Feeding practices of mothers and/or caregivers of infants below the age of 6 months in South Africa

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LIST OF ABBREVIATIONS

AFASS	Acceptable, feasible, affordable, sustainable and safe
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Treatment
BF	Breastfeeding
BM	Breast milk
EBF	Exclusive breastfeeding
FAO	Food and Agriculture Organisation
HIV	Human Immunodeficiency Syndrome
HSRC	Human Sciences Research Council
IYCF	Infant and Young Child Feeding
MBFI	Mother Baby Friendly Initiative
Non-EBF	Non-exclusive breastfeeding
PMTCT	Prevention of Mother-to-Child Transmission
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

LIST OF DEFINITIONS

Complementary feeding	The process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk.
Exclusive breastfeeding	The infant receives only breast milk. No other liquids or solids are given (not even water) with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines.
Mix feeding	The process of giving other liquids and/or foods together with breast milk to infants under 6 months of age
Partial breastfeeding	Refers to a situation where the baby is receiving some breastfeeds but is also being given other food or food-based fluids, such as formula milk or weaning foods
Predominant feeding	The infant's predominant source of nourishment is breast milk. However, the infant may also have received water and water-based drinks (sweetened and flavoured water, teas, infusions etc.); fruit juice; oral rehydration salts solution; drop and syrup forms of vitamins, minerals and medicines; and ritual fluids (in limited quantities). With the exception of fruit juice and sugar-water, no food-based fluid is allowed under this definition. The child is receiving breast milk, either directly from the breast or expressed. This definition may include exclusive, predominant and partial breastfeeding.

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ABSTRACT

Background: Breastfeeding is widely recognised as the ideal approach for improving child survival and feeding new-born babies and young infants. The World Health Organisation (WHO) recommends exclusive breastfeeding (EBF) for the first 6 months of life with timely introduction of complementary foods at 6 months and continued breastfeeding for up to two years and beyond. The feeding practices of mothers are widely influenced by different factors which may be embedded within different contexts of life.

Aim: This study explored the infant feeding practices of mothers and/or caregivers of infants below the age of 6 months.

Method: This cross sectional study was conducted in four provinces in South Africa. In total, 40 health facilities were randomly selected in the four provinces and visited including metropolitan and non-metropolitan health facilities over the geographical area of the provinces. Fixed structured interviews were conducted and data on the feeding practices of mothers were collected using a questionnaire which had both open and closed-ended questions. Qualitative data were coded under different themes. The sample size comprised of mothers and/or caregivers of babies aged 6 months and below. A 24-hour recall was completed for all infants. Dietary intake and diversity were assessed using the FAO dietary diversity list consisting of 12 different food groups. Descriptive statistics, crosstabs and Pearson chi-square tests were used.

Results: A total of 580 mothers/caregivers of infants below the age of 6 months were interviewed. Ninety-five % (n=551) were biological mothers. A total of 490 (85%) were breastfeeding at the time of the interviews. Ninety % had initiated breastfeeding during the first hour after delivery. At the time of the study, 12% (n=4) of the women were practising exclusive breastfeeding (EBF) for the recommended 6 months. Sixteen % (n=90) were not breastfeeding at the time the interviews were conducted. More than two thirds (64%) had exclusively breastfed their infants but stopped at the time of the interviews and 36% (n=32) did not breastfeed their babies at all. Twelve % (n=4) of the mothers stopped breastfeeding from as early as one month. The most cited reasons by the participants for breastfeeding cessation were the need to return to work or school. Reasons for not breastfeeding at all included the mothers HIV status, poor health and insufficient milk production. Forty-one % (n=239) of the mothers believed that breastfeeding contains adequate nutrients for the

child and 5.7% (33) did not know why breastfeeding is important. Nearly half (49%) were giving infant feeding formula. Seventy % (n=220) of the women were giving either infant feeding formula or other liquids in addition to breast milk. The most stated reason for giving other liquids or foods was the belief that breast milk was not enough for the infant. Almost two thirds (56%) of the mothers gave their infants fortified infant feeding formula. Only one infant (0.2%) met the minimum standard of dietary diversity. Complementary food was introduced from as early as one month, and 73% of the women reported that their infants were receiving dietary supplements.

Conclusion: Breastfeeding still remains a universal practice in the country. Sustained exclusive breastfeeding is still a cause of concern and 6 month EBF rates remain very low. Both mothers and caregivers had sound understanding of the importance of breastfeeding. Early initiation of complementary foods is still a norm and wide problem in the country. The dietary diversity of complementary diets given to babies was nutritionally inadequate.

Keywords: breastfeeding, exclusive breastfeeding, complementary food, dietary diversity, feeding practices

OPSOMMING

Agtergrond: Borsvoeding word algemeen aanvaar as die ideale manier om pasgeborenes en klein kinders mee te voed en dat dit oorlewingskanse verbeter. Die WGO beveel borsvoeding aan vir die eerste ses maande vanaf die kind se geboorte, met komplimenterende kosse wat vanaf ses maande ingefaseer word en borsvoeding wat tot twee en meer jare kan voortgaan. Die voedingspraktyke van moeders word beïnvloed deur verskeie faktore wat gepaard gaan met verskillende kontekste in die lewe.

Doel: Hierdie studie ondersoek die voedingspraktyke van moeders en/of oppassers van kinders in die ouderdomsgroep van ses maande en jonger.

Metode: In hierdie deursnitstudie is gestruktureerde onderhoude gevoer en data oor die voedingspraktyke van moeders is ingesamel deur middel van ’n vraelys. Die vraelyste het oop en geslote vrae bevat. Kwalitatiewe data is gekodeer na aanleiding van verskillende temas. Die steekproef het bestaan uit moeders en oppassers van kinders jonger as ses maande. Voedingsinname en diversiteit is assesseer deur die FAO se voedseldiversiteitslys te gebruik wat uit 12 voedselgroepe bestaan. Beskrywende statistiek, kruistabulering en Pearson Chi-kwadraat toetse is gebruik.

Resultate: Onderhoude is gevoer met ’n totaal van 580 moeders/oppassers. Hiervan was 95% (n=551) biologiese moeders. In totaal was 490 (85%) van die moeders besig om te borsvoed ten tye van die onderhoud. Negentig % het borsvoeding begin binne die eerste uur na geboorte begin. Ten tye van die studie het 48% (n=266) van die vroue uitsluitlike borsvoeding toegepas en 16% (n=90) het nie borsvoeding toegepas nie. Meer as twee derdes van respondente (64%) het slegs borsvoeding toegepas, maar dit gestaak teen die onderhoudtyd en 36% (n=32) het glad nie borsvoeding toegepas nie. Twaalf % van die moeders het so vroeg as een maand na die geboorte borsvoeding gestaak. Die mees algemene redes hiervoor was die noodsaaklik om terug te keer na werk of skole. Redes waarom borsvoeding glad nie toegepas is nie, sluit in die moeders se HIV-status, swak gesondheid, of onvoldoende melkproduksie. Een-en-veertig % van moeders (n=239) het geglo dat borsvoeding voldoende nutriënte vir die kind bevat en 5.7% (n=33) het nie geweet waarom borsvoeding belangrik is nie. Bykans die helfte van die moeders (49%) het formule-melk vir die kinders gegee en sewentig % (n=220) van die vroue het formule-melk of ander vloeistowwe

addisioneel tot die borsmelk gegee. Die mees algemene rede wat genoem is rakende die addisionele vloeistowwe, was dat hul geglo het dat borsmelk nie voldoende vir die babas is nie. Omtrent twee derdes (56%) van die moeders het hul kinders melk en melkprodukte gegee, wat gefortifiseerde baba formules insluit. Slegs een baba (0.2%) het aan die minimumstandaard van dieetkundige diversiteit voldoen. Komplimentêre kos is so vroeg as een maand gegee en 73% van die vroue het rapporteer dat hul kinders dieetsupplemente ontvang het.

Gevolgtrekking: Borsvoeding is steeds ŉ algemene praktyk in die land. Eksklusiewe borsvoeding vir lang termyne is steeds ŉ probleem en die getalle bly laag. Beide moeders en oppassers verstaan goed hoe belangrik borsvoeding is. Die vroeë bekendstelling aan komplementerê kosse is steeds ŉ norm en ŉ probleem in die land. Die komplementêre diëte wat aan babas gegee word, is nie voldoende in kwaliteit en kwantiteit nie.

Kernwoorde: borsvoeding; eksklusiewe borsvoeding; komplementêre kos; diversiteit in dieet, voedingspraktyke.

CHAPTER ONE: INTRODUCTION

1.1 Background and Motivation

There is overwhelming scientific evidence supporting the integral role of breastfeeding in the survival, growth and development of a child (WHO, 2012). Besides having the complete nutritional requirements that an infant needs for healthy development, breast milk is safe and contains antibodies that help protect infants and boost immunity. As a result, breastfeeding contributes to reduced morbidity and mortality due to diarrhoea, respiratory, ear and/or other infections (WHO, 2012).

Although under-five child mortality has decreased by nearly two thirds globally, the South African infant mortality rate only decreased by 2% between 1994 and 2010. Furthermore, in 2012, it was shown to be on the increase in some provinces. According to the Human Sciences Research Council (HSRC), the majority of these deaths were caused by conditions that are preventable or treatable, such as the Acquired Immune Deficiency Syndrome (AIDS), pneumonia, diarrhoea and neonatal conditions. Also, 60% of under-five mortality is reported to be associated with malnutrition (Kassier & Veldman, 2007).

In the year 2000, the World Health Organisation (WHO), in close collaboration with the United Nations Children's Fund (UNICEF), organised a consultation to assess the infant and young child feeding practices, review key interventions and formulate a comprehensive strategy for the next decade which was discussed and approved in 2002 (UNICEF, 2003). Then in 2001, WHO revised its earlier recommendation of exclusive breastfeeding (EBF) of infants from 4 to 6 months of age to EBF until 'about 6 months' of age, with the addition of complementary foods thereafter. This recommendation confirms that breast milk alone is sufficient to meet infants' nutritional requirements for the first 6 months of life. Thereafter to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods, while breastfeeding continues for two years and beyond (WHO, 2003). In South Africa, however, foods other than breast milk are frequently fed to younger infants, sometimes being introduced within the first month of life (MacIntyre *et al.,* 2005).

The above assertion is supported by the 2003 Demographic and Health Survey which shows that only eight percent of infants below the age of 6 months were exclusively breastfed, and a further 19% were almost exclusively breastfed with the addition of water only. These statistics improved slightly in 2008 as reflected in a study by HSRC that found that 25.7% of children

below the age of 6 months were reported to be exclusively breastfed but still 51.3% were fed breast milk and infant feeding formula as well as other substances such as tea, water, and/or porridge (Shisana *et al.,* 2010). The positive side however is that there appears to have been a steep fall in the proportion of infants receiving complementary foods before the age of 6 months, falling from 70% in 1998 to 22.0% in 2003 (Department of Health, 2011).

ln a pledge to address the dismal state of infant and young child feeding in the country at the highest level of governance, the Tshwane Declaration for the support of breastfeeding in South Africa was announced at a national breastfeeding summit held in August 2011. This declaration incorporated the decision that free infant feeding formula will no longer be issued at public health facilities, unless authorised by a qualified health professional. This decision was taken to support, protect and promote breastfeeding as the optimal form of nutrition for babies (Tshwane Declaration for the Support of Breastfeeding in South Africa, 2011).

The Tshwane Declaration also adopted the 2010 WHO Human Immunodeficiency Virus (HIV) and infant feeding guidelines. This guideline specifies that all HIV-infected mothers should breastfeed their infants and receive antiretroviral drugs. It also recommends that national regulations on the International Marketing of Breast milk Substitutes should be finalised and adopted into legislation within 12 months from the meeting date. Subsequently, a year later, the regulations relating to the labelling and advertising of foodstuffs for infants and young children were gazetted in December 2012. This document included legislation of the Code for the Marketing of Breast milk Substitutes in South Africa. Recently, the infant and young child feeding policy (2008) was updated in 2013 to reflect the decisions stipulated in the Declaration (Du Plessis, 2013).

With regards to complementary feeding of very young infants, this practice holds several possible risks. Physically and physiologically the young infant is not ready to handle non-milk foods. The still strong oral suckle, swallow and extrusion reflexes and immature tongue movements interfere with swallowing. In fact, there is evidence that early complementing of breastfed infants reduces the intake of breast milk and shortens the total duration of breastfeeding. According to MacIntyre *et al.* (2005) complementary feeding introduces a source of contamination through feeding utensils and feeds while the infant's immune system is immature and dependent on the protective factors in breast milk, therefore increasing the risks of diarrhoea and other infectious diseases.

Nonetheless, a mother's choice to select appropriate infant feeding practices could be influenced by different factors which may include the support provided through formal health services and other community-based groups, lack of public facilities for breastfeeding, challenges for working mothers to breastfeed (for example insufficient maternity leave and facilities at work that are not supportive of breastfeeding) and the mother's level of knowledge (Du Plessis, 2013; Swarts *et al.,* 2010). In other African countries, it has been shown that mixed feeding or the choice to breastfeed or not solely rests upon the paternal grandmothers, who are perceived to be the key decision makers when it comes to good parenting (Magawa, 2012). Additionally, the health status of a mother may be of great worry because, if a mother is HIV positive she is most likely to choose not to breastfeed her infant, more so if she can afford alternative infant feeding formula (Chezem *et al.,* 2003). At national level, little data on infant and young child feeding is available. Therefore, the purpose of this study was to explore the feeding practices of mothers and/or caregivers of infants younger than 6 months in South Africa. The study formed a part of a larger study that focused on violations of the International Code of Marketing of Breast milk Substitutes.

1.2 Aim and Objectives

1.2.1 The aim of the study

The aim of this study was: To explore the infant feeding practices of mothers and/or caregivers of infants below the age of 6 months.

1.2.2 Objectives

In order to address the aim of the study, the following objectives have been set:

Objective 1: To determine the percentage of mothers that exclusively breastfeed their babies between the periods of 0 to 6 months in four different provinces.

Objective 2: To determine the reasons that influence infant feeding practices of mothers with babies below the age of 6 months.

Objective 3: To determine the mothers' perceptions of the importance of breastfeeding.

Objective 4: To assess the dietary food intakes of babies below 6 months of age who already consume complementary foods using the FAO dietary diversity list.

1.3 Outcomes of the study

This study was conducted in four of the nine provinces in South Africa, and had a large target number of mothers and/or caregivers. In addition, this study provides information on the feeding practices of mothers and/or caregivers with infants below the age of 6 months. Upon completion, the results and all information gathered will be made available to the national Department of Health and further guidelines for infant and young child feeding can be drafted to ensure optimal child growth, development and improvement in human and economic capital in South Africa.

1.4 Research team and author's contributions to the study

This study formed part of a bigger main study; and was planned, carried out and accomplished by a team of researchers. The contribution of each team member and researcher is shown in **Table 1**.

1.5 Structure of the dissertation

This MSc dissertation will be presented in the following chapter format:

Chapter 1 includes the background and motivation of the study, aim and objectives as well as the research team and author's contribution to the research.

Chapter 2 reviews literature and provides background information on the current research study and includes information on the infant and young child feeding practices in South Africa. It also presents the factors that influence infant feeding practices as well as the different strategies that have been implemented to improve infant and young child feeding.

Chapter 3 is an article focusing on the details regarding the methodology, results and discussion on the feeding practices of mothers and/or caregivers of infants below the age of 6 months in South Africa. The article will be submitted to the Maternal and Child Nutrition journal.

Chapter 4 summarises the study and provides a brief and general discussion, as well as the concluding remarks with reference to the set objectives, limitations and recommendations for future studies.

The *Reference list* includes all references that were used in chapter one, two and four. The relevant references that were used in chapters one, two and four are presented according to the requirements specified by the North-West University (Potchefstroom Campus). But the reference style used in Chapter three (article) is in line with the specifications of the journal chosen for publication.

Includes reference to the *Addenda*

Addenda A: Ethics approval certificate

Addenda B: Consent form

Addenda C: Questionnaire used for the mothers

Table 1: Research team members and their roles

Name	Role in the study
LP Siziba (MSc candidate)	Writing and compiling this thesis, data collection, coding of qualitative data, statistical analyses and interpretation of results.
Prof E Wentzel-Viljoen (Supervisor)	Supervised this dissertation, planning and coordinating the study, statistical analyses and interpretation of results.
Prof SM Hanekom (Co-supervisor)	Co-supervised this dissertation
Prof Johann Jerling Prof E Wentzel-Viljoen (Overall project Leaders)	Planning and coordinating the study.
Dr Alverada Van Graan Dr Namukolo Covic Dr Lize Havermann-Nel Dr Karin Conradie	Project team at North-West University Potchefstroom
Ms Linda Siziba Ms Noleen Mohononi Ms Priscilla Ngoveni Ms Portia Radebe Ms Ndugiselo Muravha Mr Johann Du Plessis	Core Study team at North-West University, fieldwork and data collection, coding of qualitative data.
Prof Suria Ellis	Statistical Services of the North-West University contracted for data entry and analysis.
Ms Ann Behr Ms Lynn Moeng	National Department of Health, formed part of the project team.
Mr David Clark Dr Jullia Untoro Mrs Chantell Witten	UNICEF, formed part of the project team

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The first two years of life of children is the period that is considered a very important window of opportunity to prevent any kind of growth faltering and under-nutrition (Arabi *et al.,* 2012). Interestingly, infant and maternal health has been shown to be directly linked to breastfeeding. In contrast therefore, there are greater risks of respiratory infections, obesity and allergies amongst the infant formula fed infants, and women who choose to infant formula feed their infants are also at greater risk of having reproductive cancers (Brown, 2014). There are many factors that contribute to under nutrition, morbidity and mortality in children, some of which include poor infant and young feeding practices which can lead to any preventable diseases like pneumonia and under nutrition in children. Therefore an improvement of infant and young child feeding practices for children aged two years and below should be a very high global priority (Arabi *et al.,* 2012; Aryeetey & Goh, 2013; Daelmans *et al.,* 2013). This chapter reviews the literature that has been published on the infant and young child feeding practices which also forms the theoretical background to this study.

