

**INFANT FEEDING PRACTICES AMONG WOMEN WHO GAVE
BIRTH AT A BABY FRIENDLY HOSPITAL IN NORTHERN
MALAWI**

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Student

Mary Tinkhani Kamwana (Student Number: KMWMAR001)

Supervisor

**Associate Professor S. Clow, Division of Nursing and Midwifery,
University of Cape Town, South Africa**

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DECLARATION

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ABSTRACT

Introduction: Feeding practices are important determinants of the nutritional status of infants and children. More than one million infants worldwide die every year from causes related to poor infant feeding practices. Poor feeding practices predispose infants to increased risk of diarrhoea, respiratory and ear infections, malnutrition and allergic skin disorders. The Baby Friendly Hospital Initiative (BFHI) is a global response to declining breastfeeding rates and negative breastfeeding behaviours worldwide.

Aim: The aim of this study was to describe infant feeding practices (behaviours) and their determinants among mothers with children aged from birth to 1 year who had given birth at a designated baby friendly hospital in northern Malawi.

Theoretical framework: The Theory of Planned Behaviour (TPB) was used to understand the mothers' infant feeding practices, which were regarded as behaviours subject to the influence of maternal attitudes and knowledge, subjective norms, as well as other modifiers described by the theory.

Method: This cross-sectional study was carried out among 100 biological mothers of infants aged 12 months and younger who attended under-5 clinics at six outreach clinics and the static clinic at Embangweni Mission Hospital in northern Malawi. A structured questionnaire adapted to the local context from that used in a similar study by Ogunlesi *et al.* 2005 in Nigeria was used to collect data. Mothers were included in the study irrespective of type of birth. They were excluded if the infant had been born preterm or with low birth weight, or if the infant was unwell on the day of the study.

Data analysis: Data were analysed using Stata for Windows, release 9 (StataCorp LP, Texas, USA). Percentages, frequencies, means, medians, ranges and standard deviations

this area. Further research should focus on how attitudes towards breastfeeding in HIV infection and pregnancy influence practice, and identifying reasons for mothers' perceptions of their inability to practice a chosen behaviour.

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DEDICATION

This work is dedicated to the memory of my father, Mr R. B. Kumwenda, who would have loved to live long enough to see my academic achievements

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ABBREVIATIONS & ACRONYMS

| | |
|---------------|--|
| ARV | Anti-retrovirals |
| BAN | Breastfeeding, Anti-retrovirals, Nutrition |
| BFHI | Baby-Friendly Hospital Initiative |
| EBF | Exclusive breastfeeding |
| EREI | Expanded Rational Expectations Intentions |
| HIV | Human Immunodeficiency Virus |
| AIDS | Acquired Immunodeficiency Syndrome |
| MDHS | Malawi Demographic Health Survey |
| MF | Mixed feeding |
| MOHP | Ministry of Health and Population (Malawi) |
| PBF | Predominant breastfeeding |
| PCR | Polymerase chain reaction |
| PMTCT | Prevention of Mother to Child Transmission (of HIV) |
| TPB | Theory of Planned Behaviour |
| TRA | Theory of Reasoned Action |
| UNAIDS | Joint United Nations Program on HIV/AIDS |
| UNICEF | United Nations Children's Fund |
| VCT | Voluntary Counselling and Testing |
| WHO | World Health Organisation |
| ZDV | Zidovudine |

1 INTRODUCTION

The first year of life is a period of rapid physical and significant neurological development. The transition from dependence on the maternal-foetal circulation to dependence on the caregiver for enteral nutrition can be marked by challenges that, unresolved, have deleterious consequences for both mother and newborn infant. To avert these consequences, global initiatives such as the Baby Friendly Hospital Initiative (BFHI) have been implemented with the aim of encouraging infant feeding behaviours proven to have positive outcomes and reducing known unfavourable practices.

This document presents the details of a research study which was carried out among mothers in a rural area of northern Malawi to describe infant feeding behaviours and their determinants, using the framework of a behaviour model. In this chapter an overview of infant feeding in the context of BFHI is provided as a background to the objectives and perceived significance of the research study. Key terms for the study are defined at the end of the chapter.

1.1 Background

Caregiver feeding practices are important determinants of the nutritional status of infants and children. Unlike older children and adults, infants and young children depend on their caregivers for the preparation and intake of food; their nutritional status is thus influenced by caregiver feeding practices. More than one million infants worldwide reportedly die every year from causes related to poor infant feeding practices, which include not breastfeeding and early introduction of feeds (solid foods) (UNICEF 2006).

Poor feeding practices predispose infants to increased risk of diarrhoea, respiratory and ear infections, malnutrition and allergic skin disorders (Lartey *et al.* 2000, Cesar *et al.* 1999, Cohen *et al.* 1995). Breastfed children are less susceptible to the risks of infant and

child deaths from diarrhoeal diseases and acute respiratory infections than artificially fed children (other food substances besides formula) (Arifeen *et al.* 2001, Pallon & Tienda 1986). Among breastfed children, duration, exclusivity and intensity of breastfeeding are positively associated with child survival (Edmond *et al.* 2006, Betran *et al.* 2001).

Poor feeding practices can lead to malnutrition and its related health problems.

Malnutrition is a global problem affecting development, particularly that of the under-privileged and poor, and is directly or indirectly responsible for half of the 10.9 million deaths annually among children under 5 years of age (WHO 2001a). In the developing world over 6 million deaths each year of children younger than 5 years of age can be attributed to malnutrition, and over two-thirds of these deaths are associated with poor feeding practices occurring during the first year of life (Black *et al.* 2003, Muller *et al.* 2003, WHO 2003, Nemer 2001).

In response to increasing concern over declining global breastfeeding rates, the World Health Organisation (WHO) and United Nations Children's Fund (UNICEF) convened an expert meeting in 1990, tasked with developing strategies to reverse the trend. The result of this meeting was the Innocenti Declaration, following which the BFHI was launched (WHO/UNICEF 1990). The overall objective of BFHI is to promote, encourage and support breastfeeding through the education of health workers in maternity and neonatal services, in order to reduce infant morbidity and mortality rates. Health facilities are designated 'baby friendly' upon successful implementation of the ten steps to successful breastfeeding (Appendix 1). By 2004 about 16 000 hospitals in 171 countries had been designated baby- friendly (WHO 2004). In addition to the ten steps to successful breastfeeding, WHO/UNICEF have adopted the seven point plan for the protection, promotion and support of breastfeeding in Community Health Care settings (UK based, not international instrument). This is to enable improved practice in community health care in order to promote, protect and support breastfeeding (WHO/UNICEF 2008) (Appendix 1).

1.2 Country profile and background of BFHI in Malawi

Malawi is a land-locked country in south-eastern Africa. It has a population of 13.5 million, with an annual growth rate of 2.7%. It has one of the poorest economies, with a Gross National Income per capita of US \$160, with 28.8% of the population living on less than \$1 per day. Malawi's infant and neonatal mortality rates are estimated at 72 and 26 per 1000 births respectively. The neonatal mortality rates had been reduced by 20% by 2006 over the last 10 years due to presidential-level commitment to maternal newborn and child health and increased investment by partners to address the lack of human resources (Lawn & Kerber 2006). The estimated national HIV prevalence rate among adults (15+ years) is 14.1%, and up to 30% among antenatal women in urban areas. In 2005 the life expectancy at birth was 40 years and the maternal mortality ratio was 1100 per 100000 births (WHO 2008, National Statistical Office 2005).

For decades malnutrition has remained one of the major public health and developmental problems in Malawi. The Malawi Demographic and Health Survey (MDHS) of 2000 reported that almost half (49%) the children under the age of 5 years were chronically malnourished, while 25% were underweight and 6% were wasted (National Statistical Office 2005). According to World Health Statistics 2008, 52.5% of Malawian children under the age of 5 years were stunted and 18.4% were underweight for age during 2002-2006 (WHO 2008).

The Ministry of Health and Population (MOHP) in Malawi started implementing BFHI in 1993. One of the main objectives of the programme is to improve the health and nutritional status of children through the promotion, support and protection of breastfeeding. By 2006 20 out of 48 hospitals in Malawi had been designated baby friendly, and another 12 were committed to attaining baby friendly status by the end of the year (UNICEF 2006).

Prior to 1993, breastfeeding rates in Malawi were very low. Exclusive breastfeeding (EBF) was reported in only 3% of infants under 6 months of age in 1992 (National Statistical Office 2005). The EBF rate was 45% in 2000 and 53% in 2004, and this rise was attributed to the success of BFHI (National Statistical Office 2005).

1.3 Background to BFHI programme at Embangweni Hospital

Embangweni Mission Hospital in northern Malawi was designated baby-friendly in 1999 and has maintained this status to date. The hospital serves a rural catchment population estimated at 35 000, and has an in-patient capacity of 134 beds. In 2006 malnutrition was the fifth commonest diagnosis among admissions to the paediatric ward, accounting for 114 (6.5%) of the 1740 paediatric admissions (Embangweni Hospital Annual Report 2006).

Through the hospital's BFHI and PMTCT programmes, women attending the integrated maternal and child health services at the hospital have access to infant feeding education. Voluntary counselling and testing for HIV (VCT) and infant feeding education are offered to all women attending antenatal clinics. Women who test HIV positive are counselled for a single intrapartum dose of nevirapine (NVP), and a single NVP dose is given to the infant within 72 hours of birth to prevent MTCT.

Exclusive breastfeeding is advocated for all infants, irrespective of maternal HIV status. On discharge from the hospital mothers are referred to community breastfeeding support groups. These community-based support groups were set up at the beginning of the programme and are supervised by health workers on a regular basis. Breastfeeding education and promotion also take place at the 6-week postnatal and well child under-five clinics.

1.4 Problem statement

With two-thirds of malnutrition-related morbidity and mortality in the developing world occurring in the first year of life, interventions such as BFHI have the potential to significantly improve the health status of children. The practice of positive infant feeding behaviours can, however, be subject to numerous factors, which need to be identified in order to find appropriate solutions that will lead to positive outcomes. Although Embangweni Hospital has retained its baby-friendly hospital status for 9 years, infant feeding practices and their determinants in the community served by the hospital have not been systematically investigated and described. The magnitude of the gap between 'teaching' and 'practice' is thus unmeasured and undocumented, and therefore the success of implementing the BFHI policy is also unmeasured.

1.5 Research question

In an attempt to measure this, the present research study sought to answer the following question: Among mothers of infants aged from birth to 1 year born at Embangweni Mission Hospital, which factors influence the prevalent infant feeding behaviours and how well do the feeding behaviours compare to the teachings of BFHI?

1.6 Aim of the study

In answering this research question, the aim of this study was to describe how mothers who had given birth at this baby-friendly hospital fed their infants during the first year of life, and the behavioural attributes that determined their choices. Three specific objectives were set in order to achieve this.

1.7 Specific objectives

- To describe social and demographic characteristics of participating mothers, and describe the age and gender distribution of their infants.

- To describe the infant feeding choices and methods among these mothers at different monthly age intervals from birth to 1 year.
- To describe factors that mothers perceive as influencing their infant feeding behaviours.

1.8 Significance of the study

The study is the first of its kind to attempt to describe the infant feeding behaviours of caregivers in a rural setting in northern Malawi using a behaviour model. The findings contribute to the understanding of infant feeding behaviours in the Embangweni area, and assist in identifying behaviour modifying strategies that would help improve the implementation of the BFHI policy. The study design and findings lay a foundation for future descriptive and interventional research in this area as well as in other parts of the country.

1.9 Definition of terms

For the purpose of this study the following terms have meanings as follows.

Baby-friendly hospital

A health facility that has been designated as baby-friendly through the implementation of the ten steps to successful breastfeeding as recommended by UNICEF and WHO (Appendix 1).

Complementary food

Any food that is suitable as a complement to breast milk or to infant formula when either becomes insufficient to satisfy the nutritional requirements of the infant (WHO 2004).

Exclusive breastfeeding (EBF)

Giving breast milk only, without any additional food or drink, not even water, with the exception of vitamins/mineral drops and medicine preparations, for the first 6 months of life (WHO 2001b).

Formula feeding

Giving a suitable breast milk substitute to a baby who is not being exclusively breastfed.

Infant

A child aged from birth to 12 months.

Mixed feeding

Mixed feeding refers to giving the baby breast milk and some artificial feeds, either milk or cereal or other food (WHO 2001a).

Non exclusive breastfeeding practices

Predominant breastfeeding and Mixed feeding in this study mean non exclusive breastfeeding type of feeding practices.

Predominant breastfeeding (PBF)

The infant's predominant source of nutrition is breastfeeding. However, the infant may also receive water-based drinks, not formula.

Prelacteal feeding

Prelacteal food refers to food given to the child before the initiation of breastfeeding

Supplementary feeds

Any nutrient-containing foods or fluids offered to infants in addition to breast milk before 6 months of age (Banda 2004, p. 169).

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2 LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on feeding practices both locally and globally, with specific emphasis on breastfeeding and weaning practices during the first year of life. The aim was to obtain information regarding the methods used in other similar studies and the findings thereof.

Both print and electronic sources were searched for research articles, review articles, policy and position documents and abstracts using the following words: baby-friendly hospital; breastfeeding; exclusive breastfeeding; infant feeding practices and theory of planned behaviour. In an initial Medline search all of the 87 articles published before 1970 did not meet the requirements of the study; further searches were therefore limited to literature published in the period 1970 - 2008. Additional searches were done using Google Scholar[™] and the University of Cape Town Libraries journal portal, TDNet. Reference lists of sources identified were also inspected for relevant material which was also accessed for review. Where the original referenced material could not be accessed, cited content was referenced as such. Literature published in English, and English abstracts of literature originally published in other languages were included.

2.2 Infant feeding practices

2.2.1 Breastfeeding

Breastfeeding has been described as “an unequalled way of providing ideal food for healthy growth and development of infants” (WHO 2001a, p. 7). It is universally accepted as the optimal form of infant feeding that has numerous advantages in addition to being natural. Human milk is species-specific and differs markedly from substitute preparations, thus making it uniquely superior for infant feeding (Hambraeus *et al.*, cited in Gartner *et al.* 2005). It provides all the energy and nutrient requirements for a baby for

the first months of life, continuing to do so during the second half of the first year, with adequate introduction of complementary food (Quinn *et al.* 2001). Its protein content includes substances with immune functions that serve to reduce the incidence and severity of gastrointestinal, urinary tract, respiratory tract and central nervous system infections, thereby preventing infant morbidity and mortality (Gartner *et al.* 2005, Kakute *et al.* 2005).

Absence of breastfeeding is associated with increased incidence of diseases such as diarrhoea and acute respiratory infections, which can be exacerbated by malnutrition (Talayero *et al.* 2006, Betran *et al.* 2001, Barros *et al.* 1986). A meta-analysis by a WHO collaborative study team showed the risk of death for children younger than 2 years to be six times greater for non-breastfed than breastfed babies (WHO Collaborative Study Team 2000).

2.2.1.1 Initiation of breastfeeding

Step 4 of the Global Criteria for the WHO/UNICEF BFHI is to “Help mothers initiate breastfeeding within a half hour of birth,” (WHO 1998, p.31). Scientific evidence for this and other steps was reviewed 6 years after launching the BFHI (WHO 1998). The reviewers found four studies (Ali & Lowry 1981, Thomson *et al.* 1979, de Chateau & Wilberg 1977, Sosa *et al.* 1976) that showed that early contact between the newborn and the mother resulted in a significant increase in rates of breastfeeding at 2 - 3 months, and two studies that failed to show a significant effect (Taylor *et al.* 1985, Salariya *et al.* 1978). The timing and duration of early contact in the various studies were different, but as little as 15-20 minutes in the first hour was beneficial and even a 20- minute interruption to contact during the first hour was detrimental, leading to speculation of a possible dose response.

In another study that was reviewed, Kurinij and Shiono (1991) found that American primiparous mothers were unlikely to breastfeed exclusively in hospital if the first feed

occurred between 7 to 12 hours or more than 12 hours postpartum. Thus, early initiation of breastfeeding in their study favoured in-hospital exclusivity of breastfeeding.

The effect of contact on neonatal physiology was investigated in two studies included in the review (Christensson *et al.* 1995, Christensson *et al.* 1992). In these, newborns who had skin-to-skin contact with their mothers had significantly higher axillary and skin temperatures, higher blood glucose levels at 90 minutes, a more rapid normalisation of a negative base excess and less crying than those kept next to their mothers in a cot. These benefits of early contact were non-nutritional.

Early initiation of breastfeeding facilitates breast milk production; ensuring that the newborn receives the first milk (colostrum) which has high concentrations of nutrients and antibodies. The latter protect the newborn from infections since the infant's immune system is immature at birth (Buterys *et al.* 2002). In Ghana, Edmond *et al.* (2006) followed up more than 10 000 infants of mothers participating in a vitamin A supplementation study. They studied the effects of timing of initiation and type of breastfeeding on neonatal mortality. Their findings showed that initiation of breastfeeding at later than 1 day after birth was associated with a 2.4-fold higher neonatal mortality than initiation immediately after birth. They also reported a marked dose increase of neonatal mortality with increasing delay of breastfeeding from 1 hour to 7 days. A significant observation from this study was that 22% of neonatal deaths could be prevented by early initiation of breastfeeding.

The nutritional and non-nutritional outcomes of early contact and initiation of breastfeeding can lead to a reduction in neonatal and child morbidity and mortality, especially in the developing world. The extent to which this reduction occurs may be different from one country to another, and from one geographical area to another within the same country, because of differences in how early contact and initiation of breastfeeding are practiced.

2.2.1.2 Exclusive breastfeeding

Exclusive breastfeeding is defined as “giving infants only breast milk without any additional food or drink, not even water, with the possible exception of small amounts of medical supplements” (WHO 2003, 23). It is the reference or normative model against which all alternative feeding methods must be measured with regard to growth, health, development and other short-term and long-term outcomes (Gartner *et al.* 2005).

Exclusively breastfed infants (EBF) are protected against major causes of infant death such as meningitis, acute respiratory infections and diarrhoea (Huffman, Zehner & Victoria 2001, Lartey 2000, Cesar 1999, Cohen *et al.* 1995). These conclusions are supported by the findings of studies in both developed and developing settings.

A study in Ghana by Edmond *et al.* (2006) reported a four-fold increase in neonatal mortality risk in partially breastfed infants compared to their exclusively breastfed counterparts. There was a two-fold higher mortality rate in infants who received pre-lacteal feed. Non-exclusive breastfeeding was associated with increased mortality risk.

An attributable-fraction analysis of Latin American and Caribbean countries' national infant mortality and breastfeeding data concluded that 66% of deaths from diarrhoea and respiratory infections among infants 0-3 months old could have been prevented by EBF (Betran *et al.* 2001). Thirty-two per cent of such deaths among infants aged between 4 and 11 months were preventable by partial breastfeeding, while overall 13.9% of all-cause infant mortality was preventable by these feeding patterns. The authors observed from their findings that these feeding practices (EBF and partial breastfeeding) could substantially reduce infant mortality in Latin America. Thus EBF was more protective than non-EBF for mortality from infectious illnesses.

In a cohort study of women who were residents of slum areas in Bangladesh, Arifeen *et al.* (2001) reported a 2.23-fold higher risk of infant deaths from all causes and 2.4- and

3.94-fold higher risks of deaths attributable to acute respiratory infections and diarrhoea respectively among partial or non-breastfed infants compared with exclusively breastfed infants. As in other studies, non-EBF was associated with increased risk of mortality.

In 1979 the Joint WHO/UNICEF Meeting on Infant and Young Child Feeding recommended EBF until age 4 - 6 months as ideal (WHO 2001b). Subsequent increasing concern that the health risks to the weanling aged 4 - 6 months may outweigh the nutritional benefits of weaning at this age led to further enquiry into the appropriate duration of EBF. In 2001 WHO commissioned a systematic review of current scientific evidence on the optimal duration of EBF. The review included two small controlled trials from Honduras (Dewey *et al.* 1999, Cohen *et al.* 1994); three cohort studies (Simondon & Simondon 1997, Adair 1993, Brown 1991) from Senegal, the Phillipines and Peru respectively; as well as two pooled analyses (Frongillo, De Onis, & Gazara 1997, WHO Working Group on Infant Growth 1994) and two cohort studies (Kramer *et al.* 2000, Akeson, Axelsson & Raiha 1996) from developed countries.

