KNOWLEDGE AND COUNSELLING PRACTICES OF HEALTHCARE WORKERS RELATED TO HIV AND INFANT FEEDING IN ETHEKWINI

by

KATE ABBY NUNS

Bachelor of Science in Dietetics (UKZN)

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ABSTRACT

Introduction: Breastfeeding is recognised globally as the single most effective child survival strategy for children under the age of five years. It is associated with much health, cognitive and economic benefits. Thus, the World Health Organization (WHO) recommends exclusive breastfeeding for infants for the first six months of life, followed by the introduction of appropriate complementary foods with continued breastfeeding until two years of age. This recommendation has been adopted and included in the South Africa Infant and Young Child Feeding (IYCF) policy for all mothers, including those living with human immunodeficiency virus (HIV). Although breastfeeding does carry a small risk of HIV transmission, the benefits of breastfeeding far outweigh this risk. With the South African Prevention of Mother-to-Child Transmission of HIV (PMTCT) programme now including the use of maternal antiretroviral therapy (ART), mother-to-child transmission rates have been successfully reduced. However, what has not improved successfully is the rate of breastfeeding in the country, despite recommendations in the IYCF policy.

Poor IYCF counselling is a problem in South Africa and is thought to be one of the reasons for the country's poor breastfeeding rates. Healthcare workers are responsible for counselling mothers on IYCF practices. While it is very important to update HIV and IYCF guidelines based on new evidence, on-going changes to these guidelines can be confusing and overwhelming for healthcare workers. It can result in inappropriate IYCF counselling and in turn inappropriate IYCF practices by mothers. Mothers living with HIV require accurate and consistent information to make informed feeding decisions. Whether healthcare workers in eThekwini, KwaZulu-Natal (KZN) are knowledgeable and up-to-date with IYCF recommendations in the context of HIV is not known.

Aim: To assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at eThekwini, KZN regional state hospital antiretroviral (ARV), paediatric and antenatal departments, regarding IYCF in the context of HIV.

Objectives: (i) To determine the knowledge of healthcare workers on IYCF in the context of HIV in eThekwini, KZN. (ii) To determine if healthcare workers have attended formal training on IYCF in the context of HIV in eThekwini, KZN. (iii) To determine if healthcare workers feel they require training on IYCF in the context of HIV in eThekwini, KZN. (iv) To determine if antiretroviral (ARV) clinics, antenatal departments and paediatric

departments all have a role in IYCF counselling of mothers living with HIV in eThekwini, KZN. (v) To determine the level of confidence that healthcare workers have regarding counselling mothers on IYCF in the context of HIV in eThekwini, KZN.

Method: A self-administered questionnaire was developed for this study based on IYCF recommendations included in the National Department of Health South Africa (NDoH) 2013 IYCF policy, the 2017 amendment of the IYCF policy and the 2015 National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults. The questionnaire was administered to 188 healthcare workers, primarily doctors and nurses, working in ARV, antenatal and paediatric departments from three regional hospitals (Addington Hospital, Prince Mshiyeni Memorial Hospital and RK Khan Hospital) in eThekwini, South Africa.

Results: The participants in all three departments were not knowledgeable on IYCF in the context of HIV with a mean knowledge score of 51.7% (SD±14.1) for the overall group. The knowledge scores did not differ significantly across departments. Only 47.3% (n=89) of the participants had attended formal training on IYCF in the context of HIV. The vast majority of participants (n=171; 91.4%) felt they required more training. All three departments were found to have a role in IYCF counselling of mothers living with HIV, with antenatal departments counselling pregnant women living with HIV more frequently than ARV and paediatric departments. Overall, the group indicated an above average confidence score regarding the IYCF counselling of mothers living with HIV. Attendance of the training did not equate to improved knowledge scores.

Conclusion: This study aimed to assess the knowledge and counselling practices of healthcare workers regarding IYCF in the context of HIV. It was found that healthcare workers across all three departments were not knowledgeable on IYCF in the context of HIV. Less than half of the healthcare workers in the study had attended formal training on IYCF in the context of HIV. The majority of healthcare workers felt they required more training on the topic. The ARV, paediatric and antenatal departments at the three hospitals were all found to be involved in IYCF counselling of mothers living with HIV. Overall, the healthcare workers were confident about counselling mothers living with HIV on IYCF. The findings from this study highlight an urgent need for effective and on-going training of healthcare workers on IYCF in the context of HIV, in order to improve knowledge and to

ensure that counselling practices of healthcare workers are in line with the national policies and guidelines that exist.

PREFACE

This dissertation was written between July 2017 and November 2019, under the supervision of Dr Kirthee Pillay, using data collected in 2018 from three regional hospitals (Addington Hospital, Prince Mshiyeni Memorial Hospital and RK Khan Hospital) in eThekwini, KwaZulu-Natal.

Signed: _____ Date: 21 November 2019

Kate Abby Nuns (Candidate)

As supervisor of the candidate, I agree to the submission of this dissertation.

Signed: _____ Date: 21 November 2019

Dr Kirthee Pillay (Supervisor)

DECLARATION OF ORIGINALITY

I, Kate Abby Nuns, hereby declare that:

i. The research reported in this thesis, except where otherwise stated, is my original research.

ii. This dissertation, or any part of it, has not been submitted for any degree or examination at any other university.

iii. Where other sources have been used for information, they have been properly acknowledged in the dissertation and detailed in the reference section.

iv. This dissertation does not contain other person's data, pictures, graphs or other information unless specifically acknowledged as being sourced from that person and detailed in the reference section.

Signed: _____ Date: 21 November 2019

Kate Abby Nuns (candidate)

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- Tai (son): My dear Tai Noodle! Thanks for always checking that I'm doing my homework and keeping on track with this project. I love you so much.

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CHAPTER 1: INTRODUCTION, THE PROBLEM AND IT'S SETTING

This chapter outlines the importance of the study, the aims and objectives of the study, the study hypotheses, the study parameters and assumptions. It also provides definitions of terms related to the study, a list of abbreviations used, an outline of the dissertation and the referencing style used.

1.1 Importance of the study

Breastfeeding is recognised globally as the single most effective child survival strategy for children under the age of five years. Breastfed infants tend to be healthier than formula fed infants, with lower rates of pneumonia, diarrhoeal disease, malnutrition and overall mortality [World Health Organization (WHO) 2016a]. The WHO strongly recommends exclusive breastfeeding for the first six months of life, followed by appropriate complementary feeding with continued breastfeeding for up to two years or beyond (WHO 2016a). Exclusive breastfeeding during the first six months of life is associated with optimal growth and development and good health. At six months of age appropriate complementary foods are required to meet the nutritional requirements of the infant, however, breast milk continues to play an important role in the diet until two years of age, providing valuable nutrients, antibodies and other immunological factors (WHO 2010; WHO 2019a).

Although breastfeeding provides many nutritional and immunological benefits to all infants, the safety of breastfeeding in the context of the human immunodeficiency virus (HIV) has been under the spotlight for many years (WHO 2016a). Breastfeeding is one of three modes by which a mother living with HIV may transmit the virus to her infant (the other two ways include *in utero* and during delivery) (WHO 2019a). The first published report of HIV being transmitted through breastfeeding was released in 1985. A previously healthy woman experienced severe blood loss during birth and received a blood transfusion after delivery. One unit of the blood she received was from a male infected with HIV. The baby experienced failure to thrive and persistent atopic eczema after three weeks of breastfeeding and was later confirmed to be infected with the virus (Ziegler, Cooper, Johnson & Gold 1985). Since then a lot of attention has been given to infant and young child feeding (IYCF) practices of mothers living with HIV (WHO 2007; WHO 2010; WHO 2016a). The WHO released their first HIV and IYCF guideline in 2002 (WHO 2007).

South Africa is a country heavily burdened by the HIV epidemic [The Joint United Nations Programme on HIV/AIDS (UNAIDS) (2016)]. It has the largest antiretroviral therapy **(**ART) programme in the world and is one of many countries that have implemented its own contextualised Prevention of Mother-to-Child Transmission of HIV (PMTCT) programme, based on the WHO recommendations [UNAIDS 2016; National Department of Health South Africa (NDoH) 2015]. Since the implementation of the first national PMTCT programme in 2004, South Africa has revised the programme and improved its coverage, strengthening it significantly. The revisions made to the programme have been made in line with the most recent recommendations from the WHO, who have updated their recommendations a number of times to incorporate new evidence as it becomes available (NDoH 2008; NDoH 2010; NDoH 2013; NDoH 2015; NDoH 2017; WHO 2010; WHO 2016a). This strengthening of the programme has led to the mother-to-child transmission rates decreasing in South Africa by 84%, between 2009 (12.5%) and 2015 (2.0%) (UNAIDS 2016).

The major changes made to the WHO recommendations, and consequently to the South African PMTCT programme, include changes in ART regimes and changes in IYCF recommendations (NDoH 2008; NDoH 2010; NDoH 2013; NDoH 2015; NDoH 2017). For example, in 2003 the WHO HIV and IYCF guideline at the time stated that 'breastfeeding is associated with a significant additional risk of HIV transmission from a mother to child compared to non-breastfeeding' and recommended that when acceptable, feasible, affordable, sustainable and safe (referred to as the AFASS criteria), mothers should give their infants formula (WHO 2003a). This guideline also recommended in circumstances where mothers were not able to replacement feed that they should exclusively breastfeed their infant during the first months of life, but abruptly stopping breastfeeding as soon as able to successfully provide their infants with formula (WHO 2003a). The NDoH adopted this recommendation in 2008, either providing mothers living with HIV with free infant formula for the first six months (thereafter mothers were responsible for procuring their own formula) or alternatively, providing mothers who chose to breastfeed their infants for the first six months of life, with free infant formula for the next six months of life (NDoH 2008).

In 2010, the WHO released a new PMTCT guideline that, for the first time, recommended routine ART provision during lactation (either to the mother or daily prophylaxis to the infant) (WHO 2010). This recommendation followed strong evidence that ART use in the postnatal period can significantly reduce the change of HIV transmission through

breastfeeding (WHO 2010). In conjunction with this recommendation, the WHO revised their IYCF guideline, including a recommendation for mothers living with HIV to exclusively breastfeed their infants for the first six months of life and to continue breastfeeding until one year of age (WHO 2010). The NDoH adopted this recommendation in 2010 and changed their PMTCT guidelines and IYCF recommendations accordingly. (NDoH 2010). The South African PMTCT programme now no longer included the provision of free infant formula, instead supporting exclusive breastfeeding as the ideal infant feeding practice for the first six months of life, with continued breastfeeding until one year of age, accompanied by ART during the lactation period [either with a mother being on lifelong ART or with an infant receiving Nevirapine (NVP) daily from birth, up until one week after breastfeeding cessation] (WHO 2010; NDoH 2010). In 2013, the NDoH released an IYCF policy, which reiterated this feeding recommendation for mothers living with HIV (NDoH 2013).

The current South African National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults, was first implemented in 2015. These guidelines included the immediate initiation of lifelong ART for all women living with HIV who are pregnant or breastfeeding, regardless of their T-lymphocyte cell bearing cluster of differentiation 4 receptor (CD4) count and the provision of NVP to all HIV exposed infants (formula fed and breastfed) for the first six weeks after birth. The guideline still encouraged breastfeeding until one year of age (NDoH 2015).

A year later, the WHO released an update on their HIV and IYCF guideline (WHO 2016a). The update recommended six months of exclusive breastfeeding but this time with continued breastfeeding until two years of age or longer (WHO 2016a). The rationale behind this change included the many health and economic benefits associated with prolonged breastfeeding and the efficacy of ARV drugs at reducing the risk of transmission through breast milk (Mallampati, MacLean & Ciaranello 2015). South Africa adopted this recommendation and amended their IYCF policy to recommend breastfeeding until two years of age, with a strong focus on ART adherence (NDoH 2017; WHO 2016a).

While it is very important to update HIV and IYCF guidelines based on new evidence, on-going changes has the potential to create confusion and become overwhelming for healthcare workers (Shayo, Våga, Moland, Kamuzora & Blystad 2014; Rujumba, Tumwine, Tylleskär,

Neema & Heggenhougen 2012). Several African studies have found that healthcare workers have poor knowledge regarding IYCF guidelines in the context of HIV (Van Rensburg 2013; Adetokunboh & Oluwasanu 2016; Murila, Obimbo, Musoke, Tsikhutsu, Migiro & Ogeng'o 2015; Sint, Lovich, Hammond, Kim, Melillo, Lu, Ching, Marcy, Rollins, Koumans, Heap, Brewinski-Isaacs & The Child Survival Working Group of the Interagency Task Team on the Prevention and Treatment of HIV infection in Pregnant Women, Mothers and Children 2013). This is of concern as mothers living with HIV require clear, up-to-date and consistent messages and support with regards to IYCF (West, Schwartz, Yende, Schwartz, Parmley, Gadarowski, Mutunga, Bassett & Van Rie 2019).

Out of the 672 457 people living with HIV in eThekwini, KwaZulu-Natal (KZN), in 2014, over 23 000 were pregnant women who gave birth at state facilities. In the same year, the exclusive breastfeeding rate was only 36.4% in this district (Department of Health KZN 2015). Healthcare workers in other KZN districts have been found to provide feeding advice to mothers living with HIV that is not supportive of breastfeeding (Jama, Wilford, Masango, Haskins, Coutsoudis, Spies & Horwood 2017). It is not known whether healthcare workers in this KZN district are knowledgeable and up-to-date with South Africa's HIV and IYCF guidelines. Therefore, this study aimed to assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at eThekwini, KZN regional state hospital antiretroviral (ARV), paediatric and antenatal departments, regarding IYCF in the context of HIV.

1.2 Aim of the study

The aim of the study was to assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at eThekwini, KZN regional state hospital ARV, paediatric and antenatal departments, regarding IYCF in the context of HIV.

1.3 Study objectives

1.3.1 To determine the knowledge of healthcare workers on IYCF in the context of HIV in eThekwini.

1.3.2 To determine the demographic characteristics of healthcare workers employed at eThekwini, KZN regional state hospital ARV, paediatric and antenatal departments.

1.3.3 To determine if healthcare workers in eThekwini have attended formal training on IYCF in the context of HIV.

1.3.4 To determine if healthcare workers in eThekwini feel they require training on IYCF in the context of HIV.

1.3.5 To determine if ARV, antenatal and paediatric departments in eThekwini hospitals, all have a role in IYCF counselling of mothers living with HIV.

1.3.6 To determine the level of confidence that healthcare workers in eThekwini have regarding counselling mothers on IYCF in the context of HIV.

1.4 Hypotheses

The following hypotheses were tested in the study:

1.4.1 Healthcare workers have a poor knowledge regarding IYCF in the context of HIV.

1.4.2 Not all relevant healthcare workers have attended formal training on IYCF in the context of HIV.

1.4.3 Healthcare workers would see a need for more training on IYCF in the context of HIV.

1.4.4 Paediatric, antenatal and ARV departments all have a role in the IYCF counselling of mothers living with HIV. Healthcare workers in antenatal departments counsel pregnant women living with HIV on IYCF practices more often compared to healthcare workers in ARV and paediatric departments.

1.4.5 Healthcare workers have low levels of confidence when counselling mothers living with HIV on IYCF practices, with healthcare workers in ARV clinics displaying lower levels of confidence than healthcare workers in antenatal and paediatric departments do.

1.5 Study parameters

1.5.1 Only medical officers, medical registrars, medical consultants, enrolled nurses and professional nurses permanently employed by the Department of Health, KZN and working in ARV, paediatric and antenatal departments at Addington Hospital, Prince Mshiyeni Memorial Hospital and RK Khan Hospital, were eligible to participate in

this study. Doctors working in the Department of Obstetrics and Gynaecology and the Department of Medicine were also included as they were sometimes allocated to work in the ARV departments.

1.5.2 Other permanently employed healthcare workers that worked in the relevant departments and had a role in IYCF, were also included.

1.5.3 Staff not employed by the Department of Health, KZN (such as those employed by non-government organisations), were excluded.

1.5.4 Non-permanent staff employed by the Department of Health KZN, including (but not limited to): intern doctors, community service healthcare workers and student nurses, were excluded.

1.5.5 Dietitians were excluded from the study, as the researcher personally knew the dietitians working at all three sites and this might have introduced bias.

1.6 Assumptions

It was assumed that all participants answered the questionnaire honestly and did not look up the answers or consult with each other while answering the questionnaire. It was assumed that all participants understood English, which was the language used in the questionnaire.

1.7 Definitions of terms

Acceptable, Feasible Affordable, Sustainable and Safe (AFASS) criteria: Specific conditions specified as affordable, feasible, acceptable, sustainable and safe, needed for replacement feeding (NDoH 2013).

Antiretroviral therapy (ART): The use of a combination of three or more ARV drugs for treating HIV infection (WHO 2016a).

Antiretroviral (ARV) drug: The medicine used to treat HIV infection (WHO 2016a).

Auxiliary nurse: A person educated to provide elementary nursing care in the manner and to the level prescribed (South African Nursing Council 2005).

Child: A person 10 years of age and younger (NDoH 2015).

Complementary feeding: The stage when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are fed, along with breast milk (WHO 2019b).

District hospital: A hospital offering specialised services. Patients must be referred to such a facility for treatment (Department of Health KZN 2001).

Enrolled nurse: A person educated to practise basic nursing in the manner and to the level prescribed (South African Nursing Council 2005). Also referred to as a staff nurse.

Exclusive breastfeeding: Providing breast milk without any liquids or solids, not even water, except for oral rehydration solution or drops or syrups of vitamins, minerals or medicines (WHO 2016a).

Formula: Commercially available breast milk substitute (WHO 2016a).

Healthcare worker: Anyone who renders health care, including doctors, nurses and counsellors (NDoH 2015).

Highly active antiretroviral therapy (HAART): Describes the use of a triple combination of ART to treat advanced HIV disease: Stavudine (d4T) + Lamivudine (3TC) + Nevirapine (NVP) (NDoH 2008).

HIV-exposed infant or child: An infant or child born to a mother living with HIV until the infant or child is reliably excluded from being HIV infected (WHO 2010).

HIV-free survival: An infant or young child born to a mother living with HIV that remains both HIV uninfected (confirmed negative HIV status) and also alive over a defined follow-up period. It is commonly reported at 18 months or 24 months of age (WHO 2016a).

Human immunodeficiency virus (HIV): The human immunodeficiency virus (HIV) infects cells of the immune system, destroying or impairing their function. Infection with the virus results in progressive deterioration of the immune system, leading to "immune deficiency." The immune system is considered deficient when it can no longer fulfil its role of fighting infection and disease (WHO 2019c).

Infant: A child younger than one year of age (NDoH 2015).

Infant and young child feeding counselling: The process by which a healthcare worker can support mothers and babies to implement good feeding practices and help them overcome difficulties. Details of IYCF counselling depend on the child's age and the mother's circumstances (WHO 2009).

Knowledge: Understanding and skill in applying information to promote, maintain, and restore health (Smeltzer, Bare, Hinkle & Cheever 2008, p46).

Medical officer: A health professional who has obtained a Bachelor of Medicine and Bachelor of Surgery or equivalent qualification and who is employed to render a clinical service. In South Africa, all medical officers must have a current registration with the Health Professions Council of South Africa (HPCSA) (HPCSA 2010).

Mixed feeding: Giving an infant younger than six months of age other liquids and/or foods, together with breast milk. This could be water, other types of milk or any type of solid food (WHO 2016a).

Mother-to-child transmission: Refers to mother-to-child transmission of HIV. The spread of HIV from a woman living with HIV to her child during pregnancy, childbirth, or breastfeeding (WHO 2019a).

Nurse: An individual registered in at least one of the five categories under section 31(1) of the Nursing Act No 33 of 2005 in order to practice nursing or midwifery (South African Nursing Council 2005).

Postnatal transmission: Transmission of HIV to an infant or child after birth. Postnatal transmission refers only to transmission of HIV through breast milk and no other routes (WHO 2016a).

Practice: The customary, habitual, or expected procedure or way of doing something (Oxford Online Dictionary 2019).

Prevention of mother-to-child transmission of HIV: Refers to interventions to prevent transmission of HIV from an HIV-positive mother to her infant during pregnancy, labour, delivery or breastfeeding (WHO 2016a).

Professional nurse: A person who is qualified and competent to independently practise comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice (South African Nursing Council 2005).

Regional hospital: A hospital that receives referrals from and provides specialist support to a district hospital, and where healthcare users require the expertise of teams led by resident specialists (Department of Health KZN 2001).

Registrar: A person appointed under section 12 of the Health Professions Act 56 of 1974 or a person lawfully acting in that capacity (HPCSA 2007).

Specialist: A person appointed under section 35 of the Health Professions Act 56 of 1974 or a person lawfully acting in that capacity (HPCSA 2007).

Treatment failure: Treatment failure in adults and children is defined by a persistently detectable viral load exceeding 1000 copies/ml (that is, two consecutive viral load measurements within a two-month interval, with adherence support between measurements), after at least six months of using ARV drugs (NDoH 2015).

1.8 Abbreviations

AFASS: Affordable, feasible, acceptable, sustainable and safe

AIDS: Acquired immunodeficiency syndrome

ANC: Antenatal care

ANOVA: Analysis of variance

ART: Antiretroviral therapy

ARV: Antiretroviral

AZT: Zidovudine

BFHI: Baby-Friendly Hospital Initiative

CD4: T-lymphocyte cell bearing cluster of differentiation 4 receptor

d4T: Stavudine

EFV: Efavirenz

FTC: Emtracitabine

HAART: Highly active antiretroviral therapy

HIV: Human immunodeficiency virus

HPCSA: Health Professions Council of South Africa

IYCF: Infant and young child feeding

KZN: KwaZulu-Natal

MBFI: Mother-Baby Friendly Initiative

NDoH: National Department of Health South Africa

NVP: Nevirapine

PMTCT: Prevention of mother-to-child transmission of HIV

SADHS: South African Demographic and Health Survey

SPSS: Statistical Package for Social Sciences

TB: Tuberculosis

TDF: Tenofovir

UKZN: University of KwaZulu-Natal

UNAIDS: The Joint United Nations Programme on HIV/AIDS

UNICEF: The United Nations Children's Fund

WHO: World Health Organization

3TC: Lamivudine

1.9 Summary

South Africa is a country heavily affected by the HIV epidemic. Since the early 2000's efforts have been made by the NDOH to reduce cases of mother-to-child-transmission.

Based on recommendations made by the WHO, many changes to the ART component of the South African PMTCT programme have occurred over the years, effectively strengthening the programme and reducing mother-to-child-transmission cases. South Africa has also made many changes to the IYCF recommendations in their PMTCT programme, becoming supportive of breastfeeding. This is also in line with recommendations made by the WHO. The shift to strongly recommend breastfeeding is due to the many health and economic benefits associated with breastfeeding and, with new ART regimes, only a very small risk of HIV transmission through breast milk. Although it is important to continually update guidelines based on the latest evidence, it can potentially cause confusion among healthcare workers and mothers. Studies conducted in Africa have found healthcare workers often do not have adequate knowledge or skills regarding IYCF guidelines in the context of HIV, resulting in mothers living with HIV receiving out-dated or confusing messages. In response, this study aimed to assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at eThekwini, KZN regional state hospital ARV, paediatric and antenatal departments, regarding IYCF in the context of HIV.

1.10 Outline of dissertation

This dissertation is laid out as follows:

Chapter 1: Introduction, the problem and its setting
Chapter 2: Review of the literature
Chapter 3: Methods
Chapter 4: Results
Chapter 5: Discussion
Chapter 6: Conclusions and recommendations

1.11 Referencing style

The referencing style of the Department of Dietetics and Human Nutrition at the University of KwaZulu-Natal (UKZN) was used in this dissertation.

CHAPTER 2: REVIEW OF THE LITERATURE

This chapter reviews the literature related to IYCF in the context of HIV and the role healthcare workers play in guiding mothers living with HIV to make IYCF decisions. The first section of this chapter discusses the importance of IYCF and presents an analysis of IYCF practices in South Africa. The second section discusses IYCF in the context of HIV and summarises the changes that have taken place in South Africa regarding the PMTCT programme and the IYCF policy. The third and final section reviews the literature on the role and knowledge of healthcare workers concerning HIV and IYCF.

2.1 Introduction

Breastfeeding is recognised worldwide as the most effective infant and young survival strategy (Jones, Steketee, Black, Bhutta, Morris & Bellagio Child Survival Study Group 2003). The benefits of breastfeeding include improved immunity and better growth and development (Victora, Bahl, Barros, Franca, Horton, Krasevec, Murch, Sankar, Walker & Rollins 2016). The WHO recommends exclusive breastfeeding for the first six months of an infant's life, followed by the introduction of appropriate complementary foods with continued breastfeeding until two years of age. This recommendation not only applies to infants and young children in the general population, but also to infants and young children of mothers living with HIV. Although HIV can be transmitted from a mother to her child via breast milk, the risk of transmission can be minimised with the diligent use of ART. The benefits of breastfeeding are considered to outweigh the risk of HIV transmission (WHO 2016a).

Although an estimated one million children are born to mothers living with HIV, only a handful acquire the virus. Mother-to-child-transmission would occur in as much as 45% of cases without the use of any ART. However, with the use of ART throughout pregnancy and breastfeeding, the risk of mother-to-child transmission is reduced to less than 5%. Since 2009, over 1.2 million new paediatric cases of HIV infection have been averted globally through the provision of ART to pregnant women, with South Africa accounting for 450 000 of these cases. South Africa started routinely providing ART to pregnant women in 2010 and the mother-to-child transmission rates remarkably reduced from 11.6% in 2009, to 2.0% in 2015 (UNAIDS 2016).

The provision of ART to all pregnant women was not the first change made to the South African PMTCT programme. A number of changes have been made to the programme since

its implementation in 2004 (NDoH 2004; NDoH 2008; NDoH 2010; NDoH 2015; NDoH 2017). Most of these changes have been in response to new recommendations made by the WHO, who periodically updated their PMTCT recommendations as new evidence became available (NDoH 2004; NDoH 2008; NDoH 2010; NDoH 2015; NDoH 2017; WHO 2010; WHO 2015; WHO 2016a). Some changes made by the WHO and consequently the NDoH include changes to ART regimes and changes to IYCF recommendations (NDoH 2004; NDoH 2008; NDoH 2010; NDoH 2015; NDoH 2017; WHO 2010; WHO 2015; WHO 2016a). South Africa has changed their recommendations regarding whether mothers living with HIV should or should not breastfeed, how long these mothers should breastfeed for and how they should go about stopping breastfeeding (NDoH 2004; NDoH 2008; NDoH 2010; NDoH 2015; NDoH 2017).

