiety symptoms, PTS symptoms, and maternal worry) among Malawian mothers with early-preterm infants (28 0/6 to 33 6/7 weeks gestation), late-preterm infants (34 0/7 to 36 6/7 weeks gestation), and full-term infants (38 0/6 to 41 6/7 weeks gestation) following delivery and to determine how length of KMC exposure affects maternal emotional distress in mothers of early and late-preterm infants at baseline and follow-up.

**Hypothesis 1.** Mothers of early-preterm infants would have greater emotional distress following childbirth than mothers of full-term infants. Mothers of late-preterm infants would be intermediate between the other two groups.

**Hypothesis 2.** Both mothers of early and late-preterm infants would have greater emotional distress than mothers of full-term infants.

**Hypothesis 3.** The decrease in emotional distress at follow-up from baseline in mothers of preterm infants would be higher in mothers whose infants had more days of exposure to KMC.

#### ***4.2 Theoretical framework: The Preterm Parental Distress Model***

The theoretical framework for this study was the Preterm Parental Distress Model (Holditch-Davis & Miles, 2000). The Preterm Parental Distress Model describes the sources of maternal emotional distress as pre-existing and concurrent personal and family factors; prenatal and perinatal experience; infant's illness, treatments, and appearance; concerns about outcome; loss of parental role; and healthcare providers (Holditch-Davis & Miles, 2000). Personal and family factors such as maternal age, ethnicity, socio-economic status, social support, and family configuration influence how mothers respond to stress and interpret the Neonatal Intensive Care Unit (NICU) experience (Holditch-Davis & Miles, 2000). Prenatal and perinatal experiences included experiences with past or current birth, obstetric complications, and subsequent relationship with their child. Severity of infant's illness, treatments, and appearance

following birth and hospitalization, including the impact of KMC for preterm infants, was also explored.

### **4.3 Methods**

This was a descriptive comparative study that examined emotional distress of Malawian mothers of early-preterm infants, late-preterm infants, and full-term infants. The study was conducted at Queen Elizabeth Central Hospital, Chatinkha Maternity Unit. Queen Elizabeth Central hospital is a referral hospital and high-risk perinatal mothers, mothers who require further review or obstetrician opinion, and high-risk neonates are admitted to the Chatinkha Maternity Unit. Assessments this study were conducted once for the full-term infants, following childbirth, and twice for the preterm groups, following childbirth and at follow-up (7 days or at follow-up clinic for late-preterm infants and 14 days or at a follow-up clinic for early-preterm infants).

#### **4.3.1 Power analysis and effect size calculation**

To compute effect size for two-group comparisons the means and standard deviations of PTS, PPD, anxiety, and worry following delivery from Brandon et al. (2011) were plugged into the G\*Power software. The effect size for two-group comparisons between the preterm and full-term groups immediately following birth for this study was medium for PTS (Cohen  $d = .78$ ) and large for depressive symptoms (Cohen  $d = .93$ ), anxiety symptoms (Cohen  $d = 1.13$ ) and maternal worry (Cohen  $d = 1.23$ ). The effect size was then used to calculate the sample size after setting the alpha set

at .05 (two-tailed) and power at .8. Power analysis showed that a sample of n=20 for depressive symptoms, n=27 for PTS symptoms, n=14 for anxiety symptoms, and n=12 for worry in each group would achieve at least 80% power with an alpha of .05 (two tailed).

### **4.3.2 Sample size**

I recruited 85 mother-infant dyads: 28 mothers and their early-preterm infants (28 0/6 to 33 6/7 weeks gestation) admitted to the critical care nursery or KMC; 29 mothers and their late-preterm infants (34 0/7 to 36 6/7 weeks gestation) and admitted to either neonatal nursery or postnatal ward; and 28 mothers and their full-term infants weighing more than 2,500 grams, and admitted in the postnatal ward. For mothers with multiple births, one infant was randomly selected to participate. The criteria for inclusion in the study were mothers who have living early-preterm, late-preterm, or full-term infants; were aged 18 years or older; and were fluent in Chichewa. Mothers were excluded if they had a diagnosis of psychosis or bipolar disorder to prevent confounding the results.

Tables 8 and 9 presents the demographic characteristics of the sample. The early-preterm infants were more likely to have lower birth weights, to have lower Apgar scores at 1 and 5 minutes, to require more days on oxygen therapy, and to be born through vaginal birth than the full-term infants. The late-preterm infants were intermediate between the two other infant groups. No significant differences occurred in maternal demographic characteristics among the three groups.

**Table 8. Maternal and infant demographic characteristics in the three groups**

Parameter	Early-preterm (N = 28)		Late-preterm (N=29)		Full-term (N=28)		<i>F</i> <sup>a</sup>	DF	<i>p</i>
	Mean	SD	Mean	SD	Mean	SD			
Maternal age	25.6	5.5	24.7	6.0	24.9	5.4	0.2	2, 82	.86
Education	9.2	3.3	8.5	3.1	9.4	3.1	0.7	2, 82	.49
Gestation	30.9	1.5	34.5	0.8	39.4	1.0	394.6	2, 82	<.0001
Infant Age	2.4	0.7	2.3	0.6	1.1	1.0	24.4	2, 82	<.0001
Birthweight	1503.4	199.7	1858.6	232.6	3214.3	435.2	243.5	2, 82	<.0001
1 minute Apgar	6.5	1.7	7.0	1.6	7.8	0.9	5.3	2, 73	.006
5 minute Apgar	9.1	1.4	9.4	1.3	9.9	0.4	3.5	2, 73	.03
KMC days	2.7	2.9	5.0	2.4	0	0	50.3	2, 69	<.0001
Oxygen days	1.6	1.4	0.6	0.6	0	0	23.4	2, 82	<.0001

KMC = Kangaroo Mother Care; Note: infant age is in days, birthweight is in grams; maternal age in years; education in years; gestational age in weeks; infant age in days; birthweight in grams

<sup>a</sup>ANOVA comparing groups.

**Table 9: Maternal and infant demographic characteristics in the three groups**

Parameter	Early-preterm (N = 28)		Late-preterm (N=29)		Full-term (N=28)		X <sup>2</sup>	p
	f	%	f	%	f	%		
% Married	24	85.7%	26	89.7%	24	85.7%	0.26	.88
Tribe							2.68	.85
Hlomwe	6	21.4%	7	24.1%	10	35.7%		
Ngoni	5	28.6%	5	31.0%	6	21.4%		
Yao	9	17.7%	8	17.2%	7	25.0%		
Others	8	32.1%	9	27.6%	5	17.9%		
% Stay at home mother	17	60.7%	19	65.5%	17	60.7%	0.60	.96
% Cesarean Section	1	3.6%	8	27.6%	13	46.4%	13.47	.001
Infant gender							1.56	.46
Male	15	53.6%	12	41.4%	16	57.1%		
Female	13	46.4%	17	58.6	12	42.9%		
% Multiple birth	6	21.3%	10	34.5%	0	0%	11.27	.003
% with support	17	60.7%	21	72.4%	25	89.3%	6.02	.049
% Primiparas	9	32.1%	6	20.7%	11	39.3%	2.37	.31
% with Pregnancy complications	28	100%	28	96.6%	6	21.4%	56.22	<.0001
% with Labor complications	28	100%	29	100%	13	46.4%	37.08	<.0001
% with Infant complications	28	100%	29	100%	2	7.1%	76.25	<.0001
History of NNDs	0	0%	4	13.8%	2	7.1%	4.13	.12
History of abortions	2	7.1%	1	3.5%	0	0%	2.10	.35

NND = neonatal deaths. f = frequency. Chi Squares comparing the groups on each parameter

### 4.3.3 Study instruments and measures

**Mother characteristics.** Sociodemographic and family characteristics including maternal age, marital status, occupation, education level, gravidity, parity, mode of delivery, family size, number of living children, tribe, and presence of support persons were collected through self-report. Medical records were reviewed for mode of delivery and prenatal and perinatal complications.

**Infant characteristics.** A chart review was conducted to collect information on infant gender, date of birth, Apgar scores, medical history, and days of KMC. Severity of the infant's condition was measured using birth weight, length of oxygen therapy, and total number of diagnoses. Infant gestational age for all infants was assessed at enrollment using antenatal ultrasound scanning estimation (if available) and the New Ballard Score by the investigator (Ballard et al., 1991). The New Ballard Score assesses neurological and motor maturity on a 7-point Likert scale ranging from -1 to 5 (Ballard et al., 1991). The total score ranges from -10 [translating to 20 weeks gestation] to 50 [translating to 44 weeks gestation]. The New Ballard Score may over estimate gestational age by  $0.6 \pm 1.7$  weeks (Ballard et al., 1991). In Malawian infants, the New Ballard score conducted within 36 hours of birth overestimated gestational age by 0.8 weeks (Wylie et al., 2013).

**Maternal emotional responses.** Assessments were conducted following childbirth (24 to 72 hours--baseline) for mothers in all three groups. Follow-up

assessments were only conducted for the preterm groups: at 2 weeks from baseline (Day 14) for the mothers with early-preterm infants and at least 1 week from baseline or at a postnatal/KMC follow-up visit for the mothers of late-preterm infants.

*Depressive symptoms and anxiety symptoms.* An interview-guided Chichewa self-reporting questionnaire (SRQ) was used to measure depressive and anxiety symptoms. The Chichewa SRQ is a 20-item yes/no instrument that is adapted to screen for the presence anxiety and depressive symptoms (World Health Organization, 1994). Internal consistency of the SRQ is high with a Cronbach alpha of 0.85 (Stewart et al., 2009). Internal consistency for this sample was also high with Cronbach alpha of .89. The SRQ has a cut-off point of 7/8 with higher scores indicating elevated depressive and anxiety symptoms (Stewart et al., 2009).

*Posttraumatic stress symptoms.* The Chichewa Perinatal PTSD Questionnaire (PPQ) was used to screen for PTS symptoms. The PPQ is a 14-item instrument that measures PTS symptoms on a 5-point Likert scale (Callahan et al., 2006; Quinnell & Hynan, 1999). The Chichewa PPQ was translated and validated for use among Malawian mothers with full-term and preterm infants (Chapter 3). The internal consistency of the Chichewa PPQ was also high with a Cronbach alpha of .82 (Chapter 3). Internal consistency for this sample was also high with a Cronbach alpha of .90. The Chichewa PPQ was highly correlated with the Chichewa SRQ (Chapter 3). The cut-off point of elevated PTS symptoms for the Chichewa PPQ was set at 5/6 (Chapter 3).

*Maternal worry about the child's health.* The Chichewa Child Health Worry Scale (CHWS) was used to measure maternal worry about child's health. The CHWS is a 7-item instrument measured on a 5-point Likert scale with higher scores indicating more worry (Miles et al., 1999). The Chichewa-CHWS was translated and validated among Malawian mothers with preterm and full-term infants (Chapter 3). Internal consistency of the whole instrument was high with a Cronbach alpha of .86 (Chapter 3). Internal consistency for this sample was also high with Cronbach alpha of .93. The CHWS was highly correlated with the psychological symptoms subscale of the Chichewa-SRQ (Chapter 3).

#### **4.3.4 Procedure**

I obtained approval to conduct the study from Duke University Institutional Review Board, the Malawi College of Medicine Research Committee, and Queen Elizabeth Central Hospital. Mothers also gave consent before data collection.

#### **4.3.5 Data analysis**

I compared the means and standards deviations for continuous demographic variables using one-way ANOVA. I also calculated frequencies, percentages, and Chi-square statistics for the categorical demographic variables. I used Pearson correlations to assess correlations among the significant demographic variables that were significantly different among the three group. To avoid multicollinearity in the model selection, I dropped variables with strong or moderate correlation with infant group. If two or more

covariates had strong or moderate correlation, only one was considered in the final model (see Table 10). The final variables considered for model selection included gestational age, infant age (day postpartum), birthweight, Apgar score at 5 minutes, mode of delivery (cesarean section), multiple birth, total days of KMC, interruption in KMC, total days of oxygen therapy, presence of a support person, pregnancy complications, labor complications, and infant complications. Interruption in KMC was defined as interruption in continuous mother care because of the admission of the infant to the critical care section due to medical reasons. All mothers with KMC interruption had infants in the critical care section for more than 24 hours.

For hypothesis 1, I conducted one way ANOVA to compare the mean differences for the total scores for SRQ-20, PPQ, and CHWS for the mothers of the three groups of infants at baseline without covariates. For hypothesis 2, I conducted a linear regression model to compare the total scores for SRQ-20, PPQ, and CHWS for the mothers of the three groups of infants at baseline with and without covariates. Backward elimination was used to select final covariates to include in the model with significance level set at 0.1.

For hypothesis 3, I conducted Pearson correlation between the duration of KMC and the change in the emotional distress variables (difference between follow-up at 1-2 weeks later and the baseline assessments) in the preterm groups. I also conducted a linear regression analysis to assess the effects of duration of KMC on the change

Table 10. Correlation matrix of the demographic variables for model selection

	Education	Occupation	Infant Age	Birthweight	Apgar 5	Cesarean	KMC total	Oxygen	Support	Infant Group
<b>Education</b>	1.00 n= 85	0.20 <i>p</i> = .07 n=85	-0.12 <i>p</i> =.29 n=85	-0.003 <i>p</i> = .97 n=85	-0.05 <i>p</i> = .70 n =76	-0.05 <i>p</i> = .65 n=85	-0.07 <i>p</i> = .57 n=72	0.04 <i>p</i> = .70 n=85	-0.02 <i>p</i> = .88 n=85	-0.003 <i>p</i> = .98 n=85
<b>Occupation</b>	0.20 <i>p</i> = .07 n=85	1.00 n=85	0.06 <i>p</i> = .60 n=85	0.04 <i>p</i> = .75 n=85	-0.22 <i>p</i> = .05 n =76	-0.001 <i>p</i> = .99 n=85	-0.06 <i>p</i> = .64 n=72	-0.06 <i>p</i> = .55 n=85	-0.01 <i>p</i> = .94 n=85	0.02 <i>p</i> = .89 n=85
<b>Infant Age</b>	-0.12 <i>p</i> = .29 n= 85	0.06 <i>p</i> = .60 n=85	1.00 n=85	-0.43 <i>p</i> <.0001 n=85	-0.27 <i>p</i> = .02 n=76	0.19 <i>p</i> = .08 85	0.56 <i>p</i> <.0001 n=72	0.46 <i>p</i> <.0001 n=85	-0.15 <i>p</i> = .19 n=85	<b>0.53</b> <i>p</i> <.0001 <b>n=85</b>
<b>Birthweight</b>	-0.004 <i>p</i> = .97 n =85	0.04 <i>p</i> = .75 n=85	-0.43 <i>p</i> <.0001 n=85	1.00 n=85	0.18 <i>p</i> = .13 n=76	0.31 <i>p</i> = .004 n=85	-0.68 <i>p</i> <.0001 n=72	-0.61 <i>p</i> <.0001 n=85	0.27 <i>p</i> = .01 n=85	<b>-0.88</b> <i>p</i> <.0001 <b>n=85</b>
<b>Apgar 5</b>	-0.05 <i>p</i> = .70 n=76	-0.22 <i>p</i> = .05 n=76	-0.26 <i>p</i> = .02 n=76	0.18 <i>p</i> = .13 n=76	1.00 n=76	-0.18 <i>p</i> = .11 n=76	-0.26 <i>p</i> = .04 n=63	-0.47 <i>p</i> <.0001 n=76	0.07 <i>p</i> = .57 n=76	<b>-0.34</b> <i>p</i> = .002 <b>n=76</b>

table continued...

Table 3: Continued

	Education	Occupation	Infant Age	Birthweight	Apgar 5	Cesarean	KMC total	Oxygen	Support	Infant Group
<b>Cesarean</b>	-0.05 <i>p</i> = .65 n=85	-0.001 <i>p</i> = .99 n=85	0.19 <i>p</i> = .08 n=85	0.31 <i>p</i> = .004 n=85	-0.18 <i>p</i> = .12 n=76	1.00 n=85	-0.08 <i>p</i> = .52 n=72	-0.13 <i>p</i> = .24 n=85	0.27 <i>p</i> = .01 n=85	-0.23 <i>p</i> = .03 n=85
<b>KMC Total</b>	-0.07 <i>p</i> = .57 n=72	-0.06 <i>p</i> = .64 n=72	0.56087 <i>p</i> < .0001 n=72	-0.68 <i>p</i> < .0001 n=72	-0.26 <i>p</i> = .04 n = 63	-0.08 <i>p</i> = .52 n=72	1.00 n=72	0.60 <i>p</i> < .0001 n=72	-0.25 <i>p</i> = .04 n=72	<b>0.68</b> <i>p</i> < .0001 <b>n=72</b>
<b>Oxygen Days</b>	0.04 <i>p</i> = .70 n=85	-0.06 <i>p</i> = .55 n=85	0.46 <i>p</i> < .0001 n=85	-0.61 <i>p</i> < .0001 n=85	-0.47 <i>p</i> < .0001 n=76	-0.13 <i>p</i> = .24 n=85	0.60 <i>p</i> < .0001 n=72	1.00 n=85	-0.29 <i>p</i> = .01 n=85	<b>0.66</b> <i>p</i> < .0001 <b>n=85</b>
<b>Support</b>	-0.02 <i>p</i> = .88 n=85	-0.008 <i>p</i> = .94 n=85	-0.15 <i>p</i> = .19 85	0.27 <i>p</i> = .01 n=85	0.07 <i>p</i> = .57 n=76	0.27 <i>p</i> = .01 n=85	-0.25 <i>p</i> = .03 n=72	-0.29 <i>p</i> = .01 n=85	1.00 n=85	-0.26 <i>p</i> = .01 n=85
<b>Infant Group</b>	-0.003 <i>p</i> = .98 n=85	0.02 <i>p</i> = .89 n=85	0.53 <i>p</i> < .0001 n=85	-0.88 <i>p</i> < .0001 n=85	-0.34 <i>p</i> = .002 n=76	-0.23 <i>p</i> = .03 n=85	0.68 <i>p</i> < .0001 n=72	0.66 <i>p</i> < .0001 n=85	-0.26 <i>p</i> = .01 n=85	1.00 n=85

Note: Apgar 5 = Apgar at 5 minutes; Oxygen days = number of days on oxygen support; Support = presence of a support person

in emotional distress. I utilized backward elimination to retain covariates in the final model. Variables were retained in the model if they were significant at 0.10. Infant group and baseline assessment were retained regardless of level of significance. Other variables considered in the model selections were infant group, baseline assessment, presence of support, years of education, and whether there was an interruption in KMC.

The level of significance for each statistical test was set at 0.05 (two-tailed). All statistical analyses were conducted using Statistical Analysis Software (SAS) version 9.4.

## 4.4 Results

### 4.4.1 Emotional distress of the early- and late-preterm groups compared to the full-term group

Table 11 presents the mean differences among the three infant groups. Mothers of early-preterm infants reported more symptoms on all measures of emotional distress than mothers of full-term infants. The mothers of late-preterm infants were intermediate between the other two groups

**Table 11: One-way ANOVA for group differences in anxiety and depressive symptoms, posttraumatic stress symptoms, and worry**

	Early-preterm (N = 28)		Late-preterm (N=29)		Full-term (N=28)				
	Mean	SD	Mean	SD	Mean	SD	<i>F</i>	<i>DF</i>	<i>p</i>
Anxiety/Depress.	6.82	4.82	4.69	4.03	1.71	2.77	11.71	2, 82	<.001
PTS symptoms	9.64	6.65	6.76	7.08	2.17	5.23	9.75	2, 82	<.001
Worry	17.14	5.56	14.00	5.37	8.21	2.93	25.09	2, 82	<.001

Note: Depress. = depressive symptoms; PTS = posttraumatic stress

**Table 12: Regression analysis for emotional distress at follow-up among mothers of early-preterm, late-preterm, and full-term infants – before adjusting for covariates**

	Depressive and Anxiety Symptoms				Posttraumatic Stress Symptoms				Maternal Worry			
	Est	SE	<i>t</i> (84)	<i>p</i>	Est	SE	<i>t</i> (84)	<i>p</i>	Est	SE	<i>t</i> (84)	<i>p</i>
Intercept	1.71	0.75	2.29	.02	2.18	1.21	1.81	0.07	8.21	0.90	9.08	<.001
Early-preterm vs full-term	5.11	1.06	4.82	<.001	7.46	1.71	4.38	<.001	8.92	1.28	6.98	<.001
Late-preterm vs full-term	2.97	1.05	2.83	.006	4.58	1.69	2.71	0.008	5.79	1.27	4.56	<.001

Note: Est = estimate; SE = standard error

**Table 13: Regression analysis for emotional distress among mothers of early-preterm, late-preterm, and full-term infants – Adjusted for covariates**

	Depressive and Anxiety Symptoms				Posttraumatic Stress Symptoms				Maternal Worry			
	Est	SE	<i>t</i> (84)	<i>p</i>	Est	SE	<i>t</i> (84)	<i>p</i>	Est	SE	<i>t</i> (84)	<i>p</i>
Intercept	2.33	1.18	1.97	.05	3.46	1.91	1.81	.07	5.45	1.79	3.04	.003
Early-preterm vs full-term	5.59	1.14	4.92	<.001	8.00	1.84	4.36	<.001	8.98	1.26	7.11	<.001
Late-preterm vs full-term	3.10	1.04	2.97	.004	4.68	1.69	2.77	.007	6.06	1.26	4.81	<.001
Caesarean Section	2.42	1.06	2.28	.03	3.39	1.72	1.98	.05	-	-	-	-
Support	- 1.95	1.01	-1.93	.06	-3.20	1.63	-1.96	0.05	-	-	-	-
Education	-	-	-	-	-	-	-	-	0.29	0.17	1.77	.08

Note: Est = estimate; SE = standard error  
 -- = variable eliminated from model

Table 12 presents the unadjusted estimates of anxiety and depressive symptoms, PTS symptoms, and worry for the three groups. Mothers of early-preterm and late-preterm infants had higher anxiety and depressive symptom scores, posttraumatic stress symptoms, and maternal worry than mothers of full-term infants. Similarly, mothers of late-preterm infants had higher anxiety and depressive symptoms, posttraumatic stress symptoms, and maternal worry than mothers of full-term infants.

Table 13 presents the differences among the groups after adjusting for mode of delivery, presence of social support, and years of education. Cesarean section was related to higher depressive, anxiety and PTS symptoms. However, the relationship of PTS symptoms to cesarean section was borderline. Presence of a social support person was associated with greater depressive, anxiety and PTS symptoms but this relationship was borderline

#### **4.4.2 Effects of the duration of KMC on emotional distress in mothers of preterm infants**

Table 14 presents the correlation between KMC and the change in distress symptoms and the value of distress symptoms at follow-up (See Appendix C for separate analyses of the early and late-preterm groups). A borderline significant finding was seen between duration of KMC and SRQ difference. More days of KMC were positively associated with an increase in depression and anxiety at follow-up from baseline ( $r = 0.30, p = .046$ ) and PPQ difference ( $r = 0.30, p = .046$ ).

**Table 14: Pearson correlation between the duration of KMC and the follow-up assessment and the change between baseline and follow-up**

	<i>N</i>	<i>r</i>	<i>p</i>
<i>Correlation of KMC with Change in SRQ from Baseline to Follow-up</i>			
SRQ difference	44	0.30	.046
PPQ Difference	44	0.30	.046
CHWS difference	44	0.27	.08
<i>Correlation of KMC with Follow-up Assessment</i>			
SRQ total at follow-up	44	0.13	.39
PPQ total at follow-up	44	0.11	.50
CHWS total at follow-up	44	0.15	.32
SRQ = Self-reporting Questionnaire; PPQ = Perinatal PTSD Questionnaire; CHWS = Child Health Worry Scale; KMC = Kangaroo Mother Care			
Note: the difference was calculated between the follow-up and baseline scores			

Table 15 presents the effects KMC on the change of emotional distress from baseline to follow-up after controlling for the baseline value and KMC interruption. An increase in the number of days of KMC showed no effect on any measures of emotional distress. However, the emotional distress increased at follow-up if the mother had an interruption in KMC. Appendices D – F presents the comparisons of the preterm groups in order to explore whether the findings from merged data would be different from the analysis of each individual preterm group. These separate shows the effects of days of KMC on the change in emotional distress for the early- and late-preterm groups and also relationship between KMC and the follow-up assessment.

**Table 15: Regression analysis on the effects of the duration of KMC on the change in emotional distress from baseline to follow-up**

	Depressive and Anxiety Symptoms				Posttraumatic Stress Symptoms				Maternal Worry			
	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>
Intercept	-0.49	4.59	-0.11	.91	-2.64	7.24	-0.36	.72	3.02	5.12	0.59	.56
KMC total	0.24	0.31	0.79	.43	0.43	0.49	0.90	.38	0.30	0.32	0.93	.36
Early vs Late	0.29	1.47	0.19	.85	0.72	2.30	0.31	.76	1.04	1.59	0.65	.52
KMC Interruption	4.87	2.07	2.35	.02*	6.52	3.25	2.00	.05*	6.89	2.24	3.08	.004*
Baseline	-0.75	0.16	-4.79	<.0001	-0.66	0.16	-4.22	.0001	-0.83	0.13	-6.15	<.0001

Note: Est = Estimate; SE = standard error; SRQ = Self-reporting Questionnaire; PPQ = Perinatal PTSD questionnaire; CHWS = Child Health Worry Scale; KMC = Kangaroo Mother Care. . \* *p* < .05.

## **4.5 Discussion**

This study examined the magnitude of emotional distress in mothers of preterm infants during hospitalization in Malawian hospitals. As noted earlier, Malawi has a high number of preterm births annually (World Health Organization, 2016) and emotional distress is one of the common symptoms reported in mothers during the perinatal period (Stewart et al., 2009; Stewart et al., 2008; Stewart et al., 2013). The findings confirmed the hypothesis that mothers of early-preterm infants experienced more distress than mothers of full-term infants and that mothers of late-preterm were intermediate between the two groups. The findings failed to confirm that mothers of infants with longer exposure to KMC would experience less emotional distress than mothers with less exposure to KMC. However, mothers who had an interruption in KMC experienced a smaller reduction in distress symptoms at their follow-up assessment than mothers without an interruption in KMC.

My study confirmed that Malawian mothers of early-preterm infants and mothers of late-preterm infants were at a higher risk of emotional distress than mothers of full-term infants. The mothers of early-preterm infants in my study reported more symptoms on all measures of emotional distress than mothers of full-term infants. The late-preterm group was intermediate between the two other groups. These findings are consistent with United States literature that found that mothers of early and late-preterm infants report more emotional distress than mothers of full-term infants (Brandon et al.,

2011; Holditch-Davis et al., 2009; Miles et al., 1999). In Nigeria, mothers of early- and late-preterm infants, weighing less than 2,500 grams, showed significantly higher scores on the Beck Depression Inventory and General Health Questionnaire about possible diagnosable psychiatric disorders than mothers of full-term infants (Ukpong et al., 2003). In Canada, McDonald et al. (2013) found that mothers of late-preterm infants were at a greater risk for excessive anxiety symptoms than mothers of full-term infants. Similarly, in Brazil, mothers of early and late-preterm infants showed higher anxiety than mothers of full-term infants (Padovani et al., 2009). This shows that the experience of Malawian mothers of preterm infants is similar to that of mothers from developed and developing countries.

My study showed that obstetric factors such as cesarean section were related to higher anxiety and depressive symptoms and posttraumatic stress symptoms. The correlation of cesarean birth and emotional distress shows the importance of focusing on the emotional state of high-risk mothers as other factors besides the infant's health condition are related to emotional distress. In this study, mothers of full-term infants were more likely to have a cesarean section than either early or late-preterm infants because the likelihood that mothers who have cesarean birth would stay longer in the hospital than mothers who had spontaneous vertex delivery. National Statistics Office (NSO) [Malawi] and ICF (2017) found that in the 5 years before the survey the national cesarean birth rate for Malawi was 6% of the live births. Despite the higher

numbers of cesarean sections in the full-term group, this variable did not affect the differences between the preterm groups and the full-term group. Thus, the mothers of the preterm groups in our study were still at a higher risk of emotional distress than the high-risk mothers of full-term infants. A study among Tanzanian women showed that women preferred vaginal birth because they were socially perceived as being lazy if they had a cesarean birth, thus lost respect from their society (Litorp, Mgaya, Kidanto, Johnsdotter, & Essen, 2015). Similar experiences might exist in Malawian women and this is also a potential source of stress.

