

**GROWTH PATTERNS AND NUTRITION-RELATED  
PROBLEMS OF INFANTS UNDER ONE YEAR  
ATTENDING RED CROSS CHILDREN'S HOSPITAL'S  
ANTIRETROVIRAL CLINIC AND THE KNOWLEDGE,  
ATTITUDE, BELIEFS AND PRACTICES OF THEIR  
CAREGIVERS, CONCERNING INFANT FEEDING**



*Thesis presented in partial fulfilment of the requirements for the degree  
Master of Nutrition at the University of Stellenbosch*

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## **DECLARATION**

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof, that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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## **ABSTRACT**

### **Introduction**

A paucity of data exists regarding growth patterns and nutrition-related problems in infants (<12 months) on antiretroviral treatment (ART) and the infant feeding knowledge, beliefs, attitude and practices of their caregivers.

### **Aim**

To describe the growth and nutrition-related problems of infants (<12 months) attending the Antiretroviral (ARV) clinic at Red Cross Children's Hospital, as well as the knowledge, attitudes, beliefs and practices of their caregivers concerning infant feeding.

### **Methods**

A cross-sectional, descriptive study was conducted with census sampling. Thirty infants and 31 caregivers were included in the sample.

Anthropometric measurements were performed and interviewer-administered questionnaires were utilised to obtain the knowledge, attitude, beliefs and practices of the caregivers. The mean Z-score of each measurement as well as the weight-for-age, length-for-age, weight-for-length and bodymass index-for-age for each infant were determined, analysed, interpreted and described according to the World Health Organisation (WHO) growth standards for children.

### **Results**

Thirty-nine percent (n=11) of the mothers (n=28) did not receive infant feeding counselling prior to delivery, while only 9 (32%) received the minimum number of at least 4 sessions, as prescribed by the Department of Health. It was not assessed whether the counselling occurred before delivery.

The mean age of the infants was 6.9 (SD 3.3) months. Eighty-three percent (n=25) had an opportunistic infection prior to data collection. Twenty-three percent (n=7) were underweight-for-age and 40% (n=12) of the infants were stunted. Vomiting and diarrhoea were the most

common nutrition-related problems experienced. A statistically significant positive correlation ( $p=0.003$ ) was found between an infant's duration on ART and W/A z-score.

Only two caregivers were breastfeeding at the time of data collection, but 34% ( $n=10$ ) of the other caregivers had at some stage breastfed their infant. Formula feeding practices were poor. Sixty-two percent ( $n=18$ ) were not preparing the feeds correctly and only six (21%) were correctly cleaning and sterilising the bottles. Thirty-nine percent ( $n=11$ ) of the infants were not receiving an adequate amount of milk per day. Sixty-five percent ( $n=11$ ) of the infants (>six months) did not receive a diet the previous day which met the minimum WHO dietary diversity indicator and only 18% ( $n=3$ ) received a minimum acceptable diet.

Caregivers had an average knowledge concerning infant feeding. Thirteen percent ( $n=4$ ) knew the correct definition of exclusive breast- or formula feeding. Sixty-eight percent ( $n=21$ ) did not know what mixed feeding meant, or the dangers associated with it. Most caregivers ( $n=25$ , 81%) knew that oral rehydration solution had to be given when infants developed diarrhoea, but only 48% ( $n=15$ ) knew how to prepare it and only 6% ( $n=2$ ) knew how to administer it. Seventy-five percent ( $n=9$ ) of caregivers did not know what should be done when experiencing breast problems.

Sixty-four percent ( $n=19$ ) of the caregivers believed that if a HIV-positive woman breastfeeds she would definitely transmit HIV to her infant.

## **Conclusion**

The infant sample showed a variety of erratic growth patterns with a high prevalence of underweight and stunting. Infant feeding knowledge of caregivers was average, but not deemed sufficient to translate into appropriate, safe and optimal infant feeding practices. The breastfeeding prevalence was low. Formula preparation, feeding and hygiene practices were poor and dietary intake of infants was not optimal. The quality and quantity of HIV infant feeding counselling sessions received at antenatal clinic visits were poor and need to be addressed.

## **OPSOMMING**

### **Inleiding**

Daar is 'n tekort aan data oor groeipatrone en voedingsverwante probleme by babas (<12 maande) op antiretrovirale behandeling asook die babavoedingkennis, -oortuigings, -houdings en -praktyke van hul versorgers.

### **Doelwit**

Om ondersoek in te stel na die groei- en voedingsverwante probleme by babas (<12 maande) in die antiretrovirale kliniek by Rooikruis-kinderhospitaal, sowel as die babavoedingkennis, -oortuigings, -houdings en -praktyke van hul versorgers.

### **Metodes**

'n Beskrywende dwarsnitstudie is met sensussteekproefneming onderneem. Dertig babas en 31 versorgers is by die steekproef ingesluit.

Antropometriese metings was gedoen en onderhoude was met behulp van vraelyste gevoer ten einde inligting oor die versorgers se kennis, houdings, oortuigings en praktyke te bekom. Elke baba se gemiddelde z-telling per meting sowel as die gewig-vir-ouderdom, lengte-vir-ouderdom en liggaamsmassa-indeks-vir-ouderdom was volgens die Wêreldgesondheidsorganisasie (WGO) se groeistandaarde vir kinders bepaal, ontleed, vertolk en beskryf.

### **Resultate**

Altesaam 39% (n=11) van die moeders (n=28) het nie voor die bevalling voorligting oor babavoeding ontvang nie, terwyl slegs 9 (32%) die Departement van Gesondheid se voorgeskrewe minimum 4 sessies, deurloop het. Dit was nie bepaal of hierdie sessies voor die bevalling ontvang was nie.

Die gemiddelde ouderdom van die babas was 6,9 (standaardafwyking 3,3) maande. 'n Totaal van 83% (n=25) het voor data-insameling 'n opportunistiese infeksie gehad, 23% (n=7) was ondergewig-vir-ouderdom, en 40% (n=12) van die babas se lengtegroei was ingekort. Die algemeenste voedingsverwante probleme was braking en diarree. Daar blyk 'n statisties beduidende positiewe korrelasie ( $p=0.003$ ) te wees tussen die duur van die baba se anti-retrovirale behandeling en sy/haar gewig-vir-ouderdom-z-telling.

Slegs twee versorgers het hul babas ten tyde van die studie geborsvoed, hoewel 34% (n=10) van die versorgers in 'n stadium geborsvoed het. Voedingspraktyke met die gee van melkformule was swak. Altesaam 62% (n=18) het die melkformule verkeerd aangemaak en slegs ses (21%) het die bottels behoorlik skoongemaak en gesteriliseer. Nege-en-dertig persent (n=11) van die babas het te min melk per dag ontvang. Vyf-en-sestig persent (n=11) van die babas (>6 maande) se melkinname die vorige dag het nie aan die minimum WGO aanbevole dieetdiversiteitsaanwyser voldoen nie, en slegs 18% (n=3) het 'n minimum aanvaarbare dieet gevolg.

Versorgers se kennis ten opsigte van babavoeding was gemiddeld, met net 13% (n=4) wat die korrekte omskrywing van eksklusiewe bors- of formulevoeding geken het. 'n Totaal van 68% (n=21) het nie geweet wat gemengde voeding beteken of watter gevare dit inhou nie. Die meeste versorgers (n=25, 81%) het geweet dat orale rehidrasie oplossing toegedien moet word wanneer babas aan diarree ly, maar slegs 48% (n=15) het geweet hoe om dit aan te maak en 'n skrale 6% (n=2) hoe om dit toe te dien. Vyf-en-sewentig persent (n=9) van die versorgers het nie geweet wat om te doen as hulle probleme met hul borste ervaar nie.

Altesaam 64% (n=19) van die versorgers het geglo dat 'n MIV-positiewe vrou definitief haar baba MIV sal gee indien sy hom/haar sou borsvoed.

## **Samevatting**

Die steekproef babas het 'n verskeidenheid onreëlmatige groeipatrone getoon en baie was ondergewig of het ook dwerggroei getoon. Versorgers se kennis van babavoeding was gemiddeld, maar nie voldoende om tot toepaslike, veilige en optimale babavoedingspraktyke aanleiding te gee nie. Die voorkoms van borsvoeding was laag. Melkformulevoorbereiding, -voeding en -higiëne was swak, en babas se voedinginname was nie ideaal nie. Die gehalte van

en hoeveelheid voorligting oor MIV-babavoeding met besoeke aan voorgeboorteklinieke was swak en moet aangespreek word.

## **DEDICATION**

This thesis is dedicated to HIV-exposed infants whose voices cannot be heard.

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## **CONTRIBUTIONS BY PRINCIPAL RESEARCHER AND FELLOW RESEARCHERS**

The principal researcher, Estelle Wasserfall, developed the idea and the protocol. The principal researcher planned the study, undertook data collection, captured the data for analyses, analysed the data with the assistance of a statistician, Prof DG Nel, interpreted the data and drafted the thesis. Mrs LM du Plessis and Mrs HEK Koornhof provided input at all stages and revised the protocol and thesis.

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**LIST OF ABBREVIATIONS**

3TC	Lamivudine
ABC	Abacavir
AFASS	Acceptable, feasible, affordable, safe and sustainable
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral therapy
ARV	Antiretroviral
ASSA2003	Actuarial Society of South Africa AIDS and Demographic model
ASSAF	Academy of Science for South Africa
BF	Breastfeeding
BMI	Body mass index
CD4	Cluster of Differentiation 4
CDC	Centre for Disease Control and prevention
CI	Confidence interval
DoH	Department of Health
EBF	Exclusive breastfeeding
EFF	Exclusive formula feeding
FBDG	Food Based Dietary Guidelines
GHS	General Household Survey
HAART	Highly Active Anti Retroviral Therapy
HC	Head circumference
HCW	Health Care Worker
HIV	Human Immunodeficiency Virus
INH	Isoniazid
INP	Integrated Nutrition Programme
KABP	Knowledge, attitude, beliefs and practices
Kaletra®	Trademark name for combined antiretroviral medication of lopinavir/ritonavir
Kg	Kilogram
L/A	Length-for-age
LBW	Low birth weight
MDG's	Millennium Development Goals
MRC	Medical Research Council
MTB	Mycobacterium Tuberculosis

MTCT	Mother-to-Child transmission
MUAC	Mid-upper arm circumference
NFCS-FB	National Food Consumption Survey – Fortification Baseline
NSP	National Strategic Plan
NTP	Nutrition Therapeutic Programme
NVP	Nevirapine
ORS	Oral rehydration solution
PCR	Polymerase Chain Reaction
PEG	Percutaneous Endoscopic Gastrostomy
PFB DG	Paediatric Food Based Dietary Guidelines
PGWC	Provincial Government of the Western Cape
PMTCT	Prevention of Mother-to-Child Transmission
RCCH	Red Cross Children’s Hospital
RtHC	Road-to-Health Card
RTUTF’s	Ready-to-use therapeutic foods
SA	South Africa
SD	Standard Deviation
STATSSA	Statistics South Africa
TB	Tuberculosis
UNAIDS	Joint United Nations Programme on HIV/AIDS
VLBW	Very low birth weight
W/A	Weight-for-age
WHO	World Health Organisation
Wt	Weight

## DESCRIPTION OF TERMS<sup>i</sup>

Anorexia	Loss of appetite, especially when prolonged.
Bottle feeding	When an infant is fed commercially prepared infant formula milk with a bottle and teat, rather than by breastmilk.
Complementary feeds/food	Refers to any foodstuff, whether in solid or semi-solid form, given to an infant after the age of 6 months as part of the transitional process in which an infant learns to eat food appropriate for his or her developmental stage, while continuing to breastfeed or be fed with commercial infant formula.
Cup feeding	The act of feeding an infant or child using a cup, regardless of what the cup contains.
Exclusive breastfeeding	Defined as giving an infant no other food or drink (not even water), apart from breastmilk (including cup feeding with expressed breastmilk) with the exception of drops or syrup consisting of vitamins, mineral supplements or medicines, when medically prescribed.
Exclusive formula feeding	Feeding practice in which infants receive no breastmilk, but receive commercial infant formula milk that provides adequate nutrients until the age at which family foods can be introduced.
Feeding practices	In this study, feeding practices refer to the volume, frequency (times per day) reconstitution of formula milk or any other solution or food items given to an infant.
Flesh food	Edible parts of animals.
Formula milk	A commercial product that meets the applicable Codex standard for infant formula, follow-up formula, and infant or follow-up formula for special dietary

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<sup>i</sup>All descriptions of terms were obtained from WHO policy, research and training documents on HIV and infant feeding.

	or medical purposes which acts as a breastmilk substitute.
Gripe water	A commercial product or home remedy for infants given to treat colic, gastrointestinal discomfort, teething pain, reflux and other stomach ailments. Ingredients vary and may include alcohol, a bicarbonate, ginger, dill, fennel and chamomile.
Growth faltering	Weight loss or lack of weight gain for a period of 3 consecutive clinic visits in a child due to acute or chronic illness, a restricted diet, poor appetite, lack of food, lack of social interaction, or a harsh or disruptive environment.
Health Care Worker	Any person who is involved in the provision of health services to a client/patients. This includes professional health categories of staff as well as lay counselors and community caregivers.
HIV exposed	For the purposes of the study HIV exposed refers to children born to or breastfed by women infected with HIV.
HIV negative	Refers to people who have taken an HIV test with a negative result and know their result.
HIV positive	Refers to people who have taken an HIV test with a positive result and know their result.
Infant	A person from birth to 12 months of age.
Lipodystrophy syndrome	Clinical syndrome of body fat redistribution and metabolic changes characterised by dyslipidaemia, insulin resistance and fat redistribution.
Low birth weight	Any infant weighing less than 2500g at birth.
Very low birth weight	Any infant weighing less than 1500g at birth.

Extremely low birth weight	Any infant weighing less than 1000g at birth.
Mastitis	An acute inflammation of the interlobular connective tissue within the mammary gland in which para-cellular pathways between mammary alveolar cells open up, allowing inflammatory cells and extra-cellular fluids to enter breastmilk.
Micronutrients	Micronutrients are natural substances found in small amounts in food (e.g. vitamins and minerals), as compared with macronutrients (e.g. protein, fats and carbohydrates), which are present in larger amounts.
Mixed feeding	Feeding breastmilk as well as other milks (including commercial formula or home-prepared milk), foods, or liquids to an infant.
MTCT	Transmission of HIV from an HIV-positive woman to her child during pregnancy, delivery, or breastfeeding. The term is used since the immediate source of the infection is the mother, and does not imply blame on the mother.
Nutritional status	An individual's state as determined by anthropometric measures (height, weight, waist circumference etc.), biochemical measures of nutrients or their by-products in blood and/or urine, a physical (clinical) examination, and a dietary intake assessment and analysis.
Oral rehydration solution	Fluid consisting of water, sugar and salt, given to infants to treat or prevent dehydration caused by diarrhoea, gastro-enteritis or vomiting.
“Pap bottles”	Formula milk mixed with infant cereal, given to infants in bottles.
Predominant breastfeeding	Predominant breastfeeding means that the infant's predominant source of nourishment has been breastmilk. However, the infant may also have received water and water-based drinks; fruit juice; Oral Rehydration Salts solution; and ritual fluids (in limited quantities).

Premature infant	Any neonate, regardless of birth weight, born before 37 completed weeks gestation.
Replacement feeding	Feeding of infants, who are receiving no breastmilk, with a diet that provides adequate nutrients until the age at which they can be exclusively fed on full family foods. During the first 6 months of life, formula-feeding should be a suitable commercial formula. After 6 months, complementary foods should be introduced.
Safe infant feeding	Feeding practices that would lead to a healthy, well-grown, able HIV-free child who has no underlying morbidity resulting from incorrect feeding practices.
Severely underweight	If according to the WHO growth standards for children, an infant's weight-for-age z-score is below -3 SD.
Severely wasted	If according to the WHO growth standards for children, an infant's weight-for-length z-score or BMI z-score is below -3 SD.
Stunted	If according to the WHO growth standards for children, an infant's length-for-age z-score is below the -2 SD.
Tea bottles	Rooibos or black tea given to infants in bottles, usually mixed with sugar and milk.
Underweight	If according to the WHO growth standards for children, an infant's weight-for-age z-score is below -2 SD.
Wasted	If according to the WHO growth standards for children, an infant's weight-for-length z-score or BMI z-score is below -2 SD.

## **CHAPTER 1: LITERATURE REVIEW AND INTRODUCTION**

## 1.1 Introduction

*“South Africa is currently facing ‘three concurrent epidemics’. Two of these epidemics are caused by disease organisms – the Human Immunodeficiency Virus and the bacterium *Mycobacterium tuberculosis* – while the third, malnutrition, is the result of social, historical and political factors.”*<sup>1</sup> This description of the prevailing health situation in South Africa (SA) was documented by the study panel of the Academy of Science of South Africa (ASSAF) in their report on the state of Human Immunodeficiency Virus (HIV) and Tuberculosis (TB) infection as well as malnutrition in South Africa (2007).

This literature overview provides insight into the current situation regarding paediatric HIV infection in SA, the Government’s strategies to fight paediatric HIV and malnutrition, the effects of HIV on the nutritional status of children, nutritional support for HIV-infected children, the current situation regarding paediatric antiretroviral therapy (ART) in SA and the nutritional and immunological consequences of ART in children. HIV infant feeding policies and practices in SA will also be discussed in depth.