The reviewers examined the comparison of EBF for 4 - 6 months versus 6 months in terms of growth, infant iron status, morbidity, atopic disease and motor development. They found and concluded that infants who were breastfed exclusively for 6 or more months had no observable deficits in growth; and that there were no benefits of introducing complementary foods between 4-6 months, with the exception of improved iron status in one developing country setting. An expert committee on infant and young child nutrition acting on the evidence that EBF for 6 months conferred several benefits on infant and the mother, recommended that EBF should be practised for 6 months with introduction of adequate and safe complementary foods thereafter (WHO 2001b).

2.2.2 Complementary feeding

Complementary feeding is defined as the process starting when breast milk (or formula) alone is no longer sufficient to meet the nutritional requirements of infants (Dewey

2001). WHO (2004, 2001b) recommends the introduction of nutritionally adequate, safe and appropriate complementary foods after 6 months, in conjunction with continued breastfeeding. They advise that complementary feeding should be introduced timeously, adequately, safely and appropriately to ensure optimal growth and development of the child. The 2001 guideline states that the infant should be fed 2 - 3 times a day between 6 to 8 months of age, increasing to 3 to 4 times daily from 9 - 24 months of age, with an additional snack offered 1 to 2 times per day as desired (WHO 2001b).

During this transition infants can become vulnerable to malnutrition, contributing significantly to the prevalence of malnutrition in children under the age of 5 years worldwide (WHO 2004). It is estimated that 2 out of 5 children have stunted growth in low-income countries (WHO 2004). Weaning practices and associated factors vary from one country to another and may vary within the same country.

In rural Vietnam a longitudinal study to document the introduction of complementary food and factors influencing the decision to feed infants with solid food (Dat-Van, Colin & Andy 2005) reported a surprisingly early introduction of complementary feeding. Complementary feeding increased from 16.4% at week 1 to 56.5% at week 16, and nearly 100% at week 24. The study further found that mothers who were farmers or had secondary education or whose mother in-law preferred EBF were less likely to feed their infants with solid food at 24 weeks postpartum. However, infants were likely to be fed with solid food when the parents had higher income and lived independently from their extended families. These authors used complementary feeding to mean the same as supplementary feeding, but this did not alter the relevance and applicability of their findings.

In Nigeria a cross-sectional study by Ogunlesi *et al.* (2005) reported that 36.6% of children had been commenced on complementary feeds between 2 and 6 months. Having a mother who was a professional and/or bottle feeding were associated with early

introduction of complementary feeding. The latter finding was similar to that in Vietnam. Similarly, the use of 'complementary' in place of 'supplementary' in this Nigerian study did not alter the significance of the observation.

A cross-sectional study in a peri-urban area of South Africa (Sibeko *et al.* 2005) reported that 32% of infants were commenced on complementary feeding by the first month of life and all infants were on complementary feeding before 6 months of age. Again, complementary feeding meant the same as supplementary feeding, without negatively affecting the relevance of the findings.

In Malawi the 2004 MDHS reported a decline in the introduction of complementary foods among infants of 4 to 5 months old, from 80% in 2000 to 37% in 2004 (National Statistical Office 2005). Children were more likely to be given plain water than complementary foods between 4 to 5 months of age in 2004. Up to 91% of breastfed children aged 6-9 months were fed some semi-solid or solid foods. Most (73%) of these children received foods made from grains, half (50%) were fed fruits and vegetables, and fewer were given food made from legumes (16%) and roots and tubers (11%). Less than half of children (48%) between the ages 6 to 9 months were given fresh foods rich in vitamin A, while just over 20% were given animal products. The use of 'complementary' in place of 'supplementary' in this survey did not change the practice under enquiry, the giving of feeds to infants under 6 months of age.

The situation in Malawi exemplifies the challenges faced by individuals and populations in resource-limited settings with regard to weaning. Although weaning practices differ from one geographical area to another, the weaning diet is often one which is rich in carbohydrates and contains inadequate amounts of other nutrients and minerals, and the timing does not favour recommended exclusivity of either breast or formula feeding.

2.3 Infant feeding in the context of HIV/AIDS

During 2005, UNAIDS estimated that 13.5 million women and 540 000 children were newly infected with HIV, with 90% of these infections occurring in sub-Saharan Africa (UNAIDS 2006). The United Nations' strategic approach to the prevention of transmission of HIV to infants and young children has four aspects, namely (1) prevention of HIV infection in general; (2) prevention of unintended pregnancies among HIV-infected women; (3) prevention of HIV transmission from infected women to their infants; and (4) proper care, treatment and support of HIV-infected women and their families.

The third strategy has direct relevance to this discussion. Vertical transmission of HIV from the mother to child occurs during pregnancy (5-20%), labour and delivery (10-15%) and breastfeeding (5-20%) (UNAIDS 2006). The transmission of HIV from mother to child (MTCT) after birth is one of the greatest challenges to HIV prevention. The risk of perinatal MTCT increases in the presence of a high maternal HIV viral load (Dabis *et al.* 1999, European Collaborative Study 1999, Mayaux *et al.* 1999), a low maternal CD4 count (Leroy *et al.* 2002, European Collaborative Study 2001) and vaginal birth (European Mode of Delivery Collaboration 1999, International Perinatal HIV Group 1999). Peripartum prophylaxis reduces the risk of MTCT in the period around delivery (Dabis *et al.* 2000).

2.3.1 Breast milk and HIV transmission

The transmission of HIV through breast milk was documented quite early in the epidemic (Lepage *et al.* 1987, Ziegler *et al.* 1985). Documentation of infants infected by wet nursing mothers (Nduati, John & Kreiss 1994), and the detection of HIV-1 in breast milk (Becquart *et al.* 2006, Lee *et al.* 2004, Ghosh *et al.* 2003, Nduati *et al.* 1995, Ruff *et al.* 1994) has led to increasing certainty that HIV is transmitted through this medium.

The risk of MTCT with breastfeeding is cumulative (Leroy *et al.* 2002, Miotti *et al.* 1999, Leroy *et al.* 1998), but most infections occur early, with risk of late postnatal MTCT remaining constant throughout breastfeeding (Breastfeeding & HIV International Transmission Study Group cited in WHO 2003). In a study by Nduati *et al.* (2000), 75% of all transmission through breastfeeding had occurred by 6 months of age, and the estimated absolute rate of transmission through breastfeeding (compared to formula) was 16.2% at the 2-year follow-up. Maternal breast conditions such as cracked nipples and mastitis are known to increase HIV viral load in breast milk and therefore increase the risk of MTCT (John *et al.* 2001, Semba *et al.* 1999).

2.3.2 Infant feeding patterns and HIV transmission through breast milk

A study in South Africa (Coutsoudis *et al.* 1999) assessed the influence of infant feeding patterns on HIV transmission. The findings of the study showed that by the age of 15 months, infants of HIV-infected mothers who received mixed feeding (breast milk plus other feeds) were significantly more likely (36%) to be HIV-infected than infants who were exclusively breastfed (25%) or formula fed (19%) for the first 3 months.

The ZVI TAMBO trial in Zimbabwe (Iliff *et al.* 2005) compared EBF with early mixed feeding among 2060 HIV-infected mothers with HIV PCR-negative infants at 6 weeks. Early mixed feeding was associated with a 4.03, 3.79 and 2.6 greater risk of postnatal HIV transmission at 6, 12 and 18 months respectively. Similarly, in the Kwazulu-Natal province of South Africa Rollins (2006) described a cumulative postnatal HIV transmission risk of 4.4% after 5 months of exclusive breastfeeding, and infants who were mixed-fed at 12 weeks of age were twice more likely to be infected than exclusively breastfed infants.

A randomised control trial in Botswana compared the efficacy of EBF plus 6 months of infant zidovudine (ZDV) prophylaxis versus formula feeding plus 1 month of infant ZDV. The results showed cumulative HIV transmission rates at 7 months of 5.6% in the

formula-fed group and 9.0% in the exclusively breastfed group. However, at 18 months there were no significant differences between formula-fed and breastfed arms (13.9% vs. 15.1%) in combined outcome of HIV infection or mortality (Lockman *et al.* 2006).

The challenge that MTCT of HIV poses to mothers and programmes in resource-poor countries is well illustrated by the findings of the Breastfeeding, Antiretrovirals and Nutrition (BAN) study in central Malawi (Corneli *et al.* 2007). In this study only 50% of HIV-positive mothers knew about EBF, although they were exclusively breastfeeding at the time of the study. Eighty-five per cent of the HIV-infected mothers gave water and/or thin porridge (mixed feeding) to their infants before 4 months. Although the women expressed willingness to discontinue breastfeeding at 6 months in order to reduce the risk of HIV transmission, most were deterred by their inability to purchase replacement foods.

In a study of infant feeding practices in Botswana (Programme Review Team, PMTCT Advisory Team & Infant Feeding Study Group 2002), 21% of HIV-infected mothers of children aged 7-12 months who had chosen to exclusively formula feed admitted ever putting their children to the breast. Ninety-three per cent of infants of HIV-infected mothers received fluids (mainly water or sugar water) daily; 35% of these in the first week of life because mothers believed the infants were thirsty, or because it was a family tradition.

EBF helps preserve the integrity of the infant gut, unlike breast milk replacements which contain foreign proteins that may induce atopic and inflammatory damage to the gut mucosa and thereby open a portal for infection with HIV and other organisms (Rollins 2007, Coovadia *et al.* 2007). Further, incomplete emptying of the breast may lead to low-grade mastitis with the resultant consequence of higher viral loads in the breast milk of mothers whose infants are mixed-fed (Rollins 2007, Coovadia *et al.* 2007).

MTCT of HIV thus presents a number of practical difficulties for mothers in resource-limited settings. Breastfeeding increases the risk of postnatal transmission compared to formula feeding, and although EBF is more protective than mixed feeding or predominant breastfeeding, the latter methods occur commonly because of cultural or social pressures. On the other hand, exclusive formula feeding is only possible where PMTCT programmes or governments make formula readily available, otherwise most mothers in developing settings are unable to afford breast milk replacements. In addition, not breastfeeding may be associated with stigma against HIV/AIDS, and therefore mothers may sometimes breastfeed their infants to prevent this. Finally, formula feeding is associated with risks of increased morbidity and mortality, as discussed below.

2.3.3 HIV, infant feeding and infant morbidity and mortality

A study within an urban PMTCT programme in Kenya reported increased risk of diarrhoea, dehydration and respiratory infections in the first 3 months among HIV-exposed formula-fed infants compared to their breastfed counterparts (Mbori-Ngacha *et al.* 2001). Another study in the East African country (Obimbo *et al.* 2004) followed a perinatal cohort of HIV-infected infants, in order to determine predictors of mortality during the first 2 years of life. All deaths among non-breastfed (formula-fed) infants occurred during the first 6 months of life. In this study, formula feeding was found to be one of the predictors of infant mortality.

In Botswana, an investigation into increased diarrhoea and deaths following floods in the 2005/2006 rainy season found that most deaths occurred among HIV-exposed formula-fed infants (Creek, Luo & Quick 2006). Deaths also occurred in 'HIV-non-exposed' infants, and further enquiry found that the use of formula had 'spilt over' to HIV-negative mothers, with fatal consequences even in this middle-income African state where most mothers had access to piped water.

A pooled meta-analysis of studies from 1983 to 1991 with data on all causes of death for 1123 children under the age of 2 in Brazil, Ghana, Gambia, Senegal, Pakistan and the Philippines concluded that infants who received formula milk or other replacement feeding had a 6-fold risk of dying in the first 2 months of life, a 4-fold increase in mortality between 2-3 months, and 2.5-fold increase between 4 and 5 months compared with those who were breastfed (WHO Collaborative Study Team 2000).

These findings clearly show that there is a higher risk of infectious morbidity and mortality in non-breastfed infants, especially in developing countries. This risk is highest in infants younger than 6 months and is unrelated to HIV status - but the consequences may be quite severe, even fatal, in HIV-exposed or -infected infants.

2.3.4 Guidelines on infant feeding in the context of HIV

After a review of this growing body of scientific evidence, WHO (2006a) proposed clarifications and refinements to the existing United Nations (2000) guidelines on infant feeding in HIV. The guideline for HIV-uninfected mothers and mothers with unknown HIV status recommends that these mothers should breastfeed exclusively for 6 months and continue breastfeeding to 24 months and beyond; and that HIV-infected mothers should choose for their infants feeding options that are appropriate to individual circumstances and in consideration of health services, counselling and support.

They only recommend avoidance of all breastfeeding by HIV-infected women where replacement feeding is acceptable, feasible, affordable, sustainable and safe. Where this is not the case, EBF for 6 months is recommended, with on-going assessment of circumstances. If at this stage replacement feeding remains neither acceptable, feasible, affordable, sustainable nor safe, breastfeeding with additional complementary feeding is recommended until a nutritionally safe and adequate diet without breast milk can be provided (WHO 2006b).

2.4 Factors that influence infant feeding practices

Infant feeding practices and outcomes in different parts of the world are directly and indirectly influenced by social and economic factors and cultural beliefs and practices. In Africa the majority of babies are breastfed, but the feeding practices are suboptimal for most compared to the optimal practices of early breastfeeding and EBF (Quinn *et al.* 2001, Decock *et al.* 2000).

2.4.1 Socio-economic factors

2.4.1.1 Employment and maternity leave

The economic situation of women may be a barrier to EBF. National policies on maternity leave influence infant feeding choices among working women. There are differences among Southern African countries regarding legislation for the minimum maternity leave that female employees can take. This ranges from 6 weeks in Botswana (Employment Act 2003), 12 weeks in Malawi (Employment Act 2000), 90 days in Zambia (Minimum Wages & Conditions of Employment General Order 2002) and 4 months in South Africa (Basic Conditions of Employment Act 2002). The Malawian and Zambian legislation explicitly states that women on maternity leave are entitled to full salary and all benefits for the duration of the maternity leave, and that it is a punishable offence for an employer to terminate employment on account of pregnancy. The South African Act requires applicants for maternity leave to apply for maternity benefits, which is a variation in practice to other countries. The laws are less specific and protective of women who work part-time or are seasonal workers.

All of the minimum periods for maternity leave in the Southern African region are shorter than the recommended duration for EBF of 6 months. In certain circumstances women may go on maternity leave a month before the expected date of birth, which further shortens the amount of time available for EBF after birth. Unless nursing mothers are allowed to bring their infants to work, where conditions must also be conducive to breastfeeding, EBF is unlikely to continue beyond the period of maternity leave. In

Malawi being employed was associated with the practice of mixed feeding 3 months after birth, when mothers had to return to work (National Statistical Office 2005). Similarly, in a study of obstetric, maternal and social factors influencing the uptake and early cessation of breastfeeding in Birmingham, England, 40% of women who stopped breastfeeding within 3 months did so because they had to return to work (Bick, McArthur & Lancashire 1998). Returning to work within 3 months was a predictor of early cessation of breastfeeding.

The challenges to EBF of employed women come about because of limitations and variations in legislation, the lack of a workplace environment conducive to breastfeeding, and the lack of job security for women who are not employed full-time.

2.4.1.2 Family support and resources

In Cameroon a survey on socio-cultural barriers to EBF among the Fulani women, who rely on animal farming, found that maintaining EBF was problematic because of farm work (Kakute *et al.* 2005). The women walked long distances to and from their fields and had to leave the infants in the care of grandparents and other caregivers, who gave the children cow's milk and unfermented palm wine.

In a study among 27 HIV-infected women in South Africa (Doherty *et al.* 2006), a strong knowledge of the method and a supportive home environment (supportive husband, partner or mother to whom they had disclosed HIV status) were important for EBF. The mothers who had to go away for part of the day to work, or to do some household chores found it difficult to sustain EBF. In general, the ability to resist family pressure to introduce other feeds was a key characteristic of women who were able to maintain exclusivity of feeding. Women who had resources like electricity, a kettle and a flask found it easier to feed their infants at night and maintain exclusive formula feeding.

These findings illustrate how a woman's role in the home, the quality of family support and the amount of financial and other resources available to them can influence infant feeding decisions and practices at household level. In resource-limited settings not only may breast replacement feeding be unaffordable and unsustainable, but lack of clean water or the means to sterilise water and utensils can make formula feeding unsafe. This, compounded by poor sanitation and the lack of refrigeration, often leads to contamination of food and spread of diarrhoeal disease.

2.4.2 Maternal age

Young mothers experience different barriers to breastfeeding than older mothers (Brownell *et al.* 2002, Guttman & Zimmerman 2000). A study by Vogel, Hutchison and Mitchell (1999) found that younger maternal age was associated with shorter length of breastfeeding. This was attributed to the perception of social isolation and the need for the younger women to continue with their education. Another study (Arlotti *et al.* 1998) found that most teenage mothers stopped breastfeeding at 3 months because they had to return to school. In Northern Ireland the reported barriers to long duration of breastfeeding among young mothers included: freedom, independence associated with family issues, social embarrassment, and perceived social isolation (Stewart-Know *et al.* 2003).

A study in Ibadan, Nigeria found that mothers of 24 years old or younger and primiparous mothers were less likely to breastfeed exclusively (Lawoyin, Olawuyi & Onadeko 2001). Studies of teenage mothers in Swaziland (Dlamini, van der Merwe & Ehlers 2003) and Khayelitsha in Cape Town (Belue *et al.* 2008) provide an insight into the challenges faced by young mothers in Africa. The Swazi study found that teenage mothers lacked knowledge, advice and emotional support before, during and after pregnancy. Dlamini *et al.* (2003) concluded that parents, partners, peer groups, health personnel, teachers, church leaders and communities had failed to empower the teenage mothers to prevent pregnancy and manage motherhood. In Khayelitsha in the Western Cape up to 60% of teenage mothers had no partner, and 43% of those with partners were

not co-residing, which contributed to stress among these mothers. In addition to the stress of motherhood in a resource-deprived environment, poverty seemed to destabilise relationships and the absence of partner involvement and support perpetuated the cycle of poverty.

Therefore, in addition to the need to return to school, find work and socialise, young mothers may be ill-prepared to make infant feeding choices because of a lack of social, family and community support. In Africa poverty is an important determinant of feeding choices and practices among young mothers (Kamudoni 2007).

2.4.3 Cultural beliefs and practices

Cultural beliefs and practices can influence inappropriate choices of infant feeding. Among some cultures the first milk (colostrum) is not given to the baby due to fears that the yellow milk will lead to jaundice (Quinn *et al.* 2001). In a cross-sectional study of urban and rural mothers in Tanzania (Shirima *et al.* 2001), 43% of rural mothers and 10% of mothers in an urban area had discarded some of the colostrum because they believed it was bad for the baby. In southern Malawi (Kamudoni 2007) up to 5% of mothers discarded milk before they initiated breastfeeding. These practices lead to pre-lacteal feeding.

Kakute *et al.* (2005) reported that women initiated breastfeeding after 2 days because they believed that the colour of colostrum was bad for the baby. Cameroonian mothers in this study preferred to give cow's milk or *Viindi* (water that has been used to wash off passages of the Koran written in charcoal on a wooden slate), rather than colostrum. In an area of northern Malawi herbal mixtures are given to infants for cleansing of the body, as well as to protect the child from the effects of promiscuity by the parents or immediate community members (Kerr, Berti & Chirwa 2007), whereas in Mangochi in southern Malawi a herbal preparation which is believed to prevent tetanus in newborns was given (Kamudoni 2007).

Cultural practices and beliefs vary from country to country as well as between different tribal groups in the same country. These beliefs and practices may lead to delayed initiation of breastfeeding and the use of pre-lacteal feeds, as well as herbal preparations.

2.4.4 The influence of 'significant others'

Village elders, families, friends and health workers also influence mothers' feeding practices. Mothers in Mangochi district in southern Malawi (Kamudoni 2007) reported health workers as most influential on their perception of the right timing for the introduction of other feeds in addition to breast milk. Family and community members were the second most important, and friends last.

Kakute *et al.* (2005) reported that mixed feeding was an old practice encouraged by village elders, and changes to this practice were perceived as introduced by Western culture, which the elders held responsible for many diseases in their society. Mothers feared that any departure from these practices could lead to conflict with family and village elders, resulting in curses and bad luck.

Haider *et al.* (2000) examined the effect of community-based peer counsellors on EBF among Bangladeshi women. Women in the intervention group were visited by trained peer counsellors during the second and third trimesters, immediately postpartum and 2-weekly after that until their infants were 5 months old. At the 5-month interview 70% of women in the visited group were still exclusively breastfeeding their infants, as opposed to 6% in the control (unvisited) group. Peer counselling contributed to appropriate EBF practices in this area, where more than 90% of pregnant Bangladeshi women gave birth to their infants at home and hospital-based breastfeeding promotion activities were non-existent.

