

**The influence of maternal socio-economic status on infant feeding
practices and anthropometry of HIV-exposed infants**

By

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Abbreviations

AFASS: Acceptable Feasible Accessible Sustainable and Safe

AIDS Acquired Immune Deficiency Syndrome

ANC: Antenatal care

ANOVA: Analysis of variance

ARV: Antiretroviral

CD4: Cluster of Differentiation 4

CHC: Community Health Centre

DOH: Department of Health

HAART: Highly Active Antiretroviral Therapy

HIV: Human Immunodeficiency Virus

LAZ: Length-for-age z-score

MTCT: Mother-To-Child Transmission

PMTCT: Prevention of Mother-to-Child Transmission

SD: Standard Deviation

USD: United States Dollars

UNICEF: United Nations Children Fund

WAZ: Weight-for-age z scores

WLZ: Weight-for-length z score

WHA: World Health Assembly

WHO: World Health Organization

Definitions

Feeding definitions

Exclusive breast feeding: Any infant receiving only breast milk and no other infant food except medications prescribed by medical personnel for six months in accordance with the infant feeding policy (World Health Organisation [WHO], 2003).

Exclusive formula feeding: Any infant receiving only commercial infant formula food and no other food for the recommended period in accordance with the infant feeding policy (WHO, 2006a).

Infant feeding practices: The practice of exclusively feeding infant breast milk for six months or commercial formula and subsequently introducing solid food thereafter (WHO, 2006a).

Replacement Feeding: Any infant food other than breast milk (WHO, 2003).

Sub-optimal Feeding: Any infant receiving feeds not according to the recommended guidelines for his age and status (WHO, 2003).

Anthropometry definitions (WHO, 2009b)

Stunting: Any Infant with length-for-age z-scores less than -3.0

Underweight: Any infant with weight-for-age z-scores less than -3.0

Wasting: Any infant with weight-for-length z-scores less than -3.0

Abstract

The purpose of this quantitative, descriptive, cross sectional survey was to determine whether maternal socio-economic status has an influence on infant feeding practices, nutrition and growth status of HIV-exposed infants at Delft Community Health Centre.

Aim:

The aim of this study was to describe the influence of maternal socio-economic status on infant feeding practices and infant anthropometric measurements.

Method:

Information was collected from 125 mother-infant pairs who presented at the health clinic with infants aged between six weeks to six months. The WHO anthropometry calculator was used to determine the z scores of the anthropometric measurements.

Results:

One hundred and twenty five Case Report Forms of mother-infant pairs were analyzed. Few infants were underweight if their mothers' personal income or total household income were more than R800.00 per month, 12.7% and 1% respectively. Nearly twice as many infants (49.6%) of the single mothers were underweight as compared to infants (19.8%) whose parents were married. Similarly, twice as many infants (50%) were underweight if their mothers walked to the health facility compared to 23.8% of infants' whose mothers' used taxis. Education and employment status of mothers appear to prevent infants from becoming underweight as twice as many infants (55.8%) were underweight when their mothers did not complete secondary school compared to 23.3% of infants whose mothers did complete secondary school. Nearly four-fold more infants (59.5%) were underweight if their mothers were unemployed compared to those infants (14.9%) whose mother were employed. Housing, the presence of a flush toilet or running tap water

in the house did not improve the body mass index of infants. A total of 57.4% of infants whose mothers resided in brick houses, 71.9% of infants whose mothers had access to flush toilets and 57.5% who had running tap water in the house were still underweight. Infants whose mothers lived in houses with less than two rooms or where 3-4 people occupy the house had higher risk of being underweight (54.6% and 40.5% respectively). Underweight children were still prevalent even if the room were occupied by only one person (50%) of 1-2 children (67.2%).

Conclusion:

All women chose to formula feed their infants after receiving infant feeding counselling. Despite the availability of free replacement feeds there were evidence that infants were not properly fed.

Chapter one

Introduction to the study

1.1 Introduction

Globally, various policies and declarations on the importance of infant feeding have been available over the years. Some of these are the International Code for the Marketing of Breast Milk Substitutes of 1981 (World Health Organization [WHO], 1981) and the World Health Organizations (WHO) Human Immunodeficiency Virus (HIV) and infant feeding policy (WHO, 2012). The World Health Assembly (WHA) in its 34th session adopted the International Code on Breast Milk Substitutes as a minimum requirement to protect, support and promote appropriate infant and young child feeding. The code was implemented because of poor infant feeding practices that were negatively affecting the growth, health and development of children, and were considered a major cause of mortality in infants and young children (WHO, 2006b). Supplementary documents that promote breastfeeding practices include the evidence for the ten steps to successful breastfeeding as published in a joint WHO/United Nations Children's Fund (UNICEF) statement on Protecting, Promoting and Supporting Breastfeeding (WHO, 1998); the Special Role of Maternity Services (WHO, 1989); the initial Innocenti Declaration on the protection, promotion and support of breastfeeding of 1990 (WHO, 1990), which had four operational targets, and the revised declaration of 2005 with five additional operational targets (WHO, 2005); and the Baby-Friendly Hospital Initiative which was launched in 1991 (WHO, 1991) and was reviewed in 2009 to encompass the global strategy for infant and young child feeding (WHO, 2009a).

With the emergence of the Human Immunodeficiency Virus (HIV), the WHO and UNICEF jointly developed the Global Strategy for Infant and Young Child Feeding in 2003 to focus the world's attention on the impact that feeding practices have on the nutritional status, growth, development and health and thus the survival of infants and young children (WHO, 2003). Hence, the target is to ensure that the health and other relevant sectors protect, promote

and support exclusive breastfeeding for six months and continued breastfeeding up to two years and beyond, while providing women with the support they require in the family, community and workplace to achieve this goal (WHO, 2012). In addition, the strategy aims to provide guidance on feeding infants and young children in exceptionally difficult circumstances as well as the related support required by women, families and other caregivers.

It is recommended that all HIV-positive women should receive counselling which includes the provision of general information about meeting their own nutritional requirements, about the risks and benefits of various feeding options and, lastly, to provide special guidance on selecting the option appropriate for them. Infants born to HIV-positive women require adequate replacement feeding if they opt not to breastfeed (WHO, 2012).

At the time of the study, the feeding policy in place by the National Department of Health (NDOH) in South Africa (SA) was the Infant and Young Child Feeding Policy of 2008 which presented guidelines that aim to “provide optimal nutrition, growth, development and health of infants and young children through protecting, promoting and supporting optimal and safe infant feeding practices” (National Department of Health [NDOH], 2008. p11). However, recent review of the infant feeding policy in 2013 recognized the need for HIV-positive mothers to exclusively breastfeed their infants for the first six months while the infants are receiving prophylaxis for the duration of the breastfeeding for those who are not currently receiving antiretroviral treatment for maternal illness and complementary feeding thereafter (NDOH, 2013).

The purpose of this quantitative, descriptive, cross sectional survey was to determine whether maternal socio-economic status has an influence on infant feeding practices, nutrition and growth status of HIV-exposed infants at Delft Community Health Centre.

1.2 Background to the problem

Delft, is a township in the Western Cape Province situated close to the Cape Town International airport and was established in 1989 to relieve the pressure of overcrowding among the nearby black and coloured communities. People living in Delft are mainly from a low socio-economic status with high unemployment rates and a heavy disease burden. The poor socio-economic status of the community may influence infant feeding practices due to poor access to education, high rates of unemployment and a lack of clean water and safe sanitation systems (Girma & Genebo, 2002).

The National Food Consumption Survey of 1999 found suboptimal infant feeding among children in South Africa (Bosman et al., 2011). The authors reported that infants residing in informal settlements suffer from suboptimal feeding that led to stunting (21%), underweight (10.4%) and wasting (3.7%) among the infants (Bosman et al., 2011). The challenge is that the information does not distinguish specific areas and there is currently no published information available on the infant feeding practices of women in Delft.

1.3 Research question

The question that arises is whether HIV-exposed infants, who grow up in a low socio economic community, still present with poor nutritional and growth despite the fact that their mothers received formula milk from the health clinics?

1.4 Research aim

The aim of this study was to describe the maternal socio-economic status and its influence on infant feeding practices, nutritional status and growth of HIV-exposed infants at Delft Community Health Centre (CHC).

1.5 Research objectives

- To describe the demographic and socio-economic status of HIV-infected mothers enrolled at the well-baby clinic in Delft.
- To describe the infant feeding practices of HIV-infected mothers enrolled at the well-baby clinic in Delft.
- To determine the anthropometric status of the HIV-exposed infants.
- To evaluate the influence of socio-economic status on the anthropometry of the infants.

1.6 Research methodology

A quantitative approach, using a cross sectional descriptive survey design was used to execute the study. The methodology of this study is described in detail in chapter three.

1.7 Summary

Chapter one presents a brief introduction to the study, chapter two engages with a literature review and the research methodology is discussed in chapter three. The results are presented in chapter four and the conclusions as well as the implications of the results for research and practice are presented in chapter five.

Chapter two

Literature review

2.1 Introduction

A literature review was conducted to investigate the evidence and opinions regarding the infant feeding practices of infants born to HIV-positive women. The information was used to support the investigator's research question in identifying "gaps" in the literature to support that the problem was real and needed further investigation (Simon et al., 2011). The literature review also assisted in identifying appropriate questions that were included in the questionnaire. The search included literature regarding choice of infant feeding, advantages, disadvantages and the risks of the different infant feeding methods. The available literature on the growth patterns, nutritional status related to infant feeding practices and infant feeding policies related to infants born to HIV-positive women were analysed.

An electronic search of EBSCOhost, which is an electronic academic journal database for medical journals, was carried out to extract international and national literature related to the topics as described above. Different search engines, such as PubMed, Medline, Google Scholar and the National Health Department web page, were also used.

2.2 Exclusive breastfeeding

Feeding infants with breast milk is encouraged because of its nutritional composition, temperature, availability and all round completeness. Breast milk contains the required nutrition for growth and development of the newborn, infants and young children up to the age of two years (Butte, Lopez-Alarcon & Garza, 2002). The World Health Organization recommends that all women, irrespective of HIV status, should breastfeed their infants exclusively for the first six months of life. Those who meet the affordability, feasibility, accessibility, sustainable and safe (AFASS) criteria were further

counselled to use replacement feeding (Bhutta et al., 2008). All women were advised to introduce complementary feeding after six months with abrupt cessation of breast milk (WHO, 2006a). The advantages of exclusive breastfeeding as a choice are summarized in the next few paragraphs.