My study also showed that social support had minimal effects on emotional distress. Presence of a support person was associated with lower anxiety, depressive, and PTS symptoms, but this effect was borderline. Research has shown that emotional and physical support in the postpartum period is necessary for maternal psychological wellbeing and to lower mothers' emotional distress (Heh et al., 2004; Lau & Wong, 2008). However, my study based this analysis on presence of a support person and not whether the mother viewed their support as positive or negative. Future studies in Malawi need to explore what is regarded as positive social support and how this affects mothers during hospitalization and at home.

The length of KMC was not associated with the rate of decrease of emotional distress from baseline to the follow-up contact in my study. In the United States and Italy, kangaroo care was associated with lower emotional distress in mothers with

preterm infants (Holditch-Davis et al., 2014a; Tallandini & Scalembra, 2006). Kangaroo Care in United States is voluntary and mothers have access to all needed resources such as incubators when they need to rest. In Malawi, mothers become a living incubator by doing KMC. Although mothers are grateful to have continuous access to their infants, they are left with a huge responsibility of being the primary provider of infant care in the hospital. However, the mothers who experienced an interruption in KMC because the infant required readmission into the critical care unit reported more symptoms on all measures of emotional distress. This is similar to literature in US mothers that reported mothers feeling helpless, were concerned about their infant's health, and are uncertain about their infant's outcome (Miles & Holditch-Davis, 1997). In addition, having a fragile early-preterm infant who was attached to medical equipment and the presence of infant medical problems, as indicated by color changes, jaundice, and respiratory distress, triggered maternal distress (Miles & Holditch-Davis, 1997). In Malawi, implementing KMC for their infants provides a sign of improvement for mothers because only stable preterm infants are transferred to the KMC ward. Therefore, having a child return to a critical care section for care is an indication of worsening of the infant's illness. This maternal perception of seriousness of illness in infants experiencing interruption in KMC could have been the reason the mothers reported more symptoms on all measures of emotional distress.

The Preterm Parental Distress Model states that sources for emotional distress in mothers include pre-existing and concurrent personal and family factors; prenatal and perinatal experience; infant's illness, treatments, and appearance; concerns about outcome; loss of parental role; and healthcare providers (Holditch-Davis & Miles, 2000). In this study, maternal sociodemographic factors had no effect on maternal psychological distress. Education and maternal age were retained in my final model; however, they did not significantly influence any measure of emotional distress. This is consistent with other studies that also found that education and maternal age had no effects on emotional distress (Ghorbani et al., 2014; Wei, Greaver, Marson, Herndon, & Rogers, 2008). However, other research studies showed a relationship between maternal age and emotional distress in mothers of early-preterm infants (K. W. Gondwe, White-Traut, Brandon, Wei, & Holditch-Davis, 2017).

Perinatal factors such as cesarean birth significantly contributed to the different experiences in maternal emotional distress. In my study, KMC interruption also increased emotional distress. While I did not have a variable for severity of infant illness, KMC interruption in my study was due to readmission into the critical care unit because of infant complications. This finding is consistent with evidence in the model that mothers worry about infants' illness, treatments and appearance, and infant's outcome (Holditch-Davis & Miles, 2000).

#### **4.6 Limitations to the study**

Several factors may limit the generalizability of this study's findings including sampling and timing of the assessments. A convenience sample of mothers following birth was recruited for the study and the sample was small, which poses a risk of sampling error and selection bias as seen with the late-preterm and full-term group having a higher cesarean section rate than the national rate. However, the study is still important because it provides exploratory findings on maternal emotional distress. Future studies need to recruit a larger sample to handle issues of sampling error and selection bias. Another limitation is that the three-group comparison were assessed immediately following birth because of the short-term hospitalization of full-term infants, which made it important to maintain the timing to avoid effects of the home environment. Given the possibility of latent effects from pregnancy complications and other experiences, assessing mothers immediately after birth has the potential to include emotional distress that existed before birth. In addition, assessing the mother throughout the infancy period would also assist in understanding the long-term burdens of emotional distress.

#### **4.7 Conclusion**

In conclusion, preterm birth is a burden in Malawi and increases the risk of emotional distress. Malawian mothers of early-preterm and late-preterm infants are at a higher risk of emotional distress than mother of full-term infants. These findings suggest

that attention be given to mothers who have an interruption in KMC or mothers who had complications during birth such cesarean birth. The findings of this study are important to Malawian nurse-midwives working with mothers and their infants and to policy makers as it brings to light that mothers in Malawian postnatal units require more psychological support, which is currently limited. The healthcare system also needs to invest in well trained personnel to provide counselling for mothers offering KMC to their infants in order to prevent severe mental health disorders.

## **5. Mother and infant interactive behaviors of Malawian mothers with preterm and full-term infants**

### ***5.1 Introduction and background***

Despite the high preterm birth rate in Malawi, estimated at 18.1 per 100 live births (World Health Organization, 2016), research on mother and preterm infant interactions and the factors associated with positive interactions has not been conducted in Malawi. However, Swiss mothers with early-preterm infants showed less positive interactions with their infants than mothers with full-term infants (Forcada-Guex et al., 2011). Chapter 4 also showed that Malawian mothers of early-preterm and late-preterm infants are at higher risk of emotional distress than mothers of full-term infants. Evidence also shows that perinatal depression is negatively associated with the quality of mother-preterm infant interactions (Field, Hernandez-Reif, et al., 2005; Field, Nadel, et al., 2005). Thus, mothers and their preterm infants in Malawi, early-preterm (<34 weeks gestation) or late-preterm (34 0/6 – 36 6/7 weeks gestation), are more likely to experience less positive interactions than mothers and their full-term infants. However, nothing is yet known about how emotional distress relates to interactions of mothers with their early-preterm and late-preterm infants in Malawi compared to mothers of full-term infants.

Mother-infant interactions include the verbal or nonverbal cues of the mother and infant that produce behavioral responses from the other (Leitch, 1999). Mother-

infant interactions provide the foundation for a quality mother and infant relationship, contribute to maternal wellbeing, and continue throughout childhood (Bystrova et al., 2009). In addition, mother-infant interactions promote social, emotional, and cognitive development of infants (Harrist & Waugh, 2002).

However, mother-preterm infant interactions have mostly been studied in developed countries and only a few studies have been conducted during hospitalization or focused on late-preterm infants. In addition, the majority of these studies did not specify the gestation of the preterm infants. However, studies during hospitalization show that fewer interactive behaviors in the immediate postpartum period than at later ages. A study of Canadian mothers with high-risk preterm infants in the Neonatal Intensive Care Unit (NICU) showed that mothers got more comfortable over time with touching their infants (Minde et al., 1975). Mothers initially stroked the extremities and head, but as time passed they did more manipulation (Minde et al., 1975). However, Minde, Marton, Manning, and Hines (1980) observed little change in maternal touch and feeding behaviors from visit to visit. In addition, mothers of preterm infants who had a short-term illness talked, touched, and looked more at their infant than mothers who had preterm infants with chronic conditions (Minde, Whitelaw, Brown, & Fitzhardinge, 1983). Maternal looking has also been found to be positively correlated with Apgar scores at 5 minutes and the number of days on mechanical ventilation (Coppola & Cassibba, 2010). Mothers of infants with higher gestational ages and more days of

hospitalization talked more to their infants than mothers with infants who had lower gestational ages and fewer days of hospitalization (Coppola & Cassibba, 2010). High-risk preterm infants exhibited fewer motor behaviors (arm movements, leg movements, mouth movements, head movements, and eye opening) while they were critically ill, and these behaviors increased as the infant recovered (Minde et al., 1983). A study that assessed infant interactive behaviors when with mothers and nurses found that when with nurses the preterm infants spent more time in sleep-wake transition than in active sleep compared to when the parents were present (Miller & Holditch-Davis, 1992).

Studies in the home also showed that early-preterm infants were less interactive than full-term infants. In Switzerland, early-preterm infants were found to be less responsive during interactions with their mothers than full-term infants because of their immaturity and fragility (Forcada-Guex et al., 2006; Habersaat et al., 2014). Early-preterm infants were also described as being less alert and less attentive than full-term infants (Forcada-Guex et al., 2011). The mothers of early-preterm infants were also less sensitive during interactions than mothers with full-term infants (Forcada-Guex et al., 2011). A German study described early-preterm infants as exhibiting more vocalizations and being more vocally responsive than full-term infants (Schmücker et al., 2005). The mothers of early-preterm infants were also less facially responsive to their infants than mothers of full-term infants (Schmücker et al., 2005).

Studies on maternal interactions with late-preterm infants are limited. Baker et al. (2013) conducted assessments during hospitalization and at 6 weeks postpartum. Evidence showed no difference in perception of mother-infant responsiveness between mothers with late-preterm infants and mothers with full-term infants following delivery and at 6 weeks postpartum (Baker et al., 2013). However, maternal perceptions of their infant as having a difficult temperament were related to lower self-reported maternal responsiveness (Baker et al., 2013). Baker et al. (2013) only utilized maternal self-report measures. Few researchers have utilized observational methods to explore interactions with late-preterm infants. Thus more exploration of interactive behaviors of late-preterm infants is needed.

A significant relationship also exists between maternal emotional distress and the mother-infant relationship (Forcada-Guex et al., 2011; Forcada-Guex et al., 2006). American mothers with elevated distress symptoms also showed less positive interactions with their early-preterm infants (Holditch-Davis et al., 2007; Spinelli et al., 2013). Elevated maternal depressive symptoms were associated with less positive mother and infant interactions (Murray et al., 1996; Reissland et al., 2003; Zlochower & Cohn, 1996). Mothers with late-preterm infants experienced higher emotional distress than mothers with full-term infants (Brandon et al., 2011). However, findings on the impact of maternal emotional distress on mother-infant interactions following late-preterm birth could not be located. In addition, researchers have not conducted group

comparisons of the relationship of emotional distress and interactive behaviors among mothers of early-preterm, late-preterm, and full-term infants. Little is known on the effects of emotional distress on interactive behaviors in mothers with early-preterm infants, late-preterm infants, or full-term infants in Malawi. This gap in literature limits the understanding of healthcare workers about challenges faced by mothers in establishing a relationship with their infant after preterm birth.

Another factor that may influence mother-infant interactions in Malawi is the utilization of Kangaroo Mother Care (KMC) as the primary strategy to care for preterm infants, early and late, in the hospital (Zimba et al., 2012). Kangaroo Mother Care is a maternally administered intervention that involves continuous placement of a naked infant except for the diaper, a hat and socks in skin-to-skin contact between the mother's breasts (Cattaneo et al., 1998; Davanzo et al., 2013). Evidence on intermittent kangaroo care in the United States has shown that early-preterm infants who received kangaroo care had more social behaviors (child express positive affect and gestures) and engaged in more locomotion than infants in the control group (Holditch-Davis et al., 2014a). Intermittent kangaroo care also contributed to greater attachment to the infant and maternal satisfaction (Ahn et al., 2010), and improved maternal self-esteem (J. Lee & Bang, 2011). Research on effects of KMC on mother-infant interactions in late-preterm infants is limited and Malawi researchers have not described how KMC influences mother-infant interactions.

Studying maternal and infant interactive behaviors among mothers with early-preterm, late-preterm, and full-term infants in Malawi will assist healthcare providers in understanding the challenges faced by the mothers and their infants during hospitalization. Thus, the purpose of this chapter was to examine mother-infant interactions of Malawian mothers with preterm and full-term infants and the relationship of these interactions to emotional distress and KMC. I specifically examined the following:

- a) I compared early mother-infant interactive behaviors among Malawian mothers with early-preterm infants (28 0/6 to 33 6/7 weeks gestation), late-preterm infants (34 0/7 to 36 6/7 weeks gestation), and full-term infants (38 0/6 to 41 6/7 weeks gestation) following delivery.

**Hypothesis 1:** Mothers of early-preterm infants will have less positive interactive behaviors following delivery than mothers of full-term infants and mothers of late-preterm infants will be intermediate between the other two groups

- b) I examined the effects of emotional distress (depressive, anxiety, PTS, and worry symptoms) on mother and infant interactive behaviors in mothers with early-preterm infants, late-preterm infants, and full-term infants.

**Hypothesis 2:** Mothers of early and late-preterm infants with greater emotional distress will have less positive early maternal-preterm infant

interactions than mothers with lower emotional distress.

- c) Finally, I examined how the length of KMC exposure affects the change in early mother-infant interactions in mothers of preterm infants (early and late).

**Hypothesis 3:** Mothers of preterm infants with longer exposure to KMC (days of KMC) will have a greater increase in mother-infant interactive behaviors at follow-up than mothers of preterm infants with shorter exposure to KMC.

## **5.2 Methods**

This was a descriptive comparative study that examined predictors of early mother-infant interactions of Malawian mothers with their early-preterm infants, late-preterm infants, and full-term infants.

### **5.2.1 Study setting and population**

The study was conducted at Queen Elizabeth Central Hospital Chatinkha Maternity Unit. QECH is in the southern region and the Chatinkha Maternity Unit averaged monthly KMC admissions of 138 infants in 2013. The hospital also has two large, 60 bed postpartum wards for mothers and their stable late-preterm or full-term infants admitted for at least 24 hours.

This analysis has 83 mother-infant dyads: 27 mothers and their early-preterm infant admitted to the critical care nursery or KMC ward; 29 mothers and their late-

preterm infants admitted to the critical care nursery, KMC ward or postnatal ward; and 27 mothers and their full-term infants admitted to postnatal ward. For mothers with multiple births, one infant was randomly selected to participate. The criteria for inclusion in the study were mothers who had an early-preterm, late-preterm, or full-term infant; who were aged 18 years or older; who were fluent in Chichewa; and who had a live full-term or preterm infant. Mothers were excluded if they had a diagnosis of psychosis or bipolar disorder to prevent confounding the results. Demographic characteristics of mothers and infants are described in Chapter 4.

Early-preterm infants were more likely to have received longer oxygen support and to have had more days on KMC (Chapter 4). Mothers of full-term infants were more likely to have had a cesarean section than mothers of early-preterm infants, and late-preterm infants were intermediate (Chapter 4). The high rate of cesarean births among mothers with full-term infants occurred because mothers of full-term infants with a cesarean section were more likely to join the study because they stayed longer in the postnatal unit. Mothers who had a spontaneous vaginal delivery without any complications postpartum were discharged within 24 hours following delivery. Multiple births were higher among mothers of late-preterm infants than mothers of full-term infants, and mothers of early-preterm infants were intermediate (Chapter 4).

## **5.2.2 Study instruments and measures**

Baseline assessments of maternal emotional responses were conducted following childbirth (24 to 72 hours) for mothers in all the three groups. Follow up assessments were only conducted for the preterm groups at 2 weeks from baseline (Day 14) for mothers with early-preterm infants and at least 1 week from baseline or at a postnatal/KMC follow-up visit for mothers of late-preterm infants.

### **Maternal and infant demographic characteristics**

Chapter 4 presents the maternal and infant demographic characteristics for the mothers of the early-preterm, late-preterm, and full-term infants. Demographic characteristics at baseline that differed significantly among the three groups included gestational age, infant age, birthweight, 1- and 5-minute Apgar scores, total number of days on KMC, total number of days on oxygen therapy, percentage of women with cesarean section, multiple birth, presence of a support person, and complications (pregnancy, labor and infant). Gestational age was assessed postnatally using the New Ballard's Score. As discussed in Chapter 4, the early-preterm infants were more likely to have lower birthweights, lower Apgar scores at 1 and 5 minutes, need for more days on oxygen therapy, and vaginal birth than the full-term infants. Late-preterm infants were intermediate between the other two groups.

### **Maternal emotional responses.**

*Depressive symptoms and anxiety symptoms.* An interview-guided Chichewa self-reporting questionnaire (SRQ) was used to measure mother's depressive and anxiety symptoms. The Chichewa SRQ is a 20-item yes/no instrument that was adapted to screen for the presence of anxiety and depressive symptoms (World Health Organization, 1994). Internal consistency of the SRQ is high with a Cronbach alpha of 0.85 (Stewart et al., 2009). Internal consistency for this sample was also high with Cronbach alpha of .89. The SRQ has a cut-off point of 7/8 with higher scores indicating elevated depressive and anxiety symptoms (Stewart et al., 2009).

*Posttraumatic stress symptoms* The Chichewa Perinatal PTSD Questionnaire (PPQ) was used to screen for PTS symptoms. The PPQ is a 14-item instrument that measures PTS symptoms on a 5-point Likert scale (Callahan et al., 2006; Quinnell & Hynan, 1999). The Chichewa PPQ was translated and validated for use among Malawian mothers with full-term and preterm infants (Chapter 3). The Cronbach alpha after the deletion of each item in our pilot analysis ranged from .78 to .82 (Chapter 3). The internal consistency of the Chichewa PPQ was also high with a Cronbach alpha of .82 (Chapter 3). Internal consistency for this sample was also high with Cronbach alpha of .90. The Chichewa PPQ was highly correlated with the Chichewa SRQ (Chapter 3).

*Maternal worry about child's health.* The Chichewa Child Health Worry Scale (CHWS) was used to measure maternal worry about their child's health. The CHWS is a

7-item instrument measured on a 5-point Likert scale with higher scores indicating more worry (Miles et al., 1999). The Chichewa-CHWS was translated and validated among Malawian mothers with preterm and full-term infants (Chapter 3). In our pilot analysis, the Cronbach alpha after the deletion of each item ranged from .80 to .85 and internal consistency of the whole instrument was high with a Cronbach alpha of .86 (Chapter 3). Internal consistency for this sample was also high with Cronbach alpha of .90. The CHWS was highly correlated with the psychological symptoms subscale of the Chichewa-SRQ (Chapter 3).

### **Mother and infant interactions**

I conducted a 20-minute video recording of each mother and infant during hospitalization, either during a feeding or general caregiving. Using a modified coding system (see appendix G), I coded the videos after achieving of inter-rater reliability (Cohen's kappa of more than .80 for each individual behavior). Previous studies on this coding system recommended inter-rater reliability with Cohen's kappa of 0.70 or more (Holditch-Davis, Cox, et al., 2003). Reliability testing of the coder was periodically conducted during data coding. Training for the coding scale was done by Holditch-Davis, the developer of the coding system. The final score for each behavior was achieved by dividing the total number of the observed behaviors (that is the total number of times the behavior was coded as present in an interval) by the total number of 10-s intervals (that is the number of 10-s periods in the observation, which was 120

epochs in 20 minutes) and each behavior was measured as a percentage of the total observation to adjust for variations in the length of observations (Holditch-Davis, Cox, et al., 2003).

*Sleep-wake states.* Level of infant arousal was assessed using infant sleep-wake states. Infant sleep-wake states included alertness, drowsiness, active waking, sleep-wake transition, and sleep [active and quiet sleep] (Holditch-Davis, Scher, Schwartz, & Hudson-Barr, 2004). Sleep-wake states have high reliability in assessing preterm infants' activity level and arousal (Holditch-Davis & Edwards, 1998; Holditch-Davis et al., 2004; Holditch-Davis et al., 2014a). Intra-rater reliability for the sleep-wake states in this study was high with a Cohen's kappa ranging from .80 to 1.00.

*Maternal interactive behaviors:* Maternal behaviors coded included mothers' location (whether mother was near, away, holding baby with or without body contact, and kangaroo hold), caregiving (change, bathe, or other care behaviors), mother feeds the infant with cup or breast, mother look at the infant, mother moves the infant, mother rocks the infant, mother talks to the infant, mother touches the infant, mother shows a negative gesture, and mother shows positive interaction (such as smile, kiss, praises, caress). Intra-rater reliability for the maternal interactive behaviors in this study was also high with a Cohen's kappa ranging .94 to 1.00.

*Infant interactive behaviors:* Infant behaviors included infant looks at the mother, infant vocalizes (grunts or makes another sound), infant touches the mother, infant

expresses positive affect (smiles), infant expresses negative affect (infant cries or fusses), and infant made a gesture (grimaces), and other infant behaviors (such as play behaviors, yawn, startle/jerk, spit, cough, and jitter). Infant touch was later eliminated in the final analyses based on the assumption that infant touch in the first weeks of life may be accidental and not an intentional behavior. This study had high intra-rater reliability for the infant interactive behaviors with a Cohen's kappa of 1.00.

*Mother and infant interactive behaviors:* We also combined mother and infant interactive behaviors to explore the extent to which mother engaged in reciprocal interactions with the infant. These behaviors included passive observation (mother looks but no interaction), vis-à-vis with mother (both mother and child look at each other), interaction (mother moves, rocks, touches, rocks, plays with the infant, all mother holding behaviors, all caregiving behaviors, all mother talking behaviors, and vis-à-vis with infant).

### **5.2.3 Procedure**

We obtained approval to conduct the study from the Duke University Medical Center Institutional Review Board and the Malawi College of Medicine Research Committee. A data transfer agreement was signed between University of Malawi, Kamuzu College of Nursing and Duke University for the transfer of video files. Videos were stored on the Duke School of Nursing Secure Electronic Data (SED) drive, which is behind a firewall. Consent from mothers was sought before data collection was initiated.

## 5.2.4 Data analysis and statistical considerations

For hypothesis 1, I examined each variable for data distribution. I conducted a one-way ANOVA for mother look to explore the mean differences among the three infant groups. Non-parametric statistics, Kruskal Wallis, were used for some skewed data. Kruskal Wallis test was conducted to examine differences among the three infant groups on mother move, caregiving (change/care/bathe), mother feed, mother rock, mother talk, mother positive, mother touch, child vocalize, child negative, child gesture, child asleep. Skewed variables that showed little variability were dichotomized into presence or absence of the behavior. I dichotomized mother hold, hold with body contact, mother positive, child alert, child drowsy, child in non-alert waking activity, child look, vis-à-vis, and interaction. Fisher's exact test was conducted to examine the Chi-square values for variables that had one or more cells with fewer than five observations. I also conducted frequency distribution on variables that showed little to no variability such as mother negative and passive observation.

For hypothesis 2, I conducted Pearson correlations to assess the correlation among the distress variables. Table 16 showed that the distress variables were strongly correlated. To prevent multicollinearity, I analyzed each distress measure separately. Using baseline scores, I conducted regression models to assess the effect of emotional distress on select maternal and infant interactive behaviors (mother look, mother touch, mother talk, mother positive, interaction, infant sleep-wake states, child vocalization,

and vis-à-vis) among mothers of the three infant groups. To control for covariates, demographic variables differing significantly among the groups were entered into the model. Backward elimination was also used to select final covariates to include in the model with preliminary significance level set at 0.1.

**Table 16: Pearson correlations among the distress variables**

	SRQ-20	PPQ	CHWS
SRQ-20	1.00	0.93*	0.82*
PPQ	-	1.00	0.80*
CHWS	-	-	1.00

Note: SRQ = CHWS: Child Health Worry Scale; PPQ = Perinatal PTSD Questionnaire; Self-Reporting Questionnaire; \*  $p < .05$

For hypothesis 3, I conducted a regression analysis to assess the effects of duration of KMC and KMC interruption on the change in mother and infant behaviors at follow-up from baseline (difference between follow-up and baseline). We also controlled for mother and infant behaviors at the baseline assessment in the model.

The level of significance for all statistical test was set at 0.05 (two-tailed). All statistical analyses were conducted using Statistical Analysis Software (SAS) version 9.4.

## **5.3 Results**

### **5.3.1 Baseline interactive behaviors of the mothers and their infants**

Table 17 presents the interactive behaviors of the mothers of early-preterm, late-preterm, and full-term infants. Mothers of the infants in the three groups did not differ significantly on most interactive behaviors. Mothers of late-preterm infants looked more

Table 17: Differences in maternal interactive behaviors at baseline among the mothers of the three groups of infants

Parameter	Early-preterm (N = 27)			Late-preterm (N=29)			Full-term (N=27)					
	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	F	DF	p
<i>One-way ANOVA</i>												
Look	39.80	25.06	0 -100	56.38	29.10	0.83 - 100	54.21	22.03	15.83 – 99.17	3.38	2, 80	.04*
<i>Kruskal Wallis Test</i>												
	Med	25 <sup>th</sup>	75 <sup>th</sup>	Med	25 <sup>th</sup>	75 <sup>th</sup>	Med	25 <sup>th</sup>	75 <sup>th</sup>	X <sup>2</sup>	DF	p
Touch	0.83	0	8.33	1.67	0.83	3.33	1.67	0	7.5	0.64	2	.72
Feed	0	0	0	0	0	22.5	7.76	0	28.33	9.31	2	.01*
Caregiving	1.67	0	3.33	0.83	0	6.67	1.72	0.83	4.55	2.10	2	.35
Move	0	0	1.67	0.83	0	1.67	0.83	0	2.5	1.54	2	.46
Rock	0	0	2.08	1.66	0	5.83	2.5	0.83	15.83	9.95	2	.006*
Talk	0	0	0.83	0	0	0	0	-	3.33	4.30	2	.17
<i>Chi-Square/Fisher's Exact Test</i>												
	f	%		f	%		f	%		X <sup>2</sup>	DF	p
Hold	22	81.48		25	86.21		26	96.30		2.92	2	.23
Body contact	22	81.48		21	72.41		24	88.89		2.45	2	.29
Mother positive	8	29.63		3	10.34		6	22.22		3.27	2	.20
Vis-à-vis	2	7.41		1	3.45		6	22.22		5.58	2	.06
Interactions	22	81.48		25	86.21		26	96.30				
Passive obs	4	14.81		1	3.45		1	3.70				

Note: N= sample size; SD = standard deviation; Med = Median; 25<sup>th</sup> = 25 percentile; 75<sup>th</sup> = 75<sup>th</sup> percentile; F = F statistic; DF = degrees of freedom; f = frequency distribution; % = column percentage; X<sup>2</sup> = Chi-square value; p = p value; Hold = % of

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observation that infant was held; Body contact = maintained body contact throughout the observation; Mother positive = showed a positive behavior such as smile, caress, or kiss during the observation; Passive obs = passive observation; \* =  $p < .05$

**Table 18: Differences in infant interactive behaviors at baseline among early-preterm, late-preterm, and full-term infants**

Parameter	Early-preterm (N = 27)			Late-preterm (N=29)			Full-term (N=27)			X <sup>2</sup>	DF	p
	Med	25 <sup>th</sup>	75 <sup>th</sup>	Med	25 <sup>th</sup>	75 <sup>th</sup>	Med	25 <sup>th</sup>	75 <sup>th</sup>			
<i>Kruskal Wallis Test</i>												
Asleep	92.91	77.84	99.17	97.5	85.83	100	94.17	34.17	100	2.53	2	.28
Sleep-Wake	8.08	0.83	14.58	1.67	0	5.00	2.5	0	10.83	2.91	2	.23
Vocalize	0.83	0	7.91	0.83	0	5.83	2.5	0	10.83	2.68	2	.26
Negative	0.83	0	5.00	1.67	0	5.00	2.5	0	6.67	0.86	2	.65
Gesture	0.83	0	5.41	1.67	0.83	5.00	2.5	0	6.67	0.78	2	.68
<i>Chi-Square/Fisher's Exact Test</i>												
	<i>f</i>	%		<i>f</i>	%		<i>f</i>	%		X <sup>2</sup>	DF	<i>p</i>
Alertness	3	11.11		2	6.90		7	25.93		4.46	2	.11
Drowsiness	5	18.52		5	17.24		8	29.63		1.50	2	.47
Non-alert	3	11.11		1	3.45		3	11.11		1.43	2	.49
Child look	2	7.41		3	10.35		8	29.63		6.00	2	.05*

Note: N= sample size; Med = Median; 25<sup>th</sup> = 25 percentile; 75<sup>th</sup> = 75<sup>th</sup> percentile; F = F statistic; DF = degrees of freedom; *f* = frequency distribution; % = column percentage; X<sup>2</sup> = Chi-square value; *p* = p value; \* = *p* < .05

at their infants than mothers of early-preterm infants, mothers of full-term infants were intermediate. Kruskal Wallis test showed that during the observation, the mothers of full-term infants rocked their infants more than the mothers of early-preterm infants, and the mothers of late-preterm infants were intermediate.