2.4.5 Maternal knowledge

Knowledge of the benefits of breastfeeding and adequate complementary food for the infant are important determinants of nutritional outcomes. Insufficient prenatal education about breastfeeding is a recognised obstacle to the initiation and continuation of breastfeeding (The Ross Mothers Survey, cited in Gartner *et al.* 2005, WHO 1998).

The most commonly reported barrier to continued breastfeeding is perceived milk insufficiency (Cooke, Sheehan & Schimied 2003, Binns & Scott 2002, Turner *et al.* 1999). Many women introduce predominant breastfeeding in the first days of life because they believe they are not producing enough breast milk to satisfy the baby's hunger or thirst. A study by Davies-Adetugbu (1997) in Nigeria reported that women gave water to their infants because they thought infants required water to quench thirst and promote normal development. In Cameroon Kakute *et al.* (2005) reported that women perceived breast milk as an incomplete food, and that it only satisfied the baby's thirst and did not increase weight of the baby, hence the need to introduce supplementary foods. Half of the mothers interviewed in the BAN study in Malawi believed that infants could not grow properly when fed breast milk only (Corneli *et al.* 2007).

These findings illustrate a lack of knowledge by the mothers regarding breast milk composition and adequacy; and reflect the poor quality of antenatal feeding education. This lack of adequate knowledge poses a challenge to the implementation of policies which promote EBF, such as BFHI.

2.5 Impact of BFHI on infant feeding

2.5.1 Initiation of breastfeeding

One of the pillars of successful breastfeeding in the context of BFHI is the early initiation of breastfeeding to enable mothers to establish and sustain EBF (WHO/ UNICEF 2004). BFHI recommends that every facility providing maternity services and care of newborn

infants should help mothers initiate breastfeeding within a half-hour of birth (WHO 2004, 1998). This is the fourth of the ten steps that health facilities must fulfil in order to be designated baby-friendly (Appendix 1).

In Malawi the proportion of mothers who initiate breastfeeding within an hour increased from 3% in 1999 to 40% in 2000 and 70% in 2004 (National Statistical Office 2005). A similar breastfeeding initiation rate (68%) was reported from the southern district of Mangochi in 2005 (Kamudoni 2007). The increase in the number of women having health worker-assisted births and the rising number of baby-friendly hospitals in the country are said to be largely responsible for this trend.

The study by Shirima *et al.* (2000) in Tanzania investigated and compared feeding practices among mothers of infants of less than 7 months of age in a rural and an urban area. There was higher breastfeeding initiation within 1 hour of birth among women in the urban area (82%) compared with the rural area (52%). The authors speculated that the difference was partly due to the introduction of BFHI in the urban area, although the effects of geography and cultural practices were not examined.

Similarly, Ojofeitimi *et al.* (2000) in Nigeria compared breastfeeding practices between mothers who gave birth at a rural non-BFHI health facility and those who gave birth at an urban health facility with BFHI. Fewer women (39%) at the rural facility initiated breastfeeding within an hour, compared to 69% at the urban facility.

The findings of these studies demonstrate that where BFHI has been implemented the rates of early initiation of breastfeeding are higher than the rates before BFHI in the same area, as well being higher than in places without BFHI.

2.5.2 Exclusive breastfeeding

The BFHI recommends that women exclusively breastfeed their infants for 6 months (WHO 2003). However, adherence to the recommended 6 months of exclusive breastfeeding is poor in both developed and developing countries (Quinn *et al.* 2001). In sub-Saharan Africa fewer than 1 in 3 babies is exclusively breastfed, and the duration of EBF in most of these countries is less than 6 months (Quinn *et al.* 2001, Decock *et al.* 2000).

A prospective cohort before-and-after observation study on the impact of BFHI on breastfeeding rates in Brazil (Braun *et al.* 2003) showed significant increases in breastfeeding and EBF rates between 1995 (before BFHI) and 1999 (after BFHI). Although significantly more infants were breastfed and exclusively breastfed in 1999 compared to 1995, the rate of EBF fell sharply at 1 month (55%) and steadily after each successive month to under 10% at 6 months, in both years. The authors also reported that the effects of BFHI on rates of breastfeeding and EBF were stronger in the underprivileged population.

In the Nigerian study by Ojofeitimi *et al.* (2000), 75% of mothers at a baby-friendly hospital exclusively breastfed their infants, compared to 35% of mothers at a non-BFHI facility. Initiation rates and satisfactory positioning for breastfeeding were also better among mothers who had delivered at the baby-friendly hospital. In the same country, a baby-friendly hospital-based cross-sectional study found that only 21.4% infants were exclusively breastfed for the first 6 months (Ogunlesi *et al.* 2005). Predominant breastfeeding and pre-lacteal feeds were given among 33.2% and 36.6% infants respectively, and supplementary feeding was commenced at between 2 and 6 months.

The 2004 MDHS (National Statistical Office 2005) reported that 53% of infants younger than 6 months were exclusively breastfed, compared to 45% in 2000 and 3% in 1992. The median and mean EBF durations were 2.5 and 3.6 months respectively. The

proportion of children of 4-5 months old who were given complementary foods declined from 80% in 2000 to 37% in 2004. There had therefore been an increase in EBF rates because of the decrease in complementary feeding in infants younger than 6 months during the 13 years of BFHI.

These findings suggest that the rates of breastfeeding and EBF improve when mothers give birth in a BFHI setting, and when BFHI interventions are put in place. However, the studies have not demonstrated a similar effect on prolonging the duration of EBF towards the recommended 6 months.

2.6 Summary

Breastfeeding is a common infant feeding practice in Africa, and non-breastfeeding is an important determinant of infant morbidity and mortality, particularly in resource-poor settings. The benefits of EBF for 6 months before the introduction of other foods fails to be realised, for many reasons. These include, among others, social, economic and demographic factors, cultural and religious beliefs, maternal knowledge of infant feeding, and the role of people whose decisions and opinions matter to mothers. HIV/AIDS complicates the practice of infant feeding because of the delicate balance between preventing MTCT of HIV and ensuring safe and adequate infant nutrition.

Implementation of the BFHI has seen increases in the rates of early initiation of breastfeeding and proportions of breastfed and exclusively breastfed infants, but it has not affected the duration of EBF to a similar extent.

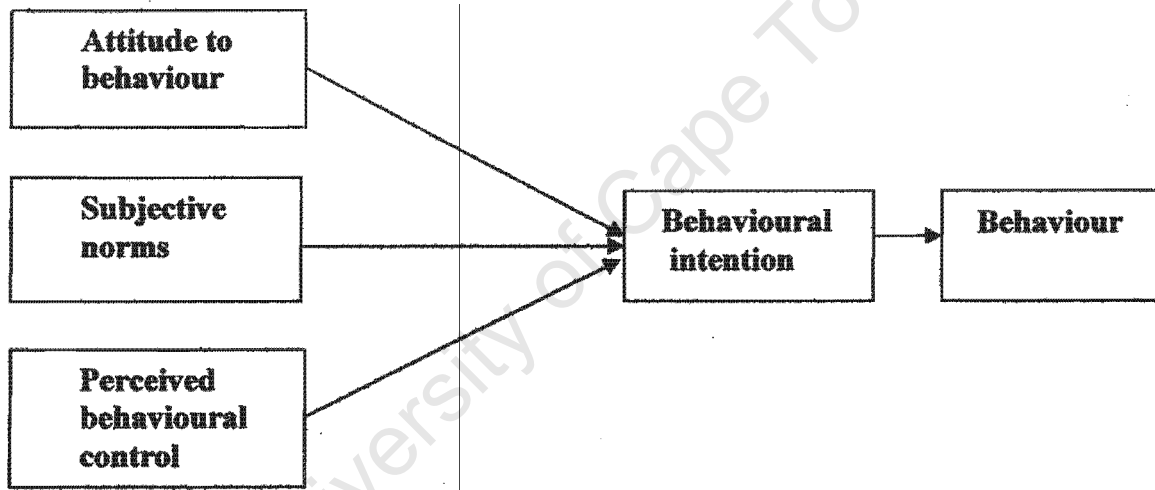
2.7 Conceptual framework: The Theory of Planned Behaviour

2.7.1 Background to the theory

Theories provide a rich context for research and help the reader to define and delimit the problem to be studied (Polit & Hungler 1999). The Theory of Planned Behaviour (TPB) used for this study (Figure 1) is a theory which predicts behaviour, because behaviour can

be planned. It is the successor of the theory of reasoned action (TRA) (Ajzen and Fishbein 1980, Fishbein & Ajzen 1975), which had assumed behaviour to be 100% voluntary and under control. The successor, TPB, incorporated the discovery that behaviour is not entirely voluntary; hence the addition of perceived behaviour control to two other constructs, namely: attitude toward the behaviour and subjective norm for behaviour. The TPB postulates that “individuals will engage in behaviours when they believe their actions will achieve desired consequences (attitudes), when the behaviour is considered worthwhile by persons or groups they want to please (normative beliefs), and when they believe the behaviour will be easy to perform (perceived control)” (Janke, 1994, p. 100) (Figure 1).

Figure 1: The Theory of Planned Behaviour



Source: Ajzen I 1991, The theory of planned behaviour and human decision process, *Organisational Behaviour and Human Decision Process*, vol. 50, p. 200.

* The later version of the TPB (Ajzen 2006) has a direct arrow from the 'perceived behavioural control' to the 'behaviour', Figure 1 in this study was adapted from Ajzen 1991 which did not have the arrow, and the researcher only became aware of it after the study was implemented.

Duckett *et al.* (1998) added another factor to the TPB model which they named 'modifiers', referring to conditions and events that occur before the individual's actual performance of the behaviour that result in changes to practice. For example, in the case of a woman who has a fully formed intention to exclusively breastfeed her baby, the preterm birth of her child may modify her behaviour towards bottle feeding.

2.7.2 Components of the theory

As seen in Figure 1, behaviour is an outcome of behaviour intention, which is a product of attitudes, subjective norms and perceptions of behaviour control. These terms are defined below.

2.7.2.1 Attitude towards the behaviour

Attitude towards behaviour is defined as an individual's positive or negative feeling associated with performing a specific behaviour. According to Ajzen (1991) an individual will hold a favourable attitude toward a given behaviour if he/she believes that the performance of the behaviour will lead to mostly positive outcomes. On the other hand, if the individual believes that mostly negative outcomes will result from the behaviour, he/she will hold a negative attitude towards it (Mykytyn & Harrison 1993).

2.7.2.2 Subjective norms

Subjective norms are defined as perceived social pressure to perform behaviour (Ajzen 1991). They are determined by individuals' normative expectations of others, for instance family, friends, health personnel and others, whose preferences about personal behaviour are considered important to them. Individuals weigh the strengths of each normative belief against their personal motivations to comply with their referents, to come up with a subjective belief on the intended behaviour.

2.7.2.3 Perceived behaviour control

Perceived behaviour control refers to the individual's ability to perform a given behaviour in the face of perceived barriers (Ajzen 1991).

According to Ajzen (1991) the individual attitude, the subjective norm and the perceived behaviour control will lead to behavioural intention. Behavioural intention refers to an "individual's readiness or likelihood to perform a particular behaviour" (Ajzen 1991, p.180). Behavioural intentions result in actual performance of the behaviour. These relationships are illustrated in Figure 1.

2.7.3 Research using The Theory of Planned Behaviour

This theory has been tested and used as a framework for numerous research studies. It features regularly in research in the field of behavioural science, and has wide application. Below is a brief summary of examples of these studies.

2.7.3.1 Infant feeding and infant nutrition

The TPB has been used in studies as a framework for studying social norms in relation to infant feeding behaviour of caregivers (Duckett *et al.* 1998, Kim 1998, Wambach 1997). These studies found that attitudes were significantly related to feeding intentions and behaviour. However, the picture for social norms in these studies is less clear, and the way norms have been conceived and measured has varied, as have the social referents to which they have been applied.

Swanson and Power (2004) used the theory to investigate new mothers' subjective norms in relation to both breast and bottle feeding. They reported subjective norms (perceived breastfeeding support from family members, friends, peers and health personnel) to be important determinants of initiation and continuation of breastfeeding for breast and bottle feeders.

Janke (1994) used the TPB to develop the Breastfeeding Attrition Prediction Tool (BAPT) which explains behaviour as a function of attitudes, subjective norms, and perceived control. The instrument has been tested by other workers (Dick *et al.* 2002, Evans *et al.* 2004). Dick *et al.* (2002) tested the reliability and validity of the tool among 269 women who planned to breastfeed for at least 8 weeks and concluded that there is potential for the modified BAPT to be an adjunct for the clinician in identifying women at risk for early cessation of breastfeeding. Evans *et al.* (2004) tested the BAPT among 117 women during the last trimester of pregnancy and in the immediate postpartum period to look for differences in scores between the two time periods and to test the ability of each set of scores to predict early breastfeeding attrition. The women completed the BAPT during a prenatal breastfeeding class and was completed a second time in the postpartum hospital room after participants gave birth, and the women were called 8 weeks later to determine if they were still breastfeeding. The women differed significantly between the prenatal and postpartum period on two of the four subscales: Social and Professional Support and Breastfeeding Control. In both instances, the women scored higher on the subscales after birth (indicating more perceptions of support and control). However, neither set of scores reliably predicted early breastfeeding attrition.

Wambach & Koehn (2004) used the TPB to report a pilot study of influencing factors in disadvantaged urban pregnant adolescents' decision-making about infant feeding choices. Consistent with the TPB and other research, attitudes, perceived social influences and perceived behavioural control factors were influential on the adolescents when choosing infant feeding methods.

Recently Giles *et al.* (2007) used the TPB to design and pilot a TPB questionnaire to measure young people's attitudes to breastfeeding. The questionnaire proved to be reliable and the preliminary analysis provided strong support for the predictive power of the TPB.

2.7.3.2 TPB applied in other contexts

The TPB has been extensively and successfully evaluated and applied to research in a wide range of behavioural science disciplines to predict and understand human behaviour in a variety of situations. Examples cited here illustrate this breadth of variety, which includes physical exercise, education and mental health, among others.

Anderson and Lavailee (2008) compared the capability of TRA and TPB to predict adherence to training in a group of athletes who had recently been introduced to a new strength and conditioning regimen. Their findings suggested that TRA and TPB offered theoretical frameworks to examine adherence to new training regimens, and that they may be used to direct interventions to increase training adherence. However, the TPB was superior to the TRA in predicting training behaviour; and perceived behaviour control appeared to be more important in determining adherence in early training.

A study evaluating the TPB for understanding physical activity behaviour in smokers aged 16-19 years found that this was significantly explained by both intention and perceived behaviour control (Everson, Daley & Ussher 2006). The study found that intention was significantly explained by attitude, subjective norm and perceived behaviour control, with all three making significant contributions to the model. The authors concluded that the TPB may be a useful framework for guiding physical activity interventions in young smokers.

Hahn and Lam (2007) used the TPB to describe condom use in Chinese, Filipina and white women attending four Northern California (USA) universities. Condom use was negatively associated with comfort in discussing sex for women from both Asian groups, but not for white women. They also found that the TPB model explained consistent condom use for white women with less consistent use among Filipina and Chinese women, in that order.

In the field of education, a study by Casper (2007) evaluated the effects of a continuing education class that applied the TPB to the intentions and behaviours of mental health practitioners in using a self-report tool among people with serious mental illness. Mental health workers were randomly assigned to either a standard continuing education class or one that applied the principles of the TPB. Practitioners in the TPB-guided class were more likely to apply the tool, and among those who implemented the assessment tool, those from the TPB-guided class also assessed significantly more of their caseload. Casper concluded that the TPB can improve and may be well suited to continuing education in psychiatry.

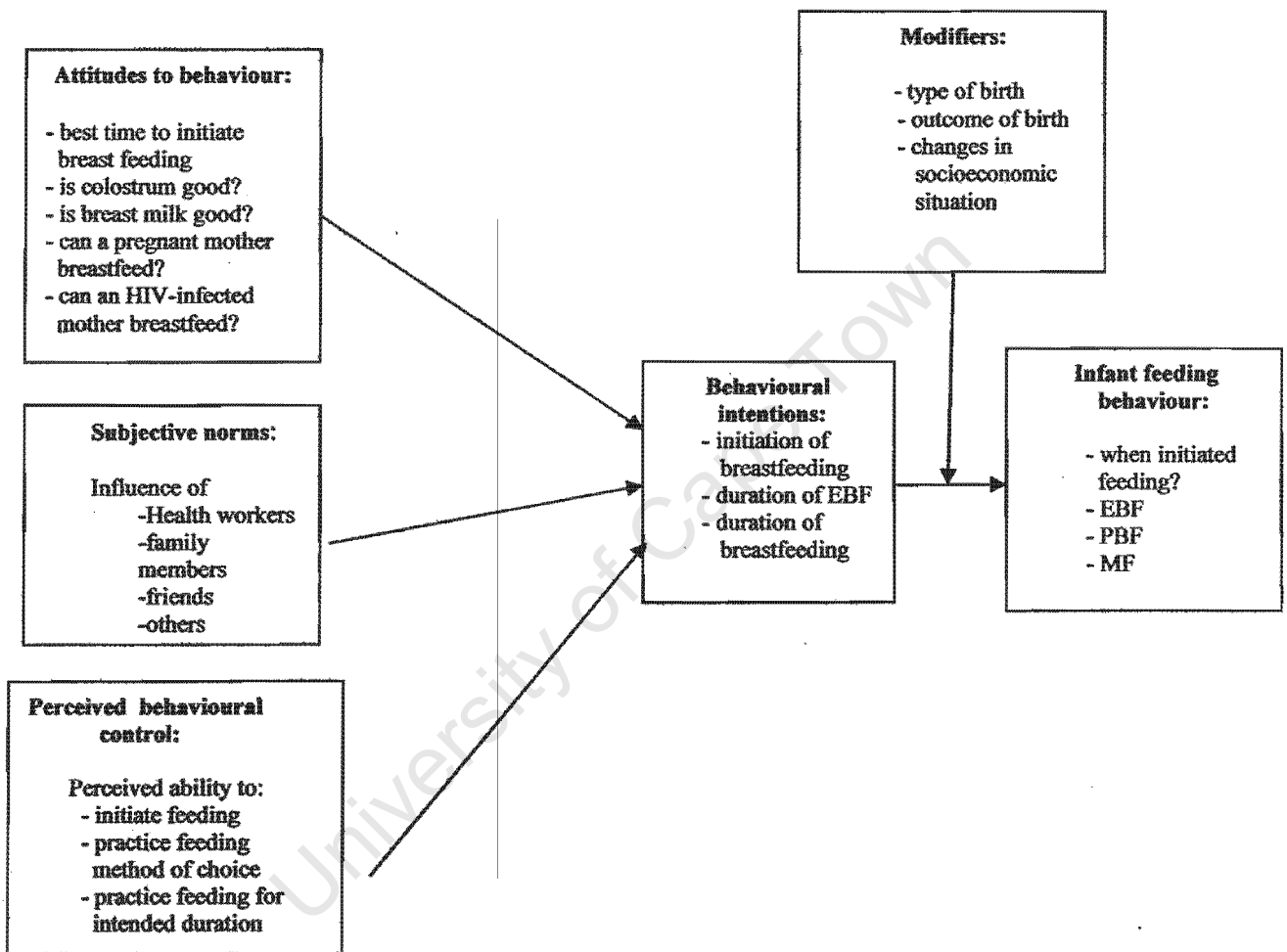
The TPB has been applied to research in substance use and misuse behaviours, with the conclusion that modifying attitudes and inducing regret may be effective strategies for reducing binge-drinking intentions (Cooke, Sniehotta & Schuz 2006). Another study found that although both the TRA and TPB were effective in predicting intention to use alcohol, the TPB was more effective than the TRA (Marcoux & Shope 1997). Up to 76% of the variance in intention to use alcohol was explained by attitudes, subjective norms and perceived behaviour control.

2.7.4 Rationale, application and relevance to this study

Because of this extensive testing, validation and application, the TPB was a good choice as a framework for this study. It was adapted for this study to understand infant feeding behaviours and the factors influencing these behaviours among mothers of infants aged 12 months and younger. The Expanded Rational Expectations Intentions (EREI) Model was derived from the TRA and is similar to it, with the addition of two constructs: knowledge and social acceptability (Hill *et al.* 2008, Sapp 1991). This model proposes that attitudes are influenced by a person's objective knowledge about the behaviour, and their beliefs that the intended behaviour will result in overall better results than alternative behaviour. In addition, it proposes that both the perception of referent others' feelings towards behaviour and the respondents' perceptions regarding whether the intended behaviour is socially acceptable form subjective norms (Hill *et al.* 2008). A

description of the variables follow, and the relationships between attitudes towards the behaviour, subjective norms, perceived behaviour control, behavioural intention and the behaviour practice conceptualised for this study are presented in Figure 2.