2.2 Importance of breastfeeding

The most appropriate preventive measure for child survival is EBF (Haroon *et al.,* 2010; Sudfeld *et al.,* 2012). Therefore, the reduction of mortality and morbidity in children has been driven by the recommendations regarding breastfeeding, that is, early initiation of breastfeeding, EBF for 6 months and the introduction of nutritiously adequate and appropriate complementary food at 6 months of age, with continued breastfeeding for two or more years (WHO/UNICEF, 2003).

Both infants and mothers have been shown to benefit from breastfeeding. Breastfeeding has been shown to protect infants from gastro intestinal infections (Chu, 2013; Lamberti *et al.,* 2011) since breast milk contains antibodies which boost immunity and reduce the incidence and occurrence of the sudden infant death syndrome (SIDS) (Chu, 2013; Ho, 2013; McCarter-Spaulding, 2004), pneumonia (Nkonki *et al.,* 2014), neo-natal sepsis and meningitis (Debes *et al.,* 2013; Magawa, 2012). Breastfeeding also protects against chronic diseases such as childhood leukaemia (Dermitas, 2012), diabetes and obesity (Kramer & Kakuma, 2002; McCarter-Spaulding, 2004). McCarter-Spaulding, (2004) suggests that these benefits and protective effects are heightened and improved by a longer duration and exclusivity of breastfeeding.

In addition, since breast milk is at the right temperature for the infant and contains the adequate and complete nutrients that an infant requires for healthy development, it is considered safe, clean and always available and therefore economical (Doherty *et al.,* 2006; Magawa, 2012). Furthermore, for the mother, breastfeeding may present a reduced risk of developing breast cancer, ovarian cancer and also prolong lactation amenorrhoea which delays the return of fertility (Avery, 2013; WHO, 2014). It also reduces the risk of postpartum haemorrhage in the early postpartum period and the development of osteoporosis and other diseases later in life (Dermitas, 2012; McCarter-Spaulding, 2004; Radaelli *et al.,* 2012).

Despite the many benefits of breastfeeding that have been elaborated above, infant feeding practices have not really improved, especially in the developing world. However, breastfeeding still remains the most important feeding practice that is being supported, protected and promoted for children below the age of 6 months.

2.3 Different types of infant feeding practices

2.3.1 Breastfeeding

According to the WHO (2004), breastfeeding is when a child receives breast milk, either directly from the breast or expressed. This may include instances where the infant is exclusively breastfed or partially breastfed. A study (Arifeen *et al.,* 2000) was conducted in Bangladesh to describe the different breastfeeding practices and investigate the influence of exclusive breastfeeding in early infancy on the risk of infant deaths. This study confirmed the importance of breastfeeding for infant survival and documented a positive relationship between exclusive breastfeeding and infant growth.

Since breastfeeding is an equalled way of providing ideal food for the healthy growth and development of infants, the main recommendation is to breastfeed exclusively for 6 months, with timely introduction of complementary food and continued breastfeeding up to two years and beyond (UNICEF, 2003). This practice is very possible, except in a few medical conditions. Unrestricted EBF results in sufficient milk production. Although the process of breastfeeding is a natural one, it can also be a learned behaviour for some mothers (Brown, 2014; Sibeko *et al.,* 2009), and as such, mothers need practical advice and psychological support to breastfeed successfully (Marais *et al.,* 2010).

A few recent studies (Bahl *et al.,* 2005; Parizoto *et al.,* 2009; Spyrides *et al.,* 2008) however have shown that predominant breastfeeding practices which include the intake of water, tea and other non-milk drinks in addition to breast milk increase the risk of diarrhoea in infants. These studies also suggest that greater risks of death or hospitalization are associated with being predominantly breastfed compared to exclusively breastfed infants.

2.3.2 Complementary feeding

UNICEF (2003) suggests that infants are most vulnerable to sickness and disease during the transition period when complementary food begins. As a result, complementary food should be introduced from 6 months, gradually increasing frequency, consistency and variety of locally available food. ln a pledge to ensure that all their nutritional needs are met, WHO and UNICEF recommend that complementary food must be:

- Timely - introduced, when the needs exceed those which can be provided through exclusive and frequent breastfeeding.
- Adequate - and provide sufficient energy, macro-nutrients and micronutrients for the growing child to meet their nutrient requirements and needs.
- Safe - food must be hygienically stored and prepared, should be fed from clean hands or by using clean utensils and not bottles and teats.
- Properly fed - feeding should be consistent with the child's appetite and satiety, and actively encouraging the child even during illness to eat sufficient food using fingers, spoon or self-feeding.

The South African Department of Health (2013), in line with the above recommendations, further suggests that complementary food must be given in the correct**:**

- Meal frequency and quantities - Infants must be given small, frequent, nutrient dense meals due to their limited gastric capacity and high nutrient needs. Quantity and frequency should thus be increased as the child grows.
- Food consistency- should be gradually increased from pureed food to solid food by 12 months, avoiding food that can cause choking.

- Responsive/active feeding - these methods include active supervision and encouragement from the caregiver.

2.3.3 Mixed Feeding

Mixed feeding and early introduction of complementary foods is the most commonly practiced infant feeding practices in South Africa. Studies (Edmond *et al.,* 2007; Duijts *et al.,* 2010) have demonstrated that these methods are not ideal, especially in pursuit of reducing child mortality and morbidity.

WHO (2004) defines mixed feeding as breastfeeding a child, while giving non-human milk or food based fluids or solid food. This can also be termed as partial breastfeeding. Some studies have also shown that mixed feeding is an option especially for low income mothers; as such they have very low rates of EBF. However, mixed feeding during the first 6 months of an infant's life should be strongly discouraged because it increases the risks of infections in early childhood. Different factors have been shown to be associated with early initiation of complementary food, as well as mixed feeding. Examples of these include infant hospital admissions and being pregnant while breastfeeding (Ladzani *et al.,* 2011).

2.3.4 Replacement feeding

According to WHO (2004), infant formula feeding which is also known as artificial feeding or replacement feeding, is feeding a child with artificial feeds (including non-human milk such as infant feeding formula and powdered animal milk) and not breastfeeding at all. This can be a form of exclusive replacement feeding.

The DITRAME PLUS study (Becquet *et al.,* 2008) found no significant difference in rates of infant illness and death at 24 months between breastfed and formula fed infants, thereby suggesting that safe infant formula feeding can be achieved, but only in settings where women have regular access to electricity, clean water and free health care, as well as transport to health centres and infant feeding formula supplies. In light of the above information, detailed factors and advice should be given to mothers who choose to infant formula feed their infants, regarding the safe preparation, handling and storage of infant feeding formula, as well as health risks of inappropriate preparation and use. Health facilities should also have a room dedicated to the demonstration of the preparation and use of infant feeding formula.

2.4 Infant and young child feeding in developing countries

ln developing countries, growth faltering often occurs as a result of introducing complementary food either too early or too late, and giving food with inadequate energy density, protein, essential fatty acids and other macro- and micronutrients (Arabi *et al.,* 2012). In addition, dismal complementary feeding and breastfeeding practices have been reported in developing countries. Exclusively breastfed infants in developing countries amount to 39%, but only 25% are found in Africa. Also, 6% of infants in developing countries are not breastfed (Lauer *et al.,* 2004). Comparatively, the Kenya Demographic and Health Survey (2008-2009) provided evidence that only 32% of infants aged 6 months and younger are exclusively breastfed, which was an improvement since 2003 (Kimani-Murage *et al.,* 2011). Additionally, in 2011, Kimani-Murage *et al.,* conducted a study in two urban slums of Nairobi Kenya (Korogocho and Viwandani), to assess the breastfeeding and infant feeding practices in reference to WHO recommendations. The results showed an early initiation of complementary food, and only 2% of infants aged 6 months and below were exclusively breastfed, and the mean age of introduction of complementary food was one month.

In Ethiopia, a study to assess the infant feeding practices of HIV positive mothers with infants aged two years and below, attending the prevention of mother-to-child transmission (PMTCT) and antiretroviral therapy in Gondar Town health institutions, was conducted. It was discovered that a higher proportion (83.7%) of the target population were found to be practising the recommended infant feeding practice and 10.5% were practising mixed feeding during the first 6 months of the infant's life (Muluye *et al.,* 2012). The study also suggested that this may be due to the culture of feeding that exists among the Ethiopian mothers. Additionally, since child mortality rates are high in low and middle income countries where EBF prevalence is very low, in Tanzania, under-five child mortality rates are very high, with an EBF rate of 41% among infants below the age of 6 months (Nkala & Msuya, 2011). Findings show that most women in that study had a high occurrence of medical conditions which led to a failure to comply with the infant feeding guidelines of that country.

One study in Ghana (Aryeetey & Goh, 2013) found that breastfeeding is a very common practice. Infants are breastfed for a long period of time, typically 20 months; therefore the EBF rate for 6 months has outstandingly improved in Ghana from below 5% in 1989 to approximately 63% in 2008 and 66% in 2013. Additionally, the 2008 demographic and health survey

suggested that although 84% of the infants below the age of 6 months were being exclusively breastfed, only 49% were still being breastfed exclusively by the age of 4 to 5 months.

With regards to Rwanda, breastfeeding is almost universal. A total of 97% infants are breastfed and almost half receive breast milk for longer than 32 months. EBF during the first 6 months of an infant's life is universally practiced and highly esteemed; therefore Rwanda has reasonably high EBF rates compared to most other developing countries (Greiner, 2005). The 2000 Rwanda Demographic and Health Survey (RDHS) showed that 71% of the infants were exclusively breastfed at 4 to 5 months, with complementary foods being introduced at 6 to 7 months (66%). However, the 2010 RDHS found that 85% of infants below the age of 6 months are exclusively breastfed, 7% were given breast milk and non-milk liquids, while 3% were given other milk in addition to breast milk. Also, 61% of the infants were fed complementary foods at the age of 6 to 8 months. Some PMTCT statistics also show that 70% of HIV positive women in Rwanda choose to breastfeed their infants (RDHS, 2010).

Current breastfeeding patterns may have improved significantly in some countries over the past ten years, but they are still far from the recommended levels in the developing world as a whole, indicating that their potential to improve child survival remains untapped. Less than 60% of infants aged between 6 and 9 months continue to be breastfed while also receiving solid, semi-solid or soft foods. Even though global levels of continued breastfeeding are relatively high at 1 year of age (76%), only half (50%) of infants are still breastfed at two years of age (UNICEF, 2009).

The realisation that child mortality and morbidity can be addressed by the correction of these practices still remains a struggle for many mothers, especially those that may not have received adequate information to influence their decisions. Additionally, from the above discussion, lack of EBF still remains a problem in developing countries. The studies have indicated that availability of policy guidelines and training about breastfeeding practices, may have a positive influence on both mothers' choices and infant child mortality and morbidity (Bevan & Brown, 2014).

2.4.1 Infant and young child feeding practices in South Africa

Although the prevalence of EBF in South Africa is said to be higher in the rural areas (Mushapi *et al.,* 2008), children aged between 6 to 23 months and those living in the rural areas are the most vulnerable to malnutrition during childhood (Faber & Benadé, 2007).

An explanatory qualitative investigation to determine the feeding and weaning practices, knowledge and attitudes towards nutrition of mothers/caregivers of children up to the age of three years attending infant clinics in the Moretele District (South Africa), was conducted by Kruger and Gericke (2002). Although EBF was rarely practiced in the target population in this study, the findings show that the first choice of feeding was breastfeeding, and infant formula feeding was only practised when breastfeeding was impossible. However, 21% of the mothers in this district were offering solids to infants at two months of age and an additional two thirds were administering the solids by three months postpartum. It was also noted that weaning diets were compromised due to poor food choices, preparation practices and limited variety.

MacIntyre *et al.* (2005) also reported that 5% of infants included in their cross sectional study at Ga-Rankuwa, were exclusively breastfed. These findings were in agreement with the results that Moeng (2003) (cited in MacIntyre *et al.,* 2005) reported, that 1.7% of 307 infants were exclusively breastfed between 1 and 2 months of age. The results given in these studies suggest that complementary feeding is most frequently initiated when an infant is between 4 and 8 weeks of age, although this appears to be younger than the peak incidence of between 2 and 3 months reported in other South African studies (Debes *et al.,* 2013; Faber & Benadé, 1999; Kruger & Gericke, 2000).

Faber and Benadé (2007) conducted a cross-sectional survey to determine the breastfeeding and complementary feeding practices in KwaZulu-Natal (KZN). In this study, many inappropriate feeding practices were identified, such as the lack of EBF and early introduction of complementary food. Their findings also show that 61% of the infants were given solid food at four months of age. Other studies however, suggest an alarmingly high administration of “supplementary” foods by 14 weeks of age (Ghuman *et al.,* 2009; MacIntyre *et al.,* 2005).

Moreover, in a descriptive and explanatory study by Mushapi *et al.* (2008), mothers with infants aged between 0 to 12 months, reported that not many of them practice EBF up to 6 months. The results suggest that 7.6% of the mothers in Limpopo Province exclusively breastfed their infants. These results are in accord with the results from other parts in the country that state that 10.4% in North West Province and 6.7% in Soshanguve exclusively breastfed their infants for 6 months. In the same study (Mushapi *et al.,* 2008), 43.2% of the mothers and/or caregivers introduced solid food at three months and 15% before two months.

A longitudinal study by Ghuman *et al.* (2009) also highlights very important and serious issues regarding infant feeding practices in South Africa. Mixed feeding rates were found to be alarmingly high (76.1%) and mothers who had just delivered their babies had very limited knowledge of PMTCT of HIV. These findings are in accordance with the findings of Ladzani *et al.* (2010) who identified gaps in the knowledge of PMTCT amongst mothers that are HIV positive in Mpumalanga Province. Ghuman *et al.* (2009) also demonstrated that there were a very high proportion of teenage pregnancies and a contradiction of the mother's feeding intentions, as well as their actual feeding practices, 2 to 3 months later.

ln 2011, Goosen (2014) also conducted a cross-sectional community-based survey to determine the feeding practices of mothers of infants younger than 6 months in two low-income communities in the Western Cape Province. All caregivers included in the study were biological parents of the infants. The findings showed very low (6%) EBF rates amongst mothers. Although 90% of the mothers included in the study had introduced water at the time of the study, 83% did so before their infants were one month old. Additionally, an alarming 44% of the mothers had also introduced food or infant feeding formula at the age of 6 months, but 75% of this population had done so before the infant was three months old.

Similarly, Van der Merwe (2012) conducted a study that aimed to assess the impact of the implementation of the Mother Baby Friendly Initiative (MBFI) on infant feeding practices in two sub-districts with different Baby Friendly status within Mpumalanga Province in South Africa. The study design was cross-sectional, descriptive, and observational with an analytical component. The target population comprised of mothers with infants from birth to 6 months of age that were attending postnatal care at public sector primary health care facilities on the days of data collection. The EBF rate up to 6 months reported in this study was 35.7% and 17% of the mothers practiced mixed feeding. In addition, 25.3% of the mothers practiced exclusive replacement feeding, and 3.7% mixed infant formula feeding (infants given infant feeding formula and other complementary foods) and only one infant (0.2%) was given soft porridge and no milk. The average age of introduction of complementary food was 45 days, which ranged from birth to 4 months, and is earlier than the recommended age of 6 months.

ln 2012, the Human Sciences Research Council (HSRC) conducted the South African National Health and Nutrition Examination Survey (SANHANES-1). The target population included individuals of all ages living in South Africa excluding those living in educational institutions, old

age homes, hospitals, homeless people and uninformed-service barracks. This survey found that 83% of children below the age of two years were breastfed within an hour after birth and only 9.6% were breastfed within 24 hours after birth. Additionally, 17.5% of infants below the age of 6 months were never breastfed, whereas 7.4% of children under 6 months of age were EBF and 75.1% were breastfed, although not exclusively. The average breastfeeding duration of infants within 0 to11 months of age was four months. Additionally, 63.5% (over two thirds) of the infants were fed either solid or semi-solid foods before 6 months of age. The total average age of introduction of semi-solid or solid food was 4.5 months. However, in the 0 to 11 month old age group, introduction of complementary food was done at an average age of 3.6 months (Shisana *et al.,* 2013).

Inappropriate infant feeding practices like the early introduction of complementary food have been identified in different studies conducted in South Africa. Consequently one would think that early introduction of complementary food appears to be the rule rather than the exception in South Africa. The EBF rates in South Africa have dropped dismally over the years, while the early initiation of complementary food has increased over the years. In the 2003 the South African Demographic Health Surveys (SADHS) states that the EBF rate of infants below the age of four months was 11.9%, which was more than the 6.8% reported in the 1998 SADHS. Among the infants in the age range of 4 to 6 months, the proportion of EBF was only 1.5%.The UNICEF's report for 2000-2006, stated that the EBF rates for infants under the age of 6 months in Southern Africa were at 7% (UNICEF, 2008). In 2008 HSRC found the EBF rate of infants 0-6 months was 25.7% (Shisana *et al.,* 2010) with a decline to 7.4% in 2012 (Shisana *et al., 2013*). Most findings in the South African studies that have been described in this research have not demonstrated the failure to breastfeed, but the failure to exclusively breastfeed for 6 months.