Table 18 presents the interactive behaviors of the infants in the three groups. Few interactive variables differed among the infants in the three different groups of infants. Very few infants from any group looked at their mothers. However, more full-term infants looked at their mothers than did early-preterm infants, and late-preterm infants were intermediate, although this difference was borderline

### **5.3.2 Effects of maternal emotional distress**

Tables 19 to 24 presents results from the regression analysis model on the effects of emotional distress on maternal and infant interactive behaviors. All measures of emotional distress had minimal effects on both mother and infant interactive behaviors. Elevated anxiety and depression were associated with more maternal moves, more infant alertness, less vis-a-s between mother and infant, and less child look. PTS symptoms and maternal worry were associated with less child vocalization. Maternal worry was associated with more infant non-alert waking activity.

Mothers with early-preterm infants also fed more, moved the infants less, rocked the infants less, and were less likely to be positive than mothers with full-term infants. Mothers of late-preterm infants were also less likely to rock their infants and their late-

**Table 19: Linear regression analysis for effects of maternal depression and anxiety on interactive behaviors**

	<b>Mother look</b>				<b>Mother feed</b>				<b>Mother care</b>			
	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>
Intercept	107.20	32.52	3.30	.002	15.73	3.96	3.97	.0002	3.00	1.29	2.66	.01
Early-preterm vs full-term	1.22	9.18	0.13	.89	-16.75	6.08	-2.76	.01*	-2.75	1.73	-1.59	.11
Late-preterm vs full-term	4.89	7.48	0.65	.51	-4.41	5.58	-0.79	.43	1.09	1.59	0.68	.50
Anxiety and depression	0.32	0.89	0.36	.72	0.62	0.56	1.12	.26	0.23	0.16	1.43	.16
Apgar at 5 minutes	-5.56	3.19	-1.74	.09	-	-	-	-	-	-	-	-
Oxygen days	-11.66	4.00	-2.92	.01*	-	-	-	-	-	-	-	-
	<b>Mother moves</b>				<b>Mother rocks</b>				<b>Mother talks</b>			
	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>
Intercept	1.26	0.39	3.22	.002	14.42	3.40	4.25	<.0001	1.41	0.70	2.01	.05
Early-preterm vs full-term	-1.46	0.60	-2.44	0.02*	-13.61	5.21	-2.61	.01*	-0.67	0.73	-0.91	.37
Late-preterm vs full-term	-0.36	0.55	-0.64	.52	-10.63	4.79	-2.22	.02*	-1.02	0.68	-1.51	.13
Anxiety and depression	0.16	0.05	2.85	.01*	0.38	0.48	0.80	.43	0.003	0.07	0.06	.95
Cesarean	-	-	-	-	-	-	-	-	0.12	0.36	0.33	.75
	<b>Mother touch</b>				<b>Child vocalize</b>				<b>Child negative</b>			
	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>
Intercept	5.43	1.47	3.70	.0004	4.60	2.40	1.92	.06	5.43	1.47	3.70	.0004
Early-preterm vs full-term	-1.89	2.52	-0.84	.40	-1.90	3.27	-0.58	.56	-1.89	2.25	-0.84	.40
Late-preterm vs full-term	-1.63	2.07	-0.79	.43	-4.17	3.09	-1.35	.18	-1.62	2.07	-0.79	.43
Anxiety and depression	0.02	0.21	0.10	.92	-0.42	0.28	-1.50	.14	0.02	0.20	0.10	.92
Infant age	-	-	-	-	2.58	1.45	1.78	.08	-	-	-	-

*table continued...*

Table 19: Continued

	Child asleep				Child sleep-wake transition				Child gesture			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>				
Intercept	73.46	5.06	14.53	<.0001	16.91	4.07	4.16	<.0001	5.48	1.47	3.73	.0004
Early-preterm vs full-term	13.95	7.76	1.80	.08	-2.79	3.26	-0.85	.40	-1.95	2.25	-0.87	.38
Late-preterm vs full-term	16.55	7.12	2.32	.02*	-6.00	3.02	-1.99	.05*	-1.58	2.07	-0.76	.45
Anxiety and depression	-0.19	0.71	-0.27	.79	0.12	0.30	0.40	.69	0.03	0.21	0.15	.88
Years education	-	-	-	-	-0.80	0.38	-2.12	.04*				

Note: Est = estimate; SE = standard error; *t* = *t* value; *p* = *p* value; \* = *p* < .05; - - = variable eliminated from model

**Table 20: Logistic regression analysis for effects of maternal depression and anxiety on interactive behaviors**

	Mother hold			Body contact			Mother positive					
	Odds	95% Wald CL	<i>p</i>	Odds	95% Wald CL	<i>p</i>	Odds	95% Wald CL	<i>p</i>			
Early-preterm vs full-term	7.31	0.65	82.67	.21	1.811	0.32	10.17	.97	0.36	0.08	1.76	.04*
Late-preterm vs full-term	6.50	0.60	70.91	.29	3.13	0.68	14.37	.14	2.21	0.44	10.99	.07
Anxiety and depression	0.97	0.82	1.16	.76	0.96	0.83	1.10	.53	0.90	0.76	1.05	.17
Years education	1.35	1.03	1.81	.03*	0.52	0.15	1.77	.29	-	-	-	-
Oxygen days	-	-	-	-	-	-	-	-	2.59	1.03	6.52	.04*
	Child non-alert			Child alert			Child drowsy					
	Odds	95% Wald CL	<i>p</i>	Odds	95% Wald CL	<i>p</i>	Odds	95% Wald CL	<i>p</i>			
Early-preterm vs full-term	3.32	0.12	88.43	.73	21.26	0.98	361.21	.15	2.15	0.49	9.32	.56
Late-preterm vs full-term	4.01	0.33	49.15	.50	8.11	1.25	52.62	.53	2.17	0.57	8.32	.51
Anxiety and depression	1.41	1.01	1.95	.04*	1.11	0.91	1.36	.28	0.99	0.86	1.13	.84
Occupation	-	-	-	-	0.67	0.36	1.29	.23	0.82	0.50	1.35	.42
Oxygen days	0.28	0.08	0.95	.04*	0.33	0.11	0.93	.04*	-	-	-	-
	Vis-a-Vis			Child look								
	Odds	95% Wald CL	<i>p</i>	Odds	95% Wald CL	<i>p</i>						
Early-preterm vs full-term	0.80	0.07	8.95	.43	2.80	0.28	27.66	.52				
Late-preterm vs full-term	3.89	0.24	61.29	.25	2.25	0.31	16.27	.72				
Anxiety and depression	0.72	0.53	0.99	.04*	0.76	0.59	0.97	.02*				
Occupation	0.78	0.36	1.67	.51	0.80	0.42	1.52	.49				
Infant age	2.33	0.73	7.45	.15	2.06	0.81	5.27	.013*				
Oxygen days	11.41	0.73	11.87	.08	3.19	0.75	13.60	.11				

Note: CL = confidence limits; *p* = p value; \* = *p* < .05; -- = variable eliminated from model

**Table 21: Linear regression analysis for effects of maternal posttraumatic stress on interactive behaviors**

	Mother look				Mother feed				Mother care			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	114.88	32.97	3.48	<.0001	16.27	3.94	4.13	<.001	.23	1.13	2.87	.01
Early-preterm vs full-term	2.58	9.12	0.28	.78	-15.36	5.98	-2.57	.01*	-2.11	1.71	-1.23	.22
Late-preterm vs full-term	5.67	7.49	0.76	.45	-3.65	5.58	-0.66	.51	1.45	1.60	0.90	.37
Posttraumatic stress	-0.17	0.52	-0.33	.74	0.23	0.34	0.69	.49	0.07	0.10	0.69	.49
Apgar at 5 minutes	-6.23	3.24	-1.92	.06	-	-	-	-	-	-	-	-
Oxygen days	-11.00	3.90	-2.82	.01*	-	-	-	-	-	-	-	-
	Mother moves				Mother rocks				Mother talks			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	5.30	2.35	2.25	.03	15.55	3.36	4.33	<.001	1.47	0.69	2.11	.04
Early-preterm vs full-term	-1.20	0.61	-1.97	.05*	-13.40	5.10	-2.62	.01*	-0.44	0.72	-0.61	.54
Late-preterm vs full-term	-0.51	0.57	-0.89	.37	-10.55	4.77	-2.21	.03*	-0.88	0.67	-1.31	.19
Posttraumatic stress	0.03	0.04	0.81	.42	0.23	0.30	0.79	.43	-0.03	0.04	-0.68	.50
Apgar at 5 Minutes	-0.38	0.23	-1.69	.10	-	-	-	-	-	-	-	-
Cesarean	-	-	-	-	-	-	-	-	0.13	0.35	0.35	.72
	Mother touch				Child vocalize				Child negative			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	4.19	2.66	1.58	.12	4.55	2.38	1.92	.06	3.56	1.80	1.98	.05
Early-preterm vs full-term	6.48	4.04	1.60	.11	-1.63	3.22	-0.51	.61	-3.05	2.45	-1.25	.21
Late-preterm vs full-term	3.58	3.77	0.95	.35	-3.98	3.06	-1.30	.20	-3.26	2.33	-1.40	.16
Posttraumatic stress	-0.21	0.23	-0.88	.38	-0.34	0.17	-2.00	.049*	-0.21	0.13	-1.64	.10
Infant age	-	-	-	-	2.66	1.42	1.88	.06	2.15	1.08	1.99	.049*

*table continued...*

Table 21: Continued

	Child asleep				Child sleep-wake transition				Child gesture			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	72.80	5.00	14.55	<.001	16.99	4.02	4.22	<.001	3.66	1.80	2.03	.05
Early-preterm vs full-term	11.92	7.60	1.57	.12	-0.44	3.17	-0.14	.89	-3.04	2.45	-1.24	.21
Late-preterm vs full-term	15.34	7.09	2.16	.03*	-4.54	2.98	-1.52	.13	-3.14	2.45	-1.35	.18
Posttraumatic stress	0.14	0.44	0.32	.75	-0.23	0.18	-1.27	.21	-0.21	0.13	-1.60	.11
Years education	-	-	-	-	-0.72	0.37	-1.94	.06	-	-	-	-
Infant age	-	-	-	-	-	-	-	-	2.10	1.08	1.95	.06

Note: Est = estimate; SE = standard error; *t* = *t* value; *p* = *p* value; \* = *p* < .05; - - = variable eliminated from model

**Table 22: Logistic regression analysis for effects of maternal posttraumatic stress on interactive behaviors**

	Mother hold				Body contact				Mother positive			
	Odds	95% Wald CL	<i>p</i>		Odds	95% Wald CL	<i>p</i>		Odds	95% Wald CL	<i>p</i>	
Early-preterm vs full-term	7.87	0.96	90.03	.20	1.88	0.33	10.41	.94	0.36	0.07	1.74	.42
Late-preterm vs full-term	7.19	0.65	79.70	.25	3.22	0.70	14.76	.14	2.19	0.44	10.91	.07
Posttraumatic stress	0.97	0.86	1.09	.60	0.96	0.88	1.06	.43	0.94	0.86	1.03	.18
Years education	1.41	1.04	1.91	.03*	-	-	-	-	-	-	-	-
Oxygen days	0.75	0.34	1.67	.49	-	-	-	-	2.39	1.02	5.61	.046*
Support	-	-	-	-	0.51	0.15	1.74	.27	-	-	-	-
	Child non-alert				Child alert				Child drowsy			
	Odds	95% Wald CL	<i>p</i>		Odds	95% Wald CL	<i>p</i>		Odds	95% Wald CL	<i>p</i>	
Early-preterm vs full-term	3.07	0.15	62.31	.77	20.87	1.08	403.57	.14	2.08	0.50	8.69	.57
Late-preterm vs full-term	4.26	0.37	49.65	.44	8.51	1.31	55.25	.48	2.13	0.56	8.15	.51
Posttraumatic stress	1.16	0.95	1.43	.15	1.03	0.92	1.16	.60	1.00	0.92	1.08	.91
Occupation	-	-	-	-	0.70	0.37	1.33	.27	0.81	0.50	1.35	.43
Oxygen days	0.35	0.11	1.06	.06	0.38	1.14	1.02	.05*	-	-	-	-
	Vis-a-Vis				Child look							
	Odds	95% Wald CL	<i>p</i>		Odds	95% Wald CL	<i>p</i>					
Early-preterm vs full-term	5.54	0.76	40.35	.59	8.17	1.24	53.73	.13				
Late-preterm vs full-term	10.68	1.04	09.62	.17	4.80	0.98	25.55	.49				
Posttraumatic stress	0.96	0.85	1.07	.44	0.96	0.87	1.05	.37				
Occupation	0.77	0.38	1.59	.48	0.79	0.43	1.44	.43				

Note: CL = confidence limits; *p* = *p* value; \* = *p* < .05; - = variable eliminated from model

**Table 23: Linear regression analysis for effects of maternal worry on interactive behaviors**

	<b>Mother look</b>				<b>Mother feed</b>				<b>Mother care</b>			
	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>
Intercept	97.24	31.82	3.06	.003	15.53	5.44	2.86	.006	2.52	1.55	1.63	.11
Early-preterm vs full-term	-5.17	10.1	-0.51	.61	-14.96	6.81	-2.20	.03*	-2.53	1.94	-1.30	.20
Late-preterm vs full-term	0.88	7.92	0.11	.91	-3.46	5.99	-0.58	.57	1.15	1.71	0.67	.50
Maternal worry	0.91	0.64	1.43	.16	0.15	0.46	0.33	.74	0.10	0.13	0.79	0.43
Apgar at 5 minutes	-1.25	3.05	-1.72	.09	-	-	-	-	-	-	-	-
Oxygen days	-11.71	3.79	-3.09	.003*	-	-	-	-	-	-	-	-
	<b>Mother moves</b>				<b>Mother rocks</b>				<b>Mother talks</b>			
	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>
Intercept	5.71	2.23	2.55	.01	11.39	5.75	1.98	.05	1.64	0.81	2.04	.05
Early-preterm vs full-term	-1.28	0.71	-1.79	.07	-11.23	5.83	-1.92	.06	-0.38	0.82	-0.46	.65
Late-preterm vs full-term	-0.57	0.61	-0.92	.35	-9.38	5.12	-1.83	.07	-0.83	0.72	-1.16	.25
Maternal worry	0.03	0.05	0.59	.56	-0.02	0.40	-0.06	.95	-0.03	0.06	-0.55	.59
Apgar at 5 Minutes	-0.45	0.20	-2.13	.04*	-	-	-	-	-	-	-	-
Cesarean	-	-	-	-	2.69	2.53	1.06	.29	0.13	0.36	0.37	.71
	<b>Child vocalize</b>				<b>Child negative</b>							
	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>	<b>Est</b>	<b>SE</b>	<b>t(1)</b>	<b>p</b>
Intercept	3.44	3.69	0.94	.35	7.80	2.76	2.82	.006	5.03	2.12	2.37	.02
Early-preterm vs full-term	4.65	4.61	1.01	.32	0.16	.45	0.05	.96	-2.52	2.65	-0.95	.35
Late-preterm vs full-term	2.45	4.06	0.60	.55	-2.77	3.13	-0.89	.38	-2.82	2.41	-1.17	.24
Maternal worry	0.03	0.31	0.11	.91	-0.50	0.23	-2.22	.03*	-0.23	0.17	-1.29	.20
Infant age	-	-	-	-	2.79	1.41	1.97	.05*	2.07	1.09	1.91	.06

*table continued...*

Table 23: Continued

	Child asleep				Child sleep-wake transition				Child gesture			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>				
Intercept	70.90	6.90	10.28	<.001	16.84	4.30	3.92	.0002	5.10	2.12	2.40	.02
Early-preterm vs full-term	10.58	8.62	1.23	.22	-2.40	3.66	-0.66	.51	-2.51	2.65	-0.94	.35
Late-preterm vs full-term	14.44	7.60	1.90	.06	-5.79	3.25	-1.78	.08	-2.72	2.41	-1.13	.26
Maternal worry	0.27	0.59	0.46	.65	0.02	0.25	0.10	.92	-0.23	0.17	-1.27	.21
Years education	-	-	-	-	-0.79	0.38	-2.07	.04*	-	-	-	-
Infant age	-	-	-	-	-	-	-	-	2.04	1.09	1.87	.07

Note: Est = estimate; SE = standard error; *t* = *t* value; *p* = *p* value; \* = *p* < .05; - = variable eliminated from model

**Table 24: Logistic regression analysis for effects of maternal worry on interactive behaviors**

	<b>Mother hold</b>				<b>Body contact</b>				<b>Mother positive</b>			
	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>
Early-preterm vs full-term	13.81	1.01	189.35	.10	3.03	0.48	19.15	.61	0.52	0.08	3.28	.12
Late-preterm vs full-term	10.43	0.84	128.61	.22	4.38	0.89	21.64	.11	2.78	0.48	16.04	.06
Maternal worry	0.91	0.79	1.06	.23	0.92	0.81	1.03	.15	0.93	0.82	1.05	.21
Years education	1.40	1.05	1.88	.02*	-	-	-	-	-	-	-	-
Cesarean	0.99	0.36	1.05	.98	-	-	-	-	-	-	-	-
Support	-	-	-	-	0.53	0.15	1.80	.30	-	-	-	-
Oxygen days	-	-	-	-	-	-	-	-	2.20	0.95	5.08	.06
	<b>Child non-alert</b>				<b>Child alert</b>				<b>Child drowsy</b>			
	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>	<b>Odds</b>	<b>95% Wald CL</b>	<b><i>p</i></b>
Early-preterm vs full-term	2.36	0.05	110.54	.89	15.38	0.54	434.84	.19	1.88	0.36	9.64	.67
Late-preterm vs full-term	3.46	0.23	51.91	.51	4.07	0.57	29.13	.97	2.00	0.47	8.47	.52
Maternal worry	1.60	1.05	2.43	.03*	1.19	0.96	1.47	.11	1.01	0.90	1.13	.90
Years education	-	-	-	-	0.79	0.60	1.03	.08	-	-	-	-
Occupation	-	-	-	-	0.76	0.37	1.59	.46	0.82	0.50	1.35	.44
Oxygen days	0.19	0.03	1.01	.05*	0.27	0.09	0.89	.03*	-	-	-	-

*table continued...*

**Table 24: Continued**

	Vis-a-Vis				Child look			
	Odds	95% Wald CL		<i>p</i>	Odds	95% Wald CL		<i>p</i>
Early-preterm vs full-term	10.26	0.58	180.92	.37	14.75	1.40	155.31	.09
Late-preterm vs full-term	12.86	0.71	232.63	.24	7.34	1.10	49.09	.40
Maternal worry	0.84	0.68	1.04	.10	0.91	0.78	1.06	.21
Occupation	0.77	0.36	1.63	.49	0.78	0.42	1.44	.42
Infant age	1.83	0.69	4.86	.22	-	-	-	-

Note: CL = confidence limits; *p* = *p* value; \* = *p* < .05; -- = variable eliminated from model

**Table 25: Linear regression analysis for effects of maternal kangaroo mother on change in interactive behaviors**

	Mother look				Mother feed				Mother care			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	24.82	10.52	2.36	.02	9.15	5.32	1.72	.09	2.89	0.69	4.21	.0001
Early vs Late	-20.03	10.96	-1.83	.08	-2.83	6.73	-0.42	.68	-0.45	0.88	-0.52	.60
Days of KMC	1.12	2.12	0.53	.60	-1.02	1.33	-0.77	.45	-0.25	0.17	-1.46	.15
KMC interruption	-1.91	14.84	-0.13	.90	-2.5	9.31	-0.27	0.78	-1.28	1.23	-1.04	.31
Baseline assessment	-0.45	0.16	-2.68	.01	-0.80	0.16	-5.02	<.0001	-0.97	0.06	-16.75	<.0001
	Mother moves				Mother rocks				Mother talks			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	1.28	0.30	4.18	.0002	2.19	0.79	2.74	.01	0.95	0.33	2.91	.01
Early vs Late	-0.07	0.38	-0.19	.85	-0.47	0.97	-0.48	.63	0.46	0.40	1.16	.25
Days of KMC	-0.16	0.08	-2.16	.04*	-0.20	0.20	-1.04	.31	-0.20	0.08	-2.54	.02*
KMC interruption	-0.03	0.53	-0.05	.96	-0.28	1.36	-0.21	.84	-0.23	0.55	-0.42	.68
Baseline assessment	-1.01	0.08	-13.12	<.0001	-1.01	0.04	-21.60	<.0001	-0.30	0.13	-2.26	.03
	Mother touch				Body contact				Mother positive			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	5.09	1.57	3.24	.003	0.71	0.08	8.40	<.0001	0.61	0.28	2.15	.04
Early vs Late	1.24	2.00	0.62	.53	-0.04	0.07	-0.64	.53	-0.08	0.07	-1.28	.21
Days of KMC	-0.93	0.42	-2.21	.03*	0.02	0.01	1.44	.16	0.10	0.32	0.33	.74
KMC interruption	-0.40	2.74	-0.15	.88	0.12	0.10	1.19	.24	-0.07	0.45	-0.15	.89
Baseline assessment	-0.71	0.07	-10.22	<.0001	-0.77	0.07	-10.65	<.0001	-0.49	0.15	-3.20	.003

*table continued...*

Table 25: Continued

	Vis-à-vis				Child negative				Child gesture			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	0.97	0.43	2.26	.03	2.38	1.2	1.86	.07	2.84	1.32	2.15	.04
Early vs Late	-0.37	0.51	-0.72	.47	1.43	1.48	0.97	.33	1.60	1.53	1.04	.30
Days of KMC	-0.11	0.10	-1.07	.29	-0.19	0.30	-0.66	.51	-0.23	0.31	-0.76	.45
KMC interruption	-0.13	0.73	-0.18	.85	-1.61	2.16	-0.74	.46	-1.76	2.26	-0.78	.44
Baseline assessment	-1.13	0.23	-4.93	<.0001	-1.07	0.15	-7.06	<.0001	-1.09	0.16	-7.02	<.0001
	Child vocalize				Child look				Child asleep			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	3.05	2.54	1.20	.24	1.68	0.75	2.22	.03	92.06	16.6	5.53	<.0001
Early vs Late	4.91	3.35	1.46	.15	-0.19	0.19	-1.04	.30	3.20	6.93	0.46	.65
Days of KMC	-0.55	0.71	-0.78	.43	-0.64	0.92	-0.70	.49	1.54	1.38	1.12	.27
KMC interruption	-3.88	4.46	-0.87	.39	-0.22	1.34	-0.17	.87	5.61	9.97	0.56	.58
Baseline assessment	-0.91	0.16	-5.53	<.0001	-1.02	0.19	-5.29	<.0001	-1.11	0.17	-6.38	<.0001
	Child non-alert				Child sleep-wake transition				Child drowsy			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	1.87	1.01	1.85	.07	9.80	3.35	2.92	.01	7.71	2.80	2.76	.01
Early vs Late	-0.78	1.41	-0.55	.58	0.76	3.78	0.20	.84	-2.86	3.47	-0.82	.41
Days of KMC	-0.21	0.30	-0.70	.49	-0.73	0.74	-0.98	.33	-0.70	0.71	-0.99	.33
KMC interruption	-0.29	1.75	-0.17	.87	-5.63	5.11	-1.10	.28	-1.30	5.07	-0.26	.80
Baseline assessment	-1.02	0.32	-3.24	.003	-1.15	0.23	-5.00	<.0001	-1.07	0.12	-8.35	<.0001

Note: Est = estimate; SE = standard error; *t* = *t* value; *p* = *p* value; \* = *p* < .05; KMC = Kangaroo mother Care. Mother hold and child alert omitted because it showed no variance among the subjects. - - = variable eliminated from model

preterm infants were more likely to be asleep and less likely to be in sleep-wake transition than mothers with their full-term infants

More years of education was associated with a greater likelihood of the mother holding and less likelihood that an infant would be in sleep-wake transition. More days on oxygen therapy was associated with less mother look, more maternal positive behaviors, less likelihood of infant being in non-alert waking activity, and less likelihood that infant would be alert

### **5.3.3 Effects of kangaroo mother care**

Table 25 presents the effects of KMC on the change in maternal and infant interactive variables from baseline to the follow up contact. Findings showed that KMC had minimal effects on the interactive behaviors among mothers of early-preterm and late-preterm infants. However, more days of KMC were associated with fewer maternal moves, less mother talk, and less mother touch. See Appendix H for separate analyses on the effects of KMC on the follow-up assessment and the change in interactive behaviors in early- and late-preterm infant groups.

## **5.4 Discussion**

Findings from this study showed minimal differences in the interactive behaviors of the mothers with their early-preterm, late-preterm, and full-term infants in Malawi. The mothers and infants from the three infant groups differed significantly on some baseline interactive behaviors: mother look, mother rock, and child look. Mothers

of late-preterm infants looked more at their infants than mothers of the early-preterm infants, and the mothers of full-term infants were intermediate. Mothers of full-term infants also rocked their infants and their infants looked more at their mothers than mothers and their early-preterm infants. Mothers and their late-preterm infants were intermediate. The findings also showed minimal associations of the distress variables and KMC with maternal and infant interactive behaviors

Overall, this study showed few significant differences among the three infant groups in interactive behaviors at baseline. However, the mean for maternal look was higher among mothers of late-preterm than mothers of early-preterm, the mothers of full-term infants were intermediate. Mothers of the early-preterm group showed fewer positive behaviors than the mothers of the full-term infants. Evidence in Canadian mothers and early-preterm infants showed that minimal changes occurred in maternal look, touch, and feed from visit to visit in the hospital (Minde et al., 1980). Mothers of early-preterm infants interacted less with their infants in the immediate postpartum and the interactions improved as the infant matured (Minde et al., 1975). These findings are also consistent with studies in the home that showed that mothers with early-preterm infants were less sensitive in interactions than mothers with full-term infants (Forcada-Guex et al., 2011). Other studies have also described mothers with early-preterm infants as being less facially responsive to their infants than mothers of full-term infants (Schmücker et al., 2005). The lack of significant differences at baseline could be because

the mothers were still recovering from the stress of labor or illness, as a majority of the full-term infants were less than 24 hours old and mothers of preterm infants had birth complications.

In my study, late-preterm infants looked more at their mother than full-term and early-preterm infants. While the late-preterm infants had a higher mean score for mother look, the late-preterm infants were more likely to be asleep and less likely to be in sleep-wake transition than the full-term infants. These findings are somewhat similar to a Swiss study that found early-preterm infants were less alert, less attentive, and less responsive than full-term infants (Forcada-Guex et al., 2011). The findings from the Malawi showed that responsiveness of the infants in all three groups to their mothers was low. Though sleep-wake states did not differ significantly, the majority of the infants in all the three groups were asleep. This evidence is consistent with Holditch-Davis (1990) who found that the majority of the preterm infants in the study were in active sleep. More research needs to be done after hospitalization when the babies are no longer in a critical condition to better compare interactive behaviors among the three-infant groups in an environment that is familiar to the mother.

Maternal anxiety and depression were associated with more maternal moves, more infant alertness, less vis-à-vis between mother and infant, and less child look. Greater PTS symptoms and more maternal worry also showed an association with fewer infant vocalizations, and more maternal worry was associated with the infant non-alert

state These findings are consistent with evidence that maternal anxiety, depression and other psychological disorders have been found to affect mothers' ability to interact and to contribute to infant negative behaviors (Bagner et al., 2009; Field, 2010; Field, Diego, & Hernandez-Reif, 2009; Kaitz, Maytal, Devor, Bergman, & Mankuta, 2010). Maternal stress related to the infant admission into NICU has also been associated with more maternal negative control (Holditch-Davis et al., 2007).

Sociodemographic characteristics and infant condition also influenced maternal and infant interactive behaviors. Mothers with more years of education held their infants throughout observation and their infants were less likely to be in sleep-wake transition. More days of oxygen therapy were associated with less mother look, but more maternal positive behaviors and the infants were less likely to be alert or in sleep-wake transition than infants who had fewer days of oxygen therapy. More days of oxygen therapy may be a proxy for being more critically ill. A study on Canadian mothers with preterm infants who had short-term illness found they talked, touched, and looked more at their infant than mothers of preterm infants with chronic conditions (Minde et al., 1983). In this study, Malawian mothers whose infant had longer oxygen therapy might have perceived the condition as serious, thus, the mother was less likely to be to be positive in her interactions.

Kangaroo mother care also had minimal effects on maternal and infant interactive behaviors. More days of KMC was associated with fewer maternal moves,

less mother talk, and less mother touch. No significant changes were seen in other interactive behaviors from baseline to follow-up. While study of Minde et al. (1980) occurred before the widespread use of KMC, their findings also showed little change in maternal touch and feeding from visit to visit to the hospital. The infants and mothers in this study might have adapted since KMC is a routine intervention. Thus little or no effects were seen in interactive behaviors.