Breast milk has the correct nutritional composition and is nutritionally rich, composed of carbohydrates, proteins, fats, water and minerals, appropriate for new-born and young infant growth and development (Picciano, 2001). It also provides immunity. Colostrum contains a significant amount of immunoglobulin A antibodies, bile salts (which stimulates lipase production which act against protozoa) and lactoferrin, an iron binding resin that offers protection against intestinal microorganisms (Van de Perre, 2003). Research has shown that exclusive breastfeeding could prevent nearly 10% of all deaths in children less than five years of age each year (Jones et al., 2003). Breastfeeding also plays an important role in offering protection from childhood illnesses and reduces upper respiratory tract infections among low birth weight infants (Van de Perre, 2003).

Long-term breastfeeding, for six months or longer, offers up to 80% protection against infections, such as otitis media, and reduces the incidence of diarrhoea up to 50% compared to infants who received replacement feeds. Non-specific gastroenteritis and severe lower respiratory tract infections and urinary tract infections are also reduced in infants who were breastfed for a long term (Ip et al., 2007). Breastfed infants also show better sleep awaking and arousal patterns as compared to their replacement fed counterparts at three months, and the risk of infants less than one year of age dying from sudden infant death syndrome is reduced by 50% (Horne et al., 2004; Venneman et.al. 2009).

There is a risk reduction of 19-27% of developing childhood type I diabetes mellitus among infants who are breastfed for longer than three months and delayed exposure to cow's milk or other non-human milk as compared to infants who are breastfed for shorter duration and exposed to non-human

milk early in infancy (Ip et al., 2007). Infants who are breastfed have a 39% reduced risk of developing type 2 diabetes mellitus later in their adult lives as compared to non-breastfed infants (Mayer-Davis et al., 2008, Ip et al., 2007, Owen et al., 2006).

Additional long-term benefits of breastfeeding include lower levels of cholesterol, lower mean blood pressure as well as a lower prevalence of overweight and type-2 diabetes in later life (WHO, 2007a). There is evidence that breastfeeding is associated with a reduction in childhood obesity (Arenz et al., 2004; Armstrong & Reilly, 2002), and it is postulated that one of the ways that it does this is that the infants learn to self-regulate their intake when they are breastfed as compared to when they are bottle fed. Infants who are bottle fed (expressed breast milk or replacement milk), as well as those who were introduced to solids early in life have the tendency to be obese in childhood and later life (Li, Fein & Grummer-Strawn, 2010).

Infants who are exclusively breastfed for four months or more, have a reduced risk of developing allergic conditions, such as atopic dermatitis, cow's milk allergy and wheezing in early childhood (Greer, Sicherer & Burks, 2008). Preterm infants who are formula fed are six to ten times more at risk of developing inflammatory disease of the intestines which can lead to sepsis and multiple organ failure or Necrotising enterocolitis (Sodhi et al., 2008).

Breastfeeding also has several advantages for the lactating mother. Bonding between the infant and the mother is increased during the breastfeeding period (Else-Quest, Hyde & Clark, 2003). Breastfeeding-supportive fathers may enhance this bonding resulting in familial bonding between the three, which improves initiation and establishment of breastfeeding (Pisacane et al., 2005). The process of breastfeeding leads to the release of two important hormones, oxytocin and prolactin. Oxytocin helps improve uterine contractions, thereby minimising bleeding, while prolactin aids the flow of breast milk. Oxytocin further leads to relaxation in the mother thus making

the process of breastfeeding a relaxing and pleasant experience (Stuebe, Grewen & Meltzer-Brody, 2013).

Breastfeeding for a minimum of six months or more, when combined with exercises and a good nutritional diet, helps women lose fat accumulated during pregnancy (Widen et al., 2013). Additionally, breastfeeding for more than six months when combined with other measures helps return the weight to pre-pregnancy weight (Ip et al., 2007; Widen et al., 2013).

Lactational amenorrhoea may be present in women who are breastfeeding. Breastfeeding suppresses ovulation during the first six months after the birth of an infant. Studies have shown that fertility is delayed in up to 98% of women who strictly breastfed every 3-4 hours during the day and at two to three times during the night (Brown et al., 2008; Cadwell & Turner-Maffei, 2007; Hatcher, 2004; Van der Wijden, Kleijnen & Van de Berk; 2003).

Breastfeeding has also been shown to decrease the risk of breast cancer (Gartner et al., 2005). There is a reduced risk of breast cancer among premenopausal women who breastfed their children (Liu et al., 2011). The longer the duration of breastfeeding was in the child bearing years, the lower the incidence of breast cancer among premenopausal women (Torgil, 2002).

Even though breast milk should be the first choice for all infants, it is important to discuss a few disadvantages associated with breastfeeding. The most notorious of all is the known risk of HIV transmission to the infant. The presence and transmission of HIV through breast milk has been established, and without any intervention, up to 25% of breastfeeding infants acquire HIV infection through the ingestion of breast milk (Coovadia et al., 2007). Infants that are exclusively breastfed carry a smaller risk (4%) than those who were mixed fed. With the recent development and intervention of prevention of mother to child treatment programmes the risk of mother-to-child transmission is further reduced (Schutzbank & Steele, 2009; Coovadia et al., 2007).

The presence of an active form of tuberculosis in the untreated mother can result in the transmission of tuberculosis through droplet nuclei to the infant during breastfeeding (not through the breast milk), hence women with active untreated tuberculosis should not breastfeed their infants until they are receiving treatment (Aquilina & Winkelman, 2008).

The American Academy of Pediatrics and the Canadian Pediatric Society consider the following as contraindications to breastfeeding: Infants with galactosemia, women who have Cytomegalovirus, Herpes on the breast, Human T-Lymphotropic Virus type 1 or 2 infection, untreated Hepatitis A or Hepatitis B and those women exposed to chemotherapy agents drug or alcohol abuse (American Academy of Pediatrics, [AAP], 2012). Anti-malarials, such as Primaquine and Quinine, as well as sulpha drugs, are contra-indicated if the mother or her infant has Glucose-6-phosphate dehydrogenase deficiency (G6PD) (AAP, 2012). Women who were exposed to radioactive isotopes should stop breastfeeding until the milk show no radioactivity and those on Metronidazole should discontinue for at least 24 hours after the last dose (AAP, 2012).

Breastfeeding places additional dietary requirements on the mother. Breastfeeding women consume between 1,500 to 1,800 calories per day which would result in 450 gm weight loss per week. However, malnourished women have deficient minerals such as iron, zinc and B₁₂ in their secreted breast milk (Mead, 2008). Hence, breastfeeding requires mothers to be mindful of their own nutrition and to continue to avoid certain foods and limit their intake of others, e.g. alcohol and caffeine (Lawrence & Lawrence, 2010). The infants born to mothers who are smoking may have smoking-induced reduction in iodine content of breast milk as compared to those who are not smoking as well as reduce the quantity of breast milk secreted by between 350 to 450 mls per day (Mennella, Yourshaw & Morgan, 2007).

2.3 Exclusive replacement feeding

Replacement feeding can be defined as a feeding practice in which infants receive no breast milk, but receive a diet that provides adequate nutrients until the age at which they can be exclusively fed on complementary food. It is recommended that women who choose to use replacement feeds during the first six months of life, should only use the recommended infant formula which is expensive in relation to cow's milk (Department Of Health South Africa & South Africa National AIDS Council [NDOH & SANAC], 2010).

The benefits of exclusive replacement feeding include the fact that it poses no risk of transmitting HIV to the infant (WHO, 2003). Since the virus is found in breast milk, avoiding all exposure to the infected milk will reduce the risk of transmission through mother-to-child transmission. Success recorded by the National PMTCT programme in Botswana, where the mother-to-child transmission rate was reduced from 30-40% prior to 1998 to less than 6% after a policy implementation of replacement feeding, showed how successful the correct implementation of an exclusive replacement feeding practice was among infants born to HIV-positive women (Dryden-Peterson et al., 2011).

There are certain maternal conditions where breastfeeding is not recommended as has been mentioned previously. In these cases commercially designed replacement feeds are nutritious and safe if correctly used (WHO, 2007b).

A significant disadvantage of replacement feeds is the association with an increased mortality and morbidity rate due to gastrointestinal and respiratory diseases (WHO, 2007c). In particular, the problem is more pronounced in less economically developed countries with poor access to clean water, unsanitary preparation conditions and lack of sanitizing equipment to prepare infant formula put infants at a greater risk of diarrhoea particularly caused by faecal contaminant, *Enterobacter sakazakii* and pneumonia (WHO, 2007b). The risk is high and an infant fed on formula milk has a 6 - 25 times increased risk of dying of diarrhoea and a fourfold risk of dying from

pneumonia as compared to a breastfed infant when exposed to the same environment (WHO, 2003).

Women either do not practise replacement feeding correctly or try to save money, or do not have money to buy commercially manufactured milk and may feed the infant diluted or too strong feeds which may lead to malnutrition (Bergstrom. 2003). Replacement feeds are expensive and it is estimated that it could cost up to \$2, 063,100:00 USD to provide formula to 10,000 HIV-positive women who chose to formula feed, whilst it will only cost about \$522, 542 USD to provide the women with Highly Active Antiretroviral Therapy (HAART) or the infants with Nevirapine whilst the women are exclusively breastfeeding (Doherty et al., 2011). A continuous, reliable formula supply is required to prevent malnutrition and commercial formula is expensive. In addition, families need resources to procure soap and sterilizing liquids for cleaning utensils used in preparing the formula (Doherty et al., 2006).

2.4 Mixed feeding as a choice

Mixed feeding is still the most common method used by many women (Coovadia et al., 2007). Breastfeeding in HIV-positive women, particularly if exclusively done, carries a significantly lower risk of HIV transmission than do all types of mixed breastfeeding (Iliff et al., 2005). Mixed feeding increases the transmission rate of HIV infection as a higher proportion of infants whose mothers who used mixed feeds, were HIV infected as opposed to those who were exclusively breastfed (Coovadia et al., 2007).

2.5 Infant feeding choices

The choice of infant feeding practice in the first six months of life is challenging for HIV-positive women, as the infant feeding recommendations for HIV-positive women differ from the recommendations for HIV-negative women (WHO, 2012). Policy makers are challenged with the task of

developing guidelines for HIV-positive women in poor resourced areas in South Africa that will inform infant feeding practices (NDOH, 2010). The benefits of promoting exclusive breastfeeding to HIV-negative women are well documented, but the promotion of exclusive breastfeeding to HIV-positive women is not without risks (Bhutta et al., 2008; Black et al., 2008; Vennemann et al., 2009).

An appropriate choice of infant feeding is fundamental to optimising infant survival and minimising infant morbidity. Women are faced with the dilemma of opposite risks on deciding to breastfeed or deciding to use replacement feeds (WHO, 2012). On the one side of the dilemma is the small but real risk of mother-to-child transmission of HIV via breast milk. On the other side, it is known that replacement feeding can reduce the HIV transmission risk, but it is also associated with diarrhoea and respiratory infections, thus increasing the risk of infant morbidity or even mortality (Doherty et al., 2006; Ip et al., 2007; Li, Fein & Grummer-Strawn, 2010; Mayer-Davis et al., 2008).