Table 2 shows a summary of studies reporting EBF data in South Africa over the years as recorded in different areas.

Table 2: Summary of studies reporting EBF rates in South Africa

Reference	Year of Publication	Area	Sample size (N=)	EBF up to 6 months (%)	Age introducing solids
Kruger & Gericke	2003	Pretoria	144	Rarely practised	2-3 months
Mamabolo *et al*	2004	Limpopo	276	4.10%	1 month
MacIntyre	2005	Gauteng	150	4.6% (9 weeks)	5 weeks
SADHS (2003)	2007	South Africa	2120	8%	<2 months
Faber & Benadé	2007	KZN	505	11% (4 months)	3.3 months
Mushapi *et al*	2008	Limpopo	185	7.60%	2 months
UNICEF report (2000-2006)	2008	South Africa	National	7%	Not reported
Shisana *et al*	2010	South Africa	508	25.70%	Birth
Ladzani *et al*	2010	Mpumalanga	815	35.60%	3 months
Goga *et al*	2012	PMTCT sites	783	16%	3 weeks
Van der Merwe	2012	Eastern Cape	218	35.70%	45 days
Shisana *et al*	2013	South Africa	243	7%	3 months
Kassier *et al*	2013	Free State	189	Not reported	2 months
Osborne	2013	Eastern Cape	43	2%	1 month
Goosen	2014	Western Cape	140	6%	3 months

EBF- EBF, SADHS- South African Demographic and Health Survey, KZN-KwaZulu Natal, PMTCT- Prevention of Mother-to-Child Transmission, UNICEF-United Nations Children's Fund-State of the World's Children report.

2.4.2 Infant feeding in the context of HIV

Estimations suggest that 1700 infants are born with HIV everyday worldwide (WHO, 2010). Mother-to-child transmission (MTCT) is the major source of HIV infection in children. The virus can be transmitted either during pregnancy, labour and delivery or through breast milk during breastfeeding. Hence, the infant feeding practices and recommendations in the context of the HIV differ from those of the general population. WHO/UNICEF (WHO, 2010) guidelines encourage that under conditions where replacement feeding is not acceptable, feasible, affordable, sustainable and safe (AFASS), mothers should breastfeed exclusively for 6 months, at which point breastfeeding cessation is only recommended if a replacement milk product compliant to AFASS conditions is available to be combined with complementary food. However, a suggested choice for women that live in resource poor communities due to the prohibitive costs of infant feeding formula, lack of safe water and lack of infrastructure (Sibeko *et al.,* 2009; Jackson *et al.,* 2009), is that mothers should continue to breastfeed for 12 months and the infant should receive Anti-Retro Viral drugs (ARVs) from birth until 6 weeks of age (Department of Health, 2013). In recent large prospective studies in South Africa, Zimbabwe, Zambia and the

Ivory Coast, EBF has been found to result in a three- to four fold reduction and decrease in HIV transmission as compared with non-EBF (Coovadia & Bland, 2007).

Although replacement feeding prevents viral transmission through breastfeeding (Oladokun *et al.,* 2009), the risks of disease in infant formula fed HIV positive babies have been elaborated and documented. WHO carried out a pooled meta-analysis of the studies conducted in developing countries, with populations with a low HIV prevalence and found that those infants that are not breastfed but receive infant feeding formula or other replacement feeding are at a six times greater chance of dying in the first two months of life, a four times increase between 2 and 3 months, and 2.5-fold increase between 4 and 5 months compared with those who are breastfed (Jackson *et al.,* 2009).

In addition, Becquet *et al.* (2008), (the DITRAME PLUS study, conducted in the Ivory Coast) and Jackson *et al.* (2009) showed that mixed feeding during the first month of life and breastfeeding beyond 6 months of age, were strong independent risk factors for postnatal acquisition of HIV. This is because the introduction of food based fluid, solid food or non-human milk during the first month of life seems to have a stronger impact on the effect of post natal acquisition of HIV, than the introduction of water based fluids (Jackson *et al.,* 2009). This could be caused by the contaminants or bacteria contained in complementary food, which can damage the infant's immature gut (Magawa, 2012), impair mucosal integrity (Sibeko *et al.,* 2009), thus facilitate post natal transmission of HIV, and also lead to other infections, sickness or death in HIV negative infants (Becquet *et al.,* 2007; Coovadia & Bland, 2007; Kerr *et al.,* 2005).

Zulliger *et al.* (2011) also carried out a study in Cape Town, South Africa, to explore the influences on infant feeding intentions and practices of women living with HIV. The study found that infant feeding choices or practices in the HIV positive population are driven by a desire to protect the infant from HIV, and ability to afford replacement feeding. Also exclusive infant formula feeding is a better option for them as they seem to believe that it carries a reduced risk of transmission to the infant (Oladokun *et al.,* 2009; Zulliger *et al.,* 2011). There was a 15% increase in risk of HIV transmission through breastfeeding in comparison to infant formula fed infants (Swarts *et al.,* 2010).

However, some HIV positive mothers are afraid to exclusively infant formula feed their infants because of fear of stigmatisation (Nor *et al.,* 2011; Oladokun *et al.,* 2009; Zulliger *et al.,* 2011).

They think that if they are seen infant formula feeding, other women would know or assume they are HIV positive. According to Doherty *et al.* (2006; Oladokun *et al.,* 2009; Sibeko *et al.,* 2009) HIV positive women were forced to mix feed their babies because they had not disclosed their statuses to their husbands, and thus instead of exclusive infant formula feeding the mothers would breastfeed their children in fear of being asked many questions. Disclosure to partners therefore should be encouraged in order to ensure adherence to the chosen option of infant feeding, so as to minimise the practice of mixed feeding. Increased partner notification has also been shown to be of paramount importance for support on other PMTCT programmes. It has also been shown that infants who are mix fed may progress to AIDS faster than the infants who are exclusively breastfed (Sibeko *et al.,* 2009).

Another study by Van der Merwe (2012) found that some mothers who were HIV positive were practicing mixed feeding while breastfeeding, which posed a greater risk of HIV transmission. So, adequate replacement feeding is needed for infants that are born to HIV positive mothers who choose not to breastfeed. This will require suitable breast milk substitutes like infant feeding formula, or for others, heat treated breast milk or breast milk provided by an HIV negative donor mother may be an option (Department of Health, 2013). Within the context of HIV, infant formula feeding may be a better choice for women who have a good source of clean and safe water, electricity and adequate quantities of formula supplies. These women must also receive intensive counselling and training (Jackson *et al.,* 2009). Also, in Uganda, EBF from 0-6 months is less commonly practised among HIV-positive mothers than the general population (Fadnes *et al.,* 2009).

2.5 Reasons that influence the choice of infant feeding practices

Choosing an infant feeding method is one of the most important decisions that a mother has to make (Doherty *et al.,* 2006). A number of studies discussed in this section have examined the reasons that mothers give which influence their breastfeeding practices. These reasons suggest that decisions about infant feeding are complex and consist of different variables which include culture, demographic setting, socio-economic and health statuses.

2.5.1 Cultural context

Some infant feeding practices given by mothers are imbedded within the cultural context. Culture has been shown to play a crucial role in establishing and maintaining breastfeeding,

although many cultures support breastfeeding and mothers require intervention from external peer groups (Bevan & Brown, 2014).

One study in the UK (Brown, 2014) showed that mothers who had expressed high levels of emotional stability, extraversion and carefulness were significantly more likely to initiate and continue breastfeeding. In this study, it was shown that many mothers in the UK felt that their surroundings are influential as they live in an infant formula feeding culture where breastfeeding is not the normative choice. As a result, feelings of embarrassment were aroused about feeding in front of others and in public. Giles *et al.* (2010) suggested that mothers need to be encouraged and convinced that breastfeeding needs not to be embarrassing. Consequently, a culture where breastfeeding is encouraged and widely practised would produce more positive breastfeeding attitudes.

Nor *et al.* (2011) explored mothers' experiences of infant feeding in the KwaZulu-Natal and Western Cape provinces in South Africa, and found that breastfeeding practices were associated with a 'healthy infant.' In this study, mothers explained that breastfed infants hardly ever got sick and the breast milk was probably what kept the infant from getting sick. Also, other mothers thought it is good practice to breastfeed their children since all their other children were also breastfed (Zulliger *et al.,* 2013), a practice and culture they had learned and adopted as a better feeding choice. But, due to a lack of a continuous supply of infant feeding formula, some mothers who had chosen to infant formula feed their infants, were forced to mix feed their infants (Nor *et al.,* 2011, Swarts *et al.,* 2010). Mothers have also been shown to mix feed or introduce solid food at an early stage because of the notion or belief that breast milk alone is not sufficient for the infant (Arts *et al.,* 2011; Ghuman *et al.,* 2009; Nor *et al.,* 2011; Zulliger *et al.,* 2013). This has been reported as the 'insufficient milk' syndrome that mothers have had and has been the leading cause associated with the decline in breastfeeding rates in the urbanised world.

Similarly, Buskens *et al.* (2007) carried out a study that examined the realities and mind-sets regarding infant feeding practices of mothers in Southern Africa. The findings showed that mothers believed the notion that 'water is life', as such they started giving their infants water as it also prevents constipation and cleanses the infants' stomach. This is also embedded within the cultural practice of giving traditional medicines in early infancy. Traditional medicines have also been used on many occasions for 'cleansing' purposes and protecting the infant from

disease. Osborne, (2013) concurs that mothers believe that water helps to clean the urine, and is given to the infant for good health or to prevent hiccups and dehydration.

Additionally, a study that was conducted in the previously known Transkei region of the Eastern Cape Province, in South Africa used focus group discussions to identify the different factors and reasons that possibly influence feeding practices. In this study, the target population comprised of forty-three black Xhosa-speaking mothers and grandmothers. The results show that while health workers believe that colostrum (the first yellowish breast milk) is to be fed to the infant, grandmothers, in particular render that milk dirty and useless therefore believe it should be discarded (Osborne, 2013).

2.5.2 Demographic settings

The demographic factors that have been studied as risk factors for breastfeeding initiation and duration include maternal age, employment status and smoking habits of mothers and other family members.

In one case, Smith *et al.* (2013) found that the reality of breastfeeding was often less than the intention of breastfeeding, because mothers had insufficient leave days from work and some were school students. Returning to work or school at or before an infant is 6 months old has influenced most infant feeding decisions (Du Plessis, 2013; Inoue *et al.,* 2012). Smith *et al.* (2013) suggests that breastfeeding is easier in workplaces that support breastfeeding. Most female employees with infants require various time accommodations, including part time and adjustable hours and lactation breaks in order to maintain EBF for 6 months. However, even if a mother is not going to be with her infant during the whole day, it is possible to still provide breast milk. The mother can express her breast milk and leave it at home for a caregiver to administer using a cup and she can then breastfeed when she is at home after work.

In addition, Dermitas (2012) and Inoue *et al.* (2012) found that the maternal age was associated with a longer duration of breastfeeding. The mean age of mothers who chose to formula feed their infants was significantly higher than those who chose to breastfeed. On the contrary, one study that used data from the national survey in Japan showed that mothers in their 30s and 40s were less likely to continue EBF at 6 months post-partum than mothers in their 20s. Also smoking mothers mostly relied on infant feeding formula and fewer mothers who smoked at home were still breastfeeding at 6 months compared to non-smoking parents. Evidence has

also shown that the early introduction of complementary food usually shortens the duration of breastfeeding.

2.5.3 Socio-economic status

The idea that breastfeeding is a social practice is supported by the fact that friends and family have much influence on the mother's feeding choices (Inoue *et al.,* 2012; Zulliger *et al.,* 2011). However, most decisions and the women's ability to enact feeding decisions are solely dependent on their cultural, social and economic context (Du Plessis, 2013; Zulliger *et al.,* 2011). Also marital status may affect the choice of feeding, especially when a husband may be the breadwinner in the family, and as such detect that the mother should breastfeed her infant. Media can also pose as a source of information (Kimani-Murage *et al.,* 2011), although, the type and quality of information that is portrayed and put across may not always be reliable (Mushapi et al., 2008).

Several studies in African countries have documented the importance of family members in these decisions. Osborne, (2013) reported that mothers suggested that there indeed are other sources that influence their decisions, but the key role players are their own mothers and health care workers. Also, some studies conducted in Malawi and Mozambique show that fathers and grandmothers are influential especially when it comes to infant feeding practices (Arts *et al.,* 2011). In cases where a mother is an adolescent, the adolescent may be compelled to obey the dominant grandmother when it comes to infant feeding choices, as this may be a source of support (Sipsma *et al.,* 2013). Therefore, most mothers may not have power and autonomy in infant feeding decision making, as these evolve around the extended family.

In Malawi for example, mixed feeding was found to begin within the first 48 hours of birth and it was advised by the paternal grandmothers who are seen as the sole decision makers when it comes to good parenting skills. Despite all this, the fathers and grandmothers have been reported to be inactively involved in this regard (Magawa, 2012). In the Eastern Cape, fathers seemed to play an insignificant role in decision making because they were not seen as "knowledgeable" regarding infant feeding. Osborne (2013) states that most fathers spend their time out of town working in bigger cities and are simply the sole provider of financial support for both mother and child.

Additionally, Swarts *et al.* (2010) carried out a study which aimed to determine the factors which influence the choice of breastfeeding versus infant formula feeding among women who

delivered babies at the Lower Umfolozi District War Memorial Hospital (LUDWM) in KZN. In this study, a questionnaire and focus group discussions were used as data collection methods. The results of the study showed that 48% of the women that had chosen to stop breastfeeding at 6 months and infant formula feed their infants had made that decision on their own, and no one and nothing had influenced them. It is therefore plausible that in some cases mothers tend to make decisions based on their own insight.

2.5.4 Health status

Some health-related reasons that are most likely to influence a mother's decision about infant feeding practices may include a child's characteristics such as low birth weight and use of pacifiers (Kimani-Murage *et al.,* 2011). However, breastfeeding promotion interventions immediately after delivery have been shown to have a strong effect on EBF in a number of studies (Lutter *et al.,* 1997; Merten *et al.,* 2004; Nkala & Msuya, 2011; Riva *et al.,* 1999).

Instances where infants have been abandoned, or orphaned pose as practical situations of choosing to infant formula feed, as well as contra-indicated situations like different medical conditions that include classic galactosemia, maple syrup urine disease and phenylketonuria in infants (UNICEF, 2003). Maternal medical conditions that can hinder or discourage breastfeeding include severe illness that prevents a mother from caring for her infant, Herpes Simplex Virus 1 (until all lesions have cleared), other maternal medications, for example psycho-therapeutic drugs, anti-epileptic drugs and opioids (WHO, 2010).

In turn, mothers who delivered normally are most likely to exclusively breastfeed their children than those that deliver by caesarean (Inoue *et al.,* 2012; Kimani-Murage *et al.,* 2011; Radwan, 2013). Other reasons for abrupt breastfeeding cessation include engorged breast, mastitis (Nkala & Msuya, 2011), conception, nipple problems, contraception (Ceriani Cernadas *et al.,* 2003; Ruel & Menon, 2002). Data from South Africa indicates that there is a greater than threefold risk of transmitting HIV from mother to infant when the HIV infected mother has a serious breast health problem (Fadnes *et al.,* 2009).

2.5.5 Education

Research has shown that the MBFI can partly be responsible for an increase in the breastfeeding rates (Perez-Escamilla, 2007). The findings by Swarts *and co-workers* (2010) suggest that more than a third (33%) of the participants reported that nurses or counsellors at

the clinics had an influence in their infant feeding decisions. Therefore, this is an indication that they obtained information about their first feeding choice at health facilities. Other studies in South Africa have shown that health education about infant feeding at clinics plays a very significant role in the choices of early infant feeding (Doherty *et al.,* 2006; Van der Merwe, 2012; Zulliger *et al.,* 2011).

It is, therefore, plausible that the higher the level of knowledge about EBF, the higher the prevalence of EBF. Although in some cases mothers choose infant feeding formula because they want to protect their children (Zulliger *et al.,* 2011). Most women who choose to infant formula feed their children have a positive attitude towards that and likewise with those that choose to breastfeed. Attitude determines behaviour and as such a positive attitude towards breastfeeding is a cause for women to breastfeed their babies (Doherty *et al.,* 2006; Giles *et al.,* 2010; Shaker *et al.,* 2004; Swarts *et al.,* 2010).

In addition, the mother's level of education is a significant factor that has such influence. The odds of either exclusively breastfeeding or predominantly breastfeeding the infant are solely dependent on whether the mother completed her primary or secondary education (Bevan & Brown 2014). Another factor that influences the choice of appropriate feeding is 'bad milk', that is, the superstition that breast milk will become bad if the mother had stopped breastfeeding for a while (Fjeld *et al.,* 2008).

2.6 Strategies to improve infant and young child feeding in South Africa

There are a few strategies that have been employed and implemented over the years that have been successful in increasing and improving the breastfeeding rates (UNICEF, 2012). This has been possible because the strategies support, protect and promote breastfeeding. These strategies are the International Code of Marketing of Breast milk Substitutes, MBFI, Global Strategy for Infant and Young Child Feeding, the *Innocenti* and Tshwane Declarations, Infant and Young Child Feeding Policy, the Maternal New-born, Child and Women's health and Nutrition strategy, the Roadmap for Nutrition in South Africa as well as the International Conference on Nutrition (ICN) Rome Declaration on Nutrition (2014).