Although many of the changes have strengthened the PMTCT programme and successfully reduced the number of infants and young children acquiring HIV through mother-to-child transmission, continuous changes to such guidelines can be confusing to both patients and healthcare workers (Shayo *et al* 2014; Van Rensburg 2013). Healthcare workers require on-going training to stay up-to-date with IYCF guidelines in the context of HIV in order to provide clear, consistent and accurate counselling to pregnant women living with HIV (Robb, Walsh & Nel 2018; Van Rensburg 2013). The next section will discuss the importance of IYCF, the WHO IYCF recommendations as well as IYCF practices in South Africa.

2.2 Infant and young child feeding

2.2.1 Importance of infant and young child feeding

Infants and young children require adequate nutrition for growth, development and overall health. Nutrition during the first few years of life has both short-term and long-term effects. Infants and young children who are malnourished are at increased risk of developing certain illnesses and associated morbidity (WHO 2009). Nutritional deficits during this period can have harmful long-term effects, such as irreversible stunting, impaired intellectual performance and reduced work capacity (Victora *et al* 2016). The importance of good nutrition early in life cannot be overemphasised (WHO 2009).

2.2.2 Feeding from birth to six months

The WHO strongly recommends exclusive breastfeeding for the first six months of life (WHO 2016a). Exclusive breastfeeding is defined as ‘when an infant receives only breast

milk without any other liquids or solids, not even water, except for oral rehydration solution or drops or syrups of vitamins, minerals or medicines' (WHO 2016a). Exclusive breastfeeding is preferred over partial breastfeeding to ensure that infants reap as many as possible of the benefits that breastfeeding offers (Chiu, Liao, Su, Tsai, Hua, Lai, Chen, Yao, Yeh & Huang 2016). Breastfeeding offers important health benefits to both the infant and their mother. Table 2.1 includes a summary of these benefits (Mahan & Escott-Stump 2016, p281; Victora *et al* 2016; Horta & Victora 2013).

Table 2.1: Health benefits associated with breastfeeding

Beneficiary	**Description of health benefits**
Infant	***Short-term health benefits*** Breastfed infants are less likely to develop malnutrition as breast milk meets all the energy and nutrient requirements of infants for the first six months of life. Breastfeeding protects against diarrhoeal disease, respiratory infections, otitis media, necrotising enterocolitis and sudden infant death syndrome (Victora *et al* 2016).
	Long-term health benefits Breastfeeding is associated with increased intellectual levels and a decreased prevalence of obesity and diabetes mellitus later in life (Victora *et al* 2016; Horta & Victora 2013).
Maternal	Breastfeeding assists mothers to lose weight gained during pregnancy and delays the return of fertility. It also has long-term protective effects against breast and ovarian cancers, osteoporosis and diabetes mellitus (Mahan & Escott-Stump 2016, p281; Victora *et al* 2016).

The global leading causes of death in children under five years of age include preterm birth complications (16%), acute respiratory infections (12%), intrapartum-related complications (11%), congenital anomalies (9%) and diarrhoeal disease (8%) (Figure 2.1) (WHO 2017a). Breastfeeding provides protective effects against many of the conditions associated with childhood mortality (Table 2.1) and if breastfeeding practices are improved an estimated 823 000 deaths of children under five years could be prevented every year (Victora *et al* 2016). Poor nutrition has been shown to be directly or indirectly responsible for over a third

(35%) of the deaths in children in the first five years of life (Black, Allen, Bhutta, Caulfield, De Onis, Ezzati, Mathers, Rivera & Maternal and Child Undernutrition Study Group 2008).

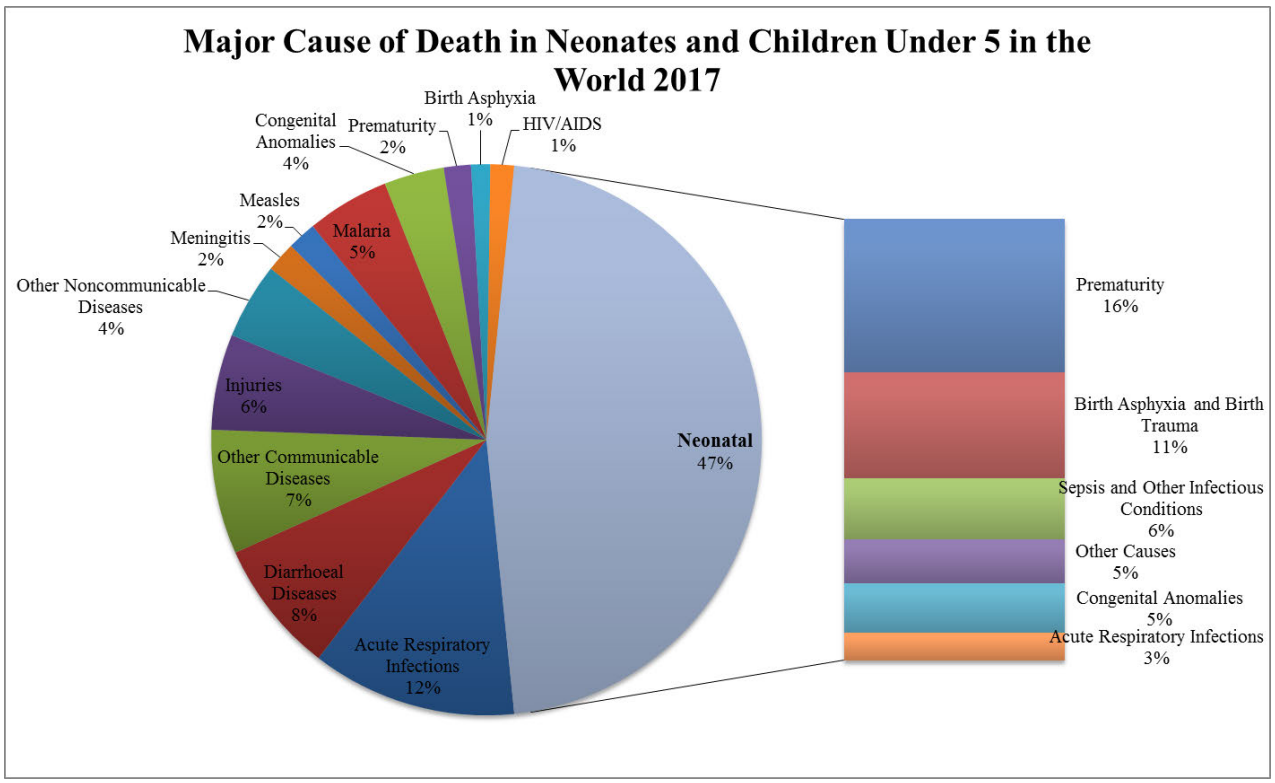

Figure 2.1: Major causes of death in neonates and children under five years in the world in 2017 (WHO 2017a)

Besides being of benefit to infants and their mothers, breastfeeding can also have a national socio-economic impact. According to the most recent Lancet Breastfeeding Series, breastfeeding is a lasting investment in a child's physical, cognitive and social capacity. It provides economic relief as it reduces infant and young child morbidity and mortality and their associated costs, increases intellectual levels and school achievements of children contributing to educational cost savings and it is associated with increased adult earnings (Rollins, Bhandari, Hajeebhoy, Horton, Lutter, Martines, Piwoz, Richter & Victora 2016).

Infant formula, also referred to as a breast milk substitute, is an industrially produced food substitute that attempts to mimic the nutritional composition of breast milk, making it suitable for consumption by infants (Martin, Ling & Blackburn 2016). Most standard infant formulas consist of modified cow's milk with added nutrients. Cow's milk has to undergo modification as it naturally contains more fat, minerals and proteins than an infant is physiologically mature enough to handle (Martin *et al* 2016). Although infant formula does

meet the basic nutritional needs of infants, it lacks other important nutritional and biological factors (Martin *et al* 2016). For example, breast milk is rich in human milk oligosaccharides that are important for infant gut health and preventing diarrhoeal disease. Although some infant formulas contain pre- and probiotics, which can reduce the incidence and severity of diarrhoea, many do not (Chassard, De Wouters & Lacroix 2014). Other examples include differences in protein and fat profiles. Some infant formulas contain higher amounts of protein than breast milk and have been associated with excess weight gain and an increased risk of obesity later in life (Michaelsen & Greer 2014). Specific fat compounds in breast milk, which contribute towards cognitive development, are lacking in infant formulas (Timby, Domellöf, Hernell, Lönnerdal & Domellöf 2014). While infant formula is inferior to breast milk, it is an acceptable feeding choice where mothers are unable to provide sufficient breast milk (Martin *et al* 2016).

2.2.3 Feeding from six months onwards

The WHO recommends the introduction of complementary foods when an infant is six months of age, while continuing to breastfeed for up to two years or beyond. At this age the nutrient and energy requirements of an infant exceeds that provided by breast milk, creating an energy and nutrient gap (WHO 2009). Complementary foods are needed to fill this gap. Complementary feeding is defined as 'the process that starts when breast milk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk' (WHO 2019b). In order to meet the needs of the young child, complementary foods need to be of good nutritional value, safe and appropriately fed (WHO 2019b). Even after complementary foods have been introduced, breast milk continues to be an important source of nutrition, providing around half of an infant's energy requirements until one year of age, and as much as a third of their energy requirements until two years of age (Figure 2.2), while continuing to provide protective factors (WHO 2009).

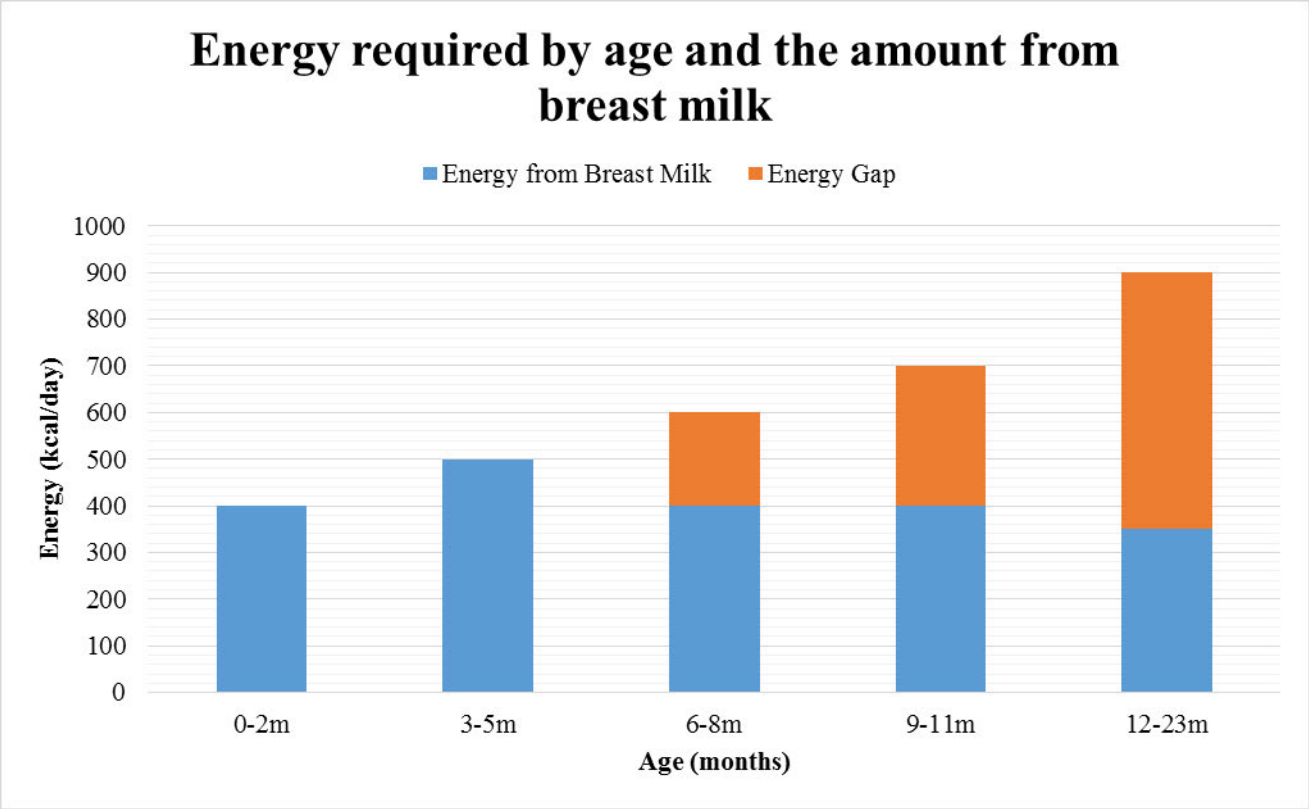

Figure 2.2: Energy required by age and the amount obtained from breast milk (WHO 2009)

2.2.4 South African infant and young child feeding practices

The recommendations in the current South African IYCF policy are in accordance with the 2003 WHO Global Strategy for IYCF, including the recommendation for mothers to practice exclusive breastfeeding for the first six months of life (NDoH 2013; WHO 2003b). The latest South African Demographic and Health Survey (SADHS) revealed that 32% of infants were exclusively breastfed in 2016 (Statistics South Africa 2016). South Africa is one of the countries working towards reaching the WHO global nutrition target of at least 50% of infants being exclusively breastfed by the year 2025 (WHO 2019d).

According to the 2016 SADHS, breastfeeding rates drastically decrease after the age of six months, with only 13% of South African mothers following the IYCF policy recommendation to continue breastfeeding until two years of age (Statistics South Africa 2016; NDoH 2013). Table 2.2 includes a summary of the IYCF findings from the 2016 SADHS and recommendations of the South African IYCF policy (Statistics South Africa 2016; NDoH 2013).

Table 2.2: Summary of IYCF practices in South Africa (Statistics South Africa 2016; NDoH 2013)

Age	IYCF recommendations	Exclusively breastfeeding	Mixed feeding	Not breastfeeding
0-5 months	Exclusive breastfeeding for the first six months of life	32%	43%	25%

Age	IYCF recommendations	Continued breastfeeding	Not breastfeeding
6-8 months	Continued breastfeeding with appropriate complementary foods until 24 months of age	59.2%	40.8%
9-11 months		57.5%	42.5%
12-23 months		33.6%	66.4%
20-23 months		13.0%	87.0%

2.3 Infant and young child feeding in the context of HIV

The feeding practices of mothers living with HIV have received much attention since the first documented case of HIV transmission through breast milk was published in 1985 (WHO 2007; WHO 2010; WHO 2016a; Ziegler *et al* 1985). A woman became infected with the virus postnatally after receiving a blood transfusion. Her infant, who was failing to thrive and experiencing persistent atopic eczema, was confirmed to have contracted HIV through his mother's breast milk (Ziegler *et al* 1985).

2.3.1 Risk of HIV transmission through breastfeeding

Human immunodeficiency virus is the retrovirus that causes HIV infection. The virus targets and impairs the function of immune cells, resulting in infected individuals becoming immuno-compromised and susceptible to a wide range of infections, cancers and other diseases. Immune function is typically measured by CD4 cell count (WHO 2019e). People living with HIV have a shortened life expectancy and experience significant human, social and economic consequences. Although there is no cure for HIV, the use of ART (medications used to manage HIV) can effectively suppress viral replication and reduce the viral load to undetectable levels, helping people living with HIV to live longer and healthier lives. Antiretroviral therapy can also reduce the risk of HIV transmission (WHO 2019e).

Mother-to-child transmission of HIV refers to the spread of HIV from a woman living with HIV to her child during pregnancy, childbirth, or breastfeeding (WHO 2019f). Without ART intervention, the risk of HIV transmission is 10% *in utero*, 20% intrapartum and up to 0.4% per month through breastfeeding (Mallampati *et al* 2015; De Cock, Fowler, Mercier, De Vincenzi, Saba, Hoff, Alnwick, Rogers & Shaffer 2000). With the use ART these risks can be decreased to as low as 3.3% *in utero,* 1.7% intrapartum and 0.19% per month during breastfeeding (Mallampati *et al* 2015; WHO 2016b). The risk of transmission is lowest when ART is initiated in early pregnancy (preferably before the woman conceives) and continued throughout pregnancy, birth and lactation, in conjunction with the provision of ART to the infant for four to six weeks after birth (WHO 2017b; Uthman, Nachega, Anderson, Kanters, Mills, Renaud, Essajee, Doherty & Mofenson 2017). The WHO recommends PMTCT services including HIV testing and ART initiation immediately after diagnosis (WHO 2016b). Provision of ART to pregnant and breastfeeding women living with HIV not only prevents the risk of mother-to-child transmission of HIV, but also improves the mother's health (WHO 2016b).

Although current evidence supports that, the risk of HIV transmission through breastfeeding is remarkably low; this was not always the case (Mallampati *et al* 2015). For example, a publication in 2000 summarised key findings of mother-to-child-transmission trials and estimated the risk of transmission via breastfeeding to be as high as 15% (De Cock *et al* 2000). Another example is a 2001 study that estimated mixed feeding to be associated with a 6.7% higher risk of HIV transmission than that of exclusive breastfeeding (Coutsoudis, Pillay, Kuhn, Spooner, Tsai, Coovadia & the South African Vitamin A Study Group 2001). These studies were the rationale behind the 2004 WHO recommendation for 'mothers living with HIV to avoid all breastfeeding and use replacement feeding when it was acceptable, feasible, affordable, sustainable and safe (AFASS criteria)' and for the recommendation that 'mixed feeding in any case should be avoided because it brings both the increased risks of HIV infection and the risks of diarrhoea and other infectious disease' (WHO 2004). It is important to note that both of these studies were conducted in the absence of ART and that the WHO recommendations at the time did not include the use of ART in pregnancy, unlike the more current recommendations (Coutsoudis *et al* 2001; De Cock *et al* 2000).

Since these recommendations substantial research has been conducted, particularly focusing on breastfeeding practices with the use of ART. For the development of the most recent

update of HIV and IYCF from the WHO, a rigorous evidence retrieval and analysis process was undertaken which included a modelling exercise which examined the impact of maternal ART use on infant mortality and an analysis of different IYCF practices and their impact on HIV-free survival (WHO 2016a; Mallampati *et al* 2015). The Cost-Effectiveness of Preventing AIDS Complications model framework (CEPAC)-Pediatric Model was used for this exercise and data from twelve studies were included in the analysis (Mallampati *et al* 2015; Ciaranello *et al* 2013; Shapiro *et al* 2013; Kesho Bora Study Group 2011; Thomas *et al* 2011; Kilewo *et al* 2009; Peltier *et al* 2009; Van Der Horst *et al* 2009; Palombi *et al* 2007; Thior *et al* 2006; Iliff *et al* 2005; Kuhn *et al* 2005; Coutsoudis *et al* 2001; Leroy *et al* 1998). The exercise determined the monthly risk of HIV infection through breastfeeding in different feeding scenarios (Mallampati *et al* 2015). Table 2.3 includes a summary of these risks.

Table 2.3: Risk of postnatal transmission in different scenarios (Mallampati *et al* 2015)

IYCF practice	ART	Risk of transmission	
		Monthly risk	Total six monthly risk*
Exclusive breastfeeding	No maternal ART	0.24%	1.42%
Mixed feeding	No maternal ART	0.40%	2.35%
Exclusive breastfeeding	Mother on ART	0.19%	1.13%
Mixed feeding	Mother on ART	0.19%	1.13%

*Calculated using cumulative binomial probability

2.3.2 Benefits of breastfeeding in the context of HIV

Infant and young child feeding in the context of HIV is more complex than simply reducing the risk of HIV transmission (WHO 2010). Infant and young child feeding practices have a major impact on child morbidity and mortality (WHO 2016a). The risk of HIV transmission through breastfeeding needs to be balanced with the increased risk of death from causes other than HIV, such as undernutrition, diarrhoea and pneumonia (WHO 2016a). Thus, the focus of IYCF recommendations in the context of HIV is on *HIV-free survival* (WHO 2010; WHO 2016a). Human immunodeficiency virus-free survival refers to an infant or young child born to a mother living with HIV remaining both HIV uninfected (confirmed negative HIV status), as well as alive over a defined follow-up period (commonly reported at 18 months or 24

months of age) (WHO 2016a). While replacement feeding prevents any risk of postnatal transmission of HIV, it has been associated with other causes of mortality, namely malnutrition, diarrhoea and pneumonia (WHO 2010). With the risk of HIV transmission through breastfeeding being only 0.19% per month with the use of ART, the promotion of replacement feeding would deny the benefits of breastfeeding to the more than 99% of infants who would remain uninfected (Kuhn & Kroom 2015). According to the WHO, infant and young child feeding recommendations need to balance HIV prevention with protection from other causes of child mortality, especially in countries where diarrhoea, pneumonia and undernutrition are common causes of infant and child mortality (WHO 2016a). Infant and young child feeding recommendations that support the greatest likelihood of HIV-free survival of children should be adopted (WHO 2016a). For many countries, such as South Africa, breastfeeding as the ideal feeding choice is the recommendation that is more likely to ensure this (WHO 2016a). The WHO also recommends that these countries provide lifelong ART for everyone living with HIV, including pregnant and breastfeeding women (WHO 2016a). This recommendation improves the health outcomes of mothers as well as reduces the risk of mother-to-child transmission (WHO 2016a).

Prevention-of-mother-to-child-transmission programmes that involve the provision of ART to pregnant women living with HIV, regardless of CD4 count, and support breastfeeding as the ideal infant feeding choice, have been shown to improve infant survival rates (Alvarez-Uria, Midde, Pakam, Bachu & Naik 2012). A cohort study found that breastfed infants of mothers living with HIV, who received ART, had a 93% lower mortality rate than that of their formula-fed counterparts (0.68% vs. 9.6%) (Alvarez-Uria *et al* 2012). Table 2.4 shows optimal breastfeeding durations to ensure HIV-free survival (Ciaranello, Leroy, Rusibamayila, Freedberg, Shapiro, Engelsmann, Lockman, Kelly, Dabis & Walensky 2014). From a public health perspective, the compelling benefits of breastfeeding to the majority of infants makes the occasional individual HIV transmission via breastfeeding, a small price to pay (Kuhn & Kroom 2015).

Table 2.4: Optimal breastfeeding durations to ensure HIV-free survival (Ciaranello *et al* 2014)

Scenario		Optimal breastfeeding duration
Maternal CD4 count	**ART**	
CD4<350 cells/mm³	Mother and infant not on ART	18 months
CD4>350 cells/mm³	Mother and infant not on ART	24 months
CD4<350 cells/mm³	Mother on ART	24 months
CD4>350 cells/mm³	Mother not on ART Infant on NVP during breastfeeding	24 months
CD4>350 cells/mm³	Mother on ART	24 months

CD4=T-lymphocyte cell bearing cluster of differentiation 4 receptor; ART=antiretroviral therapy; NVP=Nevirapine

2.3.3 History of HIV and infant feeding in South Africa

South Africa is a country heavily burdened by HIV [The Joint United Nations Programme on HIV/AIDS (UNAIDS) 2019]. Although the rate of new HIV infections is now decreasing, South Africa still has the highest HIV epidemic globally (UNAIDS 2019). In 2017, there were 7.2 million people living with HIV in South Africa (18.9% of the total population) and 110 000 HIV-related deaths that year (UNAIDS 2019). This epidemic has major social, economic and health implications for the country (Institute of Medicine 2011, pp47-48). With such a high prevalence of HIV, it is reassuring to know that South Africa has the largest ART treatment programme in the world (UNAIDS 2019). The first PMTCT programme in South Africa was implemented in 2004 (NDoH 2004). Since then a number of changes have been made to the programme, including changes to ART regimens and IYCF recommendations (NDoH 2004; NDoH 2008; NDoH 2010; NDoH 2015; NDoH 2017). Table 2.5 includes a summary of the changes made to the South African PMTCT programme and IYCF policy between 2008 and 2017. The changes made were all adoptions of the latest recommendations made by the WHO, who periodically updated their recommendations as more evidence became available (WHO 2004; WHO 2010; WHO 2016a).

In South Africa's earlier PMTCT programmes, mothers were given the option to choose between exclusively breastfeeding or exclusively formula feeding their infants (NDoH 2004;

2008; NDoH 2010). Between 2004 and 2012 free infant formula was provided by NDoH to mothers living with HIV for a period of six months (either from birth until six months or from six months until one year of age) (NDoH 2004; NDoH 2008; NDoH 2010). In 2012, the provision of free formula was stopped and a new IYCF policy was released in 2013, which for the first time recommended breastfeeding as the ideal IYCF practice for all mothers, including those living with HIV (Table 2.5) (NDoH 2013). This recommendation followed after a breastfeeding consultative meeting, held by the South African Department of Health with various stakeholders, reached a consensus on the IYCF policy and programme changes. Infant and young child feeding in the context of HIV was a major focus area of the meeting (NDoH 2011). The South African Minister of Health and other stakeholders concluded the meeting with a declaration known as the 'Tshwane Declaration of Support for Breastfeeding' and committed themselves to support and strengthen efforts to promote breastfeeding in the country (NDoH 2011). Part of the 'Tshwane Declaration of Support for Breastfeeding' included the adoption of the 2010 WHO guidelines on HIV and IYCF, which recommends that all HIV-infected mothers should breastfeed their infants and receive ART to prevent HIV transmission (NDoH 2011; WHO 2010). At the time the PMTCT recommendations were for breastfeeding mothers to either be on lifelong ART (depending on their CD4 count) or for breastfeeding infants to receive NVP daily during the breastfeeding period (NDoH 2010). This was the first PMTCT programme with routine ART for all breastfeeding mother and infant pairs (NDoH 2004; NDoH 2008; NDoH 2010). The current National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults was released in 2015 and updated in 2017 (NDoH 2015). This guideline includes the recommendation that all people living with HIV (including pregnant and breastfeeding women) should be initiated on lifelong ART and the guideline also includes the 2013 IYCF recommendation for mothers to exclusively breastfeed their infants for the first six months of life and to continue breastfeeding until two years of age (Table 2.5) (NDoH 2015; NDoH 2017).