The South African government has developed guidelines to assist HIV-positive women to adopt the best infant feeding method. However, the recommendations should be based on the best available evidence that should be adapted to the specific circumstances of the individual mother, particularly those living in poor resourced settings. Research has shown that HIV-positive women struggle to protect their decision-making autonomy and that they are faced with several factors that influence their decision on infant feeding (Doherty et al., 2006).

2.6 Factors that influence infant feeding choices

Making a decision about an infant feeding option is not an easy task for mothers who opt to breastfeed their infants. The decision is further made difficult in the presence of HIV infection. Several internal and external factors

can influence the decision-making process. Factors that have been shown to influence infant feeding choices are:

- Demographic information (maternal age, marital status, infant gender and age, location),
 - Socio-economic factors (income, education, employment, autonomy).
 - Cultural influences (religion, languages, values and morals).
 - Maternal and infant health status (HIV status of mother, infant and maternal morbidity).
 - Access to utilities (sanitation, access to energy and water supply).
- (Kong & Lee, 2004).

These factors are discussed in the following paragraphs.

2.6.1 Demographic information

Karp and Lutenbacher (2011) found that women's age may influence infant feeding choice. Young women are often overweight themselves with 52% having a body mass index (BMI) of >25% or being obese (25% with BMI >30). These young and overweight or obese women often initiate inappropriate feeding practices, such as introducing cereals into their infants' bottles (82%) or starting solids before six months of age (64%). In addition, only 25% of young women usually breastfeed beyond six months. Hence, being a young mother increases the risk of suboptimal infant feeding practices. Young women's choices may be influenced by infant feeding counsellors who promote both appropriate infant feeding as well as good maternal nutrition practices (Karp & Lutenbacher, 2011; Ummarino et al., 2003).

Adherence to good infant feeding choices is improved when couples are in stable relationships, or where the household head influences the decision making process. (Swarts, Kruger & Dolman, 2010). On the other hand, Merchant et al. (2003) showed that the risk of infants dying is increased when financial assistance is dependent on the head of the household rather than on the primary care giver (mother).

Geographic location may also influence breastfeeding practices as Girma and Genebo (2002) found that infant nutrition differs between women from rural and urban areas, with malnutrition being more prevalent in rural than semi-urban and urban areas.

2.6.2 Socio economic factors

Ummarino et al. (2003) found that higher education levels support good breastfeeding practices. Their study has shown that significantly more women with high levels of education chose to breastfeed their infants. This difference was statistically significant from as early as one month and continued till six months. Women with higher educational levels preferred to breastfeed their infants, whilst women with intermediate and low levels of education introduced cow's milk at an early age.

Infants of HIV-exposed women who were unemployed had a three-fold risk of dying as compared to infants of women who were employed (Rollins et al., 2008). The resources that employment opportunities provide for HIV-positive women often translate into better decision-making about appropriate infant feeding choices and the availability of sufficient resources allows them to stick to their decision. The sad thing is that women who lack sufficient resources opt for replacement feeding even though they cannot maintain the cost of replacement feeds and consequently feed their infants with weaker compositions to try and save money (Doherty et al., 2006).

2.6.3 Cultural influences

Women who choose infant feeding options that are contrary to the community or cultural norm of the community infant feeding practice, face challenges of involuntary disclosure of HIV status. Some may suffer from stigmatisation when they choose replacement feeding in communities that are orientated to practise breastfeeding (Sibeko et.al., 2009). In some

societies the cultural norm is to mix-feed infants and pressure from older women to introduce replacement feeds often influences women's choice of infant feeding (Nor et al., 2012; Laar & Govender, 2011).

2.6.4 Disclosure of maternal and infant HIV status

The non-disclosure of HIV status and associated stigmatisation experienced by HIV infected women influence infant feeding practices. By mixed feeding, they are free from stigmatisation as the practice of either exclusive breastfeeding or exclusive formula feeding is a deviation from the norm. Women may also be stigmatised if they are seen leaving the clinic with containers of formula (Doherty et al., 2006).

2.6.5 Access to utilities

The risk of an infant dying from diarrhoea or any other waterborne disease is high and stunting is common in communities where there is poor access to proper sewage disposal (Merchant et al., 2003). Access to proper sanitation reduces the risk of stunted growth and dying from infectious diseases in infants particularly in the first year of life. The risk of dying is higher among those infants that are on replacement feeding when compared to those who are being exclusively breastfed as the water may be contaminated (Bergstrom, 2003; Plate, Strassmann & Wilson, 2004).

2.7 Growth patterns and nutritional status

The consequence of maternal HIV infection on the HIV-exposed infant starts in the uterus and impaired growth is more pronounced with increased severity of maternal HIV infection. Infants can be born with a low birth weight and subsequently, after birth, stunting, underweight and wasting (Hendricks, Eley & Bourne, 2007). The effects are more pronounced in infants infected

with the virus as compared to the uninfected infants who may experience catch-up growth later in life as compared to infants born to HIV-uninfected mothers (Hendricks et al., 2007). Eley et al. (2006) found that 50% of infants were stunted or underweight and one in five developed wasting during the course of the disease. However, with antiretroviral treatment, these infants could regain their nutritional status (Reddi et al., 2007).

Studies evaluating the nutritional status of AIDS orphans in Zimbabwe showed a threefold increased risk of underweight, a twofold increased risk of stunting and a 1.5-fold increased risk of wasting compared with children cared for by their parents (Food and Nutrition Council, [FNC], 2004). However, besides the lack of parental care, other factors that seemed to contribute to poor growth of these children were poor feeding practices, food insecurity and lack of water and sanitation (FNC, 2004).

The type of replacement feed can also influence growth. Mennella, Ventura and Beauchamp (2011) showed that infants who are fed on cow's milk formula had a significant lower weight-for-length z-score between the ages 2.5 and 7.5 months and no difference between length-for-age z-scores, compared to infants who were fed on protein hydrolysate formula milk, which indicates that the differences were due to gain in weight and not length. It is unknown whether the differences detected were because of the differences in the protein content or amino acid profile (Mennella, Ventura & Beauchamp, 2011).

2.8 Policies and guidelines

The optimal form of infant feeding recommended worldwide is exclusive breastfeeding for the first six months and the introduction of complementary food thereafter alongside breastfeeding. During its deliberation in 2001, the World Health Assembly passed resolution 47.1 to support optimal infant-feeding practices (WHO, 2001). The resolution was based on evidence of the effectiveness of such interventions and achievement like the universal

coverage of optimal breastfeeding which could prevent about 10% of deaths occurring in children less than five years of age globally (Black et al., 2008).

Feeding infant practices for HIV-positive women is a major concern of governments and agencies concerned with infant feeding. Infant feeding practices recommended to women known to be HIV-infected should support the greatest likelihood of HIV-free survival of their children and not harm the health of women either. To achieve this, prioritization of prevention of HIV transmission needs to be balanced with meeting the nutritional requirements and protection of infants against non-HIV morbidity and mortality (WHO, 2010).

The South African guidelines on infant feeding in the context of HIV make provision for both breastfeeding women as well as women who choose to formula feed their infants (NDOH, 2013). The guidelines are regularly updated and the latest recommendation was introduced in April 2013.

2.9 Conclusion

This chapter reviewed the literature on infant feeding processes, breastfeeding, its advantages and disadvantages and considered replacement feeding as an infant feeding option, its advantages and disadvantages. The methods used in collecting data for this study is considered in the subsequent chapter.

Chapter three

Research methodology

3.1 Introduction

This chapter describes the methodology used to collect data on the impact of socio-economic status of HIV-positive women on their chosen infant feeding methods and its effect on the nutritional status of their HIV-exposed infants.

3.2 Study design

A quantitative approach and cross sectional design was used to describe the socio-economic status, infant feeding practices and anthropometric status of HIV-exposed infants and evaluate the effect of socio-economic status on growth of HIV-positive women and their infants at six weeks and six months after birth. The design was adopted because data collection took place at a point in time

3.3 Population and study sample

The population consisted of all women who attended the Delft Community Health Centre's (CHC) well-baby clinic. Mothers who presented at the Delft CHC with infants whose age were between six weeks and six months and who had participated in the Prevention of Mother-To-Child Transmission (PMTCT) programme were asked to participate in the survey.

3.4 Setting

Mother-infant pairs came from the community of Delft. The settlement is located close to Cape Town International Airport. Delft was established in 1989 as the first inter-racial community for coloureds and blacks. The establishment of the Delft community was to relieve the pressure of

overcrowding among the other city's black and coloured communities. The Delft population consists of mostly Coloureds (70%) and Xhosas (30%). The commonly spoken languages are Afrikaans and Xhosa as first languages while English is used as a second language. The community is surrounded by the building projects of the N2 gateway and there are insufficient job opportunities and rising crime rates (Statistics South Africa [SSA], 2011).

3.5 Inclusion and exclusion criteria

Mother-infant pairs who presented their infants to the well-baby clinic at Delft were approached by the researcher to participate in the study. Those who met the inclusion criteria were requested to sign the informed consent form after it was explained to them. The inclusion criteria included women:

- Who were positively identified to have been HIV-positive through the records in their infant Road-to-health card and who participated in the PMTCT programme, before, during and after birth and their infants received Nevirapine and Zidovudine at birth,
- Whose infants were between six weeks and six months of age,
- Women who gave written informed consent.

Infants who had any of the following were not enrolled into the study:

- Required special feeding after birth, which could have affected the infant feeding practices of the women.
- A birth weight less than 2.5 kg
- A prolonged hospital stay in the neonatal unit after delivery
- Infants who had congenital anomalies
- Infants with in-born errors of metabolism

3.6 Study sample

The study made use of a purposeful, convenient sample size. Mother-infant pairs were approached serially as they wait for their turn with the midwives at the well-baby clinic. It was purposeful in that the researcher only recruited the mother-infant pairs who met the inclusion criteria and who were willing to participate in the study. The researcher used a convenient sample to complete recruitment within a set time as the study was executed as partial fulfilment of an academic degree. A total of 125 mother-infant pairs met the purpose full criteria within the time period and the sample thus consisted of 125 participants (Bataglia, 2011:523).

3.7 Data collection

The data collection was done by the researcher, assisted by the study assistant who was trained by the researcher prior to the commencement of the study. Data collection was carried out on the days that the clinic offered well-baby services. These services were initially offered on a Wednesday but later moved to every Friday. The research assistant also acted as an interpreter for the researcher in situations where the women could not understand English language. Data was collected from the 1st July 2009 to 11th December, 2009. After informed consent was obtained, data were collected from the women using structured questionnaires. Anthropometric measurements were then taken from the infants. Weight measurements were carried out with an electronic digital scale and a standardized length board was used for infant length measurement. Good clinical practice was followed according to the International Conference on Harmonization of Good Clinical Practice (ICH GCP) principles during the data collection process (NDOH, 2006).