2.6.1 Maternal, New-born, Child and Women's Health and Nutrition strategy (MNCWH&N)

The MNCWH&N (2012-2016) strategy for South Africa was initiated by the National Department of Health on the 4th of May 2012. Since the existing rates for maternal mortality, under-five infant and neonatal mortality are undesirably high, the MNCWH&N aims at reducing these health indicators by 10% by 2016. Different interventions have been set out and planned for the different health indicators. These interventions will ensure that every woman, mother and child receive precedent intervention services as part of an all-inclusive service package at either of the community, primary health care and hospital levels (MNWH&N, 2012-2016).

The child health care interventions include the promotion of EBF as well as acceptable and timely complementary feeding of infants and young children. Although the new-born health interventions include the promotion of early breastfeeding initiation and EBF, they also encompass the guaranteed safety of new-borns exposed to HIV. On the other hand, maternal interventions also include other services which encourage PMTCT.

2.6.2 The International Code of Marketing of Breast milk Substitutes (The Code)

The Code was adopted by the World Health Assembly in 1981 in a pledge to protect and promote breastfeeding, through providing adequate and proper information regarding the appropriate infant feeding practices and the regulations of the marketing of breast milk substitutes, bottles and teats. Over the years, there have been additional resolutions that have been made to further define and strengthen the code.

Stipulations of the code state that there should be absolutely no promotions of breast milk substitutes, bottles or teats to the general public. Therefore neither the health facilities nor health professionals can promote breast milk substitutes, and as such free samples should not be given to pregnant women, new mothers and families. The code therefore should be adopted by all governments into national legislation.

The International Code of Marketing of Breast milk Substitutes has been in effect on a voluntary basis in South Africa since its adoption in 1981. Nevertheless, violations of the Code by the infant food industry are currently being assessed (UNICEF, 2012).

2.6.3 Regulations Relating to Foodstuffs for Infants and Young Children

The Department of Health (South Africa) has gazetted on the 6 of December 2012 the regulations relating to foodstuffs for infant and young children in a pledge to support safe nutrition for infants and young children (R991). These regulations restrict inappropriate marketing practices that have been used to promote foodstuffs for infants and young children. This strategy therefore seeks to ensure that all mothers who wish to breastfeed are supported and all parents and caregivers will receive independent and objective information concerning infant feeding. This will enable them to make informed decisions and choices regarding their feeding practices without any commercial pressures. These regulations however, will not prevent the availability of infant feeding formula and complementary foods at retail level but will ensure that all types of infant feeding formula meet the different nutritional requirements of babies while ascertaining that breastfeeding is not undermined in any way.

These regulations will contribute significantly towards child survival through the protection, promotion and support of breastfeeding because they are in total agreement with the International Code of Marketing of Breast milk Substitutes and subsequent World Health Assembly Resolutions. These regulations have been deemed an important step in addressing the very low EBF rates (UNICEF, 2012).

2.6.4 The Mother Baby Friendly Initiative (MBFI as it is known in South Africa)

The MBFI was previously known as the Baby Friendly Hospital Initiative and was launched in 1991 by UNICEF and WHO in an effort to ensure that all the maternity units, whether free standing or in hospitals, could become the centres of breastfeeding support. It is in this regard that a maternity facility can be said to be 'baby friendly' when it does not accept any free or low-cost breast milk substitutes, including feeding bottles or teats and has also implemented the Ten Steps to Successful Breastfeeding (WHO/UNICEF), which entail strong policies and the adequate relevant and practical training of personnel as well as continuing support to mothers (WHO, 2009). The name changed in South Africa to give more attention to the role that breast feeding contributes to maternal mortality and to shift away from only a hospital initiative as it extends into the community as well.

In a pledge to promote and support EBF, South Africa has adopted the MBFI as a key strategy, so as to contribute towards the reduction in infant and child mortality. St Monica's Maternity

Hospital in Cape Town was the first facility in South Africa to be declared as Baby Friendly in 1994 after the MBFI was launched in the country in 1993 (WHO, 2009).

Vast evidence from both developing and developed countries shows that the MBFI has had a direct impact on the improvement of breastfeeding rates at hospital levels (Abrahams & Labbok, 2009; Beake *et al.,* 2012). Some studies that have reported good breastfeeding rates indicated that the health facilities selected and included in the studies would have been accredited as Baby Friendly. Marais *et al.* (2010), in their follow up study, they sought to assess the implementation of the extent of the Ten Steps in both public and private maternity facilities in the Western Cape Province in South Africa. For the initial study a sampling frame of 52 public and private maternity hospitals was identified from the different administrative sectors. Likewise, a sampling frame of 35 baby friendly clinics was identified and approached. However, the results showed that the overall implementation of the Ten Steps of Breastfeeding was average (Marais *et al.,* 2010) although the MBFI appears to be sufficient to maintaining the high rates of breastfeeding and EBF (Braun *et al.,* 2003; Marais *et al.,* 2010).

2.6.5 Global Strategy for Infant and Young Child feeding (IYCF)

WHO and UNICEF jointly aim to improve- through optimal feeding- the nutritional status, growth and development, health, and survival of infants and young children and thus developed the Global Strategy for IYCF. Their targeted objectives are to raise awareness, identify approaches to solutions, and provide possible frameworks of essential interventions for the main problems affecting IYCF. Additionally, creating commitments from governments, international organisations and other concerned parties is seen as an avenue to ensure optimal feeding practices for infants and young children. The strategy is also an intended guide for action to create environments that would encourage mothers, families and other caregivers in any circumstances to make informed decisions about feeding practices (UNICEF, 2003)

Countries in Africa have since revised their health policies so as to incorporate the IYCF action area in the context of a renewed determination to address the poor uptake of optimal breastfeeding practices in a holistic manner. Currently, over 30 countries including South Africa have developed implementation plans for national IYCF strategies (Sagoe-Moses *et al.,* 2012). For example, Zambia has contributed towards improving the coverage of some key breastfeeding interventions by developing and implementing its national IYCF strategies.

Additionally, Malawi also developed a roadmap which focuses on interventions to reduce maternal and child deaths (Magawa, 2012).

However, implementing the IYCF strategies has had a few challenges which include delays and long durations of the process, a lack in political motivation to push the implementation as well as ineffective communication to the target population (Magawa, 2012).

2.6.6 Innocenti *Declaration*

The *Innocenti* is a declaration which was initiated in 1990 to protect, promote and support breastfeeding. It was declared that children should be breastfed exclusively for 4 to 6 months with the timely introduction of complementary food, and breastfeeding should continue for up to two years and beyond. This was done with the recognition that breastfeeding is one of the most preventive measures in reducing child morbidity and child mortality (Abrahams & Labbok, 2009). This is because the numerous short term and long term health benefits of breastfeeding are directly proportional to the exclusivity of breastfeeding for 6 months (Beake *at al.,* 2012). Over the years remarkable progress has been made, but still, the challenges which remain to improve EBF include poverty, the HIV pandemic, globalisation and women's increasing rates of employment outside the home, to mention a few. As a result, there is still much more that needs to be done concerning the inappropriate feeding practices, suboptimal or no breastfeeding and inadequate complementary feeding (*Innocenti* Declaration, 2005).

Innocenti was then updated according to the WHO 2010 infant feeding guidelines, which promote that EBF, should last for 6 months with timely introduction of complementary food.

2.6.7 Tshwane Declaration (2011)

The National Department of Health in August 2011 championed the Tshwane Declaration of Support for Breastfeeding in South Africa, as a concrete step towards improving maternal and child health in the country. Since South Africa has the lowest rates of EBF, currently at <10%, therefore, with the aim of improving the infant feeding practices and in accordance with the declaration, mothers will no longer be offered replacement feeding in health facilities and will be encouraged and supported to breastfeed their infants. This declaration also incorporated the WHO 2010 HIV and Infant feeding guidelines.

The progress is commendable however momentum needs to be maintained. The capacity and commitment that has been built and pledged at national level should be filtered down to

provincial and district level, so as to address the many barriers which still hinder the progress of improved IYCF (Tshwane Declaration, 2011).

2.6.8 South African Infant and Young Child Feeding Policy (2013)

The first SA IYCF policy was based on the 2006 WHO recommendations which were no longer in line with the new 2010 WHO recommendations and the Tshwane Declaration (Department of Health, 2013). This policy was subsequently updated in 2013. National policies, strategies and programs as well as numerous global initiatives are also embedded within this IYCF policy. In addition this policy is in alignment with the Global Strategy for IYCF, the International Code of Marketing of Breast milk Substitutes, the Innocenti Declaration, the MBFI, the UN Joint guidelines on HIV and Infant Feeding 2010, the Campaign on Accelerated reduction of Maternal and Child Mortality in Africa (CARMMA), Roadmap for Nutrition in South Africa and the Strategic Plan for Maternal, New-born, Child and Women's health (MNCWH) and Nutrition (Department of Health, 2013).

The policy statements reflect the most recent available scientific knowledge and programmatic experience. This policy seeks to promote optimal nutritional status, growth, development and improve health and child survival outcomes of infants and young children in South Africa. The main purpose is to define strategies and actions that should be implemented to promote, support and protect appropriate infant and young child feeding practices, including in the context of HIV.

The guiding principles are to protect, respect and fulfil human rights, effective governance, public health and primary health care approach, promoting healthy eating; provision of an integrated service as well as evidence based feeding strategies and activities.

2.6.9 Roadmap for Nutrition in South Africa (2013-2017)

The Roadmap seeks to provide high quality and access to evidence-based nutrition services, particularly for women, infants and children throughout all levels of the health care system. The focus areas include increasing life expectancy as well as decreasing maternal and child mortality. The strategy encompasses the recommendations that have been highlighted in the Integrated Nutrition Program. It also contributes to the agenda of transposing nutrition and nutrition-related issues and activities significantly in the health care system, with specific reference to the MNCWH&N in South Africa.

The roadmap also adopted the five key evidence based solutions for reducing maternal and child mortality. These include breastfeeding, which could save 22% of children from dying if initiated within the first hour of delivery, as well as the promotion of timely complementary feeding. However, the promotion of EBF and improved complementary feeding with continued breastfeeding as well as targeted supplementary feeding where needed are part of the key nutritional interventions. Also sufficient evidence for the implementation of these key interventions has been documented in the Roadmap (Roadmap for Nutrition 2013-2017, 2013).

While the roadmap seeks to promote optimal growth of children, it also focuses on the prevention of overweight and obesity later in life by ensuring optimal infant and young nutrition. In this regard breastfeeding behaviour change interventions will target pregnant women and families of infants aged from 0 to 6 months. The different delivery platforms that will be used to convey the message include community based nutrition programs through outreach, public health clinic services as well as through hospital services. Communication campaigns will also be utilised and all relevant information will be included in school curricula for grade 10 to 12.

2.6.10 ICN Rome Declaration on Nutrition (2014)

The Rome Declaration commits to eliminating hunger and preventing all forms of malnutrition worldwide in children below the age of five years. This Declaration recognises that breastfeeding is an ideal way of providing adequate nutrition for the healthy growth and development of infants. Therefore, one of the objectives is to develop policies and initiatives for ensuring healthy diets throughout the life course particularly during the first 1000 days of life, by promoting, protecting and supporting breastfeeding during the first 6 months of life. The global target is to increase the rate of EBF up to 50% during the first 6 months of life (ICN Rome Declaration on Nutrition, 2014).

2.7 Conclusion

EBF during the first 6 months of a child's life is the most important feeding practice that is being promoted in the world. Breastfeeding has been shown to be beneficial to both the mother and the infant. However, many factors have been identified in a few studies, that affect the choices of infant feeding and these include culture, socio-economic status, health status and demographic setting. As a result of different factors and reasons given by mothers, the rates of EBF in South Africa have alarmingly dropped (7.4%) and complementary foods have been shown to be introduced within the first three months of life in infants. In a pledge to support,

promote and protect breastfeeding, strategies like the MBFI have been implemented in South Africa and although the change and effects are not without challenge, the progress that has been made is commendable and cannot be disputed.

CHAPTER THREE: ARTICLE

Feeding practices of mothers and/or caregivers of infants below the age of 6 months in four provinces in South Africa

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Abstract

Breastfeeding is one of the primary strategies of enhancing infant nutrition as well as improving child survival worldwide. After the 2010 World Health Organisation (WHO) recommendations, South Africa implemented and adopted the Tshwane Declaration which ensured the removal of all free infant feeding formula from the Prevention of Mother-To-Child Transmission (PMTCT) of HIV programme. This study aimed to explore the infant feeding practices of mothers/caregivers of infants below the age of 6 months. This was a cross-sectional study carried out in four provinces in South Africa. Fixed structured interviews were conducted for this study. A total of 580 mothers/caregivers were interviewed. The exclusive breastfeeding (EBF) rate for infants up to the age of 6 months was 12%. Most women that delivered full term babies had 6.2 higher odds of initiating breastfeeding within the first hour after delivery. Breastfeeding cessation (28%) and introduction of complementary food (17%) was from as early as one month. The minimum standards of dietary diversity were met by one (0.2%) infant only. The different reasons that were found to influence the mothers' feeding practices included returning to work (29%) or school (12%), the mother's health status (25%) and perceived "insufficient" milk supply (12.5%). New strategies therefore should address the gaps in key breastfeeding awareness messages with special focus on community involvement and participation. There is also a need for the whole nutrition fraternity, including the government, academia and development industries to interject and set out more innovative approaches to increase the rate of EBF in South Africa.

Keywords: breastfeeding initiation, exclusive breastfeeding, complementary feeding, dietary intake and diversity, mothers' perceptions.

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Introduction

Breastfeeding is one of the primary strategies of enhancing infant nutrition (Meedya *et al.* 2010) as well as improving child survival (Ijumba *et al.* 2014) worldwide. The World Health Organisation (WHO) recommends and stipulates that exclusive breastfeeding (EBF) should continue for 6 months with timely introduction of complementary foods thereafter, with continued breastfeeding for up to two years and beyond (World Health Organisation 2002). South Africa supports this recommendation as shown by the 2011 resolutions of the Tshwane Declaration in Support of Breastfeeding (Tshwane Declaration for the Support of Breastfeeding in South Africa 2011). Complementary foods should be introduced when an infant reaches the age of 6 months, because breast milk no longer meets the evolving nutritional requirements. WHO recommends breastfeeding on demand, that is, as often as the child wants during the day and night.

Exclusive breastfeeding for the first 6 months is an uncommon practice in South Africa (Ijumba *et al.* 2014; Mamabolo *et al.* 2004); however the country has been shown to have very high breastfeeding initiation rates (75%-97%) (Ghuman *et al.* 2009). The 1998 and 2003 South African Demographic Health Surveys (SADHS) showed that 10% and 12% of infants aged 0 to 3 months, respectively, were exclusively breastfed and EBF was even lower in 4 to 6 month old infants (1% and 2% respectively) (Ijumba *et al.* 2014). Both surveys also reported very low cumulative EBF rates of 7% at 0 to 5 months (1998) and 8% at 0 to 6 months (2003). In 2008, Shisana *et al* (2010) reported that the cumulative EBF rate for the first 6 months had increased to 25.7% in South Africa. The cumulative EBF rate could be referred to as the "prevalence" indicator, that is, the percentage of all children below the age of 6 months who are exclusively breastfed at a point in time. This would commonly yield a higher percentage than a more direct indicator of duration and can easily be misunderstood, thereby exaggerating the amount of EBF (Pullum 2014). These EBF rates however, decreased in 2012, as the SANHANES-1 reported that only 7.4% of children below the age of 6 months were exclusively breastfed (Shisana *et al.* 2013).

Key Messages

- Appropriate infant and young child feeding practices include EBF for 6 months, timely introduction of solid and semi-solid foods at 6 months and continued breastfeeding for up to two years and beyond.
- Exclusive breastfeeding for the recommended 6 months is an uncommon practice in South Africa
- Inappropriate feeding practices contribute to infant and young child mortality
- Mothers choice of feeding practice is influenced through education, socio-economic, health and cultural contexts

The prevalence of breastfeeding in South Africa is said to be higher in the rural areas compared to urban areas (Mushaphi *et al.* 2008). In a pledge to reduce under-five child mortality, the International Conference on Nutrition (ICN) Rome Declaration on Nutrition (2014) seeks to increase the rate of EBF in the first 6 months up to at least 50%. **Table I** below presents a summary of EBF data and age of introduction of complementary foods in South Africa since as recorded in different areas since 2003.

Table I: Summary of EBF rates in South Africa

Reference	Year of Publication	Area	Sample size (N=)	EBF up to 6 months (%)	Age at introducing solids
Kruger & Gericke	2003	Pretoria	144	Rarely practised	2-3 months
Mamabolo *et al*	2004	Limpopo	276	4.10%	1 month
MacIntyre	2005	Gauteng	150	4.6% (9 weeks) *	5 weeks
SADHS (2003)	2007	South Africa	2120	8%	<2 months
Faber & Benadé	2007	KZN	505	11% (4 months)	3.3 months
Mushapi *et al*	2008	Limpopo	185	7.60%*	2 months
UNICEF report (2000-2006)	2008	South Africa	National	7%†	Not reported
Shisana *et al*	2010	South Africa	508	25.70%	Birth
Ladzani *et al*	2010	Mpumalanga	815	35.60%*	3 months
Goga *et al*	2012	PMTCT sites	783	16%	3 weeks
Van der Merwe	2012	Eastern Cape	218	35.70%	45 days
Shisana *et al*	2013	South Africa	243	7%	3 months
Kassier *et al*	2013	Free State	189	Not reported	2 months
Osborne	2013	Eastern Cape	43	2%*	1 month
Goosen	2014	Western Cape	140	6%*	3 months

EBF- exclusive breastfeeding, SADHS- South African Demographic and Health Survey, KZN-KwaZulu Natal, PMTCT- Prevention of Mother-to-Child Transmission, UNICEF-United Nations Children's Fund-State of the World's Children report. †Data refers to years of periods other than those specified in the column heading. * EBF calculation included all infants in the study.