## 1.2 Global and paediatric HIV

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS) report on the global Acquired Immunodeficiency Syndrome (AIDS) epidemic 2010, the overall growth of the global AIDS epidemic appeared to have stabilised. The annual number of new HIV infections has steadily declined since the late 1990’s and there were fewer AIDS-related deaths due to the significant scale-up of antiretroviral therapy over the past few years. Although the number of new infections has decreased, levels of new infections overall were still high, and with significant reductions in mortality, the number of people living with HIV worldwide had increased.<sup>2</sup>

The burden of HIV weighs heavily on maternal and child mortality in many countries. Globally in 2009 an estimated 2.5 million children [1.7 million–3.4 million] were living with HIV and an estimated 370 000 children were newly infected with HIV through mother-to-child transmission (MTCT). In Sub-Saharan Africa the number of children living with HIV has increased from an estimated 1.8 million in 2001 to 2.3 million in 2009. The rate of infection among children born to mothers living with HIV has dropped significantly in recent years, from 500 000 in 2001 to a total of 370 000 in 2009. This decline in numbers can be attributed to better access to services for

prevention of MTCT. Prevention of mother-to-child transmission (PMTCT) of HIV has been a fundamental advance in the AIDS response over the past decade. Worldwide in 2009, 53% of women in low- and middle-income countries received antiretroviral medication to prevent mother-to-child transmission of HIV. In 2009 the UNAIDS called for the virtual elimination of mother-to-child transmission of HIV by 2015.<sup>2</sup>

Globally an estimated 260 000 [150 000–360 000] children (younger than 15 years) died from AIDS-related illnesses in 2009. This is 19% fewer than the estimated 320 000 who died in 2004. This decrease in deaths reflects the steady expansion of services to prevent transmission of HIV to infants and an increase in access to treatment for children. There has also been progress in reducing the incidence and impact of HIV among children younger than 15 years in Southern Africa. In 2009 there were 32% fewer newly infected children – an estimated 130 000 – and 26% fewer AIDS-related deaths among children – an estimated 90 000, than in 2004.<sup>3</sup>

### **1.3 HIV and paediatric HIV in South Africa**

South Africa is one of the few countries in the world where child and maternal mortality has risen since the 1990's.<sup>3</sup> An estimated 5.5 million people were living with HIV in SA in 2006, of which 293 000 were children younger than 15 years of age.<sup>3</sup> Data from the 2008 National Antenatal Sentinel HIV and Syphilis Prevalence Survey found that 29.3% of antenatal clinic attendees were HIV positive.<sup>4</sup> According to research done by the National Burden of Disease study of the Medical Research Council (MRC), HIV/AIDS was the leading cause of under-five mortality in SA, accounting for 42749 (40.3%) of all deaths in 2000<sup>5</sup> and 46% of all deaths in 2008.<sup>6</sup>

#### **1.3.1 Relevant statistics**

- According to the Actuarial Society of South Africa AIDS and Demographic model (ASSA2003), an estimated 275 000 children under the age of 15 years were HIV-infected by mid-2005, increasing to 293 000 by mid-2006<sup>3</sup>
- The ASSA2003 estimated that in 2006 38 000 babies would have been infected by HIV at birth and 26 000 through breastfeeding.<sup>3</sup>
- UNAIDS reported that at the end of 2005, 8% of people receiving ART in SA were children and that 1.9 million children were orphaned by AIDS at the end of 2009.<sup>3</sup>

- The mid-year estimates for the 2009 report, released by Statistics SA(STATSSA) showed the following<sup>7</sup>:
  - Infant mortality rate was 45.7 per 1000 live births, however, some estimates, for example a 2002 survey by the South African Medical Research Council (MRC), reported it at 95 per 1000 live births, mainly due to deaths related to the HIV/AIDS epidemic
  - The HIV prevalence rate was  $\pm 10.6\%$
  - The estimated number of new HIV infections for 2009 would have been 413 000, of which 59 000 (14.3%) would be children

From these figures it is clear that HIV is attributing to the death of many South African children and also leaving many uninfected children either orphaned or vulnerable. The high prevalence and severity of under-nutrition and micronutrient deficiency in children seen in SA, is partly a result of HIV and AIDS. Clinical manifestations include low birth weight, delayed postnatal growth, severe undernutrition and impaired immunity to opportunistic infections that may lead to death.<sup>8</sup>Without proper intervention and treatment plans, this epidemic has the potential to destroy a whole generation.

#### **1.4 South African governmental strategies, policies and guidelines**

The most effective way to combat paediatric HIV infection is through good management of maternal health and prevention of mother-to-child- transmission.<sup>9</sup>Currently in SA, paediatric HIV and the nutrition-related problems in HIV-infected children are addressed through the PMTCT Programme, the Integrated Nutrition Programme (INP) and Guidelines for the Management of HIV-infected Children, which include ART.<sup>10</sup>

### 1.4.1 Prevention-of-Mother-to-Child Transmission Programme

The PMTCT programme is a critical intervention to reduce the incidence of paediatric HIV infections and to decrease infant, child and maternal mortality. It is the single most effective medical intervention to significantly reduce the burden of HIV in communities.<sup>11,12</sup> The optimal implementation of this programme is essential to meet the HIV reduction targets in the National Strategic Plan (NSP)<sup>13</sup> of the Department of Health (DoH), as well as to achieve two of the Millennium Development Goals (MDG's), specifically Numbers 4 (reducing infant and child mortality) and 5 (reducing maternal mortality).<sup>14</sup> Since 1999, when the first antiretroviral drug trials were conducted to reduce vertical HIV transmission in pregnant women, much work has been done to minimise, and possibly eliminate, vertical transmission. The World Health Organisation (WHO) developed a comprehensive strategic four-point approach, based on providing a continuum of appropriate care for mothers and their infants, to prevent HIV infection in infants and young children and optimise maternal and child health. The four-point strategy includes: primary prevention of HIV infection; prevention of unintended pregnancies among HIV-infected women; prevention of HIV transmission from mother to child; and provision of care and support for HIV-infected mothers and their infants, partners and families.<sup>15</sup>

This strategy states that because primary HIV infection during pregnancy and breastfeeding poses an increased threat of MTCT, HIV prevention efforts should address the needs of pregnant and lactating women, especially in high-prevalence areas. The third point (i.e.PMTCT) comprises four interventions, namely<sup>13</sup>:

- i. increasing access to HIV testing and counselling;
- ii. provision of ART, the choice depending on local feasibility, efficacy and cost;
- iii. implementation of safe delivery practices, including avoiding invasive obstetric procedures; and
- iv. providing optimal counselling and support on infant feeding methods and provision of care and support, through all health programmes, for HIV-infected mothers, their infants, partners and families.

PMTCT has been implemented in SA since 2001, initially in 18 pilot sites and is currently practised in more than 3000 facilities nationwide.<sup>16</sup> It focuses on providing voluntary counselling and HIV testing to all pregnant women attending ante-natal clinics, providing HIV-positive pregnant women with suitable antiretroviral (ARV) medication as well as for the babies after

birth, giving HIV-positive pregnant women counselling on safe infant feeding practices regarding the risks and benefits of exclusive breastfeeding and exclusive replacement feeding. It also focuses on monitoring the mothers and infants over a time period of at least six months to ensure everything is being done to minimise the risk of the infant becoming infected.<sup>17,18,19</sup>

In 2001, when the programme was first implemented, obstacles hindered the successful implementation of a good policy. The two biggest obstacles were insufficient guidance on how to implement PMTCT, resulting in inconsistent programme implementation across the country, and the second obstacle was the vertical implementation of the programme independently of maternal, neonatal and child health services. Still the programme is burdened with challenges, some of which relate to a lack of health system capacity to absorb the programme into routine care, lack of health worker knowledge about PMTCT, confusing messages about PMTCT and infant feeding, and PMTCT messages that do not fit into current socio-cultural frames of reference. Further implementation challenges which the programme faces are the interruption of essential drugs, scarce human resources at sites, HIV stigma and discrimination, and a lack of clear operational guidelines at provincial and local levels.<sup>16</sup>

Consequently, all available evidence on HIV and maternal and child mortality indicate that South Africa is well behind in meeting its MDG targets.<sup>20</sup> Several PMTCT-related study data showed that early vertical transmission rates vary from 7% to 19%,<sup>21,22,23</sup> that 9-month HIV-free survival might range between 64% to 80%,<sup>24</sup> and that guidelines on infant feeding and especially breastfeeding cessation were not feasible and not adhered to,<sup>25</sup> despite the implementation of PMTCT interventions. Nationally, in the first half of 2009, approximately 40% of HIV-exposed infants accessed an HIV polymerase chain reaction (PCR) test before three months of age. The average prevalence of HIV-positive tests among the infants tested declined from 10% in 2008 to 7% in 2009. This statistic is encouraging, but there is no measure of the rate of paediatric HIV infection in the more than half of HIV-exposed infants in the country whose mothers are less likely to be accessing PMTCT services.<sup>16</sup>

National data on the effectiveness and impact of the PMTCT programme is still unavailable.

### **1.4.2 Guidelines for the Management of HIV-infected Children**

In 2005 the South African Department of Health released a comprehensive manual on the management of the HIV-infected child, including the management of ART, for healthcare workers (HCW). This manual was developed as a consensus document by practising HIV clinicians working in clinics around the country. In 2010 a second edition of this document was released which included the preliminary Paediatric Food-based Dietary Guidelines (PFBDG's) as part of the care plan. These national guidelines are based on the recommendations of the WHO.<sup>26</sup>

### **1.4.3 Integrated Nutrition Programme**

In SA malnutrition is addressed through the INP. This programme focuses on children under 6 years of age, at-risk pregnant and lactating women, and those affected by communicable and chronic diseases of lifestyle, addressing the main nutritional problems which have been identified through research in the country. The focus areas of the programme are supported by a nutrition information system, a human resource plan and a financial and administrative system to ensure a comprehensive programme.<sup>27</sup>

The focus areas relevant to infants include:

- Infant and young child feeding (including: promotion, protection and support of breastfeeding, growth monitoring and promotion)
- Disease-specific nutrition support, treatment and counselling
- Micronutrient malnutrition control
- Community-based nutrition
- Nutrition promotion, education and advocacy

### **1.4.4 Infant and young child feeding policy**

The infant and young child feeding policy for South Africa was developed and released in 2008 by the National DoH and is based on the WHO's Global Strategy for Infant and Young Child Feeding.<sup>28</sup> This policy was developed for the protection, promotion and support of safe and appropriate infant and young child feeding. It focuses on the important role of breastfeeding as

part of the child's right to the highest attainable standard of health. It ensures that parents and children are informed and supported in knowledge of child health and nutrition, including the advantages of breastfeeding; furthermore, it recognises that mothers, who decide to use commercial infant formula should be respected in their decision and should receive all the support they require. The policy also provides expert information on what, when and how complementary foods should be given to infants. The ideal of this policy is to contribute to improvement of the nutritional status, growth and development of infants and young children in SA.<sup>28</sup>

#### **1.4.5 Paediatric Food-based Dietary Guidelines**

A high prevalence of stunting in children under five is a public health problem in SA. The National Food Consumption Survey – Fortification Baseline (NFCS-FB) done in SA in 2005, found that 18% of children between one and nine years were stunted and 5.1% were severely stunted.<sup>29</sup> Furthermore in a secondary analysis of the anthropometric data from the NFCS-FB, done by Bosman *et al.* in 2010, the prevalence of stunting was shown to be even higher at 20.1%.<sup>30</sup>

The preliminary PFBDG were therefore developed for children from birth up to seven years as a national initiative after the Food Based Dietary Guidelines (FBDG) for individuals over seven years of age became available. The PFBDG Working Group considered the 'normal' healthy child while formulating these guidelines, but it was recognised that a large and growing proportion of young South African infants and children are HIV positive and that PFBDG's should be modified and tested for this purpose. The need for PFBDG's to inform and support decisions around safe infant feeding, as well as optimal complementary feeding, which takes into account the increased energy requirements of HIV-infected infants and children, is essential. HIV-positive infants on ART should receive diets optimised for their needs, while bearing in mind the existing research gaps which still exist and that need attention to address metabolic derangements associated with ART.<sup>31</sup>

The preliminary PFBDG's have been developed to address the diet-related health issues in South African infants and children and to complement governmental strategies described above. These guidelines, once adopted by DoH, could also help to prevent nutrition-related non-communicable diseases of the lifestyle that are increasingly evident in South African adults.<sup>32</sup> According to the ASSAF committee there is an urgent need for the development of national

infant feeding guidelines for HIV-infected infants, which are aligned with the PFBDG for South Africa.<sup>1</sup>

## 1.5 Evaluation of the effectiveness of national programmes

No evaluations relating to the implementation of the above-mentioned programmes and guidelines have been conducted on a national level, although certain studies have shown that coverage of the PMTCT and the ART programmes was not optimal.<sup>19,20,33,34,</sup>

## 1.6 Nutritional effects of HIV in infants

*“A matter of great potential interest and importance is the accumulating evidence that one, perhaps the major site at which HIV infects and hence depletes CD4 T-cells is the gut, raising the possibility of links between diet and HIV infection quite different from the usual pre-occupations of traditional nutritional theory and practice”<sup>1</sup>*

Recent studies have shown that the gastro-intestinal tract is a major anatomical frontline of the disease, and that lymphocyte activation is a key step in the CD4 T-cell depletion that defines AIDS. These findings have major implications for the understanding of the intersection between nutrition and HIV/AIDS, both in terms of the potential impact of HIV infection on nutritional status, and in redefining the conceptions of how nutritional intervention might impact HIV/AIDS pathogenesis.<sup>1</sup>

### 1.6.1 Nutritional status

HIV-exposed infants' growth and nutritional status are already affected in utero.<sup>35,36</sup> Low birth weight was found to be a common problem among these infants and also that HIV infection caused early and progressive decrements in the rate of linear growth, after birth, which may already be detected at three months of age. The consequences are stunting, underweight and wasting, which persist throughout childhood, unless ART is administered.<sup>25,37</sup> Studies done in SA and the rest of Africa on HIV-positive children showed that stunting, underweight, severe malnutrition, wasting, severe wasting and multiple micronutrient deficiencies were very common in these children.<sup>33,38,39,40,41,42,43</sup> The loss of lean body mass (muscle weight) and poor linear

growth in HIV-infected children are closely associated with poor survival. Low weight is a reflection of an advancing disease and often an indication of the presence of opportunistic infections or progressive disease. Protecting lean body mass therefore prolongs survival.<sup>40,44,45</sup> Ensuring optimal nutritional status in HIV-infected children is therefore crucial for their survival and quality of life.

### **1.6.2 Growth faltering**

Growth faltering and stunting are common in children with HIV infection and occur early in life.<sup>38,40,46</sup> A variety of disturbed growth patterns have been described for HIV-infected children. It ranges from symmetric delays in weight and height, to severe wasting with normal height. Follow-up studies showed that growth of HIV-infected infants remains below the growth in age-matched and gender-matched uninfected children.<sup>37,39,40,46,47,48</sup>

### **1.6.3 Impaired nutrient intake**

The most common clinical conditions associated with HIV/AIDS are anorexia, nausea, gingivitis, oral sores and dysphagia, which all leads to an impaired food intake and, in turn, promotes growth faltering. At times ARV medication and other medications prescribed for opportunistic infections are poorly tolerated and also results in nausea, vomiting and anorexia, which cause a further decreased food intake or excessive nutrient losses in HIV-infected children.<sup>49</sup>

Paediatric HIV infection has also been linked to the neurological condition of encephalopathy. It is possible that undernutrition could contribute to impaired cognitive function in HIV-infected children, because of the high prevalence of undernutrition in these children.<sup>50</sup> Encephalopathy on the other hand can also cause impaired food intake due to the physical inability to consume enough energy to sustain growth and the difficulty of administering oral feeds in such a condition.<sup>51</sup>

## 1.7 Nutritional assessment of HIV-infected infants

The anthropometric measurements which should be taken in infants to determine nutritional status are body weight, length, head circumference and mid-upper arm circumference. The height-for-age, weight-for-age and weight-for-length should be plotted on a suitable paediatric growth chart on a regular basis to monitor growth. Measurements performed reliably form a pattern from which you can judge growth failure or abnormality. It is important to note that a reduction in lean body mass in children is detectable before a deceleration in linear growth<sup>40,52</sup> stressing the importance of weight-for-age assessment.