Figure 2: Simplified schematic theory of planned behaviour adapted for this infant feeding study



Adapted from Duckett *et al.* 1998, The theory of planned behaviour based structural model for breastfeeding, *Nursing research*, vol. 47, no. 6, p.330.

2.7.4.1 Attitudes towards infant feeding

In the application of the theory, attitudes are independent variables. In this study these included women's attitudes towards breastfeeding, EBF, exclusive formula feeding and mixed feeding, and the timing of breastfeeding initiation and attrition. The EREI model was not adopted in its entirety for this study, but maternal knowledge regarding infant feeding was documented with the intention of obtaining an understanding of how the BFHI policy may have informed the mothers' attitudes.

2.7.4.2 Subjective norms

Subjective norms are also independent variables. In this study the normative expectations of health workers, family members, friends and others whose preferences about personal behaviour were considered important to the mothers were investigated. The BFHI policy formed the standard norm against which all these were evaluated.

2.7.4.3 Perceived behaviour control

Perceptions of ability to perform behaviour form the third independent variable when the TPB is applied to research. In this study, the mothers' perceptions of their ability to perform infant feeding behaviours were not determined, because this would have extended the scope of the study. However the mothers' responses to questions about why they practiced non-exclusive breastfeeding would identify potential areas in which to test the mothers' perceptions of ability to practice certain infant feeding behaviours.

2.7.4.4 Infant feeding behavioural intention and practices

These are dependent variables. The two intentions evaluated in this study were the intention to practice EBF, and to breastfeed for respective durations recommended by the BFHI. Maternal practices were described with relation to the following predefined behaviours: initiation of breastfeeding, EBF, predominantly breastfeeding, and mixed

feeding (also known as supplementary or complementary feeding). These terms have been defined and are universally used to describe infant feeding practices.

2.7.4.5 Modifiers

In addition to enabling an assessment of mothers' perceptions of ability to perform infant feeding behaviours, the mothers' explanations for why intended behaviours were or were not practiced were used to identify factors which influenced behaviour practice even after intentions had been formed.

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3 METHODOLOGY

3.1 Introduction

This chapter describes the setting and design, population, sample and sampling method of the study. The data collection process and instrumentation are explained. Reliability and validity of the instrument will be presented, and finally the data analysis process and ethical considerations of the study will be described.

3.2 Research setting

Embangweni Mission Hospital is situated in the southern part of Mzimba district in northern Malawi. The 134-bed hospital is the only one in a rural area with a radius of approximately 30 km, and has a catchment population of nearly 35 000 people. The patient population for the hospital approximates three times the resident population, with some coming in from areas under the jurisdiction of the government district hospital situated 50 km away (Embangweni Mission Hospital Annual Report 2006).

The hospital serves as a referral facility for six community health centres. In addition to facility-based (static) services, the hospital provides outreach (mobile) maternal and child health services at 16 sites. The maternal health services include contraception and integrated prenatal and postnatal care with PMTCT. Growth monitoring, immunisations and nutrition education (guided by the BFHI policy) comprise the child health services.

3.3 Study design

A cross-sectional study was carried out in order to describe the infant feeding practice patterns among mothers with infants up to 1 year of age. This design involves collection of data at one point in time to “describe the status of phenomena or describing relationships among phenomena at that fixed point in time” (Polit & Hungler 1999, p.217). This design was suitable for the objectives of this study because it would include

infants of all ages from birth to 12 months. In addition to recalled data, it would be possible to obtain cumulative data on feeding practices by pooling findings at different ages. The month of July was chosen, for two reasons: most farming activities have stopped by this time so more women were likely to attend clinics, and it was university holiday for the researcher.

3.4 Population

The study population comprised all mothers of children aged from birth to 1 year, born at Embangweni Mission Hospital between July 2006 and June 2007. According to hospital data, there were 1808 live births in the year July 2005 to June 2006. Of these 151 (8.4%) were low birth weight and 29 (1.6%) were preterm, and there were 55 neonatal deaths (3%). Extrapolating from these and previous years' reports, the study population would be between 1500 and 1700 (Embangweni Mission Hospital Annual Reports 2004 - 2006).

3.5 Sample and sampling method

The 16 outreach clinic sites were grouped in three strata on the basis of distance from the hospital (0-10 km, 11-20 km, and 21-30 km). Two sites were then randomly chosen (drawn out of a box) from each stratum. Data were collected from participants at these 6 outreach clinics as well as the static clinic. The purpose of this was to enhance representativity by including participants who lived farthest as well as closest to the hospital. A seventh mobile clinic site was randomly selected from the remaining 10 clinics to serve as the pilot site. The data from the pilot study were not included in the main study.

The minimum sample size of 95 was computed using Stata 9, based on a national exclusive breastfeeding rate of 53% (National Statistical Office 2005), with 10% precision within a 95% confidence interval. Hospital reports showed that nearly half of all clinic attendances were at the static clinic, and the other half comprised the combined

total of the mobile clinics. Using this as a guide for representativity, data were collected from 120 consecutive consenting mothers: 10 from each mobile clinic and 60 from the static clinic.

3.5.1 Criteria for selection of study participants

3.5.1.1 Inclusion criteria

All biological mothers of infants aged from birth to 1 year born at Embangweni Mission Hospital were eligible to participate in the study if they were resident in the catchment area at the time of the study. Only mothers whose infants were alive at the time of the study and who gave consent were interviewed for either the pilot or the main study. Mothers were included irrespective of type of birth.

3.5.1.2 Exclusion criteria

Carers were not invited to participate if they were not the biological mothers of infants, even if the infant's age qualified them for participation. Mothers who had given birth as a result of preterm labour (less than 37 weeks' gestation) or whose infants had weighed less than 2000 grams at birth (and had therefore spent longer than normal in hospital), and those who were not resident in the catchment area were excluded from participation. All mothers whose infants were ill and required urgent out-patient or in-patient care were also excluded.

3.6 Data collection and instrumentation

3.6.1 Questionnaire

A structured questionnaire adapted from that used in Nigeria (Ogunlesi *et al.* 2005) was used to collect data. Permission was obtained from the principal author to adapt the questionnaire for the present study (T. Ogunlesi - personal communication, 22 April 2007). Because of differences in the types of food between Malawi and Nigeria, the list of foods given to infants on the original questionnaire was replaced by a list compiled

from common weaning foods reported in the 2004 MDHS. With the exception of check questions that were added (see 3.6.3), the rest of the questionnaire was left unchanged.

The questionnaire had two sections: the first collected socio-demographic data and the second collected information on caregiver attitudes and knowledge towards the behaviour according to the TPB (infant feeding practices), subjective norms for infant feeding (perceived social pressure from health workers, family and other community members), and mothers' practices (infant feeding behaviours). These included 24-hour recall data as well as recall of the age at which foods or fluids had been introduced.

The questionnaire was translated into the vernacular language of the area (Tumbuka). This was back-translated into English by a third party not involved in the study (and blinded to the original English version), and assessed for consistency by a lecturer in the Department of Linguistics at Mzuzu University in northern Malawi, whose first language is Tumbuka. The questionnaire was administered to participants in Tumbuka by the researcher and two assistants who had been trained. Responses were written down in Tumbuka to reduce the likelihood of the assistants imposing their own perceptions on the mothers or writing down their own interpretations of the mothers' responses. The researcher and both data collection assistants speak Tumbuka as a first language. The data collection assistants were tertiary level students.

During a training session before the study the assistants were briefed on the purpose of the study, the content of the questionnaire and the importance of confidentiality. Practical training involved simulated interview situations in order to enhance communication and consistency. This was perfected during the piloting process. Each interview session lasted between 25 and 45 minutes, and all participant responses were written in Tumbuka. During piloting the data collectors (blinded to this procedure) administered the questionnaire to the same participant, as well as a "mock" participant.

A few questionnaires had all the questions answered despite the fact that some questions (2.3.3.1 to 2.3.3.15), only needed to be answered by mothers of infants with a particular age group, for example, mothers of infants aged 6 months or younger or older than 6 months. No adaptations to the questionnaire were made after the pilot process but clarification to the data collection assistants to ensure that the questions were answered by the appropriate mothers. All participant responses were recorded in Tumbuka to prevent inaccurate interpretation by the interviewer of the interviewees' responses, had these been written in English.

3.6.2 Validity

Validity refers to “the extent to which an instrument measures what it is supposed to measure” (Polit & Hungler 1999, p. 717). The original questionnaire had been validated and used successfully in a similar study (Ogunlesi *et al.* 2005). The only changes made to the questionnaire were in order to cater for differences in types of food between Malawi and Nigeria.

The manager of the Nutrition Programme in the Ministry of Health and Population of the government of Malawi evaluated the questionnaire for face and content validity. Face validation relies on intuitive judgement to check if the instrument measures what it is intended to measure, and content validity refers to how well the instrument represents all the different components of the variables measured (Polit & Hungler 1999).

3.6.3 Reliability

Reliability is concerned with an instrument's accuracy of measurement (Polit & Hungler 1999). In this study it denoted the extent to which the quantitative components of the questionnaire gave consistent results. A pilot study was carried out in 10 consenting mothers of children younger than 1 year at one of the clinics not selected during the sampling process. The purpose of this was two-fold: firstly, to assess the questionnaire

for clarity, acceptability to participants and quality of data obtained; and secondly, as a training exercise for the data collection assistants.

Check questions (questions seeking the same response as a previously asked question) were added, which helped to assess both intra-observer and intra-participant consistency. There were no inter or intra observer differences identified.

3.7 Data management

3.7.1 Data analysis

Direct and derived data were entered and analysed in a database created for this purpose in Stata 9 statistical software for Windows (Stata Corporation 2005). Descriptive statistics (means, standard deviations, proportions and frequencies) have been used to present all numerical data. Responses to open-ended questions relating to feeding practices were categorised and assigned numerical values, and descriptive statistics were calculated when appropriate. Relationships between infant feeding choices and maternal attitudes, subjective norms and prenatal education were explored using chi-square or Fisher's exact test when appropriate. Significance was set at $p=0.05$

3.8 Ethical considerations

3.8.1 Access

Ethical approval (REC REF: 291/2007) was obtained from the Faculty of Health Sciences Human Research Ethics Committee of the University of Cape Town in order to protect the rights of the human subjects (Appendix 7).

Permission to conduct the research study at Embangweni Mission Hospital's under-5 clinics was granted by the Medical Director of the hospital (Appendix 4).

3.8.2 Ethical principles guiding all procedures

Nursing practice has traditionally been based on the four principles of autonomy, beneficence, non-maleficence and justice. These principles have been incorporated into various codes of ethics (American Nurses Association 2001) as guidelines for researchers in order to protect the rights of human subjects and minimise ethical dilemmas faced by researchers. Their application to this study is described below.

3.8.2.1 The principle of justice

The principle of justice includes the participants' rights to fair treatment and the right to privacy (Polit & Hungler 1999). Mothers had an equal chance of being selected to participate in the study. Participation was voluntary and information was given to all mothers during the scheduled health education part of the clinic activities, when a short introduction of the research study was made. Participation or non-participation did not in any way interfere with or influence the quality of services given. There were no material or other benefits or incentives offered to participants in the study.

To ensure mothers' rights to privacy, the information obtained was handled in confidence, and participants' privacy, self-respect and dignity were assured and maintained. Questionnaires were completed on an anonymous basis and all completed questionnaires were collected from the data collectors immediately after each interview and kept and handled solely by the researcher during data management. Final reports were prepared in a manner that did not reveal the identity of any participants. Participating clinics have only been identified by numbers. The data collection assistants were advised to keep all information obtained during the interview confidential.

3.8.2.2 The principle of autonomy

The principle of autonomy encompasses the notion of being a self-governing person with decision-making capacity as discussed by Carpenter (2003, p. 314). Informed consent to participate in the study was obtained from the mothers to support the principle of

autonomy. Mothers were given a short introduction to the research study during the normally scheduled health education part of the clinic activities to ensure that they had a free choice to participate in the study or decline participation at any time. This included clear details of the inclusion and exclusion criteria. The mothers who responded to the invitation were given detailed individual information about the study by the researcher, which included explanation of the purpose of the study, the procedure to be followed and duration of the study (Appendix 5).

The age of majority for consent to medical procedures and participation in medical research is not clearly defined in Malawi's Republican Constitution. A child is defined as any person under the age of 16 years, and marriage between the ages of 15 and 18 years requires parental consent (Constitution of the Republic of Malawi 1994). One of the two mothers who were younger than 18 years was married and the other was not married and neither was accompanied by another person who could give consent on their behalf. However, the question of whether 'minor' mothers would give consent for participation in this study had little relevance to the issue of majority, because the study did not involve medical procedures or require the disclosure of private and confidential personal details.

3.8.2.3 The principle of non-maleficence

The data collection strategies were designed to ensure that no physical or psychological harm (non-maleficence) was experienced as a result of participation. All information was treated in a sensitive and non-judgemental manner. The handling of data confidentially and in an anonymous manner also ensured that no harm was done to participants, hence supporting the principle of non-maleficence which states that "participants must not be harmed" (Carpenter 2003, p. 314). Mothers whose infants were ill were excluded so that the infants could receive the medical care required.

3.8.2.4 The principle of beneficence

All mothers were informed that the findings of the study would help understand the quality of the services they received. Lessons learnt would go towards improving the quality of these services in the future. The mothers were attending routine clinics so they did not incur additional costs by participating in the study.

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4 RESULTS

4.1 Introduction

During the month of July 2007, 1890 children attended Embangweni Hospital's static and mobile child health clinics. Of these, 524 (27.7%) were aged from birth to 12 months. Out of a possible 262 mothers of infants aged 12 months and younger from the selected clinics, 120 (45.8%) consented to participate in the study. On 20 questionnaires at least five areas were incompletely filled in (considered withdrawal from participation), and were therefore excluded from analysis. The remaining 100 were distributed as follows: 50 from the main hospital clinic, 10 each from outreach clinics 2 and 3, 9 from clinic 4, 8 from clinic 5, 7 from clinic 6, and 6 from clinic 7. The sample size of 100 still exceeded the required sample size of 95.

These 100 mothers represent 19% of all (524) mothers of infants born at Embangweni Mission Hospital who were aged from birth to 1 year and attended clinics during July 2007. This chapter presents the socio-demographic characteristics of the participating mothers and their infants, followed by exploration of factors that influenced infant feeding choices among the mothers (mothers' attitudes towards the behaviour and subjective norms), their infant feeding intentions (behavioural intentions) and a description of infant feeding practices (behaviours) and behaviour modifiers according to the TPB (see Figure 2).

4.2 Characteristics of participating mothers and their infants

4.2.1 Maternal characteristics

The maternal characteristics are presented in Table 1. Mothers were aged 15 to 42 years, (mean 24.87 ± 5.6 yrs); 14 (14%) of them were under 20 years of age, 39 (39%) were aged 20 to 24 years, 29 (29%) aged 25 to 29 years, and 18 (18%) aged 30 to 42 years. Ninety eight (including 13 of the teenage mothers) were married and 2 (2%) were single. Six (6%) had no formal education and 12 had some primary education (less than 5 years'

schooling), 62 had between 5 and 8 years of primary school education, and 20 had secondary or tertiary education. Thus 82% of the women participating in this study had attained a minimum level of education for basic literacy and numeracy (first 5 years of primary education). Only 2 women were employed, one as a teacher, and the other as a hospital clerk. The mothers had between 1 and 8 children; 26% had one child and 59% between 2 and 4 children, while 15% of them had between 5 and 8 children.

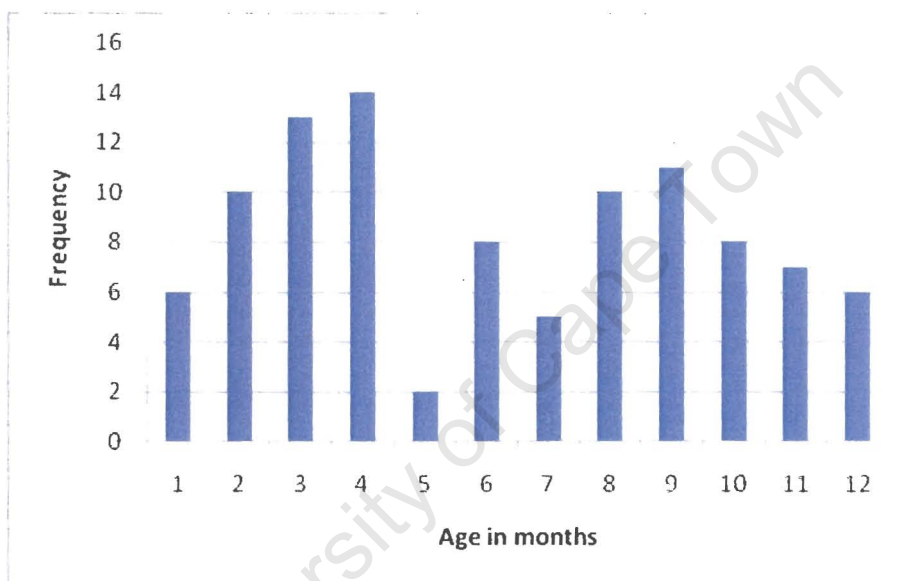
Table 1: Socio-demographic characteristics of the mothers

| Characteristic | Number (%) |
|---|-------------------|
| Age (years) | |
| 15-19 | 14 (14) |
| 20-24 | 39 (39) |
| 25-29 | 29 (29) |
| 30-42 | 18 (18) |
| Marital status | |
| Married | 98 (98) |
| Single | 2 (2) |
| Education | |
| None | 6 (6) |
| Primary 1-4 yrs | 12 (12) |
| Primary 5-8 yrs | 62 (62) |
| Secondary | 20 (20) |
| Occupation | |
| Housewife | 98 (98) |
| Nursery teacher | 1 (1) |
| Hospital clerk | 1 (1) |
| No. of children including index infant | |
| Index infant only | 26 (26) |
| 2-4 | 59 (59) |
| 5-8 | 15 (15) |

4.2.2 Infant characteristics

Slightly more than half (53%) of the infants were female and 47 (47%) were male. The infants were aged 1 to 12 months (mean 6.22 ± 3.4 months, median 6 months). Fifty-three (53%) were 6 months and younger, and 47 (47%) were older than 6 months. Attendance peak was bimodal, occurring at 1- 4 months and 8-10 months, with a nadir between 5 to 7 months (Figure 3).

Figure 3: Age distribution of infants



4.3 Exploration of factors that may have influenced infant feeding decisions and practices: The Theory of Planned Behaviour

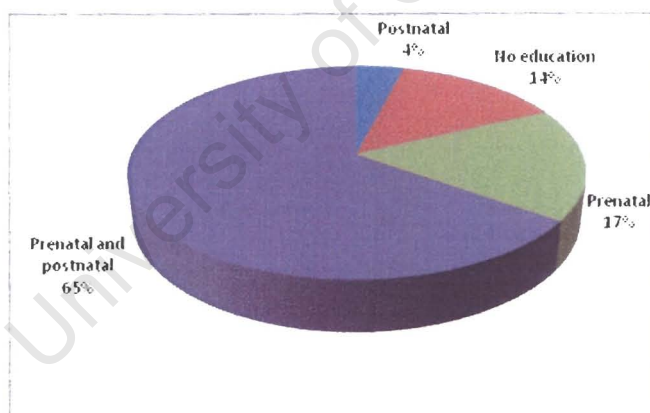
The theory of planned behaviour (TPB) guided this analysis of the results. The theory has been discussed fully under the literature review (2.7). According to the TPB, behaviour (in this case infant feeding practice) is influenced by a person's attitudes towards the behaviour, subjective norms, and perceived behavioural control (Ajzen 1991). These terms have been defined under the conceptual framework (2.7.4). This section presents

maternal attitudes to and subjective norms of the following infant feeding behaviours: breastfeeding, EBF, mixed feeding, predominant breastfeeding and non-breastfeeding.