The limitations of this study were that the duration of the observation was short, only 20 minutes, and that the infants were still young, sick, and immature. The fragility of these infants in addition to the mother's exhaustion because of going through labor and birth may have resulted in minimal interactive behaviors. Longer observations would assist in observing changes in the all three groups. Future studies should consider exploring the infants at home as they grow to explore maternal adherence to KMC and how this influences maternal and infant interactive behaviors over a long period of time. This approach would also help to examine the long-term effects of prematurity on both mothers of early-preterm and late-preterm infants. Larger sample sizes would also help to have a more representative sample of the population in Malawi.

## **5.5 Conclusion**

This study explored the interactive behaviors of mothers and their early-preterm, late-preterm, and full-term infants. I also explored the impact of emotional distress and KMC on mother and infant interactive behaviors. The findings showed minimal

differences in interactive behaviors among mothers of the three groups. I speculated that this lack of significance was due to the age of the infant as the baseline assessment were done in the first 72 hours of life before the infants and their mothers had fully adjusted after birth. In addition, critically ill newborn infants tend to show fewer behaviors than when they recover and mature (Minde et al., 1983).

The study also found minimal effects of emotional distress and KMC on maternal and infant interactive behaviors. However, the findings still showed that emotional distress resulted in less positive mother-infant interactions. The lack of effects of KMC could be as a result of KMC being a routine maternal intervention for preterm infant care. Infant may require stimulation in addition to KMC. These findings are still important as this is the first study that utilized observational methods to explore interactive behaviors in Malawi. It will provide ground work for future research in this area. The findings will also assist nurses to encourage mothers to establish positive early mother-infant interaction during hospitalization.

## **6. Malawian Mothers' Perceptions of their Early-Preterm, Late-Preterm, or Full-Term Infants' Birth and Hospitalization**

### ***6.1 Introduction and background***

Pregnancy and childbirth are also emotionally stressful experiences regardless of gestational age at birth (Davies et al., 2008; Glasheen et al., 2015), but having a preterm infant [born at <37 weeks gestation] further contributes to maternal emotional distress in the postpartum period (Holditch-Davis & Miles, 2000). Malawi has the highest preterm birth rate (18.1 per 100 live births) globally (World Health Organization, 2016). Despite the high preterm birth rate, very few researchers have explored Malawian mothers' experiences during the immediate postpartum period. This period is important because the limited human and material resources in Malawi have resulted in mothers of preterm infants becoming a living incubator and caring for their infant using Kangaroo Mother Care [KMC] (Zimba et al., 2012). Kangaroo Mother Care is a maternally administered intervention that involves the continuous skin-to-skin contact with a naked infant except for the diaper, a hat and socks placed between the mother's breasts (Cattaneo et al., 1998; Davanzo et al., 2013). Because mothers in Malawi have to deal with their own recovery from childbirth in addition to being a primary caregiver for the preterm infant, more attention needs to be given to the mother's emotional wellbeing and postpartum experiences.

Research in Malawi has shown that the perinatal period is distressing for most mothers who describe pregnancy in the vernacular term as 'pakati,' meaning "in-between" as being between life and death (Stewart et al., 2015). In addition, preterm birth was reported as the third most common concern of Malawian women in the intrapartum period (Rosato, Lewycka, Mwansambo, Kazembe, & Costello, 2009). Mothers of low-birth weight preterm infants (early or late) have described preterm infants as being too small, having difficulties in breathing, being fragile, and being malnourished (A. Gondwe, Munthali, Ashorn, & Ashorn, 2014; Koenraads, Phuka, Maleta, Theobald, & Gladstone, 2017). Mothers of low-birth weight preterm infants have also reported that they are challenged with a lack of knowledge on how to care for the infant and poverty that results in limited resources for infant care (A. Gondwe et al., 2014). Others have described being accused of causing the preterm birth because they did not take care of themselves (Koenraads et al., 2017). They have had difficulties with establishing breastfeeding and are burdened with infant care as they have to invest more time in infant care than other responsibilities (Koenraads et al., 2017).

Evidence on emotional distress in Malawi shows that mothers of early-preterm (<34 weeks gestation) and late-preterm (34-36 weeks gestation) infants experience greater emotional distress than mothers of full-term infants (>37 weeks gestation), and maternal perception of the severity of their preterm infant's condition was associated with more emotional distress symptoms (Chapter 4, 2018). However, little research has

been done on the perceptions of mothers of infants during hospitalization and research has not examined the perception of mothers of their preterm infants compared to the perceptions of mothers of full-term infants in Malawi. Therefore, the purpose of this study was to explore Malawian mothers' perceptions of their experiences with having and caring for early-preterm, late-preterm infants, and full-term infants.

### **6.1.1 Perceptions of immediate postpartum period.**

Research on experiences in the immediate postpartum period is limited in Malawi. However, mothers in Malawi have been found to prefer delivering at home because they were dissatisfied with support they received from health care workers who were rude, shouted at the mothers, left mothers unattended, provided inadequate information, and rarely provided medications for pain (Kumbani et al., 2013). Mothers of preterm infants in the United States also had to deal with miscommunications and conflicting or inadequate information from healthcare providers that contribute to maternal emotional distress (Harbaugh & Brandon, 2008; Holditch-Davis & Miles, 2000). Other American researchers have reported that the communication styles, interactions, and behaviors of health care workers can potentially trigger emotional distress (Holditch-Davis & Miles, 2000). A gap exists in Malawi literature on the perceptions of mothers of preterm infants about healthcare workers during admission in the KMC ward and mothers of full-term infants in the immediate postpartum period.

Another factor potentially affecting Malawian mothers of preterm infants is that preterm infants weighing less than 2500 grams are cared for using KMC. Mothers administer KMC all day except for bathroom breaks, expressing milk, feeding the infant, and receiving medications. Evidence shows that requests for discharge against medical advice due to the long hospital stays are common because mothers are not culturally empowered to make independent decisions and the responsibility for major decisions continues to rest on spouses and in-laws (Chisenga et al., 2015). Other reasons for requesting discharge against medical advice include the lack of assistance for implementing skin-to-skin contact, discomfort with the KMC position, and mothers' preferences for incubator care over KMC (Chisenga et al., 2015). Despite these challenges, mothers continue to support KMC as an approach to managing preterm infants and one that they would recommend to other mothers (Chisenga et al., 2015).

Thus, limited evidence exists on experiences of Malawian mothers of preterm or full-term infants and how the mothers' perceptions of postpartum support influences their ability to care for themselves and their infants. Malawi neonatal nurseries and postpartum wards are built as open-space units and infants are nursed in one room where the mothers and infants are in constant interaction with other mothers and their infants. In the United States, open-space neonatal units can potentially trigger maternal emotional distress due to the exposure to other mothers and the mothers' need to fight

for personal space and to control joyful feelings when amidst other mothers who are grieving (Beck et al., 2009).

### **6.1.2 Effects of preterm infants on experiences with motherhood**

Although no study of parenting preterm infants has been conducted in Malawi, studies conducted on early-preterm infants in the United States and France have shown that early-preterm infants require long-term hospitalization (Feeley et al., 2011; Goutaudier et al., 2011; Muller-Nix et al., 2004). Hospitalization of the preterm infant separated the infant from the mother, denying the mother an opportunity fulfill her role as primary caregiver (Holditch-Davis & Miles, 2000). In the United States, mothers of hospitalized early-preterm infants described their concerns as including the infant's medical problems, whether child will be normal, when the child would be able to come home, whether the child will always be sick, and if the child might die (Docherty et al., 2002). Studies in France and Spain showed that mothers of early-preterm infants also worried about their early-preterm infant's physical wellbeing and feared that something negative might happen to the infants (Garel et al., 2007; Saenz et al., 2009). Having total responsibility for infant care after hospital discharge was also overwhelming, and mothers felt guilty that they might have caused the preterm delivery (Garel et al., 2007). Mothers also worried about coordination of tasks between the parents (Saenz et al., 2009).

Similarly, late-preterm infants in the United States also experienced slightly longer hospitalizations than full-term infants (Brandon et al., 2011; McDonald et al., 2013). In the United States, mothers of late-preterm infants who were hospitalized after maternal discharge perceived their infants' conditions as more severe than if the mother and infant went home at the same time (Brandon et al., 2011). During hospitalization, these mothers felt stripped of their role and some of them cried often (Brandon et al., 2011).

### **6.1.3 Family and community support for mothers in Malawi**

Family and spouses are a source of emotional support in the postpartum period (Heh et al., 2004; Lau & Wong, 2008). The nature of spousal and family support may be influenced by cultural values. For some women, having their mothers around may be perceived as either positive or negative (Heh et al., 2004; Lau & Wong, 2008). Studies in Hong Kong, China, and Taiwan showed that mothers who perceived the presence of family support as positive had lower levels of depressive symptoms than mothers who perceived the support as negative (Heh et al., 2004; Lau & Wong, 2008). Marital conflict negatively influenced the mothers' perceptions of spousal support and having their biological mother for support was preferred over a mother-in-law (Lau & Wong, 2008). In Malawi, mothers hoped that their husband would show more love and affection during pregnancy, provide for their financial needs and remain faithful to them (Stewart et al., 2015). If the husband was unable to provide for her welfare and provide emotional

support, the mother was stressed and turned to other family members for support (Stewart et al., 2015). Family support included having a friend with whom to talk, who brought gifts, and who assisted with chores (Stewart et al., 2015). In the event that the mother was HIV positive or was experiencing extreme poverty, judgment from friends and family was distressing (Stewart et al., 2015).

In Malawi, issues surrounding childbirth are controlled by women who counsel each other about cultural expectations for pregnancy, birth, and infant care (Kamwendo, 2009). Some advice or practices recommended to the mothers such as food restrictions can sometimes contribute to pregnancy and postpartum complications (Kamwendo, 2009). In addition, the mothers' distress about childbirth could be worsened by the lack of spousal involvement in the pregnancy and childbirth preparation.

#### **6.1.4 Research purpose and specific objectives**

Therefore, the purpose of this study was to explore Malawian mothers' experiences with having and caring for early-preterm infants, late-preterm infants, and full-term infants and their perceptions of support received during the postpartum period. I had the following specific objectives:

- Explore mother's perception of their birth experiences, their infants, and their sources of stress based on the Preterm Parental Distress Model.
- Explore the nature of the support received during the perinatal period and mothers' perceptions of the support they received

### **6.1.5 Theoretical Framework: The Preterm Parental Distress Model**

I utilized the Preterm Parental Distress Model [PPD model] (Holditch-Davis & Miles, 2000) as the theoretical framework for this study. The six major concepts of the PPD model describe the common sources of stress in parents with preterm infants in the NICU (Holditch-Davis & Miles, 2000). The first concept, pre-existing and concurrent personal and family factors, includes age, gender, ethnicity, socioeconomic status and financial situation, employment, personal traits, family configuration, level of family support, and previous experiences with illness and death (Holditch-Davis & Miles, 2000). The second concept, prenatal and perinatal experiences, includes past obstetrical complications (infertility and high risk pregnancies and childbirth) and past infant losses that may influence the mother's fears in the current pregnancy (Holditch-Davis & Miles, 2000). The third concept describes infant illness, treatments, and appearance during hospitalization (Holditch-Davis & Miles, 2000). The fourth concept includes the mother's level of concerns about her infant's outcome (Holditch-Davis & Miles, 2000). The fifth concept, loss of the parental role results from the separation due hospitalization (Holditch-Davis & Miles, 2000). The third, fourth, and fifth concepts are interrelated as mothers are often concerned about the outcome because of the infant's illness, treatment, and appearance and infant's hospitalization separates the mothers from the infant resulting in the alteration of the parental role. Finally, the sixth concept of health care providers explores the communication/interactions between the parent and the

providers including the nonverbal behaviors that positively or negatively impact the parent's stay during the NICU admission (Docherty et al., 2002; Holditch-Davis & Miles, 2000; Miles & Holditch-Davis, 1997). This theory was used during coding of the maternal interviews to understand mother's perceptions of her sources of concerns following birth and how these concerns might influence the ability to care for the infant.

## **6.2 Methods**

This was a descriptive qualitative study that explored mothers' perceptions of their birth experiences and caring for an early-preterm infant, late-preterm infant, or full-term infant.

### **6.2.1 Study setting**

The study was conducted at Queen Elizabeth Central Hospital, a referral hospital in Malawi. This study was part of a larger study that explored emotional distress and mother-infant interactions following early-preterm, late-preterm, and full-term birth.

### **6.2.2 Study population and sampling**

I purposely selected 20 mothers: 5 mothers of full-term infants, 7 mothers of late-preterm infants, and 8 mothers of early-preterm infants. The mothers were also selected so that the sample had both mothers who had and those who did not have a support person present with them in the hospital. Theoretical saturation was determined from mothers' narration of their experiences, and data collection ended when no new themes

emerged from the mothers. Tables 26 and 27 present the descriptive statistics for the mothers in this study.

### **6.2.3 Instruments**

I collected demographic characteristics including age, marital status, occupation, education level, gravidity, parity, family size, number of living children, and source of support from mothers through a self-report questionnaire. I reviewed infant's medical records for the infant's birth weight, gestation, number of days on oxygen, and days on KMC.

I used in-depth narrative interviews to explore mothers' perceptions of the birth, infant hospitalization and infant care and spousal and family support as well as the negative or positive perceptions of health care workers. I asked mothers to describe their experiences with the birth: *"Tell me about your birth experience."* Probes were used to have mothers describe their perception of the condition of their infant after birth, their experience with breastfeeding the infant, and their perception of the support received during birth and hospitalization/care of their infant from the health workers or family members. An interview guide was developed with probes to further explore the experiences of mothers following either preterm or full-term birth. See Tables 28 and 29 for the English interview guide. Translated Chichewa interview guides are in Appendix I and Appendix J

**Table 26: Comparison of the three groups of mothers and infants on the means and standard deviations of the maternal and infant sociodemographic characteristics**

Parameter	Early-preterm (N = 7)		Late-preterm (N=7)		Full-term (N=5)		F	DF	p
	Mean	SD	Mean	SD	Mean	SD			
Maternal age	25.00	4.93	23	3.7	26.2	7.4	0.57	2, 16	.58
Education	10.57	3.36	8.1	1.77	9.8	2	1.65	2, 16	.22
Gestation	30.57	1.51	34.1	0.4	39.6	1.8	68.53	2, 16	<.0001
Birthweight	1442.86	127.24	1664.3	184.2	2980	363.3	74.02	2, 16	<.0001
1 minute Apgar	6.14	1.46	7.5	0.8	8	1.4	3.31	2, 14	.07
5 minute Apgar	9.00	1.53	10	0	9.5	1	1.33	2, 14	.29
KMC Days	2.57	2.64	5.4	1.51	0	0	12.63	2, 16	<.0001
Oxygen Days	1.71	1.6	0.7	0.8	0	0	3.79	2, 16	.045
Family Size	4.71	1.98	5.3	1.3	4.8	1.3	0.12	2, 16	.89
Living Children	1.86	1.46	2	1	2.2	1.1	0.12	2, 16	.89

KMC = Kangaroo Mother Care; maternal age in year; education in years; gestation in weeks; birthweight in grams

Note: birthweight is in grams

**Table 27: Comparison of the frequencies (*f*) and percentages (%) of categorical maternal and infant sociodemographic characteristics for the three groups of mothers**

<b>Parameter</b>	<b>Early-preterm (N = 7)</b>		<b>Late-preterm (N=7)</b>		<b>Full-term (N=5)</b>		<b>X<sup>2</sup></b>	<b><i>p</i></b>
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%		
% Married	7	100%	6	85.7%	4	80%	1.59	.45
% Stay at home mother	4	57.14%	5	71.4%	2	40%	2.49	.64
% Cesarean Section	0	0%	2	28.6%	2	40%	3.57	.17
Infant gender							4.21	.12
Male	6	85.71%	3	42.9%	2	40%		
Female	1	14.29%	4	57.1%	3	60%		
% Multiple birth	2	28.57%	0	0%	0	0%	3.33	.19
% With support person	6	85.71%	3	42.9%	3	60%	1.61	.45
% Maternal family	4	57.14%	3	42.9%	3	60%	5.6	.69
% Primiparas	4	57.14%	0	0%	1	20%	5.07	.08

**Table 28: English interview guide – Mothers with full-term infants**

1. Tell me about your birth experience. *Possible probes if mother doesn't spontaneously discuss:*
  - a. Do you consider your birth experience stressful? Why?
  - b. Tell me more about aspects that were stressful and how you responded to the hospitalization of the infant.
  - c. Tell me about your experience with health care workers
  - d. Tell me about your feelings when you first saw your baby
  - e. How did your experience with previous pregnancies and pregnancy complications influence your birth experience?
2. Tell me about yourself. *Possible probes:*
  - a. How do you feel about motherhood?
  - b. What were your expectations of pregnancy, labor, delivery, and postpartum?
  - c. What factors from your past or family and culture made the experiences with birth and caring for the infant more difficult?
  - d. Do you have other children? If yes, how do you feel about your previous births and experience with mother hood?
3. Tell me more about the condition of your infant after birth? *Possible probes:*
  - a. How did it make you feel?
  - b. Tell me more which aspects of your experience with birth and caring of your infant were more difficult?
4. Tell me your experience with breastfeeding your infant? *Possible probes:*
  - a. What is the schedule of your infant's feeding?
  - b. How has this experience made you feel?
5. Tell me about the support you received during birth and hospitalization/care of your infant. *Possible probes:*
  - a. Who were the people that supported you during the experience? (health care professionals, spouse, family members [e.g., grandparents], clergy or church members., community members, friends)
  - b. Tell me more about the type of support you received and how it might have contributed to emotional distress or emotional wellbeing
  - c. Tell me more about what you consider positive postpartum support
  - d. What do you wish people did that they never did for you?
  - e. Do you have suggestions for improvement of support rendered to women with full-term infants?
6. What advice would you give another mother with a baby?

7. Is there anything you would want to share about the experience that we have not discussed?
8. How did it feel being part of this study? *Additional probes:*
  - a. Tell me more about that, can you give me an example, and what do you mean when you say...?

**Table 29: Interview guide - Mothers of preterm infants**

1. Tell me about your experience with the birth and hospitalization of your infant.  
*Possible probes if mother doesn't spontaneously discuss:*
  - a. Do you consider your birth experience stressful? Why?
  - b. Tell me more about aspects that were stressful and how you responded to the hospitalization of the infant.
  - c. What do you think contributed to preterm birth?
  - d. Tell me about your experience with health care workers during hospitalization
  - e. Tell me about your feelings when you first saw your baby.
  - f. How did your experience with previous pregnancies and pregnancy complications influence your birth experience?
2. Tell me about yourself. *Possible probes:*
  - a. How do you feel about motherhood?
  - b. What were your expectations of pregnancy, labor, delivery, and postpartum?
  - c. What factors from your past or family and culture made the experiences with birth and caring for the infant more difficult?
  - d. Do you have other children? If yes, how do you feel about your previous births and experience with mother hood?
3. Tell me more about the condition of your infant after birth? *Possible probes:*
  - a. How did the separation with your infant make you feel?
  - b. How do you feel about having a preterm infant in the neonatal nursery?
  - c. Tell me more which aspects of your infant's hospitalization were more difficult?
  - d. How did it feel being separated from your infant after birth?
  - e. How did it feel when you were reunited for the first time?
  - f. What were the major sources of worry regarding your infant's health?
4. Tell me your experience with kangaroo care. *Possible probes:*
  - a. How are your feelings about holding your infant in kangaroo position?
  - b. Tell me more about how you have been affected from participating in kangaroo care
  - c. What were the challenges you are facing while providing kangaroo care?
  - d. What kind of support do you feel you need to make your kangaroo care a successful and positive experience for you?
5. Tell me your experience with breastfeeding your infant? *Possible probes:*
  - a. What is the schedule of your infant's feedings?
  - b. How has this experience made you feel?

6. Tell me about the support you received during birth and hospitalization/care of your infant. *Possible probes:*
  - a. Who were the people that supported you during the experience? (Health care professionals, spouse, family members [e.g., grandparents], clergy or church members, community health members, friends).
  - b. Tell me more about the type of support you received and how it might have contributed to emotional distress or emotional wellbeing
  - c. Tell me more about what you consider positive postpartum support
  - d. What do you wish people did that they never did to you?
  - e. Do you have suggestions for improvement of support rendered to women with preterm infants?
7. What advice would you give another mother facing a similar experience?
8. Is there anything you would want to share about the experience that we have not discussed?
9. How did you feel being part of this study? *Additional probes:*
  - a. Tell me more about that, can you give me an example, and what do you mean when you say...?

#### **6.2.4 Procedure**

I obtained approval from Duke University Medical Center Institutional Review Board and the Malawi College of Medicine Research Committee. I also obtained approval from the hospital authorities at Queen Elizabeth Central Hospital to conduct a study at their hospital. Informed consent was obtained before data collection on main study and a second verbal consent was obtained when mother was selected for this interview.

#### **6.2.5 Data analysis**

I used one-way ANOVA to compare the continuous demographic variables of the three groups of mothers and infants and Chi-square tests to compare the groups on categorical demographic variables. All descriptive statistical analyses were conducted in SAS 9.4.

For the qualitative analysis, I used an iterative process engaging both a deductive and an inductive approach. The deductive approach is often used when one has a theory to test and one utilizes concepts from the existing theoretical framework to make sense of the data (Vogt, Vogt, Gardner, & Haeffele, 2014). On the other hand, with an inductive approach, raw data are used to develop concepts (Vogt et al., 2014), thus identified domains and patterns/sequence from the raw data (Thomas, 2006). First, I used a deductive approach by basing my initial analysis on the Preterm Parent Distress (PPD) Model to assess the sources of stress. The inductive approach was used to explore

the additional data on experiences with infant care and perinatal support. I read completed interviews to gain insight and understanding of the mother's experiences. Qualitative data was coded in NVIVO 10 and 11.

Parent level nodes (umbrella codes/primary level coding) were created using the six major concepts of the PPD model for sources of stress. I also created parent nodes on support based on the nature of the support and mothers' perception of the support given. New Parent codes were added when new concepts arose that did not fit in the model. I read the interviews and assigned the patient responses into the specific related parent node. The second level was done by reading maternal responses in each specific parent node and reassigning them into separate factors suggested in the model or new nodes raised from the data. This was an iterative process that involved going back and forth between the parent and child nodes to create connections among the concepts. I also ran a code matrix query to assess interactions between the nodes.

After identification of the different themes/nodes, I transformed the new themes into meaningful units that described mothers' birth experiences in addition to the major concepts from the PPD model. I had another bilingual Malawian nurse-midwife read through the interviews and crosscheck my coding order to reduce researcher bias. The themes were initially coded in the vernacular language, Chichewa, and then translated into English for further analysis and reporting. Initial coding in Chichewa ensured that the meaning of the description was maintained and not lost with the translation.

Translating the quotes after clustering them into the nodes helped to work with the professors whose research is on mother and infant outcomes to establish meaning of the unit.

## **6.3 Results**

### **6.3.1 Perinatal experiences of the mothers of early-preterm, late-preterm, and full-term infants**

Findings showed that mothers in Malawi had some experiences similar to those of mothers in other countries. Mothers of full-term infants had fewer concerns than mothers of early-preterm and late-preterm infants. Mothers described the six concepts of the PPD model and in addition they expressed their concerns about KMC. Mothers of full-term infants often worried about support, prenatal and perinatal experiences, and healthcare workers. Additionally, mothers with early-preterm and late-preterm infants were concerned about the infant's appearance, condition, treatment, and outcome and the separation due to the hospitalization made the mother feel helpless about their role.

#### **6.3.1.1 Preexisting and concurrent personal and family factors**

Communication and interactions with family, friends, and other community members were also described as sources of concern for the mothers of all infants.

Concerns among mothers of full-term infants were largely to do with family planning and birth preparedness. Two mothers stated:

*People castigate you if you did not use family planning methods like I did. I did not space out my pregnancies well... So some people would laugh at you and this can make you stressed... You become pessimistic about your life.*

*Some people may scare you that when you go into labor. . . Of course, I had no idea what everyone goes through, but I would still respond that our experiences may differ.*

On the other hand, the concerns surrounding the family in mothers of late and early-preterm infants were largely related to financial struggles, responsibilities of other children at home, and being far from other home responsibilities. One mother of a late-preterm infant stated:

*My mother is the one who came here with me together with my other child. However, my mother returned home because my child was not cooperating... Later when she asked me whether she should come back, I told her not to come because it will be difficult to find the money for her transportation to come here and then for the two of us to go back home. My husband and I are also divorced and we each went separate ways. He does not provide any support.*

A mother of an early-preterm infant stated:

*My two main concerns were about the land that I own back home and the fact that my home is very far from here. It is difficult for people to afford to come and bring provisions.*

### 6.3.1.2 Prenatal and perinatal experiences

Mothers of full-term infants stated that obstetrical complications were a challenge. The complications mentioned varied from painful experiences compared their past perinatal experiences and disappointment in the mode of the delivery. However, the concept of 'God's will' promoted the acceptance of negative obstetrical outcomes in some. The mothers said:

*What I went through wasn't good. Compared to my first cesarean section, this one was more painful.*

*My pregnancy and childbirth have been uneventful. The only challenge with this pregnancy was that labor was more painful than my first, but there was no problem.*

*I was expecting a vaginal birth with no complications. However, what God willed I have accepted. At least my baby and I are alive.*

By contrast, in the mothers of early-preterm infants, the concerns about past and present prenatal and perinatal experiences were about the sudden nature of the birth. Mothers of early-preterm infants compared the current pregnancy with their past pregnancy experiences:

*I am differentiating between my babies in the sense that after delivering the first one I went straight home while with this one they sent me here to the Nursery after delivery.*

*My past pregnancies were delivered at term, but with this one I delivered at 7 months... That is when I was really scared because something like this has never happened to me before.*

Mothers of late-preterm infants also expressed their fear of pregnancy complications. Some mothers who had a prior infant loss also expressed the fear that past perinatal experiences would repeat. The issue of accepting God's will also appeared among this concern.

*After this pregnancy, I was worried because when I went to the hospital they found I had syphilis. I was worried because I didn't know how I got it. From there I used to worry a lot. Since I was pregnant sometimes I used to have severe stomach pains that were unlike what I experienced with my previous pregnancies.*

*The first and second baby died because of failing to breath, but in both cases, it was because they were cold. When I give birth to this baby I just accepted the situation because it was a gift from God. I was taking care of him according to the advice they gave me at the hospital... when this happened [preterm birth] I my heart was broken that I have to go through this again.*

### **6.3.1.3 Infant appearance, illness, and treatment**

This concept was described only by mothers of late-preterm infants and mothers of early-preterm infants. This concern was not present among mothers of full-term infants. Mothers of late and early-preterm infants raised concerns about the infant's size,

condition, and treatment. Following birth of a preterm infant, mothers were concerned about the size of the infant and some wondered whether the infant's outcome was going to be positive. The mother of a late-preterm infant said:

*The baby was very small and was having difficulties with breathing. During breathing, the chest would go inward [retractions] and I could see the bones. The healthcare workers did not even expect the baby to live after all that because he was very small. The healthcare workers said that my baby was too small. So I am wondering why they said my pregnancy was 7 months yet I entered my 8<sup>th</sup> month ... I was expecting a birthweight of 1.6 kg, but to my surprise my baby weighed 1.4 kg despite being born close to 8 months. So I was concerned.*

Similarly, one mother of an early-preterm infant stated that: "I was worried because my baby was too small, and I was also concerned about how it happened that my baby was born at 7 months."