Furthermore, early introduction of supplementary feeds (Mamabolo *et al.* 2004) and mixed feeding (Ijumba *et al.* 2014) are the most common infant feeding practices. In 2014, the SANHANES-1 survey (Shisana *et al.* 2013) reported that the average age of introduction of solid foods in the country was 4.5 months. In addition, more than two thirds (63.5%) of the children in the country population were given solid or semi-solid food before the age of 6 months (Shisana *et al*. 2013). Both of these feeding practices carry high risks of diarrhoea (Kools *et al.* 2006), malnutrition (Ijumba *et al.* 2014), as well as reduce the amount of breast milk consumed by the infant (Mamabolo *et al.* 2004).

In 2010, WHO revised its infant feeding guidelines in the context of HIV and stipulated that HIV-positive mothers should exclusively breastfeed their infants while receiving antiretroviral treatment for mothers or prophylaxis for infants (World Health Organisation 2010). In South Africa, the Tshwane Declaration ensured the removal of all free infant feeding formula from the Prevention of Mother-to-Child Transmission of HIV (PMTCT) programme. Therefore, infant feeding formula can only be issued at public health facilities upon prescription by a designated health care professional when infant formula feeding is medically indicated. This change in policy was aimed at creating vast opportunities to support all mothers to breastfeed their infants regardless of their HIV status (Tshwane Declaration for the Support of Breastfeeding in South Africa 2011). WHO also recommends that HIV infected mothers can completely avoid breastfeeding only if replacement feeding is acceptable, feasible, affordable, sustainable and safe (AFASS) (World Health Organisation 2002; World Health Organisation 2010). However, even after the adoption of the Tshwane declaration, not enough information is available regarding the feeding practices of mothers in South Africa hence the need to carry out this research.

Despite all above-mentioned efforts, a mother's selection of appropriate feeding practices is greatly influenced through various spheres of life including the support provided through formal health services and other community-based groups (Kassier & Veldman 2013; Meedya *et al.* 2010), the mother's attitudes and perceptions regarding breastfeeding and its nutritional value as well as satiety of the infant (Mamabolo *et al.* 2004; Meedya *et al.* 2010). The levels of appropriate feeding practices have also declined in many parts of the world, including communities that are of low socio-economic status. These feeding practices may be dependent upon a vast number of economic, social and cultural reasons (Bland *et al.* 2002; Ghuman *et al.* 2009; Mushaphi *et al.* 2008). However, there is limited information about how these choices are made in South Africa.

The aim of this study was to explore the infant feeding practices of mothers and/or caregivers of infants below the age of 6 months in South Africa.

Method

Research setting and study population

This was a cross-sectional descriptive study which was part of a bigger study that focused on the violations of the International Code of Marketing of Breast milk Substitutes (BMS). The target population comprised of mothers and/or caregivers of infants aged between 0 to 6

months as well as pregnant women at selected health facilities in four provinces (North West, Gauteng, Free State, and Eastern Cape). A random sample of eight to twelve health facilities was drawn from each of the four provinces. Health facilities were ranked by size of facility, by district and sub-district. Only facilities that were called on more than 7500 times in 2011 were considered to be large enough to be included. In total, 40 health facilities were randomly selected in the four provinces and visited including metropolitan and non-metropolitan health facilities over the geographical area of the provinces. Eight facilities were selected from two provinces (North-West and Free State), and twelve facilities from the other two provinces (Gauteng and Eastern Cape) due to a higher number of clinics in these provinces. The target sample was at least 20 pregnant women, mothers and/or caregivers of infants under 6 months of age per health facility. However, if more or less participants were available, the sample size at each health facility varied based on an availability basis. The research was conducted during the year 2013 and data was collected between May and November 2013.

Data was collected in only four provinces therefore the data cannot be used to determine the six month EBF rate for the country as a whole. In addition, there were delays in attaining ethical approval from the Department of Health, which led to the study taking longer than anticipated.

For the purpose of this paper, we only included the mothers/caregivers and not the pregnant women.

Study sample

On arrival at each of the 40 health facilities that were selected, the first 20 participants who met the inclusion criteria signed the consent letter were enrolled to be interviewed. Since a sample of 20 participants was not always possible in all health facilities, and given the fact that we could not return to previous facilities due to constraints of time and funding, it was a pragmatic approach to take a convenient sample of the participants at each of the selected facilities. Practical considerations such as the days on which mothers and/or caregivers with infants visit the clinic as well as the distances between facilities were also taken into account. As a risk management strategy at least two alternative clinics in close proximity were sampled.

Data collection tools

Data were collected using a standardised questionnaire for mothers and/or caregivers of infants below the age of 6 months. A fixed-structured interview was conducted with each participant in

the language of the participant. The questionnaire had both open and closed-ended questions. Dietary intake and diversity was assessed by completing a 24-hour recall with the mother or the caregiver based on the Food and Agriculture Organisation (FAO) dietary diversity list consisting of 12 different food groups (Kennedy *et al.* 2011).

Before the main study, piloting was conducted at one health facility which was not part of the bigger study in the North West province. This was done to adapt and enhance the research tools in preparation for the study and test the procedures at the health facility.

Data analysis

Epi Info version 7.6 was used for data entry. This was done twice for quality and control purposes. The Statistical Consultation Services of the North-West University was contracted to perform this duty. Prior to analysis, data were checked for missing values and inconsistencies and carefully cleaned to ensure quality and consistency. Qualitative data was coded and grouped before analysis by the first author of this paper.

Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS version 21.0, 2012). Descriptive statistics and frequencies were used. Cross tabulations and Pearson Chi square tests were used to assess relationships between groups and the level of statistical significance was set at a p-value of less than 0.05. Odds ratios (OR) were calculated from frequency tables. Dietary intake and diversity was assessed and analysed according to the FAO dietary diversity list. The infants' ages were recorded in weeks. The data was then recoded to months, where the one month age category included infants aged 1 to 4 weeks, two months included infants aged 5 to 8 weeks, three months included infants aged 9 to 12 weeks, four months included infants aged 13 to 16 weeks, five months included infants aged 17 to 20 weeks and 6 months included infants aged 21 to 24 weeks. The six month EBF rate was calculated using the following formula:

$$\textbf{6 month EBF rate} = \frac{\text{Infants (In their } 6^{th} \text{ month of life) who received breast milk only the previous day}}{\text{Total number of infants (6 months old)}}$$

Ethical approval

The Ethics Committee of the North-West University approved the research protocol (ethics number NWU-00008-13-A1). Written informed consent forms were signed by all the participants after they were verbally informed about the purpose of this research. Confidentiality was

ensured by not asking for the participant's name or other identification. The National Department of Health gave permission for the research, informed the provinces about the survey and requested their cooperation. Access to individual facilities was secured by the research team.

Results

Table II shows the health facilities that were included in the study, the total number of participants (mothers/caregivers and pregnant women) and those mothers/caregivers that were interviewed for the study.

Socio-demographic characteristics

The socio-demographic data are summarised in **Table III**. In total 580 mothers/caregivers were interviewed. More mothers (n=551; 95%) than caregivers (n=29; 5%) were interviewed. In the rest of the article we will only use the term 'mother' meaning mothers/caregivers. The infants had a mean age of 2.9±1.5 months. Only 14% (n=81) of the infants were ≤1 month old and less than 10% (n=46) were older than 5 months.

Breastfeeding practices

Breastfeeding initiation

Most (n=490; 85%) of the mothers were breastfeeding at the time the interviews were conducted and of these, 441 (90%) initiated breastfeeding during the first hour after delivery and 49 (10%) did so a day after delivery. **Table III** also shows the number of children that were exclusively breastfeeding and those that were not exclusively breastfeeding at the time of the interview, according to the different socio-demographic characteristics. Early breastfeeding initiation did not significantly affect the chances of being exclusively breastfed or not (p=0.740). However, the mothers that delivered full term babies had 6.2 higher odds of initiating breastfeeding within the first hour after delivery, compared to those that delivered prematurely (p=0.000). Also, being born full term or prematurely did not significantly affect the chances of being breastfed or not at the time of the interview (p=0.354) as shown in **Table III** below.

Table II: Participant representation per selected health facility

Province	District	Sub District	Facility	Total number of participants at each health facility (N= 895)	Participants with infants aged ≤6mo (n=580)
North-West **(N=138)**	Bojanala Platnum	Madibeng	Hebron	18	5
		Rustenburg	Anna Legoale	8	5
	Dr K Kaunda	Matlosana	Alabama	29	29
		Tlokwe	Mohadin	13	13
			Potchefstroom Clinic	15	3
		Ditsobola	Bodibe 1	9	5
	Ngaka Modiri Molema	R Moiloa	Tswelelopele	3	3
			Tlakgameng	23	22
		Mafikeng	Mafikeng Provincial Hospital	20	13
Free State **(N=175)**	Fezile Dabi	Moqhaka	Seeisoville	17	13
	Mangaung	Botshabelo	Winnie Mandela Clinic	31	23
		Thaba N'chu	Gaongalelwe	20	16
		Bloemfontein	Palenomi Hospital	50	25
	T Mofutsanyane	Dihlabeng	Relebohile (Rosendal)	2	2
		Maluti A Phofung	Ma-Haig	11	11
			Marakong	25	15
			Monontsha	19	15
Gauteng **(N=250)**	Ekurhuleni	Ekurhuleni E1	Phillip Moyo	19	13
		Ekurhuleni N1	Tembisa Hospital	44	44
	Johannesburg	Region D	Tladi	13	12
		Region A	Witkoppen	26	17
			Mayibuye	28	15
			Thuthukani	20	7
	Tshwane MM	Tshwane 1 SD	Soshanguve Block TT	17	10
			Soshanguve CHC	19	15
			Boekenhoutkloof	28	28
			Phedisong 4	24	15
	West Rand	Merafong	Khutsong CHC	12	10
Eastern Cape **(N=332)**	O. Tambo	Mhlontlo	Mhlakulo	28	20
			Qumbu	16	9
		Qaukeni	St Elizabeth Gateway	36	19
			Lusikisiki Village Clinic	30	19
			Flagstaff	24	13
	A Nzo	Umzimvubu	St Patricks	57	20
			Tabankulu	34	23
	Nelson Mandela Bay	Nelson Mandela A	Kwazakele	13	6
			Zwide	29	15
			Motherwell	25	12
		Nelson Mandela C	West End	21	6
			Chatty day	19	14
Total number of participants				**895**	**580**

Table III: Socio-demographic characteristics and EBF breastfeeding practices at the time of the interviews

Characteristics		Total N (%)	EBF n (%)	Not EBF n (%)
Place of birth				
	Hospital	419 (72%)	185 (44%)	234 (56%)
	Clinic	140 (24%	72 (51%)	68 (49%)
	Home	21 (4%)	9 (43%)	12 (57%)
Type of delivery				
	Vaginal	440 (76%)	197 (45%)	243 (55%)
	Caesarean	125 (22%)	65 (51%)	60 (49%)
	Complications*	15 (3%)	4 (27%)	11 (73%)
Relationship to infant				
	Mother	551 (95%)	266 (48%)	285 (52%)
	Caregiver	29 (5%)	0	29 (100%)
Age distribution				
	1 month	81 (14%)	75 (93%)	6 (7%)
	2 months	159 (27%)	98 (62%)	61 (38%)
	3 months	107 (19%)	56 (52%)	51 (48%)
	4 months	62 (11%)	21 (34%)	41 (66%)
	5 months	46 (8%)	11 (24%)	35 (76%)
	6 months	34 (6%)	4 (12%)	30 (88%)
Time of delivery				
	Premature†	81 (14%)	41 (51%)	40 (49%) ‡
	Full term†	499 (86%)	225 (45%)	274 (55%) ‡
Breastfeeding Initiation (n=490)				
	Within 1 hour†	441 (90%)	236 (54%)	205 (46%)
	Later†	49 (10%)	30 (61%)	19 (39%)

*Complications with either vaginal or caesarean deliveries. EBF: no other food or drink, not even water, except breast milk. Non-EBF: Including infants not BF at all or predominantly BF. †Association between time of delivery and breastfeeding initiation (p=0.000; OR=6.2). ‡Comparison between EBF and non-EBF (p=0.354)

Exclusive Breastfeeding

The percentage of mothers that were practising EBF at the time of the study was 48% (n=266). The mean age of infants on EBF was 2 months (8.3 weeks). **Figure 1** summarises the EBF rates according to age category. Only four (n=4; 12%) of the mothers had exclusively breastfed for 6 months at the time the interviews were conducted. However, 32 (6%) mothers did not breastfeed their babies at all. A quarter (n=8; 25%) of the mothers did not breastfeed their infants at all mostly because of their HIV status, while nearly a fifth (n=6; 19%) reported poor health as a reason. All other reasons that mothers gave for not breastfeeding at all are summarised in **Figure 2.**

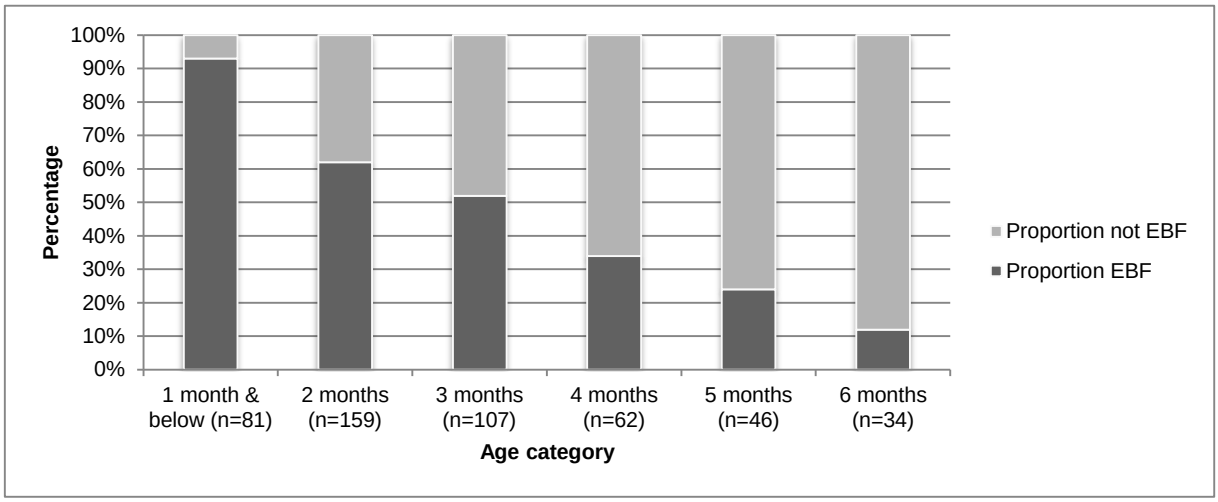


Figure 1: Exclusive breastfeeding rates according to age category

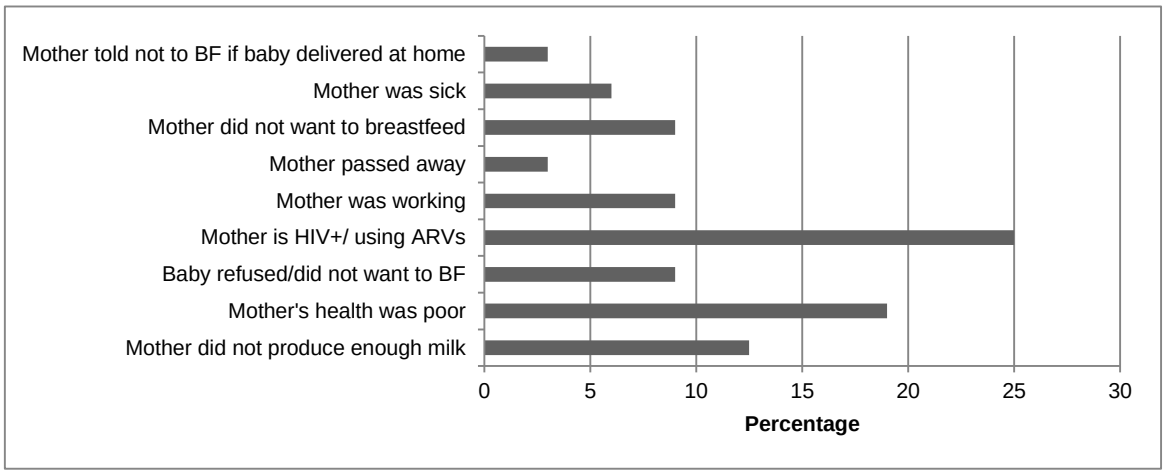


Figure 2: Reasons given by mothers for not initiating or breastfeeding their infants at all (n=32)

Breastfeeding cessation

The majority (23; 40%) of the mothers stopped breastfeeding within one month. Breastfeeding cessation started from as early as one month. **Figure 3** shows the breastfeeding cessation practices according to age category. The most important reason for cessation is that the mother had to return to work. The different reasons for breastfeeding cessation are also summarised in **Figure 4.**