4.3.1 Infant feeding education (knowledge)

Knowledge is a construct included in the EREI model that was derived from the TRA (Hill *et al.* 2008), but is not one of the constructs in the TPB. Maternal knowledge was investigated in this study to obtain an insight into the role of the BFHI policy on the mothers' general understanding of infant feeding. Figure 4 presents the proportions of mothers who reported receiving infant feeding education, and the time in relation to birth at which such education was received. Eighty two (82%) mothers had received education prenatally, 65 of whom also reported receiving infant feeding education after the birth of the infant. Of the 18 mothers who reported receiving no prenatal education, 4 had received education after the birth of the child.

Figure 4: Infant feeding education and timing in relation to birth (n=100)



Sixty five (79%) of mothers who had received prenatal education had heard about the BFHI programme at the hospital, and 9 of the 18 mothers (50%) who had not received infant feeding education had not heard about the BFHI programme (Table 2). Receiving prenatal infant feeding education was significantly associated with knowledge about the

existence of BFHI ($p = 0.01$). All mothers who had heard about the BFHI programme mentioned EBF for 6 months as one of the teachings of BFHI.

Table 2: Relationship between infant feeding education and knowledge about BFHI

| | Knew about BFHI | Did not know about BFHI | χ^2 (p value) |
|------------------------------|-----------------|-------------------------|-----------------------|
| Prenatal education (n=82) | 65 | 17 | 6.5717 (0.010) |
| No prenatal education (n=18) | 9 | 9 | |

4.3.1.1 Breastfeeding initiation (behaviour) and prenatal infant feeding education

As can be seen in Table 3, 63 (77%) of the 82 mothers who recalled having received prenatal infant feeding education initiated breastfeeding within an hour of birth, compared to 10 (56%) of the 18 mothers who had not received prenatal infant feeding education. This difference was not statistically significant ($p = >0.05$).

Table 3: Relationship between breastfeeding initiation and infant feeding education

| Infant feeding education | >1 hour (%) | < 1hour (%) | χ^2 (p value) |
|--------------------------------|-------------|-------------|-----------------------|
| Prenatal education (n = 82) | 63 (77) | 19 (23) | 3.3891 (0.066) |
| No prenatal education (n = 18) | 10 (56) | 8 (44) | |

4.3.1.2 Infant feeding choice and prenatal infant feeding education

Table 4 illustrates the relationship between maternal prenatal infant feeding education and the different feeding practices among these 100 women.

Table 4: Relationship between prenatal infant feeding education and infant feeding practice

| Infant feeding | Infants 1-6 months | | | | Infants > 6months | | | |
|--------------------|--------------------|-------------|-------|------------------------------------|-------------------|-------------|-------|------------------------------------|
| | EBF (33) | PBF/MF (20) | Total | Fisher's exact test <i>p</i> value | EBF (7) | PBF/MF (40) | Total | Fisher's exact test <i>p</i> value |
| None | 8 (73%) | 3 (27%) | 11 | 0.6468 | 2 (29%) | 5 (71%) | 7 | 1.2140 |
| Prenatal education | 25 (60%) | 17 (40%) | 42 | 0.331 | 5 (17%) | 35 (83%) | 40 | 0.276 |

PBF = predominant breastfeeding MF = mixed feeding; both are non-EBF practices

4.3.1.2.1 Infants 6 months and younger

Mothers of infants of 6 months and younger who said they had not received prenatal infant feeding education had higher rates of EBF (73%) than those who reported having received prenatal infant feeding education (60%). Of the 42 mothers who received prenatal infant feeding education, 25 (60%) practiced EBF, while 17 (40%) practiced predominant breastfeeding/mixed feeding.

4.3.1.2.2 Infants older than 6 months

A similar pattern was observed among mothers of infants older than 6 months. Mothers who had not received prenatal infant feeding education had higher EBF rates at 6 months (29%) than those who reported having received prenatal infant feeding education (17%).

The actual numbers in both infant age categories were generally too small and the difference was not statistically significant.

4.3.2 Mothers' attitudes towards infant feeding behaviours

4.3.2.1 Maternal attitudes towards breastfeeding

Attitudes are defined in the TPB as the positive or negative feelings associated with performing a specific behaviour. Mothers were asked specific questions regarding their attitudes towards infant feeding with respect to the following areas: breastfeeding initiation and colostrum, breastfeeding by an HIV-infected mother and the continuation of breastfeeding when a nursing mother gets pregnant. All mothers stated that breastfeeding or breast milk was important for a baby. Tables 5 and 6 summarise the responses and the reasons for the mothers' responses to the questions respectively.

4.3.2.1.1 Attitudes towards breastfeeding initiation and colostrum

Regarding the right time to initiate breastfeeding, 74% responded that this should be within an hour of birth while the rest gave a time later than an hour after birth.

Eighty-one mothers (81%) said colostrum was good, while 19 (19%) said it was bad for a baby. Most of the mothers who stated that colostrum was bad were from the static clinic (28% of all). However, the small numbers at mobile clinics made it difficult to test for statistical significance. Of the 81 women who said colostrum was good for the newborn, 50 (62%) said it was nutritious, and nearly a third (26; 32%) said it provided protection against diseases, while 5 (6%) did not give any reason (Table 6). Reasons why 19 mothers said colostrum was bad included perceived harm to the infant and discontent with the colour and texture of colostrum (Table 6).

4.3.2.1.2 Attitudes towards breastfeeding by an HIV-infected mother

Although all mothers believed that breast milk was important for the infant, almost half of the respondents (47%) believed that an HIV-infected mother should not breastfeed,

40% stated that an HIV-infected mother could breastfeed, and 13% stated that an HIV-infected mother should only breastfeed if she is on anti-retroviral therapy (ARV).

4.3.2.1.3 Attitudes towards breastfeeding by pregnant mother

In response to the question whether a nursing mother who gets pregnant should continue breastfeeding or not, 54 mothers (54%) stated that breastfeeding should be discontinued, the rest saying it must continue. Thirty of the mothers who stated that a pregnant nursing mother should discontinue breastfeeding were from the mobile clinics (representing 60% of mothers at mobile clinics), while 24 were from the static clinic (representing 48% of mothers at the static clinic).

Table 5: Maternal attitudes towards breastfeeding in different situations

| Situation | Attitude towards breastfeeding | Number (%) |
|----------------------------------|---|------------|
| Breastfeeding initiation | Should be initiated within an hour of birth | 74 (74) |
| | An hour or more after birth | 26 (26) |
| Colostrum | Good for the baby | 81 (81) |
| | Bad for the baby | 19 (19) |
| HIV-infected mother | Should not breastfeed | 47 (47) |
| | May breastfeed | 40 (40) |
| | May breastfeed if on ARVs | 13 (13) |
| Nursing mother who gets pregnant | Should not breastfeed | 54 (54) |
| | May breastfeed | 46 (46) |

Table 6: Summary of mothers' responses on the importance of breastfeeding and reasons for attitudes towards breastfeeding in different situations

| Reasons | Number (%) |
|---|-------------------|
| Why is breastfeeding important? (n=100) | |
| Health | 36 (36) |
| Nutritious | 31 (31) |
| Gives energy | 28 (28) |
| Cheap | 14 (14) |
| Mother and infant bonding | 11 (11) |
| Contraception | 6 (6) |
| Always warm and ready for the baby | 2 (2) |
| No response | 2 (2) |
| Why should a pregnant mother not breastfeed?(n=54) | |
| The baby becomes malnourished | 37 (69) |
| Milk goes bad | 9 (17) |
| The baby may die | 8 (14) |
| Why is colostrum good for a baby? (n=81) | |
| Nutritious | 50 (62) |
| Has antibodies that fight against diseases | 26 (32) |
| Don't know | 5 (6) |
| Why is colostrum bad for a baby?(n=19) | |
| Causes jaundice | 8 (42) |
| Bad colour | 6 (31) |
| Thick and too strong | 3 (16) |
| Causes the baby to pass black stools | 2 (11) |

4.3.3 'Significant others' who influenced or made infant feeding decisions (subjective norms)

According to the TPB, subjective norms are a function of the individual's beliefs that specific social referents (such as parents, peers, etc.) think he/she should or should not perform the behaviour, as well as his/her motivation to comply with the referents (Ajzen & Fishbein, 1980). Ninety-two mothers (92%) reported that health workers, family members or friends had a significant influence on their infant feeding decisions. As seen in Tables 7 and 8, 47 mothers (47%) cited health workers only, 26 cited family members only and 19 cited friends only as their subjective norms. Eight mothers (8%) mentioned all three as having equal influence on their decisions, and these were excluded from analysis of the feeding preferences of the subjective norms.

4.3.3.1 Infant feeding preferences of the mothers' behaviour referents

Table 7 illustrates reported mothers' behaviour referents and infant feeding practices of the mothers. All mothers who cited health workers as influencing their behaviour stated that the health workers' preference was EBF. Twenty of the 26 mothers who reported family members as significantly influencing their infant feeding behaviour stated that the families preferred predominant breastfeeding/mixed feeding and only 6 preferred EBF. Among the 19 mothers whose friends had significantly influenced feeding behaviour, only 5 (26%) stated that their friends preferred EBF while 14 (74%) stated that their friends preferred non-exclusive breastfeeding practices.

Table 7: Reported behaviour referents and infant feeding practices of mothers

| Referents | Number (n=92) | EBF (%) | PBF/MF (%) | Fisher's exact test (p value) |
|----------------|---------------|----------|------------|-------------------------------|
| Health workers | 47 | 31(66) | 16 (34) | 20.2919 |
| Family members | 26 | 4 (15.4) | 22 (84.6) | (0.000) |
| Friends | 19 | 5 (26) | 14 (74) | |

PBF/MF = predominantly breastfeeding/mixed feeding.

4.3.3.2 Mothers' infant feeding behaviour and infant feeding preference of referents

Table 8 illustrates the correspondence between the mothers' infant feeding behaviour and their referents' infant feeding preferences. None of the 6 women whose families as referents preferred EBF actually practiced EBF. Among mothers whose families as referents preferred predominant breastfeeding/mixed feeding, 16 (80%) practiced correspondingly. On the other hand, when friends were the referents, 71% of the mothers practiced predominant breastfeeding/mixed feeding as preferred by their friends. Only 1 of the 5 mothers whose friends preferred EBF actually practiced EBF. Behaviour-to-referents' preference rate (how often maternal infant feeding behaviour corresponded to the referents' preference, expressed as a percentage) was highest when health workers were the referents and lowest when friends were. Health workers were therefore the strongest referents among these women, followed closely by family members, with friends last. For each of the three categories, more than half of the mothers practiced according to their referents' preferences and the relationship between infant feeding behaviour and infant feeding preference of referents was statistically significant ($p < 0.05$).

Table 8: Correspondence between mothers' infant feeding choices and their referents' infant feeding preferences

| Referent | Feeding method preferred by referent | Mothers' infant feeding choice | | Adherence |
|----------------|--------------------------------------|--------------------------------|------------|-----------|
| | | EBF (%) | PBF/MF (%) | |
| Health workers | EBF (47) | 31 (66) | 16 (34) | 66% |
| | PBF/MF (0) | - | - | |
| Family members | EBF (6) | 0 (0) | 6 (100) | 61.5% |
| | PBF/MF (20) | 4 (20) | 16 (80) | |
| Friends | EBF (5) | 1 (20) | 4 (80) | 57.9% |
| | PBF/MF (14) | 4 (29) | 10 (71) | |

PBF/MF = predominantly breastfeeding/mixed feeding.

The numbers in Table 8 were subjected to further analysis to determine the extent to which each subjective norm favoured each of the mothers' infant feeding behaviours being studied. This measure of influence was calculated as the quotient of all mothers who practiced a particular behaviour into the number of mothers whose behaviour matched the referents' preference, expressed as a percentage. The results of these calculations are presented in Table 9.

Table 9: Derived measure of strength of subjective norms of mothers' infant feeding behaviours (n=58)

| Referent | Practiced EBF (%)*(n=40) | Practiced PBF/MF (%)*(n=52) | Total |
|----------------|--------------------------|-----------------------------|-------|
| Health workers | 31 (77.5) | 0 (0) | 31 |
| Family members | 0 (0) | 16 (30.7) | 16 |
| Friends | 1 (2.5) | 10 (19.2) | 11 |

Fisher's exact test, $\chi^2 = 12.0960$; $p=0.000$

PBF/MF = predominantly breastfeeding/mixed feeding.

Two conclusions can be drawn from this table. The first is that with regard to the practice of EBF, health workers were the strongest influence (77.5%) while family members had no influence and friends had minimal influence (2.5%). With regard to non-exclusive breastfeeding practices, health workers had no influence, while families influenced just over 30% of mothers and friends 19.2%. A second conclusion drawn from this table is that subjective norms significantly influenced behaviour in 58 of the 92 (63%) mothers in this part of analysis.

4.4 Infant feeding intentions (behavioural intention)

Infant feeding intentions are the equivalent of behavioural intentions in the TPB. They refer to the mothers' likelihood of carrying out the infant feeding method of choice. Infant feeding intentions are presented in Table 10. Before the birth of their infants, 94 mothers (94%) had intended to breastfeed exclusively for the first 6 months while 6 (6%) had intended to exclusively breastfeed only for the first 3 months. At the time of the study, 3% of the mothers intended to continue breastfeeding (not exclusively) until their child was aged 1 to 1½ years, while 77 (77%) intended to breastfeed until 2 - 3 years of age. Twenty per cent of the mothers were uncertain of how long they were going to breastfeed their infants.

Table 10: Infant feeding intentions (n=100)

| Intention | Response | Number (%) |
|---|------------------------|------------|
| EBF duration (prenatal) | First 6 months | 94 (94) |
| | First 3 months | 6 (6) |
| Breastfeeding duration (at time of study) | Between 1 and 1½ years | 3 (3) |
| | Between 2 and 3 years | 77 (77) |
| | Not sure | 20 (20) |

4.5 Infant feeding practices (behaviour) and modifiers

Feeding practices are mothers' behaviours with regard to the TPB. Mothers were asked about their practices with respect to the initiation of breastfeeding, EBF and introduction of other feeds. Relationships between these behaviours and the attitudes and subjective norms presented above are explored below.

4.5.1 Initiation of breastfeeding

All mothers were breastfeeding (EBF, mixed feeding or predominant breastfeeding) at the time of the study. Seventy three mothers (73%) reported that they had initiated breastfeeding within the first hour of birth of their infant. Of the 27 women who had initiated breastfeeding later than 1 hour after birth, 21 (78%) did so mostly because of maternal or infant complications of birth (Table 11).

Table 11: Reasons (modifiers) why mothers had initiated breastfeeding after 1 hour or more following birth (n=27)

| Reasons | Number (%) |
|--------------------------------|------------|
| Maternal | |
| Caesarean section | 10 (37) |
| Mother tired because of labour | 5 (19) |
| Postpartum haemorrhage (PPH) | 4 (14) |
| Retained placenta | 2 (7) |
| Infant | |
| Baby on oxygen therapy | 5 (19) |
| Baby was sleepy | 1 (4) |

4.5.1.1 Relationship between breastfeeding initiation (behaviour) and maternal attitude towards breastfeeding initiation (attitude toward behaviour)

The relationship between breastfeeding initiation and maternal attitude towards breastfeeding initiation is presented in Table 12. Breastfeeding initiation rates in mothers who believed in initiating breastfeeding within an hour of birth and those who believed in initiating later than an hour after birth were similar, irrespective of their beliefs although the relationship was not statistically significant ($p > 0.05$). Of the 74 mothers who believed in initiating breastfeeding within an hour, 53 (72%) had initiated breastfeeding within an hour of birth, while 21 (28%) had initiated feeding more than 1 hour after birth.

Twenty (77%) of the 26 mothers who believed in initiating breastfeeding later than an hour after birth had initiated breastfeeding within an hour of birth, while 6 (23%) had initiated it later than the first hour.

Table 12: Relationship between timing of breastfeeding initiation and maternal attitudes towards breastfeeding initiation

| Attitude towards breastfeeding initiation | Breastfeeding initiation practice | | | |
|---|-----------------------------------|-------------------------|--------|---------------------|
| | ≤ 1 hour (%) (n = 73) | >1 hour (%) (n = 27) | Number | χ^2 p value |
| Early initiation | 53 (72%) | 21(28%) | 74 | 0.6 |
| Late initiation | 20 (77%) | 6 (23%) | 26 | |

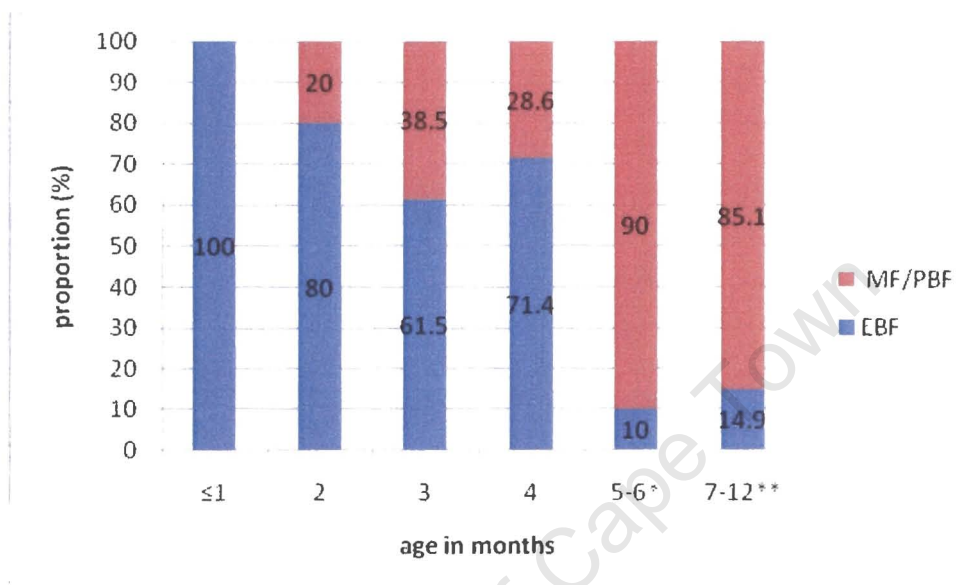
4.5.2 Exclusive breastfeeding

At the time of the study, 33 (62%) of the 53 infants aged 6 months and younger were being exclusively breastfed, while 20 (38%) were not. Although the numbers were small, current EBF rates declined with increasing age, from 100% in infants of 1 month and younger to 10% at 5-6 months (Figure 5). Among the 47 infants older than 6 months, based on mothers' recall of feeding practices during the first 6 months, only 7 (14.9%) had been exclusively breastfed for 6 months, while 23 (48.9%) had been predominantly breastfed and 17 (36.2%) mixed-fed (Figure 5).

The median duration of EBF among infants of 6 months and younger who were not exclusively breastfed was 1.09 months (range 1 day - 4 months), contrasted to 2.3 months (range 1 day - 6 months) for infants older than 6 months. Data for the age 5 - 6 months were combined because the individual numbers were too small to derive meaningful statistics; and those for infants older than 6 months were combined because, in keeping

with recommended feeding practices, complementary feeding would be the expected norm after 6 months of age.

Figure 5: Relative proportion of infants who were exclusively breastfed and predominantly fed/mixed fed



* See text for explanation (4.5.2)

** See text for explanation (4.5.2).

4.5.3 Introduction of other fluids and/or solids in addition to breastfeeding among all infants (behaviour)

Sixty-seven of all infants (67%) were on fluids and/or solids in addition to breastfeeding at the time of the study. They included all 47 of the infants who were older than 6 months and 20 (37.7%) of those aged from birth to 6 months. The ages at which the infants were introduced to fluids and/or solids in days or weeks were first converted to months (e.g. 1 day = 1/30 month). The median age at introduction to fluids was 1 month (range 1 day - 6 months) and that for solids was 5 months (range 2 - 6 months). The fluids and/or solids included water, herbal mixture (*dawale*), sweetened drink, cow's milk

and porridge. Table 13 presents the age at introduction of these fluids and/or solids in months.

Table 13: Age of infants (months) at introduction of fluids and/or solids (n=67)

| Type of fluid/solid feed | Age introduced (months) | Number of participants (%) |
|--------------------------|-------------------------|----------------------------|
| Water (n=41) | 0-3 | 17 (17) |
| | 4-6 | 24 (24) |
| Herbal mixture* (n=42) | 0-3 | 39 (39) |
| | 4-6 | 3 (3) |
| Sweetened drink (n=13) | 0-3 | 8 (8) |
| | 4-6 | 5 (5) |
| Cow's milk (n=4) | 0-3 | 1 (1) |
| | 4-6 | 3 (3) |
| Porridge (n=32) | 0-3 | 5 (5) |
| | 4-6 | 27 (27) |

*Herbal preparation made by soaking the leaves, bark or roots of a local shrub in boiled water. It is believed to have cleansing and protective properties for the baby.