## 1.8 HIV infant feeding

*“Appropriate nutritional support in a HIV-infected child has the potential benefit to help control HIV/AIDS by complementing or preceding pharmacotherapy, through delaying the rate of progression of the earlier phases of the illness before specific medicinal interventions are indicated. The clinical efficacy of nutritional intervention is likely to be dependent on the extent to which individual infected subjects suffer from functionally significant nutritional deficiencies prior to nutritional intervention.”<sup>1</sup>*

### 1.8.1 WHO guidelines

In November 2009 the WHO released revised guidelines regarding HIV and infant feeding which included, among others, the following key recommendation: “Mothers known to be HIV infected (and whose infants are HIV uninfected or of unknown HIV status) should exclusively breastfeed their infants for the first six months of life, introducing appropriate complementary foods thereafter, and continue breastfeeding for the first 12 months of life. Breastfeeding should then only stop once a nutritionally adequate and safe diet without breastmilk can be provided.” Stopping breastfeeding abruptly is no longer advisable: gradual cessation over one month is now recommended. Mothers known to be HIV infected should only give commercial infant formula milk as a replacement feed to their HIV-uninfected infants or infants who are of unknown HIV status when specific conditions (AFASS criteria: Table 1.1) are met.<sup>53,54</sup> Another key recommendation made by the WHO is that “national or sub-national health authorities should estimate which feeding strategy is likely to provide the greatest chance of HIV-free survival for

infants based on several factors, including background levels of infant mortality and the leading causes of infant mortality. Authorities must then decide whether health services should mainly counsel and support HIV-infected mothers to breastfeed and receive ARV's, or instead avoid all breastfeeding."<sup>55</sup>

**Table 1.1: AFASS criteria and explanation of terms<sup>53,54</sup>**

Acronym	Definition	Explanation
<b>A</b>	Acceptable	<p>The mother perceives no problems in replacement feeding. Potential problems could be social, cultural or due to fear of discrimination and stigmatisation.</p> <p><u>Questions to be asked:</u></p> <p>Is formula-feeding and total avoidance of breastfeeding culturally and socially acceptable?</p> <p>Has the mother disclosed her HIV status to other household members?</p> <p>Will the mother be able to deal with stigma and discrimination associated with avoidance of all breastfeeding?</p> <p>Will the mother be able to get enough family support to exclusively formula feed (EFF) without being stigmatised?</p>
<b>F</b>	Feasible	<p>The mother had adequate time, knowledge, skill, resources and support to correctly mix the formula feeds.</p> <p><u>Questions to be asked:</u></p> <p>Will mother be able to visit the clinic monthly to obtain formula milk?</p> <p>Does the mother have enough time, knowledge, skills, resources and support to correctly prepare breastmilk substitutes?</p> <p>Will the mother be able to prepare night feeds easily and also feed the infant 8 – 12 times in 24 hours?</p> <p>Where does the mother get drinking water from?</p> <p>What kind of toilet/latrine is in the house, or available?</p>
<b>A</b>	Affordable	<p>Is the mother able to afford the cost of EFF without harming the health or nutritional status of the family</p> <p><u>Questions to be asked:</u></p> <p>Does the caregiver have money for transport to the clinic, for</p>

		<p>buying bottles, cleaning equipment and to buy milk after six months or when it runs out?</p> <p>How much money can the mother afford for formula each month?</p> <p>How much money does the mother have for electricity/fuel?</p>
<b>S</b>	Safe	<p>Will the mother be able to practise EFF safely?</p> <p><u>Questions to be asked:</u></p> <p>Does the caregiver have access to safe water supply, fuel to boil water and cleaning equipment to sterilise bottles and teats?</p> <p>Will the caregiver be able to store formula milk correctly and hygienically?</p> <p>Does the mother have a refrigerator with reliable power?</p> <p>Is it safe to prepare feeds at night?</p>
<b>S</b>	Sustainable	<p>Will the mother be able to continue with EFF for the recommended six-month period, once she has begun?</p> <p><u>Questions to be asked:</u></p> <p>Will the caregiver be able to get a continuous, uninterrupted supply of formula milk, water and fuel?</p>
<p><b>If the caregiver answers “NO” to ANY ONE of above questions, exclusive breastfeeding (EBF) for six months is the most appropriate and safe infant feeding choice. If a caregiver answers “YES” to ALL of the above questions exclusive formula feeding for six months is advisable.</b></p>		

### 1.8.2 HIV and breastfeeding

In developing countries the single most effective intervention to save the lives of millions of children is the promotion of exclusive breastfeeding.<sup>56</sup> Breastfeeding has consistently shown to reduce infant morbidity and mortality associated with infectious diseases in resource-rich and poor settings, particularly in the first few months after birth, compared with the use of breastmilk substitutes, e.g. formula milk.<sup>56</sup> The Lancet Child Survival series in 2003 showed that universal coverage of exclusive breastfeeding for six months and continued breastfeeding up to one year, with appropriate complementary foods, may prevent 13% of under-5 deaths globally, even in the presence of HIV.<sup>57</sup> Subsequently the Lancet Nutrition series showed that in resource-limited

settings the survival benefits of EBF in the first six months of an infant's life, are far greater compared with predominant breastfeeding, partial breastfeeding and no breastfeeding at all, for all-cause mortality, diarrhoea mortality and pneumonia.<sup>58</sup> Accumulated international research evidence, summarised by the Bellagio Child Survival Group, states: "Infants aged 0–5 months who are not breastfed have seven-fold and five-fold increased risks of death from diarrhoea and pneumonia respectively, compared with infants who are exclusively breastfed. At the same age, non-exclusive rather than exclusive breastfeeding results in a more than two-fold increased risk of dying from diarrhoea and pneumonia."<sup>56</sup> Despite all the benefits of EBF, research shows that any breastfeeding carries a risk of post-natal HIV transmission, with mixed feeding being the largest risk and EBF the smallest.<sup>59,60,61</sup> In resource-limited settings, HIV transmission through breastmilk accounts for approximately 40% of new infections.<sup>15</sup>

In the absence of intense support, EBF is not the normative cultural practice in most African settings.<sup>62,63</sup> The Vertical Transmission Study (Bland *et al.*, 2008) done in SA was able to increase EBF rates to 40% at six months following an intense peer counselling intervention programme, consisting of approximately 20 home-based visits, starting from antenatal until six months after delivery.<sup>64</sup> Whether such intervention is replicable and sustainable in a programmatic setting is, however, questionable. Pooled analysis of data from the Vertical Transmission Study (SA) and Ditrane Plus Study (Cote d'Ivoire) (2009), showed that for the same time period, postnatal HIV transmission rates were not significantly different among exclusively or predominantly breastfed infants. However, infants exposed to solids at least once in the first two months of life were 2.9 (95% CI 1.1 – 8.0) times more likely to become HIV infected post-natal compared with infants who did not receive solids before two months of age.<sup>65</sup> This analysis did not compare HIV-free survival among the two different breastfed groups, but it does suggest that the early introduction of solids are the most risky for transmission of HIV and also that, if EBF is not socially or culturally the norm among HIV-positive mothers, the next best option would be predominant breastfeeding with mixed feeding.<sup>53</sup>

The most recent Demographic and Health Survey done in SA found that only 8% of infants younger than six months were exclusively breastfed.<sup>66</sup> There are numerous and complex reasons for this low rate, but long-standing cultural practices, the support of formula milk through the government Nutrition Therapeutic Programme, the lack of promotion of breastfeeding due to high HIV prevalence and the provision of free formula milk through the PMTCT programme certainly need to be included.<sup>55,67</sup> Furthermore, the current PMTCT policy of presenting HIV-

positive women with two “equivalent” options is likely to contribute to the confusion among mothers and HCW on whether exclusive breastfeeding is the best feeding option or not, and therefore it is not being promoted.<sup>68</sup>

Data show that ARV regimens, when given as prophylaxis to the breastfeeding infant, can reduce post-natal HIV transmission to around 5% at nine months.<sup>69,70</sup> ARV's given to mothers also appear to decrease the risk of HIV transmission, with studies reporting transmission rates of around 5% at 12 months.<sup>71,72</sup> The Breastfeeding, Antiretrovirals and Nutrition (BAN) study done in Malawi showed that maternal Highly Active Antiretroviral Therapy (HAART) for six months and infant Nevirapine (NVP) for six months were equally efficacious in reducing post-natal HIV transmission through breastmilk at six months, with a probability of HIV infection of 3% and 1.8% respectively.<sup>73</sup> The latest evidence in this field comes from the HPTN 046 study<sup>74</sup>. This was a phase-3, randomised, placebo-controlled trial designed to determine the efficacy and safety of an extended daily regimen of NVP in infants born to HIV-infected women to prevent vertical HIV transmission during breastfeeding. The results showed that the overall risk of HIV transmission through breastmilk at age six months was lower with extended daily infant NVP (for six months), 1.1%, compared to 2.4% in infants who only received NVP for six weeks ( $p=0.048$ ). The study also demonstrated that extended infant NVP is most important for infants of mothers with high CD4+ cell counts ( $> 350$  cells/mm<sup>3</sup>) who are not on ART; among these infants, breastmilk transmission was much lower with six months of NVP, 0.7%, compared to 2.8% of infants who received only six weeks of NVP ( $p=0.014$ ).<sup>74</sup>

Breastfeeding with ARV interventions is an appropriate option in SA, since with its socio-demographic pattern and urban-rural inequities, the majority of the HIV-positive population do not meet the WHO's AFASS criteria for formula feeding.<sup>54,66</sup>

### **1.8.3 HIV and formula feeding**

Evidence on the increased mortality associated with formula feeding, and avoidance of breastfeeding, in various PMTCT research studies throughout Africa, has been accumulating over the past several years. The cumulative incidence of infant death by month 7 in the MASHI study done in Botswana, was significantly higher in the formula-fed group than in the breastfed (receiving zidovudine) group (9.3% versus 4.9%;  $p = 0.003$ ).<sup>75</sup> This concurs with an earlier finding from Kenya of increased early mortality among formula-fed infants.<sup>76,77</sup> Although the

MASHI study found that breastfeeding with zidovudine prophylaxis was not as effective as formula feeding in preventing post-natal HIV transmission, the HIV-free survival of both groups of children at 18 months were not significantly different. This indicates that even though formula feeding may protect children from post-natal HIV transmission, it poses risks, other than HIV, for child survival.<sup>75</sup> Research done in 2010 in Malawi has also shown that not being breastfed while being HIV-exposed, was significantly associated with declines in nutritional status as evidenced by decreased mean length-for-age, weight-for-age and weight-for-length z-scores.<sup>78</sup>

Research from routine PMTCT sites in SA has found that an inappropriate choice to formula feed (without AFASS criteria being met) carries a greater risk of HIV transmission and death than breastfeeding.<sup>79</sup> In a study done in Hlabisa, KwaZulu-Natal, South Africa, the cumulative three-month mortality in exclusive breastfed infants was 6.1% versus 15.1% in infants given replacement feeds, despite the fact that the women who opted not to breastfeed were of higher socio-economic status.<sup>59</sup> At 18 months the probability of survival was not significantly different for the HIV-uninfected infants, whether breastfed or formula-fed from birth, even though these mothers and infants received excellent support to make and practise appropriate infant feeding choices.<sup>80</sup> This shows that the avoidance of breastfeeding incurred no survival gain for these infants, similar to the MASHI study.<sup>75</sup>

Another aspect to consider with formula feeding is the cost of such a recommendation. A recent cost analysis done for the WHO, in Southern African countries, found that any feeding strategy that includes free provision of infant formula to HIV-infected mothers, even for only 6 months, is between two and six times more costly than a strategy that provides ARV's as prophylaxis to breastfeeding mothers to reduce postnatal transmission.<sup>81</sup>

#### **1.8.4 HIV infant feeding practices**

HIV-positive mothers readily identify infant feeding in the context of HIV as an issue of great concern, with concerns centralised around three points, namely: (i) stigma and disclosure of HIV; (ii) confusion and coercion on the best infant feeding mode for their baby; and (iii) diarrhoea, sickness and free formula.<sup>82</sup>

A study done by Doherty *et al.* on infant feeding decision-making and practices among HIV-positive women in SA, found some key characteristics in the women who achieved success in exclusive feeding. This included being able to resist pressure from the family to introduce other

fluids due to self-confidence and having knowledge of the importance of exclusive feeding and being able to recall key messages on MTCT risks and mixed feeding. The women who were able to maintain EBF had a strong belief in the benefits of breastfeeding and also a supportive home environment.<sup>83</sup> The reasoning behind HIV-positive mothers' infant feeding choice is related to a desire to protect their child, by reducing the risk of transmission.<sup>84,85</sup> However, fears of HIV transmission through breastmilk often resulted from information given by HCW or other family members that over-estimated this risk and had mothers believe that HIV transmission through breastmilk was a certainty instead of a probability.<sup>84,86</sup> A study done in Nigeria on the infant feeding intentions and practices of HIV-positive mothers, found that the most common reasons for intending to formula feed, were the fear of HIV transmission and the need for an HIV-negative child to survive the mother, health workers' advice and death of a previous child. On the contrary, reasons given for choosing EBF were fear of stigmatisation, non-disclosure of HIV status to the partner, financial constraints, strong belief that breastmilk is superior and for bonding purposes.<sup>87</sup>

Research done in SA shows that exclusive feeding practices recommended by the PMTCT guidelines are not practised unless intense support is provided.<sup>64,84,88</sup> Furthermore, it shows that women are opting for formula feeding, despite not meeting the AFASS criteria.<sup>79</sup> At the same time availability of free formula, in the context of poor counselling and unclear messages, provides an incentive to choose formula feeding, even when it is not appropriate or the best option, since free formula might be viewed as a cash transfer to poor households.<sup>55</sup> Provision of free formula milk to HIV-positive mothers not only leads to inappropriate infant feeding decisions, it may also promote the common practice of mixed feeding in the general population. HIV-positive women seeking to find excuses for why they are not breastfeeding are influencing the perceptions of women in the general population on the superiority of breastfeeding as infant feeding choice and subsequently it leads to the spill-over effect as mentioned before.<sup>89,90</sup>

Choosing formula feeding inappropriately might also pose a health risk to infants due to the risk of contamination of formula milk bottles and poor formula preparation. This was shown by a small study done in South Africa which investigated the contamination of formula milk bottles at community health clinics and in the home. High levels of contamination with fecal bacteria (67% of clinic samples and 81% of home samples) were found as well as over-dilution of milk in 28% of clinic samples and 47% of home samples, showing evidence of poor hygiene and formula preparation among HIV-positive women.<sup>91</sup>

#### 1.8.4.1 Mixed feeding

As discussed, EBF is not the norm in most parts of Africa and women find it very difficult to practise exclusive feeding, even though they intend to do so.<sup>53,66,83,84,86,92,93,94,95,96</sup> The reasons for this include traditional feeding practices, unclear understanding of what EBF entails and the mother's pre-existing views on breastfeeding, poor communication on the rationale for the advice and unclear medico-scientific information.<sup>83,92</sup> The study done in Malawi, previously mentioned, showed that the mothers did not perceive giving water, gripe water and other foods in addition to breastmilk as practices that are in conflict with EBF, thus they believed they were exclusively breastfeeding. Many of these mothers also attributed the prevention of HIV during the first six months to prophylactic drugs, rather than to the practice of EBF and therefore less concern about following the advice to exclusively breastfeed were prevalent.<sup>92</sup> Evidently, the role of EBF in reducing transmission of HIV is being down-played.<sup>92</sup> In the study done in Nigeria mentioned in the previous section, the reasons given for mixed feeding while intending to exclusively formula feed, were pressure from family members/friends, non-disclosure of HIV status, lack of funds and excessive crying by infants during the night.<sup>87</sup> Fear of disclosure of HIV status and stigma has also weakened the ability of HIV-positive mothers to resist community and cultural norms that encourage the early introduction of other fluids and foods whilst breastfeeding.<sup>67</sup> Having had more antenatal clinic visits and counselling prior to birth<sup>97</sup> as well as disclosure of HIV status to the spouse has been identified as being protective from mixed feeding practices, with the spouse being the greatest support in maintaining the initial infant feeding choice.<sup>85</sup>

Evidently, choosing an appropriate infant feeding method in the light of HIV infection is challenging. The one option, breastfeeding, is weighed down by the risk of HIV transmission through breastmilk and the other option, formula feeding, is weighed down by the risk of morbidity and mortality from childhood illnesses as a result of not breastfeeding.<sup>53</sup> The question remains whether the reduction in HIV transmission through avoidance of breastfeeding outweighs the accompanying risks from infectious-disease infant mortality. The latest evidence seems to suggest that, in the context of ART provision for HIV-positive women or ARV prophylaxis to breastfeeding infants, the avoidance of breastfeeding leads to worse outcomes.<sup>55</sup>

### 1.8.5 PMTCT infant feeding recommendations: SA clinical guidelines 2010

In April 2010 the National AIDS Council and the South African DoH released revised PMTCT clinical guidelines.<sup>98</sup> (Table 1.2)

**Table 1.2: 2010 Revised PMTCT Guidelines**

**For all mothers:**

- Counselling on infant feeding must commence after the first post-test counselling session in pregnancy.
- Infant feeding should be discussed with women at every antenatal visit.
- Mixed feeding during the first six months of life should be strongly discouraged as it increases the risk of childhood infections.
- Provide nutritional support for ALL breastfeeding HIV-positive mothers and for formula-feeding mothers with food insecurity.

**Breastfeeding HIV-positive women:**

- All mothers who are known to be HIV-infected either on lifelong ART or not, who exclusively breastfeed their infants should do so for six months, introduce appropriate complementary foods thereafter and continue breastfeeding for the first 12 months of life.
- Trained health-care personnel should provide high quality, unambiguous and unbiased information about risks of HIV transmission through breastfeeding, ART prophylaxis to reduce this risk, and risks of replacement feeding.
- Mothers who are known to be HIV-infected, and not on lifelong ART, who decide to stop breastfeeding at any time should do so gradually during one month while the baby continues to receive daily NVP and should continue for one week after all breastfeeding has stopped.

**Formula-feeding HIV-positive women:**

- Free commercial infant formula will be provided to infants for at least six months.
- Women should receive practical support, including demonstrations on how to safely prepare formula and feed the infant.
- At six months of age, infants with – or at risk of – poor growth should be referred for continued nutritional monitoring and dietary assistance.
- An appropriate formula milk product for the infant's age and circumstances should be chosen.
- In cases in which commercial formula is provided free of charge at health facilities, managers, supervisors and health care personnel should ensure an uninterrupted supply at clinic level. A reliable procurement and distribution system should be put in place.

The recommendations in the 2010 South African PMTCT guidelines state that the programme should adopt an approach to infant feeding that maximises child survival and not only the avoidance of HIV transmission. By keeping the WHO's recommendations in mind, it seems, however, that no determination on which feeding practice will maximise HIV-free survival nationally, has been made, with a choice between two feeding options (exclusive breast- or exclusive formula-feeding with free formula milk for the first six months) still being recommended.<sup>55</sup>

Key role players in the field of HIV infant feeding developed key messages to promote safe infant feeding and improve HIV-free survival (**SSSUPPORT** – Table 1.3). They recommend that while stakeholders engage in discussions on which regimens to include in national policy to minimise postnatal transmission, “**SUPPORT**” should be given to all HIV-positive women to improve infant outcomes and reduce postnatal transmission.<sup>53</sup>

**Table 1.3: Definition of SSSUPPORT**

<b>S</b>	Screen all women for HIV
<b>S</b>	Send off CD4 cell counts on all HIV-positive women
<b>S</b>	Screen all HIV-positive women for AFASS
<b>U</b>	Understand the mother's personal and socio-cultural context
<b>P</b>	Promote exclusive or predominant breastfeeding if all the AFASS criteria are not met and start postnatal prophylactic regimens to minimise postnatal HIV transmission
<b>P</b>	Promote exclusive formula feeding if all the AFASS criteria are met
<b>O</b>	Organise supplies of formula milk if mothers choose to formula feed of cotrimozazole for infants from six weeks and of prophylactic antiretrovirals if mothers do not meet AFASS
<b>R</b>	Review mothers and infants in the first three days post-natal, in the first two weeks post-natal and monthly thereafter. Review mother's and infant's health, and infant feeding practices/techniques, regardless of feeding choice
<b>T</b>	Treat all mothers and children with antiretroviral therapy according to updated recommendations

According to a review of data the challenges to implement policies on HIV infant feeding can be categorised into four main areas: (i) Confusion among health care providers on infant feeding and the risks of HIV transmission through breastfeeding<sup>99,100</sup>; (ii) Infant feeding counsellors not receiving sufficient support<sup>101</sup>; (iii) poor counselling skills of counsellors<sup>102,103</sup>; and (iv) a disjunction between feeding recommendations and the socio-cultural context within which feeding occurs.<sup>83,84,88,95,104</sup>

### 1.8.6 HIV infant feeding counselling

The principles of safe infant feeding according to the National DoH's PMTCT clinical guidelines, relies on provision of proper counselling to the HIV-positive mother, to equip her to make an informed and appropriate decision on how to feed her infant.<sup>98</sup>

These guidelines state that:

- i. Trained health care personnel should provide high quality, unambiguous, and unbiased information about risks of HIV transmission through breastfeeding, ART prophylaxis to reduce this risk, and risks of replacement feeding;
- ii. Counselling on infant feeding must commence after the first post-test counselling session in pregnancy;
- iii. Infant feeding should be discussed with women at every antenatal visit and;
- iv. Mixed feeding during the first six months of life should be strongly discouraged as it increases the risk of childhood infections.