Table 2.5: Changes to the South African PMTCT programme (NDoH 2008; NDoH 2010; NDoH 2013; NDoH 2015; NDoH 2017)

Year	ART recommendation
2008	Women with a CD4 cell count of more than 200 cell/mm³ and WHO stage 1 and 2 disease: From 28 weeks until directly after labour: AZT (ART prophylaxis) Women with a CD4 cell count of 200 cell/mm³ or less or WHO clinical stage 4 disease: Any point during pregnancy: immediate initiation of HAART (short course)
2010	Women with a CD4 cell count of more than 350 cell/mm³ and WHO stage 1 and 2 disease: From 14 weeks: AZT (ART prophylaxis) Intrapartum single dose NVP, three hourly AZT Postpartum: single dose of TDF + FTC Women with a CD4 cell count of 350 cell/mm³ or less or WHO clinical stage 3 and 4 disease: Any point during pregnancy: immediate initiation of lifelong ART (TDF + 3TC/FTC + NVP) No additional intrapartum single dose NVP or three hourly AZT or postpartum TDF + FTC
2013	No change [as per Clinical Guidelines: PMTCT (Prevention of Mother-to-Child Transmission) (2010)]
2015	Immediate initiation of lifelong ART provided as fixed-dose combination (TDF + 3TC (or FTC) + EFV) for all women living with HIV who are pregnant, breastfeeding or within one year postpartum, regardless of CD4 cell count
2017	No change [as per National Consolidated Guidelines for the Prevention of Mother-to-Child Transmission of HIV (MTCT) and the Management of HIV in Children, Adolescents and Adults (2015)]

Table 2.5: Changes to the South African PMTCT programme continued

Year	Infant prophylaxis recommendation
2008	Single dose NVP + AZT for seven days. *or* AZT for 28 days if: 1. Mother received < four weeks AZT during pregnancy 2. Mother received < four weeks HAART 3. Mother only received single dose NVP 4. Mother did not receive any ART during pregnancy (unbooked mothers/who have not taken any during pregnancy and labour).
2010	Mother on lifelong ART: NVP at birth and then daily for six weeks irrespective of infant feeding choice. Mother on PMTCT regimen: NVP at birth and then daily during breastfeeding duration. If formula fed baby can stop NVP at six weeks.
2013	No change [as per Clinical Guidelines: PMTCT (Prevention of Mother-to-Child Transmission) (2010)]
2015	NVP at birth and then daily for six weeks.
2017	No change [as per National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults (2015)]

Table 2.5: Changes to the South African PMTCT programme continued

Year	IYCF recommendation
2008	Choice between breastfeeding or formula feeding: Breastfeeding mothers: Exclusive breastfeeding for six months and then stopping breastfeeding at this age and introducing appropriate complementary foods and an infant formula (provided by their local clinic for six months). Formula feeding mothers: Free commercial infant formula will be provided by local clinics for at least six months.
2010	Choice between breastfeeding or formula feeding: Breastfeeding mothers: Exclusive breastfeeding for six months, introduce appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life. Formula feeding mothers: Free commercial infant formula will be provided by local clinics for at least six months.
2013	Exclusive breastfeeding for six months, introduce appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life.
2015	No change [as per IYCF policy (2013)]
2017	Exclusive breastfeeding for six months, introduce appropriate complementary foods thereafter, and continued breastfeeding until 24 months.

AZT=Zidovudine; EFV=Efavirenz; FTC=Emtracitabine; NVP=Nevirapine; TDF=Tenofovir; 3TC=Lamivudine; HAART=Highly Active Antiretroviral Therapy, HAART describes the use of a triple combination of ART to treat advanced HIV disease: Stavudine + 3TC + NVP.

2.4 The role of healthcare workers regarding infant and young child feeding

Healthcare workers are responsible for the implementation of health policies and programmes (NDoH 2015). In South Africa, this includes the implementation of the PMTCT programme and the IYCF policy (NDoH 2013; NDoH 2015; NDoH 2017). Healthcare workers are the main source of IYCF information for South African mothers living with HIV (Mnyani, Tait, Armstrong, Blaauw, Chersich, Buchmann, Peters & McIntyre 2017). Breastfeeding counselling and support offered to women by trained healthcare workers during antenatal and postnatal periods influences how a mother chooses to feed her infant or young child (McFadden, Gavine, Renfrew, Wade, Buchanan, Taylor, Veitch, Rennie, Crowther, Neiman & MacGillivray 2017; Goga, Doherty, Jackson, Sanders, Colvin, Chopra & Kuhn 2012; Ochola, Labadarios & Nduati 2012). Regular counselling at different time intervals has been shown to enhance sustained breastfeeding practices (Choudhary, Meena, Gothwal, Sitaraman, Sharma & Verma 2017; Asemahagn 2016).

One such way of ensuring appropriate IYCF counselling of healthcare workers is through the effective implementation of the Baby-Friendly Hospital Initiative (BFHI). The BFHI is a well-known initiative developed by the WHO and the United Nations Children's Fund (UNICEF), which involves the implementation of practices that protect, promote and support breastfeeding (WHO 2017c). The goal of the BFHI is to create an environment that enables mothers to breastfeed. The initiative includes having a written breastfeeding policy, the training of healthcare workers, antenatal breastfeeding education and preparation for mothers, and on-going breastfeeding support. The BFHI involves the implementation of ten steps, referred to as the Ten Steps to Successful Breastfeeding (Figure 2.3), which have been shown to positively impact breastfeeding outcomes (WHO 2017c). Healthcare workers are responsible for the implementation of all these steps. One of the objectives of the South African IYCF policy is for all public hospitals and health facilities with maternity services to be BFHI accredited [locally renamed as the Mother-Baby Friendly Initiative (MBFI)] (NDoH 2013).

Ten Steps to Successful Breastfeeding

Step 1: Have a written breastfeeding policy that is routinely communicated to all healthcare staff.

Step 2: Train all healthcare staff in the skills necessary to implement this policy.

Step 3: Inform all pregnant women about the benefits and management of breastfeeding.

Step 4: Help mothers initiate breastfeeding within half an hour of birth.

Step 5: Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.

Step 6: Give newborn infants no food or drink other than breast milk, unless medically indicated

Step 7: Practise rooming-in (allowing mothers and infants to remain together) 24 hours a day.

Step 8: Encourage breastfeeding on demand.

Step 9: Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.

Step 10: Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Figure 2.3: Ten steps to successful breastfeeding (WHO 2017c)

The successful implementation of these steps and a resultant positive impact on feeding practices has not always been found to be the case (Ikeako, Ezegwui, Nwafor, Nwogu-Ikojo & Okeke 2015; Gyampoh, Otoo & Aryeetey 2014). The next section of this literature review discusses the barriers to successful HIV and IYCF counselling of mothers by healthcare workers (Step Three and Step Ten of the Ten Steps to Successful Breastfeeding).

2.5 Barriers to successful infant and young child feeding counselling

The importance of consistent and accurate IYCF information conferred by healthcare workers in a supportive manner to mothers living with HIV cannot be stressed enough (Mnyani *et al*

2017). However, in order for this to occur, healthcare workers require education and on-going training to improve their knowledge and equip them with IYCF counselling skills (Kavle, LaCroix, Dau & Engmann 2017; WHO 2017c; De Jesus, De Oliveira & Fonseca 2016). The quality of counselling messages given by healthcare workers can directly influence the feeding practices of mothers living with HIV (Ejara, Mulualem & Gebremedhin 2018; Abebe, Haki & Baye 2016). Those who receive adequate IYCF counselling are more likely to practice appropriate IYCF (Ejara *et al* 2018; Abebe *et al* 2016). Mixed IYCF messages from healthcare workers can lead to confusion for mothers living with HIV, making them unsure whether they should breastfeed at all, resulting in poor IYCF practices (Dunkley, Ashaba, Burns, O'Neil, Sanyu, Akatukwasa, Kastner, Berry, Psaros, Matthews & Kaida 2018; Abebe *et al* 2016). Knowledge gaps on IYCF among healthcare workers are barriers to the protection, promotion and support of breastfeeding (Utoo, Ochejele, Obulu & Utoo 2012).

A number of studies conducted in South Africa and other low-income countries have investigated the knowledge, attitudes, counselling practices and/or confidence of healthcare workers regarding IYCF recommendations of PMTCT programmes. The main findings from these studies include inadequate training and poor IYCF knowledge of healthcare workers. Table 2.6 shows a summary of these studies. Although many studies have been conducted on the topic, there is a lack of studies in KZN, South Africa, thus justifying the need for the current study.

Table 2.6: Competency of healthcare workers regarding HIV and IYCF

Study	Subjects	Country and setting	Objectives of study	Method of assessment	Main findings of study
Mphasha & Skaal (2019)	Nurses (n=103)	Twenty-one primary healthcare clinics in Blouberg, South Africa	To assess the knowledge and practices of nurses regarding HIV and IYCF	Self-administered questionnaire	Most of the nurses were knowledgeable regarding IYCF recommendations with regards to HIV. The majority of the nurses were not trained on the IYCF policy. The majority of the nurses reported contravening the IYCF policy with regards to the issuing of infant formula.
Essien, Mgbekem & Okareh (2018)	Doctors, nurses/midwives, community health extension workers (n=278)	Three hospitals in Akwa Ibom State, Nigeria	To assess the knowledge of healthcare workers regarding HIV and IYCF	Self-administered questionnaire	The majority of healthcare workers were knowledgeable regarding the national IYCF guidelines for mothers living with HIV. Over half of the healthcare workers had attended IYCF training.
Ashipa, Ofili, Onakewhor & Adejumo (2017)	Doctors, nurses/midwives, counsellors, laboratory scientists, pharmacists (n=270)	Seven health facilities in Benin City, Nigeria	To assess the knowledge of healthcare workers regarding HIV and IYCF	Self-administered questionnaires	Inadequate knowledge of healthcare workers regarding HIV and IYCF options. Training on IYCF was not reported on.
Haffejee, Ports & Mosavel (2016)	Healthcare volunteers (n=12)	A municipal subsidised housing estate for people with low incomes or have mental/physical disabilities in Durban, South Africa	To determine the knowledge and attitudes of healthcare workers regarding PMTCT (including IYCF practices)	Interviews	The healthcare volunteers lacked healthcare training and had very poor knowledge regarding IYCF in the context of HIV. Training on IYCF was not reported on.

Table 2.6: Competency of healthcare workers regarding HIV and IYCF continued

Study	Subjects	Country and setting	Objectives of study	Method of assessment	Main findings of study
Murila *et al* (2015)	Doctors and nurses (n=161)	Hospitals across Kenya	To assess the knowledge of healthcare workers regarding HIV and IYCF	Self-administered questionnaires	Doctors and nurses have inadequate knowledge of IYCF recommendations for mothers living with HIV. Training on IYCF was not reported on.
Shayo *et al* (2014)	Healthcare workers (n=44)	Regional and district health facilities in Mbeya, Tanzania	To explore the ways in which changes in IYCF guidelines have been communicated to and understood	Interviews and focus group discussions	There were misconceptions and lack of knowledge regarding the IYCF guidelines in the context of HIV. Healthcare workers lacked an awareness of the scientific explanations behind the policies. The majority of the healthcare workers had received some training on PMTCT management (details regarding IYCF were not mentioned).
Mkontwana, Steenkamp & Von Der Marwitz (2013)	Nurses (n=32)	Nelson Mandela Bay District, Eastern Cape, South Africa	To assess IYCF policy implementation in the PMTCT programme, the related knowledge of healthcare workers, and identification of challenges that need to be addressed, in order to improve the programme	Interviews	Half of the nurses had been trained on IYCF in the context of HIV. The nurses were knowledgeable on HIV and IYCF. The majority of nurses had not seen a copy of the IYCF policy or been orientated on it.

Table 2.6: Competency of healthcare workers regarding HIV and IYCF continued

Study	Subjects	Country and setting	Objectives of study	Method of assessment	Main findings of study
Vallely, Kelly, Kupul, Neo, Fiya, Kaldor, Mola & Worth (2013)	Nurses/midwives, medical officers, HIV patient experts, a social worker and an AIDS council coordinator (n=28)	Government, non-government and faith-based facilities offering PMTCT services in Mount Hagen and Port Moresby, Papua New Guinea	To assess the knowledge of healthcare workers regarding HIV and IYCF	Interviews	More than half the participants had been trained on PMTCT programmes, which include IYCF counselling practices. However, most of these participants were not knowledgeable regarding IYCF in the context of HIV.
Van Rensburg (2013)	Doctors, nurses/midwives and dietitians (n=64)	A hospital in Bloemfontein, South Africa	To assess the knowledge, opinions and practices of healthcare workers regarding HIV and IYCF	Self-administered questionnaires	Healthcare workers were not knowledgeable about all important aspects of IYCF recommendations for mothers living with HIV. Majority of healthcare workers agreed with the guidelines that breastfeeding was an excellent feeding choice for mothers living with HIV. Most healthcare workers were confident with their counselling practices relating to IYCF in the context of HIV. Training on IYCF was not reported on.
Rujumba *et al* (2012)	Doctors, nurses/midwives and counsellors (n=24)	A regional hospital, eight healthcare centres and The AIDS Support Organisatition Mbale in Mbale, Uganda	To explore the lessons learnt by healthcare workers involved in PMTCT services on what needs to be done to strengthen the programme	Interviews	Regarding the IYCF component of the PMTCT programme: Healthcare workers had concerning gaps in their knowledge regarding IYCF in the context of HIV. Healthcare workers indicated they felt they required more training in IYCF in the context of HIV.

Table 2.6: Competency of healthcare workers regarding HIV and IYCF continued

Study	Subjects	Country and setting	Objectives of study	Method of assessment	Main findings of study
Sprague, Chersich & Black (2011)	Key informants consisting of HIV and public health specialists, academics, nurses, doctors and HIV lay counsellors (n=38)	Hospitals and a primary healthcare centre in Eastern Cape and Gauteng, South Africa	To identify the barriers facing pregnant women seeking access to maternal HIV services from the perspectives of both patients and healthcare workers	Interviews	Lack of healthcare worker knowledge on HIV and IYCF. Infant feeding counselling was one of the weakest aspects of the PMTCT programme across the facilities. Poor and inappropriate infant counselling during antenatal and postnatal care. Training on IYCF was not reported on.
Fadnes, Engebretsen, Moland, Nankunda, Tumwire & Tylleskär (2010)	Nurses, midwives, clinical officers and doctors (n=18)	Hospitals and health centres in Mbale District, Uganda	To assess the adequacy of IYCF counselling to mothers living with HIV by healthcare workers	Interviews	Most of the healthcare workers acquired their knowledge during their training as professionals and the majority were not trained on IYCF in the context of HIV. A few had attended specific IYCF workshops. Infant feeding messages varied and were often contrary to the Ugandan guidelines.
Leshabari, Blystad, De Paoli & Moland (2007)	Nurses (n=25)	Hospitals in Kilimanjaro region, Tanzania	To explore the challenges faced by nurses regarding HIV and IYCF counselling	Interviews	The nurses lacked confidence and felt they were inadequately trained on HIV and IYCF. The nurses felt overworked and reported having limited opportunities and resources to keep themselves updated on PMTCT guidelines. The personal beliefs of some nurses were not in line with the IYCF recommendations.

Table 2.6: Competency of healthcare workers regarding HIV and IYCF continued

Study	Subjects	Country and setting	Objectives of study	Method of assessment	Main findings of study
Piwoz, Ferguson, Bentley, Corneli, Moses, Nkhoma, Tohill, Mtimuni, Ahmed, Jamieson, Van Der Horst, Kazembe & the UNC Project BAN Study Team (2006)	Nurses/midwives, clinical officers/medical assistants (n=19)	Health centres in Lilongwe, Malawi	To assess attitudes, beliefs, and counselling messages of healthcare workers regarding HIV and IYCF	Interviews	None of the healthcare workers had received formal training on HIV and IYCF. The majority of healthcare workers were not knowledgeable regarding HIV and IYCF recommendations. There were important differences in the attitudes and counselling practices of healthcare workers and the WHO recommendations. The personal beliefs of some healthcare workers were not in line with the IYCF recommendations.

2.5.1 Healthcare worker knowledge

Poor knowledge and/or a lack of training of healthcare workers was found in many of the studies presented in Table 2.6 (Mphasha & Skaal 2019; Ashipa *et al* 2017; Haffejee *et al* 2016; Murila *et al* 2015; Shayo *et al* 2014; Vallely *et al* 2013; Van Rensburg 2013; Rujumba *et al* 2012; Sprague *et al* 2011; Fadnes *et al* 2010; Leshabari *et al* 2007; Piwoz *et al* 2006). Inadequate or poor IYCF training can result in poor knowledge of healthcare workers (Haffejee *et al* 2016; Mkontwana *et al* 2013). A systematic review of 17 studies found IYCF training to have an overall positive effect on healthcare workers' knowledge and counselling skills (though it was noted that there were variations in the effectiveness of the training in different economic, ethnic and cultural scenarios) (De Jesus *et al* 2016). Many studies in Table 2.6 recommended improved and/or on-going training of healthcare workers (Mphasha & Skaal 2019; Ashipa *et al* 2017; Haffejee *et al* 2016; Murila *et al* 2015; Van Rensburg 2013; Vallely *et al* 2013; Van Rensburg 2013; Rujumba *et al* 2012; Sprague *et al* 2011; Fadnes *et al* 2010; Leshabari *et al* 2007; Piwoz *et al* 2006). Specialised training programmes, with a strong focus on the importance of breastfeeding, such as the WHO/UNICEF BFHI training courses, have been found to improve breastfeeding knowledge, attitudes and confidence of healthcare workers (Yang, Salamonson, Burns & Schmied 2018).

A major concern regarding the poor IYCF knowledge amongst healthcare workers is the negative effect these healthcare workers may have on mothers' IYCF practices (Daniels, Nor, Jackson, Ekström & Doherty 2010). An Ethiopian study found that inadequate IYCF knowledge and poor counselling skills among healthcare workers was associated with poor IYCF practices, resulting in child stunting (Daniels *et al* 2010). Poor or out-dated knowledge of healthcare workers regarding IYCF recommendations and HIV results in mothers living with HIV receiving inaccurate information or out-dated messages (West *et al* 2019). Uniform messages regarding the many benefits of breastfeeding and the low risk of transmission of breastfeeding with the use of maternal ART are needed to improve breastfeeding practices (West *et al* 2019).

2.5.2 Counselling skills of healthcare workers

Although not frequently assessed, two studies from Table 2.6 reported a lack of confidence among healthcare workers in their counselling skills (Van Rensburg 2013; Leshabari *et al* 2007). Healthcare workers not only require accurate knowledge when it comes to IYCF, but also the counselling skills needed to build a trusting and understanding relationship with

mothers living with HIV (Tuthill, McGrath & Young 2014). Healthcare workers that lack the necessary counselling skills can leave mothers feeling judged or unsupported. Conversely, supportive counselling can leave mothers with a sense of gratitude and confidence. The counselling skills of a healthcare worker can have a significant impact on a mother's infant feeding choice (Tuthill *et al* 2014). Professional support with effective counselling skills has been identified as critically important for the success of breastfeeding (Schmied, Beake, Sheehan, McCourt & Dykes 2011). A lack of rapport between mothers and healthcare workers can inhibit learning by mothers, leading to a lack of confidence and less successful breastfeeding (Schmied *et al* 2011).

Poorly communicated information by healthcare workers can lead to misconceptions by mothers (Mogre, Dery & Gaa 2016). Healthcare workers require a fundamental understanding of the sociocultural environments of their patients in order to provide effective counselling services (Leshabari *et al* 2007). Successful counselling involves not only the dissemination of IYCF information, but also practical support and encouragement from healthcare workers to mothers to assist them with barriers they may experience while taking into account social, cultural and economic backgrounds (Ekubagewargies, Mekonnen & Siyoum 2018; Mogre *et al* 2016).

Chaponda, Goon & Hoque (2017), highlighted concerns regarding the counselling skills of South African nurses in a study. Mothers complained of nurses 'telling' them what to do and 'shouting at' them when they did not conform. The study also found that information given to the mothers varied between nursing personnel and seemed to be based on the nurses' personal preferences. The mothers reported feeling as if they were recipients of health advice and not active members in the decision making process (Chaponda *et al* 2017).

An aspect of counselling that is of public health concern is the extraction of information from mothers by healthcare workers. An interesting Tanzanian study highlighted the need for healthcare workers to have the skills to accurately obtain IYCF information from mothers (Hussein, Mgongo, Uriyo, Damian, Stray-Pedersen, Msuya & Wandel 2019). The study found that the methods used by healthcare workers to obtain information on feeding practices since birth, to be more accurate than methods that primarily focused on infant feeding practices in the last 24 hours. This is of importance not only to give the healthcare worker a clearer understanding of the feeding situation of the mother, but also for data collection.

Inaccurate collection of information from mothers by healthcare workers can lead to data that inflates breastfeeding rates (Hussein *et al* 2019).

2.5.3 Other barriers

Knowledge and counselling skills are not the only barriers to successful IYCF counselling of mothers living with HIV. Studies have found the attitudes and beliefs of healthcare workers and staff limitations to also be barriers to IYCF counselling (Schmied *et al* 2011; Leshabari *et al* 2007; Piwoz *et al* 2006).

2.5.3.1 Attitudes and beliefs of healthcare workers regarding HIV and IYCF

The attitudes and beliefs of healthcare workers can affect how they counsel mothers living with HIV on IYCF practices (Leshabari *et al* 2007; Piwoz *et al* 2006). Two studies in Table 2.6 (Leshabari *et al* 2007; Piwoz *et al* 2006) discussed the personal beliefs and attitudes of healthcare workers, with both studies finding that the attitudes and beliefs of healthcare workers influenced the counselling messages given to mothers. It is of concern that many beliefs of the healthcare workers were in fact misbeliefs (Leshabari *et al* 2007; Piwoz *et al* 2006). A meta-synthesis of sub-Saharan African studies found that some healthcare workers had negative feelings to the changes in the HIV and IYCF recommendations, as they believed that changes in messages confuses mothers and leads to mistrust (Tuthill *et al* 2014). To overcome barriers of attitudes and beliefs, healthcare workers should be actively engaged when guidelines are updated, informing them of the rationale behind the changes, in order to ensure their support (West *et al* 2019).

2.5.3.2 Staff limitations and time constraints

Staff limitations and time constraints were identified as barriers to quality IYCF counselling in one of the studies in Table 2.6 (Piwoz *et al* 2006). According to a meta-analysis, inadequate time spent by healthcare workers with mothers in understaffed facilities, can result in a lack of rapport and poor relationships between healthcare workers and mothers. This inhibits learning by mothers, leading to a lack of breastfeeding confidence and shorter breastfeeding durations (Schmied *et al* 2011). Rushed interactions with healthcare workers have been reported as being unhelpful by mothers (Schmied *et al* 2011). Adequate human resources are imperative for the success of IYCF programmes (Wuehler & Hassoumi 2011).

The frequency and intensity of counselling affects IYCF practices of mothers (Ochola *et al* 2012). An intervention study in Kenya found routine nutrition education in group sessions to be associated with a very low exclusive breastfeeding prevalence of only 5.6% at six months. This was for the control group, which received no additional counselling by the research team. In one intervention group, mothers received one semi-intensive individual counselling session and the prevalence of exclusive breastfeeding at six months was significantly higher than that of the control group (9.2% vs. 5.6%). In another intervention group, mothers received seven individual counselling sessions. In this intervention group, the prevalence of exclusive breastfeeding was 23.6%, more than four times greater than that of the control group (5.6%) (Ochola *et al* 2012). Adequate staffing is essential for healthcare workers to be able to have adequate time to provide effective IYCF counselling (Piwoz *et al* 2006).

2.6 Conclusion

Breastfeeding is recognised as the best source of nutrition for infants in the first six months of life and continues to be an important source of nutrition until two years of age. Not only does breast milk contain the nutrients infants require, it also provides many biological properties, which offer both short- and long-term health, cognitive and economic benefits. For these reasons the WHO strongly recommends mothers exclusively breastfeed their infants for the first six months of life, followed by the introduction of appropriate complementary foods, with continued breastfeeding until two years of age. This recommendation has been adopted in South Africa for mothers in the general population and for those living with HIV. Although breastfeeding does carry a small risk of HIV transmission, the benefits of breastfeeding far outweigh this risk. With PMTCT programmes, such as the one in South Africa, now recommending the use of maternal ART, mother-to-child transmission rates have been drastically reduced. The South Africa PMTCT programme and IYCF policy strongly recommend breastfeeding as the ideal feeding choice for mothers living with HIV. It is the responsibility of healthcare workers to counsel mothers on IYCF practices and to provide mothers living with HIV with accurate and consistent information in line with their countries' recommendations. However, many healthcare workers are not knowledgeable about HIV and IYCF or do not possess the necessary skills for effective IYCF counselling. Whether this is the case for healthcare workers in eThekwini, KZN is not known. Therefore, this study aimed to assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at eThekwini, KZN regional state hospital ARV, paediatric and

antenatal departments, regarding IYCF in the context of HIV. The next chapter discusses the methods used in this study.

CHAPTER 3: METHODS

This chapter presents the background information on the study sites, type of study, study population and sample selection. The materials and methods, content and face validity, data collection, pilot study, data quality control, reduction of bias, statistical analysis of the data and ethical considerations are also discussed.

3.1 Background information on the study sites

The study was conducted in eThekwini, South Africa. EThekwini is one of nine districts in the South African province of KZN. The district covers an area of approximately 2 297 km² and includes the city of Durban (eThekwini Municipality 2019). A map of eThekwini is shown in Figure 3.1.

Figure 3.1: Map of eThekwini, KZN (Municipalities of South Africa 2019)

EThekwini has a total population of 3.7 million people, of which 650 000 are living with HIV (eThekwini Municipality 2018). There are seventeen state hospitals in eThekwini, six of which are regional hospitals (Department of Health KZN 2019a). Three of the regional hospitals (RK Khan Hospital, Addington Hospital and Prince Mshiyeni Memorial Hospital), were included in the study. The selected hospitals are busy regional hospitals that all provide paediatric, ARV and antenatal services (Department of Health KZN 2019b; Department of Health KZN 2019c; Department of Health KZN 2019d; Department of Health KZN 2019e).