As seen in Table 14, perceived thirst was the only reason that mothers introduced water; the same reason was given by 2 mothers for starting infants on herbal mixtures. The rest of the mothers who gave herbal mixture did so to cleanse the infants' bodies based on their belief that herbal mixture cleanses the infants' bodies. Perceived breast milk insufficiency was the reason why mothers gave sweetened drink, porridge and/or cow's milk. One-third of the mothers of infants who fed porridge had felt their infants were ready to start on solids when they introduced it.

Table 14: Reasons (modifiers) for introduction of fluids and/or solids in all infants

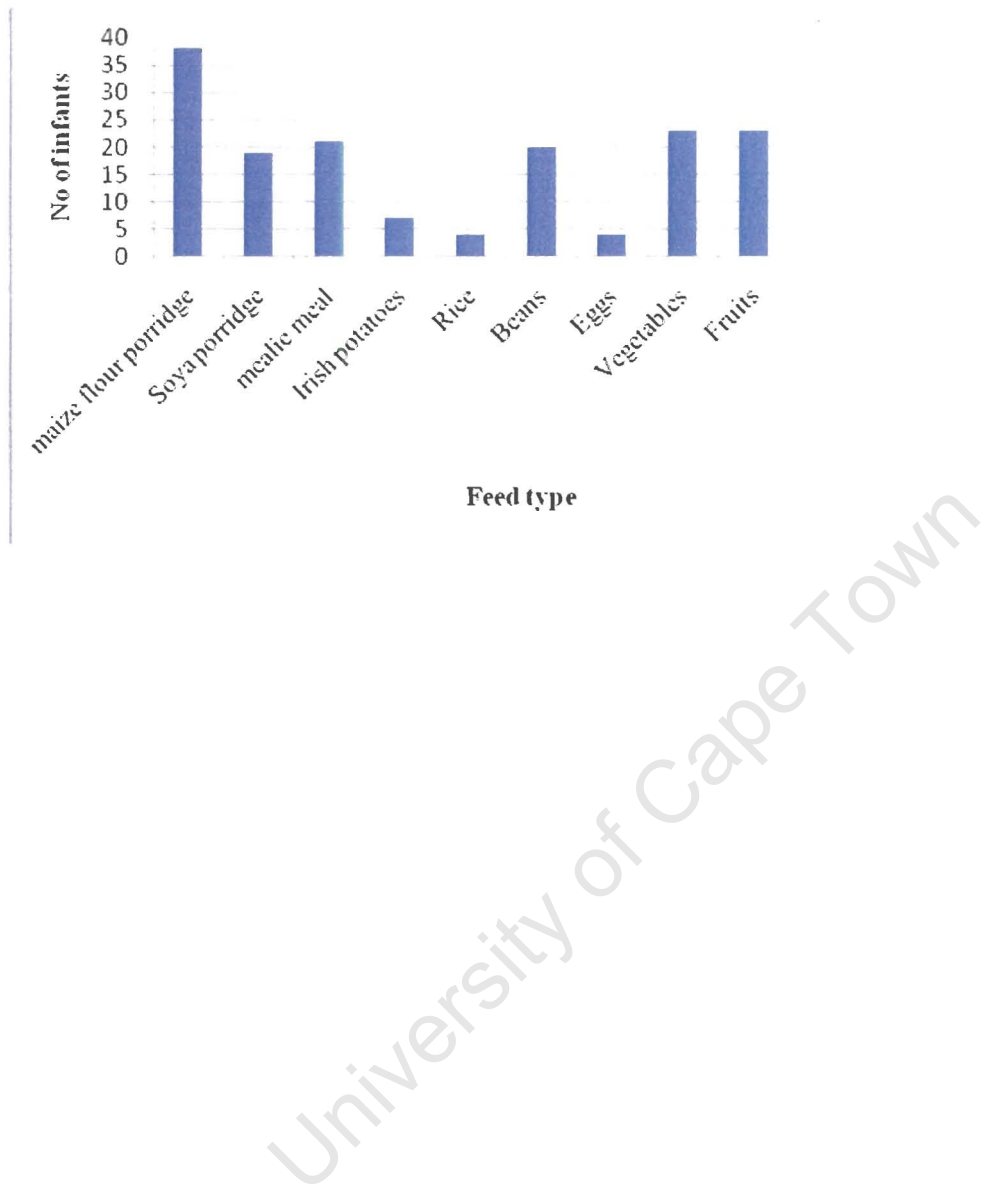
| Fluid or solid | Reason for starting | Number |
|------------------------|----------------------------|---------------|
| Water (n=41) | Infant thirsty | 41 |
| Herbal mixture (n=42) | To cleanse the gut | 40 |
| | Infant thirsty | 2 |
| Sweetened drink (n=13) | Breast milk not sufficient | 13 |
| Porridge (n=32) | Breast milk not sufficient | 22 |
| | Infant ready for porridge | 10 |
| Cow's milk (n=4) | Breast milk not sufficient | 4 |

4.5.4 Types of supplementary and complementary feeds

Complementary foods are solids and/or fluids given to breastfeeding infants in addition to breast milk after 6 months of age (WHO 2001). Any nutritive-containing solids and/or fluids given to an infant before 6 months are referred to as a supplement. Fifty-two of the infants in this study were receiving either supplementary or complementary feeds.

The complementary (solid) foods given to the 47 infants older than 6 months included soft porridge made from maize flour (81%), soya porridge (40%), mealie meal (47%), potatoes (15%), rice (9%), eggs (9%), beans (43%), vegetables (49%) and some fruits like orange and bananas (49%), as presented in Figure 6. These foods were not given exclusive of each other. For example, beans, eggs and vegetables were given with mealie meal, potatoes or rice prepared as family meals. Soft porridge was given as a complete meal.

Figure 6: Complementary feeds given to infants older than 6 months



5 DISCUSSION OF RESULTS

5.1 Introduction

In this chapter the findings presented in Chapter 4 are discussed in detail with regard to practical relevance to the study population and comparison to the findings of other studies in infant feeding. The 100 women who participated in this study represented approximately 19% of infants born at Embangweni Hospital from June 2006 to July 2007 who attended clinics in the month of July 2007. This sample size was higher than the required minimum of 95 which had been computed on the basis of 53% national prevalence of EBF in infants aged 0 - 6 months, with 10% precision and 95% confidence interval.

5.2 Socio-demographic characteristics

The mean age of the mothers in this study was 24 years. The proportion of teenage mothers (14%) was lower than the national proportion of teenage women who had children in Malawi (33%) and rural northern Malawi (37.7%) in 2004 (National Statistical Office 2005). This could be explained in part by the higher literacy level (number of years spent in school) among these mothers, better than the national average; only 10% of rural Malawian women attain secondary or tertiary education (National Statistical Office 2005), compared to 20% in this study. However, there was 98% unemployment among the mothers, despite the higher literacy levels.

This study included 53 (53%) mothers of infants of 6 months and younger and 47 (47%) of infants older than 6 months. Attendance at clinics according to age (in months) had bimodal peaks at 4 and 9 months. The least attendance at clinics was in infants aged 5-7 months. Malawi's Extended Programme of Immunisation (EPI) schedule gives immunisation at birth, 6, 10 and 14 weeks, with the measles vaccine due at 9 months. This means there are no immunisation activities in infants between the ages of 4 and 9 months, unless they are to catch up on missed immunisations or part of mass campaigns.

Immunisation coverage in Malawi is high, and although this study did not document immunisation status, the trough in attendance between 5 and 7 months could be due to fewer infants in this age bracket being brought into the clinics for this reason.

5.3 Maternal knowledge

Knowledge is not a construct of the TPB, although it has been included in the EREI Model adapted from the TRA (the original form of the TPB). It was assessed in this study in order to obtain an impression of the influence of the BFHI policy (taught during infant feeding education sessions) on the mothers' understanding of the different types of infant feeding. Giles *et al.* (2007) used the TPB to measure young peoples' attitudes towards breastfeeding, and found that participants mentioned their lack of knowledge and suggested that breastfeeding might be more likely if they knew more about it.

Eighteen per cent of the mothers in the present study had not received infant feeding education prenatally, even though all mothers had attended an antenatal clinic at least once. The proportion of mothers who had not heard about the hospital's BFHI programme (26%) was also surprisingly high, considering that all mothers had given birth in a baby-friendly hospital. Prenatal infant feeding education was significantly associated with the likelihood of having heard about BFHI (Table 2).

Generally, prenatal infant feeding education was associated with higher rate of early initiation of EBF, but this was not statistically significant. The inverse relationship between prenatal feeding education and EBF raises questions about the quality of antenatal care as well as the success with which infant feeding knowledge was imparted to mothers. In a study of PMTCT sites in Botswana, Kenya, Malawi and Uganda (Chopra & Rollins 2008), infant feeding issues were discussed in depth in only 5.5% of observed counselling sessions, and over half of these were rated as poor.

A similar assessment of the infant feeding education sessions in the BFHI programme of Embangweni Hospital would be useful in identifying at what point knowledge transfer fails in these women, and why knowledge of the existence of a BFHI programme and its teachings does not favour the practice of positive infant feeding behaviour among mothers who gave birth at this baby-friendly hospital.

5.4 Factors influencing infant feeding decisions and behaviours: An exploration of infant feeding practices using the TPB

The TPB makes the assumption that “individuals will engage in health behaviours when they believe their action will achieve desired consequences (attitude); when the behaviour is considered worthwhile by persons or groups they want to please (subjective norm); when they believe the behaviour will be easy to perform (control)” (Janke 1994, p. 100). The influence of attitudes, subjective norms and mothers’ perceived ability to perform breastfeeding, EBF and complementary feeding are explored in relation to actual infant feeding practiced by the mothers.

5.4.1 Maternal attitudes (attitude) and infant feeding practices (behaviour)

According to Ajzen (1991), an individual will hold a favourable attitude toward a given behaviour if he/she believes that the performance of the behaviour will lead to mostly positive outcomes. Thus, an individual’s positive attitude toward a specific behaviour precipitates that individual’s intention to perform the behaviour.

5.4.1.1 Attitudes towards breast milk (attitude) and breastfeeding (behaviour)

In this study, all mothers said that breast milk or breastfeeding was good for the baby. This behavioural belief produced a favourable attitude towards breastfeeding that was matched by universally practiced breastfeeding (behaviour). Among these mothers, the positive outcomes of breastfeeding were linked to their understanding of the advantages

of breast milk (Table 6). More than a third of the mothers (36%) said that breast milk promoted good health in the infant, and more than half (59%) said breast milk was either nutritious or gave energy to the infant. Up to 16% of mothers viewed breast milk as cheap or readily available for infant feeding. A small number (6%) mentioned the contraceptive effects of breastfeeding.

5.4.1.2 Attitudes towards breastfeeding initiation and colostrum

Maternal attitudes to the behaviours of early initiation of breastfeeding and giving colostrum to the infant were favourable in 74% and 81% of mothers respectively (Table 5). The two common behavioural beliefs that led to this attitude among these mothers were that colostrum was nutritious or gave energy (62%) and that it helped protect the infant from disease (32%). A few mothers did not know why colostrum was good or advantageous despite reporting a favourable attitude towards it (see Table 6).

However, the attitudes' effects on infant feeding behaviour in these women were difficult to quantify because they gave birth in a baby-friendly hospital whose policy is to help mothers to initiate breastfeeding within 1 hour of birth. Breastfeeding initiation rates were similar, irrespective of maternal attitude. Further to this, the mothers were not asked if they had continued to give colostrum after being discharged from the hospital, and this would have been particularly important to find out in the 19 mothers whose attitudes towards giving colostrum were unfavourable ("colostrum is bad for the baby").

Negative perceptions of colostrum were not unique to this group of mothers. Shirima *et al.* (2000) reported that 43% of rural Tanzanian mothers discarded colostrum before they initiated breastfeeding because they believed it was bad for the baby. In Cameroon mothers who believed that colostrum was bad for the baby initiated breastfeeding 2 days after birth (Kakute *et al.* 2005). In this study (as seen in Table 6) the 19 mothers who believed that colostrum was bad for the baby stated that colostrum caused jaundice (42%), had a bad colour (31%), had a texture and consistency unsuitable for the baby

(16%), and was responsible for the colour of meconium (11%). Contrary to these perceptions, colostrum has high concentrations of nutrients and antibodies that protect the newborn from infections since the infant's immune system is immature at birth (Buterys *et al.* 2002).

The finding that 19 (19%) mothers who gave birth in this BFHI hospital believed that colostrum was bad or unsuitable for the baby raises concern about the quality of infant feeding education and that of teaching regarding jaundice and the normal colour of meconium. Further to this, these misconceptions possibly represent some of the beliefs that are held by the communities they live in, which persisted in these mothers in spite of the teachings of BFHI in the area. The latter is supported by the finding that these misconceptions were held by mothers at both the static and mobile clinics.

5.4.1.3 Attitudes towards breastfeeding by an HIV-infected mother

The mothers were not asked to give reasons as to why they held their beliefs, but their attitudes towards breastfeeding by an HIV-infected mother suggested their awareness of MTCT of HIV through breast milk. In all, 60% said HIV-infected mothers either should not breastfeed or only breastfeed if on ARV therapy; only 40% said an HIV-infected mother could breastfeed. The effect of these attitudes on behaviour could not be assessed for two reasons: the mothers were not asked to disclose their HIV status, and all were breastfeeding their infants at the time of the study.

In the year just before this study, HIV seroprevalence among antenatal mothers going for VCT at Embangweni Mission Hospital was 5.1% (Embangweni Mission Hospital Annual Report 2006). The 2004 MDHS found an HIV seroprevalence of 6.8% among females in Mzimba district, with a test refusal rate of 26% (National Statistical Office 2005). These proportions are both lower than the national rate, but future research should investigate how the attitudes of HIV-infected mothers towards EBF and PBF/MF influence their infant feeding behaviours.

5.4.1.4 Attitudes towards breastfeeding by a pregnant mother

More than half of the mothers believed that a nursing mother who gets pregnant must stop breastfeeding. Most these mothers (69%) believed that breast milk would lose its nutritional potency in pregnancy and therefore the infant would become malnourished; nearly a third suggested some form of harm or death might result from breastfeeding by a pregnant mother (Table 6). The attitudes of most mothers were not favourable to continuing to breastfeed, but the mothers were not asked to state whether they were pregnant or not, and all of them were breastfeeding at the time of the study. In this case too it was not possible to determine the impact of this attitude on behaviour.

The practical implication of holding such behavioural beliefs (“breastfeeding in pregnancy might cause harm to the infant”) may be a positive influence of encouraging mothers to increase the pregnancy interval. This would be especially true for these women, because of the association between the belief that breast milk was good and the universal practice of breastfeeding. A study in a rural area in the district of Mangochi in southern Malawi (Vaahtera *et al.* 2001) reported a significantly longer duration of EBF in infants from households with fewer children under the age of 15. The conclusion drawn from this finding is that when a nursing mother has fewer other young children to care for, they are likely to spend a longer time breastfeeding the index infant.

This possible positive outcome should, however, not mask the finding that these mothers had misconceptions about what happens to breast milk production, quality and composition when a nursing mother gets pregnant. These misconceptions were possibly a result of widely held local community beliefs. By continuing to believe the way they did, the mothers either ignored or disregarded the teaching of BFHI. This may be a reflection of poor quality and content (depth) of the infant feeding education process in the BFHI programme of the hospital.

5.5 Subjective norms

According to the TPB, subjective norms are perceived social pressure to perform a particular behaviour (Ajzen 1991). These are determined by the individual's normative expectations of significant others whose preferences are considered important to them (Ajzen 1991). "Individuals weigh the strength of each normative belief against their personal motivations to comply with their referents to come up with subjective belief on the intended behaviour" (Ajzen 1991, p. 100).

The results of this study showed a statistically significant relationship between mothers' behaviour referents and infant feeding practices of the mothers (see Table 7). Swanson and Power (2004) used the TPB to investigate new mothers' subjective norms in relation to both breast- and bottle (formula) feeding. They reported that subjective norms were important determinants of initiation and continuation of breast- and bottle feeding. Duckett *et al.* (1998), Kim (1998) and Wambach (1997) all reported that positive attitudes of the subjective norms on infant feeding were related to positive infant feeding behaviours. The influence of each of the mothers' subjective norms on infant feeding behaviour is explored below.

5.5.1 Health workers influencing infant feeding practices (behaviour)

Forty-seven (47%) mothers mentioned health workers as the people that influenced their infant feeding practice the most (Table 8). If the 8 mothers who mentioned multiple influencing groups were added to the 47, health workers as an influence on the mothers' feeding decisions would have been reported by more than half (55%) of the participants.

These 47 mothers represent 55% of all mothers who had received prenatal infant feeding education (84), and 66% of those who had heard about BFHI (74). Only 31 mothers who were influenced by health workers in this study actually practiced EBF, representing just over a third (36.9%) of all mothers who had received prenatal infant feeding education. This implies that the infant feeding education process failed to influence infant feeding

choice in up to two-thirds of all mothers in this study, which might reflect both the poor quality of this education and failure of knowledge transfer during the process. In southern Malawi Kamudoni (2007) reported health workers as the most influential on mothers' perception of introduction of other feeds. However, this influence was not quantified, as has been done in this study.

Pletta, Eglash & Choby (2000) concluded that women who received positive advice concerning breastfeeding from a physician were likely to breastfeed their infants exclusively. Arora *et al.* (2005) found the women who had participated in prenatal childbirth education classes to be more likely to breastfeed exclusively than women who did not participate in educational classes. Similarly, Abramson (1992) and Zimmerman (1999) found that breastfeeding classes offered prenatally were effective in increasing breastfeeding rates.

The finding that just over a third of mothers receiving prenatal infant feeding education were influenced positively by health workers, coupled with the inverse relationship between prenatal infant feeding education and EBF rates, indicate a possible failure of knowledge transfer in nearly two-thirds of these rural mothers. As shown in Tables 7 to 9, health workers had a significantly large influence on the practice of EBF and did not influence the practice of non-exclusive breastfeeding. In this population, where antenatal clinic attendance was high, the proportion of mothers receiving antenatal education about BFHI could be higher, and improving the quality of infant feeding education would in turn lead to higher rates of EBF.

5.5.2 Influence of family members on infant feeding decisions and practices

Twenty six mothers (26%) stated that their families had significantly influenced their infant feeding decisions. As seen in Table 10, the influence of family members emerged as the subjective norm with the second highest proportion (38.5%) of mothers whose behaviour was non-adherent to the referents' preferences (Table 9). The families of 20 of

these mothers had preferred non-exclusive breastfeeding choices (predominant breastfeeding/mixed feeding), and 16 mothers actually practised these behaviours (80% adherence). None of the 6 mothers whose families preferred EBF actually practised EBF (0% adherence, and no influence).

The finding that most mothers influenced by family practised non-exclusive breastfeeding is not unique to these mothers. In rural Vietnam, Dat-van *et al.* (2005) reported that mothers whose mother-in-law preferred EBF were less likely to feed their infants with solids at 24 weeks postpartum. Guttman and Zimmerman (2000) reported that mothers who preferred formula feeding as the infant feeding choice were influenced by family members assisting with the caregiving of their infants, who were not supportive of breastfeeding. Black *et al.* (1990) found negative attitudes of significant others and family members to represent barriers to breastfeeding success.

The 4 mothers (20%) who practiced EBF contrary to the preferences of family were probably influenced by BFHI, although they did not admit to this fact themselves. Arora *et al.* (2005) reported that formula feeding mothers stated that support from the grandmother or other family members would have been an important positive influence had they decided to breastfeed. Families, as a referent with high preference to non-exclusive breastfeeding behaviour, could therefore be targeted by the BFHI programme in this area in order to encourage positive infant feeding beliefs and behaviour (EBF for the first 6 months of life and appropriate weaning practices).

5.5.3 Influence of friends on infant feeding behaviour

Nineteen (19%) mothers stated that they had been influenced by friends in their choice of, and decisions on, infant feeding (Table 8). Four of the 5 whose friends preferred EBF for 6 months actually practiced predominant breastfeeding or mixed feeding, contrary to the referents' preference, while 10 of the 14 mothers whose referents preferred predominant breastfeeding or mixed feeding adhered to these practices. The numbers in

the EBF category were too small to perform further statistical comparison, but the tendency was for the mothers to adhere less to their friends' preference for EBF than for predominant breastfeeding. Similarly, Kamudoni (2007) found that the influence friends came third after health workers and families among mothers in the southern Malawi district of Mangochi.