3.8 Instruments

A case report form (Appendix I) was used to collect information from the mother-infant-pair and to record anthropometric information. The case report form is divided into eight sections which covered the following variables.

The first section was completed by the researcher and covers the inclusion criteria such as whether the mother was on the PMTCT programme, age of infant and date of interview. Four biographic questions followed which gave the researcher insight into the marital status of the participants, their religious inclinations as well as the sections of the community where they live within Delft. The following nine questions addressed anthropometry, polymerase chain results at seven weeks and whether the mother disclosed her status or not.

Immunization records section consisted of four questions where type and dose of immunizations were recorded from infant's road-to-health card. Infant health section consisted of nine questions related to the history of infant clinic visits or hospitalization at birth or since discharge. The reasons for the clinic visit or admission as well as medications given were asked and recorded in this section.

Demographic data evaluated the distance from the health centre to the residence of the mother-infant pair and how long it took to reach the health facility. The cost and means of transportation from the home to the clinic was also evaluated. Access to an energy source in the household (electricity, paraffin, liquefied petroleum gas or coal) and to water and sanitation (flush toilet, pit latrine or open field defecation or bucket means of sewage disposal) were recorded. The presence of piped water in the household, communal tap or river, dam water or collection of rain water was also obtained.

Socio-economic data covered employment status, type of housing, occupancy and adult versus children under the age of five occupancy

density. The section also collected data on level of education as well as literacy level. The personal income that is available to the mother as well as the total household income information was collected under this section.

Five questions assessed the infant feeding method, the frequency of the chosen method and the practice of the chosen method. Other questions dealt with the demonstration of the infant feeding method particularly if replacement feeding method was practiced, care of the feeding utensils, source of water, handling, storage and preparation of infant feeds.

3.9 Validation of Anthropometry

Anthropometric data collected consisted of weight, length and head circumference. The anthropometric data at birth was obtained from the infant's road-to-health chart while the second data was collected on the day of the visit. The anthropometry was done based on the WHO protocol on measurements and standardization for anthropometry (De Onis et al. 2004).

The weighing scale was standardized every morning with a standard 2.00 kg weight, the infants were weighed with no clothes or with a light vest if the weather was not conducive. The infants were weighed by the researcher, to the closest 0.1kg.

The infant length was measured using an infant length mat, to the closest 0.1cm. The mat had a fixed headboard and a movable foot board. The infants were made to lay flat on the mat with their occiput, shoulders on the mat and their eyes positioned such that the outer canthus of their eyes is at the same plane with their tragion.

The head circumference was measured over the widest occipito-frontal prominence. The head circumference was measured to the closest 0.1 cm.

3.10 Data capturing and analysis

The data capturing took place immediately after the interviews. EpiData version 3.0 was used to capture the information from the case report files (CRF). The information on the CRF was checked for correctness before entry and all data was entered twice into EpiData 3.0. The data was analysed using Stata version 12. Central tendencies (mean, standard deviation and range) were used to analyse continuous data. Shapiro-Wilk test was used to test the skewedness of the data and the mean was used for normally distributed data. Categorical data were analysed using proportions.

The z-score is widely recognised as the most appropriate way to present infant anthropometric information as the z-score scale is linear and the differences between the intervals are fixed, thus having the same statistical relation to the distribution of the reference around the mean. The z-score expresses the proportion of infants of the sample that deviates from the reference mean in relation to the outcome measured. Anthropometric analyses were done based on the WHO anthropometry calculator (WHO, 2009b). The WHO anthropometry calculator (2009b) was used to calculate the Z-scores as this calculator “facilitated detection of thinness, overweight and obesity in individuals and populations from 0-19 years” (WHO 2009b:vi). Data are therefore presented within the interval corresponding to z-scores between -3 and +3. The reason for not going beyond ± 3 Standard deviations (SD) is that percentiles beyond ± 3 SD are seen as being “invariant to changes in equivalent z-scores” (WHO, 2009b:11).

3.11 Presentation of results

The results of the study are presented in chapter four. Descriptive tables were used to present the results.

3.12 Pilot study

Prior to the commencement of the study, the researcher conducted a pilot study to evaluate the validity and reliability of the data collection sheet and the anthropometric measurements. Face and content validity were evaluated by sending the case report file to two experts in the field. The CRF was adapted to incorporate their recommendations. The researcher attended WHO anthropometry course and was evaluated to ensure that anthropometric readings were executed with validity and reliability.

3.13 Validity and Reliability

Validation exercise by the researcher and his research assistants took place before the pilot study to minimise intra and inter observer bias. The exercise was repeated until differences in weight measurements were minimized to 0.1kg and differences in length and head circumferences were minimized to 0.5cm between the researcher and his research assistants. The case report forms was discussed and responses simulated to ensure that both the researcher and the research assistants understood the meaning and context on which the questions were asked. The case report forms were given to two experts in the field to assess the forms for both the contents as well as its face validity.

During the pilot study, the researcher and his assistants ensured that their measurements on a set of 20 infants did not differ by 0.1kg for weight, and 0.5cm for length and head circumference measurements. The case report forms were administered and responses evaluated by the researcher for their validity and reliability. During the trial, the researcher ensured that standardization of the weight and length board were carried out in the morning of the day of the data collection. The standardization was repeated after every 10 infants interviewed.

3.14 Ethical considerations

The researcher obtained ethical approval from the Research Ethics Committee (REC) at University Of Cape Town Faculty of Health Sciences. The ethics approval is attached as an appendix. The researcher who is a certified International Conference on Harmonization of Good Clinical Practice (ICH GCP) researcher ensured that the study was conducted in accordance with the principles of the South African Good Clinical Practice (SA GCP) as well as the ICH-GCP. The principles that guided the researcher were based on ensuring confidentiality of participation.

An information pamphlet explaining the objectives, procedures (questionnaire and anthropometry measurement), possible risks and benefits of participation in the study was given to each mother to read. She was also verbally informed about the same. Once the researcher was sure that the participant understood the study, written consent was obtained. The informed consent process was administered by the researcher and aided by his trained study research assistant where translation was required. Subsequent to agreeing to participate, an impartial witness (someone of the subject's approval) asks the participant whether she understood the study and informed consent. If she agreed, the researcher and the witness signed the consent form.

Participation in the study was free and voluntary. The mother could withdraw herself, or her child or both from the study at any point in the study, without giving any reason for the decision to do so. She was ensured that the withdrawal would have no consequences whatsoever for the level or standard of care given to them.

All mother-infant pair records were identified by means of a unique study number. No names were used to identify study CRFs. All records were stored securely in a locked cabinet. Similarly, all electronic data information was securely stored on the computer with password-restricted access which is limited to the researcher. Every effort was made to protect their privacy and conceal their HIV-1 status from those outside the study.

Chapter four
Results

4.1 Introduction

Chapter four presents an interpretation of the results. The results are presented in descriptive tables under the following sections: demographic information, socio-economic status, cultural background, maternal and infant health status and access to utilities. Women's infant feeding practices, anthropometric outcomes of the infants as well as the effect of socio-economic status on growth and the nutrition are also presented.

4.2 Demographic information

The mean age of the women who participated was 27.8 years. Nearly two thirds of the women were single and the majority lived within 5 to 10 km radius from the clinic, with only 7.2% living more than 10 km away from the clinic. Most walked to the clinic (66.4%) and could reach the clinic within an hour. Those who used a taxi spent on average less than R10 on transport. The male infants were more in number than their female counterparts by one (63 males, 62 females) and the infants ages were between 5.7 to 25.9 weeks with a mean weight of 6.02 kg at the time of the assessment (Table 4.1 and 4.2).

Table 4.1 Demographic continuous data information

Outcome	n/N	(%)	Mean	(SD)
Mother's age (years)	123/125	(98.4%)	27.8	(5.5)
Infant's age (days)	125/125	(100%)	12.9	(5.3)
Infants weight at birth (kg)	124/125	(100%)	3.2	(0.4)
Infants weight (kg)	125/125	(100%)	6.0	(1.3)
Infant length (cm)	122/125	(97.6%)	59.4	(4.9)
Infant head circumference (cm)	123/125	(98.4)	41.0	(2.5)

Table 4.2 Demographic categorical information

Outcome		n/N	(%)
Infant gender	Male	63/125	50.4
	Female	62/125	49.6
Mothers' Marital status	Single	78/124	62.9
	Married	39/124	31.5
	Living together	5/124	4.0
	Divorced	1/124	0.8
	Other	1/124	0.8
Distance to clinic	<5 km	67/125	53.6
	5 - 10 km	45/125	36.0
	>10 km	9/125	7.2
	Not known	4/125	3.2
Duration to get to clinic	< 15 min	32/125	25.6
	15 - 30 min	60/125	48.0
	31 - 60 min	17/125	13.6
	> 60 min	12/125	9.6
	Not known	4/125	3.2
Transport fare to clinic	R0 - R5	97/125	77.6
	R6 - R10	20/125	16.0
	R11 - R15	6/125	4.8
	>R15	2/125	1.6
Transport	Walking	81/122	66.4
	Taxi	41/122	33.6

4.3 Socio-economic factors

Less than one third of the participants stated that they earned more than R800.00 per month, although nearly two thirds reported that the total household income was more than R800.00 per month (Table 4.3).

Table 4.3 Income

Outcome		n/N	(%)
Own income	Nil own income	14/104	13.5
	< R100	3/104	2.9
	R100 - R299	29/104	27.9
	R300 - R499	14/104	13.5
	R500 - R799	10/104	9.6
	>R800	34/104	32.7
Total income	< R100	2/99	2.0
	R100 - R299	15/99	15.2
	R300 - R499	11	11.1
	R500 - R799	12	12.1
	>R800	59	59.6

All the women stated that they could write, but two could not read. Few (4.1%) of the women had some primary education, which is described as having spent less than seven years in primary school without completion. Half of the women (50.4%) have spent up to five years in secondary school without completing secondary school. (Table 4.4).

Table 4.4 Education

Outcome		n/N	(%)
Education	Some primary	5/123	4.1
	Complete primary	7/123	5.7
	Some secondary	62/123	50.4
	Complete secondary	47/123	38.2
	Tertiary	2/123	1.6
Read	Yes	123/125	98.4
	No	2/125	1.6
Write	Yes	125/125	100

Unemployment was prevalent, with 55.2% being unemployed before they fell pregnant and 78.2% unemployed at the time of the interview (Table 4.5).

Table 4.5 Employment

Outcome		n/N	(%)
Before pregnancy	Employed	56/125	44.8
	Unemployed	69/125	55.2
Currently	Employed	27/124	21.8
	Unemployed	97/124	78.2

4.4 Cultural influences

The majority of the women spoke IsiXhosa, reside in Delft South and belonged to the Protestant religion. Very few reported other religions and only eight women stated that they spoke Afrikaans at home (Table 4.6).