Most mothers of early-preterm infants expressed concern about the infant's condition as their newborns required oxygen therapy. At first meeting with their infant following the separation, mothers were concerned about the treatments and the condition of the infants. Mothers of early-preterm infant stated that:

*After giving birth and arriving at the KMC ward, they told me that your baby has a problem of chest in-drawing [retractions]. That is when they send me here, but I was worried about what is happening to my baby. Now I am grateful that the baby was*

*feeling good. When he was readmitted to critical care unit for chest in-drawing, I started to worry but I just accepted the situation and let God's will be.*

*I wasn't worrying much, but when we arrived at the neonatal nursery and they told me that the baby needed oxygen therapy, I started to worry. He Just stayed there for short time and they removed the oxygen and send us to KMC ward.*

Similar experiences were also described by the mothers of late-preterm infants who required oxygen therapy. One mother said:

*When I saw my baby, I was concerned because they put him on oxygen therapy. With his size, I was wondering if the outcome would be good. But look today he is fine.*

#### **6.3.1.4 Concerns about infant outcome**

Mothers of early-preterm and late-preterm infants were concerned about the outcomes of the infants, while mothers of full-term infants expressed no concern about the infants' outcomes after birth. The concerns about infant outcome were related to the infant's appearance, condition, and treatment and the loss of maternal role from hospitalization. Thus, there was an overlap on concerns about outcome with the concerns about infant illness, appearance and treatment and also with loss of parental role. Mothers had both negative perceptions and positive perceptions about the infant's outcome. The main concerns about infant outcome were the fear of infant loss and the fear of a poor prognosis. Fear of infant loss and poor prognosis was related to the

infants' appearance, condition, and treatment. However, other mothers relied on God's will amidst their fears. Mothers of early-preterm infants reported that:

*My baby was born preterm, so I was wondering whether the baby would live. Then, I heard about the neonatal nursery. But even when they were taking the baby to the neonatal nursery and when I was visiting, I was feeling that I have already lost this baby. That time I wasn't feeling well when my twins were sent to neonatal nursery. What was bothering me was whether they would grow.*

*My concern was that my baby might die in nursery, but in the morning when they told me to go and see my baby, I found him crying and everything looked fine.*

One mother of an early-preterm infant also was concerned about the effects of hospitalization on long-term factors such as intelligence when she said that: "Family back home also came to see me and encourage me so that I did not worry because even if the baby required care in the neonatal nursery, he can still be intelligent." Other mothers of early-preterm infants also interpreted the infant's outcome as the will of God:

*What was scaring me was what God had in store for me. With the problem of chest in-drawing while breathing [retractions], my baby was sent to neonatal nursery and I was still struggling trying to comprehend what was going on. However, my baby has survived to this day.*

Similarly, mothers of late-preterm infants worried about the infant's outcome following admission into the neonatal nursery and reported losing hope that their infant might live considering the rate of infant losses in the neonatal nursery.

*It hurt me because so many children die in the neonatal nursery, so I was uncertain of whether my child would also die. However, I just left it in the hands of God because He will help me.*

*I gave up hope that the baby was going to live, I wasn't even thinking that there was a chance that he would be alive.*

#### **6.3.1.5 Loss of parental role**

The concern about the loss of the parental role also appeared in mothers of late-preterm infants. Mothers of late-preterm infants worried about their inability to care for their infant the way they would want. Mothers thought they could do better at handling the baby than healthcare workers.

*The concern I had was how the healthcare workers were holding him, considering that the baby was fragile I thought he/she could break . . . If it were me, I would have known how to hold her gently.*

#### **6.3.1.6 Healthcare system**

Mothers' descriptions of their experiences with healthcare workers and the healthcare system included both positive and negative aspects. These experiences were shared by mothers of the three different groups. Six major factors emerged from

mothers' descriptions of their experiences with health care workers, both at the referring health center and at the main referral center. These included the promptness and helpfulness in provision of care; non-verbal behaviors; patient-provider interactions; patient education, patient care and support; and lastly, though not directly related to the personnel, the hospital environment was raised as a source of concern.

### **Promptness and helpfulness in care**

The majority of mothers of full-term infants stated that the healthcare workers were helpful and prompt in delivery of care and kind and empathetic in patient-provider interactions. Helpfulness and promptness in delivery of care was seen both at referring facility and referral center. Mothers reported that the staff from referring centers were prompt to refer if needed and that the providers at the referral center did their best. The mothers stated that:

*They took really good care of me until the baby was born and my baby was fine with no problems... They were prompt in receiving me and registering me while another nurse examined me and prepared me for the cesarean section.*

*I was welcomed and sent for a cesarean section . . . You know they have so much work, but they really tried to save my life and that of my baby.*

Some mothers of early-preterm infants also expressed appreciation towards the health care workers. Mothers stated that:

*Both hospitals treated me kindly. The health center did not delay referring me, and they did not take long to examine me and transfer me.*

*When I arrived the admission room was crowded, but I met good health workers who after seeing my condition rushed to register me and offer me a bed.*

Mothers of late-preterm infants also shared similar experiences with the tertiary facility:

*As for me I was received kindly in the labor ward ...and when I arrived here at the neonatal nursery they also received me kindly and put a feeding tube in her mouth...what they did for my baby showed that they received me positively at the unit.*

However, some mothers of late-preterm infants shared a negative experience with the care:

*They have received me kindly, but one thing that they need to work on is when a child has fever, they should attend to us promptly.*

*The thing that was not good is that when I arrived in the ambulance, the health workers were called, but no one came promptly to take me. Time passed, and that could be why my child had breathing problems.*

### **Non-verbal behaviors**

One mother of a late-preterm infant was concerned about how the healthcare providers handled her infant during hospitalization:

*The problem in the neonatal nursery was how they were handling the baby roughly when placing her on the weighing scale, while I do it gently ... it hurts because in my case I was still in pain from the labor and when they handled the baby roughly it felt like they are reminding me of the labor pains... However, there was nothing I could say because there are some health workers if you ask they answer politely, but some shout at us.*

### **Patient-provider interactions**

On verbal interactions with healthcare providers, most of the mothers reported negative experiences as they had faced verbal insults before referral to the tertiary level hospital. One mother of a full-term infant who had negative experience with the care at the referral center stated that:

*Some of the health workers were rude saying I enjoyed the sex... this is not good because that is how everyone conceives. Therefore, I want the health care workers to welcome us with joy.*

One mother of an early-preterm infant said:

*Some health care workers came to the KMC ward, and they laughed at us, that is not good. They should speak to us kindly so that we would not be stressed.*

Another mother of a late-preterm infant whose baby was handled roughly also expressed dissatisfaction when she said:

*I could not ask them about it [rough handling] because some of the healthcare workers when you ask them they answer you nicely, but others start shouting at you.*

Another mother of late-preterm infant reported similar sentiments when she stated:

*Some health care workers are difficult, while sometimes you meet good ones who understand you.*

### **Patient education**

Issues surrounding patient education were mainly reported by mothers of preterm infants. Mothers of preterm infants appreciated the education they received when they were admitted in the KMC ward. One mothers of early-preterm infant stated:

*When I arrived, they taught us how to care for the infant and how to wrap the infant to keep her warm.*

Another mother of late-preterm infant said that:

*The nurses ... taught us the expectations and how to handle the infant including measuring milk, how to dress the infant and also how to sleep and handle oneself considering that we have the infant on our chest.*

### **Patient care and support**

The mothers of preterm infants expressed both appreciation and dissatisfaction with the care and support they received during hospitalization. Mothers of early-preterm infants felt that the health workers did everything they were supposed to do:

*There is nothing they have done that is wrong. It was like I came to buy our lives and my baby is alive so there is nothing wrong.*

*The hospital is providing us with food during lunch and dinner. I can say the hospital has helped.*

Mothers of late-preterm infants also stated that they received support from the healthcare workers:

*In my opinion, I have received good care, and no one was rude to me. Also, on the care I have received on my body, they did a good job. No complications occurred.*

*The nurses also come visit us at night and remind us to put the baby on skin to skin care . . . they call you to have a conversation with you and explain what to do.*

In addition to the positive experiences, some mothers had negative experiences with their care. Two mothers of late-preterm infants stated:

*In the neonatal nursery, they don't do much. When I go visit, I find the baby crying and her whole body covered in feces, so I feel the care is lacking. The only benefit is that they help make the babies grow and mature but still the care is not comprehensive.*

*On our side [KMC ward] there is no staff members who stay overnight. When a child is sick, we have to go to the neonatal nursery for help."*

### **Environment**

The hospital environment was also mentioned as a source of a concern. One mother of late-preterm infant was worried about the lack of lighting in her room and also the lack of a mosquito net:

*The problem I noticed when I arrived here was that there was no electricity in this room, since I came this room has been dark...the hospital also needs to invest in mosquito nets because there are a lot of mosquitos, which is very dangerous.*

### **6.3.1.7 Infant and infant care**

Mothers of early-preterm and late-preterm infants were often concerned about how they would care for their infant and about breastfeeding. The mothers of the full-term infants were generally happy with the condition of their infant. While concerns about infant condition was not the main theme from mothers of full-term infants, the mothers were still concerned about the infant's temperament, caregiving, and establishment of breastfeeding.

#### **Infant care**

Some mothers of full-term infants reported that their infants were inconsolable, which made it difficult for them to rest. Another mother also stated her infant's irritability made her feel pain.

*The baby is crying a lot, I cannot sleep.*

*It was difficult to provide care for my baby because of my cesarean section ... the baby was crying a lot, which also made me feel pain.*

One mother of a late-preterm infant expressed fear of hurting the baby when cleaning the umbilical stump with no help from the older women in her family.

*I was scared only about umbilical stump because with my first born, the elders [older women in her family] were the ones who took care of it. This time was like they have left me on my own so that I could learn that if I gave birth without them, I would be able to take care of the baby.*

Mothers of early-preterm infants were largely concerned with their inability to care for the infant. Some just felt the responsibility was hard for them because they required to have someone to help care for the baby.

*The following morning the baby's weight dropped and I told them that I had trouble with the timing for feedings. The nurses blamed me for oversleeping through the feeding time. They also said that the baby was cold and I accepted that I made a mistake. The problem is that I start with showering and then doing laundry. I put the baby down, and that is why the temperature dropped.*

*Because the responsibility of taking care of two infants [twins] is much harder than one baby. In this case, you are supposed to have someone who can help you*

### **Breastfeeding**

Concerns of breastfeeding among mothers of full-term infants were largely about milk production and attachment to the breast.

*I have no problem taking care of my baby and breastfeeding. The only problem is that my baby has difficulty in suckling.*

*My baby is breastfeeding, but I am not producing enough milk. I am just letting her stay on the breast because the health care workers taught us to continue feeding even when no milk is coming.*

Mothers of late-preterm infants expressed similar concerns about milk production. Mothers reported that feeding through a cup was challenging because they thought their infant preferred the breast. Thus, when fed from cup the infant would spit up a lot.

*My breasts were not producing enough milk and this made it difficult for my twins to feed adequately. Now they are feeding adequately because I am supplementing with formula. Both of them are finishing their portions.*

*He doesn't like feeding using a cup. He always prefers sucking from the breast. When you use a cup most of the times he just spits up the milk. He is used sucking so when you give him the cup he fails to drink properly.*

Mothers of early-preterm infants also struggled with milk production. They also felt that their infants struggled to feed both from breast as they tired and from cup as the infants risked aspiration.

*I was concerned about what I would feed the baby because my breasts were not producing any milk and he was losing weight. This really worried me because it meant the progress was not positive.*

*I give the baby both milk from the breast and milk from the cup. I cannot force her to breastfeed for a long time because she would get tired fast and stop suckling. Others might confuse the times when she is full with the times when she is just tired.*

*My baby is comfortable sucking from the breast rather than drinking from the cup.*

*Sometimes she drinks but sometimes it's hard for her because the milk gets into her windpipe. This mostly happens when she feeds soon after waking up. She gets excited and plays. Then she starts coughing.*

#### **6.3.1.8 Kangaroo mother care**

While KMC falls under infant treatment, a look at the concept in-depth is necessary as the mothers were not concerned with the actual intervention but rather their ability to provide it. All mothers of early-preterm and late-preterm infants agreed that KMC was a good intervention that promoted infant growth, kept infant warm, and promoted better outcomes. Mothers stated that their infants could stay warm and also that they gained weight. One mother of an early-preterm infant said:

*In these 4 days, I have noticed that my child has gained some weight and the condition has improved... KMC also helps to keep the baby warm because when your child's weight gain is unstable and you neglect to use a blanket the baby gets cold easily.*

Mothers of late-preterm infants also stated that:

*When they referred me to KMC, I realized at that time that my baby was better and we would be discharged soon.*

*I am seeing a difference after starting KMC as my baby's body feels warmer and now he is stronger. In the critical care unit, it was also difficult to see him, but now I can see him.*

The concerns about KMC mainly centered on the difficulty in providing the care throughout the night. Mothers stated that sleeping on their back for a long time was not an easy task and they thought it was a responsibility that needed to be shared with support system. Mothers of early-preterm infants stated that:

*Sometimes when you place your child on your chest, you have to sleep while facing the roof, it's difficult to change positions even if you want to, but you get used to it as you are also trying to save a life.*

*Sometimes you have neck pain, the back also hurts ... Sometimes you just wake up at night and stay awake, just feeding the baby... Someone needs to help you with this responsibility.*

*The major problem is sleeping because I have to sleep on my back... sometimes you may feel pain on one side but you just stay in same position because I can't move when I have a baby on my chest.*

Mothers of late-preterm infants also stated that:

*My chest feels like I have done a lot of work as I have the baby on my chest the whole day... It is different from when you do not have anything on your chest. You can breathe comfortably but when you have a baby on your chest it is hard. However, I can't put the*

*child down because I will create more problems as the baby will get cold and have other problems.*

*Someone needs to help you with this responsibility... Sometimes I reach a point when I really need someone to take over... When my BP is high and with the heat in the room and I have to put the baby on the chest, I really get uncomfortable.*

### **6.3.2 Perinatal support for mothers of full-term infants**

The major types of support received during hospitalization for all mothers and their infants were instrumental/tangible care, financial, and emotional. Some mothers had a support person physically present with them in the hospital, but others had none. Some mothers received support from other people who visited them.

#### **6.3.2.1 Perceptions of social support and the support person**

Among mothers of full-term infants, three mothers had a support person (an aunt, a mother, and a sister), whereas the other two did not have a support person physically present in the hospital with them. Most of the mothers of full-term infants with or without support expressed gratitude to people who had assisted them during hospitalization. Those who did not have a support person present received support from women on the ward.

*My husband has helped a lot because my mother lives far away. My mother came to be with me, but she was very busy so I called for my aunt .... My aunt is a loving person and takes care of me. My husband is also a loving man and he tries his best to take care of*

*me. My neighbors have also celebrated with me and they will come back today to see me.*

*To be honest I am happy.*

*My older sister is who I regard as my mother because we lost our parents. I am grateful that she came to the hospital when she has her own children.*

*Women in the ward are also helping each other. Like when you have not wrapped the baby properly, they help you.*

Three mothers of late-preterm infants had a support persons (two had their mothers and one her aunt), but the rest had no support person. Mothers of late-preterm infants who had no support person with them during hospitalization said that:

*So when we were referred to Queens, my aunt left while I stayed because I was waiting for the baby to gain weight so that I could be discharged. But today when they were doing ward rounds, they discovered that the baby looks yellow and they said that I will have to stay longer in hospital... The major thing that worries me is that I am staying here alone without relatives so it's difficult.*

*It is good when there is someone to help you. When I was failing to walk, someone would have been caring for the baby. When they sent me back to the postnatal ward that is when my mother-in-law left because she said there was no place to sleep...my family has not been helpful.*

When asked who they would prefer as a caregiver, mothers of late-preterm infants provided conflicting information with some wishing they had someone from their own family.

*It is different when you have your own relative with you in the hospital as opposed to someone you met when you are already an adult. A person who has seen you grow from childhood is different. I feel that if my mother was around, my baby would have received the best care.*

*It would be better if I was with my aunt or my grandmother .... Then I wouldn't have struggled to eat and could have been eating in the morning, afternoon and evening. I could have been eating the way I am supposed to but now I can't go out of the ward to prepare tea because I'd be leaving the baby alone.*

Six of the seven mothers of early-preterm infants had a support person who ranged from their mother, aunt, or their in-laws. Mothers of early-preterm infants stated that:

*I have received support from my husband's family. However, my family were the ones to do this and my husband family were supposed to just visit. Therefore, I cannot say that they did not take care of me well when the support that they gave me should have been from my family.*

*It's better to be with my grandmother compared to my aunt. My grandmother loved me like my mother, she doesn't act like she is just my granny.*

*The care provided by my aunts compared to my mother in-law...I am differentiating with how it was with my mother in-law because it looked like she was too busy to make time to care for the babies, she did not look concerned.*

The mother of an early-preterm infant who did not have a social support person stated that:

*It is just the same because maybe the other person wouldn't even manage to provide the care I am providing. I am managing and am feeding her accurately. Would another person manage to feed her?*

#### **6.3.2.2 Instrumental/tangible support**

Instrumental or tangible care included the physical help, including providing infant care, that the mother received while in hospital. Support persons were responsible for helping the mother with bathing herself, washing clothes, infant care, and helping with other children at home. Mothers of full-term infants stated that:

*My sister is also cleaning me up and also taking the baby so that I can rest.*

*My mother's younger sister is here with me and helps with washing the sanitary pads that I am using, washing my clothes, cleaning me up, and changing baby diapers, which I could not have managed to do on my own.*

*When I arrived yesterday, my caregiver went back home because I left my other young child home, but my caregiver came to see me this morning.*

Mothers of late-preterm infants also described receiving physical help from their caregivers:

*My mother has really helped me because I was alone I couldn't have managed because I had a cesarean section. She was doing KMC on my behalf and my sister-in-law was also bringing food.*

*I have received great care because they have helped me like they did with my first pregnancy...She washes for me and my baby.*

Mothers of early-preterm infants stated that:

*She cooks for me; she washes the clothes for me. Most of the times I just stay in the ward with the baby, so I can't go out with the baby to cook or to wash.*

*Sometimes we don't receive porridge in the morning, she goes to cook for me and to bring the food to the ward.*

### **6.3.2.3 Financial support**

Financial support included support, whether in form of finances or materials, that reduced the mother's financial burden and included provision or monetary support or materials for infant care including transportation. The husbands were the main financial support system for all mothers who commented on financial support. One mother of full-term infant stated that:

*My husband has been helpful. If I ask him to bring sobo [juice], he will bring it ... If I tell him now that we might get discharged, he will come to pick me up.*

Mothers of late-preterm infants reported that their husbands provided transportation to the facility and necessities, they also reported receiving baby supplies from other mothers in the unit:

*When I went to give birth at the health center, my husband was cooperative and he made arrangements for transportation. When he heard that I was being referred to QECH, he also brought a car.*

*This baby used to have few wraps but people in the ward have helped me by giving me some bedding for the baby.*

Mothers of early-preterm infants also stated that their husbands provided finances and resources for them:

*My husband brings money. He also buys soap and body lotion because when I came here, I didn't bring anything.*

*My husband just sent money...because the money I had was only MK3,000 [approximately \$4] and I used it for food...It is hard for him to come to visit because he travels and it would cost money for him to come.*

*My husband brings money that my sister in-law uses for buying rice ... cassava, sobo [juice] as instructed by her brother [the husband].*

#### **6.3.2.4 Emotional support**

Emotional support included the moral support, appraisal, and spiritual support that mothers received during hospitalization. Most of the emotional support came as

encouragement, visitations, and prayers for positive outcomes. Mothers of full-term infants stated:

*Women from church came to visit and pray with me. They even said that they might visit again today.*

One mother of a late-preterm infant was appreciative of the encouragement she received. Another mother mentioned how family visited, but she wished her husband made an effort to come visit her.

*When they see the baby, they [family] encourage me...They encourage me to continue doing what I was taught.*

*People who supported me were my friends, my sister-in-law, and my landlord. My husband's elder brother and his wife are the ones who were coming. My husband was not visiting and I didn't like it.*

Mothers of early-preterm infants also reported receiving encouragement from friends:

*My friends accepted what happened and encouraged me not to be worried because the baby was not too small and would grow fast.*

*My husband visits and encourages me He says that I should not worry. Everything will be alright. He was even happy when he heard that we were discharged. Family back home also came to see me and to encourage.*

Some of the spiritual support was based on individual faith in God that provided inner strength for the mother. Some mothers also had other church members pray for them. Mothers of early-preterm infants added that:

*I was having stress but I was just praying that God should guide me so that my baby would be fine and I would see the way forward from here.*

*I was just waiting for what the Lord has prepared for me. At church, they are taking part by praying for me so that the baby improves.*

## **6.4 Discussion**

This study explored Malawian mothers' perceptions of their perinatal experience including the concerns they had about their early-preterm, late-preterm, and full-term infants and also their support system during the perinatal period. Findings showed that the mothers had both positive and negative experiences. The mothers were concerned about their perinatal experiences, past experiences that repeated or new experiences that they had not experienced in previous pregnancies, their infant and the infant's hospitalization, and the health care workers and health care system. Mothers of early-preterm and late-preterm infants had more concerns than the mothers of full-term infants as they also had to worried about the pending hospitalization, severity of the infant's condition, and uncertainty about the outcome.

The first concept in the PPD Model on sources of stress is personal and family factors (Holditch-Davis & Miles, 2000). This study revealed that Malawian mothers,

preterm or full-term infants, are concerned with presence of social support, communications with family members, and financial support. It is also important to note that husbands provided much of the financial support. Evidence from Iranian mothers also shows that mothers need support from spouses, family, relatives and healthcare team (Arzani, Valizadeh, Zamanzadeh, & Mohammadi, 2015). The concern of Malawian mothers about the hospital environment is also important the mothers have to live in that space for a significant amount of time. The mothers of preterm infants were concerned about the living conditions as opposed to mothers in the United States who have expressed concerns about the technologies in NICU from the noise of monitors and equipment, sounds of the alarms, and even the respirators (Miles, Funk, & Carlson, 1993). The healthcare system needs to provide a conducive environment in which the mother's choice of a caregiver is supported and that the caregivers as well are supported throughout hospitalization.

In our study, mothers who had complications during pregnancy or labor expressed concerns about their inability to care for their infants in the postpartum period. In addition, mothers who had past infant losses or similar past experiences were afraid that the past experiences would reoccur. These findings are consistent with the second concept of PPD model that described maternal concerns about prenatal and perinatal experiences and subsequent relationships with infants (Holditch-Davis & Miles, 2000). Wereszczak, Miles, and Holditch-Davis (1997) also described prenatal

stressors that included prior infant losses, prior preterm birth, and undesirable labor experiences that included perinatal complications such as edema or preeclampsia.

Research in Malawi has not focused on perceptions of mothers of preterm infants on stress related to the prenatal and perinatal factors. Thus, more research is necessary in order to identify potential areas for counselling mothers.

The third concept of the PPD model includes maternal concerns about the infant illness, treatments, and appearance during hospitalization (Holditch-Davis & Miles, 2000). In this study, this concept was a major issue for mothers of early-preterm and late-preterm infants. Both mothers of early-preterm and late-preterm infants were worried about the size of their infant and the feeding tubes or nasal cannulas placed on the baby. This is consistent with other studies in Malawi that found that mothers of low-birth weight preterm infants (early or late) described their babies as being too small, with breathing difficulties, fragility, and malnourishment (A. Gondwe et al., 2014; Koenraads et al., 2017). In addition, the infant's condition meant a pending hospitalization, which worried the mothers about the infant's outcome. Malawian mothers in the study also felt that infant hospitalization in a critical care unit made it difficult for them to provide care. This is consistent with American studies of early-preterm infants that found that parents felt helpless, were concerned about their infant's health, and were uncertain about their infant's outcome (Miles & Holditch-Davis, 1997). In addition, mothers from developed countries have also reported that they were shocked with their fragile early-preterm

infants' small size (Feeley et al., 2011). Studies of American mothers of late-preterm infants also found that the continued hospitalization of late-preterm infants after the mother has been discharged increased the mother's perception of the severity of the infant's condition (Brandon et al., 2011). Brandon et al. (2011) also found that mothers felt stripped of their parental role.

The sixth concept of health care also brought both negative and positive perceptions. Health care providers were believed to be a source of both negative and positive experiences because their communication/interactions with the parent and the providers including the nonverbal behaviors affected the parent's hospital stay (Docherty et al., 2002; Holditch-Davis & Miles, 2000; Miles & Holditch-Davis, 1997). Malawian mothers in this study described some healthcare workers as being welcoming, kind, and prompt in their interventions. In addition, they provided the mothers in the KMC ward with adequate information about infant care. However, other mothers reported that the healthcare workers at either the referring facility or the referral center were rude and unhelpful to them during delivery. Others stated that after birth in the KMC ward, some healthcare workers would come and laugh at them. Some mothers also said that they failed to approach some healthcare workers whom they perceived as difficult and they mentioned the lack of staffing at night in the KMC ward. This is consistent with previous research findings in Malawi that said mothers described health care workers as often being rude, shouting at mothers, leaving mothers unattended,

providing inadequate information, and rarely providing medications for pain (Kumbani et al., 2013). Zambian mothers also feared delivering at the hospital because the healthcare workers were rude (Sialubanje, Massar, Hamer, Ruitter, & Ruitter, 2015). American mothers have complained the nurses were rough with their infants and that they felt like they have to keep watch to insure their infants were safe (Wereszczak et al., 1997). The Malawian mothers also commented on the physical environment as there were no mosquito nets and this was a concern to them. While not related to the postpartum period, Zambian mothers have expressed barriers to delivering at the hospital relating to the hospital infrastructure as poor state of the labor ward and lack of maternity waiting homes (Sialubanje et al., 2015).

Apart from the six concepts of the PPD, another source of concern mentioned by the mothers of preterm infants was infant care. Mothers with labor or delivery complications such as cesarean section had challenges providing care for the infant in postpartum because of pain. Mothers in all three groups were concerned about establishing breastfeeding. In addition, early- and late-preterm infants were too weak to suckle and, thus, they tired easily on the breast. These findings are consistent with a previous study in Malawi that found that mothers of preterm infants had difficulty establishing breastfeeding and they described their preterm infants as weak and tiring easily during breastfeeding (Koenraads et al., 2017). Mothers of preterm infants who had to feed their infants with cup also felt that their baby did not like cup feeding because

the infants were spitting up milk. Mothers' preference for breastfeeding over cup feeding could have been because they thought the baby could suckle without having to worry about receiving too much milk from the cup, which the infant would be unable to swallow. The infants spitting up milk was also hard for the mothers because expressing enough breast milk was a challenge. Future research could also explore other strategies for feeding babies in low-income countries besides a cup so as to provide more feasible options for the mothers. Healthcare workers also need to continue reinforcing the need to express milk in order to provide adequate feedings and to also help mothers to feed the babies slowly so as to avoid spitting up.

Mothers appreciated KMC and thought that it was a great intervention for preterm infants because it promoted weight gain and growth. Mothers who had twins felt that the responsibility was too much for them alone to provide KMC. Moreover, the mothers were concerned with having to lay on their backs for long hours, which cause discomfort in some of them. This finding was consistent with a study of Tanzanian women who stated that KMC was tiring as they had to sit for long hours without changing positions. As a result, they would take the baby off KMC and put the baby in bed (Kiwanuka, Tarabani, Mbao, & Kisanga, 2017). Tanzanian women, thus, felt they needed support from home to help them with KMC (Kiwanuka et al., 2017). Another study of Malawian women of low-birthweight preterm infants found that the mothers were burdened with infant care as they have to invest more time in infant care than in

other responsibilities (Koenraads et al., 2017). Thus, because the mothers in my study were recovering from the birth, providing continuous KMC was a challenge and the need to sleep in one position made this challenge worse. More social support is thus needed to allow mothers to rest and other caregivers take turns with them in providing KMC. In the future, low-income nations need to obtain more incubators for the neonatal units so mothers are allowed to provide intermittent kangaroo care. This would allow the baby to get the benefits of KMC and mothers who have no one with whom to rotate get to rest occasionally while the baby stays warm. This would also help lessen the emotional stress that the mother is bound to experience when healthcare providers do not focus on her emotional wellbeing as well as the infant's recovery.

I also explored the sources of support in-depth and the mothers' perceptions of the support person. In addition to financial support described above, mothers also reported receiving physical help from their caregiver and also reported emotional support that helped them cope with the preterm delivery and to care for the preterm infant. These findings are consistent with evidence on types of support expected of mothers of hospitalized preterm infants. Mothers stated that receiving material, emotional, and informational support was important (Davis, Logsdon, & Birkmer, 1996). Negron, Martin, Almog, Balbierz, and Howell (2013) also found that mothers of preterm infants need assistance with basic self-care, household chores, infant care, and they were sad if they had no spousal support. Emotional support was also necessary as

mothers said they wanted to talk to someone (Negron et al., 2013). It is important to note that caregivers play a significant role in the Malawi health care system. Considering the shortage of human resources in Malawi, caregivers, often known as guardians in Malawi, play various roles in the hospitals such as assisting with basic needs and medical care (Hoffman et al., 2012). In addition, Malawian families value close family ties and support, which is why mothers in my study might have appreciated family support. Thus, researchers need to consider the mothers' challenges when offering support to the mothers and their infants in order to promote positive support.