One study was found in the literature which had explored the role of peers (not necessarily friends). In their study, Haider *et al.* (2000) showed that when mothers were visited by trained peers, EBF was maintained for longer (70% practiced EBF in the visited group at 5 months compared to 6% in the control group). This study found that although friends were the least mentioned referent, their influence on mothers was largely to practice predominant breastfeeding or mixed feeding. The approach that Haider *et al.* (2000) used might find purchase in this group of mothers, with the positive consequence that more members of the community would receive training on BFHI policies and practices.

5.5.4 Summary of the role of subjective norms on these mothers' infant feeding practices (behaviour)

The three subjective norms identified in these women were the preferences or advice of health workers, families and friends. This study found that the majority (77.5%) of mothers who practiced EBF were positively influenced by health workers, although this number comprised less than a third of all mothers. The infant feeding behaviours of predominant breastfeeding/mixed feeding were positively influenced by families (26.7%) and friends (16.7%). Overall, 30.4% of the mothers practiced EBF or predominant breastfeeding/mixed feeding contrary to the preferences or advice of their mentioned referents.

The findings that both families and friends favoured non-exclusive breastfeeding over EBF support the view that the local communities where these mothers live hold certain

beliefs not conducive to EBF. It seems reasonable to conclude from the findings of this study and the observations from other studies that the successful implementation of step 6 of BFHI (i.e. limited use of any food or drink other than human breast milk) will depend to a large extent on reversing the negative influence of families and friends, and enhancing the positive influence of health workers on infant feeding behaviour. This is further explored in Chapter 6 (recommendations).

5.6 Perceived behaviour control

Perception of behavioural control is a result of control beliefs. "Control beliefs are beliefs about the presence of factors that may facilitate or impede the performance of behaviour" (Ajzen 1991, p. 184). It is a measure of how easy or difficult it is to perform behaviour (Ajzen 1991). These mothers were not asked to state their beliefs about the presence of factors affecting their infant feeding behaviours. This weakness in the design of the study is partly compensated for by inferences drawn from the mothers' reasons or explanations for particular behaviours.

The main perceptions that determined the infant feeding behaviour of mothers included the perceived insufficiency of breast milk to quench thirst and/or satisfy hunger. These perceptions led to the introduction of water and other fluids and/or solids to infants younger than 6 months of age. These perceptions were strong enough to influence a change in intention to exclusively breastfeed for 6 months, with the result that only 14.9% of mothers of infants older than 6 months had practised EBF until 6 months, and 37.7 % of infants younger than 7 months had already received water or supplementary feeds at the time of the study. These mothers therefore found it difficult to practice their intended behaviour, because they perceived their behaviour as inadequate to meet their infants' needs.

Another perception that the mothers had is intricately imbedded in tradition and cultural practices and beliefs - namely the cleansing rituals for newborns and young infants. In an

area of northern Malawi with a similar ethnic history and composition to Embangweni, herbal preparations were given to infants and young children in order to protect them from an illness believed to be caused by promiscuity by a member of the immediate family or close community (Kerr *et al.* 2007). The practice to confer this “protection” is prophylactic rather than therapeutic, because mothers have no control over the sexual activities of other members of the family or community. Practising EBF (without giving these herbal mixtures) might be perceived as an inadequacy to nurture and protect the infant.

A more speculative inference can be made about mothers who were unable to initiate early breastfeeding although they had intended to initiate it in the first hour, and their attitudes favoured this practice. Extraneous factors, for example maternal complications such as caesarean section, modified the practice of their intended behaviour and resulted in perceived inability to perform intended behaviour.

What can be inferred from the perceptions and situations presented above is that some mothers found it difficult to practice the behaviour of their choice (lost control over intended behaviour) because of perceived inadequacy, insecurity or a poor outcome of the labour and birth process. A true measure of the extent to which mothers felt in control of their behaviours would have been possible had the specific questions been asked.

5.7 Infant feeding intentions (behaviour intentions)

Behavioural intentions result from the synergistic effects of attitudes, subjective norms and perceived behavioural control. As a general rule, if “attitudes and subjective norms are favourable, the perceived control is greater” (Ajzen 1991, p. 181). This results in stronger intentions to perform the behaviour in question.

Before the birth of their infants, all mothers had intended to practise EBF for either 3 months or 6 months. At the time of the study the mothers' intentions were to carry on breastfeeding to either between 1 year and 18 months or longer. The strength of the intention for EBF could not be determined retrospectively, but it has become clear following the discussion on subjective norms (above) that this intention remained fairly fluid, continuing to be influenced by the opinions and preferences of families and friends.

Had the intention to practice EBF been a result of prenatal infant feeding education (84 mothers) or knowledge of BFHI (74 mothers), for example, the intention could be said to be weak because only 40 mothers (representing 47.6% and 54% respectively) actually practiced EBF. On the other hand, because all mothers breastfed their infants, the strength of the intention to continue breastfeeding beyond infancy could only have been estimated among mothers with more than one child by asking how long they had breastfed their older child(ren), and if they intended to feed the index infant for the same duration. These questions were not asked in this study.

However, Ajzen investigated residual effects of past behaviour on later behaviour, and came to the conclusion that this factor exists but cannot be described as habituation (Ajzen 2002). "The residual impact of past behaviour was attenuated when measures of intention and behaviour were compatible, and it vanished when intentions were strong and well formed, expectations were realistic, and specific plans for intention implementation had been developed" (Ajzen 2002, p. 665) . Because the outcome of this behaviour intention is subject to a number of factors, using the answers to these questions alone would be speculative.

The influence of attitudes would have been assessed had HIV status been declared or any of the mothers been pregnant; and it would be estimated had the mothers been asked the theoretical question: "If you were pregnant (or HIV-infected) would you breastfeed (or practise EBF/mixed feeding/predominant breast feeding)?" . Without the support of

responses to these questions or knowledge of pregnancy and HIV status, and for as long as perceived behavioural control is inferred, the strength of these behavioural intentions among these mothers remains undetermined.

5.8 Infant feeding practices (behaviour)

The infant feeding practices in this study are the mothers' infant feeding behaviours according to the TPB. All mothers were breastfeeding (EBF, predominant breastfeeding or mixed feeding) at the time of the study. This finding reflects the national (98%) and regional (98.2%) breastfeeding uptake (National Statistical Office 2005). The following is a closer look at the different infant feeding behaviours.

5.8.1 Breastfeeding initiation

WHO recommends that breastfeeding should be initiated early, preferably within an hour after the birth of the child (WHO 2001a). Early initiation is associated with longer duration of EBF (Thomson, Hartsock & Larson 1979, Salariya, Easton & Cater 1978, de Chateau & Wiberg 1977). It facilitates breast milk production and the consumption of colostrum, which contains high concentrations of nutrients and antibodies (Buterys *et al.* 2002).

Theoretically, all mothers who give birth at a baby-friendly hospital would initiate breastfeeding within an hour of birth, if BFHI policy is successfully implemented. The exceptions to this would be where one or both members of the mother-infant dyad have suffered complications, or where the infant was born preterm and unable to suck. In this study 73% of mothers had initiated breastfeeding within 1 hour of birth, and 21 (78%) of the 27 mothers who initiated breastfeeding 1 hour or more after birth did so because of serious maternal or infant complications, which according to the TPB were behavioural modifiers (Table 6).

The delay was inevitable, although some complications such as maternal fatigue could have been prevented by proper support and appropriate interventions during labour. Early initiation can be achieved in mothers giving birth by caesarean section if the operation is done under local spinal anaesthetic and if the decisions to carry out the caesarean section are made before foetal and maternal complications arise in labour. Improved quality of midwifery and obstetric practice reduces the risk and frequency of complications such as retained products of conception and postpartum haemorrhage.

The 2004 MHDS reported that 70% of mothers had initiated breastfeeding within an hour, a significant increase from 3% in 1999 (National Statistical Office 2005). The study among rural and urban mothers in Mangochi found that 65.3% of women initiated breastfeeding within an hour following birth, and there was no significant difference between rural and urban mothers (Kamudoni 2007). The finding that 73% of mothers initiated breastfeeding within the first hour compares well with the national rate in 2004 and is better than the rate reported in Mangochi.

A study at a baby-friendly hospital in a rural area of Nigeria (Egbuomu, Ezechukwu & Chukwuka 2004) had reported an initiation rate of 73% within the first hour. In the same country, a study published 4 years earlier (Ojofeitimi *et al.* 2000) compared breastfeeding practices between mothers who gave birth at a rural non-BFHI health facility and an urban health facility with BFHI designation. The breastfeeding initiation rates were higher (69%) at the BFHI-designated facility than at the rural non-BFHI facility (39%). Similarly, in Tanzania, Shirima *et al.* (2000) investigated and compared feeding practices between mothers in a rural and an urban area. The breastfeeding initiation rates were higher (82%) in the urban area where BFHI messages were promoted compared with the rural area (52%), where BFHI messages were not being promoted. The effects of geography in the two studies were not investigated.

The findings of this present study are consistent with the observation that early initiation of breastfeeding is influenced by BFHI policies in Malawi as well as other parts of Africa and the world. Among these mothers who gave birth in a rural baby-friendly hospital in northern Malawi, nearly 3 in 4 had initiated breastfeeding within an hour following birth. The behaviour was influenced by giving birth in a baby-friendly hospital, and maternal attitudes towards timing of initiation did not play a significant role. Mostly preventable maternal and infant complications were responsible for delayed initiation of breastfeeding.

5.8.2 Exclusive breastfeeding

The WHO recommendation of EBF for 6 months followed a review of scientific evidence which concluded that EBF for the first 6 months “has a strong protective effect against gastrointestinal infections and reduces all causes of mortality rates for exclusively breastfed infants compared with partially breastfed infants from 4 to 6 months” (Kramer & Kakuma 2004, WHO 2001b). This evidence was presented in detail in the literature review in Chapter 2 (2.2.1.2).

Thirty-three (62%) of the 53 mothers of infants of 6 months and younger in this study practiced EBF, and the proportion of infants older than 6 months who had been exclusively breastfed until 6 months was 16.3% (Figures 5 and 6). The 2004 MDHS found that EBF was reported by 53% of mothers of infants younger than 6 months (National Statistical Office 2005), which was a lot higher than the EBF rate of 3% in 1992. During the 12 years between the two surveys, most hospitals in Malawi attained baby-friendly status (UNICEF 2006). The proportion of all infants younger than 6 months who were exclusively breastfed in this study was higher than the national rate in 2004 (62% vs 53%).

There was an abrupt and significant reduction in the rate of EBF from 71% at 4 months to 10% at 5-6 months (Figure 5). This finding has two implications. Firstly, the weaning

rate in infants of 5-6 months was high (90%), which is not in keeping with infant feeding guidelines and BFHI policy. The second implication is that because clinic attendance among infants in this age group (5-6 months) was very low (Figure 1), most infants in this community were weaned at a time when contact with health workers was least likely, and therefore the infants could not be assessed for complications occurring during this process. The mothers are also unlikely to receive appropriate infant weaning education.

The EBF rate at 6 months for those infants older than 6 months at the time of the study was based on mothers' recall of when they had introduced fluids and/or solids during the first 6 months; this could therefore have been subject to recall bias. Indeed, Engebretsen *et al.* (2007) and Ssenyonga, Muwange & Nankya (2004) reported low EBF rates in since-birth recall compared with 24-hour recall. The finding in this study that this rate was only slightly higher than the rate at 5-6 months suggests that the effect of recall bias, although unquantified, should not dramatically affect the overall impression obtained from these findings. Between 83% and 90% of all infants in this study were not exclusively breast fed for 6 months.

In the Ekwendeni area in northern Malawi only 4 % of the children were exclusively breastfed for 6 months (Kerr *et al.* 2007). In Mangochi, Kamudoni (2007) reported a whole-sample EBF rate at 6 months of 3.8% (urban 5.7%, rural 0.6%). In 2001 the EBF rate was 0% in the same rural area (Vaahtera *et al.* 2001), and in the 2004 MHDS only 3.8% of infants aged 6-7 months were exclusively breastfed (National Statistical Office 2005). The rate of 10% in this study was higher than these other findings, but only marginally so.

The median duration of EBF in non-exclusively breastfed infants was 1 month for infants who were 6 months and younger at the time of the study, and 2.3 months for older infants. The latter is similar to the finding of Vaahtera *et al.* (2001) in southern Malawi in 2001 (2.5 months), but earlier than the 3 months reported by the 2004 MHDS (National

Statistical Office 2005). Generally infants in this study were introduced to fluids at the same or an earlier age than has been reported before in Malawi.

In Brazil, Braun *et al.* (2003) reported a sharp decline in EBF rates from 1 month of age onwards, despite generally higher EBF rates attributed to BFHI. A similar trend was reported in rural and urban Morogoro in Tanzania, where the recalled EBF rates declined from 52% (urban) and 28% (rural) at birth, to 30% and 6% respectively at 1 month (Shirima *et al.* 2000). In Malawi Vaahtera *et al.* (2001) reported a similar pattern in a rural area in the southern district of Mangochi, where EBF rates were 19% at 1 month and 0% at 4 months. In the same area EBF rates at 2 and 4 months were 8.9% and 3.2% respectively 6 years after the study by Vaahtera *et al.* (Kamudoni 2007). The current practices by mothers of infants aged 6 months and younger in this study showed consistently higher rates of EBF until the age of 4 months.

In summary, with regard to the current and recalled practice of EBF, the mothers in this study generally performed better than mothers in and outside Malawi. The current EBF rate in infants aged 6 months and younger was higher, and although the median duration of EBF was shorter in infants who were not exclusively breastfed, the rate of EBF at 4 months was much higher than reported before and elsewhere in the country. This showed a tendency to adhere to the recommendations of the BFHI which suddenly reduced after the infants were 4 months of age. The decline in EBF rates at an age when most infants lost contact with clinic services might be explained on the basis of this loss of contact. The co-occurrence of these observations raises concern of serious consequences in the nutritional status of these 'weanlings' and the nearly 30% who had been started on fluids and/or solids at an earlier age.

5.8.3 Supplementary and complementary feeding

To ensure optimal growth and development of the child, the WHO (2003) recommends that infants should be timeously, adequately, safely and appropriately introduced to

complementary feeds after 6 months of age. Early introduction of supplementary or complementary feeds could cause indigestion and impairment of growth, while delays in the introduction of complementary foods could cause the child's growth to falter (Dewey *et al.* 1999, Cohen *et al.* 1994).

5.8.3.1 Supplementary feeding of infants younger than 6 months

At the time of the study 13 infants (24.5%) aged 6 months and younger were predominantly breastfed (on breast milk plus water-based drinks), while 7 (13.2%) were mixed-fed (breast milk plus other milk or nutritive foods). Based on mothers' recall, among the 43 infants older than 6 months, 17 infants (36.1%) had been predominantly breastfed and 23 (48.9%) mixed-fed at the age of 6 months. Based on current and recalled data, supplementary feeds were or had been given to 30 (30%) of all infants in the study.

In Nigeria, a cross-sectional study by Ogunlesi *et al.* (2005) found that supplementary feeds were commenced in 36.6% of infants between 2 and 6 months of age. The difference from the findings of this Nigerian study was that supplementary feeding was associated with a professional mother and bottle feeding, while in this present study mothers introduced supplementary feeds due to perceived breastfeeding insufficiency and pressure from family or friends.

The feeds given included thin porridge made from maize and soya bean flour. These feeds are stomach-filling and can displace the desire for breast milk. The nutritional complications arising from this have been described elsewhere (Dewey *et al.* 1999, Cohen *et al.* 1994), and unhygienic handling during preparation or storage may have negative health effects. Both these factors in turn feed into the cycle of malnutrition and infection.

5.8.3.2 Complementary feeding among infants older than 6 months

All (47) infants older than 6 months were on complementary feeds at the time of the study. Twenty-three had been mixed-fed (supplementary feeding) during the first 6 months, and 17 had been predominantly breastfed. Complementary feeds included soft porridge made from maize or soya bean flour, fruits like oranges and bananas, and family meals comprising mealie meal, rice or potatoes given with beans and eggs (Figure 6). Most of these infants (81%) were given a soft porridge made from grains, and 40% mealie meal-based family meals. Thirty-eight per cent of the infants were given beans (source of plant protein), and a small proportion (8%) were given eggs, the only source of animal protein mentioned. Vegetables and fruits were given to 43% and 41% of children respectively, either in isolation or as part of the meal.

The complementary foods given to infants in this present study did not differ from other parts of the country. The study by Kamudoni (2007) in Mangochi did not make a distinction between complementary and supplementary feeds (referring to feeds in all infants as complementary feeds). However, the types of feed reported as given to infants older than 6 months were similar to feeds in this study. Mothers in Mangochi (a lakeshore district) included fish in the complementary diet, primarily because fish forms part of the family diet in this area (Kamudoni 2007, Vaahtera *et al.* 2001). In the 2004 MDHS most infants of 6-9 months old received foods made from grains (73%); 50% were fed fruits and vegetables, 16% were fed foods made from legumes, 11% received foods from roots and tubers, and 20% were given meat, eggs, fish and poultry (National Statistical Office 2005).

In summary, the supplementary feeds given to infants younger than 7 months were predominantly based on maize flour, while complementary feeds included soft porridge and family meals. The infants' only source of animal protein was eggs, but these were given to a small proportion of infants. Legumes and breast milk were therefore their main source of protein. Vegetables and fruits were given to 2 out of every 5 infants; but these sources of vitamins and minerals have seasonal availability. These practices would

predispose the infants in this study to the effects of malnutrition and infectious morbidity. These effects need to be studied in this population in a study that includes documentation of nutritional status.

5.9 Summary

The relevance and practical implications of the findings of this study presented in Chapter 4 have been discussed in the context of infant and young child feeding guidelines as well as the findings of other research studies on infant nutrition. The TPB was used as a framework for the discussion.

The attitude that breast milk is good for the baby was held by all mothers, and this was matched by universally practiced breastfeeding. Although the majority of mothers held unfavourable attitudes towards breastfeeding in pregnancy and HIV infection, these attitudes were not explored to find if they influenced the mothers' behaviours.

The three subjective norms reported by mothers influenced behaviour differently, with health workers influencing EBF and family members and friends influencing non-exclusive breastfeeding. Similar findings have been reported by other workers within and outside Malawi.

Three areas that could have impacted on perception of behavioural control were identified, which related to maternal perception of the inadequacy of breast milk, the vulnerability of the newborn to illness, and the lack of control over the outcome of labour and the birth process.

Behaviour intentions were under continuous pressure from mainly subjective norms and certain modifiers. Although the mothers performed better with regard to EBF,

supplementary and complementary feeding practices involved giving a carbohydrate-rich diet with virtually no animal protein.

Prenatal infant feeding education was associated with the likelihood of having heard about BFHI but it was not significantly associated with EBF rates.

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6 RECOMMENDATIONS AND STUDY LIMITATIONS

6.1 Introduction

This chapter gives study recommendations based on the results of the study. It will also include the study limitations and strengths that might be put into consideration when carrying out another study of a similar sought.

6.2 Recommendations to health workers

6.2.1 Initiation of breastfeeding

Most of the barriers to early initiation of breastfeeding resulted from complications of labour and childbirth. With the exception of a few, these are amenable to reduction. With this in mind, two recommendations with regard to initiation of breastfeeding are that:

- Staff working in the labour ward should continuously be encouraged to support these mothers to initiate breastfeeding early.
- Mothers should be given adequate support while in labour and the staff should ensure supportive care and good management of the labour process to reduce fatigue/prolonged labour.

6.2.2 Infant feeding education

Several misconceptions existed regarding breastfeeding and the importance of colostrum among mothers in this study. A large proportion of mothers stated that a pregnant nursing mother and an HIV-infected mother should not breastfeed, and nearly 1 in 5 mothers believed that colostrum was bad for the baby for reasons which represented a misunderstanding of the composition of colostrum and breast milk. The reasons for introducing supplementary feeds included perceived inadequacy for breast milk and breastfeeding to satisfy hunger and thirst. The inverse relationship between education and practice was also of concern.