Table 4.6 Cultural influences

Outcome		n/N	(%)
Religion	Protestant	112/116	96.6
	Catholic	3/116	2.6
	Others	1/116	0.8
Language	IsiXhosa	116/125	92.8
	Afrikaans	8/125	6.4
	Others	1/125	0.8
Language by residence area section			
Delft South	IsiXhosa	110/119	92.4
	Afrikaans	0/119	0
Rosendal	IsiXhosa	0/119	0
	Afrikaans	1/119	0.8
Voorbrug	IsiXhosa	0/119	0
	Afrikaans	1/119	0.8
Eindhoven	IsiXhosa	0/119	0
	Afrikaans	1/119	0.8
	Others	1/119	0.8
Leiden	IsiXhosa	4/119	1.0
	Afrikaans	0/119	0
The Hague	IsiXhosa	0/119	0
	Afrikaans	1/119	0.8

4.5 Maternal and infant health status

The women were approached to participate in the study based on their HIV status which was established from the infants Road-to-Health card. The evidence to approach the women was based on documentation of their infants receiving neonatal antiretroviral. The women had disclosed their HIV status at the time of the assessment either to their partners or to close family members with only 15.5% who were yet to disclose their HIV status. At the time of the study a six-week Polymerase Chain Reaction (PCR) for infant HIV-testing was introduced. A total of 52 Infant PCR results were available at the time of the study and of those, 98.1% tested negative for HIV at six weeks. Of the total study population, 43 mothers were still awaiting results which were due to the delay in turnaround time experienced at the centrally collated PCR laboratory test centre, while 26 infants were not yet tested at the time of the study. The majority of the infants had received full immunization at birth and only 37 (29.6%) had experienced some illness since birth. Respiratory associated diseases were the main reason why women sought medical help for their infants. Diarrhoeal disease accounted for 21.6% of the infants that received medical help (Table 4.7).

Table 4.7 Maternal and health status

Outcome		n/N	(%)
Disclosure	Partner	47/116	40.5
	Parents/Siblings	48/116	41.4
	Friends	3/116	2.6
	Not yet	18/116	15.5
Infant PCR	Infants tested	52/121	43
	Awaiting results	43/121	35.5
	Not tested yet	26/121	21.5
Infant PCR results obtained	Positive	1/52	1.9
	Negative	51/52	98.1
Immunization at birth	BCG no TOPV	1/125	0.8
	TOPV no BCG	3/125	2.4
	Both	121/125	96.8
Infant illness since birth	Yes	37/125	29.6
	No	88/125	70.4
	Respiratory	19/37	51.4
	Diarrheal	8/37	21.6
	Unknown	10/37	27.0

4.6 Access to utilities

About three quarters (78.4 %) of the women lived in brick houses with one to two rooms (73%). The results show that most houses were occupied by more than two people and children under the age of five. Nearly all the women had access to flush toilets (95.2%), electricity (91.9%) and slightly fewer (74%) had tap water in the homes or a refrigerator (63.7%) (Table 4.8).

Table 4.8 Access to utilities

Outcome		n/N	(%)
Housing	Bricks	98/125	78.4
	Shacks	27/125	21.6
Number of rooms	1 -2 Rooms	89/122	73.0
	3 - 4 Rooms	30/122	24.5
	5 - 6 Rooms	3/122	2.5
Number of people in house	1-2 People	11/124	8.9
	3 - 4 People	67/124	54.0
	5 - 6 People	30/124	24.2
	> 6 People	16/124	12.9
House occupancy	1-2 Children <5	114/125	91.2
	3-4 Children <5	7/125	5.6
	5-6 Children <5	4/125	3.2
	1-2 Adults >18	81/123	65.9
	3-4 Adults >18	39/123	31.7
	5-6 Adults >18	3/123	2.4
Sewage disposal	Flush toilet	118/124	95.2
	Pit latrine	2/124	1.6
	Bucket	3/124	2.4
	Bush	1/124	0.8
Refrigerator	Yes	79/124	63.7
	No	45/124	36.3
Water Source	Tap in house	91/123	74.0
	Communal tap	32/123	26.0
Energy source	Electricity	114/124	91.9
	Paraffin	7/124	5.7
	Gas	3/124	2.4

4.7 Women's' infant feeding practices

Nearly all the women (84.3%) chose replacement feeds due to their HIV-positive status. Only 11.2% of the mothers were mix-feeding their infants and indicated that insufficient breast milk was the reason for mixed feeding (4.6%). A low percentage (10.4%) of the women introduced solids to their infants (Table 4.9).

Table 4.9 Feeding method

Outcome	n/N	(%)	
Feeding method	Formula only	111/125	88.8
	Mixed feeding	14/125	11.2
Reason for choosing formula feeds method	Insufficient breast milk	5/108	4.6
	Due to HIV+	91/108	84.3
	Other	12/108	11.1
Number of women who introduced solids		13/125	10.4

Women used approximately 136.6 mls of lukewarm water and added about 5.4 scoops of formula to the water. This can be translated to be equivalent to what the manufacturers' advise as five scoops per 125 mls. The mean age that solids were introduced to the infants was 47 days (Table 4.10).

Table 4.10 Infant feeding

Outcome	Mean (SD)		Range (Min-max)
Volume per feed	136.6	(44.0)	215 (60 - 275)
Scoops of formula per feed	5.4	(1.8)	9 (1 - 10)
Age in days when solids were introduced	47	(51.7)	150 (0 - 150)

Almost three quarters of the women (71.7%) prepared single feeds. This resulted in the use of at least one 500 g tin of formula powder a week. Lukewarm water was used to prepare infants' milk by 90.4% of the women and 84.8% mixed water first before adding powdered milk. The practice of storing left over milk was common (36.8%). The use of boiling water and salt as the means of cleaning the infants' feeding bottles and teats were reported as a method by 43.4% of the mothers. Only 18.9% reported using disinfectants for cleaning their infant feeding bottles (Table 4.11).

Table 4.11 Feeding practices

Outcome		n/N	(%)
Single feeds	Yes	86/120	71.7
	No	34/120	28.3
Tins used per week	¼ - ½	4/125	3.2
	¾ -1	2/125	1.6
	>1 tin	119/125	95.2
Temperature of water	Cold	3/125	2.4
	Lukewarm	113/125	90.4
	Hot	9/125	7.2
Mixing	Water first	106/125	84.8
	Powder first	19/125	15.2
Left over milk	Stored	43/117	36.8
	Discarded	74/117	63.2
Clean utensils	Soap & water	45/122	36.9
	Boiling & salt	53/122	43.4
	Disinfectant	23/122	18.9
	Other	1/122	0.8

Almost all the women (83.9%) indicated that they received infant feeding counselling and instruction on feed preparation. Although only few (23.4%) said they actually demonstrated back to the health care provider how to prepare the feeds as required by the infant and young child feeding policy. About three quarter (76.6%) of the mothers did not receive follow up counselling on infant feeding by health workers on their return to the health facility (Table 4.12).

Table 4.12 Knowledge

Outcome		n/N	(%)
Mother's Knowledge on feed preparation	Yes	122/123	99.2
	No	1/123	0.8
Preparation education by health worker	Yes	104/124	83.9
	No	20/124	16.1
Feeding counselling by health worker	Yes	112/125	89.6
	No	13/125	10.4
Prepare formula under supervision	Yes	29/124	23.4
	No	95/124	76.6
Follow up counsel by health worker	Yes	78/124	62.9
	No	46/124	37.1

4.8 Anthropometric outcomes of infants

The infants in the study had a mean weight of 6.0 kg, mean length of 59.4 cm and head circumference of 41.0 cm. The infants' body mass mean index was 17.2% (Table 4.13).

Table 4.13 Infant anthropometry

Outcome	n/N	(%)	Mean	(SD)
Weight (kg)	125/125	(100)	6.0	(1.3)
Length (cm)	122/125	(97.6)	59.4	(4.9)
Head circumference (cm)	123/125	(98.4)	41.0	(2.5)
BMI (%)	122/125	(97.6)	17.2	(3.4)

The weight-for-length z-score in the sample showed that 7.7% of the infants were wasted and 0.9% severely wasted. On the other hand, weight-for-length z-score showed that 14.5% of the infants were at risk of becoming overweight and 7.7% at risk of becoming obese.

Length-for age (stunting) z-scores showed that 12.4% (-3SD) of the infants were severely stunted and 17.4% (-2SD) were at risk of severe stunting.

Weight-for-age z-score shows that 4% of the infants were underweight or malnourished and 1.6% severely underweight.

The BMI for age cut-off for +1SD is equivalent to overweight, 2 z-scores for obese while scores of +3SD indicates severe obesity (WHO, 2009b:9). BMI-for-Age z-scores showed that 13.2% of the infants were obese and 4.1% severe obesity (Table 4.14).

Table 4.14 Infant anthropometry Z-scores

Measurement indicators	-3SD	-2SD	-1SD	Mean (SD)	+1SD	+2SD	+3SD
Weight-for-Length (wasting) (N=117)	0.9%	7.7%	0%	0.35 (1.66)	33.3%	14.5%	7.7%
Length-for-Age (Stunting) (N=121)	12.4%	17.4%		-0.36 (1.83)			
Weight-for-Age (malnutrition) (N=125)	1.6%	4%		-0.03 (1.16)			
BMI-for-age (Obesity) (N=121)	0.8%	2.3%		0.28 (1.53)	27.3%	13.2%	4.1%

4.9 Effect of socio-economic status on infant anthropometry

Body mass index (BMI) is a calculated measure to classify children as underweight, overweight and at risk of being overweight. It is an acceptable indicator of body fatness although it does not directly measure body fat. The Centers for Disease Control and Prevention (CDC) or the WHO growth charts are often used to determine the corresponding BMI for children. Body mass index has not commonly been used in the infant population, but new charts have been developed to include very low birth weight infants as well as exclusively breast fed infants. These changes provide more accurate readings for BMI measurements and CDC promote the use of WHO Growth Standards growth charts for infants for all racial groups. The socio-economic status and growth of infants in this study was compared using children WHO growth charts. Cognition is given that BMI categorization should be interpreted with caution as infants under the age of six months may have different amounts of body fat at different ages, but can be used as a reliable indicator to identify early obesity (Dinsdale, Ridler & Ells, 2011).

Few infants were underweight if their mothers' personal income or total household income were more than R800.00 per month, 12.7% and 1% respectively. Nearly twice as many infants (49.6%) of the single mothers were underweight as compared to infants (19.8%) whose parents were married. Similarly, twice as many infants (50%) were underweight if their mothers walked to the health facility compared to 23.8% of infants' whose mothers' used taxis. (Table 4.15[1]).