Most mothers felt having their own family as caregivers was a preferable to having the paternal family. Some mothers had had preferences on who would be a better caregiver among their own family. Most people preferred someone who they were comfortable with like a mother, whether that person was their biological mother or not. Evidence also shows that women perceived having their mothers for support as either positive or negative (Heh et al., 2004; Lau & Wong, 2008). A Hong Kong study found that most mothers who preferred staying with their biological parents had fewer depressive symptoms and those who stayed with their mother in-laws were dissatisfied with the support given and presented with more depressive symptoms (Heh et al., 2004). This finding is significant because it can guide Malawian healthcare workers in empowering community participation in postpartum care.

One more interesting factor that appeared across the experiences is the mothers' reliance on spiritual sources. Besides the cultural beliefs and value system of different tribes, Malawi is a religious country with Christianity and Islam as major religions. In my study, mothers believed that God would help them get through their challenging experience. The belief in God as a source of support provided hope to the mothers about the outcome of the infant's condition. This finding was also evident among African American and Latino women in the US who believed that prayer and self-reflection were important because God would understand more than men (Negron et al., 2013). South African mothers also expressed that their spiritual connection with God was a source of hope, as mothers described their conversation with God not to take their babies away (Steyn, Poggenpoel, & Myburgh, 2017). Iranian mothers also thought that God gave them patience and also that God would help those who take the initiative to help themselves (Arzani et al., 2015). Healthcare workers in Malawi need to take note of the significance of spiritual support to mothers during postpartum period and allow for opportunity for mothers to access their spiritual support systems.

The findings from this study showed some of the experiences of Malawian mothers were shared with mothers of other nationalities. However, my study was limited because mothers who delivered full-term infants vaginally only stayed in hospital for 24 hours and the short duration of hospital stay did not allow me to capture their immediate postpartum period in-depth. My sample was also not diverse, as the

tribes of the mothers were not representative of all the tribes in Malawi. Thus, my findings might not apply to the perception of mothers from all regions of Malawi. However, this study does add knowledge to the research literature about perinatal experiences after birth for mothers of early-preterm, late-preterm, and full-term infants. Future studies can recruit a more diverse sample and also explore support when the mother is at home.

## **6.5 Conclusion**

The findings from this study showed that mothers of early-preterm, late-preterm, and full-term infants encountered both negative and positive experiences during hospitalization. The study findings supported the PPD model (Holditch-Davis & Miles, 2000) by showing that mothers are concerned with pre-existing and concurrent personal and family factors; prenatal and perinatal experience; infant's illness, treatments, and appearance; concerns about outcome; loss of parental role; and healthcare providers. In addition to the six concepts in the PPD Model, mothers were concerned about their ability to care for their infants (breastfeeding, general care, and provision of KMC). The concept of social support was also embedded in the first concept, as pre-existing and concurrent personal and family factors. However, considering the nature of support needed by Malawian mothers and the extent of the family's role in the Malawi healthcare system, there is need to provide support systems, especially for family who come from locations that are distant from the hospital so that they can be present for the

mothers. Although KMC has many benefits for the infant, requiring mothers to provide this intervention can potentially be a burden. The knowledge gained in this study can provide a foundation for culturally sensitive and effective interventions to improve maternal psychological wellbeing of Malawian mothers and the mother and infant relationship.

## **7. Conclusions and Recommendations**

### ***7.1 Introduction***

This study was a mixed method and three-part investigation that explored emotional responses and mother-infant interactions of mothers of early-preterm, late-preterm, and full-term infants in Malawi and their perceptions of sources of stress and social support during hospitalization. This study was needed because Malawi has the highest preterm birth rate in the world, 18.1 per 100 live births (World Health Organization, 2016), and only limited literature has focused on maternal emotional distress and the mother-infant relationship following a preterm birth in comparison to full-term birth in Malawi and thus providing new information for the development of interventions. My study was, thus, groundbreaking in examining mother-infant interactions in Malawi. It also expanded on the research conducted in developed countries on emotional distress in the perinatal period. The purpose of this chapter is to discuss the findings from the previous chapters in this dissertation, make connections with current literature, suggest future interventions, and suggest future research in Malawi.

As noted in Chapter 1, my study utilized the Preterm Parental Distress Model [PPD model] (Holditch-Davis & Miles, 2000). This model proposes that mother's distress is associated with six major sources: pre-existing and concurrent personal and family factors; prenatal and perinatal experiences; infant's illness, treatments, and appearance;

mother's concerns about the infant outcome; loss of parental role; and communication/interactions with health care providers. Pre-existing and concurrent personal and family factors include issues associated with maternal age, gender, ethnicity, socioeconomic status and financial situation, employment, personal traits, previous experiences with illness and death, family configuration and level of family support (Holditch-Davis & Miles, 2000). Prenatal and perinatal experiences include maternal past obstetrical complications such as infertility and high-risk pregnancies and childbirth, as well as past infant losses (Holditch-Davis & Miles, 2000). Infant's illness, treatments, and appearance during hospitalization, mother's level of concerns about the infant's outcome; and loss of the parental role are depicted as interrelated concepts because the severity of the infant's condition necessitates longer hospitalization and mothers worry about outcome and lose parental role following the admission (Holditch-Davis & Miles, 2000). Communication or interactions with healthcare providers include nonverbal behaviors that positively or negatively affects the parent during the NICU admission (Docherty et al., 2002; Holditch-Davis & Miles, 2000; Miles & Holditch-Davis, 1997).

In order to make the model more culturally sensitive I separated family support from pre-existing and concurrent personal and family factors and depicted it separately because family support is related to all other concepts in the model. In Malawi, family support is a major aspect of the health care system because the family takes the role of

counselors and provides tangible support to mothers during hospitalization including care for the infant. I was also aware that culture would play a major role in the maternal and infant outcomes since it contributes to the beliefs system and practices of the mother. In addition, my modified model provided a basis for exploring how all these factors were related to emotional distress and the mother-infant interactions. In this chapter, I will also discuss the adaptation of the model to the study findings and how we can improve the model so it is cultural sensitive to the Malawian population.

## ***7.2 Selecting the measures for the Malawi population***

Prior to the main research, a pilot study was conducted to validate the translated measures of emotional distress. Literature showed that in Malawi, the Chichewa Self-Reporting Questionnaire (SRQ-20) and the Edinburgh Postnatal Depression Scale (EPDS) were validated for assessment of neurotic symptoms (anxiety and depression) and depressive symptoms respectively (Stewart et al., 2009; Stewart et al., 2013).

However, for this study, I also considered traumatic stress and maternal worry because preterm birth, regardless of gestational age at birth, is a traumatic experience for many mothers (Davies et al., 2008) and having a fragile preterm infant is a source of concern for most mothers (Holditch-Davis & Miles, 2000). I utilized the SRQ-20, Perinatal PTSD Questionnaire, and the Child Health Worry Scale for the emotional distress measures in this study. Specifically, I translated and validated the measures of emotional distress (Perinatal PTSD Questionnaire and Child Health Worry Scale) using the SRQ-20 as a

gold standard for validation of PPQ and CHWS. This was the first study to explore emotional distress variables other than depressive symptoms. However, for accuracy of symptom diagnosis more validation studies are required using the DSM-V or ICD-10 as a gold standard to improve the validity of the instruments. A specific scale for anxiety should also be translated and adapted to the population of Malawi because currently anxiety can only be assessed along with depression in the SRQ-20. Although all the distress measures used in this study were highly correlated, each emotional response may present with unique symptoms that may need to be explored separately. Also, because humans are diverse, identifying the outliers who present differently on different distress measures would help in identifying unique patterns that need further research.

In order to assess mother-infant interactions, I employed observational methods to assess of mother and infant interactive behaviors. I utilized a coding scale developed by Evelyn B. Thoman (Thoman, Denenberg, Sievel, Zeidner, & Becker, 1981) and modified by Diane Holditch-Davis and colleagues (Holditch-Davis, Cox, et al., 2003; Holditch-Davis & Edwards, 1998; Holditch-Davis, Edwards, & Helms, 1998; Holditch-Davis et al., 2004; Holditch-Davis et al., 2007; Holditch-Davis, Tesh, Miles, & Burchinal, 1999) and adapted it for use among mothers from diverse backgrounds in the US population. The challenge was that this coding scale had not been used in the Malawi population, thus, some behaviors, for example kissing and caressing, might not naturally occur among the rural mothers as they are not culturally sensitive. I tried to

incorporate other culturally sensitive behaviors, such as putting thread moistened with mother's saliva on forehead when infant is having a hiccup or touching the child's mouth when they yawn to prevent stretching the lips, that are considered as positive caregiving behaviors in Malawi. While we do not have published literature for Malawi, the belief for managing hiccups are also shared in other Asian communities such as the Philippines (Franklin, 2005). I also had other Malawi healthcare professionals review the coding scale and give feedback on what would be culturally appropriate descriptions of the interactive behaviors. The challenge was that I was the only coder, however, intra-rater reliability was assessed to guarantee that I was consistent with the coding. Future studies could engage more coders to avoid fatigue and also ensure that inter-rater reliability is assessed. More validation of the coding scale is also required and more critique by other experts is needed to make it adapted to more populations.

### ***7.3 The challenge of maternal emotional distress in Malawi***

I assessed emotional distress in mothers of early-preterm, late-preterm, and full-term infants immediately after birth and followed up with mothers of early-preterm and late-preterm infants at 2 weeks and 1 week, respectively. Findings showed that mothers of early-preterm infants and late-preterm infants experienced higher levels of emotional distress than the mothers with full-term infants (Chapter 4). In addition, assessment of the mean differences showed that the mothers with early-preterm infants reported the highest anxiety and depressive symptoms, posttraumatic stress (PTS) symptoms, and

maternal worry, whereas the mothers of late-preterm infants were in the middle, and mothers of full-term infants had the lowest distress symptoms.

Factors associated with mothers having more symptoms of emotional distress in Malawi included birth complications such as cesarean birth. Assessment of the change in emotional distress symptoms in mothers of preterm infants also showed that mothers of early-preterm infants who had interruption of kangaroo mother-care (KMC) experienced an increase in emotional distress symptoms at the follow-up assessment 1-2 weeks later. I speculated that because the interruption of KMC was associated with an increase in the severity of the infant's condition, mothers might have been concerned about poor infant outcomes. The findings from this analysis supported the link between emotional distress and two of the components of the PPD model, prenatal and perinatal experiences and infant's illness, treatments, and appearance (Holditch-Davis & Miles, 2000). Cesarean birth and KMC interruptions were associated with higher emotional distress. The increase in distress symptoms related to cesarean births may have occurred because in the event that cesarean section was due to fetal distress they might have feared infant loss. KMC interruptions were associated with the child's readmission into the critical care section of the neonatal nursery thus signaled severity of infant's condition.

Cesarean sections in this study were higher among mothers of full-term infants (46.4%) than mothers of the early-preterm (3.6%) and late-preterm (27.6%) groups. These

cesarean sections were higher than the national average that is at 6% (National Statistics Office (NSO) [Malawi] & ICF, 2017). It is important to note that Queen Elizabeth Central Hospital is a referral center. Thus, the majority of the mothers admitted are at risk of a complication. However, the findings from this study still showed that mothers of the preterm groups were at greater risk of emotional distress than high risk mothers of full-term infants. The relationships among severity of infant's condition, maternal emotional distress, and mother-infant interactions need further exploration. While KMC interruptions provide a perspective on severity of infant illness, it does not objectively give us the nature of the illness, rather just an indication the infant was sick.

The findings confirm that Malawian mothers are faced with emotional distress whether their infant is full-term or preterm. More intervention studies are needed to address this emotional distress. Considering the shortage of staffing in Malawian hospitals coupled with the overcrowding, healthcare workers miss the opportunity to diagnose and manage postpartum stress symptoms in the early stages. Researchers also need to explore perinatal concerns from antenatal period because some of elevated symptoms seen during the intrapartum period might have already existed in pregnancy.

I also explored the sociodemographic factors that were significantly different among the three groups and these factors had limited effects on emotional distress. Maternal demographic characteristics such as age, education, tribe, and occupation, and infant characteristics such as gender showed no effects on emotional distress. Mothers

and infants of the three groups did not differ on these demographic characteristics. The effect of maternal age might have been more limited in the Malawi study than in studies done in developed countries because of the lack of data from Malawian adolescent mothers. The lack of teenage mothers in this study occurred because I only recruited mothers who were at a legal age to give consent, 18 years and older, and also teenage pregnancy is a unique concept that could come with additional challenges than those with older mothers as the teenagers are still developing. Although there were mothers who were 18-19 years of age in this study, the majority of the mothers were over 21 years. Future studies also need to focus on teenage mothers since some studies have found an association between young maternal age and posttraumatic stress symptoms (Holditch-Davis et al., 2009).

Tribe is another demographic variable that showed no relationship with emotional distress. Culture would be considered as an important variable. It is important to note that the location of the hospital limited the diversity in tribe. The hospital is located in the southern region and the study had little representation of the tribes from the central and northern regions. Future researchers need to explore mothers from different geographical locations in order to explore effects of culture on emotional distress in Malawi.

#### ***7.4 Mother-infant Interactions in Malawi***

I also assessed the mother-infant interactions of mothers with early-preterm, late-preterm, and full-term infants immediately after birth and followed up with the mothers of early-preterm and late-preterm infants at 2 weeks and 1 week, respectively. Findings from this study showed that there were minimal differences in the interactions of mothers with their early-preterm, late-preterm, and full-term infants. All measures of maternal emotional distress also had minimal associations with maternal and infant interactive behaviors. However, severity of infant illness (more days of oxygen therapy) was associated with lower scores on maternal look but more maternal positive behaviors and infants with greater illness severity were less likely to be alert than other infants. KMC also had minimal effects on maternal interactive behaviors and this might be attributed to the routine nature of the intervention that the mother-infant dyad may get accustomed to over time.

Studying the infants' interactive behaviors was challenging as the infants were still young and recovering from the stress of labor. This might have contributed to the lack of responsiveness among the preterm and full-term infants. Studying the infants beyond hospitalization and in an environment with which the mother is familiar would help explore more differences as infant grows. Considering that newborns have limited interactive behaviors, home studies would be the best option for future research as infants would have established more behaviors. Mother-infant interactions promote the social,

emotional, and cognitive development of infants (Harrist & Waugh, 2002). Regardless of these limitations these findings will still groundbreaking research for study mother-infant interactions in Malawi. Evidence also shows that mother-infant interactions promote a positive mother and infant relationship, foster maternal wellbeing and continue throughout childhood (Bystrova et al., 2009). Thus, healthcare workers can use my findings to understand the challenges mothers face with interactions during hospitalization and educate mothers on how they can engage in a fruitful interaction with their infant despite the severity of infant's condition.

### ***7.5 Perceptions of the mothers during hospitalization***

Finally, I explored the hospital experiences of the mothers and their perceptions of caring for their infants whether preterm or full-term. Mothers of early-preterm, late-preterm, and full-term infants were all concerned about the preexisting and concurrent family factors, the prenatal and perinatal experiences, and healthcare workers. However, in addition to these factors, mothers of early-preterm and late-preterm infants were concerned about the infant's illness, treatment, and appearance; the infant's outcome, and the loss of parental role. Social support, a concept initially embedded in pre-existing and concurrent personal and family factors, emerged as a larger concept and a critical source of concern because family members are the major source of social support for the mothers. Infant care emerged as a concern as mothers worried about breastfeeding and provision of KMC. Considering that mothers take the role of main care provider after

the infant is discharged from the critical care unit to the KMC ward, mothers are burdened with the responsibility of caring for their infant in addition to other roles such as basic self-care needs and doing laundry.

Mothers appreciated having someone who could perform the tangible activities when they could not do them, plus assist them with KMC in case of obstetric complications or multiple birth. Spiritual support also emerged as an important concept in social support, as mothers' reliance on God was a source of hope and comfort. In Figure 4, social support has dotted lines to depict that it can potentially influence all the concepts in the model, as mothers at each phase of their perinatal period require different forms of support whether tangible, emotional, financial, or spiritual. The healthcare workers and healthcare system are also concepts that influence all the other concepts in the model as mothers come into constant interaction with healthcare workers throughout pregnancy, birth, and hospitalization.

Figure 2 presents the different concepts that emerged from this analysis based on the PPD model. Considering that the relationships among these concepts are not linear, each concept is bound to influence other concepts directly or indirectly. For example, mothers who had obstetric complications were unable to care for their infants and at the same time having a critically ill infant made some mothers concerned about the infant's outcome. More research is needed to adapt the PPD model to a low-income country with strong cultural beliefs about family and community connections like Malawi. It is

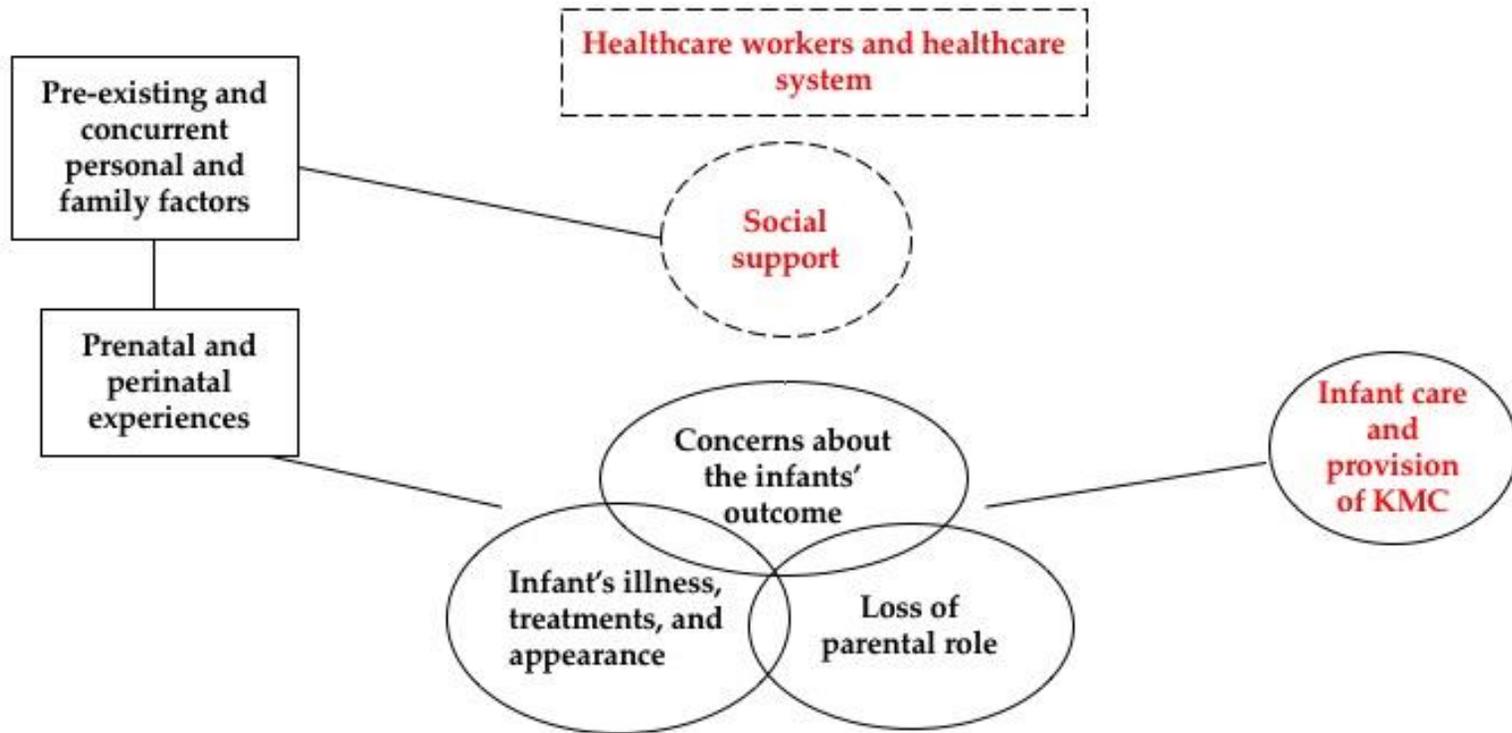


Figure 4: Modified Preterm Parent Distress Model

important to note that Malawi is a diverse society with multiple tribes and varied cultural beliefs and practices regarding pregnancy and childbirth. Thus, creating a culturally sensitive understanding of the sources of perinatal stress is important for management of women from diverse backgrounds. While this model provides a glimpse into the women's major concerns, individualized care is necessary to understand a mother's personal challenges and experiences

### ***7.6 Challenges with this study***

I identified several challenges while conducting this study and one of them was video recording. This study was the first study to utilize video recording as an observational method for studying Malawian mothers in the postpartum period. Considering that this was an unusual method for collecting data in Malawi, several challenges were noted. Privacy was challenging and acquiring a private room consistently for collecting data was difficult. The hospital units were already crowded and space was limited. In addition, screens were either damaged or not available. This made collecting data on some days difficult. In addition, even when a private space was available, the unit staff still needed to access those rooms to collect equipment or other resources, which resulted in interruptions. Some of the rooms also had poor lighting, which made coding of some behaviors hard on some videos. However, I still managed to collect quality data for analysis.

The other factor was environmental distractions because the referral hospital was not an environment familiar to the mothers. The mothers had a hard time adapting to both the change in living environment and to the infant's condition. The study was also done during winter when the room temperature was low. It was not feasible for the mother to remove preterm babies from skin-to-skin contact and avoid hypothermia. Therefore, I targeted the time when the mother was preparing a feeding because mothers usually took their baby down from KMC in order to express milk, feed the infant, and burp. However, this videotaping situation might have affected maternal responsiveness to the infant because the mother might have been distracted by the preparation of the feeding.

Myths and rumors also played a role in the mothers' comfort during the study. Some study participants faced criticisms from other mothers who accused them of joining satanic cults that would initiate their babies. This was a challenge because mothers are culturally viewed as protectors of their infants and the uncertainty of what to believe amidst the rumors made them seek more information on the study. Some mothers who mentioned that they were told that research studies are satanic said that other women in the unit told them that receiving participant incentive is a sign of the mother giving permission for recruitment into the cult. Since other research studies conducted at the same time required collection of blood samples, mothers explained that

they were also told that even though blood samples were not collected in this study, the researchers could magically obtain them.

In addition, mothers were told by other mothers that pictures or videos of your child could be used for black magic. Studies on HIV and AIDS in Malawi have shown that people associate witchcraft with misfortunes, illness, and death (Forster, 1998). This belief is not uncommon in the country. Thus, the mothers who had lost their family members who participated in research studies assumed the death was because of the study. There is also a possibility that researchers have failed to create awareness among the population on the activities and role of each study performed and after family loss, researchers have not paid attention to managing family concerns about the cause of death. These experiences could be why some Malawians believe research studies are cults. This belief resulted in some mothers refusing to join the study and I assume that some mothers who could not be found on follow-up dropped out silently. However, some mothers who were religious continued with the study because they said that they did not believe that God would let the Devil harm them that easily.

Another challenge was conflict with multiple research studies enrolling the same population. The mothers were confused about whether all the studies were one or run by different organizations. Some mothers confused my study with other studies in the units that required collection of blood samples. This resulted in some mothers refusing to participate in the study as they thought that we would trick them into giving a blood

sample even after I explained the studies were different. Other studies also required follow-up at home and some mothers stated that they did not want to be followed up at home because they had heard that study participants who are followed-up at home died afterwards. One mother who had had a child in a study before and blamed that study for the death of her child refused to join this study because she felt research studies were associated with death.

### ***7.7 Recommendations and conclusions***

My study created a background for future research on emotional distress and mother-infant interaction comparing mothers of early-preterm, late-preterm, and full-term infants. While this study recruited mothers of full-term infants who were at risk of birth complications, this study still shows that mothers of early-preterm and late-preterm are at a higher risk of emotional distress than mothers of full-term infants, high- or low-risk. Despite these findings, the challenge in the Malawi healthcare system is that we do not have mechanisms in place to address perinatal distress. Thus, mothers are sent home with elevated distress symptoms without a proper assessment or interventions. Gaps also exist in literature for low-income countries about mother-infants' interactions during hospitalization and in the home. More research is necessary to explore how we can promote mother-infant relationship in the hospital and at home and also to explore culturally sensitive behaviors that need to be taken into consideration. Understanding these challenges would assist researchers in the health

sector to design interventions that promote maternal mental wellbeing and mother and infant relationship.

### **7.7.1 Interventions for perinatal emotional distress**

I propose that healthcare workers assess maternal mental health after traumatic birth experiences and high-risk pregnancy in order to identify risk factors and also for early identification and management of emotional distress. In addition, healthcare workers also need to provide professional postpartum counselling for mothers with emotional distress and also refer mothers who have clinical depression, anxiety, or posttraumatic stress for psychiatric help in order to promote maternal mental wellbeing beyond the postpartum period. Chuffo-Siewert, Cline, and Segre (2015) proposes 'listening visits' as an innovative intervention for managing perinatal depression that should be used as an adjunct therapy to other maternal mental health services. Listening visits is an extension of family centered care and utilizes active reflective listening and collaborative problem solving to facilitate a therapeutic relationship between the mother and provider. Bachelor prepared neonatal nurses can be trained on listening visits intervention (Chuffo-Siewert et al., 2015). The nurses utilize the mothers' strengths to empower her to identify her needs, prioritize them, and identify possible solutions for the identified needs. The listening visits interventions has shown to promote maternal adjustment, reduce anxiety and depression, and mothers reported high satisfaction with the intervention (Segre, Chuffo-Siewert, Brock, & O'Hara, 2013).

While this intervention is innovative, caution must be taken when administering this intervention for Malawian mothers. Malawian mothers usually are discharged early than mothers from developed countries. Children with similar condition and Malawian mothers also are faced with long distance to the hospital. In Malawi, attending to the six sessions of the listening visits intervention would need to be tailored with the routine care at the under-five clinics for mothers attending with their full-term infants and the KMC follow-up visits for mothers coming with their low-birth weight preterm infants. Healthcare workers also need to educate mothers and the community on symptoms of emotional distress in the perinatal period and possible sources of professional support so that they access treatment early. Considering the value of family and community support in Malawi, another intervention for maternal emotional distress would be a community based intervention for perinatal depression.

Studies in Uganda and Rwanda showed that community health workers role in maternal and newborn care are appreciated (Condo et al., 2014; Okuga, Kemigisa, Namutamba, Namazzi, & Waiswa, 2015). In Rwanda, community members are trained to assist new mothers with their mental health problems, utilizing the community resilience and resistance as a support system for the mothers (Hynie et al., 2015). Findings from this study also show that Malawian mothers rely strongly on their community members and family and their spiritual beliefs for social support including mental health concerns. The use of community health workers is already in place in

Malawi and studies on diagnosis of ear, nose, and throat conditions have shown that with proper training the community health workers can identify cases (Mulwafu, Kuper, Viste, & Goplen, 2017). Thus, with proper training on assessment of emotional distress and counselling intervention the community health workers could effectively identify mothers with elevated symptoms and also assist the new mothers with their concerns.

Healthcare providers also need to explore interventions to promote mother and infant relationship. Healthcare workers need could encourage mothers to provide more stimulation to infants, preterm or full-term, early so as to enhance the establishment of a positive mother and infant relationship. Rahman, Iqbal, Roberts, and Husain (2009) trained community health workers to implement an intervention, learning through play, that is intended at promoting parental involvement and attachment through provision of a calendar on five key areas: sense of self, physical, relationships, understanding and communication. The calendar is adapted for people with low literacy and with visual cues to help the mothers know what to do. Group education was offered to mothers and the community health workers followed up the mothers in the home to discuss child development. Their findings showed that mothers in their intervention group had increased knowledge and had a more positive attitude about their infant's development than mothers in their control group. The learning through play intervention would be feasible for Malawi mothers who have high illiteracy rates, with only approximately 26% women and 36% men 15-49 years having at least some secondary education

(National Statistics Office (NSO) [Malawi] & ICF, 2017). This intervention would be feasible for post discharge and community workers and family members would act as a support system.