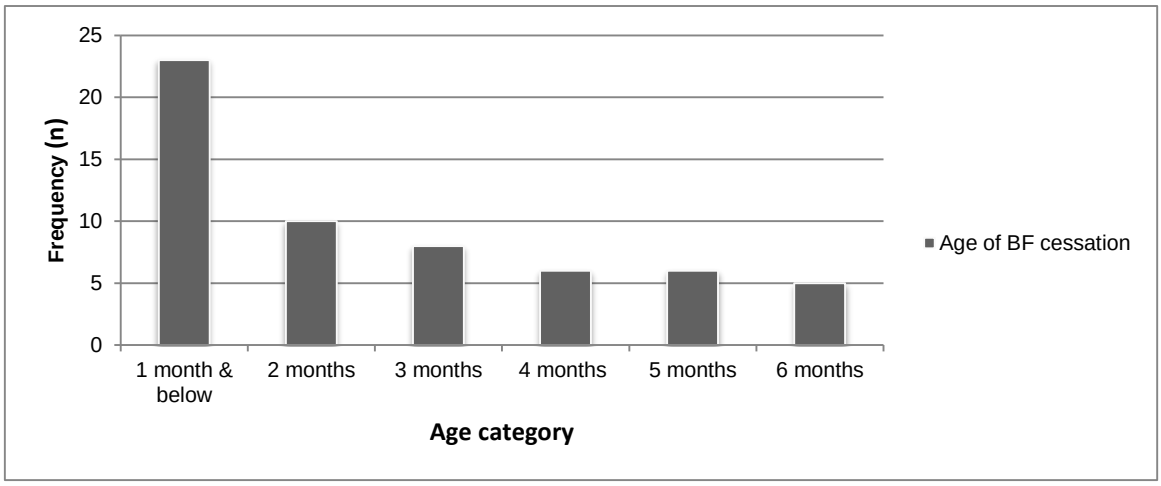


Figure 3: Breastfeeding cessation practices of mothers according to infant age category (n=58)

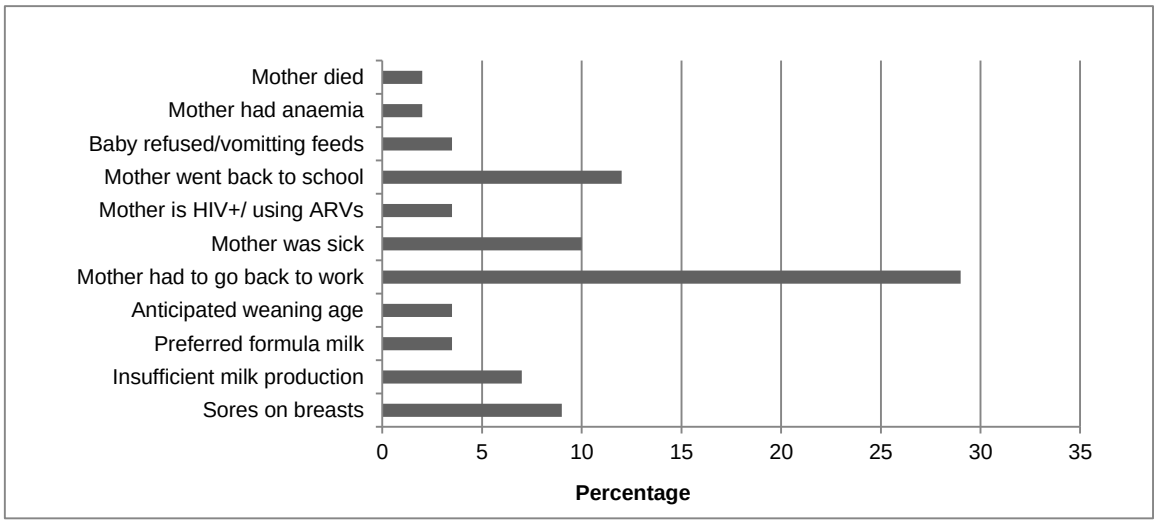


Figure 4: Reasons given by mothers for breastfeeding cessation at the time of the interviews (n=58)

Mothers' perceptions about the importance of breastfeeding

All mothers that were interviewed were asked why they think breastfeeding is important. More than a third (n=237; 41%) said breast milk contains adequate nutrients for the child and only 33 (5.7%) mothers did not know. **Table IV** shows the different perceptions that mothers gave about the importance of breastfeeding.

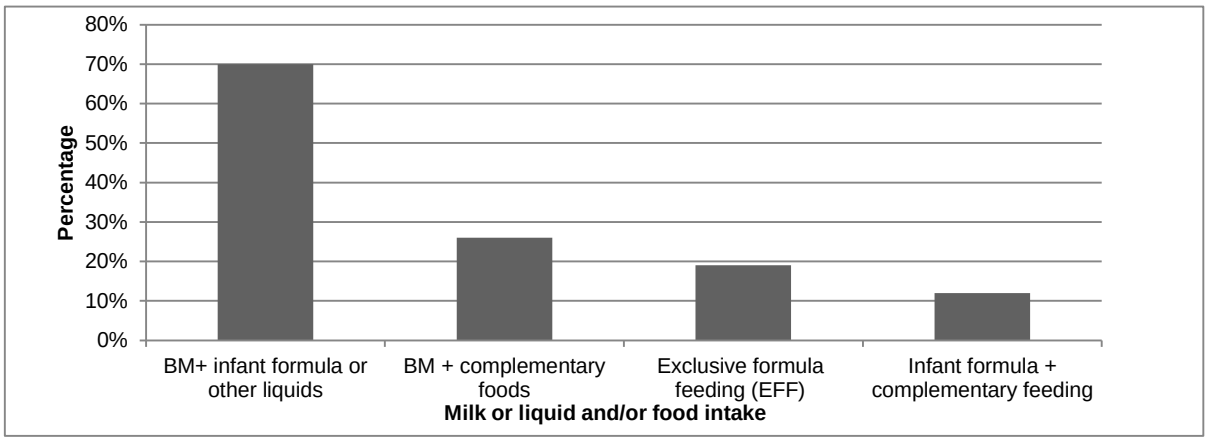
Table IV: Mothers' perceptions about the importance of breastfeeding

Importance of breastfeeding	N=580	Percentage
Breast milk contains adequate nutrients for the child	239	41%
Breast milk protects the infant from infections and sickness	159	27%
Breastfeeding is economical	50	9%
Breastfeeding helps with bonding of mother and infant	44	8%
Do not know	33	6%
Breast milk make the infant grow well/ strong	28	5%
Breast milk is clean/ warm/best/normal food for the infant	12	2%
Breast milk is always available/ Breast milk is convenient	15	3%

Milk or liquid and/or food intake

A total of 314 (54%) mothers were not practising EBF at the time of the interviews and gave other liquids/food to the infants. Nearly half (n=154; 49%) of the mothers were giving their infants infant feeding formula, whereas only three (1%) gave cow's milk, 99 (32%) gave water, seven (2%) gave tea and three (0.9%) gave other liquids that were not specified.

Figure 5 below represents the different feeding practices of mothers not practising EBF. The majority (n=220; 70%) of the mothers were giving either infant feeding formula or other liquids (water, tea or juice) in addition to breast milk (BM). Nearly a fifth (n=59; 19%) of the mothers were exclusively formula feeding.



**BM- breast milk*

Figure 5: Feeding practices of mothers not practising EBF at time of the interviews (n=314)

A third (n=95; 30%) of the mothers gave milk, other liquids and/or foods because they believed that breast milk alone was not enough for the infant, and 23 (7.3%) mothers gave other foods because they had to return to work. Other top ten reasons are given in **Table V** below.

Table V: Reasons for giving other liquids and/or foods

Reason	N=314	Percentage
Breast milk alone was not enough	95	30%
Mother had to return to work	23	7.3%
Infant was thirsty all the time	19	6%
Insufficient milk production	14	4.5%
Mother still at school	11	3.5%
Advised to do so by family member	10	3.2%
Mother was sick	9	2.9%
Water cleans the babies navel	6	1.9%
Mother was taking ARVs/ is HIV+	6	1.9%
Advised to do so by health practitioner	5	1.6%

Dietary intake

A 24-hour recall was completed for all infants, for both EBF (n=266) groups and non-EBF groups (n=314). This was done as part of a validating procedure to make sure that those mothers reporting EBF were indeed practicing EBF and not offering water or anything else to the infant. Of all women that were not practising EBF, the majority (n=247; 93%) of the mothers reported that the diet recall was typical of what the infant ate/drank on a daily basis. **Figure 6** below shows the dietary intake of infants categorised according to the different food groups based on the FAO dietary diversity list (this list does not include breast milk *per sé*). None of the mothers gave food from the following food group categories: dark green leaves, meat and poultry (fleshy meats), eggs, as well as fish and seafood. More than half (n=175; 56%) of the mothers gave their infants mostly fortified infant feeding formula. Ten per cent (n=31) gave their infants sugars and sweets, this group included the sugar added in tea, water or any milk feeds.

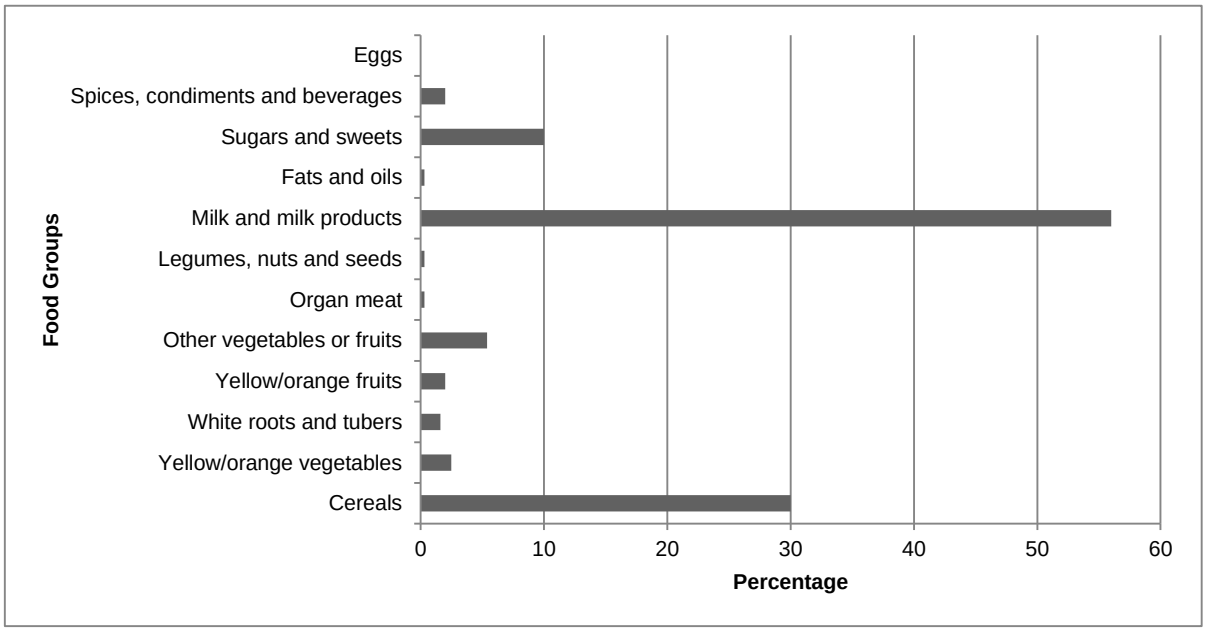


Figure 6: Dietary intakes of non-EBF infants according to the FAO dietary diversity list (n=314)

Dietary diversity

The FAO dietary diversity list consisting of 12 food groups was used to assess dietary diversity. The standard for minimum daily dietary diversity was achieved if infants consumed four or more food groups from the list. **Figure 7** shows the dietary diversity of all non-EBF infants. Only one (0.3%) infant met the standards for minimum dietary diversity. The majority of the infants were consuming only one food group.

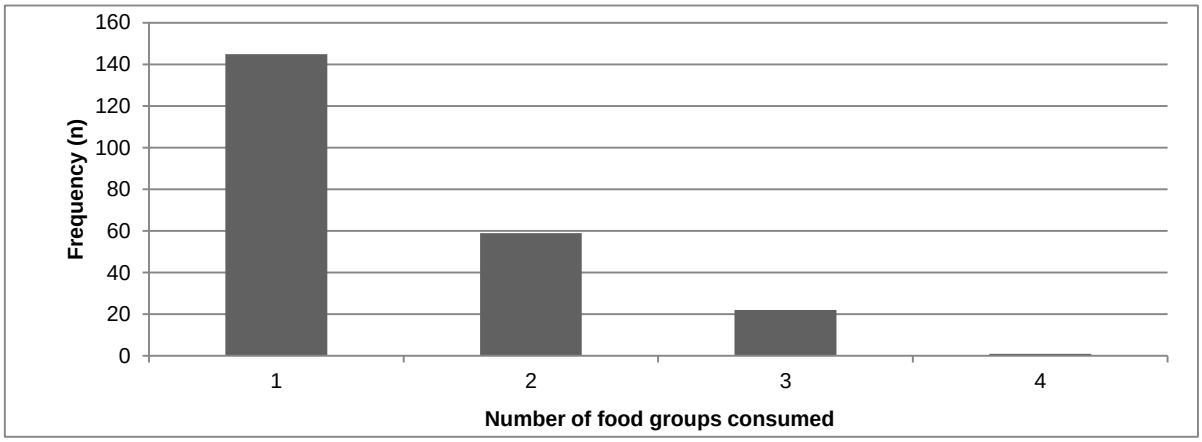


Figure 7: Dietary diversity of non-EBF infants according to the FAO dietary diversity list (n=314)

Introduction of milk, other liquid feeds and semi-solid/solid food

For the purposes of this study, the first drink was defined as any fluid or liquid other than breast milk that was given to the infant. **Figure 8** shows the different stages of introduction of infant feeding formula, first drink other than breast milk and complementary foods according to the different infant age categories. The sample size comprises of the mothers that were not practising EBF (n=314; 54%) at the time the interviews were conducted. Significantly more mothers (n=122; 39%) reported that infant feeding formula was the first drink besides breast milk that was given to their infants, whilst 62 (20%) reported water ($p<0.0004$) as the first drink. Nearly half (n= 150; 48%) of the mothers added sugar to these milk feeds and drinks. Furthermore, 176 (56%) mothers were using a bottle for feeding their babies, while 27 (9%) practiced cup feeding, with only 21 (7%) reporting spoon feeding their infants. Nearly two-thirds (n=195; 62%) reported that their babies drank some fluid or liquid from a bottle on the night prior to the day the interviews were conducted.

Amongst this non-EBF group a third (n=116; 37%) of the women introduced complementary food (semi-solid/solid) between 1 and 6 months as shown in **Figure 8** below. More than a third (33%) of the mothers introduced complementary foods at 3 months of age. Nearly half (n=131; 42%) reported giving food between one and six times a day, the mean being 2.5±1.1 times a day. Twenty (7%) mothers reported that the infant ate the semi-solid/solid food once a day, 53 (17%) said twice a day, 46 (15%) reported three times a day, seven (2%) four times a day, four (1%) five times a day and only two (1%) six times a day.

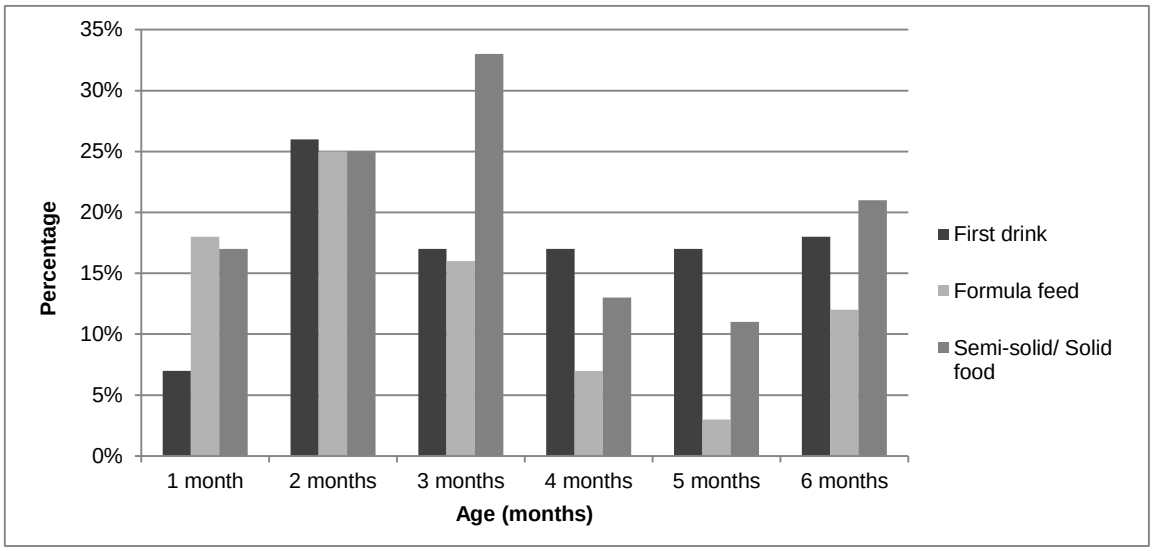


Figure 8: Introduction of infant formula, liquids and semi-solid/solid food to infants not EBF

In addition, all mothers and caregivers that participated in the study (n=580; 100%) were asked if their infants were getting dietary supplements. Nearly three-quarters (n=423; 73%) reported that their infants were getting dietary supplements like vitamin syrup or vitamin supplements.