Education and employment status of the mothers appeared to be associated with less risk of becoming underweight as twice as many infants (55.8%) were underweight when their mothers did not complete secondary school compared to 23.3% of infants whose mothers did complete secondary schooling. Nearly fourfold more infants (59.5%) were underweight if their mothers were unemployed compared to those infants (14.9%) whose mother were employed. Housing, the presence of a flush toilet or running tap water in the house did not improve the body mass index of infants. A total of 57.4% of the infants whose mothers resided in brick houses, 71.9% of infants whose mothers had access to flush toilets and 57.5% who had running tap water in the house were still underweight (Table 4.15 [2]).

Infants whose mothers lived in houses with less than two rooms or where 3-4 people occupy the house had a higher risk of being underweight (54.6% and 40.5% respectively). Underweight children were still prevalent even if the rooms were occupied by only one adult (50%) or 1-2 children (67.2%). There was no significant relationship between socio-economic factors and anthropometry measurements (Table 4.15[3]).

Table 4.15 Socio-economic factors in relation to anthropometry outcomes (1)

Outcome	BMI < 18.5		18.5-24.9		25-29.9		>30	
	n/N	%	n/N	%	n/N	%	n/N	%
Personal Income								
P=0.224								
<R100	26/102	25.5	5/102	4.9	0		0	
R100-299	10/102	9.8	4/102	3.9	0		0	
R300-499	7/102	6.9	2/102	2.0	1/102	1.0	0	
R500-799	23/102	22.5	9/102	8.8	0		1/102	1.0
>R800	13/102	12.7	1/102	1.0	0		0	
Total Income	n/N	%	n/N	%	n/N	%	n/N	%
P=0.674								
<R100	13/97	13.4	3/97	3.1	0		0	
R100-299	10/97	10.3	1/97	1.0	0			
R300-499	9/97	9.3	2/97	2.1	1/97	1.0	0	
R500-799	43/97	44.4	13/97	13.4	0		1/97	1.0
>R800	1/97	1.0	0		0		0	
Marital status	n/N	%	n/N	%	n/N	%	n/N	%
P=0.766								
Married	24/121	19.8	13/121	10.7	1/121	0.8	0	
Single	60/121	49.6	15/121	12.4	0/121	0	1/121	0.8
Living together	5/121	4.1	0		0		0	
Divorced	1/121	0.8	0		0		0	
Others	1/121	0.8	0		0		0	
Transport	n/N	%	n/N	%	n/N	%	n/N	%
P=0.393								
Walking	61/122	50.0	16/122	13.1	0/122		1/122	0.8
Taxi	29/122	23.8	11/122	9.0	1/122	0.8	0/122	
Others	1/122	0.8	2/122	1.6	0/122		0/122	

Table 4.15 Socio-economic factors in relation to anthropometry outcomes (2)

Outcome	BMI < 18.5		18.5-24.9		25-29.9		>30	
	n/N	%	n/N	%	n/N	%	n/N	%
Education P=0.102								
Some primary school	3/120	2.5	2/120	1.7	0		0	
Completed primary school	4/120	3.3	3/120	2.5	0		0	
Some secondary school	54/120	45.0	7/120	5.8	0		0	
Completed secondary school	28/120	23.3	16/120	13.3	0		1/120	0.8
Post-secondary school	1/120	0.8	1/120	0.8	0		0	
Employment status P=0.244	n/N	%	n/N	%	n/N	%	n/N	%
Employed	18/121	14.9	7/121	5.8	0		1/121	0.8
Unemployed	72/121	59.5	22/121	18.2	1/121	0.8	0	
Housing P=0.575	n/N	%	n/N	%	n/N	%	n/N	%
Brick/RDP	70/122	57.4	24/122	19.7	1/122	0.8	1/122	0.8
Shack/wendy	21/122	17.2	4/122	3.3	0		0	
Others	0		1/122	0.8	0		0	
Sewage disposal P=0.930	n/N	%	n/N	%	n/N	%	n/N	%
Flush toilet	87/121	71.9	26/121	21.5	1/121	0.8	1/121	0.8
Non flush toilet	4/121	3.3	2/121	1.7	0		0	
Water source P=0.490	n/N	%	n/N	%	n/N	%	n/N	%
Tap in house	69/120	57.5	18/120	15.0	1/120	0.8	1/120	0.8
Tap outside house	21/120	17.5	10/120	8.3	0		0	

Table 4.15 Socio-economic factors in relation to anthropometry outcomes (3)

Outcome	BMI < 18.5		18.5-24.9		25-29.9		>30	
	n/N	%	n/N	%	n/N	%	n/N	%
Rooms per housing P=0.875								
1-2	65/119	54.6	19/119	16.0	1/119	0.8	1/119	0.8
3-4	21/119	17.6	9/119	7.6	0		0	
5-6	3/119	2.5	0		0		0	
People per room P=0.146	n/N	%	n/N	%	n/N	%	n/N	%
1-2	8/121	6.6	2/121	1.7	0		1/121	0.8
3-4	49/121	40.5	16/121	13.2	0		0	
5-6	21/121	17.4	7/121	5.8	1/121	0.8	0	
>6	12/121	9.9	4/121	3.3	0		0	
Adults per room P=0.921	n/N	%	n/N	%	n/N	%	n/N	%
0-1	60/120	50	16/120	13.3	1/120	0.8	1/120	0.8
2-3	28/120	23.4	11/120	9.2	0		0	
>4	2/120	1.6	1/120	0.8	0		0	
Children <5 per room P=0.926	n/N	%	n/N	%	n/N	%	n/N	%
1-2	82/122	67.2	27/122	22.1	1/122	0.8	1/122	0.8
3-4	6/122	4.9	1/122	0.8	0		0	
5-6	3/122	2.5	1/122	0.8	0		0	

4.10 Conclusion

The preceding concludes the presentation of results from this study. Discussion of these results will follow in the subsequent chapter.

Chapter five

Discussion and recommendations

5.1 Introduction

The following section highlights the findings of the study with the study objectives serving as the framework for the discussion. The comparisons with similar literature are incorporated to relate salient points observed in this study. The implication for research and subsequent conclusions are discussed.

5.2. Discussion

The WHO as quoted in (Schoeps et al, 2011) recommends that all health facilities should be within walking distance from the users. The results of this study showed that the clinic is accessible as far as distance is concerned as only 7.2% of the women stayed more than 10 km away from the clinic and could reach the clinic within 30 minutes if they walked.

The 2011 census reported that about 24.5% of the people in Delft earned an income of between R1 - R1600.00 (SSA, 2011). The women who participated in the study were poorer compared to the greater population of Delft as nearly 40% earned a total income of less than R800.00 per month. The results of this study differ slightly with the 2011 census report in that 38.2% of women in Delft completed secondary school education in contrast to the 22.7% of women as reported in the census (SSA, 2011). However, those who completed primary education (5.69%) in the study population were close to the 4.6% of the census figure among the South African population, but less than the overall proportion of those who completed primary education in the census figures (7.4%). Unemployment rate is higher among the study mothers at 55.2% before pregnancy and rose to 78.2% after delivery as compared to the general population of 39.4% among the inhabitants of Delft (SSA, 2011).

Most women (92.8%) in the study stated that their home language is isiXhosa. Given the results of the 2011 Census report one would have expected that more women would report Afrikaans or English as their home language as 58.4% of Delft inhabitants were Coloured (SSA, 2011). The high percentage of isiXhosa speaking people maybe due to the fact that the clinic is closer to Delft South, which is inhabited by mostly people who speak isiXhosa. Delft is subdivided into six sections namely, The Hague, Rosendal, Voorbrug, Eindhoven, Leiden and Delft South. The first three sections are predominantly "coloured" while Eindhoven is partially inhabited by "coloureds" and "blacks" and Delft South and Leiden are predominantly "black" (Klein and Wessels, 2007). The most populous religion in South Africa is Christianity (74%), similarly did the study show that practicing Protestants (96.5%) constitute the main religion of the women (SSA, 2011).

Disclosure of HIV status to immediate family members enhances infant feeding practices. Most mothers in this study did disclose their status, and their infant feeding practices could have been influenced by their family members (Madiba & Letsoala, 2013; Linda, 2013; Doherty et al. 2006).

Mother-to-child transmission occurred in only one out of the 52 infant PCR test results that was received which is lower than the national 3.5% mother-to-child transmission rate (NDOH, 2011; Kumwenda et al., 2008). The proportion of infants seeking health attention was 29.6% and most of the infants sought medical attention for respiratory conditions (51.4%) and diarrhoeal conditions (21.6%). Diarrhoeal conditions can contribute to impaired growth as it may cause depletion of key minerals and interfere with the absorption of other elements required for nutritional uptake (Garcia, 2012).

Slightly fewer mothers occupy formal housing than was reported in the census, 78.4% vs 87% (SSA, 2011). The level of access to sanitary facilities (flush toilet and piped water) was similar between the census figures as well as the study population. In this study population, 95.2% had access to flush

toilets which was similar to the census figure of 94.4% having access to same facilities (SSA, 2011). The percentage of mothers who had access to electricity also corresponds with the figures reported in the census (91.9% vs 98.7%). The importance of energy source, access to piped water and the chosen infant feeding method may be reflective of the high proportion of mothers who opt for replacement feeding as they in principle met the AFASS criteria as described by Coovadia et al. (2007).

Weight-for-length z-scores indicated that current infant feeding method of replacement feeding may result in obese infants (7.7%), which is slightly lower than the 9.5% that was reported by Bosman et al., (2011). Analysis of weight for age showed that 5.6% of the infants were underweight, which is slightly fewer than the 6.8% reported by Bosman et al., (2011). More infants (29.8%) were stunted in this study compared to the 20.1% reported by Bosman, et al., (2011).

The results of this study are supported in that Janevic et.al. (2010) as well as Alom, Quddus and Islam (2012) reported that the higher the personal income and total household income the lesser the risk is of infants being underweight. Several authors confirmed the findings of this study that being a single, young mother with low level of education is associated with stunting underweight and wasting (Lakshaman et al., 2013; Muhangi et al., 2013; Javenic et al., 2010). Similarly, Mohammadzadeh et al., (2010) demonstrated that unemployment increases the risk of underweight infants.

The results concur with Phuphaibul et al., (2011) findings which showed that family size may influence infant BMI. There was a three times risk of underweight in infants who come from overcrowded households where mothers reside in one to two room facilities. Similarly, there is an increased risk for underweight among infants who come from densely occupied households with more adults occupying the rooms. The risk of being underweight is three times higher compared to infants with normal BMI from

similar households but fewer adult occupancy rates (Mohammadzadeh et al., 2010).

5.3 Limitations

It is important to highlight the limitation of the study. The researcher depended on information recorded by professional nurses on the road-to-health card of the infants. Several cards were incomplete and the most common omissions were birth length, head circumference and immunization record. Professional nurses also do not use standardized anthropometry measurements at birth, and information transcribed from the road-to health card should thus be interpreted with caution. A simple calculated random selection would have been a better choice but due to financial and time constraints did the researcher decided to use a convenient sample and therefore acknowledge the risk of selection bias in the study sample.