Education of mothers should therefore include:

- Information about the composition, content and safety of colostrum and breast milk.
- Signs of hunger and thirst in an infant, and the different reasons for crying.
- Appropriate positioning and emptying of breasts during breastfeeding.
- Mothers of infants aged 4 months should be adequately educated and supported so that EBF can continue into the 5th and 6th months.

Adequately trained staff members are best suited and equipped to deal with these challenges. In addition to training staff with regard to the above-mentioned matters within the scope of BFHI and PMTCT, they should be equipped with the knowledge to advise mothers and caregivers appropriately with regard to weaning practices and diet.

This should include:

- Improving the protein, vitamin and other nutrient content of supplementary and complementary feeds with affordable and locally available resources.
- The hygienic preparation, handling and storage of these feeds.
- Exploring the use of herbal mixtures in non-ingestion methods such as bathing that reduce the risks associated with oral intake.

6.3 Recommendations to the community

6.3.1 Family members and friends

Family members and friends were the strongest influence of non-exclusive breastfeeding in this study. BFHI activities at community and household level should therefore include family members and friends who have a significant say on feeding decisions. Pregnant women should be encouraged to bring along to antenatal clinics family members such as mothers, mothers-in-law and husbands, since these are known to influence maternal choices and support their practices.

6.3.2 Community support groups and peer counsellors

There should be establishment and on-going training of community breastfeeding support groups and peer counsellors equipped with adequate information on infant feeding. This will enable them to give appropriate information and support to mothers with respect to infant feeding. At community level, such training might influence positive community attitudes towards infant feeding, as increasingly more members are trained. Closer collaboration would be important in ensuring an effective two-way referral system between the hospital and these community support groups or peer counsellors.

6.4 Recommendations for further research

Future research in this area would be useful in expanding the knowledge acquired from the findings of this study, and therefore helpful in finding solutions to some of the challenges of the BFHI programme. The following are some of the areas and methods that will require focus in future research:

- Use of focus groups to collect data on the attitudes and beliefs towards infant feeding will help to collect in-depth information on the cultural beliefs that impact on infant feeding.
- The impact of community breastfeeding support groups on infant feeding practices should be investigated to evaluate their effectiveness on infant feeding support and education.
- There is a need to do some literature search on the influence of caesarean section on breastfeeding.
- There is a need to investigate breastfeeding patterns within the first 72 hours of birth to see if mothers continue breastfeeding after they are discharged from the labour ward and hospital.

- There is a need to conduct research to compare infant feeding practices in a non-baby-friendly hospital and a baby-friendly hospital to evaluate the effectiveness of BFHI in Malawi.
- Attitudes towards breastfeeding and non-exclusive breastfeeding and how they affect behaviour in HIV-infected mothers also need to be investigated.
- Maternal perceived behaviour control in practising the different infant feeding behaviours as well as the different factors that impact on these perceptions of control need to be investigated.
- Assessment of the nutritional status and growth of weanlings.

6.5 Study limitations and strengths

This study was carried out among mothers of infants who gave birth at the hospital; therefore the results cannot be generalised to the whole community because mothers who gave birth outside the hospital might have different infant feeding behaviours from the mothers in this study.

Data collection from some mothers with infants older than 6 months required them to recall information on infant feeding practices when the infants were much younger. Data were therefore subjected to recall bias. This bias was minimised by analysing infant feeding practices in younger infants separately in order to form a more representative impression of current practices.

Several limitations arose out of use of the questionnaire in its current form. The study by Ogunlesi *et al.* from which the questionnaire was adapted did not study infant feeding practices in the context of the TPB or any other behavioural model. Further to this, the possibility that multiple responses might be given to the question regarding mothers' referents did not arise during the piloting process, and only became apparent much later in the data collection process when 8 participants gave multiple responses.

This section of the questionnaire will need to be revised to provide clarity. Another section that requires attention relates to perceived behaviour control, where several questions testing this will need to be added. These modifications will need to be in line with the guidelines for construction of a TPB questionnaire (Ajzen 2006).

The effects of different infant feeding practices on nutritional status were not documented because the study did not include the anthropometric measurements of the infants. This information would have been helpful, but it was beyond the focus of the study.

The study documented attitudes towards breastfeeding by a pregnant mother and an HIV-infected mother, but did not report either pregnancy or HIV status and test their influence on practice. Documentation of HIV status would have required either disclosure of status or the testing and counselling of mothers at the time of the study. This would have required more resources than were available for this study.

Perceived behavioural control as one of the components of the TPB which influences individuals' behaviours was not investigated fully, but was determined from the mothers' responses on their infant feeding behaviours. A true measure of the extent to which mothers felt in control of their behaviours would have been possible had specific questions been asked. However, this would have extended the scope of the study.

Although most of the findings of this study are specific to women in the Embangweni area and therefore difficult to generalise to other localities, a sufficiently representative sample was recruited to validate the conclusions drawn from this study for this population. The study also managed to highlight several areas relating to infant feeding that require further research in this community.

Most of the mothers 10 (37%) who initiated breastfeeding later than the first hour of birth of the baby reported caesarean section as a reason for the late breastfeeding initiation. It would have been useful to explore the influence of caesarean section on breastfeeding further but this was beyond the stated objectives of the study.

Most of the mothers who stated that colostrum was bad were from the static clinic (28% of all), however, the small numbers at mobile clinics made it difficult to test for statistical significance.

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7 CONCLUSION

Maternal and caregiver infant feeding behaviours are an important determinant of infant and young child nutritional outcomes. Like other human behaviours, infant feeding practices are both volitional and beyond voluntary control. As such, they can be understood from the perspective of the TPB to be the results of infant feeding intentions formed from an intricate interplay of attitudes, the influence of others (subjective norms), and the mothers' own perception of their ability to influence behaviour. Performance of the behaviour may vary from the intended behaviour because of extraneous factors that interfere with the process.

This cross-sectional study was carried out in order to determine the attitudes, subjective norms and performance perceptions that influenced the practice of breastfeeding, EBF, non-exclusive breastfeeding and complementary feeding in mothers of infants born in a baby-friendly hospital. The BFHI is an internationally adopted initiative aimed at improving positive infant feeding practices with regard to breast milk and breastfeeding.

All mothers' attitudes towards breast milk were that it was "good for a baby." This was matched by universally practiced breastfeeding. The attitudes of a significant majority of the mothers did not favour breastfeeding in pregnancy or by an HIV-infected mother. The effects of these attitudes on behaviour practice could not be determined because of absence of information on HIV serostatus or pregnancy.

Health workers influenced EBF and discouraged non-exclusive breastfeeding. On the other hand, family members and friends were important influencers of non-exclusive breastfeeding and discouraged EBF. Because more than half of the mothers adhered to their respective norms, family members and friends are an important target group for infant feeding education.

Although perceptions of behavioural control had neither been solicited nor voluntarily declared by the mothers, it is speculated that the mothers' perceptions of inadequacy or insufficiency of breast milk contributed to loss of control over intended behaviour. Exclusivity of breastfeeding was abandoned when mothers perceived failure to produce satiety or quench thirst.

The practice of EBF declined rapidly after the age of 4 months. This was also the time when the least number of infants attended clinics. Correspondingly, mixed feeding and predominant breastfeeding were more commonly practiced in infants older than 4 months. Infants aged 5-6 months were identified to be at risk from unsupervised weaning practices, the outcomes of which were not monitored. Complementary feeding was starch-based, had a variable fresh vegetable and fruit component, and lacked animal protein content. Breast milk substitutes were rarely used.

Barriers to behaviour practice included obstetric complications, of which a large proportion was preventable. The absence of animal protein from the complementary foods generally reflects the absence of animal products in the family diet. This is a factor of poverty, because the majority of families in the area are subsistence crop farmers. Products such as meat or milk are not readily available or affordable to them.

The TPB was used successfully in this study to understand the behaviours and their influencing factors among these mothers. As a result, a number of areas have been identified where better implementation of BFHI policy and further research will lead to improvement in the practice of positive feeding behaviours by mothers who are adequately informed, feel sufficiently supported and are empowered to form strong infant feeding behaviour intentions, which they follow up with practice.

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Appendix 1: Ten steps to successful breastfeeding

1. A written breastfeeding policy that is communicated to all health care staff.
2. Staff training in skills to implement the policy.
3. Education of pregnant women about the benefits and management of breastfeeding.
4. Early initiation of breastfeeding.
5. Education of mothers on how to breastfeed and maintain lactation.
6. Limited use of any food or drink other than human breast milk.
7. Rooming in.
8. Breastfeeding on demand.
9. Limited use of pacifiers and artificial nipples.
10. Fostering of breastfeeding support groups and services.

*Promote co-operation between healthcare staff, breastfeeding support groups and the local community.

Source: WHO 1998, *Evidence for the ten steps to successful breastfeeding*. Geneva, WHO/CHD/98.9

*= 7 point plan for breastfeeding in community settings (UK based, not an international instrument)

APPENDIX 2: EMBANGWENI HOSPITAL BFHI POLICY

Embangweni mission hospital promotes supports and protects exclusive breastfeeding that is initiated immediately after birth and continued up to 6 months. Thereafter, breastfeeding continues for the first 2 to 3 years of life with the introduction of appropriate and adequate weaning foods. Our goal is to reduce infant morbidity and mortality to promote health and well being for all mothers.

To achieve this goal the hospital will implement the following steps;

Health personnel

- All nurses and clinicians will be trained atleast for 18 hours in lactation management with regular update on breast feeding being provided.
- New nurses and clinicians will be trained within 6 months of their arrival.
- All wardmaid will be briefed for atleast 1 day in lactation management.
- All other staff will be oriented on the hospital breastfeeding policy.
- All female members of staff with babies less than 6 months of age are given break during their working day and can have their babies brought to work for breastfeeding.

Pregant women

Labour ward

- Skin to skin contact between the mother and baby will be initiated immediately after delivery
- All mothers who have delivered vaginally will be assisted to begin breastfeeding within 3 hours of delivery and will receive follow up assistance within 6 hours of delivery

- For women who have delivered by ceaserian section, breastfeeding will be initiated in the theater or when they are fully awake depending on the type of anesthesia used.

Postnatal ward

- All mothers will be taught how to express breastfeeding and importance of maintaining lactation
- All mothers will be assisted in proper position and attachment of the babies for breastfeeding.
- Babies less than 6 months will be fed only breast milk unless supplements are medically indicated.
- Babys will stay with their mothers 24 hours a day to allow looming in.
- Mothers will feed their babies on demand.
- No dummies, artificial teats and pacifiers will be given to breastfeeding infants.
- Prior to discharge all lactating mothers will be informed of thoe r nnerares breastfeeding support groups and will be referred to them.

Community and education and support

- The hospital will prohibit any posters, encourage breastfeeding substutes or pacifiers.
- Group discussion in the use of infant formula is not permitted.
- The hospital prohibits the use of glucose, water, freezes, dowale, or fanta amongst infants less than 6 months of age.
- The hospital will support and maintain adequate number of gender balanced breastfeeding support groups within the hospital catchment area including health centers.
- The hospital will provide infant regarding breastfeeding throughout their premises.

- Lactating women who are ill either in the outpatient department or in the general ward and their guardians will be educated on maintaining lactation

University of Cape Town

Appendix 3: Data Collection Tool

INFANT FEEDING PRACTICES QUESTIONNAIRE

Collection date _____

PART 1 Socio-demographic characteristics of mothers and their infants.

Please write down the participant's answer in the spaces provided.

Maternal Data

Date of birth (state at least year, if known) _____

1. Number of children _____
2. Marital status _____
3. Highest level of education _____
4. Maternal occupation _____
5. Did you attend antenatal clinic during this last pregnancy? _____
6. If yes, at which clinic did you receive the prenatal care? _____
7. Did you receive counselling and education about feeding your baby during the prenatal care visits? _____
8. Were you counselled about feeding your baby after the birth of the child? Yes /No

Child's Personal Data

Date of birth (please check on Road To Health Card) _____

Sex (please circle): Female / Male

Part 2 Infant feeding practices among mothers from birth to one year of life and factors influencing their infant feeding decision.

(Write down the participant's answer in the space provided and circle the answer to yes/no questions)

Factors that may influence mothers' baby feeding choice

2.1 Attitudes, intentions towards infant feeding.

2.1.1. Do you think is breastfeeding important to a baby? _

Yes / No

2.1.2. If yes give reasons _____

2.1.3. If no give reasons _____

2.1.4. When is the best time to put a baby to the breast after he/she is born?

2.1.5. Can the first milk after birth harm a baby? Yes/No

If yes, please give reasons _____

2.1.6. Is the first milk after birth beneficial to the baby? YES/NO

b. Give reason for your answer?

2.1.7. For how long do you think breast milk would be enough for the baby (until what age)?

2.1.8. At what age can a baby be given water?

2.1.9. At what age can a baby be given maize meal porridge?

2.1.10. At what age can a baby be given cow's milk?

2.1.11. At what age can a baby be given

Sweetened Drink? _____

Potato? _____

Other food? _____

2.1.12. Do you think a mother should not breastfeed her baby? Yes/No

If yes, give reasons for your answer

2.1.13. Do you think an HIV-infected woman can breastfeed her baby? Yes/No

Give reason for your answer _____

2.1.14. In your opinion can a pregnant woman breastfeed if she has a baby less than a year old? Yes/No

2.1.15. What was your choice of feeding for your baby?

2.1.16. When did you make your choice on how to feed your baby?

2.2 Subjective Norms/normative beliefs

2.2.1 Have you heard about the Baby Friendly Hospital Initiative at Embangweni hospital? Yes/No

2.2.2. If yes, what are some of the messages of this programme?

2.2.3. If yes, do you find the messages acceptable to

You? Yes/No

Friends Yes/No

Family? YES/NO

If no, please give reasons

2.2.4. Do you find any of the messages of the programme difficult to put into practice?

Yes/No

* Question 2.1.1.15 mean the mothers' feeding intentions

2.2.5. Who was the most influential person in your infant feeding decision?

- a. Friends
- b. Family
- c. Health workers
- d. Other

2.2.6. In what way did the above influence your feeding decision for your baby?

2.2.7. Are you aware of any breastfeeding support group in your area? YES / NO

2.3 Infant feeding behaviours

How mothers feed their infants and reasons for their infant feeding choice

2.3.1 Breastfeeding

- a. Have you ever breastfed this baby? YES/NO
- b. If no, give reason for not breastfeeding?

- c. If yes, how long do you want to breastfeed your baby?

2.3.2 Initiation of breastfeeding

2.3.2.1 . When did you first put your baby to breast after birth?

2.3.2.2. For how long were you separated from your baby immediately after birth?

a. Give a reason for the separation.

2.3.3. Exclusive breastfeeding

For child less than 6 months old (if child is older than 6 months go directly to question 2.3.3.6)

2.3.3.1. Have you given your baby any of the following

a. Water? YES / NO

b. Sweetened drink? YES / NO

c. Cow's milk? YES / NO

d. Herbal mixture? YES / NO

e. Any other feed or drink? YES / NO

2.3.3.2. If answer is yes to any of the above, state the age when you introduced it and please give reason to your answer

2.3.3.3. How many times have you breastfed your baby in the past 24 hours?

a. 2 times

b. 3 times

c. 4 times

d. 5 times

e. More than 6 times

2.3.3.4. After you were discharged from the Hospital did you ever experience insufficient breast milk? YES / NO

a. If yes, how old was your baby when this happened? _____

b. Did you give your baby any other food?

2.3.3.5. Do you feel breast milk is sufficient for a baby less than 6 months? Yes/No

a. If no, give reason to your answer?

If child is more than six months old

2.3.3.6. Do you still breastfeed your baby? Yes/No

If No

a) When did you stop breast feeding?

b) If no, give reasons for stopping breastfeeding?

2.3.3.7. How old was your baby when you first gave him/her any of the following:

a. Water _____

b. Sweetened drink _____

c. Cow's milk _____

d. Herbal mixture _____

e. Any other feed or drink _____

2.3.3.8. Why did you start your baby on the food or drink at that time?

2.3.3.9. How old was your baby when you introduced solid food to him/her? _____

2.3.3.10. What are some of the foods that you give to your baby now?

2.3.3.11. Who else, apart from you, is involved in feeding your baby? _____

2.3.3.12. What foods does he/she usually give to your baby?

2.3.3.13. How many times did your baby breastfeed in the past 24 hours?

2.3.3.14. How many times did you give your baby water in the past 24 hours?

2.3.3.15. How many times did you give your baby other food in the past 24 hours? _____

2.3.3.16. Please give the name of the other food(s) that were given to your baby in the last 24 hours

Appendix 4: Letter to the Hospital Director of Embangweni Hospital

505 Rusdon Park,
College Road,
Rondebosch 7700,
Cape Town.

The Hospital Director,
Embangweni Mission Hospital,
Post office Box 7,
Embangweni,
Malawi.

Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY

I am a second year master's student in nursing at the University of Cape Town. I write to request permission to conduct a research study among women with children aged 12 months and younger in your catchment area.

The topic for the study is 'Infant feeding practices among women with children less than a year old at a baby friendly hospital'. The purpose is to describe the infant feeding practices and factors associated with the feeding practices among women with children aged 12 months and younger.

I intend to conduct the study during the month of July, 2007. This would require me to have access to mothers in the under 5's clinics, where they would be invited to

participate. Data collection would be done by questionnaire administered by two trained research assistants. A detailed account is contained in the attached proposal.

A copy of approval of the study from the University of Cape Town Human Ethics Committee is attached.

I would be happy to clarify any aspect of this study should this be necessary.

Alternatively you may speak with my supervisor, Prof Sheila Clow in Cape Town (+27 21 406 6449) or the chair of the Research Ethics Committee, Prof Marc Blockman (+27 21 406 6338).

I will appreciate your consideration and support in this matter.

Yours faithfully,

Mary T. Kamwana.

Contact number +27 21 686 7377 or +27 0763740927

Appendix 5: PARTICIPANT INFORMATION SHEET

To mothers of children under one year old

My name is Mary Kamwana. I am a nurse and a second year master's student at the University of Cape Town in South Africa.

As part of my studies I wish to do a research project on infant feeding practices among mothers of children 12 months and younger, who gave birth at Embangweni Hospital. The purpose is to understand better the reasons why mothers choose to feed their babies one way or the other. If you are a mother of an infant who is 12 months old or younger, and you gave birth at Embangweni Hospital, I am inviting you to take part in this study.

If you agree to take part, information will be gathered by asking you some questions on infant feeding from the time your baby was born until now. This will take about 30 minutes and can be done in a private place while you are waiting for your clinic visit. Your name will not be recorded and the information will not be shared with anyone else.

There is no pressure to take part and you are free to withdraw at any time. This will not make any difference to the care you receive at the clinic. The finding of this study will contribute to our understanding of infant feeding practices, and what would help in supporting women's feeding choices in the future.

If you are willing to participate in this study please complete the consent form. If you have any questions I will be happy to answer them. My telephone number is 01348709 from Embangweni Hospital.

Alternatively you may speak with my supervisor, Prof Sheila Clow in Cape Town (+27 21 406 6449) or the chair of the Research Ethics Committee, Prof Marc Blockman (+27 21 406 6338).

Thank you

Mary Kamwana.

Appendix 6: CONSENT FORM

If the participant cannot read, this will be read to her by the data collection assistant.

I (Name) have had the explanation and the purpose of the research project to me.

I understand the process of the study.

I understand participation in this study may require personal information.

I have had the opportunity to ask questions and have been given answers.

I understand my name will not be recorded and the information will not be shared with anyone else.

I am willing to participate in this study and I can withdraw any time without any penalty given to me.

.....

Signature.

Date.

.....

Researcher's Signature

Appendix 7: LETTER OF APPROVAL FROM RESEARCH ETHICS COMMITTEE

UNIVERSITY OF CAPE TOWN



Health Sciences Faculty
Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6338 • Facsimile [021] 406 6411
e-mail: preaward@curie.uct.ac.za

03 July 2007

REC REF: 291/2007

Mrs M Kamwana
505 Rusdon Park
College Road
Rondebosch
7700

Dear Mrs Kamwana

PROJECT TITLE: INFANT FEEDING PRACTICES AMONG WOMEN WHO HAVE GIVEN BIRTH AT A BABY FRIENDLY HOSPITAL IN NORTHERN MALAWI

Thank you for submitting your study to the Research Ethics Committee for review.

It is a pleasure to inform you that the Ethics Committee has formally approved the above-mentioned study.

This serves to confirm that the University of Cape Town Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP) and Declaration of Helsinki guidelines.

The Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC. REF in all your correspondence.

Yours sincerely

signature removed

PROF M BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS

p/p

kmjedi