Moreover, the guidelines also state that:

- v. Each pregnant HIV-positive woman should receive at least four antenatal counselling sessions on infant feeding and ARV prophylaxis;
- vi. During the post-natal period, mother-infant pairs should have a follow-up visit within three days after delivery to review feeding practices, check breast health, maternal health and child health, and provide general support and that;
- vii. All HIV-positive infants should continue breastfeeding for at least two years.

The guidelines for HIV-positive mothers who have chosen to avoid all breastfeeding are set out in Table 1.4.<sup>98</sup>

**Table 1.4: PMTCT guidelines for mothers who have chosen to avoid all breastfeeding**

- Formula-feeding mothers require support at every well child/routine visit, every immunization visit, and every sick child visit to facilitate and support exclusive formula feeding.
- Formula milk preparation should be demonstrated at the first post-natal visit and as needed thereafter, and discussed at every visit.
- Health care personnel should:
  - provide clear guidance regarding the volume and frequency of feeding needed at each age;
  - discuss the dangers associated with bottle-feeding and how bottles should be cared for, if used. Discuss and demonstrate cup feeding as a recommended alternative to bottle-feeding;
  - discuss home support for avoiding breastfeeding – ensure that the woman has a supporter outside the health facility to help her avoid all breastfeeding.

Evidence shows that when infant feeding advice, especially for EBF, is well defined and women understand the advice well, they succeed in following it.<sup>64,103,92</sup> Unfortunately, several studies done in SA have shown that the quality of counselling given at antenatal visits is poor<sup>80,105</sup> and that AFASS conditions are not taken into account when counselling.<sup>84</sup>

A study done at three different PMTCT sites in SA, which represents three diverse types of communities, found that the quality and intensity of infant feeding counselling and thus the mother's infant feeding choices, differs greatly between sites<sup>84</sup> and that the counselling is influenced by staff training, availability of lay counsellors and individual facility preferences.<sup>101</sup> Even though these mothers received sufficient counselling, many of them doubted their ability to carry out certain feeding practices, especially EBF, and had lowered beliefs in their own ability to care for their children. Many of the mothers felt confused and unsure about the best infant feeding choice for their infant and consequently chose whatever they were told would provide the best protection for their child.<sup>84</sup> It appears that health workers have the greatest influence over mothers' initial choice on how to feed their infants, but this influence diminishes in the postpartum period when initial infant feeding intentions are affected by opinions of other family members.<sup>84</sup> Infant feeding seems to be imbedded within traditional relationships of intimacy with both relatives and breadwinners having influence and even authority over options and modes of infant feeding.<sup>86</sup>

Poor quality counselling can cause a “spill-over effect” of sub-optimal infant feeding practices in women who are not HIV-positive. A reason for this spill-over-effect is that HIV-positive women seek, and often receive, suggestions from HCW on ways to explain why they are not breastfeeding, in order to avoid the risk of stigma associated with HIV. The false reasons given to mothers to tell others serve to strengthen the already existing misperceptions that breastmilk is not sufficient and that a mother can have “insufficient” or “bad” milk.<sup>84</sup> However, in the case of appropriate counselling and support, spill-over of sub-optimal feeding practices to HIV-negative women is minimal.<sup>62</sup>

Encouraging results from research done in SA show that with good counselling for appropriate feeding choices and support for optimal feeding practices, HIV-uninfected children of HIV-infected women grow as well as those of uninfected women, whether breast- or formula-fed. It can therefore be concluded that optimal early feeding practices can ameliorate the effect of being born to an HIV-infected mother.<sup>63</sup>

### **1.8.7 Clinical guidelines**

The dietary goal when feeding an HIV-infected infant or child is to prevent growth faltering and weight loss and to optimise nutritional status and dietary intake. Guidelines for increased energy intake above the normal requirements, to maintain growth, were developed by the South African HIV Clinicians Society Nutrition work group. The requirements are as follows:<sup>106,107</sup>

- Asymptomatic: increase energy with 10%
- Mild symptomatic: increase energy with 20-30%
- Severely malnourished and experiencing weight loss: increase energy with 50 – 100%

There is no clinical evidence to support an increase in protein intake, which should provide 12–15% of the energy requirements and no specific evidence-based dietary guidelines for micronutrients have been established. Studies have shown that daily zinc supplementation in HIV-infected children was associated with reduced morbidity from diarrhoea, and children receiving zinc plus multivitamins experienced fewer episodes of hospitalisation and diarrhoea.<sup>38,108,109</sup>

It has been found that ready-to-use therapeutic foods (RTUTF's) are effective in reversing the poor nutritional status found in severely malnourished HIV-infected children; vitamin supplements decreased the mortality and morbidity of HIV-infected children and that zinc supplements given to HIV-infected children are safe and effective in reducing morbidity.<sup>110,111,112,113,114</sup>

## **1.9 Antiretroviral treatment in infants**

### **1.9.1 Early ART initiation**

The course of HIV and AIDS is particularly aggressive in children. Without treatment and specialised care, HIV multiplies and destroys the child's defence to infection, leaving the child less able to resist pneumonia and other common childhood infections. At least a third of children who acquire HIV from their mothers and do not receive antiretroviral treatment will die before their first birthday, approximately 50% die before their second birthday and an estimated 62–89% of children will have died by age 5 years, if untreated.<sup>11,115,116,117,118</sup>

With early HIV testing, within the first 12 weeks of life, and treatment of infected infants, mortality levels can be reduced by up to 76% and HIV progression by 75%.<sup>119</sup> Data from the KIDS-ART-LINK Cohort Collaboration shows that only 12% of children start ART at <12 months and that 70% of children starting ART had severe immunodeficiency. They found that the two-year death-risk on ART was 6.9% and this was independently associated with immunodeficiency and advanced clinical disease.<sup>120</sup> Other studies showed that children receiving ART had a probability of survival of 84-97% at one year after initiation of ART and that the majority of deaths occurred within six months of starting ART.<sup>119,120,121</sup>

The Children with HIV Early Antiretroviral Therapy (CHER) trial, conducted in SA, found that starting ART before 12 weeks of age reduced early infant mortality by a highly significant 76% and HIV progression by 75%, compared with starting at CD4 percentages of >25% or guided by clinical symptoms. This study suggested that early ART also has a protective effect against gastroenteritis in infants in whom replacement feeding is common. Failure to thrive was the most common event in both of the infant groups studied, but was twice as frequent in the group that did not receive early ART.<sup>119</sup>

From the above-mentioned findings and data available, it is very clear that every effort should be made to identify HIV-infected infants as early as possible in order to not delay initiation of ART, whilst the need for enhanced PMTCT programmes and effective transition from hospital to care at home, should also be the focus. The nutrition, care-giving and social factors of these infantile patients are also of great importance.

### **1.9.2 WHO recommendations**

In mid-2008 the WHO revised their guidelines to recommend universal treatment of all HIV-infected infants <12 months of age. The WHO strongly recommends “*All infants under 12 months of age with confirmed HIV infection should be started on ART, irrespective of clinical or immunological stage*”.

The Department of Health in SA officially approved these guidelines in February 2010 and therefore it should be standard protocol at all health facilities.<sup>122</sup>

### **1.9.3 Paediatric ART in South Africa**

According to STATSSA the number of children receiving ART in SA has increased from <3000 in February 2005 to ± 70 000 by mid-2009, an estimated 106 000 children would have been in need of ART in 2009, but only an estimated 70 000 would be receiving ART.<sup>7</sup>

Despite the proven beneficial effects of ART in improving the survival and nutritional status of HIV-infected children, the recommendation of the National DoH that, at least 15% of all patients on ARV medication should be children, has unfortunately not been achieved in most provinces.<sup>123</sup> By 2007 there was no national data on the outcomes of children receiving ART in SA. Although some South African ART facilities have published data demonstrating the early benefits of ART in children enrolled in the programme, routine data on adherence, retention, viral load suppression, clinical and nutritional status, mortality and adverse effects are required to assess the impact and efficacy of such programmes.<sup>123</sup>

#### **1.9.4 Nutrition and ART**

The importance of nutrition in any paediatric treatment plan has been acknowledged for a long time and is often reported.<sup>13,31,78,98</sup> With ARV medication being a relatively new treatment to infants, the need for specialised nutritional care has not been studied in depth and there is a great need for scientifically proven treatment plans.

ART and especially HAART have shown to improve the nutritional status of HIV-infected children and studies in SA have reported significant short-term nutritional gains in response to ART.<sup>121</sup>

##### **1.9.4.1 Dietary problems associated with ART**

Antiretroviral medication has gastro-intestinal side effects. The most common side effects, as mentioned before, are nausea, vomiting, abdominal pain, diarrhoea, pancreatitis, liver enzyme abnormalities and anorexia. The above-mentioned side-effects can all contribute to impaired intake of food, excessive nutrient losses and malnutrition.<sup>124</sup>

##### **1.9.4.2 Growth and immunological status**

Weight and height of HIV-infected children tend to lag behind those of uninfected children of similar age. There are reports showing that the introduction of HAART results in a significant catch-up in weight and height without an increase in body mass index (BMI).<sup>125,126</sup> This may be related to the fact that children, in contrast to adults, increase their height parallel to their weight, and therefore, their BMI remains stable.<sup>126</sup> Various studies have shown improvements in weight during the first year and in height mostly over the second year, after initiating HAART.<sup>120,125,127,128,129</sup> It has also been found that initiation of ART at younger ages has been associated with better catch-up in weight and height.<sup>128</sup>

Studies have also shown that ART significantly improves the immunological status of HIV-infected children and that it decreases the morbidity and mortality in these children.<sup>120,130,131</sup>

Growth failure in HIV-positive children is a multi-factorial problem, which includes HIV infection, HIV-associated opportunistic infections and the lack of virologic and immunologic control before initiation of HAART. Treatment with HAART has improved the clinical manifestations and

outcomes of HIV infection and although ART independently exerts a favourable effect on growth and body composition in HIV-infected children, whereby recovery from wasting and underweight precedes linear growth, the problem of growth failure remains multi-factorial in nature and therefore needs multi-factorial treatment.<sup>40,131</sup>

#### **1.9.4.3 Lipodystrophy**

The lipodystrophy syndrome (clinical syndrome of body fat redistribution and metabolic changes) characterised by dyslipidaemia, insulin resistance and fat redistribution, develops after the introduction of ART in adults and children.<sup>128,132,133,134</sup> Lipodystrophy has also been associated with decreased total body fat, increased viral load and a decreased CD4 cell count.<sup>133</sup> Emerging data has shown that children are not spared the metabolic effects of HAART and there is a significant risk of lipodystrophy in children, which requires further research.<sup>5,133</sup> Prevalence of this syndrome in HIV-positive children has been reported to range from 1% to 43%, although its extent in African children is unknown.<sup>135</sup> It is therefore important that the impact of HAART on the nutritional status and lipid profile of children should be further investigated.<sup>136</sup>

### **1.10 Conclusion**

Paediatric HIV is a preventable disease. Even though ART improves the chance of early mortality in HIV-infected children, it should be remembered that HIV-infected children or infants remains a vulnerable population and those receiving ART may later be at risk of developing non-communicable diseases, such as fat redistribution syndromes, insulin resistance and eventually type II diabetes mellitus, cardiovascular disease and obesity.<sup>8</sup> Keeping these findings in mind, it is therefore of utmost importance that attention should be given to the infant feeding practices of HIV-positive women, the quality of counselling and support these women receive and the quality of diets of HIV-infected infants on ART. Nutritional interventions not yet adequately evaluated in HIV-infected children include food supplementation and the recommended daily allowances of macro- and micronutrients for children on ART. Attempts should therefore be made to conduct research that will allow HCW to compile these national guidelines. Ultimately every effort should be made to promote safe infant feeding practices which protects and promotes the health of infants born to HIV-positive mothers.

## 1.11 Statement of the problem

A paucity of data exists regarding growth patterns and nutrition-related problems in infants (under one year) on ART and the infant feeding knowledge, beliefs, attitude and practices of their caregivers.

## 1.12 Motivation for the study

A literature search on HIV in infants (0-12months) and children and the nutritional effect of ART on these infants and children found that only one study has been done that investigated the impact of ART on infants younger than 12 months of age. Of all the literature on ART in infants and children reviewed, only two studies included HIV-positive children younger than six months of age. This lack of research may be due to the WHO's relatively recent (mid-2008) change in ART protocol or guidelines that all infants under 12 months of age with confirmed HIV infection should be started on ART, irrespective of their clinical or immunological stage. In the past children were not given ART at young ages as they would only meet the clinical criteria or immunological stage for ART when they were older, hence the gap in the literature on infants younger than 12 months.<sup>60,88</sup>

No literature was found regarding the feeding practices of caregivers HIV-positive infants on ART. Furthermore no information is available on the knowledge these caregivers have regarding infant feeding and nutrition-related problems associated with HIV infection and ART. Additionally no literature was found on the infant feeding advice given by HCW to these caregivers and whether the advice given is nutritionally sound and sufficient for the nutritional needs of HIV-infected infants on ART. Only literature on the practices of HIV-positive mothers were found, irrespective whether their children were HIV positive, HIV negative or on ART.

There is therefore a need to investigate the nutritional impact of ART on infants younger than one year of age and the nutrition-related problems these infants' experience. Such research will help to identify the most common problems caregivers experience with infant feeding, as well as determine the knowledge, attitude, beliefs and practices of caregivers regarding infant feeding and management of common nutrition-related problems associated with HIV infection and ART. The ASSAF report stated that *"there is an urgent need for the development of national guidelines for HIV-infected infant feeding, which are aligned with the Paediatric Food-Based*

*Dietary Guidelines for South Africa.*<sup>1</sup> This statement was the final motivation for the study to be conducted, highlighting the need for research in this specific population.

Ultimately the knowledge obtained from this study could contribute to improving the healthcare provided to HIV-infected infants and ultimately improve their quality of life and life expectancy.

## **CHAPTER 2: METHODOLOGY**

## 2.1 Study aim

To describe the growth and nutrition-related problems of infants under one year attending the ARV clinic at the Red Cross Children's Hospital, as well as the knowledge, attitudes, beliefs and practices of their caregivers concerning infant feeding.

## 2.2 Study objectives

1. To describe, in *HIV-positive infants* on ART:
  - Growth patterns
  - Dietary intake
  - Nutrition-related problems
  
2. To describe, in *caregivers* of HIV-positive infants on ART:
  - Knowledge, attitudes, beliefs and practices (KABP) regarding infant feeding
  - Most common nutritional problems experienced with infant feeding
  - Management of nutrition related problems

## 2.3 Study design

This study was a cross-sectional, descriptive study.

## **2.4 Study population**

### **2.4.1 Sample selection**

#### **2.4.1.1 Study site**

The Red Cross Children's Hospital (RCCH) is situated in Rondebosch, Cape Town. It is an internationally renowned specialist children's hospital dedicated entirely to children in Southern Africa. As a public tertiary- and secondary-level hospital, the Red Cross Children's Hospital is dedicated to delivering world-class paediatric treatment, care, research and specialist training. The Hospital is managed by the Provincial Government of the Western Cape (PGWC) Department of Health and the outpatient ARV clinic serves the Metropolereion of the Western Cape Province.

To obtain potential study population numbers for this study, the provincial statistics of the number of children on antiretroviral therapy at each Department of Health District/Community Health clinic in the Western Cape, for the month of March 2010 was studied (see Addendum B: March 2010 Western Cape ART monthly summary). The six antiretroviral clinics with the highest number of children (birth – 12 years) on ART were investigated as potential clinics for data gathering. Numbers for the infants on ART at each clinic were obtained. Of the numbers obtained, RCCH's ART clinic had the highest number of infants attending and was therefore chosen as the study site.

#### **2.4.1.2 Study population**

##### **Infants**

Infants attending RCCH's ARV clinic were not only HIV exposed but were already diagnosed as HIV positive before referral to this clinic.

Therefore all HIV-positive infants, under one year of age on ART attending RCCH's ARV clinic during the time period of data collection, who fitted the inclusion criteria and whose caregivers gave informed consent for participation were included in this study.

## Caregivers

All caregivers accompanying infants in the selected infant study population who fitted the inclusion criteria and who gave informed consent for participation were included in this study as the study caregiver population.

### 2.4.1.3 Description of study population

The Metropole region hosts almost two-thirds of the Western Cape's population, with 73% of the population being dependant on the public sector health services. In 2004, HIV/AIDS caused 21.6% of all under-5 deaths in the Metropole.<sup>137</sup>

In 2008 the Western Cape had just less than 300 000 HIV-positive people (6% of total population), with an antenatal HIV prevalence of 16.1% and approximately 27 000 new infections per year. Fifty-five thousand people would have been in need of ART and 41 000 would have been accessing ART.<sup>138</sup> According to statistics, 6% of the population would have been HIV positive in 2010, with 55260 adults and 5173 children on ART. The infant mortality rate was expected to be 23/1000 live births and the child mortality rate 37/1000 live births, with a birth rate of 18/1000 live births and death rate of 12/1000 live births.<sup>139</sup> According to the Centre for Actuarial Research, the percentage of HIV-positive women attending antenatal clinics in the Western Cape peaked at 17% in 2010.<sup>140</sup>

### 2.4.2 Sampling of study population

Census sampling<sup>141</sup> of all infants under one year old attending the clinic were conducted over a time period of 11 weeks (14 January 2011 – 8 April 2011). Every infant and caregiver who complied with the inclusion criteria during the data gathering time period were included.