3.2 Type of study

The study was a cross-sectional, descriptive survey. Cross-sectional studies involve the collection of data from subjects at one given point in time. Cross-sectional designs entail criterion-groups of subjects being studied at a single point in time (Grove, Burns & Gray 2012, p220). In this study, the subjects were permanently employed doctors and nursing staff working in ARV, antenatal departments and paediatric departments in the regional hospitals. The differences between the subjects that were analysed included the following: age, sex, occupation, which department they worked in, how long they had worked in that department, if they had received training on HIV and IYCF and if they received updates regarding policies on HIV and IYCF. With cross-sectional studies, data is collected from the participants at one point in time with no follow up (Grove *et al* 2012, p220), as was the case in the current study. The study was descriptive as it described the knowledge and counselling practices of doctors and nurses concerning HIV and IYCF, using a self-administered questionnaire, without any intervention. Descriptive studies aim to gain more understanding of a particular matter as it occurs naturally, without any intervention or manipulation (Grove *et al* 2012, p215).

3.3 Study population and sample selection

The study population primarily consisted of permanently employed doctors and nursing staff working in ARV, antenatal and paediatric departments in the participating regional hospitals. A convenience sample was used: all staff members who met the selection criteria and who were on duty on the days of data collection, were invited to participate in the study. A response rate of 80% was required to ensure adequate representation of the departments. Doctors and nurses who participated in the pilot study were not invited to participate in the main study.

3.4 Study materials and methods

3.4.1 Self-administered questionnaire

A self-administered questionnaire was designed to assess the knowledge and counselling practices of healthcare workers concerning IYCF in the context of HIV (Appendix A). The questionnaire was based on IYCF recommendations included in the South African 2013 IYCF policy, the IYCF policy's 2017 amendment (Circular No. 3 of 2017/2018 HIV/AIDS, TB & MCWH) and the 2015 National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults (NDoH 2013; NDoH 2015; NDoH 2017). Respondents were assured that their responses to the questionnaire would remain anonymous and that they were not completing a 'test', encouraging them to answer truthfully.

The questionnaire consisted of eight sections, namely: demographic information (section A); training (section B); counselling on HIV and IYCF (section C); confidence to counsel mothers living with HIV on different aspects of IYCF (section D); knowledge on IYCF (section E); knowledge on risk of transmission (section F); understanding of terms, determining ART compliance and recommendations (section G) and; opinions on guidelines, compliance and practices (section H). The questionnaire consisted predominantly of closed-ended questions, while section G included open-ended questions only. The majority of the questions were closed-ended questions to reduce the time taken to complete the questionnaire and reduce respondent fatigue, which could have potentially lead to unreliable data. Respondent fatigue occurs when a participant becomes tired or bored with a study, which can affect the responses and study findings (Grove *et al* 2012, p719).

A Likert scale was used in section C to investigate confidence. In the Likert scale 1=not confident at all and 6=very confident. Knowledge scores of the participants were calculated for sections E, F and G. Healthcare workers in South Africa are required to maintain and update their professional competence by accruing continuing professional development (CPD) points (HPCSA 2017). One way to obtain these points is by reading journal articles and completing assessments afterwards. In order to qualify for the points the respondent has to score 70% or above in the assessment (HPCSA 2017). Thus, a knowledge mark of 70% was considered as 'acceptable' in the current study. Two questions were excluded from section E of the questionnaire at the data capturing stage, due to ambiguity with the question. Question 6.4 ('Mothers living with HIV can introduce solid foods if their infant shows signs

of readiness') was excluded as it did not include a specific age, which made the question ambiguous. Question 6.15 ['Infant polymerase chain reaction (PCR) testing should be done for infants of mothers living with HIV at 6 weeks of age'] was also excluded. Although PCR testing is no longer routinely done at six weeks (rather at 10 weeks or 18 weeks), it is still acceptable to test at six weeks if the infant is symptomatic of HIV or their birth PCR was not done. This led to the question being considered confusing by a number of participants. This was indicated to the researcher during data collection either verbally or as written comments in the questionnaire. However, these questions were not flagged as being ambiguous during the pilot study. Question 11 (from section F of the questionnaire) which asked, 'What percentage of babies born HIV negative, acquired HIV through breastfeeding in 2017 in eThekwini?' was excluded from the data analysis. This was because the researcher was not able to obtain this information from Department of Health KZN, as this data is not routinely captured in the province.

3.4.2 Content and face validity

Content validity and face validity were ensured in the current study. Content validity pertains to the degree to which an instrument fully assesses or measures the construct of interest (Bolarinwa 2016). In this study, the researcher conducted extensive research on HIV and IYCF and the NDoH guidelines, to ensure content validity of the questionnaire. Face validity refers to the extent to which an instrument 'looks' valid. Face validity is established when an individual who is an expert on the research subject reviews a questionnaire and concludes that it measures the characteristic or trait of interest (Bolarinwa 2016). In the current study, three leading experts in the field of HIV and IYCF scrutinized the questionnaire. The questionnaire was revised based on the feedback from the experts. All three experts approved of the final version of the questionnaire. Table 3.1 includes a summary of the professional details of the expert panel.

Table 3.1: Professional qualifications and achievements of the expert panel

Name	Summary of professional qualifications and achievements
Dr Nigel Rollins	Dr Nigel Rollins is a paediatrician who has been part of the WHO Department of Maternal, Newborn, Child and Adolescent Health Research team since 2008. His research mainly focuses on PMTCT and IYCF. He has authored and co-authored a number of publications on HIV and IYCF and is globally recognized as an expert in the field.
Lynne Haskins	Lynne Haskins is a researcher at the Centre of Rural Health at UKZN. She is a professional nurse with qualifications in general nursing, midwifery, community nursing, primary healthcare, pharmacology and occupational nursing. She has extensive experience in the research field and has been involved in a number of studies related to HIV and IYCF.
Penny Reimers	Penny Reimers is a midwife, community and occupational health nurse practitioner and international board certified lactation consultant, who is currently employed by the Department of Paediatrics at UKZN as a researcher and lactation consultant.

3.5 Data collection

Data was collected between July and December 2018. Where possible, the researcher supervised the completion of the questionnaires and immediately collected the questionnaires after completion. On some occasions, the study participants were not available to complete the questionnaire at a set time and date, due to their high workload. In these cases, the researcher issued the questionnaire to the participants directly or to the secretary of their department and then collected the questionnaires at a later more convenient stage.

3.6 Pilot study

The questionnaire was field-tested and adapted based on comments from the pilot study participants. The pilot study was conducted at RK Khan Hospital on 22 May 2018. Eleven people participated in the pilot study (three medical officers, two consultants, three professional nurses and three enrolled nurses working in the hospital's ARV, antenatal and paediatric departments). The researcher met with the heads of the relevant departments and requested them to identify and invite staff who met the study inclusion criteria, to participate

in the pilot study. The pilot study was conducted in a boardroom under the supervision of the researcher. The nature of the study and the purpose of the pilot study were verbally explained to the potential participants. An information sheet was also given to the participants, detailing the purpose and nature of the study. The researcher explained that the study was voluntary, that there were no risks associated with the study, that there was no remuneration for participation and the details of ethical approval received. Potential participants who agreed to participate in the pilot study signed a consent form. The participants were then asked to complete the questionnaire and to make any comments or suggestions on any aspect that was confusing or unclear. The participants were also encouraged to verbally ask the researcher any questions they had. The researcher timed how long it took participants to complete the questionnaire and found that participants took between 18 and 35 minutes.

Based on the comments from the pilot study, a few questions were reworded to prevent ambiguity. The pilot study questionnaires did not contain any names and were all completely anonymous. However, a register of the names of the participants was kept to ensure that the pilot study participants were excluded from the main study. The names were not divulged in any way by the researcher and anonymity was maintained.

3.7 Data quality control

The data was entered into Microsoft Excel by the researcher and cross-checked by a research assistant to ensure that data was captured accurately. Some of the answers given to question 15 of the questionnaire ('When would you recommend that a mother living with HIV stops breastfeeding?') included scenarios not covered in the IYCF Policy (NDoH 2013). These answers were forwarded to the National Nutrition Directorate of South Africa for comment. Feedback was given by a dietitian at the National Nutrition Directorate, and then coded accordingly. The National Nutrition Directorate was also asked to confirm the answers for two of the true and false questions. These questions were question 6.17 ('A mother living with HIV who is adherent to ART and has introduced solids foods at 5 months, should be encouraged to return to exclusive breastfeeding') and question 6.20 ('Mothers infected with HIV who are non-compliant with their ART should be encouraged to formula feed'). The National Nutrition Directorate confirmed question 6.17 to be 'true' and question 6.20 to be 'false', as per the IYCF policy (Behr 2019; NDoH 2013; NDoH 2015).

3.8 Reduction of bias

Although the researcher aimed to be present to answer any questions at each data collection session, this was not feasible for many departments due to the workload of the participants. In cases where the researcher did supervise completion of questionnaires, the researcher ensured that there were no posters or other materials containing IYCF information in the venues that used for data collection. Participants were reminded that the questionnaires needed to be completed honestly and without discussion with each other. Participants were not allowed to use cell phones or other electronic devices during the completion of the questionnaires. In instances where the researcher was unable to supervise the completion of the questionnaire, the researcher issued the questionnaires to the participant and collected the completed questionnaires at a later time. In these instances, the researcher explained the nature of the study to the participant and asked them to complete the questionnaire honestly. In the cases where the departmental secretary issued and collected the questionnaires, a letter was attached to the questionnaire explaining the purpose of the study and requesting that the questionnaire be completed honestly (Appendix B). It is possible that individuals who were more concerned about IYCF and/or HIV volunteered to participate in the study, while those not concerned would have chosen not to participate. This potentially introduced bias.

3.9 Statistical analysis

Data from the questionnaires were captured electronically in Microsoft Excel by the researcher and cross-checked by a research assistant. Data was analysed by a statistician using the Statistical Package for Social Sciences (SPSS) programme, version 22. The tests used to analyse the data are listed and explained in Table 3.2. A p-value of <0.05 was considered significant.

Table 3.2: Tests used in statistical analysis

Test	Description of test:
Descriptive statistics	Brief descriptive statistics that summarise a given data set, such as means and standard deviations, where applicable.
Chi-square goodness-of-fit-test	A univariate test, used on a categorical variable to test whether any of the response options are selected significantly more/less often that the others.
Chi-square test of independence	Used on cross-tabulations to see whether a significant relationship exists between the two variables represented in the cross-tabulation. When conditions are not met, the Fisher's exact test is used.
Binomial test	Tests whether a significant proportion of respondents select one of a possible two responses.
Pearson's correlation	Pearson's correlation coefficient is a measure of linear association between two interval variables.
One sample t-test	Tests whether a mean score is significantly different from a scalar value.
Analysis of variance (ANOVA)	A test for several independent samples that compares two or more groups of cases in one variable.
Welch	An alternative method to ANOVA used when conditions for ANOVA are not met.

3.10 Ethical considerations

Ethical clearance was obtained from the Biomedical Research Ethics Committee of the UKZN (Reference: HSS/0296/018M) (Appendix C) as well as from the KZN Department of Health Research Committee (Reference: HRKM129/18 KZ_201803_036) (Appendix D). Approval was also obtained from the Chief Executive Officers or Medical Managers of the different health facilities that were used in this study (Appendix E).

Consent forms and information sheets were issued to all participants (Appendix F). The information sheets included the purpose and nature of the study as well as statements about the study being voluntary, that no risks were associated with participation, that there would be no remuneration for participation and an estimation of how long the questionnaire would

take to complete. The contact details of the researcher and supervisor were included and the details of the ethics committees that approved the study were included. The signed consent forms were returned to the researcher and the participants kept the information sheets. The hard copies of the questionnaires will be kept under lock and key in the Dietetics Department with the supervisor for a period of five years. The electronic data will be saved, password protected and kept with the supervisor.

CHAPTER 4: RESULTS

This chapter presents and describes the results of the study. There were some non-responses to most of the questions. In most cases, this was less that 5% and appeared to be missing completely at random. Close inspection of the data showed that for those questions for which non-responses exceeded 5%, it was because of some questions not being applicable to some of the respondents. It was therefore decided that doing a complete case analysis each time was acceptable and would not bias the results.

4.1 Response rate

The number of eligible doctors and nurses on duty on data collection days was used to calculate the response rate for the study. There was a total response rate of 82.2% (n=175) (Table 4.1). Thirteen other eligible healthcare workers from other departments or were other professions also participated in the study. However, they were not included in the response rate calculation, as it was not known how many of them were on duty on the data collection days. This resulted in a total number of participants of 188.

Table 4.1: Response rate

Department	Profession	Total on duty n	Participated in study n	Response rate %
ARV	Doctors	9	9	100.0
	Nurses	25	21	84.0
	Total	34	30	88.2
Paed	Doctors	27	24	88.9
	Nurses	94	69	73.4
	Total	121	93	76.9
ANC	Doctors	35	29	82.9
	Nurses	23	23	100.0
	Total	58	52	89.7
Overall	**Doctors and nurses**	213	175	82.2

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology).

4.2 Demographic characteristics of the participants

The study sample consisted of 188 healthcare workers. Of that, 99 worked in paediatric departments (paediatric group) (52.7%), 56 worked in antenatal departments (ANC group) (29.8%) and 30 worked in ARV clinics (ARV group) (16.0%). Two were from other departments (1.1%) (one participant worked in the medical register specialist clinic but occasionally rotated to the hospital's ARV clinic and the other participant worked in the hospital's milk kitchen, a subdivision of their paediatric department). One participant never indicated which department they worked in (0.5%). The majority of participants were female (n=154; 81.9%). The demographic characteristics of the participants are presented in Table 4.2.

Table 4.2: Demographic characteristics of the participants (n=188)

	ARV (n=30)		**Paed** (n=99)		**ANC** (n=56)		**Other** (n=2)		**Total** (n=188)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Gender										
Male	5	16.7	8	8.1	20	35.7	1	50.0	34	18.1
Female	25	83.3	91	91.9	36	64.3	1	50.0	154*	81.9
Age										
22-25 years	0	0.0	4	4.0	0	0.0	0	0.0	4	2.1
26-30 years	1	3.3	13	13.1	5	8.9	0	0.0	19	10.1
31-35 years	6	20.0	21	21.2	17	30.4	1	50.0	45	23.9
36-45 years	11	36.7	30	30.3	16	28.6	0	0.0	57	30.3
46-55 years	9	30.0	19	19.2	12	21.4	0	0.0	40	21.3
>55 years	3	10.0	12	12.1	5	8.9	1	50.0	22*	11.7

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *One participant indicated their age and gender, but not which department they worked in.

4.3 Professional characteristics of the participants

The professional characteristics of the participants are summarised in Table 4.3. The majority of the participants were professional nurses (n=70; 37.2%) followed by enrolled nurses (n=44; 23.4%), medical officers (n=36; 19.1%), medical consultants (n=19; 10.1%), medical registrars (n=8; 4.3%), enrolled auxiliary nurses (n=7; 3.7%), HIV counsellors (n=2; 1.1%) and a ward clerk (n=1; 0.5%). One participant (n=1; 0.5%) never indicated their

professional status nor which department they worked in. Table 4.3 also includes a summary of the length of time the participants spent working in their current department, at the time of the study. Sixty-six (35.1%) of participants had been working in their specified department for a period of between five and less than 10 years.

Table 4.3: Professional characteristics and work experience (n=188)

	ARV (n=30)		Paed (n=99)		ANC (n=56)		Other (n=2)		Total (n=188)*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Professional status										
Medical officer	7	23.3	13	13.1	15	26.8	1	50.0	36	19.1
Medical registrar	1	3.3	2	2.0	5	8.9	0	0.0	8	4.3
Medical consultant	1	3.3	9	9.1	9	16.1	0	0.0	19	10.1
Professional nurse	7	23.3	43	43.4	20	35.7	0	0.0	70	37.2
Enrolled nurse	14	46.7	26	26.3	3	5.4	1	50.0	44	23.4
Enrolled auxiliary nurse	0	0.0	5	5.1	2	3.6	0	0.0	7	3.7
HIV counsellor	0	0.0	0	0.0	2	3.6	0	0.0	2	1.1
Ward clerk	0	0.0	1	1.0	0	0.0	0	0.0	1	0.5
Years										
< 2 years	5	16.7	12	12.1	16	28.6	0	0.0	33	17.6
2 - < 5 years	6	20.0	35	35.4	13	23.2	1	50.0	55	29.3
5 - < 10 years	16	53.3	33	33.3	16	28.6	1	50.0	66	35.1
10 - < 20 years	3	10.0	13	13.1	6	10.7	0	0.0	22	11.7
≥ 20 years	0	0.0	6	6.1	5	8.9	0	0.0	11	5.9

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *The participant who did not indicate which department they worked in did not answer both of these questions; therefore, percentages do not add up to 100%.

4.4 Infant and young child feeding training

Participants in the paediatric group had received the most formal training on IYCF in the context of HIV (n=53; 53.5%). Twenty-nine (51.8%) participants working in the ANC group and nine participants (30.0%) from the ARV group had also been trained. Overall, the majority of participants in the sample (n=97; 51.6%) indicated they had not been formally trained on IYCF in the context of HIV (Table 4.4).

Table 4.4: Attendance of IYCF and HIV training (n=188)

	ARV (n=30)*		Paed (n=99)		ANC (n=56)		Other (n=2)		Total (n=188)*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Attendance of training										
Attended	9	30.0	53	53.5	27	48.2	0	0.0	89	47.3
Did not attend	20	66.7	46	46.5	29	51.8	2	100	97	51.6

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *Two participants did not answer, including the participant who never specified which department they worked in and a participant from the ARV clinic group; therefore, percentages do not add up to 100%.

Table 4.5 includes a summary of the type of training that was attended by those who indicated they had been formally trained and when they were trained. The most common training programme across all groups was the Department of Health three day IYCF training course (this is a local adaptation of the BFHI course developed by the WHO and UNICEF). Of the 89 participants who indicated that they had been trained on IYCF in the context of HIV, 67 (75.3%) indicated that they attended the Department of Health training programme, 20 (22.5%) indicated they had been trained as part of their degree or diploma and 16 (18.0%) indicated they had received other training. Some of the other training attended included the more in-depth five day IYCF training course (n=3; 3.4%), presentations by hospital dietitians (n=2; 2.2%), nurse initiated management of ART training course (n=1; 1.1%) and a training hosted by a non-government organization (n=1; 1.1%). A significant proportion (n=40; 75.5%) of those in the paediatric group indicated that they had attended the three day IYCF training, ($p<0.05$), while a significant proportion (n=48; 90.6%) had not undergone any formal training on HIV and IYCF as part of their degree or diploma ($p<0.05$). A significant proportion (n=21; 77.8%) of those in the ANC group indicated that they were not trained on IYCF in the context of HIV as a part of their formal degree or diploma ($p<0.05$). For the overall sample, only 40.4% (n=36) of the participants who had been trained on IYCF in the context of HIV had been trained between 2016 and 2018.

Table 4.5: Type of training attended by healthcare workers (n=89)

	ARV (n=9)		Paed (n=53)		ANC (n=27)		Total (n=89)	
	n	**%***	**n**	**%***	**n**	**%***	**n**	**%***
Type of training								
Three day IYCF training	7	77.8	40	75.5	20	74.1	67	75.3
Part of degree/diploma	3	33.3	9	17.0	8	29.6	20	22.5
Other	0	0.0	10	18.9	6	22.2	16	18.0
	ARV (n=9)**		**Paed** (n=53)**		**ANC** (n=27)**		**Total** (n=89)**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Year								
2016-2018	3	33.3	23	43.4	10	37.0	36	40.4
Before 2016	3	33.3	21	39.6	11	40.7	35	39.3

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *Participants were allowed to select more than one answer; therefore, percentages exceed 100%. **Some participants did not answer; therefore, percentages do not add up to 100%.

4.5 Updates on guidelines

Table 4.6 shows how many participants indicated they received updates on HIV and IYCF guidelines, how often they received updates and how they received updates. A significant number in the paediatric group (n=71; 71.7%) ($p<0.05$) and a significant number in the total group (n=115; 61.2%) ($p<0.05$) indicated they received updates on HIV and IYCF guidelines. There were no significant findings regarding the frequency with which participants received updates on HIV and IYCF guidelines for the ARV group and for the total group. In the paediatric group, a significant number (n=21; 29.6%) ($p<0.05$) indicated that they received updates 'at least every 6 months' and a significant number in the same group (n=28; 39.4%) ($p<0.05$) also indicated that they received updates 'at least once a year'. In the ANC group, a significant number (n=9; 29.0%) ($p<0.05$) indicated that they received these updates 'at least every 3 months' and a significant number (n=13; 41.9%) ($p<0.05$) in the same group indicated they received updates 'at least once a year.' Just over half of the participants (n=62; 53.9%) indicated they received updates during training or in-service, while 47%

(n=54) indicated they received updates at meetings. Interestingly, 24 participants (20.9%) in the overall group indicated they received updates via multiple strategies.

Table 4.6: Receipt of IYCF and HIV updates (n=188)

	ARV (n=30)*		**Paed** (n=99)*		**ANC** (n=56)		**Other** (n=2)		**Total** (n=188)*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Receipt of updates										
Total not receiving updates	15	50.0	27	27.3	25	44.6	2	100	69	36.7
Total receiving updates	12	40.0	71	71.7	31	55.4	0	0.0	115	61.2
	ARV (n=12)		**Paed** (n=71)		**ANC** (n=31)		**Other** (n=0)		**Total** (n=115)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Frequency of updates										
At least every 3 months	4	33.3	12	16.9	9	29.0	0	0.0	25	21.7
At least every 6 months	0	0.0	21	29.6	7	22.6	0	0.0	28	24.3
At least once a year	6	50.0	28	39.4	13	41.9	0	0.0	48	41.7
Less than once a year	2	16.7	10	14.1	2	6.5	0	0.0	14	12.2
	ARV (n=12)		**Paed** (n=71)**		**ANC** (n=31)**		**Other** (n=0)		**Total** (n=115)**	
	n	**%**	**n**	**n**	**%**	**%**	**n**	**%**	**n**	**%**
Method										
Email	4	33.3	10	0	0.0	16.1	0	0.0	19	16.5
Training or in-service	4	33.3	43	0	0.0	45.2	0	0.0	62	53.9
Meetings	4	33.3	31	0	0.0	61.3	0	0.0	54	47.0
Other	0	0.0	1	0	0.0	6.5	0	0.0	3	2.6

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *Some participants did not answer; therefore, percentages do not add up to 100%. **Participants were allowed to select more than one answer; therefore, percentages exceed 100%.

4.6 Policy awareness

Table 4.7 indicates how many participants had seen a copy of the IYCF policy in their department. A significant number of participants in the total group (n=102; 54.3%) ($p<0.05$)

indicated that they had seen a copy of the IYCF policy in their department. A significant relationship was found between the department and having seen a copy of the IYCF policy in their department. More participants than expected had seen a copy of the policy in the paediatric (n=58; 58.6%) ($p<0.05$) and antenatal departments (n=30; 53.6%) ($p<0.05$).

Table 4.7: IYCF policy awareness (n=188)

	ARV (n=30)		Paed (n=99)*		ANC (n=56)		Other (n=2)		Total (n=188)*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Policy seen										
Yes	13	43.3	58	58.6	30	53.6	0	0.0	102	54.3
No	13	43.3	22	22.2	14	25.0	2	100	51	27.1
Unsure	4	13.3	18	18.2	12	21.4	0	0.0	34	18.1

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *Some participants did not answer; therefore, percentages do not add up to 100%.

4.7 Training needs

Table 4.8 shows a summary of the responses of the participants when asked if they felt they required additional training on IYCF in the context of HIV. A significant number of participants (n=173; 92.0%) across all the departments indicated a need for additional training ($p<0.05$).

Table 4.8: Need for additional training (n=188)

	ARV (n=30)		Paed (n=99)		ANC (n=56)		Other (n=2)		Total (n=188)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Require more training										
Yes	26	86.7	93	93.9	50	89.3	2	100	173	92.0
No	4	13.3	6	6.1	6	10.7	0	0.0	15	8.0

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *One participant did not answer; therefore, percentages do not add up to 100%.

Out of the 188 participants who indicated they felt they required further training, 173 indicated in which specific areas they required additional training. Table 4.9 includes a summary of these areas. Of the 10 participants that indicated 'other,' only five specified a

topic. These topics included mixed feeding (n=2; 1.2%), ART medications and breastfeeding (n=2; 1.2%) and antibodies from breast milk (n=1; 0.6%).

A significant number of participants in the total group indicated that they required more training on both infant feeding and treatment failure (n=113; 65.3%) ($p<0.05$) and infant feeding advice with regards to non-compliant mothers (n=124; 71.7%) ($p<0.05$).

It is interesting to note that a significant number in the total group (n=108; 62.4%) indicated they did not require additional training on practical skills regarding breastfeeding ($p<0.05$). A significant number in the total group (n=112; 64.7%) also indicated that they did not require additional training on practical skills regarding formula feeding (n=58; 33.5%) ($p<0.05$).

Table 4.9: Specific additional training areas (n=173)

	Total (n=173)	
	n	**%**
Training area		
Why mothers living with HIV are advised to breastfeed vs. formula feed	90	52.0
Continued breastfeeding after 6 months	87	50.3
Complementary feeding	77	44.5
Practical skills regarding breastfeeding	61	35.3
Practical skills regarding formula feeding	58	33.5
Infant feeding and treatment failure	113	65.3
Infant feeding advice with regards to non-compliant mothers	124	71.7
Other	10	5.8

4.8 Areas trained on

Table 4.10 includes a summary of IYCF and HIV topics that the participants had been trained on. More participants indicated that they had been trained on these items than had indicated they had attended training in question 2.1 (Table 4.4). Significant numbers in the total group indicated they had been trained on all the mentioned areas ($p<0.05$).