Another intervention that could be used are the Hospital to Home: Optimizing the Infant's Environment (H-HOPE) and auditory-tactile-visual-vestibular (ATVV) (Holditch-Davis et al., 2014b; White-Traut et al., 2002; White-Traut & Norr, 2009; White-Traut et al., 2013). The ATVV is a maternally administered intervention that involve stimulating an infant through voice followed by a combination of auditory, tactile (moderate stroking or massage), with visual (eye-to-eye) stimulation and vestibular (rocking) introduced when infant is more awake (Burns, Cunningham, White-Traut, Silvestri, & Nelson, 1994). The ATTV intervention has been associated with better home environment. Using the Hospital to Home: Optimizing the Infant's Environment (H-HOPE) intervention that consists of maternal education and social support the researchers taught the mothers the ATTV interventions and followed-up mothers in their home (White-Traut et al., 2013). The intervention showed that mothers in the intervention group had more positive mother-infant interactions than mothers in their control group (White-Traut et al., 2013). This intervention can also be adapted during hospitalization and in the home for Malawi and community health workers can be trained to support mothers with implementations of this intervention.

One significant feature from my study is the role family members play during the hospitalization of mothers and their infants. These caregivers provide the tangible assistance including washing and bathing the mother and the infant and also making sure the mother has access to resources she needs during hospitalization. The healthcare system needs to establish mechanisms to support the family members so that they have the resources necessary for them to be present throughout hospitalization. These include gloves for washing blood-filled sanitary pads and provision of a safe environment to sleep and rest for mothers who have been referred from areas not close to the tertiary hospital. Providing a conducive environment for caregivers would promote people's willingness to be present with their family members during hospitalization.

### **7.7.2 Recommendations for future studies**

- Further modification and validation of Chichewa modified Perinatal posttraumatic stress and Child Health Worry Scale. Considering that there is already a translated and validated measure for depression (Edinburgh Postpartum Depression Scale), there is a need to also translate, adapt, and validate a specific measure for anxiety in the perinatal period. Use of the SRQ 20 makes it impossible to differentiate between anxiety and depression.
- Explore emotional distress and mother-infant interactions in the home environment. Studying emotional distress will help to identify whether the early symptoms of distress continue after birth or if they were latent effects from the

complications in the antenatal period. Studying mother-infant interactions in the home will also help capture more infant behaviors.

- Studies also need to explore caregivers burden during hospitalization in order to explore the concerns that family members have while providing care to the mothers and also if they experience psychological distress during the hospitalization of the mother and the infant. Partner/spousal engagement also need to be explored because while childbirth is a women's issue in Malawi, fathers may still experience psychological distress and also need to engage in father-infant interactions so they also attach with the infant.

## Appendix A

**Table 30: Chichewa Perinatal PTSD Questionnaire**

<p>Chonde sankhani mulingo umene uukufotokozera bwino zomwe mwadutsamo chibelekeleni mwana wanuyu pogwiritsa ntchito m'ndandanda uwu: 0 = Sizinandichitikilepo,          1 = Kamodzi kapena kawiri          2= Nthawi zina          3 = Kangapo koma kochepelela mwezi          4 = Kwambiri, kuposela mwezi</p>					
1. Kodi munakhalapo ndi maloto oipa okhuzana ndi kubeleka kapena kugonekedwa m'chipatala kwa mwana wanuyu?	0	1	2	3	
2. Kodi mumakumbukila zosakusangalatsani zokhudzana ndi kubeleka kapena kugonekedwa m'chipatala kwa mwana wanuyu?	0	1	2	3	
3. Kodi munamvapo m'thupi mwanu zadzidzidzi ngati mukubelekanso mwana wanuyu? (Mwachitsanzo kumamva ngati kuti matenda obeleka ayambanso)	0	1	2	3	
4. Kodi mumapewa kuganiza za kubeleka kapena kugonekedwa m'chipatala kwa mwana wanuyu?	0	1	2	3	
5. Kodi mumapewa kupanga zinthu zimene zimakukumbutsani za kubeleka kapena kugonekedwa m'chipatala kwa mwana wanuyu (Mwachitsanzo, kukhala nawo pa gulu la azimayi omwe akukamba za ana awo kapena kuonera kanema yoonetsa ana)	0	1	2	3	
6. Kodi mumavutika kukumbukila zina mwa zomwe zinachitika mwana wanuyu atagonekedwa m'chipatala?	0	1	2	3	
7. Kodi munakhalapo opanda chidwi kapena kusasangalatsidwa ndi zinthu zomwe kale mumakondwa nazo (monga kusasangalatsidwa ndi ntchito yanu kapena banja lanu)?	0	1	2	3	
8. Kodi mumamva ngati mulibe anzanu kapena ngati mukupatulidwa kwa anthu ena (mwachitsanzo, kumamva ngati anthu sakukumvetsetsani zomwe mukudutsamo)?	0	1	2	3	
9. Kodi chibelekereni munakhalapo ndi vuto kuonetsa chikondi kwa anthu ena (monga amunanu, ana anu, ndi anzanu)?	0	1	2	3	

10. Kodi munakhalapo ndi vuto lokanika kupeza tulo kapena kudzukadzuka pakati pa usiku?	0	1	2	3	
11. Kodi chibelekereni mumakwiya msanga ndi anthu moposera kale?	0	1	2	3	
12. Kodi munavutika kuti muike chidwi pa zinthu zimene mukupanga kuyerekeza ndi m'mene munalili musanabeleke?	0	1	2	3	
13. Kodi mumamva ngati mtima wanuyu siukukhazikika (mwachitsanzo, simuchedwa kututumutsidwa kapena kumadana ndi phokoso)?	0	1	2	3	
14. Kodi munamva chikumbumtima ndi uchemberewu (mwachitsanzo kumva ngati ndinu munapangitsa kuti zonse zisayende mundondomeko yake) koposera m'mene mumayembekezela?	0	1	2	3	

## Appendix B

Table 31: Chichewa Child Health Worry Scale

<p>Tili ndi chidwi ndi muyeso/mulingo wa m'mene mumadandaulila za mavuto a umoyo wa mwana wanu. Sankhani nambala imene ikufanana ndi muyeso wa madandaulo anu pa m'ndandanda uli m'musiwu:</p> <p>1 = Sindimadandaula,                  2= Ndimadandaula pang'ono,                  3 = Ndimadandaula moonjezelako,                  4 = ndimadandaula kwambiri,                  5 = Ndimadandaula mosowetsa mtendere</p>						
No.						
1	Ndimadandaula ngati mwana wanga atakule molingana ndi msinkhu wake	1	2	3	4	5
2	Ndimadandaula za m'mene mwana wanga akulile ndi kuphunzila zinthu zogwirizana ndi msinkhu wake	1	2	3	4	5
3	Ndimadandaula ngati mwana wanga atakhale ndi mavuto a zaumoyo kapena kudwaladwala	1	2	3	4	5
4	Ndimadandaula ngati ndingathe kuzindikila pamene mwana wanga asakupeza bwino	1	2	3	4	5
5	Ndimadandaula ngati mwana wanga akudya mokwanila	1	2	3	4	5
6	Ndimadandaula ngati mwana wanga akugona mokwanila	1	2	3	4	5
7	Ndimada nkhawa kuti mwina mwana wanga akhoza kutisiya	1	2	3	4	5

## Appendix C

Table 32: Correlation between KMC and the change between baseline, baseline, and follow-up in SRQ, PPQ, and CHWS

	Early-preterm			Late-preterm			Combined		
	N	<i>r</i>	<i>p</i>	N	<i>r</i>	<i>p</i>	N	<i>r</i>	<i>p</i>
<i>Correlation with SRQ difference</i>									
SRQ difference	23	0.30	.16	21	0.30	.19	44	0.30	.046
PPQ Difference	23	0.28	.18	21	0.43	.05	44	0.30	.046
CHWS difference	23	0.25	.23	21	0.23	.31	44	0.27	.08
<i>Correlation with follow-up</i>									
SRQ at follow-up	23	0.12	.59	21	0.19	.42	44	0.13	.39
PPQ at follow-up	23	0.11	.62	21	0.12	.61	44	0.11	.50
CHWS at follow-up	23	0.23	.29	21	0.07	.76	44	0.15	.32

SRQ = Self-reporting Questionnaire; PPQ = Perinatal PTSD Questionnaire; CHWS = Child Health Worry Scale; KMC = Kangaroo Mother Care

Note: Merged dataset combine the early-preterm and late-preterm datasets

## Appendix D

Table 33: Regression analysis on the effects of days of KMC on emotional distress at follow-up assessment

	Early-preterm				Late-preterm				Combined data			
	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>
Anxiety and depressive symptoms												
Intercept	2.45	2.13	1.15	.26	-4.53	4.60	-0.98	.34	-0.25	2.27	-0.01	.99
KMC total	0.18	0.34	0.53	.60	0.97	0.82	1.19	.25	0.38	0.31	1.19	.24
Early vs Late	-	-	-	-	-	-	-	-	0.33	1.55	0.21	.83
Baseline	0.01	0.22	0.05	.96	0.54	0.24	2.25	.04*	0.26	0.17	1.59	.12
Posttraumatic stress symptoms												
Intercept	2.18	3.46	0.63	.54	-9.03	7.10	-1.27	.21	-1.50	3.44	-0.44	.66
KMC total	0.34	0.56	0.61	.55	1.81	1.24	1.46	.16	0.63	0.49	1.28	.21
Early vs Late	-	-	-	-	-	-	-	-	0.80	2.38	0.34	.74
Baseline	0.13	0.27	0.48	.64	0.56	0.20	2.82	.01*	0.37	0.16	2.31	.03*
Maternal worry												
Intercept	8.61	4.37	1.97	.06	4.28	5.49	0.78	.45	5.78	3.20	1.80	.08
KMC total	0.46	0.43	1.08	.29	0.46	0.81	0.57	.58	0.47	0.35	1.34	.19
Early vs Late	-	-	-	-	-	-	-	-	1.12	1.74	0.64	.53
Baseline	0.04	0.23	0.15	.88	0.24	0.19	1.29	.21	0.14	0.15	0.93	.36

## Appendix E

Table 34: Regression analysis on the effects of days of KMC on the change in emotional distress from baseline to follow-up

	Early-preterm				Late-preterm				Combined			
	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>
Anxiety and depressive symptoms												
Intercept	2.45	2.13	1.15	.26	-4.53	4.60	-0.98	.34	-0.03	2.27	-0.01	.99
KMC total	0.18	0.34	0.53	.60	0.97	0.82	1.19	.25	0.38	0.32	1.19	.23
Early vs Late	-	-	-	-	-	-	-	-	0.33	1.55	0.21	.83
Baseline	-0.99	0.22	-4.40	.0003	-0.46	0.23	-1.93	.07	-0.74	0.17	-4.43	<.0001
Posttraumatic stress symptoms												
Intercept	2.18	3.46	0.63	.54	-9.03	7.10	-1.27	.21	-1.50	3.44	-0.44	.66
KMC total	0.34	0.56	0.61	.55	1.81	1.24	1.46	.16	0.63	0.49	1.28	.21
Early vs Late	-	-	-	-	-	-	-	-	0.80	2.39	0.34	.74
Baseline	-0.87	0.27	-3.24	.004	-0.44	0.20	-2.18	.04	-0.63	0.16	-3.90	<.001
Maternal worry												
Intercept	8.61	4.37	1.97	.06	4.28	5.49	0.78	.45	5.78	3.20	1.80	.08
KMC total	0.46	0.43	1.08	.29	0.46	0.81	0.57	.58	0.47	0.35	1.34	.19
Early vs Late	-	-	-	-	-	-	-	-	1.12	1.75	0.64	.53
Baseline	-0.96	0.23	-4.13	.001	-0.76	0.19	-4.08	.001	-0.86	0.14	-5.86	<.001

## Appendix F

Table 35: Regression analysis on the effects of days of KMC on emotional distress at follow-up assessment adjusted for covariates

	SRQ				PPQ				CHWS			
	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>	Est	SE	<i>t</i> (43)	<i>p</i>
Intercept	-0.49	4.59	-0.11	.91	-2.64	7.24	-0.36	.72	3.02	5.12	0.59	.56
KMC total	0.24	0.31	0.79	.43	0.43	0.49	0.90	.38	0.30	0.32	0.93	.36
Early vs Late	0.29	1.47	0.19	.85	0.72	2.30	0.31	.76	1.04	1.59	0.65	.52
KMC Interruption	4.87	2.07	2.35	.02*	6.52	3.25	2.00	.05*	6.89	2.24	3.08	.004*
Baseline	0.25	0.16	1.56	.13	0.34	0.16	2.18	.04	0.17	0.13	1.29	.20

Note: Est = Estimate; SE = standard error; SRQ = Self-reporting Questionnaire; PPQ = Perinatal PTSD questionnaire; CHWS = Child Health Worry Scale; KMC = Kangaroo Mother Care

## Appendix G

### Codes and Definitions of Behaviors Scored During Videotapes at Birth to 2 weeks

#### Code

#### Behaviors

*Mother Location*--Score one, and only one, of the location codes in each epoch

- N        *Mother Near*--The mother is positioned so that interaction with the child is possible, i. e. so that the child can see his mother but is not being held.
- H        *Mother Hold without Body Contact* --The primary caregiver is holding or carrying the child, but the trunk is not in contact with any part of the mother's body (such as baby suspended in air or sitting up on mother's lap).
- W        *Hold with Body Contact*--An infant is positioned so that his trunk is in direct contact with the mother or a child, old enough to locomote, is positioned so that his trunk is in physical contact with any part of the caregiver's body for the majority of the epoch. For example, an infant is being held on the mother's shoulder, or an older child is wrapped around the mother's legs. Do not also score this contact as a touch.
- O        *Out of Camera Range*--The primary caregiver is out of camera range but probably positioned so that the child could see her.

- # *Mother Gone*—The primary caregiver is out of camera range and probably positioned out of the child's sight
- 4 *Mother not holding baby but there is Body contact* – Mothers is positioned so that there is body contact with the child but not holding i.e breastfeeding with the baby's weight held by a pillow next to Mom or a child laying on mother's lap with no support from the mother.
- I *Kangaroo hold*: mother holding baby in skin-to-skin contact in a kangaroo hold
- \ *Unscorable behavior*—Videotaping techniques makes scoring this epoch questionable.

**Caregiving**--Score whenever they occur.

- F *Feed*--The infant is being fed by breast, bottle, gavage or gastrostomy tube, or spoon. Score only the time the caregiver is actually giving the nipple to the child, offering a spoonful to the child, or giving a tube feeding including tube insertion. Do not score burping time. For continuous feedings, only the time the tube is manipulated by a caregiver is included. (For other feeding types, the entire time that the infant is receiving formula is

scored even if the caregiver hangs the feeding or props the bottle.)

C *Change/Bathe/Care*--The infant is being changed or bathed or cared for. Wiping off infant hands and face is scored in this category. Touches associated with changing or bathing are not scored additionally as touches. Emptying ostomy bags would be scored as Change/Bathe. Also score this on other care wrapping baby and traditional management of hiccup by putting a thread on baby's forehead and closing mouth when baby is yawning

P *Pacifier*--The caregiver gives a pacifier to the infant or uses a finger as a pacifier. Scored only while the caregiver touching the pacifier. Even if the infant retains the pacifier after the adult lets go, it is not scored. (If a finger is used primarily as a pacifier, it is scored as pacifier. If used to elicit sucking, then suck stimulate is scored.) – this code can be skipped as it may not be used because of baby friendly clinic principles to promote exclusive breastfeeding

***Mother Look Behaviors***--Score every epoch in which they occur. Do not score Mother Look in the same epoch as vis-a-vis.

L *Mother Look*--The person specified in the location codes looks at the child's face if near or the child's body if further away.

V *Vis-a-vis with Mother*--The person specified in the location codes and the child look at each other and have eye-to-eye contact. Looks are assumed and should not be coded.

***Mother Moves***--Score whenever they occur.

M *Move*--The caregiver is changing the position of the infant's body in space.

R *Rock*--The caregiver moves the infant rhythmically (at least 3 repetitions), includes rocking, jiggling, and bouncing.

***Mother Talk Behaviors***--Score every epoch in which they occur. Only score one level of affect for caregiver in each epoch.

K *Mother Talk*--The primary caregiver or the person specified in the location coded talks to the child. Cannot be used in same epoch with Mother Praise or Mother Scold.

S *Mother Scold*--The primary caregiver or the person specified in the location coded talks to the child in a way that is negative in tone or content. Includes scolding, criticizing, warning. Cannot be used in same epoch with Mother Praise or Mother Talk. [*to combine with Negative Gesture*]

D *Mother Praise*--The primary caregiver or the person specified in the location codes talks to the child in a way that is positive in tone or content. Cannot be used in same epoch as Mother Talk. [*to combine with positive Gesture*]

Y *Teach*--The mother explains, models, demonstrates, provides a label, or questions the child with the purpose of teaching a concept, principle, or fact.

*Mother Gestures*--Score in every epoch in which they occur. Score only one level of affect for caregiver in each epoch.

A *Mother Neutral Gesture*--The person specified in the location codes makes a neutral gesture or facial expression to the child, such as showing or taking a toy. Cannot be used in the same epoch as Mother Smile.

X *Mother Negative Gesture*--The primary caregiver or the person specified in the location codes makes a negative gesture or facial expression to the infant, such as shaking his head. Cannot be used in the same epoch as Mother Smile.

U *Mother Smile*--The primary caregiver or person specified in the location codes makes a positive gesture or facial expression to the child such as

smiling or laughing. Cannot be used in the same epoch as  
Mother Negative Gesture.

***Touch Behaviors***--Score every epoch in which they occur. Only score one level of affect in each epoch for caregiver and child.

- T *Mother Touch*--The person specified in the location codes touches the child, such as pats and caresses. Do not use in the same epoch with Mother Hit.
- + *Mother Positive Touch*--The person specified in the location codes touches the child, such as hugs and kisses. Do not use in the same epoch with Mother Hit.
- *Mother Negative Touch*--The caregiver touches the child in a rough or negative way but is not physically punishing the child. (Do not score with Positive Touch, Touch, or Hit.)

***Play Behaviors*** - Score the following play behaviors in every epoch in which they occur.

- e *Mouthe Self*--Infant mouthes or sucks a part of his or her body.
- b *Mouthe Object*--Infant mouthes or sucks an object. Score in addition to play code. Does not includes pacifier, mother's hand, or bottle during feeding.

Score only one of the following play codes in each epoch. Score the one showing the highest play involvement. Listed from lowest to highest play involvement.

- o *Look at Object*--The infant fixates on a specific object. Score only if it is the predominant play behavior for the 10-second epoch
- @ *Play with Self*--The child is playing but not with object or game. Includes locomotor play, dancing, bouncing, and playing with a body part.
- B *Play with Object*--The child is playing with an object but not playing with any person. Must be more than mouthing the object. Score only when child is actively using the object--more than merely holding. Includes play on equipment, such as swing or balance beam.
- G *Play with Mother*--The mother plays a game with the infant. The important discriminator is that the shared activity must be playful or fun. It may or may not involve an object. For young infants, score whether or not the infant responds to the mothers' activities. For 18 month olds, score only if the infant responds. Also score all behaviors involved, such a vis-a-vis and gesture with an imitating game.

*Sleep-Wake States*--Score one state in every epoch

- 5        *Alert*--            The infant's eyes are open and scanning. Motor activity is typically low, particularly during the first two weeks, but the infant may be active.
- 3        *Non-Alert Waking Activity*--The infant's eyes are usually open, dull, and unfocussed. Motor activity varies but is typically high. During periods of high-level activity, the eyes may close.
- 2        *Drowsiness or daze*--The infant's eyes are "heavy-lidded," opening and closing slowly, or open but dazed in appearance. The level of motor activity is typically low, and respiration fairly even.
- 1        *Sleep-Wake Transition*--The infant shows behaviors of both wakefulness and sleep. There is generalized motor activity, and although the eyes are typically closed, there may be a rapid opening and closing of the eyes. Brief fussy vocalizations may occur. (Generally, 4 epochs of continuous activity without

REMs in the middle of sleep are scored sleep-wake transition.)

0        *Sleep-- active sleep* =The infant's eyes are closed. Respiration is uneven and primarily costal in nature. Sporadic motor movements occur, but muscle tone is low between these movements. REMs occur intermittently in this state. OR *Quiet Sleep--* The infant's eyes are closed, and respiration is relatively slow and is abdominal in nature. A tonic level of motor tone is maintained, and motor activity is limited to occasional startles, sigh sobs, or other brief discharges. Periods of sleep that show mixed signs of active and quiet sleep are recorded as quiet sleep if they are definitely transitional into or out of quiet sleep otherwise they are recorded as active sleep.

/        *Questionable State*—Videotaping techniques makes scoring state in this epoch questionable.

***Motor Activity*** - Score in addition to sleep-wake states

s        *Startle/Jerk--*A sudden infant movement involving at least one whole extremity but may involve the entire body, as in a Moro reflex. A sudden

infant movement involving at least one whole extremity but may involve the entire body, as in a Moro reflex. Do not also score small move. If the startle is the size of a large move, also score large move.

- j *Jitter*--A rhythmic infant twitch of at least three cycles, may involve as little as part of an extremity or as much as the whole body. A rhythmic infant twitch of at least three cycles, may involve as little as part of an extremity or as much as the whole body. If the jitter is also the size of a small or large move also score the behavior.

***Other infant behaviors***--Score when they occur.

- p *Spit Up*--The infant drools or regurgitates.
- k *Clearing*--The infant gags, coughs, or sneezes.
- h *Hiccup*--The infant hiccups.
- y *Yawn*--The infant yawns.

***Child Look Behaviors***--Score every epoch in which they occur.

- n *Child Look*--The child looks at the adult specified in the location codes. When close, the child's attention is on the caregiver's head or face. When far, the child's attention is on the caregiver.

*Child Talk Behaviors*--Score every epoch in which they occur. Only score one level of affect for child in each epoch. Both talk and vocalize behaviors may be scored in the same epoch but only one of each. Only one level of affect can occur in each epoch (e.g., Cry can't be scored with Child Positive Talk); neutral variables can be scored with affect variables (e.g., Cry with Child Talk) if they represent clearly different vocalizations.

Note: child talk behaviors may be directed to anyone.

[ *Child Vocalize*--The child makes a neutral sound or grunt but does not say any words.

Do not code in same epoch as any other child talk behaviors. Drinking and swallowing sounds are not scored as vocalize. Do not score with Cry or Squeal.

c *Cry/fuss*--The child is crying or fussing. Must be more than 2 brief fusses. Do not use in same epoch with Child Vocalize, Squeal, or Child Positive Talk. *Fuss*--The infant is fussing and emits at least three brief fuss sounds during the epoch. The infant is usually active, and the eyes are usually open. *Cry*--The infant is crying wholeheartedly. The infant is usually active. The eyes are usually closed but may open.

*Child Gestures*--Score in every epoch in which they occur. Score only one level of affect for child in each epoch. (Gestures to inanimate objects and animals are ignored unless

responded to by the caregiver in which case they should be scored as though they were addressed to that individual.) Gestures with clear affect, such as smiles or frowns, should be scored unless they are clearly directed towards an inanimate object or animal.

**g** *Child Negative Gesture*--The child makes a negative gesture, such as shaking his head, to the person specified in the location codes. Includes frowns or cry faces without sound. Do not use in the same epoch as Child Smile.

**u** *Child Smile*--The child smiles or laughs to the person specified in the location codes. Do not also score Child Negative Gesture or Child Positive Gesture.

***Child Touch Behaviors***--Score every epoch in which they occur. Only score one level of affect in each epoch for child.

**t** *Child Touch*--The child touches the person specified in the location code. Do not use in same epoch with Child Hit.

## Appendix H

Table 36: Linear regression analysis for effects of maternal kangaroo mother on interactive behaviors at follow-up and the change from baseline to follow-up

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Change in mother look</b>												
Intercept	34.25	14.04	2.44	.02	-0.27	26.80	-1.03	.32	24.82	10.52	2.36	.02
Early vs Late	-	-	-	-	-	-	-	-	-20.03	10.96	-1.83	.08
Days of KMC	0.86	2.50	0.34	.73	5.40	4.83	1.12	.27	1.12	2.12	0.53	.60
KMC interruption	-30.38	24.88	-1.22	.23	18.71	17.00	1.10	.29	-1.91	14.84	-0.13	.90
Baseline assessment	-0.62	0.27	-2.27	.03	-0.31	0.20	-1.57	.13	-0.45	0.16	-2.68	.01
<b>Mother look at follow-up assessment</b>												
Intercept	34.25	14.04	2.44	.02	-0.27	26.80	-1.03	.32	24.82	10.52	2.36	.02
Early vs Late	-	-	-	-	-	-	-	-	-20.03	10.96	-1.83	.08
Days of KMC	0.86	2.50	0.34	.73	5.40	4.83	1.12	.27	1.12	2.12	0.53	.60
KMC interruption	-30.38	24.88	-1.22	.23	18.71	17.00	1.10	.29	-1.91	14.84	-0.13	.90
Baseline assessment	0.37	0.28	1.36	.19	0.69	0.19	3.55	.003	0.54	0.16	3.27	.002
<b>Change in mother feed</b>												
Intercept	10.72	6.95	1.54	.13	8.64	14.39	0.60	.56	9.15	5.32	1.72	.09
Early vs Late	-	-	-	-	-	-	-	-	-2.83	6.73	-0.42	.68
Days of KMC	-0.77	1.75	-0.44	.67	-1.69	2.71	-0.62	.54	-1.02	1.33	-0.77	.45
KMC interruption	-6.25	17.54	-0.36	.73	-0.19	9.47	-0.02	.98	-2.5	9.31	-0.27	0.78
Baseline assessment	-1.29	0.61	-2.13	0.04	-0.74	0.13	-5.60	<.0001	-0.80	0.16	-5.02	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Mother feed at follow-up assessment</b>												
Intercept	10.72	6.95	1.54	.13	8.64	14.39	0.60	.56	<b>Est</b>	<b>SE</b>	<b><i>t</i>(1)</b>	<b><i>p</i></b>
Early vs Late	-	-	-	-	-	-	-	-	9.15	5.32	1.72	.09
Days of KMC	-0.77	1.75	-0.44	.67	-1.69	2.71	-0.62	.54	-2.83	6.73	-0.42	.68
KMC interruption	-6.25	17.54	-0.36	.73	-0.19	9.47	-0.02	.98	-1.02	1.33	-0.77	.45
Baseline assessment	-0.29	0.61	-0.48	.64	0.25	0.13	1.88	.08	0.19	0.16	1.24	.22
<b>Change in mother rocks</b>												
Intercept	2.30	1.13	2.04	.06	1.36	1.34	1.01	.32	2.19	0.79	2.74	.01
Early vs Late	-	-	-	-	-	-	-	-	-0.47	0.97	-0.48	.63
Days of KMC	-0.22	0.29	-0.76	.46	-0.16	0.25	-0.63	.54	-0.20	0.20	-1.04	.31
KMC interruption	0.34	2.90	0.12	.91	-0.67	0.82	-0.82	.42	-0.28	1.36	-0.21	.84
Baseline assessment	-1.05	0.09	-11.04	<.0001	-0.98	0.03	-32.20	<.0001	-1.01	0.04	-21.60	<.0001
<b>Mother rock at follow-up assessment</b>												
Intercept	2.30	1.13	2.04	.06	1.36	1.34	1.01	.32	2.19	0.79	2.74	.01
Early vs Late	-	-	-	-	-	-	-	-	-0.47	0.97	-0.48	.63
Days of KMC	-0.22	0.29	-0.76	.46	-0.16	0.25	-0.63	.54	-0.20	0.20	-1.04	.31
KMC interruption	0.34	2.90	0.12	.91	-0.67	0.82	-0.82	.42	-0.28	1.36	-0.21	.84
Baseline assessment	-0.05	0.09	-0.55	.59	0.02	0.03	0.72	.48	-0.01	0.05	-0.24	.81