### 2.4.3 Inclusion and exclusion criteria

#### Infants

*Inclusion criteria:*

All HIV-positive infants under one year old receiving ART, attending RCCH ARV clinic between 11 January 2011 and 8 April 2011.

*Exclusion criteria:*

- Infants whose caregivers did not give consent to participate in the study.
- Institutionalised infants attending the clinic.
- Infants born with a known genetic disorder or clinical condition, other than HIV, affecting normal growth.

#### Caregivers

*Inclusion criteria:*

Any person accompanying the above-mentioned infant to the antiretroviral clinic who identified him/herself as the primary caregiver of the infant and gave consent to participate.

*Exclusion criteria:*

- Caregivers who were not English-, Afrikaans- or Xhosa-speaking.
- Caregivers who did not give consent to participating in the study.

### 2.4.4 Sample size

The number of infants who attended RCCH's antiretroviral clinic for the duration of the data gathering (11 weeks) totalled 49.

- Eleven infants were institutionalised and were excluded.
- Three caregivers did not give consent to participate.
- One infant still had to start with ART and was therefore excluded.
- One infant had a clinical condition affecting her growth (oesophageal strictures with a PEG) and were excluded, but the caregiver was included.
- Two Xhosa-speaking caregiver-infant pairs were transferred to a community clinic before translators could assist and were excluded.

- On the last day of data collection there was one caregiver who did not speak English or Afrikaans and no translator was present to assist with translation. They were therefore not included.

In the end a total of 30 infants and 31 caregivers were included in this study.

## **2.5 Data collection**

Each infant/caregiver included in this study was seen only once at RCCH's antiretroviral clinic for data collection. All data collection was done by the researcher herself, and a Xhosa interpreter assisted with the completion of questionnaires for three of the caregivers included.

### **2.5.1 Study methods**

- Anthropometric measurements including weight, height, mid-arm circumference and head circumference were performed by the researcher according to standard procedures. Two measurements were taken and the average calculated and used for analysis.
- Interviewer-administered questionnaires, developed specifically for the purpose of this study, were used to obtain the KABP of the caregivers. Included in the questionnaires were the following sections: Twenty-seven socio-demographic questions (Questionnaires A+B, Addenda E+F), eight medical history questions (Questionnaire A, Addendum E), six dietary intake questions with sub-sections (Questionnaire C, Addendum G), as well as questions testing knowledge (18 questions), attitude (nine questions), beliefs (12 questions) and practices (six questions) (Questionnaires C+D, Addenda G+H).

### 2.5.1.1 List of questionnaires

- Questionnaire A:** Infant socio-demographic, medical history, anthropometry and nutrition related problems (Addendum E)
- Questionnaire B:** Caregiver socio-demographic information (Addendum F)
- Questionnaire C:** Infant feeding and nutritional care – Caregiver and practices (Addendum G)
- Questionnaire D:** HIV infant feeding and nutritional care – Caregiver attitude and beliefs (Addendum H)

### 2.5.2 Assessment of caregivers' knowledge

To assess the knowledge of the caregivers regarding HIV infant feeding, the researcher used standardised questions which asked the caregivers to describe what they know about specific aspects of HIV infant feeding.

All caregivers were asked questions on the meaning of exclusive feeding, mixed feeding, the dangers of mixed feeding, introduction of complementary foods, oral rehydration therapy, what to do if their infant gets sick and general food safety and hygiene practices.

If mothers were breastfeeding or had breastfed at an earlier stage they were asked additional questions on how often to breastfeed their infant, how much time to spend on each breast when feeding, breast problems and the heat treatment of breastmilk. If caregivers were formula-feeding their infants they were asked additional questions on the formula milk needs of their infant, cleaning of the feeding bottles, cupfeeding and hygiene practices relating to formula feeding.

### 2.5.2.1 Analyses of knowledge and allocation of knowledge scores

For analysis purposes a knowledge score was allocated to each caregiver. The method for calculating this score was developed by the researcher with the help of the study leaders and consulting statistician. For each question asked a score was given: if the caregiver answered the question completely correctly, 2 points were allocated, if the answer was partially correct, 1 point was allocated and if the answer was totally incorrect, or no answer was given, no points were allocated (zero score).

The average score obtained for each of the questions was calculated and an average knowledge score given to each caregiver, whereby a score of 2 indicated good knowledge (100%), a score between 1 and 1.99 indicated average knowledge and a score between 0 and 0.99 indicated poor or insufficient knowledge.

The different knowledge scores calculated for this sample were:

- General infant feeding knowledge (general knowledge): Score derived from questions asked to all the caregivers in the sample irrespective of infant feeding method.
- Breastfeeding knowledge score (BF knowledge): Score derived from specific questions asked only to mothers who were breastfeeding or who had breastfed before.
- Formula-feeding knowledge score (FF knowledge): Score derived from specific questions asked only to caregivers who were formula feeding their infants.

The total knowledge score for each caregiver was calculated by adding the general knowledge score to the BF knowledge or FF knowledge score as applicable.

For a breastfeeding mother the total knowledge score was calculated as:

**TOTAL KNOWLEDGE = GENERAL KNOWLEDGE + BF KNOWLEDGE**

For a formula-feeding caregiver the total knowledge score was calculated as:

**TOTAL KNOWLEDGE = GENERAL KNOWLEDGE + FF KNOWLEDGE**

### 2.5.3 Time and logistics

After the planned study was given ethics approval, the researcher contacted the head of the ART clinic at RCCH's to obtain permission to conduct the study, as well as the superintendent for consent for the execution of the study. After this consent was obtained, the researcher visited the ARV clinic to acquaint herself with the clinic as well as the HCW working at the clinic. The dietician working in the clinic assisted to obtain a dedicated and private space for data collection.

Infants are seen at the clinic every Tuesday and Friday. The researcher therefore visited the clinic every Tuesday and Friday between 11 January and 8 April 2011. Only 18 caregiver-infant pairs were seen at the clinic after the planned eight weeks of data collection and it was then decided to extend the period with a month to include more subjects.

Data collection was performed as follows (Table 2.1):

- The number of infants booked for the specific day was noted.
- The researcher introduced herself to the caregiver when they arrived at the clinic.
- The caregiver was informed (in her/his language of choice) about what the study would entail and was asked consent (for the infant and caregiver) to participate in the study. If consent was granted the consent forms were signed (also see "Informed Consent" section 2.8.2 and Addenda C and D).
- The infant's weight, height, head circumference and mid-arm circumference were taken after consent was given, before seeing the doctor (see Addendum E). A note was then placed in the infant's folder for the doctor, to ask to refer them back to the researcher for completion of questionnaires, after their appointment.
- A basic medical history of the infant was taken from the Road to Health Chart and medical records. (See Addendum E)
- The researcher conducted a structured interview with the caregiver, using the applicable questionnaires (See Addendum F – H)
- The amount of time it took to complete the questionnaires was approximately thirty to forty minutes.

**Table 2.1: Summary of data collected**

Specific objective To describe:	Data needed	Research tool/information to be used
Growth patterns (Infants)	<ul style="list-style-type: none"> <li>• Growth curve</li> <li>• Anthropometric measurements</li> </ul>	<ul style="list-style-type: none"> <li>• Road to Health Card</li> <li>• Anthropometry</li> <li>• Questionnaire A (Addendum E)</li> </ul>
Dietary intake (Infants)	<ul style="list-style-type: none"> <li>• Dietary intake (provided by caregiver)</li> </ul>	<ul style="list-style-type: none"> <li>• Structured questionnaire</li> <li>• Questionnaire C (Addendum G)</li> </ul>
Nutrition related problems (Infants)	<ul style="list-style-type: none"> <li>• Medical history (provided by medical reports and caregivers)</li> </ul>	<ul style="list-style-type: none"> <li>• Road to Health Card</li> <li>• Medical records</li> <li>• Structured questionnaires</li> <li>• Questionnaire A (Addendum E)</li> </ul>
Infant feeding and nutritional care knowledge, attitude, beliefs and practices (Caregivers)	<ul style="list-style-type: none"> <li>• Socio-demographic information (caregiver)</li> <li>• Information from caregiver</li> </ul>	<ul style="list-style-type: none"> <li>• Structured questionnaires</li> <li>• Questionnaires B, C + D (Addenda F, G + H)</li> </ul>
Infant feeding problems (Caregivers)	<ul style="list-style-type: none"> <li>• Information from caregiver</li> </ul>	<ul style="list-style-type: none"> <li>• Structured questionnaire</li> <li>• Questionnaire A (Addendum E)</li> </ul>

#### 2.5.4 Development of questionnaires as research tools

The WHO's principal guidelines for breastfed and non-breastfed infant feeding,<sup>142,143</sup> HIV infant feeding, the WHO's handbook on guidelines for an Integrated Approach to the Nutritional care of HIV-infected children (six months – 14 years)<sup>144</sup> and the South African Department of Health's Infant and Young Child feeding policy<sup>145</sup> were used to obtain information on the standardised messages about infant feeding practices which are supposed to be conveyed to all HIV-infected mothers and caregivers of HIV-positive infants.

To ensure that this information obtained were relevant to the study population, the researcher also studied the National PMTCT protocol<sup>98</sup> and the Western Cape's PMTCT protocol.<sup>146</sup> In these protocols the infant feeding messages which should be conveyed and explained to mothers are clearly stipulated and summarized below:

- Breastfeeding
  - The meanings of exclusive BF, mixed feeding
  - Frequency of BF: On demand and in the night
  - Management of breast problems
  - Dangers of mixed feeding
  - Exclusive BF until six months
  - Introduction of appropriate complementary foods after six months
  - Food safety and hygiene
- Formula feeding
  - Cleaning of utensils
  - Caring for bottles
  - Cup feeding
  - Preparation of formula feeds
  - The volume of formula milk per feed and frequency
  - What to do with unused prepared formula feeds
  - Introduction of appropriate complementary foods after 6 months
  - Food safety and hygiene

The researcher used this information to compile the questions on infant feeding practices and knowledge. To comply with international standards for the measurement of appropriate infant feeding practices, the WHO's Indicators for Assessing Infant and Young Child Feeding practices guidelines<sup>147</sup> were also used. Questions testing the appropriateness of the infants' intake and other feeding practices were developed using these guidelines.

## **2.5.5 Description of questionnaires and anthropometric measurements**

### **2.5.5.1 Questionnaire A: Infant socio-demographic, medical history, anthropometry and nutrition-related problems (Addendum E)**

#### **Description of questionnaire A:**

This questionnaire had four sections, all of which had to be completed. The researcher completed the questionnaire by asking the caregiver the questions and by obtaining data from the RtHC and medical records.

The socio-demographic data and information on the nutrition-related problems of the infant were obtained from the caregiver and the RtHC. The number of HIV infant feeding counselling sessions the caregiver received pre- and post delivery was also obtained. The medical history and growth pattern of the infant were obtained from the RtHC and medical records.

#### **Information obtained by questionnaire A:**

The following information concerning the infant were obtained from the RtHC and the medical records at the clinic and recorded in questionnaire A.

- Date of birth
- Age (in weeks)
- Sex
- Gestation period
- Birth weight
- CD4% and classification of HIV-stage
- Date started on ART
- Duration of ART
- ARV regime
- Other medication received
- Medical history
- Growth curve pattern as on RtHC

To classify the growth of the infant, the growth curve was described for each month of the infant's life. The researcher indicated at each month, whether growth was normal, faltering or whether weight loss occurred. Incomplete growth chart mapping was also indicated per month. The infant's actual weight for each month was recorded, if available. The infant's current weight percentile was recorded and interpreted according to the WHO (2006) growth standards for children.<sup>148</sup>

The weight, length, head circumference and mid-upper arm circumference measurements were obtained and recorded by using standard equipment and standardised techniques. The z-score of the average of each duplicate measurement was recorded for interpretation purposes. It was interpreted according to the WHO (2006) growth standards for children.<sup>148</sup>

- **Weight**<sup>149</sup>

Infants were weighed on a calibrated pan-type paediatric electronic scale, measuring the weight to the nearest 0.01kg, according to standard weighing procedures. Infants were totally undressed. The caregiver was asked to remove all clothing and the nappy. The time of day and whether the infant had been fed just before the measurement could have potentially affected the measurements and therefore influenced the validity. To improve the reliability of the measurement, weight was taken twice, with the average of the two measurements used.

- **Length**<sup>149</sup>

The recumbent length of the infants was measured by using a special measuring device with a stationary headboard and moveable footboard which was perpendicular to the backboard. The caregiver of the infant was asked to remove any head covering as well as shoes and socks. The researcher placed the infant in the supine position, ensuring that the infant's crown was securely against the headboard with the Frankfort plane perpendicular to the backboard. The researcher asked the caregiver to keep the infant's head in that position while taking the measurement. The length was measured in centimetres to the nearest 0,1cm according to standard measuring techniques. To improve the reliability of the measurement it was taken twice, with the average of the two measurements used.

- **Head circumference**<sup>149</sup>

The head circumference was measured with a tape measure to the nearest 0,1cm. To measure the maximum circumference, the tape was placed just above the eyebrows, above the ears and around the back of the head, on the same plane on both sides of the head and pulled snug to compress any hair. The reliability of the measurement was verified with a second reading.

- **Mid-upper arm circumference**<sup>149</sup>

The MUAC of the infant was taken by using a tape measure, placing the tape around the arm, perpendicular to the long axis of the arm and midway between the lateral projection of the acromion process of the scapula and the inferior margin of the olecranon process of the ulna, without compressing the soft tissue. The measurement was taken to the nearest 0,1cm and the average of two measurements was used to improve the reliability of the measurement.

The medical information and verbal record obtained by questionnaire A gave the researcher a comprehensive picture of the infant's nutrition-related problems.

#### **2.5.5.2 Questionnaire B: Caregiver socio-demographic information (Addendum F)**

##### **Description of questionnaire B:**

This questionnaire comprised of 20 questions, all of which were completed for each caregiver. The researcher completed the questions by asking the caregiver the questions.

**Information obtained by questionnaire B:**

The following socio-demographic information of the caregiver was obtained by using questionnaire B:

- Date of birth
- Age
- Sex
- Relationship to infant
- Marital status
- Number of children
- Level of education
- Occupational status
- Residential town
- Type of house
- Basic services in the house
  - Electricity, running water, toilet facilities, personal washing facilities
- Facilities in the house
  - Refrigeration
  - Stove or kettle to boil water
  - Dish/bottle-washing facilities and tools
- Other commodities in the house
  - Cell phone, radio, television, microwave
  - Motor vehicle

**2.5.5.3 Questionnaire C: Infant feeding and nutritional care – Caregiver knowledge & practices (Addendum G)****Description of questionnaire C:**

This questionnaire consisted of two sections. The researcher completed the questionnaire by asking the caregiver the questions.

Section A of the questionnaire collected information on the infant feeding and nutritional care knowledge of the caregiver and was based on the infant feeding messages that HCW are supposed to convey and explain to caregivers. It also assessed the caregiver's practices regarding infant feeding.

Section B determined the infant's dietary intake by making use of questions which also gave an indication of the caregiver's knowledge and practices regarding appropriate infant feeding.

### **Information obtained by questionnaire C:**

The following information on the **knowledge and practices of the caregiver** regarding infant feeding and nutritional care was obtained in section A of questionnaire C:

- Knowledge regarding the meaning of exclusive breast-/formula feeding
- Knowledge on the meaning and dangers of mixed feeding practices
- Knowledge and practices on introduction of solid food into the infant's diet
- Knowledge and practices on the management of diarrhoea, vomiting and anorexia in infants
- Knowledge on oral rehydration therapy
- Cleaning and sterilising of feeding bottles and equipment<sup>ii</sup>

Information on the **infant's dietary intake** and **caregiver's infant feeding practices** was obtained through questionnaire C.

The WHO's Indicators for assessing infant and young child feeding<sup>87</sup> were used as guideline to set up relevant questions assessing the dietary intake and infant feeding practices of the sample population. These indicators focus on selected food-related aspects of child feeding, amenable to population-level measurement and gives insight on the progress of populations with regards

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<sup>ii</sup> The correct way of cleaning feeding bottles, as prescribed by the South African DoH, is to:

- A.) Wash with a bottlebrush in warm water with soap/detergent
- B.) Rinse with clean water
- C.) Sterilise either by boiling the bottles and teats for at least 10 minutes in water, or soaking it in a commercial sterilizing agent for 30 minutes and not rinsing it again after it has been sterilized
- D.) Air-dry bottles and teats, do not dry with cloth

to optimal feeding practices. Although these indicators are mainly designed for use in large-scale surveys or national programs the researcher found them useful as augmentation with more specific questions which reflect the study population's own behaviour and practices and which helped to achieve this study's specific objectives.

This study was not designed to assess the dietary adequacy of the infants' dietary intake, but rather to describe the infant feeding practices of the infant sample population. The indicators focus on the previous-day recall period because it has been widely used and found appropriate in surveys of dietary intake when the objective is to describe infant feeding practices. Practices vary widely from day to day, therefore the indicators derived from the previous day recall period should not be used to assess the adequacy of individual dietary intake and was therefore not used for this purpose in this study.<sup>87</sup>

#### **2.5.5.4 Questionnaire D: HIV infant feeding and nutritional care – Caregiver attitude and beliefs (Addendum H)**

##### **Description of questionnaire D:**

This questionnaire was structured and consisted of three sections with 31 questions in total. Sections A and B tested the beliefs and section C the attitude of the caregiver regarding HIV infant feeding practices. The researcher completed the questionnaire by asking the caregiver the questions.

### Information obtained by questionnaire D:

Information on the attitude and beliefs of the caregivers of infants on ART, regarding infant feeding and management of nutrition related problems were obtained.

The information on the **beliefs** of the caregiver was obtained by asking the caregiver to indicate how far they agree with selected statements with the use of a Likert scale.<sup>141</sup> The Likert scale consisted of the following options:

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
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In section B the caregiver's beliefs were obtained by choosing one answer from multiple-choice questions.