Table 4.10: Topics healthcare workers had been trained on (n=188)

	Total (n=188)	
	n	**%**
Trained on the following		
The importance of exclusive breastfeeding for the baby for the first six months of life	165	87.8
Importance of continued breastfeeding with appropriate complementary feeding after six months	139	73.9
Importance of breastfeeding for the mother	159	84.6
The importance of immediate skin-to-skin contact after birth	158	84.0
Positioning and attachment	154	81.9
Hand expression of breast milk	141	75.0
The risks and hazards of not breastfeeding	156	83.0
ART adherence	144	76.6

4.9 Frequency of counselling

Table 4.11 summarises how often participants in the different groups counselled mothers in different scenarios. A significant relationship was found between department and frequency of counselling pregnant women living with HIV on IYCF ($p<0.05$). In the ANC group, a significant number (n=24), indicated that they counselled mothers living with HIV on IYCF 'at least once a day,' whereas in the ARV group a significant number (n=11) indicated they counselled these mothers 'at least once a month.' In the paediatric group a significant number (n=41) indicated that they 'never' counselled pregnant women living with HIV on IYCF.

A significant relationship was found between department and frequency of counselling pregnant women living with HIV who intend to go back to work before their infants are six months old ($p<0.05$). Significant numbers in the ANC group indicated that they counselled these mothers 'at least once a day' (n=19) or 'at least once a week' (n=11). In the ARV group a significant number indicated that they counselled these mothers 'less than once a

month' (n=7). In the paediatric group a significant number (n=46) indicated that they 'never' counselled these mothers.

A significant relationship was found between department and frequency of counselling pregnant women living with HIV who are not compliant with their ART on infant feeding ($p<0.05$). A significant number in the ANC group (n=14) indicated that they counselled a mother in this scenario 'at least once a day.' In the ARV group, a significant number indicated that they counselled these mothers 'less than once a month' (n=9) and in the paediatric group a significant number (n=43) indicated that they 'never' counselled these mothers.

A significant relationship was found between department and frequency of counselling exclusively breastfeeding mothers living with HIV on IYCF practices ($p<0.05$). A significant number in the ANC group (n=18) indicated that they counselled mothers in this scenario 'at least once a day.' In the paediatric group, a significant number (n=33) indicated that they counselled these mothers 'at least once a week.' In the ARV group, a significant number (n=5) indicated that they 'never' counselled mothers in this scenario.

A significant relationship was found between department and frequency of healthcare workers observing a mother living with HIV breastfeeding her baby ($p<0.05$). A significant number in the paediatric group (n=44) indicated that they observed these mothers breastfeeding 'at least once a day.' In the ARV group a significant number indicated that they observed these mothers breastfeeding 'at least once a month' (n=7) or they 'never' observed them breastfeeding (n=8). In the ANC group a significant number indicated that they 'never' observed mothers living with HIV breastfeeding (n=12).

A significant relationship was found between department and frequency of counselling mothers living with HIV experiencing breast engorgement on the management of engorgement ($p<0.05$). A significant number in the paediatric group (n=19) indicated that they counselled a mother on the management of engorgement 'at least once a week.' In the ANC group, a significant number (n=26) indicated that they counselled a mother on the management of engorgement 'less than once a month' and a significant number in the ARV group (n=14) indicated that they 'never' did this kind of counselling.

A significant relationship was found between department and frequency of counselling postnatal mothers living with HIV on IYCF while they are still in hospital ($p<0.05$). A significant number (n=21) in the paediatric group indicated that they counselled postnatal mothers living with HIV on IYCF while they are still in hospital 'at least once a week.' In the ANC group a significant number (n=15) indicated that they counselled these mothers on IYCF 'less than once a month' and in the ARV group a significant number (n=15) indicated that they 'never' counselled mothers in this scenario.

A significant relationship was found between department and frequency of counselling mothers living with HIV IYCF within one week of delivery ($p<0.05$). In the paediatric group, a significant number (n=26) indicated that they counselled these mothers on IYCF within one week of delivery 'at least once a day.' In the ANC group a significant number (n=18) indicated that they counselled mothers on IYCF within one week of delivery 'less than once a month.' A significant number (n=17) in the ARV group indicated that they 'never' counselled mothers living with HIV on IYCF within one week of delivery.

A significant relationship was found between department and frequency of counselling mothers living with HIV on correct formula preparation ($p<0.05$). In the paediatric group a significant number (n=17) indicated that they counselled mothers living with HIV on correct formula preparation 'at least once a month,' whereas a significant number in the ARV and ANC groups (n=12 and n=22, respectively) indicated that they 'never' counselled mothers living with HIV on correct formula preparation.

Table 4.11: Frequency of IYCF counselling (n=185)

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling pregnant women on IYCF						
Never	4	13.3	41	41.4	3	5.4
Less than once a month	4	13.3	14	14.1	7	12.5
At least once a month	11	36.7	16	16.2	8	14.3
At least once a week	4	13.3	15	15.2	13	23.2
At least once a day	6	20.0	7	7.1	24	42.9
Counselling pregnant women who intend to go back to work before six months on IYCF						
Never	7	23.3	46	46.5	6	10.7
Less than once a month	7	23.3	9	9.1	7	12.5
At least once a month	7	23.3	18	18.2	11	19.6
At least once a week	2	6.7	12	12.1	11	19.6
At least once a day	5	16.7	6	6.1	19	33.9

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling pregnant women who are not compliant with their ART on IYCF						
Never	3	10.0	43	43.4	7	12.5
Less than once a month	9	30.0	17	17.2	8	14.3
At least once a month	6	20.0	12	12.1	12	21.4
At least once a week	6	20.0	15	15.2	14	25.0
At least once a day	3	10.0	4	4.0	14	25.0
Counselling exclusively breastfeeding mothers on IYCF						
Never	5	16.7	5	5.1	4	7.1
Less than once a month	9	30.0	18	18.2	14	25.0
At least once a month	7	23.3	15	15.2	10	17.9
At least once a week	4	13.3	33	33.3	8	14.3
At least once a day	3	10.0	22	22.2	18	32.1

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling exclusively formula feeding mothers on IYCF						
Never	6	20.0	4	4.0	9	16.1
Less than once a month	6	20.0	19	19.2	9	16.1
At least once a month	8	26.7	23	23.2	14	25.0
At least once a week	2	6.7	23	23.2	9	16.1
At least once a day	4	13.3	24	24.2	12	21.4
Counselling mixed feeding mothers on IYCF						
Never	3	10.0	6	6.1	10	17.9
Less than once a month	7	23.3	18	18.2	13	23.2
At least once a month	9	30.0	20	20.2	10	17.9
At least once a week	4	13.3	27	27.3	11	19.6
At least once a day	3	10.0	21	21.2	9	16.1

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling postnatal mothers who intend to go back/ or have returned to work before their infant is six months on IYCF						
Never	12	40.0	17	17.2	13	23.2
Less than once a month	4	13.3	18	18.2	13	23.2
At least once a month	6	20.0	23	23.2	12	21.4
At least once a week	3	10.0	21	21.2	8	14.3
At least once a day	2	6.7	15	15.2	6	10.7
Observation of a mother breastfeeding						
Never	8	26.7	3	3.0	12	21.4
Less than once a month	6	20.0	13	13.1	13	23.2
At least once a month	7	23.3	14	14.1	9	16.1
At least once a week	3	10.0	17	17.2	9	16.1
At least once a day	2	6.7	44	44.4	11	19.6

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling mothers with breast engorgement on the management of breast engorgement						
Never	14	46.7	14	14.1	8	14.3
Less than once a month	5	16.7	29	29.3	26	46.4
At least once a month	4	13.3	13	13.1	6	10.7
At least once a week	2	6.7	19	19.2	6	10.7
At least once a day	2	6.7	18	18.2	7	12.5
Counselling mothers with mastitis on the management of mastitis						
Never	16	53.3	27	27.3	14	25.0
Less than once a month	7	23.3	34	34.3	23	41.1
At least once a month	1	3.3	23	13.1	7	12.5
At least once a week	1	3.3	8	8.1	4	7.1
At least once a day	1	3.3	9	9.1	6	10.7

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling mothers with cracked nipples on the management of cracked nipples						
Never	15	50.0	18	18.2	11	19.6
Less than once a month	5	16.7	38	38.4	25	44.6
At least once a month	4	13.3	11	11.1	5	8.9
At least once a week	1	3.3	11	11.1	5	8.9
At least once a day	2	6.7	14	14.1	7	12.5
Counselling postnatal mothers who are not compliant with their ART on IYCF						
Never	8	26.7	16	16.2	10	17.9
Less than once a month	6	20.0	33	33.3	23	41.1
At least once a month	7	23.3	20	20.2	7	12.5
At least once a week	3	10.0	14	14.1	7	12.5
At least once a day	3	10.0	10	10.1	7	12.5

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counselling postnatal mothers on IYCF while they are still in hospital						
Never	15	50.0	19	19.2	12	21.4
Less than once a month	1	3.3	18	18.2	15	26.8
At least once a month	6	20.0	6	6.1	8	14.3
At least once a week	3	10.0	21	21.2	6	10.7
At least once a day	2	6.7	27	27.3	13	23.2
Counselling postnatal mothers on IYCF within one week of delivery						
Never	17	56.7	23	23.2	10	17.9
Less than once a month	3	10.0	12	12.1	18	32.1
At least once a month	2	6.7	10	10.1	9	16.1
At least once a week	2	6.7	19	19.2	9	16.1
At least once a day	3	10.0	26	26.3	8	14.3

Table 4.11: Frequency of IYCF counselling (n=185) continued

Scenario	**ARV** (n=30)*		**Paed** (n=99)*		**ANC** (n=56)*	
	n	%	n	%	n	%
Counse ling mothers on correct formula preparation						
Never	12	40.0	15	15.2	22	39.3
Less than once a month	7	23.3	25	25.3	18	32.1
At least once a month	5	16.7	17	17.2	1	1.8
At least once a week	1	3.3	20	20.2	9	16.1
At least once a day	2	6.7	15	15.2	5	8.9

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *Some participants did not answer; therefore, percentages do not add up to 100%.

4.10 Counselling confidence

Table 4.12 includes a summary of the mean counselling scores of the participants regarding different scenarios. An overall mean confidence score is also included. The scoring was based on the Likert scale, where 1=not confident at all and 6=very confident. The mean overall confidence score of the group was 4.54 (SD±1.28). A significant difference in average overall confidence levels was found between departments, with the paediatric group having a significantly higher overall confidence score (mean=4.82; SD±1.15) than the ARV group (mean=3.80; SD±1.51) ($p<0.05$). The paediatric group and the ANC group both indicated significant confidence across all areas ($p<0.05$). For the ARV group there was only significant confidence regarding the counselling of a mother with diagnosed ARV treatment failure on her infant feeding options ($p<0.05$) and significant confidence with counselling mothers living with HIV on ART adherence for both herself and her infant ($p<0.05$).

The ANC group had significantly greater levels of confidence than the ARV group for the following scenarios: 'counselling an expectant mother living without HIV on the benefits of exclusive breastfeeding for 6 months' ($p<0.05$) and 'advising a mother living with HIV on the management of mastitis' ($p=0.05$). The ANC and paediatric groups had significantly greater levels of confidence than the ARV group for the following scenarios: 'counselling an expectant mother living with HIV on the importance of skin-to-skin contact after birth' ($p<0.05$), 'counselling a mother on breastfeeding positioning and attachment' ($p<0.05$), 'counselling a mother living with HIV on when to introduce complementary food to her infant' ($p<0.05$), 'counselling a mother living with HIV on expressing breast milk' ($p<0.05$) and 'advising a mother living with HIV on the management of breast engorgement' ($p<0.05$).

The paediatric group was found to have significantly greater levels of confidence than the ARV and ANC groups for the following scenarios: 'counselling a mother on which complementary foods to give to her infant and when' ($p<0.05$) and 'counselling a mother on safe formula preparation' ($p<0.05$). The paediatric group were significantly more confident 'counselling a mother on how to identify hunger cues in her infant' than the ARV group ($p<0.05$).

Table 4.12: IYCF counselling confidence (n=181)

	ARV Mean (SD)	Paed Mean (SD)	ANC Mean (SD)	Total Mean (SD)
Counselling scenario				
Counselling an expectant mother living with HIV on the benefits of exclusive breastfeeding for six months.	4.10 (2.01)	4.79 (1.54)	5.04 (1.25)	4.73 (1.60)
Counselling an expectant mother living without HIV on the benefits of exclusive breastfeeding for six months.	4.17 (1.81)	5.02 (1.49)	5.22 (1.08)	4.91 (1.51)
Counselling an expectant mother living with HIV on the importance of skin-to-skin contact after birth.	3.89 (1.75)	5.17 (1.39)	5.13 (1.33)	4.92 (1.53)
Counselling a mother on breastfeeding positioning and attachment.	3.69 (1.85)	5.18 (1.27)	4.75 (1.40)	4.77 (1.54)
Counselling a mother on how to identify hunger cues in her infant.	3.62 (1.84)	5.01 (1.33)	4.49 (1.56)	4.59 (1.59)
Counselling a mother living with HIV on when to introduce complementary food to her infant.	3.76 (1.70)	4.98 (1.39)	4.57 (1.34)	4.63 (1.52)
Counselling a mother on which complementary foods to give to her infant and when.	3.48 (1.75)	4.85 (1.39)	4.21 (1.62)	4.41 (1.62)

Table 4.12: IYCF counselling confidence (n=181) continued

	ARV Mean (SD)	Paed Mean (SD)	ANC Mean (SD)	Total Mean (SD)
Counselling scenario				
Counselling a mother living with HIV on expressing breast milk.	3.52 (1.75)	5.00 (1.34)	4.62 (1.56)	4.62 (1.59)
Counselling a mother living with HIV on safe formula preparation.	3.86 (1.96)	5.04 (1.38)	4.04 (1.72)	4.52 (1.69)
Advising a mother living with HIV on the management of breast engorgement.	3.46 (1.82)	4.56 (1.42)	4.41 (1.35)	4.32 (1.53)
Advising a mother living with HIV on the management of cracked nipples.	3.71 (1.82)	4.51 (1.44)	4.44 (1.44)	4.34 (1.54)
Advising a mother living with HIV on the management of mastitis.	3.43 (1.83)	4.13 (1.62)	4.50 (1.30)	4.11 (1.61)
Counselling a mother with diagnosed ARV treatment failure on her infant feeding options.	4.29 (1.61)	4.34 (1.67)	4.04 (1.55)	4.22 (1.64)
Counselling a mother living with HIV on ART adherence for both herself and her infant.	4.79 (1.38)	4.84 (1.55)	4.56 (1.50)	4.72 (1.54)
Overall confidence score	**3.80 (1.51)**	**4.82 (1.15)**	**4.59 (1.09)**	**4.54 (1.28)**

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology); SD=standard deviation; Mean (SD) refers to the six-point Likert scale, where 1=not confident at all and 6=very confident.

4.11 Infant and young child feeding knowledge

The knowledge section of the question consisted of three components: (i) a true and false section; (ii) a section regarding the risk of transmission in different breastfeeding scenarios; and (iii) an open-ended section.

Table 4.13 includes a summary of the findings from the true and false section of the questionnaire, which tested knowledge of different IYCF principles. The correct answers are listed under each question. Answers that were left blank or marked as 'unsure' were considered incorrect. The mean score of the total group for the true and false section was 63.5% (SD±14.6). The paediatric group (mean=65.1%; SD±14.4) and ANC group (65.2%; SD±13.9) had significantly higher knowledge scores for this section than the ARV group (54.7%; SD±14.3) ($p<0.05$).

Table 4.13: Knowledge of IYCF in the context of HIV (n=188)

Question	Answered correctly							
	ARV (n=30)		Paed (n=99)		ANC (n=56)		Total (n=188)	
	n	%	n	%	n	%	n	%
After delivery the mother and baby are usually very tired and need to rest for a few hours before they start breastfeeding. **Correct answer: False**	24	80.0	92	92.9	53	94.6	172	91.5
The benefits of breastfeeding outweigh the risks of HIV transmission. **Correct answer: True**	13	43.3	61	61.6	39	69.6	115	61.2
Mothers living with HIV should discard their colostrum. **Correct answer: False**	24	80.0	95	96.0	54	96.4	173	92.0
Mixed feeding is better than no breastfeeding for an ART compliant mother living with HIV. **Correct answer: False**	27	90.0	80	80.8	46	82.1	156	83.0
Mothers on TB treatment should not breastfeed. **Correct answer: False**	15	50.0	84	84.8	44	78.6	146	77.7
Mothers living with HIV, who can afford to safely formula feed, should be encouraged to do so. **Correct answer: False**	12	40.0	65	65.7	33	58.9	85	45.2
If a mother living with HIV has mastitis, she should stop breastfeeding. **Correct answer: False**	12	40.0	45	45.5	26	46.4	84	44.7
Mothers living with HIV should be encouraged to express breast milk and heat-treat it before giving it to their infants. **Correct answer: False**	13	43.3	49	49.5	28	50.0	91	48.4

Table 4.13: Knowledge of IYCF in the context of HIV (n=188) continued

Question	Answered correctly							
	ARV (n=30)		Paed (n=99)		ANC (n=56)		Total (n=188)	
	n	%	n	%	n	%	n	%
If a mother living with HIV is compliant with her ART, she can continue breastfeeding up until two years or longer. **Correct answer: True**	21	70.0	68	68.7	42	75.0	134	71.3
Nevirapine should be administered to the infant for the duration of breastfeeding and stopped one week after breastfeeding is stopped. **Correct answer: False**	6	20.0	44	44.4	17	30.4	68	36.2
At 12 months, a mother living with HIV should stop breastfeeding and give her child cow's milk instead. **Correct answer: False**	22	73.3	78	78.8	43	76.8	146	77.7
Breast pumps are essential for expressing breast milk. **Correct answer: False**	14	46.7	65	65.7	37	66.1	118	62.8
Pregnant women living with HIV should be counselled on infant feeding separately to uninfected pregnant women. **Correct answer: False**	20	66.7	69	69.7	36	64.3	127	67.6
A mother living with HIV who is adherent to ART and has introduced solids foods at five months, should be encouraged to return to exclusive breastfeeding. **Correct answer: True**	6	20.0	19	19.2	8	14.3	33	17.6
If a mother wants to stop breastfeeding, she should go about it gradually. **Correct answer: True**	16	53.3	50	50.5	35	62.5	103	54.8

Table 4.13: Knowledge of IYCF in the context of HIV (n=188) continued

Question	Answered correctly							
	ARV (n=30)		Paed (n=99)		ANC (n=56)		Total (n=188)	
	n	%	n	%	n	%	n	%
Formula fed babies are at higher risk of getting sick (diarrhoea, pneumonia, malnutrition) than breastfed babies are. **Correct answer: True**	28	93.3	96	97.0	54	96.4	181	96.3
Mothers infected with HIV who are non-compliant with their ART should be encouraged to formula feed. **Correct answer: False**	5	16.7	35	35.4	15	26.8	56	29.8
Mean score: %(SD)	**54.7 (14.3)**		**65.1 (14.4)**		**65.2 (13.9)**		**63.5 (14.6)**	

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology); SD=standard deviation.

Table 4.14 summarises the knowledge of participants regarding the risk of transmission through breastfeeding in different scenarios. Answers that were left blank were considered incorrect. The mean knowledge score of the group was 26.7% (SD±25.3). Knowledge scores for this topic differed significantly across departments. Those in the ANC group (mean=33.0%: SD±28.7) had a significantly greater knowledge regarding the risk of transmission compared to those from the ARV group (mean=23.3%; SD±22.7) and paediatric group (mean=23.7%; SD±23.2) ($p<0.05$).

Table 4.15 summarises the answers given by the total group for the different scenarios.

Table 4.14: Knowledge regarding risk of HIV transmission (n=188)

	Answered correctly							
	ARV (n=30)		**Paed** (n=99)		**ANC** (n=56)		**Total** (n=188)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
What percentage of infants who tested HIV negative at six weeks would acquire HIV by six months of age for mothers living with HIV who are *not on ART* and are practicing *exclusive breastfeeding?* **Correct answer: < 5%**	6	20.0	18	18.2	20	35.7	46	24.5
What percentage of infants who tested HIV negative at six weeks would acquire HIV by six months of age for mothers living with HIV who are *not on ART* and are *practicing mixed feeding?* **Correct answer: < 5%**	1	3.3	5	5.1	4	7.1	10	5.3
What percentage of infants who tested HIV negative at six weeks would acquire HIV by six months of age for mothers living with HIV who are *on ART* and are *exclusively breastfeeding?* **Correct answer: < 5%**	15	50.0	57	57.6	35	62.5	109	58.0
What percentage of infants who tested HIV negative at six weeks would acquire HIV by six months of age for mothers living with HIV who are *on ART* and are *mixed feeding*? **Correct answer: < 5%**	6	20.0	14	14.1	15	26.8	36	19.1
Mean score: %(SD)	**23.3 (22.7)**		**23.7 (23.2)**		**33.0 (28.7)**		**26.7 (25.3)**	

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology).

Table 4.15: Answers given by the total group for questions regarding risk of transmission (n=188)

Feeding practice	ART	Overall risk of transmission at six months	Number of participants that selected the following answers n (%)*				
			<5% *Correct answer*	5-20%	21-40%	41-60%	>60%
Exclusive breastfeeding	No maternal ART	1.42%	46 (24.5%)	43 (22.9%)	21 (11.2%)	34 (18.1%)	31 (16.5%)
Mixed feeding	No maternal ART	2.35%	10 (5.3%)	32 (17.0%)	39 (20.7%)	35 (18.6%)	61 (32.4%)
Exclusive breastfeeding	Mother on ART	1.13%	109 (58.0%)	27 (14.3%)	20 (10.6%)	11 (5.9%	10 (5.3%)
Mixed feeding	Mother on ART	1.13%	36 (19.1%)	42 (22.3%)	41 (21.8%)	22 (11.7%)	36 (19.1%)

*Percentages do not add to 100% as some people left answers blank (blank answers were included in the analysis but scored as 'incorrect').

Knowledge regarding key terms, determining compliance and breastfeeding recommendations of participants are summarised in Table 4.16. Four open-ended questions were asked in this part of the questionnaire. The first open-ended question asked 'What do you understand by the term "Exclusive Breastfeeding?"' In the NDoH 2013 IYCF policy, the term 'exclusive breastfeeding' is defined as 'an infant receives only breast milk and no other liquids or solids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines' (NDoH 2013). This definition was divided into three components for scoring the answers given, namely (i) an infant receives only breast milk, (ii) no other liquids or solids and (iii) with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines. If an answer included all three components of the definition, this was scored as excellent knowledge and given a score of 100%. If their answer included two of the components, this was scored as good knowledge with a score of 66.7%. If they only included one component, this was scored as average knowledge with a score of 33.3%. If the respondent's answer was completely inappropriate, their knowledge was scored as poor and they were given a score of 0%. Blank answers were also scored as 0%. A summary of the participants' responses is detailed in Table 4.16. No significant differences in knowledge scores were found between the different departments for this question.

Table 4.16 also includes a summary of the answers given by the participants when asked 'What do you understand by the term "Treatment Failure?"' According to the South African National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults (NDoH 2015), the term 'treatment failure' is defined as 'a persistently detectable viral load exceeding 1000 copies/ml^3. That is: two consecutive viral load measurements within a 2-month interval, with adherence support between measurements, after at least six months of using ARV drugs.' Participants' answers were scored out of three. If their answer included having multiple (two or more) persistently high viral load readings after using ART for at least six months with good adherence, their answer was scored as excellent and a 100% was awarded. If their answer included having multiple (two or more) persistently high viral load readings after using ART for at least six months, but adherence was not mentioned, their answer was scored as good and they were given 66.7%. If their answer only mentioned the patient being on ART, but still having a high viral load, their answer was scored as average and they were awarded 33.3%. Answers that were

incorrect or did not mention the use of ART or that mentioned poor adherence as a cause of treatment failure were scored as poor and given 0%. Blank answers were also scored as 0%. Sixty-seven participants (35.5%) mentioned treatment failure occurring as a result of poor adherence. The mean knowledge score for the question was 26.3% (SD±34.4). Knowledge regarding understanding of the term 'treatment failure' significantly differed across departments ($p<0.05$). Those from ARV and ANC groups had a significantly greater knowledge in this area than those from the paediatric group.

The next open-ended question asked 'Briefly describe how you would determine ART compliance in pregnant/lactating women living with HIV? (Please indicate if this question is not appropriate for your profession).' Although not fully detailed in the current guidelines on the PMTCT and the Management of HIV in Children, Adolescents and Adults (NDoH 2015), the strategies to assess treatment adherence have been listed in earlier guidelines (NDoH 2004). The strategies mentioned in the National Antiretroviral Treatment Guidelines from 2004 include: (i) blood tests; (ii) ARV pill-returns count; (iii) routine adherence discussions (self-reports); and (iv) attendance of follow-up visits (NDoH 2004). If the respondents mentioned any of these methods or any other acceptable methods (such as clinical assessments), their answer was scored as correct and they were given 100% for the question. If their answers were incorrect, their answer was scored as incorrect and they were given 0% for the question. Blank answers were also scored as 0%. Table 4.16 includes a summary of the answers for this question. Participants who indicated that the question was not appropriate for their profession were excluded from the analysis. No significant differences in knowledge regarding how to determine ART compliance were found between departments ($p=0.241$). The mean knowledge score of the participants for this question was 69.3% (SD±46.3).

The last open-ended question asked 'When would you recommend that a mother living with HIV stops breastfeeding? (Please indicate if this question is not appropriate for your profession).' The current IYCF policy in South Africa recommends that mothers living with HIV should continue breastfeeding for 24 months (NDoH 2013; NDoH 2017). Thus, it is recommended that these mothers should stop breastfeeding at 24 months. However, the guideline also recommends that pregnant and breastfeeding mothers, who have confirmed treatment failure, should not breastfeed their infants due to the increased risk of mother-to-child transmission with poor viral suppression. Other medical contraindications for

breastfeeding are also listed in the 2013 IYCF Policy (NDoH 2013). Any answers given that included any of the above scenarios as an appropriate time to recommend a mother to stop breastfeeding were accepted as correct, and the respondent was scored 100% for their answer. Answers that included incorrect and correct information were considered partially correct and scored 50%. Answers that were wrong and blank answers were given 0%. Participants who indicated that the question was not appropriate for their profession were excluded from the analysis. A summary of the answers for this question is shown in Table 4.16. No significant differences in knowledge regarding when to recommend a mother living with HIV should stop breastfeeding were found between departments (p=0.449). The mean knowledge score for this question was 34.7% (SD±46.7). The mean score for the group was 52.7% (SD±15.8). Seventy-one participants (38.6%) listed incorrect ages for stopping breastfeeding. Fifty-three (28.8%) indicated 'at six months of age' and eighteen (9.8%) indicated 'at one year of age.'