5.4 Conclusions and recommendations

The results of this study show that socio-economic factors do influence the growth and nutritional status of HIV-exposed infants, although none of the factors contributed significantly to the outcomes. Despite women receiving free formula from the health facility, this did not improve their infants' growth and nutritional status. Further research is required to establish exactly which of the socio-economic factors strongly correlate with stunting and wasting

The economic burden of providing free formula feeds is much greater than providing HAART or ARVs to infants. Long term ARVs given to breastfeeding infants has been proven to be effective and cost efficient in preventing mother to child HIV transmission during breastfeeding (Doherty et. al., 2011, Nagot et al., 2012).

It is strongly recommended that exclusive breastfeeding should be the norm rather than the exception irrespective of the HIV status of mother infant pairs, as long as ARV's are administered to mothers or infants while breastfeeding.

The benefits far outweigh the disadvantages of replacement feeding on growth and development of HIV-exposed infants. This is in line with the Tswane Declaration of support for breastfeeding in South Africa 2011, which actively promotes and support exclusive breastfeeding (NDOH, 2011b).

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nt c

4 Physical home address

5 Infant Male Female
gender

6 Length of infant at birth (cm)

7 Head circumference at birth
(cm)

8 Weight of infant at birth (g)

9 Weight of infant today (g)

10 Length of infant today (cm)

11. Head circumference today
(cm)

12 PCR Results at 7 weeks

13 Mothers status and
disclosure

Infant immunisation record

1 Immunisations at birth TOPV BCG Both

2 Immunisations at 6 weeks TOPV DPT HIB HBV ALL

3 Immunisations at 10 weeks TOPV DPT HIB HBV ALL

4 Immunisations at 14 weeks TOPV DPT HIB HBV ALL

Infant health record

1 Has your infant been sick since discharge YES NO

from hospital at birth?

- 2 If yes, specify
- 3 If yes, did you seek care for the infant? YES NO
- 4 If yes, from whom did you receive care?
- 5 For how long did the above symptom persist?
- 6 Has your baby been admitted to a hospital YES NO
for illness since discharge at birth?
- 7 What was the reason for admission OR
illness diagnosed?
- 8 For how long was your infant in hospital?
- 9 Did the infant receive any medication? If yes YES NO
specify

Demographic data

- 1 How far is the nearest clinic to your house? < 5km 5 – 10 km > 10 km
- 2 How long does it take to reach the nearest clinic? < 15 min 15 – 30 min 30 min – 1 hour > 1 hour
- 3 What does it cost you to reach your nearest clinic? R0 – R5 R6 – R10 R11– R15 > R15
- 4 What method of transport do you use? Walk Car Taxi Bus Bicycle Other
- 5 Where do you Running Communa River Da Other

- get water for water in I tap household use? household
- 6 What type of sanitation facility do you use? Flush toilet Pit latrine Bucket Others
- 7 If non flush toilet, how many times per week does a sanitation service visit your area (i.e. rubbish removal)? < 1 time Once > once No waste disposal system
- 8 What type of energy source do you use for cooking/heating? Electricity Paraffin Gas Wood Others
- 9 Do you have a fridge in the house? YES NO
- Socio-economic data
- 1 Were you employed before the pregnancy? YES NO
- 2 Are you currently employed? YES NO
- 3 What is your current income per month (including grants/other < R100 R100 – R300 – R500 – > R800

	contributions)?		R300	R500	R800	
4	What is your total household income per month?	< R100	R100	R300	R500	>R800
			–	–	–	0
			R300	R500	R800	
5	Did you go to school?	YES	NO			
6	If yes, to what grade, if after school qualifications acquired fill in?					
7	Can you read?	YES	NO			
8	Can you write?	YES	NO			
9	What type of house do you live in?	Brick	RDP House	shacks	Others	
10	How many rooms are in the house?	1 – 2	3 – 4	5 – 6	> 6	
11	How many people live in the house?	1 – 2	3 – 4	5 – 6	> 6	
12	How many adults (18 years and older) live in the house?	1 – 2	3 – 4	5 – 6	> 6	
13	How many children (5 years and younger) live in the house?	1 - 2	3 – 4	5 – 6	> 6	
14	When did you arrive in Cape Town?					
15	Are you the primary care giver?					

Data on Feeding Practices

- | | | | | | | |
|----|--|-------------|---------|---------------------|-------------------------------------|--------|
| 1 | What do you feed your infant? | Breast milk | Formula | Breast + Formula | Breast + Formula + other food/fluid | Others |
| 2 | Why this feeding method? | | | | | |
| 3 | What do you use to feed your baby, for example breast/bottle/cup/spoon/other or mixed? | | | | | |
| 4 | How many feeds per 24 hours do you give? | | | | | |
| 5 | If you give milk with utensils other than breast, how many millilitres do you give per feed? | | | | | |
| 6 | When using feeding utensils (cup/spoon/bottle), how do you clean these. | | | | | |
| 7 | If formula, how many tins of formula powder do you use per week? | | | < 1/4 - 1/2 - 3/4 > | 1/4 1/2 3/4 - 1 | |
| 8 | How many tins of formula do you collect per month? | | | | | |
| 9 | Do you know how to make the milk (if formula feeding)? | | | YES | NO | |
| 10 | Did a health worker counsel you on infant feeding? (if formula feeding as well as breast-feeding)? | | | YES | NO | |
| 11 | Did a health worker teach you how to prepare the milk? (if formula feeding) | | | YES | NO | |
| 12 | Did you prepare formula in front of a health care worker before discharge? | | | YES | NO | |

1 Do health workers question and counsel you
3 about feeding when your baby when you visit
the clinic?

1 How do you prepare the formula (if formula
4 feeding)?

(What amount of water and number of scoop of
formula do you add)

1 What water do you use to prepare the feed (if
5 formula feeding)?

1 What is the temperature of the water you use to
6 prepare the formula?

1 Do you mix other ingredients or fluid except for 7 the water and formula to the preparation of a milk feed (if yes, what)?	YES	NO	Ingredie nt:
--	-----	----	-----------------

1 Do you make formula milk per feed or in larger 8 quantities for more than one feed?	Per feed	Larger quantities
--	-------------	----------------------

1 If milk is left after a feed (if not breast fed), what
9 do you do with the rest of the milk?

2 Do you have a fridge in your house? 0	YES	NO
--	-----	----

2 If you feed food/s other than milk
1 (formula/Breast), at what age did you first
introduce this?

2 How many times do you feed baby in one night?
2

2 Do you prepare fresh feed each time or stored
3 food?

- | | | | |
|---|--|-------|--------|
| 2 | Which one do you add first into the cup? | WATER | POWDER |
| 4 | | R | |
-
- | | | | |
|---|---|--|--|
| 2 | Indicate the quantity of feed given per feeding | | |
| 5 | session [sample bottle] | | |
-
- | | | | |
|---|---|--|--|
| 2 | How many scoops do you feed per feeding | | |
| 6 | sessions? | | |

IMFUNALWAZI

thombolo
yemtwana

Iziko zamgama			
---------------	--	--	--

Indawo	
umvavanyi	

kandelo lofunisiso ngesimo sentlalo nendiela ezisetyenziswa ngomama base Gugulethu ukondla iintsana

ingaba umntwana ukhona kwinkqubo EWE HAYI
ye PMTCT?

inombolo yekhadi lekliniki										
----------------------------	--	--	--	--	--	--	--	--	--	--

umhla wokuzalwa kukamoma	D	D	M	M	Y	Y	Y	Y
--------------------------	---	---	---	---	---	---	---	---

umhla wokuzalwa komntwana	D	D	M	M	Y	Y	Y	Y
---------------------------	---	---	---	---	---	---	---	---

umhla wovavanyo ngemibuzo	D	D	M	M	Y	Y	Y	Y
---------------------------	---	---	---	---	---	---	---	---

Inkukacha ngesimo sikamoma nomntwana

- | | | | | | | |
|---|-------------------|----------|---------|-------------|----------|---------|
| 1 | imeko | utshalil | awutsh | uyahlalisan | uqhawule | umhlolo |
| | yomtshato | e | atanga | a | umtshato | kazi |
| 2 | ulwimi | | isizulu | isingesi | isibhulu | ezinye |
| | iwasekhoya | isixhos | | | | |

a

3 **inkolo** unprot mkatoli ezinye
estant k

4 **Idilesi yasekhaya/yokuhlala**

5 isini yinkwenke yintombaz
somntwana ana

6 ubude bomtwana [cm]

7 umjikelezo wentloko
ekuzalweni [cm]

8 ubunzima bomntwana
bokuzalwa [g]

9 ubunzima bomntwana
namhlanze [g]

10 ubude bomntwana
namhlanye [cm]

11 umjikelezo wentloko
namhlanje [cm]

12 iziphumo ze PCR?

Inkcukacha ngothintelo lamtwana

1 uthintelo ngexesha TOPV BCG Both/zombini
lokuzalwa

2 uthintelo ngeveki ezi 6 TOPV DPT HIB HBV
zonke

3 uthintelo ngeveki ezi 10 TOPV DPT HIB HBV zonke

inkcukacha ngempilo yomntwana

1 ingaba umtwana wakhe wagula emva EWE HAYI

e?