The information on the caregiver's **attitude** was obtained by asking the caregiver to indicate how they felt about selected statements with the use of a Likert scale.<sup>141</sup> The first 5-point Likert scale used consisted of the following options:

Very positive	Positive	Neutral	Negative	Very negative
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## 2.5.6 Validity and reliability of questionnaires

### 2.5.6.1 Validity

The face validity<sup>141</sup> of the questionnaires was tested during a pilot study. Any questions which compromised the validity by being irrelevant, ambiguous or not easily understood, was corrected before the study commenced. The validity of the questions regarding the caregivers' infant feeding practices were also tested by making use of open and closed ended questions as well as repeated questions. The researcher asked two experts in the field of HIV infant nutrition to review the questionnaires in order to test the content validity of the questionnaires.

### **2.5.6.2`Reliability**

The reliability of information obtained via a questionnaire increases with objectivity and standardisation. An objective, structured interview process was followed, with a standardised questionnaire which increased the reliability.<sup>141</sup> The researcher performed all the interviews and completed all the questionnaires personally, which increased reliability. The interpreter who assisted the researcher was trained by the researcher beforehand, also to increase the reliability. To maximise reliability and standardisation, the questionnaires were administered according to a fixed question order. The researcher standardised herself by using the same prompts and explanations when caregivers did not understand the questions or had poor language skills.

The setting of the data collection could have influenced the reliability of the questionnaire. Data were collected at the ARV clinics after the respondents had seen the doctor, before they fetched their medication. This caused impatience in some caregivers while doing the interviews, which could have led to incomplete answers given.

## **2.6 Pilot study**

A pilot study was conducted at the TC Newman ARV clinic in Paarl after ethics approval (see 2.8.1 Ethics Review Committee and Addendum I) was obtained. It served as a trial run to revise the logistics of data collection as well as to test the questionnaires as research instruments. The pilot study was conducted over a period of one week, beginning November 2010. It included four participants. After the pilot study, one question in questionnaire B was changed. Instead of asking whether caregivers had a computer in the house, the researcher asked whether they had a microwave in the house. Other important information regarding the number of infant feeding counselling sessions received were identified as missing in the questionnaires and added to questionnaire A.

## 2.7 Data analysis

The researcher captured data using *Microsoft Excel, 2007*<sup>®</sup>. A statistician appointed by the Faculty of Health Science, Stellenbosch University assisted the researcher with statistical analysis using *Statistica version 10*<sup>®</sup>.

### 2.7.1 Statistical methods

Descriptive and inferential statistics were used to report the data.<sup>141,144</sup> For analyses purposes a  $p$ -value  $< 0.05$  was considered statistically significant.

The following components will be described using descriptive statistics:

- Growth patterns of the infants
  - Data obtained from information on the RtHC as well as the anthropometric measurements of the HIV-infected infant which includes, weight, length, HC and MUAC.
  - The available growth measurements of the infants, as presented on the RtHC and medical files, were re-interpreted according to the WHO standards for growth in healthy infants.
  - The mean Z-score of each measurement as well as the weight-for-age (W/A), length-for-age (L/A), weight-for-length (W/L) and BMI-for-age for each infant were determined, analysed and interpreted according to the WHO growth standards for children.
- Dietary related problems experienced by the infants
- Dietary intake of the infants
- Problems the caregivers experienced with feeding the infants
- The caregivers' knowledge of infant feeding practices were described in relation to the WHO's recommended messages and standards for HIV infant feeding education and counselling as well as the standards set out in the National and Western Cape Provincial PMTCT protocols.
- The attitude, beliefs and practices of the caregivers concerning infant feeding and nutritional care.

The following components will be described using inferential statistics:

- The correlation between an infant's duration on ART and the CD4% of that infant.
- The correlation between an infant's duration on ART and the growth of that infant.
- The relationship between the amount of infant feeding counselling sessions caregivers received and their knowledge on infant feeding
- The relationship between the amount of infant feeding counselling sessions caregivers received and the growth of their infants
- The correlation between caregivers' knowledge on infant feeding and the growth of their infants

## **2.8 Ethics and legal aspects**

### **2.8.1 Ethics Review Committee**

The protocol for this study was submitted to the Health Research Ethics Committee, Faculty of Health Sciences, Stellenbosch University and the Research Committee of the RCCH for approval. Ethics approval was obtained from the Health Research Ethics Committee on 29 October 2010. (Addendum I). Consent was obtained from RCCH's Research Committee on 12 January 2011. (Addendum J)

### **2.8.2 Informed consent**

The researcher approached and explained to each potential participant (in their preferred language) what the study entailed and why she had been approached to participate. If the caregiver did not understand English or Afrikaans, a translator was organised and the caregiver was approached with the assistance of the translator on their next visit to the clinic. The potential participants, who did not decline immediately, received informed consent forms in their preferred language (English, Afrikaans or Xhosa) for adult and infant consent. Time was allowed for potential participants to read through the forms. The researcher then asked the potential participant to sign the consent forms if she was willing to participate in the study. The standard informed consent forms used by the Faculty of Health Sciences of Stellenbosch University were adapted for the specific research study. (Addenda C + D)

The participants were informed that participation was entirely voluntary and of their choice to exit the study at any stage, without penalisation.

### **2.8.3 Patient confidentiality**

Patient identification information was omitted from all the study-related material to ensure participant confidentiality. Upon entering the study, each participant received a subject identification number which was used on all study-related material and documentation. Names of participants were recorded on only one document, which stayed in the possession of the researcher, to keep the subject identification number and name of subject on record, for possible follow-up problems which could have occurred.

All information obtained via medical records or interviews was regarded and handled as confidential. The participant was ensured of this, both verbally and by means of the informed consent form.

To ensure the privacy and protection of the study population, data were collected at the ARV clinics, in a separate room, out of hearing proximity of any HCW or other patients.

### **2.8.4 Benefits / risks**

There were no risk to the study population involved in this study, and similarly no direct benefit. This study could possibly benefit HIV-infected infants in general as well as caregivers in future.

## **CHAPTER 3: RESULTS**

### 3.1 Sample description

A period of eight weeks was planned for data collection, but it was extended to 11 weeks since only 18 caregiver-infant pairs were recruited after eight weeks. At the end of 11 weeks, 31 caregivers and 30 infants were included (See 2.4.4 Sample size).

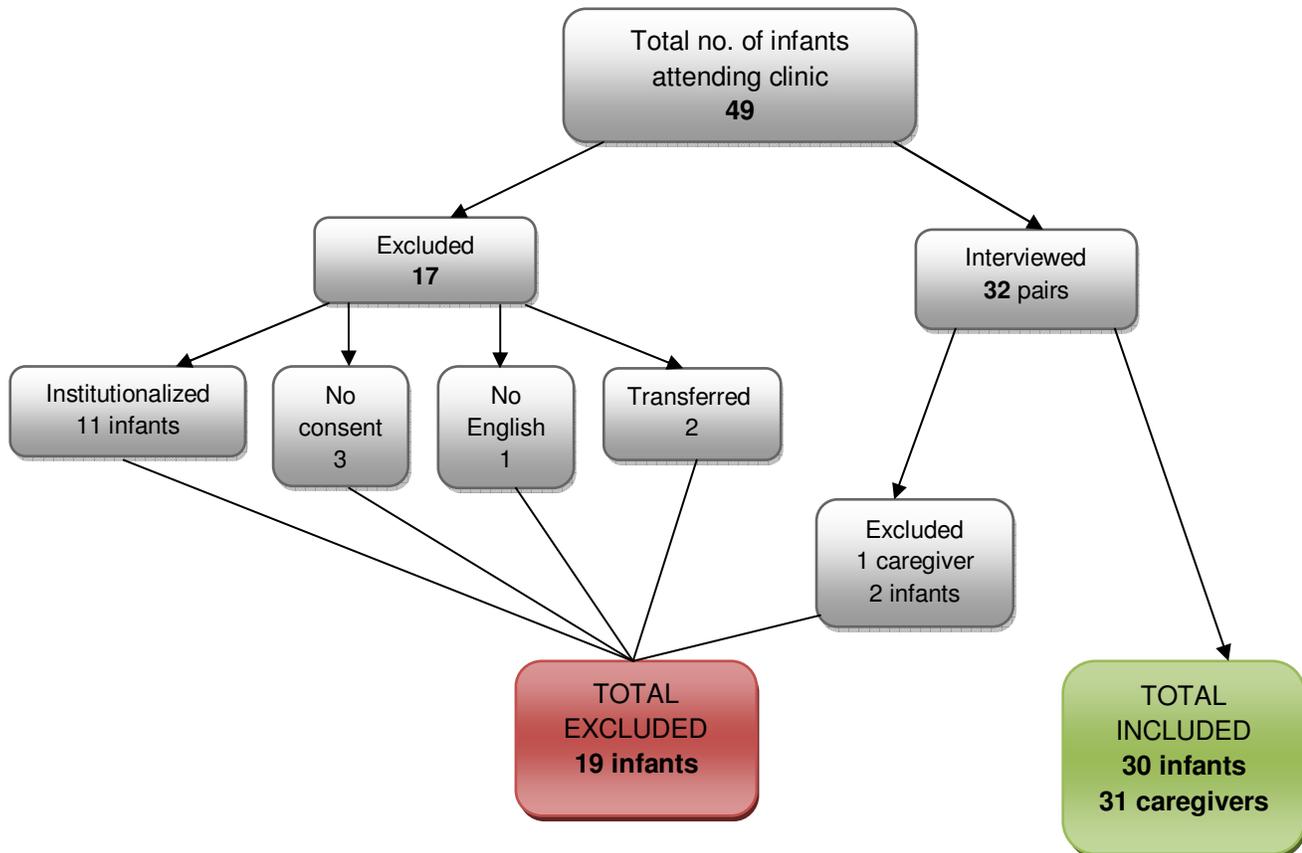


Figure 3.1: Flow diagram for determination of final sample

### 3.2 Socio-demographic characteristics of caregivers

Thirty-one caregivers were included in the sample population, of which all were females. The mean age of the caregivers was 28 (SD7.7) years. The youngest was 19 years of age and the oldest 59 years. Most of the caregivers (n=28, 90%) were also the mother, but two of the caregivers (6%) were the grandmother and one caregiver (3%) was an aunt of the infant.

The mean number of children each caregiver was caring for, including the recruited infant, was 1.8 (SD 1), with a median of 2, a minimum of 1 and a maximum of six children. Fourteen (45%) of the caregivers indicated they had a boyfriend, 13 (42%) indicated they were single, three (10%) were married and one was a widow (3%).

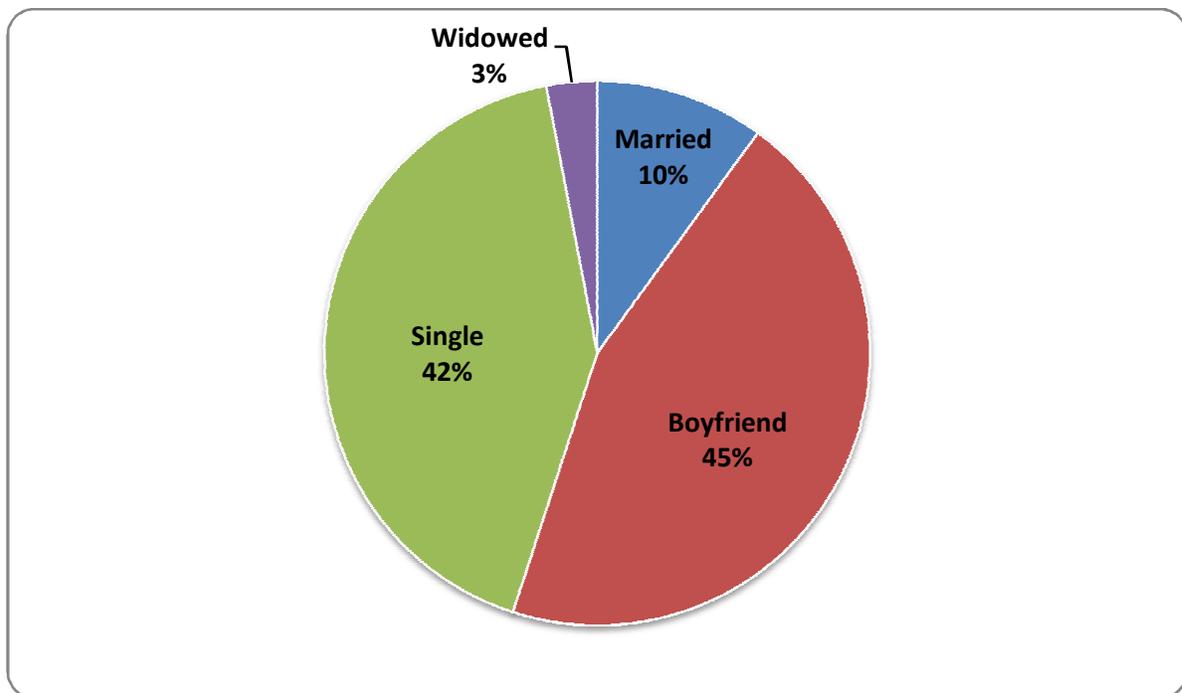
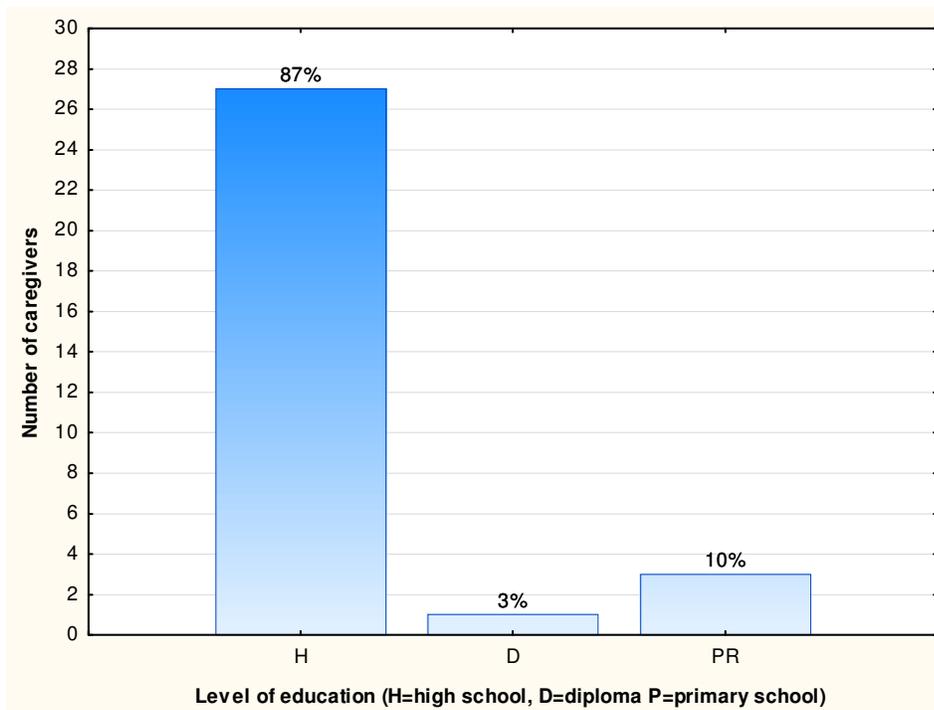
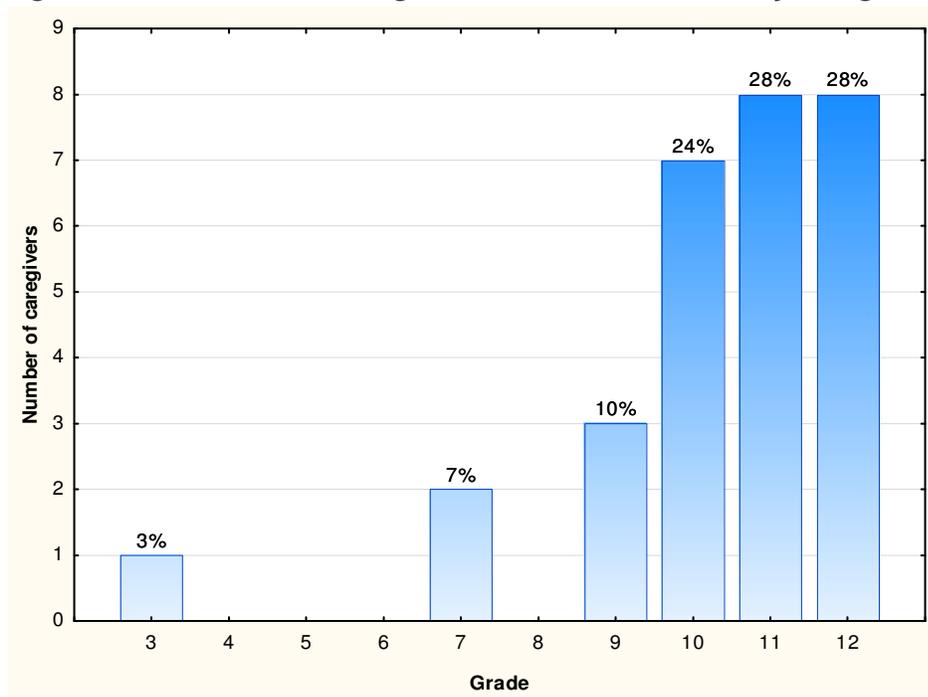


Figure 3.2: Marital/relationship status of caregivers in sample

Of the sample, only one caregiver (3%) had any form of post- high school education. Twenty-seven (87%) had a level of high school education and three (10%) only completed primary school. Of the caregivers who attended high school, only eight (18%) completed grade 12 (Figures 3.3 and 3.4).