Table 4.16: Knowledge regarding key terms, determining compliance and breastfeeding recommendations (n=188)

	ARV (n=30)		Paed (n=99)		ANC (n=56)		Total (n=188)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Understanding of the term 'exclusive breastfeeding'								
Poor	1	3.3	12	12.1	5	8.9	18	9.6
Average	13	43.3	30	30.3	18	32.1	62	33.0
Good	16	53.3	46	46.5	28	50.0	92	48.9
Excellent	0	0.0	11	11.1	5	8.9	16	8.5
Mean score: % (SD)	**50.0 (19.4)**		**53.3 (27.7)**		**53.0 (26.2)**		**52.7 (25.8)**	
	ARV (n=30)		**Paed** (n=99)		**ANC** (n=56)		**Total** (n=188)	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Understanding of the term 'treatment failure'								
Poor	13	43.3	70	70.7	24	42.9	109	58.0
Average	7	23.3	11	11.1	12	21.4	30	16.0
Good	6	20.0	8	8.1	18	32.1	33	17.6
Excellent	4	13.3	10	10.1	2	3.6	16	8.5
Mean score: % (SD)	**35.6 (36.7)**		**20.2 (34.3)**		**32.8 (31.9)**		**26.3 (34.4)**	

Table 4.16: Knowledge regarding key terms, determining compliance and breastfeeding recommendations (n=188) continued

	ARV (n=28)*		Paed (n=87)*		ANC (n=52)*		Total (n=169)*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Answer regarding how to determine ART compliance								
Incorrect	7	25.0	34	39.1	12	23.1	53	31.4
Correct	21	75.0	53	60.9	40	76.9	116	68.6
Mean score: % (SD)	**75.0 (44.1)**		**62.4 (48.7)**		**76.9 (42.5)**		**69.3 (46.3)**	
	ARV (n=29)*		**Paed** (n=96)*		**ANC** (n=56)*		**Total** (n=184)*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Answer regarding when to recommend a mother living with HIV to stop breastfeeding								
Incorrect	23	79.3	59	61.5	37	66.1	121	65.8
Partially correct	1	3.4	4	4.2	2	3.6	7	3.8
Correct	5	17.2	33	34.4	17	40.4	56	30.4
Mean score: % (SD)	**22.4 (41.4)**		**38.0 (48.0)**		**34.8 (46.6)**		**34.7 (46.7)**	

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology). *For two of the questions some participants indicated 'not appropriate for their profession' and were excluded from the analysis.

An overall knowledge score was given to the participants by combining the scores together from each knowledge section (Table 4.17). The mean knowledge score for the group was 51.7% (SD±14.1). The ARV group had a mean knowledge score of 46.5% (SD±14.0), the paediatric group had a mean knowledge score of 51.7% (SD±14.1) and the ANC group had a mean knowledge score of 54.1% (SD±14.1). No significant differences in the mean knowledge scores were found between the departments.

Table 4.17: Overall knowledge regarding IYCF and HIV (n=188)

	Mean knowledge scores			
	ARV (n=30) **% (SD)**	**Paed** (n=99) **% (SD)**	**ANC** (n=56) **% (SD)**	**Total** (n=188) **% (SD)**
Knowledge on IYCF	54.7 (14.3)	65.1 (14.4)	65.2 (13.9)	63.5 (14.6)
Risk of transmission	23.3 (22.7)	23.7 (23.3)	33.0 (28.7)	26.7 (25.3)
Understanding of exclusive breastfeeding	50.0 (19.4)	53.3 (27.7)	53.0 (26.2)	52.7 (25.8)
Understanding of treatment failure	35.6 (36.7)	20.2 (34.3)	32.8 (31.9)	26.3 (34.4)
Determining ART compliance	75.0 (44.1)	62.4 (48.7)	76.9 (42.5)	69.3 (46.3)
When a mother should stop breastfeeding	22.4 (41.4)	38.0 (48.0)	34.8 (46.6)	34.7 (46.7)
Total score	**46.5 (14.0)**	**51.7 (14.1)**	**54.1 (14.1)**	**51.7 (14.1)**

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology); SD=standard deviation.

4.12 Relationship between training and knowledge

An independent samples t-test was applied to test if the overall IYCF in the context of HIV knowledge scores differed significantly depending on the completion of training on the topic (Table 4.18). No significant relationship was found between the attendance of training and mean knowledge scores (p=0.217).

Table 4.18: Relationship between training and knowledge (n=184)

	Mean knowledge score % (SD)
Training	
Attended training (n=95)	54.3 (13.2)
Did not attend training (n=89)	51.8 (14.9)

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology); SD=standard deviation.

4.13 Opinions on guidelines, compliance and practices

The last section of the questionnaire assessed opinions on guidelines, compliance and practices. A Likert scale was used as follows: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree. Table 4.19 includes a summary of the mean results for this section.

No significant differences were found between the groups for the following statements: 'I am up to date with the current HIV and Infant Feeding Guidelines'; 'The current Infant Feeding Guidelines in the context of HIV need to be reviewed'; and 'Viral load testing for pregnant or lactating women living with HIV should be measured more frequently than 6-monthly.' There was a significant difference in opinions of the paediatric group and the ARV and ANC groups regarding the statement 'ART compliance is a major problem for many pregnant women living with HIV,' with the paediatric group agreeing with the statement significantly more so than the ARV and ANC groups ($p<0.05$). The paediatric group agreed with the statement 'ART compliance is a major problem for many breastfeeding women living with HIV,' significantly more so than the ANC group agreed ($p<0.05$). The ARV group were found to significantly agree with the statement 'Free formula should be provided to mothers living with HIV who do not want to breastfeed' more than both the paediatric and ANC groups ($p<0.05$).

Table 4.19: Agreement on guidelines, compliance and practices (n=188)

	ARV Mean (SD)	Paed Mean (SD)	ANC Mean (SD)	Totals Mean (SD)
Statement				
I am up to date with the current HIV and Infant Feeding Guidelines.	2.55 (1.09)	2.99 (0.92)	2.94 (0.88)	2.90 (0.95)
The current Infant Feeding Guidelines in the context of HIV need to be reviewed.	3.72 (0.96)	3.54 (0.98)	3.37 (0.78)	3.52 (0.92)
Viral load testing for pregnant or lactating women living with HIV should be measured more frequently than 6-monthly.	3.90 (1.21)	3.88 (0.79)	3.54 (1.08)	3.78 (0.97)
ART compliance is a major problem for many pregnant women living with HIV.	3.11 (1.32)	3.92 (0.97)	3.26 (1.09)	3.59 (1.12)
ART compliance is a major problem for many breastfeeding women living with HIV.	3.28 (1.33)	3.73 (1.10)	3.25 (1.02)	3.51 (1.13)
Free formula should be provided to mothers living with HIV who do not want to breastfeed.	3.90 (1.26)	2.67 (1.29)	3.04 (1.32)	2.98 (1.36)

ARV=antiretroviral clinic; Paed=paediatric department; ANC=antenatal department (including obstetrics and gynaecology); SD=standard deviation; Mean (SD) refers to the five-point Likert scale where 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree.

4.14 Summary of results

Only 47.3% (n=89) of participants had been formally trained on IYCF in the context of HIV. The vast majority of participants (92.0%) felt they required more training on this matter. The ANC group counselled pregnant women living with HIV on IYCF more frequently than the ARV and paediatric groups. Overall, the group indicated an above average confidence score regarding the IYCF counselling of mothers living with HIV. There were no significant differences in mean knowledge scores between the ARV group, paediatric group and ANC group. The mean knowledge score for the participants was 51.7% (SD±14.1). The attendance of IYCF training was not associated with improved knowledge scores. Participants in the ARV group agreed that free formula should be provided to mothers living with HIV more strongly than the paediatric and ANC group did. The next chapter discusses the results of this study.

CHAPTER 5: DISCUSSION

The aim of the study was to assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at regional eThekwini state hospital ARV, paediatric and antenatal departments, regarding IYCF in the context of HIV. This chapter discusses the findings from the study.

5.1 Demographic and professional characteristics

One hundred and eighty-eight healthcare workers participated in the study. The vast majority of the study participants were female (n=154; 81.9%). This was expected as the majority of the participants were nursing professionals (professional nurses: n=70, 37.2%; enrolled nurses: n=44, 23.4 %; total number of nurse participants: n=114, 60.6%) and in South Africa the majority of nurses (91.2%) are female (Van Der Heever, Van Der Merwe & Crowley 2019).

The vast majority of healthcare workers (n=154; 81.9%) in the current study had worked in their departments for longer than two years (derived from Table 4.3). Healthcare worker competency tends to increase with years of experience (Kim & Kim 2015). Competency of healthcare workers refers to the knowledge and skills needed to perform a task in conformity with hospital regulation (Kim & Kim 2015). Thus, it would be expected that the majority of the healthcare workers in the current study possessed the knowledge and skills needed to perform their duties.

5.2 Training experiences

A clear, well-supported IYCF policy, coupled with appropriate training of healthcare workers are of the upmost importance for the successful implementation of the policy (WHO 2003b). Training and education is essential for assisting healthcare workers in acquiring the knowledge and skills needed to translate policy into practice (Forland, Rohwer, Klatser, Boer & Mayanja-Kizza 2013). Participants were asked if they had attended any formal training on IYCF in the context of HIV and if so, which training they had attended, namely the Department of Health three day IYCF training course, part of formal degree or diploma training or other. Only 47.3% (n=89) of the participants indicated they had attended formal training on IYCF in the context of HIV. This lack of training is a concern and has been highlighted as a recurring issue in other studies (Mphasha & Skaal 2019; Rujumba *et al* 2012;

Leshabari *et al* 2007; Piwoz *et al* 2006). Without adequate training, healthcare workers are ill equipped with the knowledge and skills needed to successfully implement the IYCF policy (Mphasha & Skaal 2019). Reasons for lack of training were not investigated, but could potentially include staff shortages, high workloads, lack of opportunities, lack of accountability regarding attendance of training and lack of interest in attending IYCF training.

The most commonly attended training course by the participants who indicated they had attended training, was the Department of Health three day IYCF training course. Three quarters of these participants (n=67; 75.3%) indicated they had attended this course. The Department of Health three day IYCF training course is an adaptation of the WHO/UNICEF BFHI course, an IYCF training course that is used in many countries worldwide. The WHO/UNICEF BFHI training course is designed to equip healthcare workers with skills on breastfeeding counselling needed to improve breastfeeding rates (Kavle, Welch, Bwanali, Nyambo, Guta, Mapongo, Straubinger & Kambale 2018). According to a systematic review by De Jesus *et al* (2016), completion of this course can improve knowledge, skills and counselling practices of healthcare workers.

At the time of study, all three hospitals (RK Khan Hospital, Prince Mshiyeni Memorial Hospital and Addington Hospital) were MBFI accredited. It is a requirement of the MBFI accreditation process that at least 80% of clinical staff members who have contact with mothers and/or infants must have attended the Department of Health three day IYCF training course (Department of Health KZN 2017). Although the three hospitals were accredited, this study found that only 35.6% (n=67) of the total group had attended this training. It is also of concern that the 'KwaZulu-Natal Provincial Guidelines on Mother-Baby Friendly Initiative Implementation in Department of Health Healthcare Facilities' states that healthcare workers require IYCF training or refresher training every two years, but only 40.4% (n=36) of the participants indicated that they had attended training in the required time frame (between 2016 and 2018) (Department of Health KZN 2017). The possible implications of this include healthcare workers providing out-dated information or forgetting a significant amount of the content covered in training.

The next most common type of training that participants had attended (n=20; 22.5%) was training as part of their formal degree or diploma. Educational curricula that include the most

recent information and guidelines can facilitate improved knowledge and counselling practices (Haines, Kuruvilla & Borchert 2004). However, the majority of participants (n=154; 81.9%) had been working for longer than two years, making it unlikely that their educational syllabus included the current IYCF and HIV guidelines and recommendations. Additionally, it was also not investigated at which institution participants had completed their degree or diploma. If they attended an educational institution outside South Africa, they may have been educated on guidelines not appropriate for the local context.

5.3 Areas trained on

A significant number of participants indicated that they had been trained in the context of HIV on the following topics: (i) the importance of exclusive breastfeeding for the baby for the first six months of life (n=165; 87.8%); (ii) the importance of continued breastfeeding with appropriate complementary feeding after six months (n=139; 73.9%); (iii) the importance of breastfeeding for the mother (n=159; 84.6%); (iv) the importance of immediate skin-to-skin contact after birth (n=158; 84.0%); (v) positioning and attachment (n=154; 81.9%); (vi) hand expression of breast milk (n=141; 75.0%); (vii) the risks and hazards of not breastfeeding (n=156; 83.0%); and (viii) ART adherence (n=144; 76.6%) ($p<0.05$ for all topics). The current study did not investigate whether participants were trained on these topics as part of the Department of Health three day IYCF training course, departmental in-service training, formal education, workshops or other means. Because the question did not specify if the training was formal or informal may be why many more participants [139-165 participants (73.9-87.8%)] indicated that they had been trained on at least one of the topics listed in question 3 of the questionnaire, compared to the number that indicated that they had been formally trained on IYCF in the context of HIV (n=89; 47.3%). Although other studies investigated if healthcare workers had been trained on IYCF in the context of HIV, none of the studies reported on which topics their participants had been trained on (Fadnes *et al* 2019; Mphasha & Skaal 2019; Essien *et al* 2018; Mkontwana *et al* 2013; Vallely *et al* 2013; Van Rensburg 2013).

5.4 Training needs

Although participants were overall confident in their IYCF and HIV counselling abilities, over 90% of participants (91.4%; n=171) indicated that they felt they required more training on the topic. A reason for this discrepancy could be that the healthcare workers were comfortable with counselling mothers, as it was something they did frequently but were

unsure if the advice they were giving was up-to-date with the most current guidelines. Other studies have also identified healthcare workers feeling that they require more training (Shayo *et al* 2014; Leshabari *et al* 2007). In the study by Leshabari *et al* (2007), nurses discussed their concerns regarding on-going changes to the IYCF recommendations and the expectations for them to provide mothers with advice, even though they were not always trained on the most recent guidelines. In a Ugandan study that investigated the experiences of healthcare workers involved in PMTCT programmes, healthcare workers stated that they required more clarity on IYCF options for mothers living with HIV (Rujumba *et al* 2012). Healthcare workers who are not up-to-date with guidelines may give mothers incorrect feeding advice, which may result in harmful feeding practices (Daniels *et al* 2010).

In the current study, participants identified specific areas in which they required more training. Two areas were identified to be statistically significant. These included 'Infant feeding and treatment failure' and 'Infant feeding advice with regards to non-compliant mothers'. This illustrates a lack of awareness or acceptance of Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations, a local KZN circular that served as an update of the NDoH Circular Minute No 3 of 2017/18 HIV/AIDS, TB & MCWH (Department of Health KZN 2018; NDoH 2017). This circular addresses both of the identified areas on which participants indicated they required more training.

5.5 Receipt of updates

To ensure up-to-date counselling, healthcare workers need to regularly receive updated information regarding the IYCF guidelines in the context of HIV (De Paoli, Manongi & Klepp 2002). It is incumbent for PMTCT programmes to ensure timely and effective dissemination of new IYCF guidelines (Vallely *et al* 2013). The recirculation of current guidelines has also been shown to be beneficial (Bluestone, Johnson, Fullerton, Carr, Alderman & BonTempo 2013). A systematic review found that repetitive reminders significantly improve knowledge and practices of healthcare workers (Bluestone *et al* 2013). The sharing of updates and reminders of unchanged policies provides information that can enhance knowledge; act as cues, which may trigger appropriate behaviour; and serve as persuasive communication that can possibly lead to changes in beliefs and practices (Michie, Johnston, Abraham, Lawton, Parker, Walker & "Psychological Theory" Group 2005). In the current study, the majority of participants (n=115; 61.2%) reported receiving updates on HIV and IYCF guidelines. However, out of those who indicated they received updates, only

21.7% (n=25) and 24.3% (n=28) indicated they received updates ‘at least every 3 months’ or ‘at least every 6 months,’ respectively. In addition, 41.7% (n=48) indicated they only received updates ‘at least once a year’ and 12.2% (n=14) indicated they received updates ‘less than once a year.’

The manner in which guidelines are received is also of importance. Recently there has been a lot of focus on how different dissemination strategies affect the uptake of guidelines (Gagliardi, Brouwers & Bhattacharyya 2015). According to a systematic review by Gagliardi *et al* (2015), the use of multiple strategies for disseminating guidelines is more effective than a single strategy approach. For example, sending guidelines in the form of reminders (such as emailing) is less effective than providing educational intervention in conjunction with sending reminders. In the current study, 20.9% (n=24) of participants that received updates indicated they received updates via multiple strategies.

The most common method by which participants received updates was in the form of in-service training (n=62; 53.9%). In-service training refers to the on-going professional education of healthcare workers relating to relevant topics (Bluestone *et al* 2013). On-going in-service trainings are a recommended mode for updating healthcare workers on IYCF guidelines (Rujumba *et al* 2012; De Paoli *et al* 2002). The current study did not investigate further regarding details of the in-service training, such as topics covered, duration, or how understanding and accountability is ensured.

The second most common method by which participants received updates was in the form of meetings. Again, the current study did not investigate further in terms of which updates are shared in meetings and how understanding and accountability is ensured.

Nineteen of the participants (16.5%) indicated that they received updates in the form of email. Email has the advantage in that electronic versions of guidelines and updates can be easily sent and the reader has permanent access to the guideline/update itself (Badran, Pluye & Grad 2015). However, not all healthcare workers have access to email services and there is also the risk that emails may not be delivered (Badran *et al* 2015). Additionally, even if an email is received, it does not necessarily mean that it will be read (Bennett, Casebeer, Kristofco & Collins 2005). Simply circulating a guideline has been shown to only have a small effect on practice (Haines *et al* 2004). Email in conjunction with training on IYCF guidelines is likely to be more useful than email alone.

Part of the MBFI criteria includes that all healthcare workers who have any contact with pregnant women, mothers and/or infants and young children, should receive orientation on the IYCF policy (Department of Health KZN 2017). It is a concern that nineteen participants (36.7%) indicated that they did not receive updates on IYCF and HIV. Without knowing what the current guidelines are, it is unlikely that healthcare workers will fully comply with them.

5.6 Infant and young child feeding policy awareness

Only 54.3% of participants (n=101) in the study had seen a copy of the IYCF policy in their department. It is a requirement of the MBFI programme that departments that provide care to mothers, infants and young children, have a copy of the IYCF policy and should display a summary of it in the department, so that healthcare workers are able to refer to it as needed (Department of Health KZN 2017). More participants in the paediatric (53.6%) and antenatal groups (59.2%) had seen a copy of the 2013 IYCF policy in their departments, than in the ARV group (43.3%). These findings are an improvement compared to a Cape Town study, which found that only 44% of study participants had seen a copy of the IYCF policy in their facility (Mkontwana *et al* 2013). However, since all three hospitals in the current study were MBFI accredited, it is a concern that not all departments had easy access to a copy of the IYCF policy or that staff were not aware of its existence. According to Mphasha & Skaal (2019), this may impact negatively on the ability of healthcare workers to implement the 2013 IYCF policy. Another worry is that in the event of an IYCF misunderstanding and/or conflict of opinions, healthcare workers do not have a readily available document to guide them in decision-making (Mphasha & Skaal 2019).

5.7 Frequency of counselling

The results regarding the frequency of counselling mothers in different scenarios are consistent with what would have been expected from the different departments. Antenatal departments are responsible for the care of pregnant women during the pregnancy and after delivery, whereas paediatric departments are responsible for the care of infants and children (NDoH 2016a; NDoH 2016b). Participants working in antenatal departments did the majority of IYCF counselling of pregnant women living with HIV. As expected, the paediatric group generally never counselled pregnant women; however, they counselled mothers six months after delivery. The ANC group also counselled mothers six months after

delivery as mothers usually return to hospital for routine check-ups or if the mother is experiencing any medical complications (NDoH 2016a).

In South Africa, any adult or child living with HIV, regardless of age, gender or the presence of other conditions, receives treatment for the condition from either a hospital or primary healthcare ARV clinic (NDoH 2015; NDoH 2019a). Where patients also have other conditions, ARV clinics and other appropriate departments (NDoH 2015; NDoH 2016a) manage them. In the case of pregnancy, an expectant mother living with HIV would receive treatment from an ARV clinic as well as from an ANC clinic (NDoH 2015; NDoH 2016a). As is the same for infants and children unexposed to HIV, infants and children of mothers living with HIV receive routine immunisations from well-baby services (NDoH 2015). These services are available at hospital paediatric outpatient departments and at primary healthcare facilities (NDoH 2014a; NDoH 2019b). All critically ill children, regardless of HIV status, are admitted to hospital paediatric wards for inpatient management (NDoH 2016b).

The purpose of this section of the questionnaire was to illustrate that healthcare workers conduct some form of IYCF counselling across all three of the departments included in the study.

5.8 Counselling confidence

The mean overall confidence score of the group was high, with a score of 4.54 (SD±1.28) on a six point Likert scale (where 6=very confident). A significant difference in average overall confidence levels was found between groups, with the paediatric group having an overall confidence score significantly higher than that of the ARV group (mean=4.82; SD±1.15 vs. mean=3.80; SD±1.51) ($p<0.05$). This finding is different to a Tanzanian study by Leshabari *et al* (2007), but similar to the findings of a South African study by Van Rensburg (2013). In the study by Leshabari *et al* (2007), nurses working at PMTCT sites were found to lack confidence concerning IYCF counselling in the context of HIV. The study by Van Rensburg (2013) investigated the confidence of healthcare workers working in postnatal wards in two different scenarios. The healthcare workers were asked to rate their confidence as 'not at all confident,' 'low confidence,' 'moderately confident,' 'high confidence' or 'very high confidence'. The first scenario was confidence in showing mothers living with HIV how to correctly position and attach their infants when breastfeeding. The study found that most

healthcare workers had a high (37.5%) or very high (35.9%) level of confidence for this (Van Rensburg 2013). The current study found similar results, with the total group having a mean confidence score of 4.77 (SD±1.54) when asked to rate their confidence regarding counselling a mother on breastfeeding positioning and attachment. The other scenario in the Van Rensburg (2013) study was confidence in showing a mother how to express breast milk. The study again found high levels of confidence, with the two most indicated answers being a high confidence level (35.9%) and a very high confidence level (28.1%) (Van Rensburg 2013). The current study found similar results with a mean confidence score of 4.62 (SD±1.59) for the group regarding their confidence in counselling mothers living with HIV on expressing breast milk. Sufficient practice and exposure to a clinical skill develops confidence (Nicholls 2014). The high level of confidence in the study could be due to most participants (n=154; 81.9%) in the current study having worked in their departments for longer than two years and that they frequently counselled mothers living with HIV on IYCF.

5.9 Infant and young child feeding knowledge

5.9.1 Overall knowledge score

Although detailed policies and guidelines on IYCF in the context of HIV exist, all three groups scored poorly in the knowledge section of the study, with a mean overall knowledge score of only 51.7% (SD±14.1) for the total group. This is of concern as all the departments in the study have a role in IYCF counselling of mothers living with HIV. In a recent study by Horwood, Jama, Haskins, Coutsoudis & Spies (2019), South African mothers living with HIV were found to diligently follow IYCF advice given by healthcare workers and perceived healthcare workers to be knowledgeable professionals who provide accurate advice (Horwood *et al* 2019). The mothers in their study strived to follow the advice of healthcare workers, resisting contrary advice given by family and friends (Horwood *et al* 2019). The authors reported concerns that healthcare workers with a poor knowledge may share incorrect IYCF messages with mothers, resulting in inappropriate IYCF practices (Horwood *et al* 2019). This is also likely to be the case in the current study.

The IYCF policy, the National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults and their updates are examples of clinical practice guidelines. Clinical practice guidelines are evidence-based guidelines that provide advice on the clinical management of individuals with a particular disease or condition

(Wilkinson, Wilkinson, Kredo, MacQuilkan, Mudara, Winch, Pillay & Hofman 2018). These guidelines assist healthcare workers with clinical decision-making and ensure standardised consistent care (Wilkinson *et al* 2018). It is evident that the healthcare workers in the current study were poorly orientated on the abovementioned policy, guideline and their updates. The IYCF policy instructs provinces, districts and health facilities to hold dissemination sessions and to formulate action plans for the implementation of the IYCF policy. However, this does not seem to have successfully occurred in eThekwini, leaving healthcare workers at Prince Mshiyeni Memorial Hospital, Addington Hospital and RK Khan Hospital without the knowledge to effectively implement the policy (NDoH 2013). The Department of Health in KZN would benefit from following the IYCF policy recommendations to review and align related strategies, guidelines and educational material and to ensure that IYCF recommendations are correctly reflected in these documents and to develop implementation guidelines to improve healthcare worker knowledge and implementation of the policy (NDoH 2013). Effective dissemination and monitoring strategies are vital for ensuring effective implementation and adherence of clinical practice guidelines. Barriers to the successful implementation of a guideline include limitations of time and resources as well as a lack of knowledge, beliefs and attitudes of healthcare workers and patients (Haines *et al* 2004). The Department of Health in KZN should identify and address the barriers to improve the awareness and implementation of the IYCF policy and its updates regarding HIV. An understanding of the evidence-base for guidelines is thought to improve knowledge and acceptance of IYCF guidelines (Mphasha & Skaal 2019; Nieuwoudt & Manderson 2018; Shayo *et al* 2014). The Department of Health in KZN should compare different durations, content (including clinical and practical skills) and modes of training delivery, in order to provide the minimum knowledge and skills needed by healthcare workers to provide accurate and effective IYCF counselling.

5.9.2 Knowledge regarding practices

The first area that tested knowledge was a true and false section, where a number of relevant statements were listed. The mean score for the total group was 63.5% (SD±14.6). Although this score may be regarded as acceptable in some scenarios, considering that the participants were health professionals and that the area investigated was relevant to their jobs, a better result would have been expected. The knowledge score of the ARV group (mean=54.7%; SD±14.3) for this section was significantly lower than the scores of the paediatric group

(mean=65.1%; SD±14.4) and the antenatal group (mean=65.2%; SD±13.9) ($p<0.05$). The importance of the individual statements and the answers given by the group are discussed next and arranged from the least answered correctly, to the most answered correctly.