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Change in mother moves</b>												
Intercept	1.23	0.44	2.82	.01	1.11	0.80	1.39	.18	1.28	0.30	4.18	.0002
Early vs Late	-	-	-	-	-	-	-	-	-0.07	0.38	-0.19	.85
Days of KMC	-0.18	0.10	-1.75	.10	-0.14	0.15	-0.88	.39	-0.16	0.08	-2.16	.04*
KMC interruption	0.47	1.00	0.47	.65	-0.36	0.55	-0.65	.52	-0.03	0.53	-0.05	.96
Baseline assessment	-0.97	0.25	-3.93	.001	-1.01	0.07	-15.10	<.0001	-1.01	0.08	-13.12	<.0001
<b>Mother moves at follow-up assessment</b>												
Intercept	1.23	0.44	2.82	.01	1.11	0.80	1.39	.18	1.28	0.30	4.18	.0002
Early vs Late	-	-	-	-	-	-	-	-	-0.07	0.38	-0.19	.85
Days of KMC	-0.18	0.10	-1.75	.10	-0.14	0.15	-0.88	.39	-0.16	0.08	-2.16	.04*
KMC interruption	0.47	1.00	0.47	.65	-0.36	0.55	-0.65	.52	-0.03	0.53	-0.05	.96
Baseline assessment	0.03	0.24	0.13	.90	-0.01	0.07	-0.13	.89	-0.01	0.08	-0.15	.88
<b>Change in mother touch</b>												
Intercept	5.04	2.15	2.35	.03	5.03	3.01	1.67	.11	5.09	1.57	3.24	.003
Early vs Late	-	-	-	-	-	-	-	-	1.24	2.00	0.62	.53
Days of KMC	-0.82	0.74	-1.11	.28	-0.66	0.56	-1.17	0.25	-0.93	0.42	-2.21	.03*
KMC interruption	2.70	5.96	0.45	.66	-1.90	1.93	-0.99	.34	-0.40	2.74	-0.15	.88
Baseline assessment	-0.82	0.18	-4.48	.0003	-0.71	0.05	-13.69	<.0001	-0.71	0.07	-10.22	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Mother touch at follow-up assessment</b>												
Intercept	5.04	2.15	2.35	.03	5.03	3.01	1.67	.11	5.09	1.57	3.24	.003
Early vs Late	-	-	-	-	-	-	-	-	1.24	2.00	0.62	.53
Days of KMC	-0.82	0.74	-1.11	.28	-0.66	0.56	-1.17	0.25	-0.93	0.42	-2.21	.03*
KMC interruption	2.70	5.96	0.45	.66	-1.90	1.93	-0.99	.34	-0.40	2.74	-0.15	.88
Baseline assessment	0.18	0.18	1.00	.33	0.28	0.05	5.52	<.0001	0.26	0.07	3.55	.001
<b>Change in mother talk</b>												
Intercept	1.02	0.37	2.78	.01	0.43	0.90	0.48	0.63	0.95	0.33	2.91	.01
Early vs Late	-	-	-	-	-	-	-	-	0.46	0.40	1.16	.25
Days of KMC	-0.21	0.09	-2.25	.04*	-0.04	0.17	-0.26	.80	-0.20	0.08	-2.54	.02*
KMC interruption	-0.41	0.09	-0.42	.68	0.08	0.59	0.14	.89	-0.23	0.55	-0.42	.68
Baseline assessment	-0.32	0.15	-2.15	.04	1.72	0.85	2.02	.06	-0.30	0.13	-2.26	.03
<b>Mother talk at follow-up assessment</b>												
Intercept	1.02	0.37	2.78	.01	0.43	0.90	0.48	0.63	0.95	0.33	2.91	.01
Early vs Late	-	-	-	-	-	-	-	-	0.46	0.40	1.16	.25
Days of KMC	-0.21	0.09	-2.25	.04*	-0.04	0.17	-0.26	.80	-0.20	0.08	-2.54	.02*
KMC interruption	-0.41	0.09	-0.42	.68	0.08	0.59	0.14	.89	-0.23	0.55	-0.42	.68
Baseline assessment	0.68	0.15	4.48	.0003	2.72	0.85	3.19	.01	0.69	0.13	5.25	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Change in mother care behaviors</b>												
Intercept	2.81	1.03	2.71	.01	3.67	1.37	2.67	.02	2.89	0.69	4.21	.0001
Early vs Late	-	-	-	-	-	-	-	-	-0.45	0.88	-0.52	.60
Days of KMC	-0.19	0.25	-0.77	.45	-0.52	0.27	-1.90	.07	-0.25	0.17	-1.46	.15
KMC interruption	-1.91	2.50	-0.76	.45	-0.88	0.96	-0.92	.37	-1.28	1.23	-1.04	.31
Baseline assessment	-0.98	0.32	-3.04	.01	-0.96	0.04	-26.41	<.0001	-0.97	0.06	-16.75	<.0001
<b>Mother care at follow-up assessment</b>												
Intercept	2.81	1.03	2.71	.01	3.67	1.37	2.67	.02	2.89	0.69	4.21	.0001
Early vs Late	-	-	-	-	-	-	-	-	-0.45	0.88	-0.52	.60
Days of KMC	-0.19	0.25	-0.77	.45	-0.52	0.27	-1.90	.07	-0.25	0.17	-1.46	.15
KMC interruption	-1.91	2.50	-0.76	.45	-0.88	0.96	-0.92	.37	-1.28	1.23	-1.04	.31
Baseline assessment	0.02	0.32	0.07	.94	0.04	0.04	1.05	.31	0.03	0.06	0.59	.56
<b>Change in body contact</b>												
Intercept	0.72	0.11	6.66	<.0001	0.51	0.23	2.22	.04	0.71	0.08	8.40	<.0001
Early vs Late	-	-	-	-	-	-	-	-	-0.04	0.07	-0.64	.53
Days of KMC	0.02	0.02	1.03	.31	0.05	0.04	1.34	.20	0.02	0.01	1.44	.16
KMC interruption	0.08	0.15	0.53	.60	0.14	0.13	1.06	.30	0.12	0.10	1.19	.24
Baseline assessment	-0.76	0.10	-7.31	<.0001	0.76	0.11	-7.09	<.0001	-0.77	0.07	-10.65	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
<b>Body contact at follow-up assessment</b>												
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
Intercept	0.72	0.11	6.66	<.0001	0.51	0.23	2.22	.04	0.71	0.08	8.40	<.0001
Early vs Late	-	-	-	-	-	-	-	-	-0.04	0.07	-0.64	.53
Days of KMC	0.02	0.02	1.03	.31	0.05	0.04	1.34	.20	0.02	0.01	1.44	.16
KMC interruption	0.08	0.15	0.53	.60	0.14	0.13	1.06	.30	0.12	0.10	1.19	.24
Baseline assessment	0.23	0.10	2.30	.03	0.24	0.11	2.20	.04	0.23	0.07	3.18	.003
<b>Change in maternal positive behavior</b>												
Intercept	0.59	0.27	2.18	.04	0.92	0.99	0.94	.36	0.61	0.28	2.15	.04
Early vs Late	-	-	-	-	-	-	-	-	-0.08	0.07	-1.28	.21
Days of KMC	-0.09	0.07	-1.41	.18	-0.12	0.19	-0.63	.53	0.10	0.32	0.33	.74
KMC interruption	0.51	0.65	0.78	.44	-0.47	0.67	-0.71	.49	-0.07	0.45	-0.15	.89
Baseline assessment	-0.51	0.15	-3.43	.003	-0.30	0.56	-0.54	.59	-0.49	0.15	-3.20	.003
<b>Maternal positive behavior at follow-up assessment</b>												
Intercept	0.59	0.27	2.18	.04	0.92	0.99	0.94	.36	0.61	0.28	2.15	.04
Early vs Late	-	-	-	-	-	-	-	-	-0.08	0.07	-1.28	.21
Days of KMC	-0.09	0.07	-1.41	.18	-0.12	0.19	-0.63	.53	0.10	0.32	0.33	.74
KMC interruption	0.51	0.65	0.78	.44	-0.47	0.67	-0.71	.49	-0.07	0.45	-0.15	.89
Baseline assessment	0.49	0.15	3.29	.004	0.70	0.56	1.24	.23	0.50	0.15	3.27	.002

table continued...

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Change in vis-à-vis</b>												
Intercept	1.04	0.64	1.63	.11	-	-	-	-	0.97	0.43	2.26	.03
Early vs Late	-	-	-	-	-	-	-	-	-0.37	0.51	-0.72	.47
Days of KMC	-0.13	0.17	-0.78	.45	-	-	-	-	-0.11	0.10	-1.07	.29
KMC interruption	-0.40	1.65	-0.24	.81	-	-	-	-	-0.13	0.73	-0.18	.85
Baseline assessment	-1.15	0.33	-3.46	.003	-	-	-	-	-1.13	0.23	-4.93	<.0001
<b>Vis-à-vis at follow-up</b>												
Intercept	1.04	0.64	1.63	.11	-	-	-	-	0.97	0.43	2.26	.03
Early vs Late	-	-	-	-	-	-	-	-	-0.37	0.51	-0.72	.47
Days of KMC	-0.13	0.17	-0.78	.45	-	-	-	-	-0.11	0.10	-1.07	.29
KMC interruption	-0.40	1.65	-0.24	.81	-	-	-	-	-0.13	0.73	-0.18	.85
Baseline assessment	-0.15	0.33	-0.46	.65	-	-	-	-	-0.13	0.23	-0.58	.56
<b>Change in child negative behaviors</b>												
Intercept	1.72	0.79	2.19	.04	9.46	5.40	1.75	.10	2.38	1.2	1.86	.07
Early vs Late	-	-	-	-	-	-	-	-	1.43	1.48	0.97	.33
Days of KMC	-0.02	0.19	-0.13	.90	-1.25	1.04	-1.20	.25	-0.19	0.30	-0.66	.51
KMC interruption	-1.46	2.10	-0.69	.50	-1.91	3.61	-0.53	.60	-1.61	2.16	-0.74	.46
Baseline assessment	-1.01	0.11	-8.82	<.0001	-1.16	0.33	-3.50	.003	-1.07	0.15	-7.06	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Child negative behavior at follow-up assessment</b>												
Intercept	1.72	0.79	2.19	.04	9.46	5.40	1.75	.10	2.38	1.2	1.86	.07
Early vs Late	-	-	-	-	-	-	-	-	1.43	1.48	0.97	.33
Days of KMC	-0.02	0.19	-0.13	.90	-1.25	1.04	-1.20	.25	-0.19	0.30	-0.66	.51
KMC interruption	-1.46	2.10	-0.69	.50	-1.91	3.61	-0.53	.60	-1.61	2.16	-0.74	.46
Baseline assessment	-0.01	0.11	-0.12	.91	-0.16	0.33	-0.47	.64	-0.67	0.15	-0.44	.66
<b>Change in child gestures</b>												
Intercept	2.23	0.85	2.62	.02	9.73	5.56	1.75	.10	2.84	1.32	2.15	.04
Early vs Late	-	-	-	-	-	-	-	-	1.60	1.53	1.04	.30
Days of KMC	-0.08	0.20	-0.37	.71	-1.23	1.08	-1.14	.27	-0.23	0.31	-0.76	.45
KMC interruption	-1.32	2.26	-0.58	.57	-2.17	3.76	-0.58	.57	-1.76	2.26	-0.78	.44
Baseline assessment	-1.09	0.12	-8.50	<.0001	-1.15	0.33	-3.45	.003	-1.09	0.16	-7.02	<.0001
<b>Child gesture at follow-up assessment</b>												
Intercept	2.23	0.85	2.62	.02	9.73	5.56	1.75	.10	2.84	1.32	2.15	.04
Early vs Late	-	-	-	-	-	-	-	-	1.60	1.53	1.04	.30
Days of KMC	-0.08	0.20	-0.37	.71	-1.23	1.08	-1.14	.27	-0.23	0.31	-0.76	.45
KMC interruption	-1.32	2.26	-0.58	.57	-2.17	3.76	-0.58	.57	-1.76	2.26	-0.78	.44
Baseline assessment	-0.05	0.12	-0.40	.70	-0.15	0.33	-0.45	.66	-0.09	0.15	-0.58	.56

table continued...

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Change in child sleep</b>												
Intercept	101.90	28.14	3.62	.002	81.65	20.75	3.93	.001	92.06	16.6	5.53	<.0001
Early vs Late	-	-	-	-	-	-	-	-	3.20	6.93	0.46	.65
Days of KMC	0.83	2.02	0.41	.68	3.48	2.53	1.38	.19	1.54	1.38	1.12	.27
KMC interruption	9.12	18.66	0.49	.63	4.06	10.29	0.40	.70	5.61	9.97	0.56	.58
Baseline assessment	-1.21	0.30	-4.08	.001	-1.07	0.20	-5.26	<.0001	-1.11	0.17	-6.38	<.0001
<b>Child sleep at follow-up assessment</b>												
Intercept	101.90	28.14	3.62	.002	81.65	20.75	3.93	.001	92.06	16.6	5.53	<.0001
Early vs Late	-	-	-	-	-	-	-	-	3.20	6.93	0.46	.65
Days of KMC	0.83	2.02	0.41	.68	3.48	2.53	1.38	.19	1.54	1.38	1.12	.27
KMC interruption	9.12	18.66	0.49	.63	4.06	10.29	0.40	.70	5.61	9.97	0.56	.58
Baseline assessment	-0.21	0.30	-0.71	.49	-0.07	0.20	-0.34	.74	-0.11	0.17	-0.65	.52
<b>Change in sleep-wake transition</b>												
Intercept	9.46	2.87	3.30	.004	19.90	12.05	1.65	.12	9.80	3.35	2.92	.01
Early vs Late	-	-	-	-	-	-	-	-	0.76	3.78	0.20	.84
Days of KMC	-0.38	0.65	-0.59	.56	-2.76	2.34	-1.18	.25	-0.73	0.74	-0.98	.33
KMC interruption	-5.42	6.42	-0.84	.41	-4.99	8.25	-0.60	.55	-5.63	5.11	-1.10	.28
Baseline assessment	-1.22	0.21	-5.69	<.0001	-0.93	0.55	-1.71	.11	-1.15	0.23	-5.00	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Sleep-wake transition at follow-up</b>												
Intercept	9.46	2.87	3.30	.004	19.90	12.05	1.65	.12	9.80	3.35	2.92	.01
Early vs Late	-	-	-	-	-	-	-	-	0.76	3.78	0.20	.84
Days of KMC	-0.38	0.65	-0.59	.56	-2.76	2.34	-1.18	.25	-0.73	0.74	-0.98	.33
KMC interruption	-5.42	6.42	-0.84	.41	-4.99	8.25	-0.60	.55	-5.63	5.11	-1.10	.28
Baseline assessment	-0.22	0.21	-1.04	.31	0.07	0.55	0.12	.90	0.01	0.23	-0.65	.52
<b>Change in child drowsiness</b>												
Intercept	7.91	3.98	1.99	.06	4.21	3.94	1.07	.30	7.71	2.80	2.76	.01
Early vs Late	-	-	-	-	-	-	-	-	-2.86	3.47	-0.82	.41
Days of KMC	-0.51	1.12	-0.46	.65	-0.64	0.76	-0.84	.41	-0.70	0.71	-0.99	.33
KMC interruption	-5.06	10.69	-0.47	.64	-0.06	3.32	-0.02	.99	-1.30	5.07	-0.26	.80
Baseline assessment	-1.14	0.25	-4.67	.0002	-1.03	0.09	-11.03	<.0001	-1.07	0.12	-8.35	<.0001
<b>Child drowsiness at follow-up assessment</b>												
Intercept	7.91	3.98	1.99	.06	4.21	3.94	1.07	.30	7.71	2.80	2.76	.01
Early vs Late	-	-	-	-	-	-	-	-	-2.86	3.47	-0.82	.41
Days of KMC	-0.51	1.12	-0.46	.65	-0.64	0.76	-0.84	.41	-0.70	0.71	-0.99	.33
KMC interruption	-5.06	10.69	-0.47	.64	-0.06	3.32	-0.02	.99	-1.30	5.07	-0.26	.80
Baseline assessment	-0.15	0.25	-0.60	.56	-0.03	0.09	-0.33	.74	-0.07	0.13	-0.56	.58

table continued...

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Change in child non-alert</b>												
Intercept	1.99	1.51	1.32	.20	-	-	-	-	1.87	1.01	1.85	.07
Early vs Late	-	-	-	-	-	-	-	-	-0.78	1.41	-0.55	.58
Days of KMC	-0.25	0.47	-0.53	.60	-	-	-	-	-0.21	0.30	-0.70	.49
KMC interruption	-0.76	3.97	-0.19	.85	-	-	-	-	-0.29	1.75	-0.17	.87
Baseline assessment	-0.99	0.47	-2.10	.05	-	-	-	-	-1.02	0.32	-3.24	.003
<b>Non-alert at follow-up</b>												
Intercept	1.99	1.51	1.32	.20	-	-	-	-	1.87	1.01	1.85	.07
Early vs Late	-	-	-	-	-	-	-	-	-0.78	1.41	-0.55	.58
Days of KMC	-0.25	0.47	-0.53	.60	-	-	-	-	-0.21	0.30	-0.70	.49
KMC interruption	-0.76	3.97	-0.19	.85	-	-	-	-	-0.29	1.75	-0.17	.87
Baseline assessment	0.01	0.47	0.02	.98	-	-	-	-	-0.03	0.31	-0.08	.93
<b>Change in child look</b>												
Intercept	1.82	1.14	1.60	.13	-	-	-	-	1.68	0.75	2.22	.03
Early vs Late	-	-	-	-	-	-	-	-	-0.19	0.19	-1.04	.30
Days of KMC	-0.22	0.30	-0.76	.46	-	-	-	-	-0.64	0.92	-0.70	.49
KMC interruption	-0.69	2.93	-0.24	.82	-	-	-	-	-0.22	1.34	-0.17	.87
Baseline assessment	-1.07	0.32	-3.38	.003	-	-	-	-	-1.02	0.19	-5.29	<.0001

*table continued...*

Table 36: Continued

	Early-preterm				Late-preterm				Merged			
	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>	Est	SE	<i>t</i> (1)	<i>p</i>
<b>Child look at follow-up assessment</b>												
Intercept	1.82	1.14	1.60	.13	-	-	-	-	1.68	0.75	2.22	.03
Early vs Late	-	-	-	-	-	-	-	-	-0.19	0.19	-1.04	.30
Days of KMC	-0.22	0.30	-0.76	.46	-	-	-	-	-0.64	0.92	-0.70	.49
KMC interruption	-0.69	2.93	-0.24	.82	-	-	-	-	-0.22	1.34	-0.17	.87
Baseline assessment	-0.07	0.32	-0.22	.83	-	-	-	-	-0.02	0.19	-0.12	.90
<b>Change in child vocalization</b>												
Intercept	2.23	0.86	2.58	.02	19.08	11.86	1.61	.13	3.05	2.54	1.20	.24
Early vs Late	-	-	-	-	-	-	-	-	4.91	3.35	1.46	.15
Days of KMC	0.04	0.26	0.15	.88	-3.04	2.34	-1.30	.21	-0.55	0.71	-0.78	.43
KMC interruption	-1.86	2.30	-0.81	.43	-7.32	8.22	-0.89	.39	-3.88	4.46	-0.87	.39
Baseline assessment	-1.06	0.06	-17.26	<.0001	-0.42	0.50	-0.85	.41	-0.91	0.16	-5.53	<.0001
<b>Child vocalization at follow-up assessment</b>												
Intercept	2.23	0.86	2.58	.02	19.08	11.86	1.61	.13	3.05	2.54	1.20	.24
Early vs Late	-	-	-	-	-	-	-	-	4.91	3.35	1.46	.15
Days of KMC	0.04	0.26	0.15	.88	-3.04	2.34	-1.30	.21	-0.55	0.71	-0.78	.43
KMC interruption	-1.86	2.30	-0.81	.43	-7.32	8.22	-0.89	.39	-3.88	4.46	-0.87	.39
Baseline assessment	-0.06	0.06	-0.93	.37	0.57	0.50	1.14	.27	0.09	0.16	0.54	.59

Note: Est = estimate; SE = standard error; *t* = *t* value; *p* = *p* value; \* = *p* < .05; KMC = Kangaroo mother Care

Child alert omitted because it showed no variance among the subjects

- - = variable eliminated from model or no variation in infant group

## Appendix I

Table 37: Chichewa Interview Guide – Mothers with Full-term Infants

<p>1. Tandiuzeni za uchembere wanu ndi momwe munakhalira ndi mwana wanu mu chipatala.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino:</i></p> <ol style="list-style-type: none"><li>Uchembere wanu mungaufotokoze ngati wovutirapo? Chifukwa chiyani?</li><li>Mukuona ngati chinapangitsa kuti mubereke mwana wosakhwima ndi chani?</li><li>Nanga a chipatala anakuthandizani bwanji?</li><li>Munmva bwanji mutangomuona mwana wanu?</li><li>Chomwe chinakuvutani kwambiri pauchembere umenewu chinali chani?</li><li>Kodi zomwe munadutsamo pauchembere wina zinakhudzana bwanji ndi kuchembeza kwa mwana wanu wosakwana masikuyu?</li></ol> <p>2. Ndiuzeni za moyo wanu.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ol style="list-style-type: none"><li>Mumamva bwanji za uchembere?</li><li>Chiyembekezo chanu chokhala ndi pakati, kubereka ndipo mukabereka chinali chotani?</li><li>Kodi muli ndi ana ena? Ngati eya, mumamva bwanji za kuchra kwanu kwa ana enawo ndi kukhala mayi.</li></ol> <p>3. Ndiuzeni zambiri za mwana wanuyi atabadwa.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ol style="list-style-type: none"><li>Munamva bwanji?</li><li>Munava bwanji zokhala ndi mwana wanu mu kachipinda kosungiramo ana a nthete?</li><li>Ndi ziti zomwe munazona zovuta kwambiri?</li><li>Munamva bwanji kukulekanitsani ndi mwana wanu atangobadwa?</li><li>Munamva bwanji atadzakupatsirani mwana wanu koyamba kuchoka mu chipinda chayekha?</li></ol> <p>4. Tandiuzeni za kayamwitsidwe ka mwana wanu.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ol style="list-style-type: none"><li>Mwana wanu mumamuyamwitsa kangati?</li><li>Mumamva bwanji ndi kayamwitsidwe kotere?</li></ol> <p>5. Ndi mathandizo anji omwe munalandira pochila komanso kusamala mwana wanu pa nthawi yomwe munali mu chipatala?</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ol style="list-style-type: none"><li>Anakuthandizani ndani nthawi imeneyi?</li></ol>
--

- Achipatala
  - Amuna anu
  - A ku tchalitchi
  - Oyang'anira za umoyo a mmidzi
  - Anzanu
- b. Thandizo limeneli linali lofunika bwanji
  - c. Ndi thandizo lanji munalandira mutabereka lomwe linakuthandizani kwambiri
  - d. Ndi ziti zomwe mumalalaka anthu sakanakuchitirani munthawi imeneyi?
  - e. Muli ndi maganizo ena omwe angathandize kutukula chisamaliro cha amayi omwe ali ndi ana a nthete?
6. Mungamulangize bwanji mayi mzanu amene angakhale ndi mwana ngati wanuyu?
  7. Chilipo china chomwe mungafune kuonjezela chomwe sitinakambirane chokhudza izi?
  8. Munamva bwanji kutenga nawo mbali pakafukufuka ameneyu?  
*Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino*
- a. Ndiuzeni zambiri za izi
  - b. Mungandipatse zitsanzo
  - c. Mukamati .....mukufuna kutanthauza chani?

## Appendix J

Table 38: Chichewa Interview Guide – Mothers with Preterm Infant

1.	<p>Tandiuzeni za uchembere wanu ndi momwe munakhalira ndi mwana wanu mu chipatala.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino:</i></p> <ul style="list-style-type: none"><li>a. Uchembere wanu mungaufotokoze ngati wovutirapo? Chifukwa chiyani?</li><li>b. Mukuona ngati chinapangitsa kuti mubereke mwana wosakhwima ndi chani?</li><li>c. Nanga a chipatala anakuthandizani bwanji?</li><li>d. Munmva bwanji mutangomuona mwana wanu?</li><li>e. Chomwe chinakuvutani kwambiri pauchembere umenewu chinali chani?</li><li>f. Kodi zomwe munadutsamo pauchembere wina zinakhudzana bwanji ndi kuchembeza kwa mwana wanu wosakwana masikuyu?</li></ul>
2.	<p>Ndiuzeni za moyo wanu.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ul style="list-style-type: none"><li>a. Mumamva bwanji za uchembere?</li><li>b. Chiyembekezo chanu chokhala ndi pakati, kubereka ndipo mukabereka chinali chotani?</li><li>c. Kodi muli ndi ana ena? Ngati eya, mumamva bwanji za kuchra kwanu kwa ana enawo ndi kukhala mayi.</li></ul>
3.	<p>Ndiuzeni zambiri za mwana wanuyi atabadwa.</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ul style="list-style-type: none"><li>a. Munamva bwanji?</li><li>b. Munava bwanji zokhala ndi mwana wanu mu kachipinda kosungiramo ana a nthete?</li><li>c. Ndi ziti zomwe munazona zovuta kwambiri?</li><li>d. Munamva bwanji kukulekanitsani ndi mwana wanu atangobadwa?</li><li>e. Munamva bwanji atadzakupatsirani mwana wanu koyamba kuchoka mu chipinda chayekha?</li></ul>
4.	<p>Ndiuzeni zambiri za njira ya kuchifundisi [Kangaroo]. (dumphani kwa ana amene sanapite kuchifundisi)</p> <p><i>Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino</i></p> <ul style="list-style-type: none"><li>a. Mumamva bwanji kunyamula mwana wanu munjira ya kuchifundisi (kangaroo)?</li><li>b. Kodi kuutengapo mbali pa chisamaliro cha kangaroo kwakukhudzani bwanji?</li></ul>

- c. Ndizovuta zANJI zomwe mwakumanapo nazo ndi njira ya kuchifundisi (kangaroo)?
- d. Ndi chinthandizo chANJI chowonjezera chomwe mungafune kuti njira ya kuchifundisi (kangaroo) yikupindulireni ndipo ikhale yosavuta kwa inu.
5. Tandiuzeni za kayamwitsidwe ka mwana wanu.  
*Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino*
- a. a. Mwana wanu mumamuyamwitsa kangati?  
b. Mumamva bwanji ndi kayamwitsidwe kotere?
6. Ndi mathandizo anji omwe munalandira pochila komanso kusamala mwana wanu pa nthawi yomwe munali mu chipatala?  
*Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino*
- a. Anakuthandizani ndani nthawi imeneyi?
  - Achipatala
  - Amuna anu
  - A ku tchalitchi
  - Oyang'anira za umoyo a mmidzi
  - Anzanu
- b. Thandizo limeneli linali lofunika bwanji
- c. Ndi thandizo lanji munalandira mutabereka lomwe linakuthandizani kwambiri
- d. Ndi ziti zomwe mumalalaka anthu sakanakuchitirani munthawi imeneyi?
- e. Muli ndi maganizo ena omwe angathandize kutukula chisamaliro cha amayi omwe ali ndi ana a nthete?
7. Mungamulangize bwanji mayi mzanu amene angakhale ndi mwana ngati wanuyu?
8. Chilipo china chomwe mungafune kuonjezela chomwe sitinakambirane chokhudza izi?
9. Munamva bwanji kutenga nawo mbali pakafukufuka ameneyu?  
*Zomwe mungafunse ngati mayi sanafotokoze zomveka bwino*
- a. Ndiuzeni zambiri za izi
- b. Mungandipatse zitsanzo
- c. Mukamati .....mukufuna kutanthauza chani?

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## Biography

Kaboni Whitney Gondwe was born on October 11, 1983 in Blantyre, Malawi. She completed a Bachelor of Science in Nursing with distinction at University of Malawi, Kamuzu College of Nursing from 2002 to 2006. During the same period, she had an opportunity to complete a certificate in Minor Global Nursing from Amsterdam University of Applied Sciences, Hogeschool Van Amsterdam. In 2008, she pursued a 12-month midwifery program at University of Malawi, Kamuzu College of nursing and obtained a University Certificate in Midwifery with distinction. She obtained Masters in Nursing Education and Nursing Administration from Ohio University, Athens, Ohio USA in 2012. In 2013, she enrolled in the PhD in Nursing program at Duke University School of Nursing and completed in Spring 2018. She is a Fulbright Junior Development Program Scholarship Alumni for her Masters program and a Global Aids Interfaith Alliance Scholarship Alumni for her undergraduate program. She has received awards for her exceptional performance in nursing and midwifery at University for Malawi Kamuzu College of Nursing. She is currently a member of Sigma Theta Tau International and Southern Nurses Research Society.

She has 4 publications:

**Gondwe, K.W. & Holditch-Davis, D. (2015).** Posttraumatic stress symptoms in mothers of preterm infants. *International Journal of African Nursing Sciences*, 3, 8-17. doi: 10.1016/j.ijans.2015.05.002

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