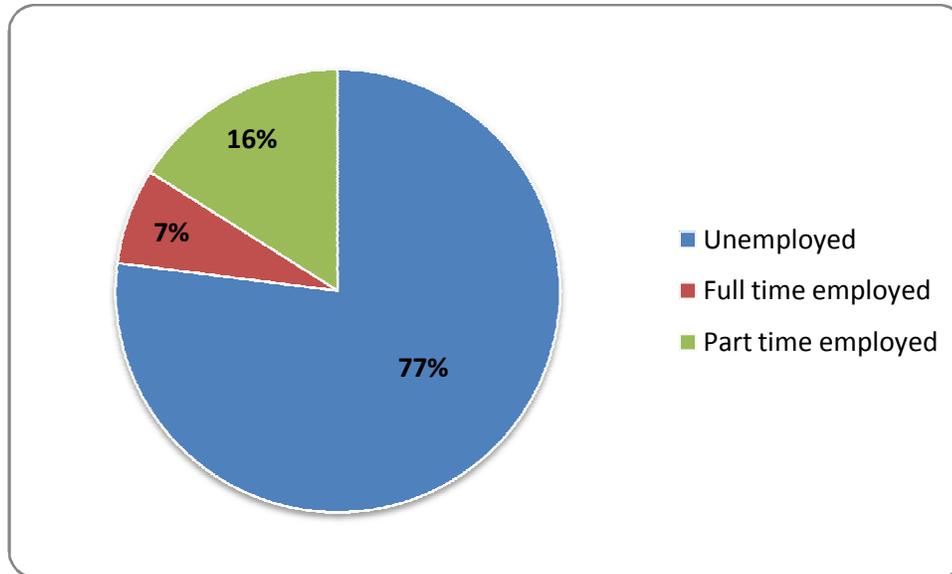


**Figure 3.3: Distribution of highest education obtained by caregivers**



**Figure 3.4: Distribution of highest school grade completed by caregivers**

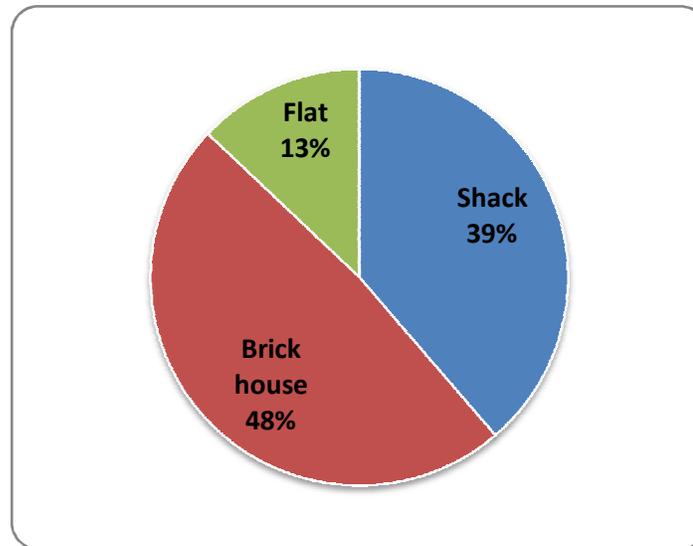
Twenty-four (77%) caregivers were unemployed at the time of data collection. Of the seven caregivers (16%) who had any form of employment, only two (7%) indicated that they were employed full time (Figure 3.5).



**Figure 3.5: Employment status of caregivers**

Twenty-eight (90%) of the caregivers reported receiving regular income, two (6%) had an irregular income and only one (3%) reported to have no income at all. Of the caregivers receiving a regular income, 16 (52%) reported that the income received was in the form of a grant and three (10%) regularly received money from family members.

All the caregivers resided within the CapeMetropole region. Forty-eight percent (n=15) reportedly lived in a brick house, 13% (n=4) lived in a flat and 39% (n=12) in a shack (Figure 3.6). All of the caregivers used public transport.



**Figure 3.6: Types of dwellings in which caregivers resided**

Fifty-five percent (n=17) of the caregivers reported having running water available inside their house. Of the 14 caregivers (45%) who did not have running water inside the house, only one was not using formula milk as infant feeding method. Most of the caregivers (n=30, 97%) had electricity in their houses. Fifty-two percent (n=16) reported having a flush toilet available in the house. See Table 3.1 for the reported availability of other basic services, facilities and commodities in the houses.

**Table3.1: Availability of basic services and facilities in caregiver dwellings**

<b>Basic services and facilities available in the house</b>	<b>Reported % availability</b>	<b>Number</b>	<b>Substitute if not available in the house</b>
Electricity	97%	30	Gas
Running water	55%	17	Communal tap outside the house
Sewerage (flush toilet)	52%	16	Communal toilets outside the house Bucket
Personal washing (bath or shower)	45%	14	Wash basin
Working refrigerator	74%	23	
Electric kettle to boil water	90%	28	Gas stove with kettle to boil water
Bottle-washing facilities (sink)	68%	21	Wash basin
Bottle-cleaning tools (soap, bottle brush)	97%	30	
<b>Other commodities available in the house</b>			
Cellular phone	97%	30	
Radio	71%	22	
Television	87%	27	
Microwave	55%	17	

### 3.3 Infant feeding counselling received by caregivers

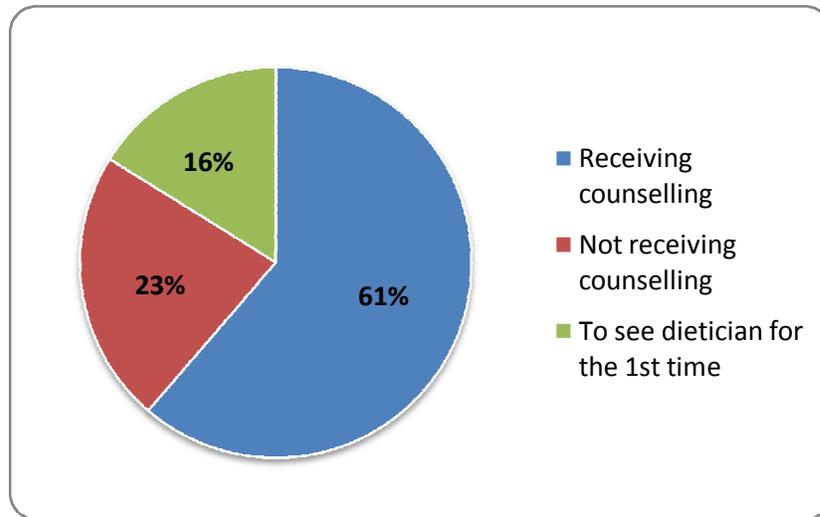
The researcher asked the caregivers whether they had received infant feeding counselling at a clinic or hospital before the infant was born. If they had received counselling, the researcher asked when the counselling was given (pre-delivery, post-delivery or pre- and post-delivery) and approximately how many sessions they received as well as who conducted the counselling. All of the caregivers were asked whether they were still receiving infant feeding counselling, irrespective of whether they received counselling before the infant was born. Antenatal clinic attendance was not determined.

Fourteen (45%) reported not receiving any infant feeding counselling prior to delivery. Three of the caregivers (10%) who did not receive any counselling were also not the mothers of the infants. Therefore of the 28 caregivers who were also the mothers of the infants, 11 (39%) did not receive infant feeding counselling prior to giving birth and 17 (61%) did receive counselling. The reason why they did not receive any counselling was not assessed. A counsellor was most frequently (n= 21, 76%) the person giving the counselling.

Of the 17 mothers who received pre-delivery counselling, 8 (47%) also received infant feeding counselling post-delivery. Nine (53%) of the 17 mothers reported receiving 4 or more infant feeding counselling sessions in total, but it was not assessed whether at least 4 of the sessions were received prior to delivery, as prescribed in the National PMTCT protocol.<sup>85</sup> Four mothers (24%) reported only receiving one counselling session. Of the 9 mothers who only received infant feeding counselling pre-delivery, merely 3 (33%) received the prescribed amount of at least 4 counselling sessions.<sup>85</sup>

Of the 17 caregivers who received antenatal infant feeding counselling, 84% (n=14) felt either positive or very positive about the counselling. Three (16%) of the caregivers felt negative about it. The reasons for their negative feelings were not assessed.

Nineteen (61%) caregivers indicated that they were still receiving infant feeding counselling from the dietician working in the clinic. Five caregivers (16%) were to see the dietician for the first time after the interview with the researcher and seven (23%) were no longer receiving any infant feeding counselling (Figure 3.7).



**Figure 3.7: Distribution of caregivers receiving infant feeding counselling at ARV clinic**

### 3.4 Socio-demographic characteristics of infants

The mean age of the infants included in the sample was 6.9 (SD 3.3) months. The youngest infant included was 1.2 months (five weeks) of age and the oldest 11.9 months (Figure 3.8). There was a gender distribution of 16 females and 14 males.

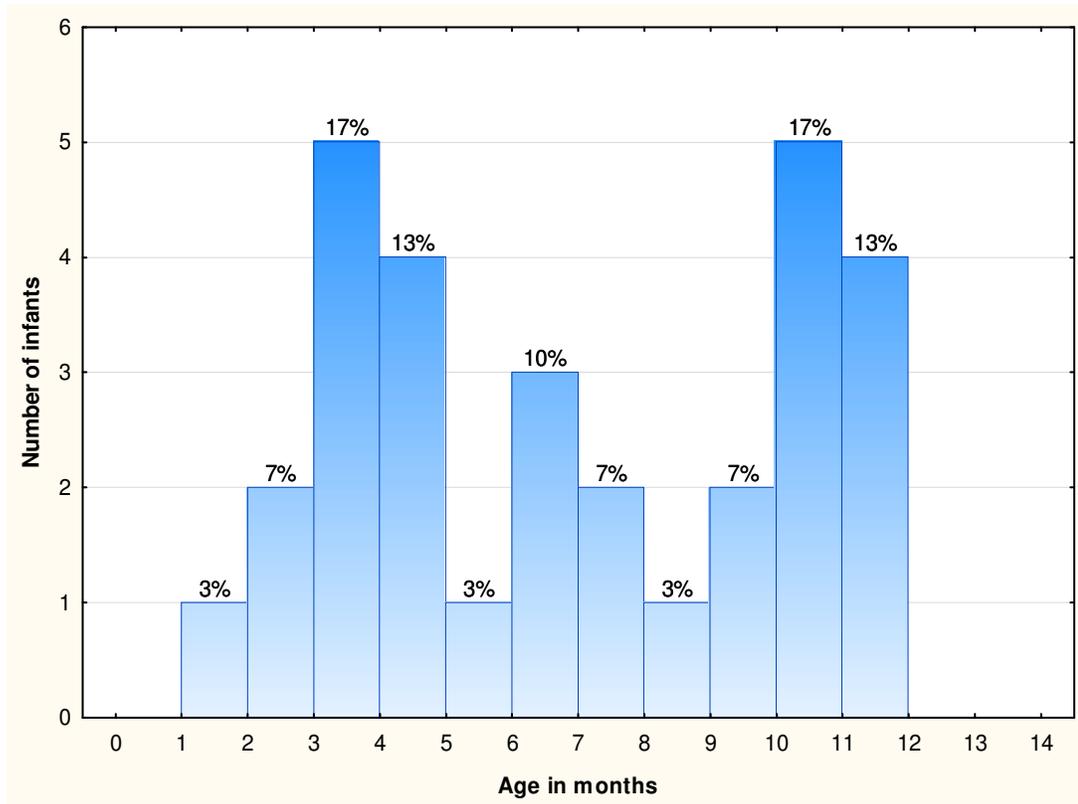


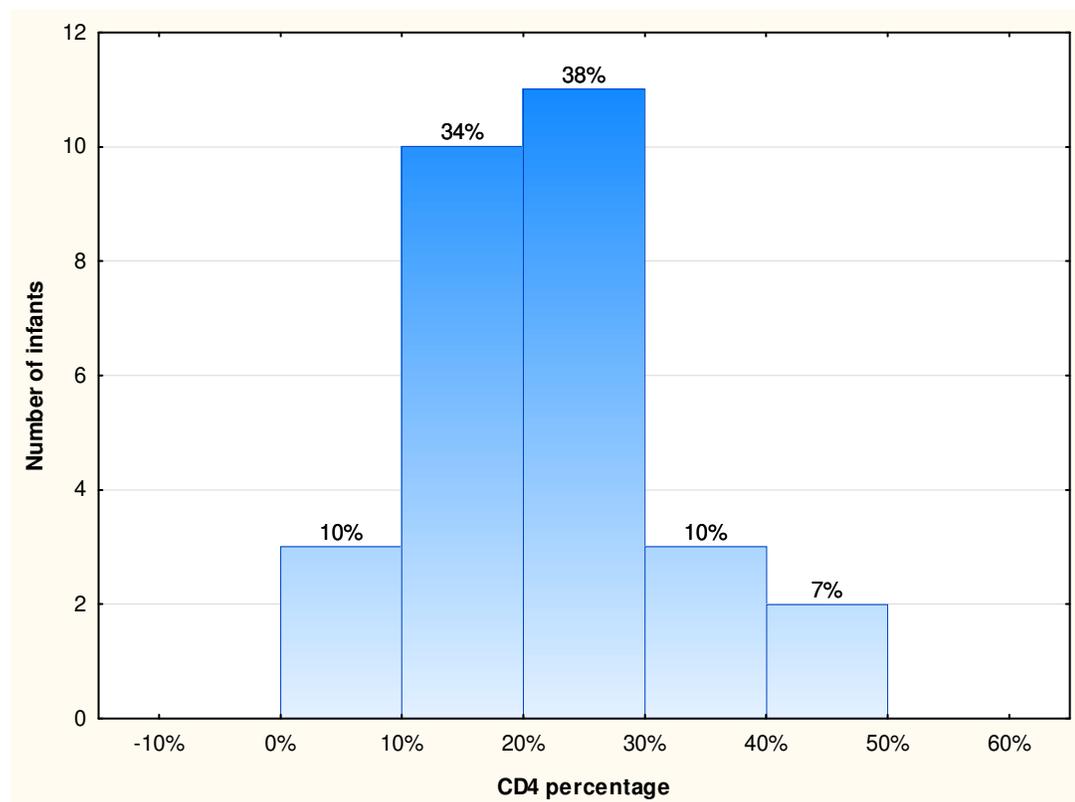
Figure 3.8: Age distribution of infants in sample

### 3.5 Medical history of infants

All infants included in this study were on ART. Only two infants included had never been hospitalised before initiation of the study. The mean CD4% of the infants was 22% (SD 10) (n=29). See Table 3.2 and Figure 3.9 for comprehensive description of CD4 percentages.

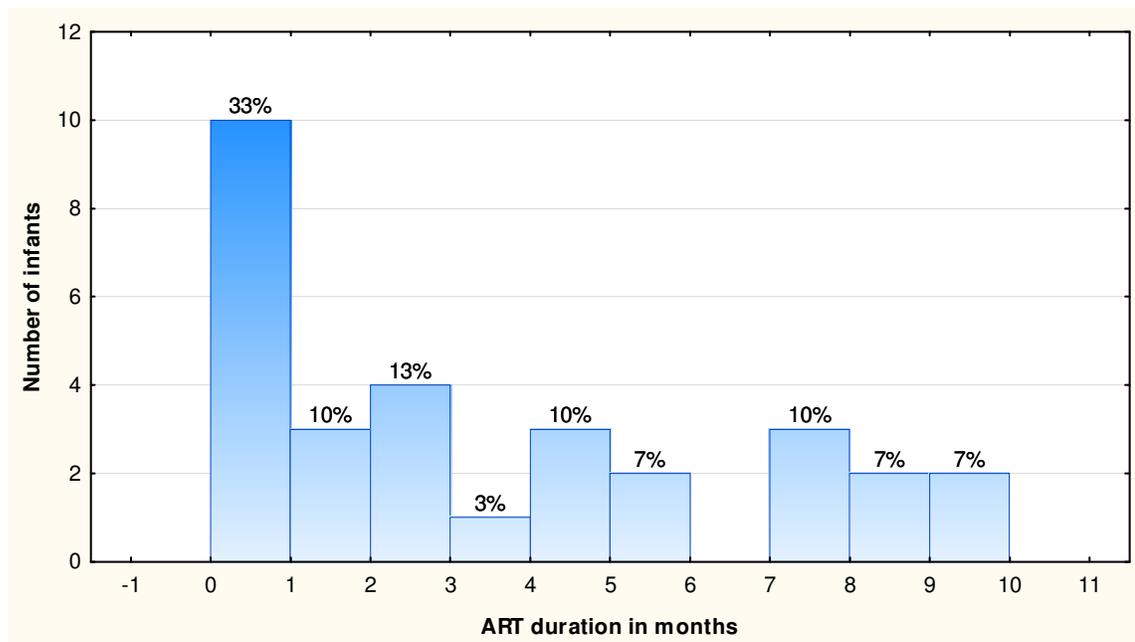
**Table 3.2: CD4% description of infant sample**

Descriptive statistics of infant sample's CD4 percentages								
Variable	Valid N	Mean	Median	Minimum	Maximum	Lower Quartile	Upper Quartile	Std Dev.
<b>CD4%</b>	29	22%	22%	4%	47%	16%	30%	10%



**Figure 3.9: CD4% distribution of infant sample**

According to the WHO immunological staging of infant HIV disease<sup>iii</sup> three infants (10%) had no immunological suppression, three infants (10%) had mild immunological suppression, three infants (10%) had advanced immunological suppression and 20 infants (69%) had severe immunological suppression. The mean ART duration for the infant sample was 3.6 (SD 3.1) months, with a minimum period of two weeks and a maximum of 9.6 months. See Figure 3.10 for the distribution of ART duration of the infants.