5.9.2.1 Questions answered correctly by less than 50% of participants

Six of the true and false questions were answered correctly by less than half of the participants.

The 2013 IYCF Policy and Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations, both reiterate the recommendation of six months of exclusive breastfeeding (Department of Health KZN 2018; NDoH 2013). However, only 17.6% (n=33) indicated 'false' to the following statement 'A mother living with HIV who is adherent to ART and has introduced solids foods at 5 months, should be encouraged to return to exclusive breastfeeding.' The National Nutrition Directorate was consulted regarding this question and confirmed that in a case like this, a mother should indeed be encouraged to return to exclusive breastfeeding as the IYCF policy does encourage six months of exclusive breastfeeding (Behr 2019; NDoH 2013).

Only 29.8% (n=56) of participants indicated 'true' to the statement that 'Mothers infected with HIV who are non-compliant with their ART should be encouraged to formula feed.' Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations, recommends breastfeeding for all mothers living with HIV (with the exception of those with diagnosed treatment failure), with a strong focus on ART adherence support (Department of Health KZN 2018). The National Nutrition Directorate was also consulted regarding this question and confirmed that in scenarios where mothers living with HIV are non-compliant with their ART, ART adherence supportive measures should be increased and breastfeeding should still be encouraged [as per the National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults] (Behr 2019; NDoH 2015).

According to the National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults, 'Infants born to HIV-positive women should receive daily NVP for six weeks, unless there are circumstances that warrant 12 weeks of NVP or NVP plus AZT' (NDoH 2015). However, in the true and false section of the questionnaire, only 36.2% (n=68) correctly indicated 'false' to the statement 'Nevirapine should be administered to the infant for the duration of breastfeeding and stopped one week

after breastfeeding is stopped.' The reason why so many participants may have answered this question incorrectly may be because of the 2010 PMTCT Guidelines, which recommended 'Breastfed infants whose mothers are not on lifelong ART should continue NVP beyond 6 weeks of age until all cessation of breastfeeding.'

Mothers living with HIV who are experiencing mastitis are encouraged to continue breastfeeding with guidance, according to the 2013 IYCF policy (NDoH 2013). The IYCF policy recommends that these mothers should express and heat-treat their breast milk. Only 44.7% of the participants (n=84) knew that mothers living with HIV who experience mastitis should not stop breastfeeding.

According to Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations, the main feeding recommendation for mothers living with HIV is to exclusively breastfeed their infants for the first six months of life, followed by the introduction of complementary foods at six months, with continued breastfeeding until two years of age (Figure 5.1) (Department of Health KZN 2018). Only 45.2% (n=85) of the participants knew that mothers living with HIV, who can afford to safely formula feed, should not be encouraged to do so.

Main Feeding Recommendation				
HIV positive mothers on lifelong ART (and whose **infants are HIV uninfected or of unknown status)**	Exclusively breastfeed their infants during the first 6 months of life	Introduce adequate, safe and appropriate complementary foods at 6 months	Continue breastfeeding for 24 months (recommended) **while being fully supported for ART adherence.** Infant should receive prophylactic ART in accordance with PMTCT guidelines.	Breastfeeding cessation needs to occur gradually over one month. Abrupt cessation is discouraged

Figure 5.1: Main feeding recommendation for mothers living with HIV (Department of Health KZN 2018)

Although heat-treating expressed breast milk can reduce the viral load of breast milk, the practice of giving heat-treated expressed breast milk to infants has never been a routine IYCF recommendation in any PMTCT guideline or IYCF policy (however, giving heat-treated expressed breast milk via a cup when stopping breastfeeding was a suggestion in the 2008 PMTCT guideline) (WHO 2010; NDoH 2008). The 2013 IYCF policy does not routinely encourage mothers living with HIV to express and heat-treat breast milk before giving it to their infants (NDoH 2013). Only 48.4% (n=91) of participants knew that mothers living with HIV do not need to be encouraged to express breast milk and heat-treat it before giving it to their infants.

5.9.2.2 Questions answered correctly by between 50-60% of participants

According to Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations 'Breastfeeding cessation needs to occur gradually over one month' for mothers living with HIV (Figure 5.1) (Department of Health KZN 2018). When asked 'If a mother wants to stop breastfeeding, she should go about it gradually,' only 54.8% of participants (n=103) correctly answered 'true.' This could be because of out-dated knowledge as previous guidelines recommended abrupt cessation of breastfeeding (NDoH 2008). Uncertainty regarding how to go about stopping breastfeeding was also found in the study by Shayo *et al* (2014).

5.9.2.3 Questions answered correctly by 61-70% of participants

Three of the true and false questions were answered correctly by 61-70% of the participants.

As discussed in Chapter 2, breastfeeding is associated with many significant health benefits and, with the use of maternal ART, only carries a very small risk of HIV transmission (WHO 2016a). For these reasons, the benefits of breastfeeding are considered to outweigh the risks of HIV transmission (WHO 2016a). However, only 61.2% (n=115) of participants correctly indicated 'true' for the statement 'The benefits of breastfeeding outweigh the risks of HIV transmission.'

As part of the MBFI programme in South Africa, all breastfeeding mothers should be educated on how to hand express their breast milk. The expression of breast milk assists mothers to maintain their breast milk supply even when separated from their infants (NDoH 2014b). Every mother who delivers at a government hospital should be comfortable with the hand expression of breast milk prior to discharge (NDoH 2014b). Breast pumps are not

routinely encouraged as they are often expensive, require careful sterilisation and are not necessary for expressing breast milk (NDoH 2014b). However, only 62.8% (n=118) of participants correctly indicated 'false' to the statement 'Breast pumps are essential for expressing breast milk'.

Since the IYCF recommendations for mothers living with HIV and the recommendations for mothers not living with HIV are the same, both categories of pregnant women can attend the same IYCF group counselling provided at healthcare facilities (NDoH 2017). Only 67.6% of participants (n=127) knew that pregnant women living with HIV do not need to be counselled on IYCF separately to uninfected pregnant women.

5.9.2.4 Questions answered correctly by 71-100% of participants

Seven of the true and false questions were answered correctly by 71-100% of participants.

Over 70% (n=134; 71.3%) of participants knew that if a mother living with HIV is compliant with her ART, she can continue breastfeeding up until two years or longer, as per the Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations (Figure 5.1) (Department of Health KZN 2018).

According to the South African 2014 National Tuberculosis Management Guidelines 'Mothers must be encouraged to breastfeed their babies whilst on tuberculosis (TB) treatment' and 'All the TB drugs are safe for use during breastfeeding' (NDoH 2014c). The majority of participants (n=146; 77.7%) correctly indicated that being on TB treatment is not a contraindication for breastfeeding. However, a finding of concern was that only half (n=15; 50.0%) of participants in the ARV group knew this, yet ARV departments are more likely than the other departments to see cases of TB. This is because people living with HIV are 16-27 times more likely to develop TB, than people who do not have HIV. Tuberculosis is the common presenting illness for people living with HIV (WHO 2019g).

Mothers living with HIV are recommended to continue breastfeeding for 24 months, as per Circular G19/2018: Update of the IYCF in the Context of HIV Recommendations, (Figure 5.1) (Department of Health KZN 2018). This circular was an amendment to the previous 2013 IYCF policy, which recommended that these mothers breastfeed for 12 months (NDoH 2013). Most of the participants (n=146; 77.7%) knew that the statement 'At 12 months, a

mother living with HIV should stop breastfeeding and give her child cow's milk instead' was false.

The WHO includes a guiding practice statement that 'mothers living with HIV and healthcare workers can be reassured that ART reduces the risk of postnatal HIV transmission in the context of mixed feeding. Although exclusive breastfeeding is recommended, practising mixed feeding is not a reason to stop breastfeeding in the presence of ARV drugs' (WHO 2016a). However, the NDoH has not adopted this recommendation (NDoH 2017). Thus, there has been no change to the 2013 IYCF policy recommendation of exclusive breastfeeding for six months and that healthcare workers should educate mothers on the risks associated with mixed feeding (NDoH 2013). Eighty-three per cent (n=156; 83.0%) correctly indicated that the statement 'Mixed feeding is better than no breastfeeding for an ART compliant mother living with HIV,' is false (as in accordance with the South Africa's guidelines) (NDoH 2013).

Over 90% of participants (n=172; 91.5%) knew that after delivery it is unlikely that a mother and baby are usually very tired and need to rest for a few hours, before they start breastfeeding. The 2013 IYCF policy encourages the early initiation of breastfeeding, as infants are eager and more alert to feed in the first hour after birth. This practice is associated with improved exclusive breastfeeding rates (NDoH 2013). Rarely are mothers too tired to initiate breastfeeding (NDoH 2014b). The vast majority of participants (n=173; 92.0%) knew that mothers living with HIV should not discard their colostrum. Colostrum offers a range of health benefits to the infant and is one of the reasons why early initiation of breastfeeding is encouraged (NDoH 2013). The statement that was answered correctly the most was 'Formula fed infants are at a higher risk of getting sick (diarrhoea, pneumonia, malnutrition) than breastfed infants.' One-hundred and eighty-one participants (96.3%) correctly answered 'true' to this question.

5.9.3 Knowledge regarding risk of transmission

As part of the current study, participants' knowledge regarding the risks of HIV transmission in different scenarios was also determined. This was asked in order to gain a better understanding of how safe or how hazardous participants perceived breastfeeding to be. As illustrated in Table 4.15, participants frequently overestimated the risk of transmission, in some cases by remarkably high amounts. These findings are different to those from the

South African study by Van Rensburg (2013), which found healthcare workers to be knowledgeable regarding the risks of transmission in three scenarios. In their study 73.4% of participants correctly indicated that the risk of HIV transmission through breastfeeding increases if the mother/infant does not use ART and the mother does not breastfeed according to the guidelines; 70.3% of participants correctly indicated that the risk of transmission decreases if the mother/infant receives ART and the mother breastfeeds according to the guidelines; and 89.1% of their participants indicated that mixed feeding increases the risk of HIV transmission (the use of ART was not specified and the study was conducted before the WHO 2016a guidelines were released) (Van Rensburg 2013). However, the questions asked by Van Rensburg (2013) were easier to answer correctly than the current study, as participants did not have to estimate the actual risks of transmission.

In the current study the only question that the majority of participants (n=109; 58.0%) answered correctly was 'What percentage of infants who tested HIV negative at six weeks would acquire HIV by six months of age for mothers living with HIV who are on ART and are exclusively breastfeeding?' This is the scenario that healthcare workers are most exposed to, since all lactating women, living with HIV should be on lifelong ART, as per the 2015 National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults (NDoH 2015). While it is encouraging to know that at least 58.0% of the participants did know that this scenario carries a very low risk of HIV transmission, it is still very concerning that 36.2% (n=68) of participants believed the risk to be much higher, with 5.3% (n=10) believing the risk to be greater than 60%.

The scenario with the lowest percentage of correct answers (n=10; 5.3%) was for infants whose mothers are not on ART and who are mixed fed. Although in the absence of ART, mixed feeding is associated with a higher risk of HIV transmission than exclusive breastfeeding, the risk is still low (2.35% vs. 1.42%). A worrisome 61 participants (32.4%) estimated the risk to be higher than 60%. This severe overestimation could be a result of South Africa's IYCF recommendations, which always strongly discourage mixed feeding (NDoH 2008; NDoH 2010; NDoH 2013; NDoH 2015). For example, the 2008 PMTCT policy included the caution 'mixed feeding should be strongly discouraged as it predisposes to childhood infections and increases the risk of HIV transmission in HIV-positive women' (NDoH 2008).

The scenario where infants are mixed fed in the presence of maternal ART, was also answered very poorly, with only 19.1% of participants (n=36) answering this correctly. According to the modelling exercise commissioned by the WHO that examined the effect of ART among mothers living with HIV on HIV-free survival of infants, with the use of ART, mixed feeding carries no additional risk of HIV transmission (Mallampati *et al* 2015). In the presence of ART, exclusive breastfeeding and mixed feeding both only carry a 1.13% risk of HIV transmission. Following these findings the WHO included in their 2016 Guideline Update of HIV and Infant Feeding, the guiding practice statement 'Mothers living with HIV and healthcare workers can be reassured that ART reduces the risk of postnatal HIV transmission in the context of mixed feeding. Although exclusive breastfeeding is recommended, practising mixed feeding is not a reason to stop breastfeeding in the presence of ARV drugs.' However, this practice statement was not adopted when South Africa amended its IYCF policy in 2017 (NDoH 2017). No amendments have been made to the 2013 IYCF policy statement: 'Mixed feeding, defined as feeding breast milk as well as other milks (including commercial formula or home-prepared milk), foods or liquids, results in the highest rate of HIV transmission.' Neither have there been amendments to the 2015 National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults statement 'Mothers must be counselled about the risks of mixed feeding their infants during their first six months of life, as exclusive breastfeeding reduces the risk of HIV transmission and improves child survival' (NDoH 2013; NDoH 2015). For these reasons, it is not surprising that the participants severely overestimated the risk of HIV transmission through mixed feeding.

This fear of mixed feeding has been shown to be detrimental to breastfeeding practices. A recent study by Horwood *et al* (2019), found that the fear of mixed feeding led mothers living with HIV to stop breastfeeding entirely. With mixed feeding being more commonly practiced in South Africa than exclusive breastfeeding (43% vs. 32%), healthcare workers would benefit from guidelines containing more up-to-date and accurate information regarding mixed feeding in the context of HIV (Statistics South Africa 2016).

5.9.4 Understanding of key concepts

5.9.4.1 Definition of exclusive breastfeeding

The overall knowledge score regarding the definition of the term 'exclusive breastfeeding' was 52.7% (SD±25.8), with only 8.5% (n=16) of participants showing an excellent understanding of the term and 48.9% (n=93) showing a good understanding. With regards to a good understanding of the term, the results of the current study are poorer than that of the Van Rensburg (2013) study, which found that 70.0% of their participants had a good understanding of the term 'exclusive breastfeeding.' However, similar to the current study, only 6.7% of participants in the Van Rensburg (2013) study could comprehensively explain the term.

5.9.4.2 Definition of treatment failure

The understanding of the term 'treatment failure' was very poor, with a mean knowledge score of 26.3% (SD±34.4) for the sample. Only 8.5% (n=16) of participants had an excellent understanding of the term and 17.6% (n=33) had a good understanding. An alarming 58.0% (n=109) had a poor understanding. The definition of treatment failure, as per the South African National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults (NDoH 2015), is 'a persistently detectable viral load exceeding 1000 copies/mL. That is two consecutive viral load measurements within a 2-month interval, with adherence support between measurements, after at least six months of using ART drugs' (NDoH 2015). Treatment failure can only be diagnosed in patients who are compliant with their ART. Yet, 35.5% of participants (n=67) incorrectly described treatment failure as the occurrence of a high viral load because of poor adherence. With poor adherence, it would be expected that the viral load would not be adequately suppressed because of insufficient ART rather than ineffective ART.

This misunderstanding is similar to the findings from a study by Johnston, Fielding, Charalambous, Churchyard, Phillips & Grant (2012). The study by Johnston *et al* (2012) found that South African healthcare workers often do not exclude ART adherence issues, before diagnosing treatment failure. A concern with a poor understanding and misdiagnosis of treatment failure is that healthcare workers may discourage breastfeeding in mothers who do not have treatment failure. If a healthcare worker thinks a mother has treatment failure they may discourage her from breastfeeding, as Circular G19/2018: Update of the IYCF in

the Context of HIV Recommendations, states that 'Pregnant and breastfeeding mothers who are confirmed treatment failure and on 2nd or 3rd line treatment for greater than three months, are not recommended to breastfeed their infants due to the increased risk of mother-to-child transmission with poor viral suppression' (Department of Health KZN 2018).

5.9.4.3 Ability to determine antiretroviral therapy compliance

The participants scored well when asked to briefly describe how they would determine ART compliance in pregnant or lactating women living with HIV, with a mean knowledge score of 69.3% (SD±46.3). It is important to be able to determine ART compliance, in order to identify non-compliance and provide support to patients as needed. It is also important to be able to determine good compliance in order to identify and correctly diagnose the occurrence of treatment failure. Although not investigated in this study, it is hoped that healthcare workers provide the needed support when adherence issues are identified. A study by Johnston *et al* (2012), found that South African healthcare workers provided poor adherence support measures to patients.

5.9.4.4 Awareness regarding when breastfeeding should be stopped/discouraged

The participants scored poorly (34.7%) when asked when they would recommend a mother living with HIV to stop breastfeeding. Incorrect answers frequently given included 'at six months' (n=53; 28.8%) and 'at one year' (n=18; 9.8%). These answers may have been given as a result of previous guidelines which recommended these periods (six months of breastfeeding was recommended in the 2008 PMTCT guideline and the 2013 IYCF policy, before the 2017 amendment, recommend breastfeeding until one year of age) (NDoH 2008; NDoH 2017). Advice given by healthcare workers influences the feeding decisions of mothers, thus it is a serious concern that many healthcare workers would encourage mothers to stop breastfeeding in cases where breastfeeding is not contraindicated (West *et al* 2019).

5.10 Relationship between training and knowledge

Ideally, the training of healthcare workers should impart the knowledge and skills needed to implement the IYCF policy, providing accurate and consistent care (WHO 2017c). However, the attendance of training in the current study was not found to have this desired outcome. No significant relationship was found between the attendance of training and mean knowledge scores. This finding is supported by the study by Vallely *et al* (2013), which found that although the majority of healthcare workers in their study had been trained on

IYCF in the context of HIV, participants were not knowledgeable on the matter. A systematic review found that IYCF training courses had some small but significant positive effects in terms of measures of breastfeeding knowledge; however, this systematic review was not in the context of HIV, specifically (Gavine, MacGillivray, Renfrew, Siebelt, Haggi & McFadden 2017). Currently, there is no systematic review analysing the effect of HIV and IYCF training on knowledge or counselling practices. It is possible that the HIV component of the Department of Health three day IYCF training course is poorly designed or not effectively delivered, thus, not achieving the desired outcomes. It is also possible that the hospitals use inappropriate or out-dated material or that the participants may have last attended a training course a very long time prior to the current study. In any of these cases, the participants would not have been trained on the updated guidelines that were in place at the time of the study.

5.11 Confidence levels and knowledge

It is of concern that participants were identified to have high confidence levels regarding IYCF counselling practices in the context of HIV, yet they were found to have unacceptably low knowledge scores. Confident healthcare workers are more likely to be effective at influencing a mother's feeding choice (Schmied *et al* 2011). With high levels of confidence and poor IYCF knowledge, it is possible that these healthcare workers are contributing to poor feeding practices by mothers living with HIV.

5.12 Opinions on guidelines, compliance and practices

The attitudes and opinions of healthcare workers can influence IYCF counselling messages given to mothers living with HIV (Leshabari *et al* 2007; Piwoz *et al* 2006). The current study included six questions about the participants' opinions on guidelines, compliance and practices. The opinions were ranked using a Likert scale, where ratings were as follows: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree.

5.12.1 Knowledge of current guidelines

When asked to quantify how participants agreed with the statement 'I am up to date with the current HIV and Infant Feeding Guidelines,' the total group was in disagreement, with a mean score of 2.90 (SD±0.95). This indicates that participants were concerned about their lack of knowledge on the topic. This finding was different to the findings from Van Rensburg (2013), which found that 51.6% of healthcare workers in their study considered

themselves to be either experts or very knowledgeable regarding HIV and IYCF. In addition, the Van Rensburg study found that 40.6% of participants considered themselves moderately knowledgeable and only 7.8% considered themselves to have a low or very low knowledge on the topic (Van Rensburg 2013).

The on-going changes to the IYCF guidelines in the context of HIV could be one reason as to why the participants in the current study felt they were not up to date with the current guidelines. Confusion resulting from changes in guidelines has been reported in other studies (Mphasha & Skaal 2019; Tuthill, Chan & Butler 2015; Shayo *et al* 2014). Other reasons may include lack of or ineffective training and ineffective dissemination of guidelines. The feeling by the participants that they were not up to date with the current HIV and IYCF guidelines is valid as they did score low in the knowledge section of the study.

5.12.2 Need for the guidelines to be reviewed

The participants agreed that 'The current Infant Feeding Guidelines in the context of HIV need to be reviewed', with the statement receiving a mean score of 3.52 (SD±0.92). This result is in contrast to the findings by Van Rensburg (2013), which found 89.1% of participants to be supportive of the guideline when asked 'What is your opinion on the new guideline which will promote breastfeeding together with the use of ARVs as the number one infant feeding option for HIV-infected women in South Africa?' (Van Rensburg 2013). The guideline referred to in the Van Rensburg (2013) study is the same as the guideline in the current study, that is, the 2013 IYCF policy. The opinions between these studies are very different. However, at the time of the Van Rensburg study (2013) the policy had only recently been implemented, whereas in the current study the policy had been implemented for five years. Longer experience with the policy may have had an effect on participants' opinions towards it.

A concerning finding is that although the participants in this study felt that the guidelines needed to be reviewed, based on their poor knowledge scores, it appears the participants had an opinion about a guideline that they were not very knowledgeable about. The lack of knowledge regarding the IYCF recommendations for mothers living with HIV could be a result of poor dissemination of the IYCF policy and its updates at the three hospitals. For guidelines to be implemented in practice, they need to be accompanied by an effective dissemination strategy (Haines *et al* 2004). Some of the strongest resistance to change is

often related to the experiences and beliefs of healthcare workers. Selecting the best approach for dissemination requires an understanding of barriers to change, what behaviours need to be targeted and who the key stakeholders are (Michie *et al* 2005; Haines *et al* 2004). If healthcare workers are more aware of the policy, its recommendations and the rationale behind the recommendations, they may feel more positive towards the policy. The Department of Health in KZN should consider new approaches to disseminate and implement the IYCF policy.

5.12.3 Viral load testing of pregnant and breastfeeding women

The group had a mean score of 3.78 (SD±0.97) when asked to indicate how much they agreed with the statement 'Viral load testing for pregnant or lactating women living with HIV should be measured more frequently than six monthly.' The South African National Consolidated Guidelines for the PMTCT and the Management of HIV in Children, Adolescents and Adults, recommends six-monthly viral load monitoring and routine adherence support for pregnant and lactating women with viral loads of less than 1000 copies/mL and monthly testing for women with viral loads of greater than 1000 copies/mL (NDoH 2015). Participants may have responded that they feel viral load testing should be done more frequently than six monthly as higher viral loads are associated with increased risk of HIV transmission and should be addressed as soon as possible (WHO 2016b). It appears that the participants were not aware of or did not agree with why viral load testing is only done once every six months.

5.12.4 Antiretroviral therapy compliance of pregnant and breastfeeding women

Concerns regarding poor adherence of ART by some patients has been highlighted in a number of South African studies (Mthethwa 2017; Dewing, Mathews, Schaay, Cloete, Louw & Simbayi 2013; Peltzer, Friend-du Preez, Ramlagan & Anderson 2010). When asked how much they agreed with the statement 'ART compliance is a major problem for many pregnant women living with HIV,' the total group had a mean score of 3.59 (SD±1.12). Although the paediatric group agreed with this statement more strongly that the ARV and ANC groups [3.92 (SD±0.97) vs. 3.11 (SD±1.32) and 3.25 (SD±1.09), respectively], the paediatric group had the least experience with pregnant women (as discussed in 5.7). However, the ARV and ANC groups, who both frequently see pregnant women living with HIV, were also both in agreement with the statement. This highlights a lack of adequate ART support for pregnant women.

All the groups tended to agree with the statement 'ART compliance is a major problem for many breastfeeding women living with HIV,' with a mean score of 3.51 (SD±1.13) for the group. The paediatric group agreed more strongly with this statement than the ANC group [3.73 (SD±1.10) vs. 3.25 (SD±1.02), respectively]. A reason for this could be because while the ANC group offers routine care for patients, the paediatric group is more likely to offer services to sick or unwell patients (infants and young children that are well attend primary healthcare facilities for routine care but come to hospitals when unwell). Thus, the paediatric group may have been exposed to more cases of unwell children who acquired HIV through breastfeeding than the ANC group. The fact that the total group agreed with the statement highlights that there is also a lack of ART support for lactating women.

5.12.5 Provision of free infant formula

The majority of participants mildly disagreed with the statement 'Free formula should be provided to mothers living with HIV who do not want to breastfeed,' with a score of 2.98 (SD±1.36) for the total group. However, this outcome seems to be because of the large sample size of the paediatric group who disagreed with the statement, with a mean score of 2.67 (SD±1.29). The ANC group agreed with the statement (mean=3.04; SD±1.32) more than the paediatric group, although the difference was not statistically significant. The ARV group agreed with the statement significantly more so than the paediatric and ANC groups, with a mean score of 3.90 (SD±1.26) ($p<0.05$).

Healthcare workers are very influential when mothers living with HIV make infant feeding decisions (Nyoni, Sweet, Clark & Ward 2019). A study conducted in Johannesburg, South Africa, associated poor breastfeeding practices among mothers living with HIV with reluctance on the part of healthcare workers to promote breastfeeding to these mothers (Sepeng & Ballot 2015). Healthcare workers who agreed with this statement, especially the 14.9% (n=28) who strongly agreed with the statement, may be likely to encourage mothers to formula feed their infants instead of breastfeeding. This in-favour opinion of providing free formula highlights a lack of stakeholder support from the ARV group as to why the provision of free formula was stopped. Healthcare workers should be actively engaged whenever guidelines are introduced or updated. In order to ensure successful implementation of and good compliance with a guideline, healthcare workers require an understanding of the rationale behind the guideline (West *et al* 2019).