Discussion

Nearly half of the mothers were practising EBF at the time of the study with 12% at the age of 6 months. This is far below the 2014 Rome Declaration target of 50% EBF rates during the first 6 months of life. The results from this cross-sectional study are in agreement with other South African studies that showed that breastfeeding is a universal practice in the country (Ladzani *et al.* 2011; MacIntyre *et al.* 2005; Mamabolo *et al.* 2004; Mushaphi *et al.* 2008; Swarts *et al.* 2010). Similarly this study found that the breastfeeding initiation rate within the first hour after delivery was very high. This shows that early initiation of breastfeeding following delivery as recommended by the WHO is being practiced universally in the four provinces.

In addition, our findings show that the time of delivery, that is, full term delivery is a significant factor that is associated with early breastfeeding initiation. Most of the women that delivered full term babies were likely to initiate breastfeeding within the first hour of delivery. However, our results did not show a statistically significant association between the type of delivery and likelihood to exclusively breastfeed. This was in contrast to a study that showed that vaginal delivery was associated with higher breastfeeding rates (Radwan 2013). Nearly five percent of the mothers reported that they were told not to breastfeed if the infant was delivered at home.

The EBF rate of 12% for infants at the age of 6 months in the current study was relatively higher than the other studies that were conducted in other parts of the country (Faber & Benadé 2007; Goosen *et al.* 2014; MacIntyre *et al.* 2005; Mamabolo *et al.* 2004; Mushaphi *et al.* 2008; Shisana et al, 2013). Our findings, although lower than other studies show that the EBF rates decreased from one month onwards hence the very low EBF rates at 6 months. In this regard, EBF for longer periods still remains uncommon.

Previous research shows that strategies that do not engage important family members like the grandmothers, in supporting breastfeeding are most likely to fail (Bhutta *et al.* 2013). Therefore, the “MomConnect” programme that was recently launched by the South African Department of Health could be an effective intervention to promote EBF and provide support to pregnant mothers and moms to be, during the periods of pregnancy, after delivery and beyond. In order to achieve the global target of increasing the EBF rate up to at least 50% during the first 6 months (ICN Rome Declaration on Nutrition, 2014), WHO also recommends that mothers

should avoid using bottles, teats or pacifiers and should breastfeed on demand, that is, as often as the infant wants, day and night. Such messages should be communicated to mothers through counselling on breastfeeding, which has been shown to be an effective intervention to improve EBF rates (WHO 2014). One study (Van der Merwe 2013) also reported that higher rates of EBF may have been influenced by the fact that mothers refer to exclusive breastfeeding even when they are giving water to the infant. Solutions to this problem may include further education and breastfeeding awareness. This current study used 24 hour recalls to validate whether mothers were exclusively breastfeeding and not giving water.

A variable that could possibly contribute to the disparity in EBF rates among the studies could be the calculation of the EBF rate for 6 months. To assess EBF, an indicator defined as the percentage of children below the age of 6 months who are being EBF at a point in time is used. However, this indicator actually describes the prevalence of EBF, that is, whether children under 6 months of age are currently being EBF at the time the survey is conducted (Pullum 2014). The EBF recommendation is that every child should be exclusively breastfed until they reach the 6 month anniversary of their birth, that is, for the duration of 6 months. Therefore the method used in this study assesses the actual duration of EBF, as it is calculated by including only the infants in their sixth month of life. The formula used in this study is illustrated below.

6 month EBF rate = Infants (In their 6^{th} month of life) who received breast milk only the previous day

Total number of infants (6 months old)

Other studies that reported similarly low EBF rates (Goga *et al.* 2012; Mamabolo *et al.* 2004; Shisana *et al.* 2013; Van der Merwe 2013) used the same method of calculation used in this study. This method of calculation is different from the methods used in two other studies (Goosen *et al.* 2014; MacIntyre *et al.* 2005; Mushaphi *et al.* 2008) which reported higher EBF rates at 6 months of age in comparison to our findings. The method of calculation is illustrated below, and included the entire sample of infants less than 6 months old. It is in light of this that the extent to which EBF is reaching 6 months should be assessed using the appropriate and accurate indicators in order to promote EBF for the recommended 6 months.

EBF rate = Infants (0-6 months of age) who received breast milk only the previous day

Total number of infants included in the study

Although the total number of mothers that chose not to breastfeed at all was very low, the most cited reasons were the mothers' HIV status and poor maternal health. These results suggest

that the resolutions of the Tshwane Declaration may not have been effectively implemented. Despite the general high level of HIV awareness, mothers still demonstrate an unclear understanding of the possibility to breastfeed their infants regardless of their HIV status (Goga *et al.* 2012; Oladokun *et al.* 2010; Swarts *et al.* 2010; Zulliger *et al.* 2013). In addition, some mothers reported that they did not produce enough milk. This phenomenon is described by Obermeyer & Castle (1996) as the "insufficient milk syndrome" and they proposed that there is an alternative explanation for it in cases where it is a "real" phenomenon. This may not simply be an excuse used by mothers to validate reasons for early breastfeeding cessation or early initiation of complementary food but insufficient milk is caused by a lack of contact between the mother and infant. A qualitative analysis of interviews indicated that maternal experience of hunger contributes to perceived milk insufficiency, anxiety about infant hunger and a perception that access to adequate food is necessary for successful breastfeeding (Webb-Girard *et al.* 2012). One study (Hurley *et al.* 2008) also reported that in comparison to white and African-American mothers, Hispanic mothers were most likely to give perceptions of milk insufficiency as a reason for early breastfeeding cessation.

In developed countries, maternal depression and distress have been shown to be a significant predictor of reduced breastfeeding duration, self-efficacy and exclusivity (Hurley et al. 2008). Also, psychological stress possibly associated with severe food insecurity and malnutrition could impair milk let-down, subsequent milk output and breast emptying. The physiological mechanisms that could potentially alter the concentration of certain fats and micronutrients as well as breast milk output include hunger, which can drive perceptions of the body's ability to produce insufficient milk (Hurley *et al.* 2008).

This may be a cause for concern and is an issue which could be addressed by more in-depth education and breastfeeding awareness. Hurley *et al.* (2008) and other recent systematic reviews showed that breastfeeding education and community-based interventions significantly improved the EBF rates in developing countries (Bhutta *et al.* 2013; Hall, 2011; Kidney *et al.* 2009). In addition, it was reported that mothers with higher levels of education or income are more likely to initiate breastfeeding and to breastfeed longer than women with lower levels of education. (Hurley *et al.* 2008).

Breastfeeding cessation was reported as early as one month of age. The most stated reason was that the mother had to return to work. This could mean that mothers are given either insufficient maternity leave days at work, or the self-employed mothers have no maternity leave days at all. Our findings are similar to the findings that have been made in several studies which

showed that insufficient leave can influence a mothers' choice of feeding practice (Kassier & Veldman 2013; Perez-Escamilla *et al.* 2012; Radwan 2013; Sowden *et al.* 2009; Swarts *et al.* 2010). On the other hand, even if a mother has to return to work early, it is still possible to express breast milk and leave it at home for the caregiver to administer either with a cup or a spoon. Our results also show that some mothers stopped breastfeeding because they had to go back to school. In the developing world, studies have been done that employed educational strategies at schools which combined multi component strategies for contraception and teenage pregnancies were successful (Taylor *et al.* 2014).

Evidently, early introduction of foods, mixed feeding and the failure to exclusively breastfeed, still remain one of the biggest challenges in South Africa. Health care workers and mothers both need to be educated about the importance of EBF and appropriate initiation of complementary food. Our findings appear to be consistent with other studies that showed peak initiation of complementary food as early as before one month (Van der Merwe 2013), at one month (MacIntyre *et al.* 2005; Mamabolo *et al.* 2004), and at two months (Kruger & Gericke 2003). The most stated reason for early initiation of complementary food was that breast milk was not enough for the infant. (Esterik 2002) proposes that human milk production is actually controlled by the infant's appetite, the frequency of milk removal, and a mother's ability to produce milk. Since the infant actually controls the amount of breast milk consumed, some women can produce more milk than their infants demand. It is therefore suggested that a distinction should be made between the phenomenon when it occurs during EBF and when it occurs once complementary feeding has begun. It could be referred to as a cultural phenomenon when it occurs during EBF and largely a physiologic response to reduced nipple stimulation once complementary feeding has begun.

Dietary data showed that the most commonly consumed fluid was infant feeding formula. What is of concern is that 10% of the mothers added sugar to some of the milk feeds and drinks that they had introduced to the infants. The early introduction and consumption of sugar in infants may create a pattern of a preference for sweet and fatty foods that could continue in the later years (Birch & Fisher, 1998). In this study, a third of the infants were given mostly maize meal porridge. The maize-meal porridge is not only bulky and of low nutrient-density, but is also high in phytate which inhibits zinc and iron absorption (Faber & Benadé 2007). Other studies also showed that using cereal based-gruel is the most common practice in complementary feeding (Buskens *et al.* 2007; Ghuman *et al.* 2009; Mushaphi *et al.* 2008). Only one infant met the minimum dietary diversity. Infants are at risks of becoming stunted if they do not receive

sufficient dietary diversity with the introduction of complementary food (Bhutta *et al.* 2013). It has also been demonstrated that infants introduced to early complementary feeding can self-regulate their energy intakes by decreasing breast milk consumption and this can lead to abrupt breastfeeding cessation (Goga *et al.* 2012).

Feeding practices influence infection and mortality (Burns 2001). One study (Edmond *et al.* 2007) demonstrated a causal association between early breastfeeding and reduced infection-specific neonatal mortality in young infants. Another study (Duijts *et al.* 2010) proposed that infants who were breastfed for 4 to 6 months were not at risk of contracting upper and lower respiratory or gastro intestinal tract infections in the first 6 months in comparison to those infants that were never breastfed. Breastfeeding for at least 6 months seems to have protective effects for the development of respiratory and gastrointestinal tract infections during the first 6 months. This protective effect is improved with greater duration and exclusivity of breastfeeding (Kramer & Kakuma, 2012). These findings support health policy strategies that seek to promote EBF for the recommended period of 6 months. Therefore promoting these programmes would help mothers choose an appropriate infant feeding practice and commit to it, thus the infant will be at a lesser risk of infection.

Despite all this, mothers included in this study demonstrated a sound understanding of the importance of breastfeeding. Mothers may know and understand that breastfeeding is important, but may not have the proper support and encouragement to be able to breastfeed their infants. Schmied *et al.* (2011) showed that peer support, professional support and guidance have been identified as very important elements of breastfeeding success. Although we did not investigate this, other studies (Buskens *et al.* 2007; Meedya *et al.* 2010) found an association between the mother's perceptions about breastfeeding and their choice of feeding practice.

Limitations of this study include the fact that the number of 6 month-old babies in this study was low. This is possibly because some mothers may not have been expected to be at the health facilities at the time especially if the specific infant day was for six week old infants. Therefore, the age distribution may have been influenced by the age at which children are expected to visit clinics. Thus there might have been some bias in the study. In addition, although the main reason for not breastfeeding at all was poor maternal health, the total number of mothers in that category was very low. This study also does not have a very good insight into the context of

babies that are infant formula fed, so even if it is known that it is not ideal it could still have been the only choice for many mothers practising infant formula feeding or bottle feeding.

Conclusion and recommendations

This current study confirmed that breastfeeding is a universal feeding practice, with a high initiation ratio but demonstrates the failure of mothers to exclusively breastfeed their infants for the recommended 6 months period. The majority of mothers included in this study had a clear perception and understanding of the importance of breastfeeding. Early initiation of complementary foods still remains a problem in South Africa. The diversity of food groups consumed by infants is nutritionally inadequate and presents additional risks to the infants.

The most stated reasons for not breastfeeding at all were returning to work or school early, the mother's HIV status and poor maternal health. Health care professionals should therefore conduct educative learning sessions for mothers to participate in. Emphasis must be put on ARV treatment and the risks of not breastfeeding against the risks of HIV transmission.

Community-based strategies to educate teenagers, women and mothers about the appropriate complementary foods for infants should be implemented. It is also important to ensure that practices and behaviours in health care settings always protect, promote and support breastfeeding. Possible strategies to increase EBF for longer periods include family and community support groups, an increase of maternity paid leave days, further education and breastfeeding awareness. To be able to reach the aimed rate of 50% as indicated recently (ICN Rome Declaration on Nutrition, 2014), the whole nutrition fraternity, which includes government, academia, industry and development agencies need to interject and set out more innovative approaches such as workplace support and interventions, and the use of mass media to disseminate appropriate infant feeding messages, so as to increase the rate of exclusive breastfeeding in South Africa.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

All the co-authors participated in the conceptualisation of the study. The manuscript was prepared by the first author with inputs from the other authors.

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CHAPTER FOUR: CONCLUSIONS AND RECOMMENDATIONS

4.1 Introduction

The main aim of this study was to explore the feeding practices of mothers and/or caregiver of infants below the age of 6 months. In order to achieve this aim, the study design was cross sectional and standard interviews were conducted amongst mothers and/or caregivers. The questionnaires had both open and closed-ended questions which sought to investigate the feeding practices and the reasons that influence the feeding practices. Dietary data was collected using a 24-hour recall and assessed using the FAO dietary diversity list. This study was part of a bigger study that focused on the violations of the International Code of Marketing of Breast milk Substitutes.

4.2 Main findings

This study confirmed that breastfeeding is a universal practice in South Africa. In line with WHO recommendations, the early breastfeeding initiation rate was relatively high. Our study did not demonstrate a statistical significance of how vaginal and caesarean deliveries can affect the likelihood to breastfeed or practice EBF. However, our results showed that mothers that deliver at full term have 6.2 higher odds of initiating breastfeeding within the first hour after birth. Although, the majority of mothers included in this study had a clear perception and understanding of the importance of breastfeeding, our findings confirm that EBF for longer periods still remains a problem in South Africa.

EBF practices decreased with the age of the infant, as it was highest during the second month and lowest at 6 months. Only 12% of the mothers had exclusively breastfed their infants up to the age of 6 months. Other inappropriate feeding practices included early breastfeeding cessation and choosing not to breastfeed at all. HIV infection was the reason given by most mothers for not breastfeeding their infants at all. Breastfeeding was stopped from as early as one month and the most stated reason for this was the need to return to work, and/or school. The mothers that were interviewed reported giving their infants other liquids and/or food, mostly because of the perception that breast milk is not enough for the infant.

Complementary food was introduced as early as one month but was more prominent during the third month. Early introduction of complementary food and mixed feeding therefore seem to still be the norm in South Africa. The mostly consumed food in the cereals and cereal products food group was maize meal porridge. This study also showed that the standards of minimum dietary diversity were not met. Only one (0.2%) infant was fed food from at least four different food groups. Even with optimum breastfeeding, infants are at risks of becoming stunted if they do not

receive sufficient dietary diversity. The complementary diets were not only nutritionally inadequate in quantity but also in quality.

4.3 Conclusion

This study showed that most mothers were practicing inappropriate feeding practices which were not in line with the National Department of Health infant and young child feeding recommendations. These inappropriate feeding practices include early breastfeeding cessation, early initiation of complementary food, not breastfeeding at all, and the failure to exclusively breastfeed infants for the recommended 6 months. The percentage of mothers who exclusively breastfed their infants decreased between 2 and 6 months. The majority of the mothers had a sound understanding and perception of the importance of breastfeeding. The different reasons which influenced the feeding practices were embedded within the cultural, demographic, health, education and socio-economic contexts. The diversity of food groups of what the infants were getting was nutritionally inadequate and presents additional risks to the infants.

4.4 Recommendations

Much emphasis has been put in protecting, promoting, and supporting breastfeeding. This is because it is the most important infant feeding practice that could contribute to the reduction of under-five child mortality.

For South Africa to reach the aim of 50% EBF rate at 6 months by 2025, a concerted effort will be needed to achieve the following recommendations that have been made from this study:

4.4.1 In-depth education and breastfeeding awareness

Intense education on appropriate feeding practices should include discussions that clearly and elaborately address the importance of breastfeeding, early initiation of breastfeeding, the underlying principles of EBF and the comprehensive dangers of mixed feeding to enable mothers to understand that breast milk is sufficient both in quality and quantity. Such education should be implemented during and throughout the pregnancy stages. Education should be done in the health facilities as well as in the community to ensure that every mother or pregnant woman is reached out to. Tools that can be used for breastfeeding education and awareness include the Paediatric Food Based Dietary Guidelines (PFBDGs) and messages on the Road to Health Booklet (RtHB). A recent systematic review showed that breastfeeding education interventions significantly improved the EBF rates in developing countries (Bhutta *et al.,* 2013). Education and training should be made available to mothers with HIV to understand the importance of appropriate feeding practices. Much emphasis must be put on ARV treatment and

the risks of not breastfeeding against the risks of HIV transmission. One study showed a positive effect of promotion interventions on occurrence of breastfeeding, and concluded that counselling and educational interventions increased EBF by 43% at one day, by 30% till one month and by 90% from 1 to 5 months (Haroon *et al.,* 2013).

4.4.2 Timely initiation of complementary food

Strategies for nutrition education against mixed feeding and early initiation of complementary food should be developed. Health care professionals should provide promotions and demonstrations of specific nutrient-dense foods appropriate for complementary feeding and weaning infants. These educative interventions should target the mothers, pregnant women, caregivers, and encourage the involvement of grandmothers and fathers in decision making regarding infant feeding.