4	uhamba ngantoni?	Walk	Car	Uhamba nge taxi	Uham ba nge bus	Uhanba nge bhayisiki le	ezinye
5	uwafumana phi amanzi owasebenzisa ekhaya?	Uwafumana endlwini?	Impompo iphandle	emlanjeni	edami ni	ezinye	
6	nisebenzisa antoni ukuzithuna ukuya ngasese?	Unegumbi langasese eli gungxulwayo	Nigrumbeli nya onzulu?	Nisebenzisa ama bucket?		ezinye	
7	ukuba zizindlu zangasese ezingagungxulwayo zithawe kangaphu ngeveki	< 1 time	Kubekanye	Ngaphezulu kwakanye	Abazi na ukuzakuthatha ama bucket?	nanini	
8	nipheka ngantoni okanye ukuzifudumeza	umbane	iparefin	igesu	linkuri	ezinye	
9	unaso khenkcese	isi EWE		HAYI			

si ekhaya

inkwukacha ngezengeniso nentlalo

1	ngaba wawusebenza phambi kokukhulelwa	EWE	HAYI				
2	uyasebenza ngoku?	EWE	HAYI				
3	ufumana malini ngenyanga hudibene nezibonelilo?	< R100	R100	R300	R500	> R800	
			R300	R500	R800		
4	yimalini iyonke eyingemiso yekhaya ngenyanga?	< R100	R100	R300	R500	>R800	
			R300	R500	R800	0	
5	waya esikolweni	EWE	HAYI				
6	ukuba waya uphele kuliphi ibanga?						
7	uyakwazi ukufunda?	EWE	HAYI				
8	uyakwazi ukubhala?	EWE	HAYI				
9	luhlabo luni iwendlu ohlala kuyo?	Eyezi tera	RDP hous es	Shacks		Ezinye	
10	inamagumbi amangaphi?	1 – 2	3 – 4	5 – 6	> 6		
11	Nihlala nibangaphi kuyo?	1 – 2	3 – 4	5 – 6	> 6		

12 Bangaphi abantu abadala 1 – 2 3 – 4 5 – 6 > 6
 abanzabhazu kweminyaka eli
 18?

13 Bangaphi abantwana abana 1 - 2 3 – 4 5 – 6 > 6
 minyaka emi 5 nangaphatsi?

lindlela zokondla umntwana

1 umtyisa ntoni ibele ubisi ibele
 umntwana olung +nom ibele+nomgubo+ nant
 umgu gubo nokunye ukutye u
 bo

2 ukuba lubisi
 olungumgubo
 cacisa

3 usebenzisa nooni ukutyisa umntwana,
 umzeketo ibele ibhotile icephe nantomi uyavuba

4 umtyisa kangaphi ngosuku oko kukuthi ngeyure
 ezi 24

5 ungakanani umlinganiselo ngesidlo ngasinye
 xa engancanci bele

6 uzicoca njani izixhobo omtyisa ngazo ikomityi
 icephe, ibhotile

7 usebenzisa izipoponi ezingaphi zobisi < $\frac{1}{4}$ - $\frac{1}{2}$ - $\frac{3}{4}$ >
 olungumgubo ngeveki $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ -
 1 1

t
 i
 n

8 ufumana izipoponi zobisi ezingaphi ngeveki?

9	uyakwazi ukwanza umxube wobisi?	EWE	HAYI
1	Ingaba umsebenzi wezemphilo wakuchazela	EWE	HAYI
0	ngadlela zokondla umntwana wakupha nawe ithuba lokukhetha mdlela ofuna ukondla ngaya umntwana wakho?		
1	umsebenzi wezemphilo wakufundiso	EWE	HAYI
1	ngokuxuba ubisi lomntwana?		
1	ingaba abasebenzi bezempilo bayakubuzo		
2	bakubonise ngendlele yokondla umntwana xa uye ekilini?		
1	ulwenzani ngani ubisi olungumgubo [uxuba		
3	amacephe amangaphi emanzini angakanani]		
1	usebenziba amanzi anjani ukuxuba ubisi?		
4			
1	bunjani ubu shushu bamanzi		
5	awasebenzisayo ukuxuba ubisi?		
1	zikhwona ezinye izinto ozixubayo elubisini	EWE	HA
6	ngaphandit kwamanzi?		YI
1	wenza umxube olingene isidlo esinye okanye	Okulin	Okulingene
7	uxuba ubisi olumininzi?	gene nga leyo cesha	nga leyo cesha
1	Xa lusele ubisi emva kokudla ulwenzani?		
8			
1	unaso isikhenkeezisi ekhaya?	EWE	HAYI
9			
2	ukuba umtyisa okunye ukutya okungelulo ubisi		

- 0 uqate xa enenyanga ezingaphi?
- 2 umtyisa kangaplu ebusuku?
- 1
- 2 ulungisa ukatya okutsha lonke ixesha okanye
- 2 wenza ukutya okunninzi?
- 2 ufaka ntomi kuqala ekomityini xa uxuba ubisi? Umgubo
- 3 Amanzi
- 2 ungakanani umlinganiselo ngesidlo ngasineye?
- 4
- 2 umtyisa izikuphu ezingaphi ngexesha?
- 5

Appendix 2 Informed consent



UNIVERSITY OF CAPE TOWN

STUDY INFORMATION AND INFORMED CONSENT

STUDY INFORMATION FOR LEGAL GUARDIAN AND INFORMED
CONSENT DOCUMENT

TITLE OF RESEARCH

AN ASSESSMENT OF INFANT FEEDING PRACTICES OF HIV INFECTED
MOTHERS AND THE GROWTH OF THEIR CHILDEN AT PREVENTION OF
MOTHER-TO-CHILD TRANSMISSION CLINICS IN GUGULETHU

REFERENCE NUMBER:

RESEARCHER: AKU, AMWE SUNDAY

ADDRESS: SCHOOL OF CHILD AND ADOLESCENCE HEALTH,
UNIVERSITY OF CAPE TOWN
46 SAWKINS ROAD,
Rondebosch.

CONTACT PERSONS: 1. Prof Marc Blockman 021 4066496

[Chairperson, Human Research Ethics Committee]

Amwe Aku 0738361390 [Researcher]

INFORMED CONSENT FORM AND STATEMENT

[To be explained by the researcher or qualified GCP trained field worker]

EXPLANATION OF THE RESEARCH

May I use this opportunity to welcome you and your baby. At the same time, may I provide some information regarding this research. The process will take about fifteen minutes of your time to go through and answer some questions. Strict confidentiality will be maintained throughout the process. Please feel free to ask any question regarding issues that are not clear to you.

This study has been approved by the Ethics Committee of the University of Cape Town as well as with the Western Cape Provincial Department of Health. The study will be in accordance with the ethical guidelines and principles of the International Declaration of Helsinki and the South African Guidelines on Good Clinical Practice.

AIM OF THE STUDY

The aim of this cross-sectional study is to evaluate the infant feeding practices and socio-economic status of mothers/caregivers and the growth of their HIV-exposed infants on the PMTCT programme in low socio-economic community In Cape Town.

PROCEDURES

The study will involve 150 mother-infant pairs with age range of infants from six weeks to six months on the PMTCT programme. The researcher will conduct interviews using a structured questionnaire. In addition, the researcher will collect measurements of infants' weight, length and head circumference, and enter them into data sheets on the questionnaire.

Records of immunization from the infant's road to health chart will be captured into the questionnaire.

POSSIBLE RISKS

There is no possible risk to either yourself or your baby. The questions are all voluntary and you are free to decline to answer any aspect that you are not comfortable.

POSSIBLE BENEFITS

At this point, you and your infant may not benefit directly. Nevertheless, your participation will benefit you, your subsequent baby, and the community at large in the future on proper infant feeding practices and improving the growth of your infants.

PARTICIPATION AND SUBJECT RIGHTS

Participation by you and your baby is voluntary and there will be no coercion [force] to participate. Furthermore, you and your baby will receive fair and just treatment with respect from the researcher to your person and culture. Information collected will be confidential and all the information will be available and kept by the researcher. You can opt out of the study at any point. This will not affect the service you are receiving at the clinics. You need to be legally capable of consenting to this research. Teenage mothers will need to assent to participate.

By signing this informed consent, you agree to participate in this study and that you fully understand what this study is all about.

ADDITIONAL INFORMATION

Should the need to obtain additional information or clarification regarding this research, feel free to contact the researcher, his supervisors or the

Chairperson of the Human Research Ethics Committee, Prof Marc Blockman
on 021 4066496.

**AN ASSESSMENT OF INFANT FEEDING PRACTICES OF HIV INFECTED
MOTHERS AND THE GROWTH OF THEIR CHILDEN AT PREVENTION
OF MOTHER-TO-CHILD TRANSMISSION CLINICS IN GUGULETHU**

CONSENT STATEMENT

I the undersigned have read and had the foregoing information explained to me. I have had the opportunity to ask questions which have been answered to my satisfaction. I understand what my role will be during the procedure. I hereby consent to participate voluntarily in this study.

Name.....

Signature..... Date.....

Investigator's Name..... Signature.....

If not literate: The contents have been explained to me by the researcher or dedicated field worker with additional explanation given to me in understandable language by another person other than the researcher. I understand the requirement of the procedure.

Witness

Signature of person who explained the content in understandable language
or the legal representative.

Language.....Date.....

Appendix 3 Progress report


UNIVERSITY OF CAPE TOWN
FACULTY OF HEALTH SCIENCES
Human Research Ethics Committee

FH8017: Annual Progress Report / Renewal

Record Review/Audit/Collection of Biological Specimens/Repositories/Databases/Registers

HREC office use only (FWAC0001507; HRE0001954)

This form serves as notification of annual approval, including any documentation described below.

<input checked="" type="checkbox"/> Approved	Annual progress report	Approved until next renewal date	30/10/2014
<input type="checkbox"/> Not approved	See attached comments		

Signature Chairperson of the HREC: _____ Date Signed: 14/10/2013

Principal Investigator to complete the following:

1. Protocol Information

Date form submitted	11 October 2013		
HREC REF Number	074/2009	Current Ethics Approval was granted until	2011
Protocol title	THE IMPACT OF METFORMIN ON BODY FAT, BLOOD PRESSURE, GLUCOSE AND LIPID METABOLISM IN THE METABOLIC SYNDROME OF SOUTH AFRICAN SUBJECTS		
Principal Investigator	A. M. J. VAN DER MERWE		
Department/Office	SCHOOL OF HEALTH AND BIOMEDICAL SCIENCES		
Internal Mail Address	SCHOOL OF HEALTH AND BIOMEDICAL SCIENCES		
1.1 Does this protocol receive US Federal funding?	<input type="checkbox"/> Yes		<input checked="" type="checkbox"/> No

2. Protocol status (tick ✓)

<input type="checkbox"/> Research-related activities are ongoing
<input checked="" type="checkbox"/> Data collection is complete, data analysis only

3. Protocol summary

Total number of records or specimens collected, reviewed or stored since the original approval	125
Total number of records or specimens collected, reviewed or stored since last progress report	125
Have any research-related outputs (e.g. publications, abstracts, conference presentations) resulted from this research? If yes, please list and attach with this report.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

4. Signature

Signature of PI	_____	Date	14 October 2013
Signature of Supervisor (if PI is a student)	_____	Date	14 October 2013

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 (Now Please complete the Closure form (FH8018) if the study is completed within the approval period)
 HEALTH SCIENCES FACULTY
 UNIVERSITY OF CAPE TOWN

Appendix 4 Clearance



UNIVERSITY OF CAPE TOWN

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

13 February 2009

REC REF: 074/2009

Dr AS Adu
 Red Cross Children's Hospital

Dear Dr Adu

PROJECT TITLE: AN ASSESSMENT OF THE IMPACT OF MATERNAL HIV STATUS, INFANT FEEDING PRACTICE AND SOCIOECONOMICS STATUS ON THE NUTRITIONAL STATUS OF INFANTS AT WELL-BABY CLINICS IN GUGULETHU

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.

Approval is granted for one year till the 28th February 2010.

Please submit an annual progress report if the research continues beyond the expiry date. Please submit a brief summary of findings if you complete the study within the approval period so that we can close our file.

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

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSE HUMAN ETHICS

Federal Wide Assurance Number: PWA00001637.
 Institutional Review Board (IRB) number: IRB00001938

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