The paediatric group may have been less supportive of formula feeding and more supportive of breastfeeding because of their experiences. As discussed in 2.2, infants who are formula fed are more likely to suffer from malnutrition, diarrhoea, respiratory infections, otitis media, necrotising enterocolitis and sudden infant death syndrome than breastfed infants (Victora *et al* 2016). For these reasons, the paediatric group may have seen more formula-fed ill infants than breastfed ill infants.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

The aim of this study was to assess the knowledge and counselling practices of healthcare workers, primarily doctors and nurses, employed at eThekwini, KZN regional state hospital ARV, paediatric and antenatal departments, regarding IYCF in the context of HIV. The objectives were as follows: (i) to determine the knowledge of healthcare workers on IYCF in the context of HIV in eThekwini, KZN; (ii) to determine if healthcare workers have attended formal training on IYCF in the context of HIV in eThekwini, KZN; (iii) to determine if healthcare workers feel they require training on IYCF in the context of HIV in eThekwini, KZN; (iv) to determine if ARV clinics, antenatal departments and paediatric departments all have a role in IYCF counselling of mothers living with HIV in eThekwini, KZN; (v) to determine the level of confidence that healthcare workers have regarding counselling mothers on IYCF in the context of HIV in eThekwini, KZN. This chapter presents the study conclusions and recommendations.

6.1 Conclusions

Antenatal, ARV and paediatric departments all have a role in IYCF counselling of mothers living with HIV at regional hospitals in eThekwini, KZN. Although it is a job requirement, the healthcare workers in the study were not knowledgeable regarding IYCF in the context of HIV. The participants had a poor knowledge regarding general IYCF practices in the context of HIV, severely overestimated the risk of HIV transmission through breastfeeding; had a poor understanding of the term 'exclusive breastfeeding', had an exceptionally poor understanding of the term 'treatment failure' and were not aware of when mothers living with HIV should be encouraged to stop breastfeeding. Although knowledge levels were low, confidence levels were high. This implies that healthcare workers are confidently sharing incorrect information with mothers living with HIV and this is a concern.

Less than half of the participants had attended formal training on IYCF in the context of HIV. The three day IYCF training course offered by the Department of Health was the training most attended by the participants. Attendance of the training did not equate to improved knowledge scores. This suggests that the HIV component of the Department of Health three day IYCF training course is possibly being ineffectively delivered at the three hospitals. It also appears that updates on IYCF guidelines in the context of HIV are not being effectively

disseminated. The healthcare workers in the study were aware that they were not up to date with the current guidelines and felt they required more training.

6.2 Study limitations

6.2.1 Only three regional hospitals in eThekwini were included in this study. The healthcare workers who participated were not representative of all the healthcare workers in eThekwini who work with mothers living with HIV, preventing generalised conclusions from being drawn.

6.2.2 Many study participants were not supervised when completing their questionnaires due to logistical limitations. This is of concern for two reasons. Firstly, these participants may have researched their answers. Secondly, these participants could not readily ask the researcher any questions (although they were given the researcher's contact number and encouraged to contact her if needed).

6.2.3 Although efforts were made to avoid leading questions in the questionnaire, the use of predetermined questions may have introduced bias.

6.3 Recommendations

6.3.1 It is recommended that the dissemination of IYCF and HIV guidelines should be improved. This should be done in a manner that addresses behaviour change, tests for understanding and ensures accountability.

6.3.2 Health facilities should make training and timely refresher IYCF training a priority across all relevant departments.

6.3.3 There is a need for the NDoH to revise and improve its IYCF and HIV training courses. Participants should exhibit a clear understanding of the key concepts and display the necessary skills needed for desirable IYCF counselling in order to pass the course.

6.3.4 Healthcare workers should be assessed quarterly to ensure that they are correctly counselling mothers living with HIV on IYCF. These assessments could form part of the MBFI programme and be conducted by MBFI coordinators or registered dietitians.

6.4 Recommendations for further research

6.4.1 There is a need for studies that determine how effective the different IYCF and HIV training strategies are in improving knowledge levels.

6.4.2 The role that IYCF counselling has on the infant feeding decisions made by mothers living with HIV, should be further researched.

6.4.3 Future research should address the misbeliefs that healthcare workers have regarding IYCF in the context of HIV.

6.4.4 Similar studies should also be conducted in other South African provinces in order to make comparisons between provinces.

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Appendix A: Questionnaire

Knowledge and Practices of Healthcare Workers related to HIV and Infant Feeding in eThekwini

Dear Participant,

Thank you for your participation in this research project, for a Master of Science in Dietetics.

The objectives of the study are as follows:

1. To determine the knowledge of different healthcare professionals on infant feeding in the context of HIV.
2. To determine the roles of different healthcare professionals in infant feeding counselling in the context of HIV
3. To determine the level of training different healthcare professionals have received on infant feeding in the context of HIV
4. To determine the level of confidence different healthcare professionals have in regards to counselling mothers on infant feeding in the context of HIV.

Please answer all questions honestly. Tick the appropriate answer or fill in where required. Any queries can be directed to the researcher.

Section A: DEMOGRAPHIC INFORMATION

1.1 Gender

Male	
Female	

1.2 Age

<22 years	
22-25 years	
26-30 years	
31-35 years	
36-45 years	
46-55 years	
>55 years	

1.3 What is your professional status?

Medical Officer	
Medical Registrar	
Medical Consultant	
Professional Nurse	
Enrolled Nurse	
Other (please specify):	

1.4 In which department do you currently work?

ARV Clinic	
Paediatrics	
Antenatal Clinic	
Other (please specify):	

1.5 How long have you been working in that department?

Less than 2 years	
2- <5 years	
5- <10 years	
10- <20 years	
20+ years	

Section B: TRAINING

2.1 Have you attended any formal training on Infant Feeding in the context of HIV?

Yes	
No	

2.2 <u>If YES to q2.1</u>, which training did you attend? (Tick <u>ALL</u> that apply)

2.2.1 Three Day Infant and Young Child Feeding Training (Department of Health)	
2.2.2 Part of formal degree or diploma training	
2.2.3 Other (please specify):	

2.3 <u>If YES to q2.1</u>, when was the last time you were formally trained on Infant Feeding in the context of HIV? *(Please specify the year)*

_____

2.4 How often do you receive updates on HIV and Infant Feeding Guidelines? (Tick ONE option only)

At least every 3 months	
At least every 6 months	
At least once a year	
Less than once a year	
I don't receive any updates	

2.5 How do you receive updates on HIV and Infant Feeding Guidelines? (Tick ALL that apply)

2.5.1 Email	
2.5.2 Trainings or in-services	
2.5.3 Meetings	
2.5.4 I don't receive updates	
2.5.5 Other (please specify):	

2.6 Have you seen a copy of the Infant and Young Child Feeding Policy in your department?

Yes	
No	
Unsure	

2.7 Do you feel that you require any further training on HIV and Infant Feeding Guidelines?

Yes	
No	

2.8 If <u>YES to q2.7</u>, please select in which area/areas you would appreciate further training. (Tick <u>ALL</u> that apply)

2.8.1 Why HIV infected mothers are advised to breastfeed as opposed to formula feed	
2.8.2 Continued breastfeeding after 6 months	
2.8.3 Complementary feeding	
2.8.4 Practical skills regarding breastfeeding	
2.8.5 Practical skills regarding formula feeding	
2.8.6 Infant feeding and treatment failure	
2.8.7 Infant feeding advice with regards to non-compliant mother	
2.8.8 Other (please specify):	

3. In the context of HIV, were you trained on the following topics? (Tick all that apply)

Training			
		Yes	**No**
3.1	The importance of exclusive breastfeeding for the baby for the first 6 months of life.		
3.2	Importance of continued breastfeeding with appropriate complementary feeding after 6 months.		
3.3	Importance of breastfeeding for the mother.		
3.4	The importance of immediate skin-to-skin contact after birth.		
3.5	Positioning and attachment.		
3.6	Hand expression of breast milk.		
3.7	The risks and hazards of not breastfeeding.		
3.8	ART adherence.		

Section C: COUNSELLING ON HIV AND INFANT FEEDING

4. Indicate the frequency with which you do the following:

Counselling: Pregnant Women						
		Never	**Less often than once a month**	**At least once a month**	**At least once a week**	**At least once a day**
4.1	How often do you counsel pregnant women living with HIV on infant feeding?					
4.2	How often do you counsel pregnant women living with HIV who intend to go back to work before their infant is 6 months old?					
4.3	How often do you counsel pregnant women living with HIV who are not compliant with their ART, on infant feeding?					
Counselling: Women Within 6 Months of Birth						
4.4	How often do you counsel exclusively breastfeeding mothers living with HIV on infant feeding practices?					
4.5	How often do you counsel mothers living with HIV who exclusively formula feed their infants, on infant feeding practices?					
4.6	How often do you counsel mothers living with HIV who practice mixed feeding?					
4.7	How often do you counsel postnatal mothers, living with HIV who intend to go back/ have gone back to work before their infant is 6 months, on infant feeding practices?					
4.8	How often do you observe an HIV mother breastfeeding?					
4.9	How often do you counsel a mother living with HIV, who is experiencing breast engorgement, on the management of her engorgement?					
4.10	How often do you counsel a mother living with HIV, who has mastitis, on the management of her mastitis?					
4.11	How often do you counsel a mother living with HIV, who has cracked nipples, on the management of her cracked nipples?					
4.12	How often do you counsel postnatal mothers living with HIV, who are not compliant with their ART, on infant feeding practices?					
4.13	How often do you counsel postnatal mothers living with HIV on infant feeding, while they are still in hospital?					
4.14	How often do you counsel mothers living with HIV on infant feeding within one week of delivery?					
4.15	How often do you counsel a mother living with HIV on correct formula preparation?					

Section D: CONFIDENCE

5. Rate your confidence, from 1 = not at all confident to 6 = very confident, with regard to the following:

Confidence							
		Not at all confident 1	**2**	**3**	**4**	**5**	**Very confident 6**
5.1	Counselling an expectant mother living with HIV on the benefits of exclusive breastfeeding for 6 months.						
5.2	Counselling an expectant mother living without HIV on the benefits of exclusive breastfeeding for 6 months.						
5.3	Counselling an expectant mother living with HIV on the importance of skin-to-skin contact after birth.						
5.4	Counselling a mother on breast-feeding positioning and attachment.						
5.5	Counselling a mother on how to identify hunger cues in her infant.						
5.6	Counselling a mother living with HIV on when to introduce complementary food to her infant.						
5.7	Counselling a mother on which complementary foods to give to her infant and when.						
5.8	Counselling a mother living with HIV on expressing breast milk.						
5.9	Counselling a mother on safe formula preparation.						
5.10	Advising a mother living with HIV on the management of breast engorgement.						
5.11	Advising a mother living with HIV on the management of cracked nipples.						
5.12	Advising a mother living with HIV on the management of mastitis.						
5.13	Counselling a mother with diagnosed ARV treatment failure on her infant feeding options.						
5.14	Counselling a mother living with HIV on ART adherence for both herself and her infant.						

Section E: KNOWLEDGE ON INFANT FEEDING

6. Indicate whether the following statements are true or false.

True or False				
		True	**False**	**Unsure**
6.1	After delivery the mother and baby are usually very tired and need to rest for a few hours before they start breastfeeding.			
6.2	The benefits of breastfeeding outweigh the risks of HIV transmission.			
6.3	Mothers living with HIV should discard their colostrum.			
6.4	Mothers living with HIV can introduce solid foods if their infant shows signs of readiness.			
6.6	Mixed feeding is better than no breastfeeding for an ART compliant mother living with HIV.			
6.7	Mothers on TB treatment should not breastfeed.			
6.8	Mothers living with HIV, who can afford to safely formula feed, should be encouraged to do so.			
6.9	If a mother living with HIV has mastitis, she should stop breastfeeding.			
6.10	Mothers living with HIV should be encouraged to express breastmilk and heat-treat it before giving it to their infants.			
6.11	If a mother living with HIV is compliant with her ART, she can continue breastfeeding up until 2 years or longer.			
6.12	Nevirapine should be administered to the infant for the duration of breastfeeding and stopped one week after breastfeeding is stopped.			
6.13	At 12 months, a mother living with HIV should stop breastfeeding and give her child cow's milk instead.			
6.14	Breast pumps are essential for expressing breastmilk.			
6.15	Infant polymerase chain reaction (PCR) testing should be done for infants of mothers living with HIV at 6 weeks of age.			
6.16	Pregnant women living with HIV should be counselled on infant feeding separately to uninfected pregnant women.			
6.17	A mother living with HIV who is adherent to ART and has introduced solids foods at 5 months, should be encouraged to return to exclusive breastfeeding.			
6.18	If a mother wants to stop breastfeeding, she should go about it gradually.			
6.19	Formula fed babies are at higher risk of getting sick (diarrhoea, pneumonia, malnutrition) than breastfed babies are.			
6.20	Mothers infected with HIV who are non-compliant with their ART should be encouraged to formula feed.			

Section F: KNOWLEDGE ON RISK OF TRANSMISSION

Please read the following questions carefully and indicate your answer.

7. What percentage of infants who tested HIV negative at 6 weeks would acquire HIV by 6 months of age for mothers living with HIV who are *not on ART* and are practicing *exclusive breastfeeding?*

< 5%	5– 20%	21– 40%	41– 60%	>60%

8. What percentage of infants who tested HIV negative at 6 weeks would acquire HIV by 6 months of age for mothers living with HIV who are *not on ART* and are *practicing mixed feeding?*

< 5%	5– 20%	21– 40%	41– 60%	>60%

9. What percentage of infants who tested HIV negative at 6 weeks would acquire HIV by 6 months of age for mothers living with HIV who are *on ART* and are *exclusively breastfeeding?*

< 5%	5– 20%	21– 40%	41– 60%	>60%

10. What percentage of infants who tested HIV negative at 6 weeks would acquire HIV by 6 months of age for mothers living with HIV who are *on ART* and are *mixed feeding?*

< 5%	5– 20%	21– 40%	41– 60%	>60%

11. What percentage of babies born HIV negative, acquired HIV through breastfeeding in 2017 in eThekwini?

< 1%	2– 5%	6– 15%	16– 30%	>30%

Section G: UNDERSTANDING OF TERMS, DETERMINING COMPLIANCE AND RECOMMENDATIONS

12. What do you understand by the term "Exclusive Breastfeeding?"

_____
_____
_____
_____
_____
_____

13. What do you understand by the term "Treatment Failure?"

_____
_____
_____
_____
_____
_____

14. Briefly describe how you would determine ART compliance in pregnant/lactating women living with HIV? (Please indicate if this question is not appropriate for your profession)

_____
_____
_____
_____
_____
_____

15. When would you recommend that a mother living with HIV stops breastfeeding? (Please indicate if this question is not appropriate for your profession)

_____
_____
_____
_____
_____
_____

Section H: OPINIONS ON GUIDELINES, COMPLIANCE AND PRACTICES

16. Indicate your agreement with the following statements:

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
16.1	I am up to date with the current HIV and Infant Feeding Guidelines.					
16.2	The current Infant Feeding Guidelines in the context of HIV need to be reviewed.					
16.3	Viral load testing for pregnant or lactating women living with HIV should be measured more frequently than 6 monthly.					
16.4	ART compliance is a major problem for many pregnant women living with HIV.					
16.5	ART compliance is a major problem for many breastfeeding women living with HIV.					
16.6	Free formula should be provided to mothers living with HIV who do not want to breastfeed.					

Thank you for taking the time to participate in this study, it is much appreciated. For any questions please do not hesitate to contact the researcher (Kate Nuns 082 297 7732 katenuns@gmail.com)

Appendix B: Letter for unsupervised participants

Dear Doctor 3 September 2018

Thank you for taking the time to consider participating in my master's research study. My study is titled *Knowledge and Practices of Healthcare Workers related to HIV and Infant Feeding in eThekwini* and it involves a self-administered questionnaire being completed by permanently employed doctors and nurses working in ARV, ANC (as well as labour ward and maternity) and paediatric departments at Addington Hospital, Prince Mshiyeni Memorial Hospital and RK Khan Hospital. The questionnaire takes about 30 minutes to complete and is completely **anonymous** (the consent forms are not kept with the questionnaires).

The aim of the study is to identify who are the role players in infant feeding counselling for mothers living with HIV and if these healthcare workers are up-to-date with the current guidelines. There have been many changes in the Infant Feeding Guidelines with regards to HIV which can be very confusing for healthcare professionals and patients. I am hoping to identify the gaps which will then hopefully be addressed by Department of Health and thus improve healthcare in our district.

Once you have completed the questionnaire please return it to your department's secretary.

Every single questionnaire makes a huge difference to the strength of my study and I cannot explain how much I appreciate your assistance☺

Yours in health,

Kate Nuns

0822977732

katenuns@gmail.com

Appendix C: Ethics approval letter from UKZN

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

04 May 2018

Ms Kate Abby Nuns (206512989)
School of Agricultural, Earth & Environmental Sciences
Pietermaritzburg Campus

Dear Ms Nuns,

Protocol Reference Number : HSS/0296/018M
Project title: Knowledge, attitudes and practices of healthcare workers related to HIV and infant feeding in eThekwini, South Africa

Approval Notification – Expedited Application

With regards to your response received on 03 May 2018 to our letter of 25 April 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

[redacted]
.....
Dr Shamila Naidoo (Deputy Chair)

/ms

Cc Supervisor: Dr Kirthee Pillay
cc Academic Leader Research: Professor Hussein Shimelis
cc School Administrators: Ms Marsha Manjoo

Humanities & Social Sciences Research Ethics Committee
Professor Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

Appendix D: Ethics approval letter from Department of Health KZN

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

330 Langalibalele street,
Private Bag X9051 PMB, 3200
Tel: 033 395 2805/3189/3123 Fax: 033 394 3782
Email: hrkm@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
Health Research & Knowledge Management (HKRM)

Reference: HRKM129 /18
KZ_201803_036

02 May 2018

Dear Ms K A Nuns
(UKZN)

Subject: Approval of a Research Proposal

1. The research proposal titled **'Knowledge and Practices of Healthcare Workers related to HIV and Infant Feeding in eThekwini, South Africa'** was reviewed by the KwaZulu-Natal Department of Health (KZN-DoH).

   The proposal is hereby **approved** for research to be undertaken at Prince Mshiyeni Memorial; Addington; Mahatma Gandhi Memorial & RK Khan Hospitals.

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facilities before commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Ms G Khumalo on 033-395 3189.

Yours Sincerely

[redacted]

Dr E Lutge
Chairperson, Health Research Committee
Date: 03/05/18

Fighting Disease, Fighting Poverty, Giving Hope

Appendix E: Approval letters from hospital managers

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Physical Address : R.K. Khan Circle
Physical Address : CHATSWORTH
Tel: [031] 4596001 Fax:[031] 4011247 Email:Sharon.gounden@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
R.K. KHAN HOSPITAL
OFFICE OF THE CEO

4 May 2018

Ms Kate Abby Nuns [206512989]
School of Agricultural, Earth & Environmental Sciences
PIETERMARITZBURG

Dear Ms Nuns

RE: PERMISSION TO CONDUCT RESEARCH: KNOWLEDGE, ATTITUDES AND PRACTICES OF HEALTHCARE WORKERS RELATED TO HIV AND INFANT FEEDING IN ETHEKWINI, SOUTH AFRICA

Permission is granted to conduct the study at this institution.

Please note the following:

1. Please ensure that you adhere to all the policies, procedures protocols and guidelines of the Institution with regards to this research.
2. Please ensure this office is informed before you commence your research and your University's Ethics approval must be attached.
3. You will be expected to provide feedback on your findings to this institution.

Yours faithfully

[redacted]

CHIEF EXECUTIVE OFFICER

R K KHAN HOSPITAL
HOSPITAL / HOSPITAAL
2018 -05- 07
PRIVATE BAG X004
CHATSWORTH
4030

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

Physical Address : R.K. Khan Circle
Physical Address : CHATSWORTH
Tel: [031] 4596001 Fax:[031] 4011247 Email:Sharon.gounden@kznhealth.gov.za
www.kznhealth.gov.za

DIRECTORATE:
R.K. KHAN HOSPITAL
OFFICE OF THE CEO

26 October 2018

Ms Kate Abby Nuns
UKZN

Dear Ms Nuns

RE: PERMISSION TO CONDUCT RESEARCH: KNOWLEDGE AND PRACTICES OF HEALTHCARE WORKERS RELATED TO HIV AND INFANT FEEDING IN ETHEKWINI, SOUTH AFRICA

Permission is granted to conduct the study at this institution.

Please note the following:

1. Please ensure that you adhere to all the policies, procedures protocols and guidelines of the Institution with regards to this research.
2. Please ensure this office is informed before you commence your research and your University's Ethics approval must be attached.
3. You will be expected to provide feedback on your findings to this institution.

Yours faithfully

[redacted]

CHIEF EXECUTIVE OFFICER

R K KHAN HOSPITAL
HOSPITAL / HOSPITAAL
2018 -10- 26
PRIVATE BAG X004
CHATSWORTH
4030

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE: Senior Medical Manager

Mangosuthu Highway, Private Bag X 07
MOBENI
Tel: 031 907 8317/8304 Fax: 031 906 1044 Email:myint.aung@kznhealth.gov.za
www.kznhealth.gov.za

Prince Mshiyeni Memorial Hospital

Enquiry: Dr M AUNG
Ref No: 16/RESH/2018
Date: 17/05/2018

TO: Kate Nuns

RE: LETTER OF APPROVAL TO CONDUCT RESEARCH AT PMMH

Dear Researcher;

I have pleasure to inform you that PMMH has granted to conduct research on **"Knowledge and Practices of Healthcare Workers related to HIV and Infant Feeding in eThekwini, South Africa"** in our institution.

Please note the following:

1. Please ensure this office is informed before you commence your research.
2. The institution will not provide any resources for this research.
3. You will be expected to provide feedback on you finding to the institution.

With kind regard

[redacted]

MYINT AUNG
Senior Medical Manager & specialist in Family Medicine
MBBS, DO(SA), PGDip in HIV (Natal), M.Med.Fam.Med (natal), PhD
Tel: 031 9078317
Fax: 031 906 1044
myint.aung@kznhealth.gov.za

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

ADDINGTON HOSPITAL

P O BOX 977
DURBAN
4000
Tel: 031 327 2970 Email: reshma.boodhai@kznhealth.gov.za
www.kznhealth.gov.za

OFFICE OF THE CHIEF EXECUTIVE OFFICER

Reference: 9/2/3/R

Date: 21st May 2018

Principal Investigator:
- **Ms KA Nuns**

PERMISSION TO CONDUCT RESEARCH AT ADDINGTON HOSPITAL: "KNOWLEDGE AND PRACTICES OF HEALTHCARE WORKERS RELATED TO HIV AND INFANT FEEDING IN ETHEKWINI, SOUTH AFRICA"

I have pleasure in informing you that permission has been granted to you by Addington Hospital Management to conduct the above research.

Please note the following:

1. Please ensure that you adhere to all the policies, procedures, protocols and guidelines of the Department of Health with regards to this research.
2. This research will only commence once this office has received confirmation from the Provincial Health Research Committee in the KZN Department of Health.
3. Please ensure this office is informed before you commence your research.
4. Addington Hospital will not provide any resources for this research.
5. You will be expected to provide feedback on your findings to Addington Hospital.

[redacted]

DR M NDLANGISA
HOSPITAL MANAGER
ADDINGTON HOSPITAL

Appendix F: Consent form

CONSENT FORM FOR STUDY PARTICIPANTS

UNIVERSITY OF KWAZULU-NATAL ™
INYUVESI YAKWAZULU-NATALI

INFORMATION SHEET AND CONSENT TO PARTICIPATE IN RESEARCH

Date: _____

My name is Kate Abby Nuns and I am currently doing my M.Sc in Dietetics through the University of KwaZulu-Natal. My supervisor is Dr K Pillay.

You are being invited to consider participating in a study, titled ***Knowledge, Attitudes and Practices of Healthcare Workers related to HIV and Infant Feeding in eThekwini***. The aim of the study is to assess the knowledge and practices of healthcare workers employed at regional state hospital ARV, paediatric and antenatal departments, concerning HIV and infant feeding in eThekwini District, KZN. The study is being conducted at regional state hospitals in eThekwini and involves permanently employed doctors and nurses working in ARV, antenatal and paediatric departments. Participants will be required to complete a self-administered questionnaire focused on infant and young child feeding (IYCF) practices in the context of HIV. The regional hospitals selected for this study include Addington Hospital, Prince Mshiyeni Memorial Hospital and RK Khan Hospital. Around 250 doctors and nurses are expected to participate in the study. The questionnaire consists of open and closed-ended questions and should take a maximum of 30 minutes to complete. The study is self-funded by the researcher.

In the event of any problems or concerns/questions, you may contact the researcher at 0822977732 or katenuns@gmail.com. The project supervisor can be contacted on 033-2605674 or pillayk@ukzn.ac.za.

The HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION can be contacted as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION
Research Office, Westville Campus
GoVan Mbeki Building
Private Bag X 54001
Durban
4000

KwaZulu-Natal, SOUTH AFRICA
Tel: 27 31 2604557- Fax: 27 31 2604609
Email: HSSREC@ukzn.ac.za

There are no risks associated with participation in the study. The questionnaire will be completed anonymously and all the data from the study will remain confidential and be used only for the purpose of this research project. The research supervisor will keep the original copies of the completed questionnaires and the researcher will have electronic versions. Participation in the study is voluntary and participants may withdraw from the study at any time if they wish to do so, with no consequences. There are no individual benefits or costs associated with participating in this study. No participant will receive any payment (financial or other) for participating in the study. We hope to identify strengths and weaknesses of healthcare workers' knowledge on infant and young child feeding (IYCF) practices in the context of HIV. A report from the study will be forwarded to Department of Health KZN Provincial Office and the findings may be used to strengthen the IYCF strategies.

The study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (reference HSS/0296/018M) and the National Health Research Database Ethics Committee (reference HRKM129/18 KZ_201803_036).

Consent:

I _____ (full name and surname) hereby confirm that I have been informed about the study titled *Knowledge, Attitudes and Practices of Healthcare Workers related to HIV and Infant Feeding in eThekwini* by Kate Abby Nuns.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is completely voluntary and that I may withdraw at any time without any negative consequences.

I have been informed that there is no financial or any other compensation for participating in this study.

If I have any further questions/concerns or queries related to the study I understand that I may contact the research via telephone (082 297 7732) or email (katenuns@gmail.com).

If I have any questions or concerns about my right as a study participant, or if I am concerned about an aspect of the study or the researcher or research supervisor then I may contact:

Research Office, Westville Campus
GoVan Mbeki Building
Private Bag X 5400
Durban
4000
KwaZulu-Natal, South Africa
Tel: +27 31 260 4557 Fax: +27 31 260 4609
Email: HSSREC@ukzn.ac.za

I hereby consent to participating in this research project.

_____ _____

Signature **Date**