4.4.3 Support groups

Mothers and caregivers should be given support on EBF during the first 6 months of the infant's life to ensure safe and appropriate feeding practices. Community-based groups would support in ensuring that the mothers go to the clinic for both antenatal and postnatal care regularly. Health care professionals, community leaders and the community at large should work together towards setting up these support groups in respective communities. Interventions such as those that are community-based have the potential to reach more women, improve EBF at 4 to 5 months and have been shown to be effective in other contexts such as maternal mortality (Hall, 2011; Kidney *et al.,* 2009).

Paternal inclusion has been encouraged in breastfeeding promotion programs, so that the father may be better prepared to provide emotional and practical support to the breastfeeding woman (Scott *et al.,* 2001). This is because fathers have been described as one of the most significant sources of stimulus to breastfeeding (Kessler *et al.,* 1995). Studies (Pisacane *et al.,* 2005; Susin & Giugliani, 2008) have shown that fathers included in pro-breastfeeding interventions could potentially increase the rates of exclusive breastfeeding in the infant's first 6 months of life. However, special attention should be paid to the cultural and behavioural complexities associated with such a practice.

Other bold initiatives could include workplace support and interventions. Mass media, broadening nutrition education to fathers, grandmothers, through community based education sessions and peer counselling programmes.

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ADDENDA A – Ethics approval certificate

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2013/04/23

ETHICS APPROVAL OF PROJECT

The North-West University Ethics Committee (NWU-EC) hereby approves your project as indicated below. This implies that the NWU-EC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: South African baseline Code violation assessment

Project Leader: : Prof J Jerling

Ethics number: N W U - 0 0 0 0 8 - 1 3 - A 1
(Institution / Project Number / Year / Status)

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Approval date: 2013/04/12 **Expiry date:** 2018/04/11

Special conditions of the approval (if any): None

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- *The project leader (principle investigator) must report in the prescribed format to the NWU-EC:*
  - *annually (or as otherwise requested) on the progress of the project,*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the NWU-EC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-EC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-EC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the NWU-EC or that information has been false or misrepresented,*
    - *the required annual report and reporting of adverse events was not done timely and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*

The Ethics Committee would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the Ethics Committee for any further enquiries or requests for assistance.

Yours sincerely

Prof Amanda Lourens
(chair NWU Ethics Committee)

ADDENDA B - Consent form

MONITORING COMPLIANCE OFTHE INTERNATIONAL CODE OF MARKETING OF BREAST-MILK SUBSTITUTES

CONSENT FORM FOR PREGNANT WOMEN and MOTHERS

My name is ……, and I work as an interviewer for a Child Health Survey being carried out by the Ministry of Health in collaboration with the United Nations Children's Fund {also known as UNICEF) and the North-West University

I do not know anything about you, **I** have chosen to speak to you by chance, and **I** will not ask the staff about you or look at your record afterwards. **I** will not take your name (or your infant's name *[if mother])* and will not repeat anything you say to anyone else.

The information you provide will be analysed together with that provided by other pregnant women and mothers of young infants. It will not be possible to identify you. This study carries no risk to you or to your infant, family or this health facility.

The aim of this interview is to find out what information you have been given about feeding your infant and {if you can remember) where the information came from. **I** would like to know if you have heard or seen anything about feeding your infant formula milk or any other drink or food. There is no right, or wrong, answer. Anything you say will be interesting and helpful for me and very valuable to this study.

The interview should take only approximately 15 minutes of your time. If you do not feel like answering a question just tell me and we will go on to the next one. If you wish to withdraw from the interview at any time, please let me know.

You may not get direct or immediate benefit from participating in this survey; however the information you provide as part of this survey will greatly contribute to the health and well- being of babies and small children in *South Africa.*

If you have any questions related to this interview **I** can refer you to my supervisors or persons responsible for health research in the Ministry of Health.

Do you agree to be interviewed?

1. YES 2. NO

Thank you.

Signature

Contact for concerns: Ms Anne Behr, Department of Health, 071 671 9563

Contact regarding the interview: Prof Johann Jerling, North West University 083 285 5380

ADDENDA C - Questionnaire for women

SUBJECT CODE
FORM 1: QUESTIONNAIRE FOR WOMEN

Province	
District	
Sub-district	
Facility name	
Data collector Name/ID	
Date of interview (dd/mm/yyyy)	

NOTE to data collectors: Remember to go through the *consent form* before you begin

Consent form signed by participant	Yes = 1	No = 2

Primary Caregiver of child < 6 months of age	Mother	Caregiver

SECTION A

1. Are you currently pregnant?

Yes = 1	**No = 2**

If 'NO', go to <u>question 3</u>

2. If YES, how far into the pregnancy are you?
(As told by the health worker)

1st trim	**2nd trim**	**3rd trim**

Then go to <u>question 7</u>

3. How old is your/the infant?

weeks	Months

4. Was the delivery,

	Yes	**No**
Normal		
There were complications		
Caesarean		

5. Was the infant,

	Yes	No
Full Term		
Premature		

6. Where was the infant born?

	Yes	No
Hospital		
Clinic		
Home		

SECTION B: INFORMATION AND ADVICE

7. During this pregnancy/since this infant was born has anyone told you or suggested to you **personally** that you should use formula milk or anything else besides breastfeeding?

Yes = 1	No = 2	Don't know = 99

If 'YES' continue, if 'NO' or 'DON'T KNOW' go to question 12

8. Who was this?

DO NOT READ EACH ANSWER ON THE LIST. JUST LISTEN AND PROMPT BY ASKING ***anyone else?***

	Yes	No
a. Health personnel – nurse/doctor/dietician/pharmacist/any other (**H**)		
b. Partner/relative/friend/grandparent (**P**)		
c. Shop owner/ shop keeper (**S**)		
d. Representative of a company (**R**)		
e. Somebody at school (**Sc**)		
f. Can't remember (**99**)		
g. Other (**O**)		

If other, specify

_____

9. What did they say?

Answers = 1	Does not answer = 88

9.1 If answers, specify

10. Were you **told or advised** to use a specific product?

Yes = 1	No = 2	Don't know = 99

If 'YES' continue, if 'NO' or 'DON'T KNOW' go to question 1

11. What was the recommended company or brand?

Write the company name/brand and the source using initials as indicated in question 8. Prompt by asking: ***Any other name?***

Company	Code	Brand	Code	Who recommended it
a.				
b.				
c.				
d.				
e.				

SECTION C: PROMOTIONS

12. During this pregnancy/since this infant was born have **you read about or seen** a promotion/advertisement or message for any of the following (read the list)

Product	Yes	No	Don't know
a. Formula milk (powder in tin/box/ready-to-drink milks)			
b. Other drinks or foods for infants aged under 6 months			
c. Follow-on / toddlers milk (powder in tin/box/ready-to-drink milks)			
d. Feeding bottles			
e. Teats			

If 'YES' continue, if 'NO' or 'DON'T KNOW' go to question 14

13. Where did you see the promotion/advertisement or message?

DO NOT READ EACH ANSWER, JUST LISTEN AND PROMPT BY ASKING ***Any other place?***
Circle 'YES' to all that apply and 'NO' to the others.*Complete either the Company or Brand

Place	Yes	No	Company*	Code	Brand*	Code
a. Health facility						
b. Magazine						
c. Shop/pharmacy						
d. Billboard						
e. Newspaper / adverts/ junk mail						
f. Internet						
g. Other, Specify						

14. During this pregnancy/since this infant was born have you **heard on the radio** or **seen on TV** a promotion or advertisement or message for any of the following? (read the list)

Product	Yes	No	Don't know
a. Formula milk (powder in tin/box/ready-to-drink milks)			
b. Other drinks or foods for infants aged under 6 months			
c. Follow-on or toddlers milk (powder in tin/box/ready-to-drink milks)			
d. Feeding bottles			
e. Teats			

If 'YES' continue, if 'NO' or 'DON'T KNOW' go to question 16

15. Where did you see or hear the promotion/advertisement or message?

DO NOT READ EACH ANSWER, JUST LISTEN AND PROMPT BY ASKING ***Any other place?***
Tick 'YES' to all that apply and 'NO' to the others

Place	Yes	No	Company*	Code	Brand*	Code
a. Radio						
b. TV						
c. Other, Specify						

* Complete either the Company or the Brand

SECTION D: FREE SAMPLES

16. During this pregnancy/since this infant was born have you ever received free samples of any of the following? This could be in a hospital or clinic **(Not because of medical or therapeutic reasons)**, a shop or at home.

Product	Yes	No	Don't know
a. Formula milk (powder in tin/box/ready-to-drink milks)			
b. Other drinks or foods for infants aged under 6 months			
c. Follow-on or toddlers milk (powder in tin/box/ready-to-drink milks)			
d. Feeding bottles			
e. Teats			

If 'YES' continue, if 'NO' or 'DON'T KNOW' go to question 19

17. Who provided you with the samples? DO NOT READ EACH ANSWER ON THE LIST. JUST LISTEN AND PROMPT BY ASKING ***anyone else?***

	Yes	No
a. Health personnel – nurse/doctor/dietician/pharmacist/any other (**H**)		
b. Partner/relative/friend/grandparent (**P**)		
c. Shop owner/ shop keeper (**S**)		
d. Representative of a company (**R**)		
e. Somebody at school (**Sc**)		
f. Can't remember (**99**)		
g. Other (**O**)		

18. What was it a sample of?

Tick 'YES' to all that apply, tick 'NO' to others. Do not read each answer, just listen and prompt by asking ***any other samples?***

Write the brand name and the source using initials as indicated in **question 17**

Free Sample	Yes	No	Source	Brand	Code
a. Infant formula					
b. Any other drink or food for infants under 6 months					
c. Follow-on or toddlers milk (powder in tin/box/ready-to-drink milks)					
d. Feeding bottles					
e. Teats					

SECTION E: FREE GIFTS

19. Have you ever received **a gift** during this pregnancy/since this infant was born **from someone other than a family member or a friend**? This could be in a hospital or clinic, a shop or at home

Yes = 1	No = 2	Don't know = 99

If 'YES' continue, if 'NO' or 'DON'T KNOW' go to question 24

20. What did you receive?

Product	Yes	No	Don't know
a. Formula milk (powder in tin/box/ready-to-drink milks)			
b. Other drinks or foods for infants aged under 6 months			
c. Follow-on / toddlers milk (powder in tin/box/ready-to-drink milks)			
d. Feeding bottles			
e. Teats			

21. Who gave it to you?

DO NOT READ EACH ANSWER, JUST LISTEN AND PROMPT BY ASKING *any other free gifts?*
Tick 'YES' to all that apply and 'NO' to the others

	Yes	No
a. Health personnel – nurse/doctor/dietician/pharmacist/any other (**H**)		
b. Partner/relative/friend/grandparent (**P**)		
c. Shop owner/ shop keeper (**S**)		
d. Representative of a company (**R**)		
e. Somebody at school (**Sc**)		
f. Can't remember (**99**)		
g. Other (**O**)		

22. Can you please tell me exactly where you were given it/them?

DO NOT READ EACH ANSWER, JUST LISTEN AND PROMPT BY ASKING ***Any other place?***
Tick 'YES' to all that apply and 'NO' to the others

Place	Yes	No
a. Public health facility like a CLINIC		
b. Public health facility like a HOSPITAL		
c. Pharmacy		
d. Retail shop		
e. Private hospital or clinic		
f. Other		

23. What other gifts did you receive?

DO NOT READ EACH ANSWER, JUST LISTEN AND PROMPT BY ASKING *Any other gift?*

Write the Company name or brand name and the source using initials as in question 21

Free Sample	**Yes**	**No**	**Source**	**Company or Brand**	**Code**
a. Bib					
b. Nappy /Diapers					
c. Toy					
d. Other infant products					
e. Other, Specify					

NB: <u>THE FOLLOWING SECTION IS ONLY FOR MOTHERS WITH AN INFANT AGED 0-6 MONTHS</u>

SECTION F: BREASTFEEDING PRACTICES AND DIETARY INTAKES

24. Are you currently breastfeeding your infant?

Yes (**go to next question**)	1
No (**go to question 26**)	2
Don't know (**go to question 26**)	99

25. When did you start breastfeeding?

During the first hour after delivery (**go to question 30**)	1
A day after delivery(**go to question 30**)	2
Don't know (**go to question 30**)	99

26. Did you ever breastfeed your infant?

Yes (**go to question 28**)	1
No (**go to next question**)	2
Don't know (**go to question 28**)	99

27. Why not? Do not read the list.

Mother did not produce enough milk	1
Mother's health was poor	2
Not enough time to breastfeed because of employment	3
Because of elder's instruction	4
Other, specify	

Then go to <u>question 30</u>

28. How old was the infant when breastfeeding was stopped

Weeks	Months

29. Why did you stop breastfeeding? Do not read the list

Sores on breasts	1
Insufficient milk production	2
Preferred formula milk	3
Anticipated weaning age	4
Other, Specify	

30. Please describe everything that the infant ate and/or drank yesterday during the day and night.

Breakfast	**Midmorning**	**Lunch**	**Mid Afternoon**	**Supper**	**After supper**

*If the infant received breast milk **ONLY**, go to **question.33***
*If the infant received other liquids and/or food, go to **next question***

31. Is this diet recall typical of what your infant eats on a daily basis?

Yes	1	No	2

32. MILK/LIQUID INTAKE: **Fieldworker to complete this table from the 24-hour recall information. Then go to question 34**

	Yes	No
a. Cow's milk (full strength)		
b. Cow's milk (diluted)		
c. Cow's Milk powder like Klim/Nespray		
d. Water		
e. Tea		
f. Infant formula Give name		
g. Other, specify		

33. For how long did you give your infant **breast milk ONLY**? **Then go to question 42**

Weeks	Months

34. Why did you give the infant other liquids and/or foods? Do not read the list

Breast-milk alone was not enough for the infant	1
The infant was thirsty all the time	2
Was advised to do so by a family member	3
Was advised to do so by a health practitioner	4
Because of mother did not produce sufficient milk	5
Other	

35. What was the **first drink** other than breast milk that your infant received?

_____ ☐

36. How old was your infant when you gave **this drink** for the first time? ☐

Weeks	Months

37. How old was your infant when he/she was given the **milk/liquid** feed ***(mentioned in 24-hr recall)*** for the first time? ☐

Weeks	Months

38. Do you add Sugar to this milk/liquid (

Yes = 1	**No = 2**	**Don't know = 99**

39. How do you administer this milk/liquid?

Cup feeding	1
Bottle feeding	2
Spoon feeding	3
Other, specify	4

40. How old was the infant when you gave the semi-solid/solid food (***mentioned in the 24-hr recall)*** to him/her ☐

Weeks	Months

41. How many times does your infant eat **that food** other than milk/liquid feed during the day and the night? ☐

42. Did your infant drink anything from a bottle with a teat yesterday during the day and night?

Yes = 1	**No = 2**	**Don't know = 99**

43. Does your child get any dietary supplements (e.g. vitamin syrup, vitamin supplements)

Yes = 1	**No = 2**	**Don't know = 99**

44. What do you think is the importance of breastfeeding? **Do not read the list**.

Mother's milk contains adequate nutrients for the child	1
I can save money	2
Breast-milk protects the infant from infections and sickness	3
Do not know	99
Other, specify	

***When the recall is completed, fill in the food groups based on the information recorded above. For any food groups mentioned, probe whether any of the foods in the groups were consumed the day before.**

	Group	**Foods**	**Yes=1 No=0**
A	Cereals	Corn/maize/samp, rice, wheat, sorghum, porridge, phutu, bread, pasta, breakfast cereals, oats, Mabella, Morvite, fortified cereals	
B	Yellow/orange vegetables	Carrot, butternut, pumpkin, orange-fleshed sweet potato	
C	White roots and tubers	potato, white sweet potato, cassava	
D	Dark-green leaves	spinach, imfino, morogo	
E	yellow/orange fruits	Apricot, mango, pawpaw, sweet melon, yellow peach, 100% fruit juice made from these	
F	Vegetables or fruits other than dark-green leafy and yellow/orange	Beetroot, brinjals, broccoli, brussels, sprouts, cabbage, cauliflower, gem squash, green beans, onion, peas, tomato, turnip, Apple, avocado, banana, berries, fig, granadilla, grape, grapefruit, guava, lemon, litchi, maroela, orange, naartjie, peach, pear, pineapple, plum, strawberry, watermelon, 100% fruit juice made from these	
G	Organ meat	Liver, kidney, heart, spleen, lungs	
H	Meat and poultry (flesh meats)	beef, goat, lamb, mutton, pork, venison, game, chicken, birds, insects, Mopani worms	
I	Eggs	any type of egg	
J	Fish and seafood	Fresh fish or canned fish, (sardines, pilchards, tuna) dried fish, shellfish	
K	Legumes, nuts and seeds	Dried beans, dried peas, lentils, nuts, peanuts, seeds (or foods made from these e.g. peanut butter)	
L	Milk and milk products	Milk, sour milk, cheese, yoghurt, custard, or any other milk products, or any drinks made with milk	
M	Fats and oils	oils, fats, margarine or butter added to foods or used for cooking	
N	Sugars and sweets	sugar sweets, chocolates, cake and sweetened biscuits, honey, sweetened drinks, sugary foods, sweetened condensed milk	
O	Spices, condiments, beverages	Spices (salt, pepper, etc), condiments (e.g. chutney, tomato sauce), coffee, tea, alcoholic drinks, cocoa	

THANK YOU VERY MUCH