**Figure 3.10: Distribution of infants' duration on ART in months**

<sup>iii</sup> The WHO immunological staging of infant HIV is based on an infant's HIV viral load percentage.<sup>83</sup> A percentage:

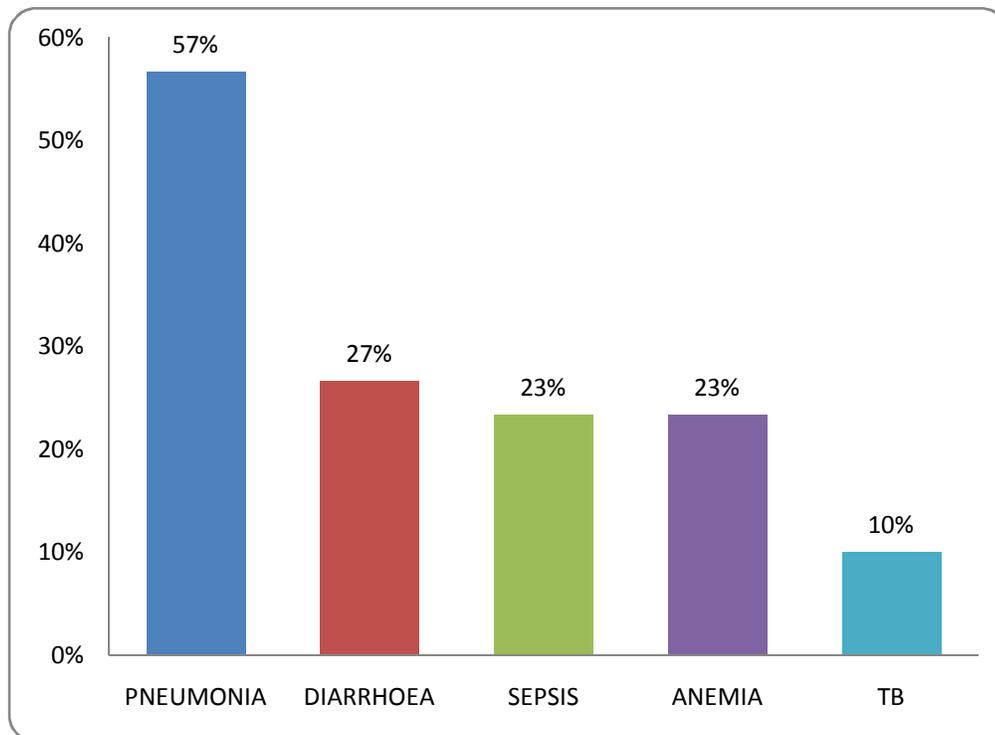
- larger than 35% is classified as "No immunological suppression"
- between 30 – 35% is classified as "Mild immunological suppression"
- between 25 – 30% is classified as "Advanced immunological suppression"
- smaller than 25% is classified as "Severe immunological suppression"

Twenty-six (87%) of the infants were on the first line antiretroviral regimen (ABC+3TC+Kaletra®)<sup>150</sup>, one infant (3%) was receiving a Ritonavir booster regimen (ABC+3TC+Kaletra®+Ritonavir), two infants (6%) were receiving D4T+3TC+Kaletra® and one infant (3%) was receiving an individualised regimen. For other medications the infants received see Table 3.3.

**Table3.3: Documented medications (other than ARV's)infants received**

Documented medications		Number of infants	Percentage
<b>Medications received</b>	Bactrim / Cotrixamole	25	83.3%
	Multi-vitamin syrup	20	66.7%
	INH (TB treatment)	2	6.7%
	Valaciclovir	1	3.3%
	Omeprazole (Reflux disease treatment)	1	3.3%
	Prevnar (Streptococcus pneumoniae vaccine)	1	3.3%
	Fluconazole (Treatment for fungal infections)	1	3.3%
	Zinc	1	3.3%
	Pentaxim (Combination vaccine)	1	3.3%

Twenty-five infants (83%) had an opportunistic infection (pneumonia, diarrhoea/gastro-enteritis or TB) prior to data collection. Seventeen (57%) infants had pneumonia, three (10%) had TB, and eight (27%) had diarrhoea or gastro-enteritis (Figure 3.11).



**Figure 3.11: Documented illnesses infants had prior to data collection**

## 3.6 Growth patterns of infants

### 3.6.1 Anthropometrical data

Anthropometric data obtained from the infant sample were birth weight (recorded on medical file or RthC), weight, length, MUAC and head circumference. The researcher performed all the anthropometric measurements. The WHO's 2006 growth standards for children were used to classify, analyse and interpret the measurements.<sup>151</sup>

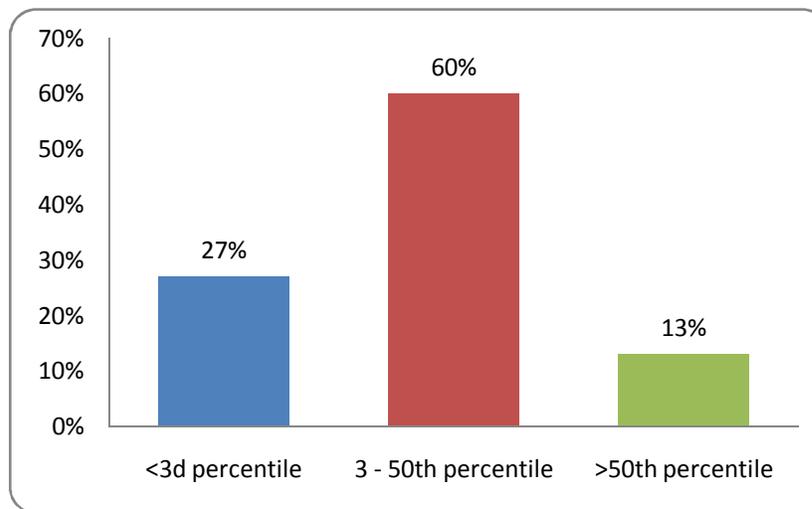
#### 3.6.1.1 Birth weights and gestational ages

The mean birth weight for the sample was 2.74 kg (SD 0.66). Two infants (7%) had very low birth weights (<1500g), four infants (13%) had low birth weights (<2500g) and 24 infants (80%) had normal birth weights.

The mean gestational age of the infants, for whom gestational age was available ( $n=23$ ) were 37.5 weeks. Fifteen infants (65%) were born term, eight (35%) were born premature (37 weeks or earlier).

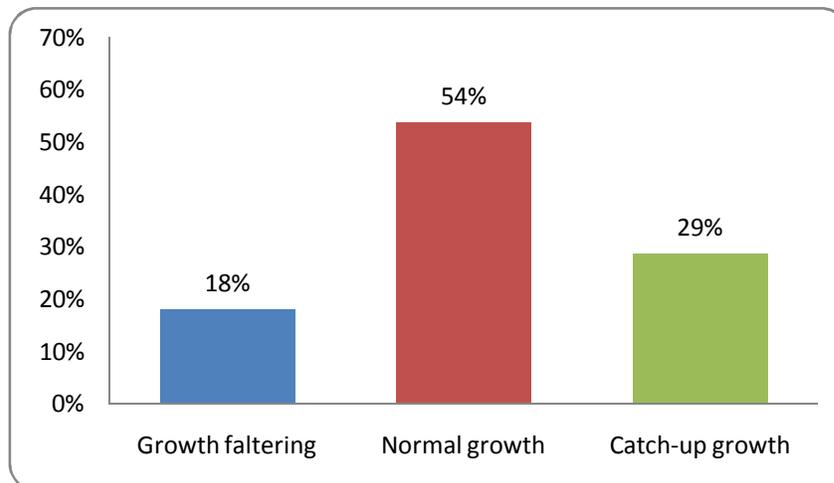
### 3.6.1.2 Growth patterns of infants according to their RtHC

The researcher studied every infant's RtHC, if it was available. None of the infants had a new Road to Health Booklet, as released by the National DoH in February 2011.<sup>152</sup> The infants' weights from birth were therefore all plotted on a growth chart with percentiles (CDC 2000)<sup>153</sup> and were analysed accordingly. The weight measurement taken during data collection were also plotted on the growth chart. Eight infants' (27%) weight-for-age (W/A) were below the 3<sup>d</sup> percentile, 18 (60%) of the infants' W/A were between the 3<sup>d</sup> and 50<sup>th</sup> percentile, and four infants' (13%) W/A were above the 50<sup>th</sup> percentile (Figure 3.12).



**Figure 3.12: Percentile distribution of infants' W/A at data collection**

The infants' W/A growth curve velocity of the two months prior to data collection were recorded. More than half of the infants (54%) had a normal growth curve, eight infants (29%) showed catch-up growth and five infants' (18%) growth curves were faltering (Figure 3.13).



**Figure3.13: Infants' W/A growth curve velocity of two months prior to data collection**

The recorded monthly weights of all the infants were obtained either from the RtHC or the infant's medical records. Two infants did not have growth charts available and no history of weights could be obtained in the medical records. The weights were captured in the software program WHO ANTRHO v3.1.0<sup>154</sup>. The program compiled a W/A z-score growth chart for each infant and the growth patterns for each month of all the infants were analysed accordingly. (Addendum K) The growth patterns were classified according to the WHO growth standards for children, as:

- "Normal" if growth curve was ascending,
- "Growth Faltering" if growth curve was flattening,
- "Weight loss" if growth curve was descending or
- "Catch-up growth" if growth curve had a sharp inclination.

Growth faltering occurred mostly between the first and the third month [1 – 2 months (36%), 2 – 3 months (44%)] and between the ninth and the twelfth month [9 – 10 months (40%) and 11 – 12 months (50%)]. Weight loss occurred most frequently between 5 – 6 months (12%) and 9 – 10 months (10%) of age. Catch-up growth was mostly observed between the ages of 3 – 4 months (32%), 4 – 5 months (30%) and 10 – 11 months (38%). Growth was normal in more than half of the infants at the ages between 0 – 2 months, 3 – 4 months and 5 – 9 months. See Table 3.4 for complete analysis.

**Table 3.4: Monthly classification of infants' growth curves**

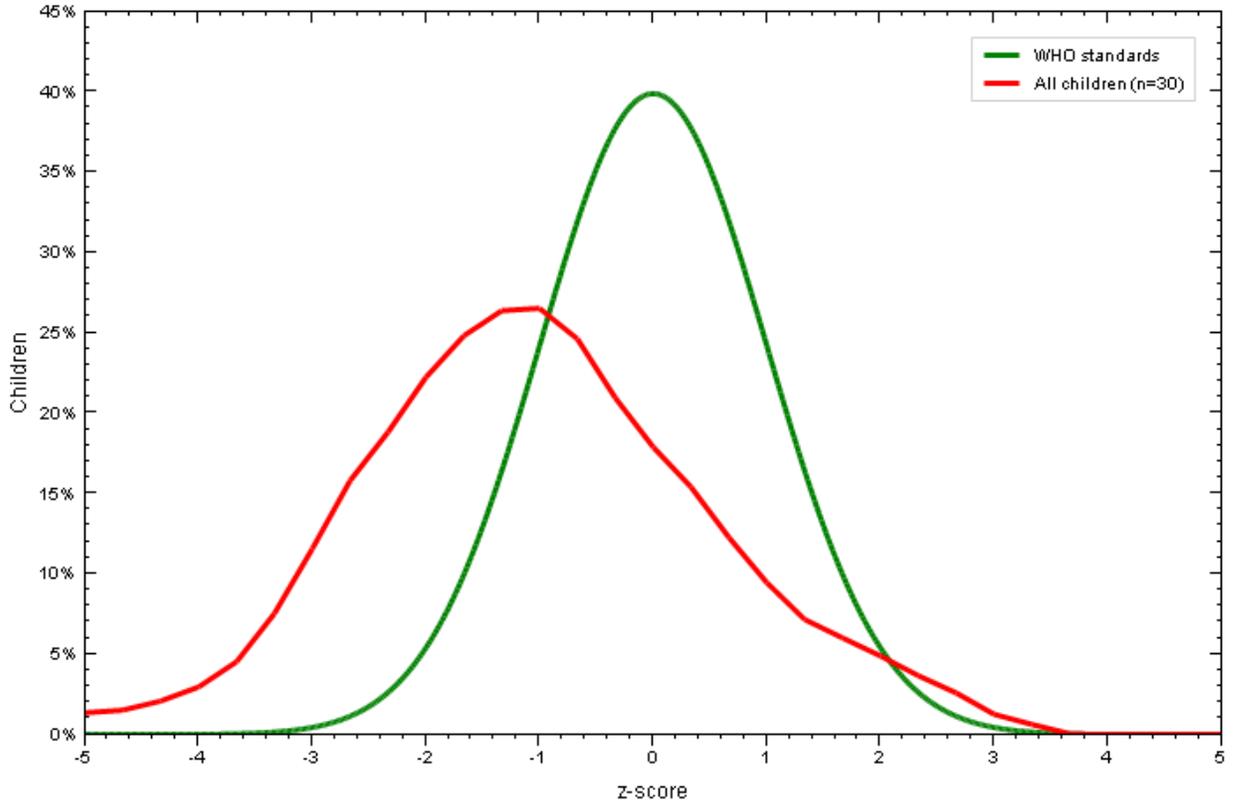
AGE IN MONTHS	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9 - 10	10- 11	11- 12
<b>N</b>	28	28	27	25	20	17	16	13	11	10	8	4
<b>Normal</b>	22	17	12	13	9	10	10	7	6	3	3	1
<b>%</b>	79%	61%	44%	52%	45%	59%	63%	54%	55%	30%	38%	25%
<b>Growth Faltering</b>	5	10	12	2	5	0	3	3	3	4	2	2
<b>%</b>	18%	36%	44%	8%	25%	0	19%	23%	27%	40%	25%	50%
<b>Weight Loss</b>	1	1	0	2	0	2	1	1	0	1	0	0
<b>%</b>	4%	4%	0	8%	0	12%	6%	8%	0	10%	0	0
<b>Catch-up growth</b>	0	0	3	8	6	5	2	2	2	2	3	1
<b>%</b>	0	0	11%	32%	30%	29%	13%	15%	18%	20%	38%	25%

### 3.6.1.3 Weight-for-age

The mean W/A z-score for the infant sample was -1.12 (1.56 SD). Seven infants (23.3%) had a z-score below -2SD (underweight), of these seven infants two (6.7%) had a z-score below -3SD (severely underweight). Both of the severely underweight infants were older than 6 months. Twenty-two infants (73.4%) had a normal weight-for-age with a z-score between -2 SD and 2 SD. One infant (3.3%) had a W/A z-score of more than +3 SD (Table 3.5, Figure 3.14).

**Table 3.5: W/A z-score distribution of infant sample**

Age groups	N	Weight-for-age (%)		% < -2SD	(95% CI)	% > +2SD	% > +3SD	Mean	SD
		% < -3SD	(95% CI)						
<b>Total:</b>	30	6.7	(0%, 17.3%)	23.3	(6.5%, 40.1%)	3.3	3.3	-1.12	1.56
<b>(0-5)</b>	13	0	(0%, 3.8%)	38.5	(8.2%, 68.8%)			-1.55	0.95
<b>(6-11)</b>	17	17.6	(0%, 30%)	11.8	(0%, 30%)			-0.79	1.86



**Figure 3.14: W/A z-score distribution of infant sample against WHO W/A z-score standards**

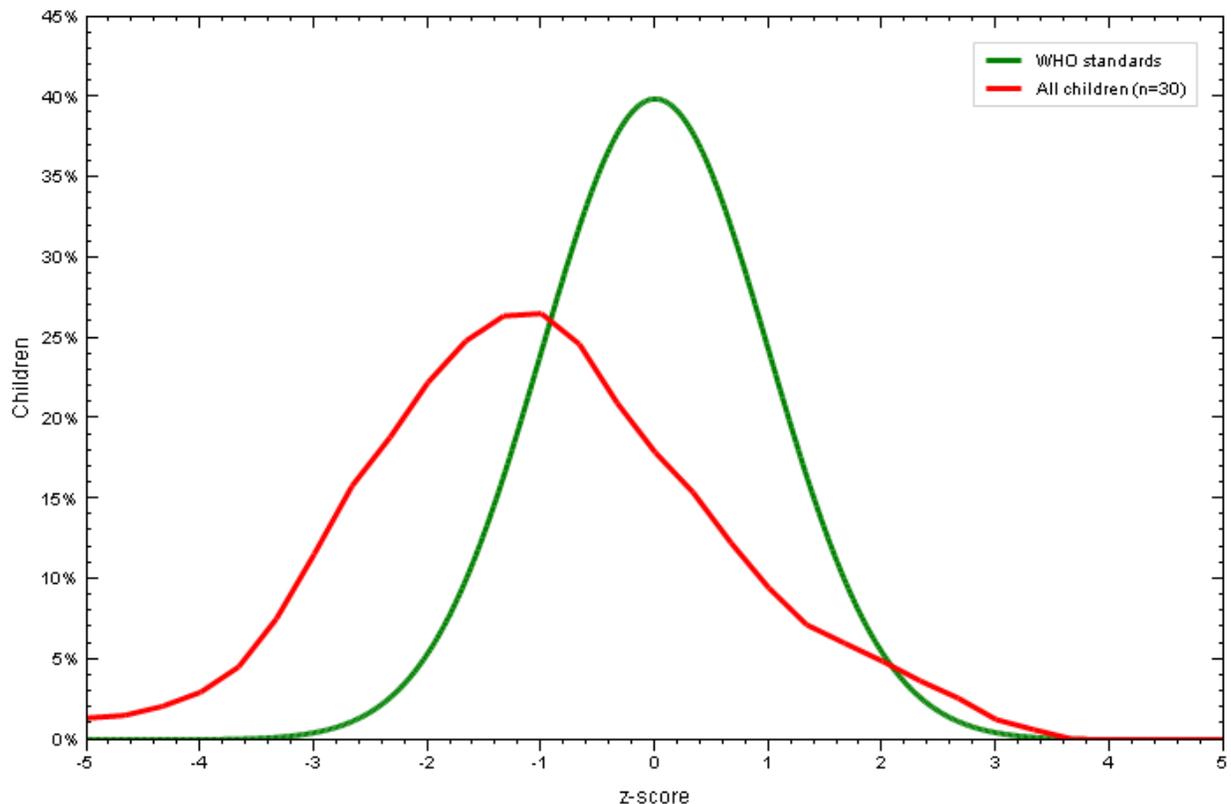
### 3.6.1.4 Length-for-age

The mean L/A z-score for the infant sample was -1.52 (1.55 SD). Twelve infants (40%) had a L/A z-score below -2SD (stunted), and of these twelve, seven infants (23%) had a z-score below -3SD (severely stunted). Both of the severely stunted infants were older than six months.

Eighteen infants (60%) had a normal length-for-age with a z-score between -2 SD and 2 SD (Table 3.6, Figure 3.15).

**Table 3.6: L/A z-score distribution of infant sample**

Age groups	N	L/A (%)		Mean	SD		
		% < -3SD	(95% CI)				
<b>Total:</b>	30	23.3	(6.5%, 40.1%)	40	(20.8%, 59.2%)	-1.52	1.55
<b>(0-5)</b>	13	30.8	(1.8%, 59.7%)	53.8	(22.9%, 84.8%)	-1.65	1.47
<b>(6-11)</b>	17	17.6	(0%, 38.7%)	29.4	(4.8%, 54%)	-1.43	1.64



**Figure 3.15: L/A z-score distribution of infant sample against WHO L/A z-score standards**

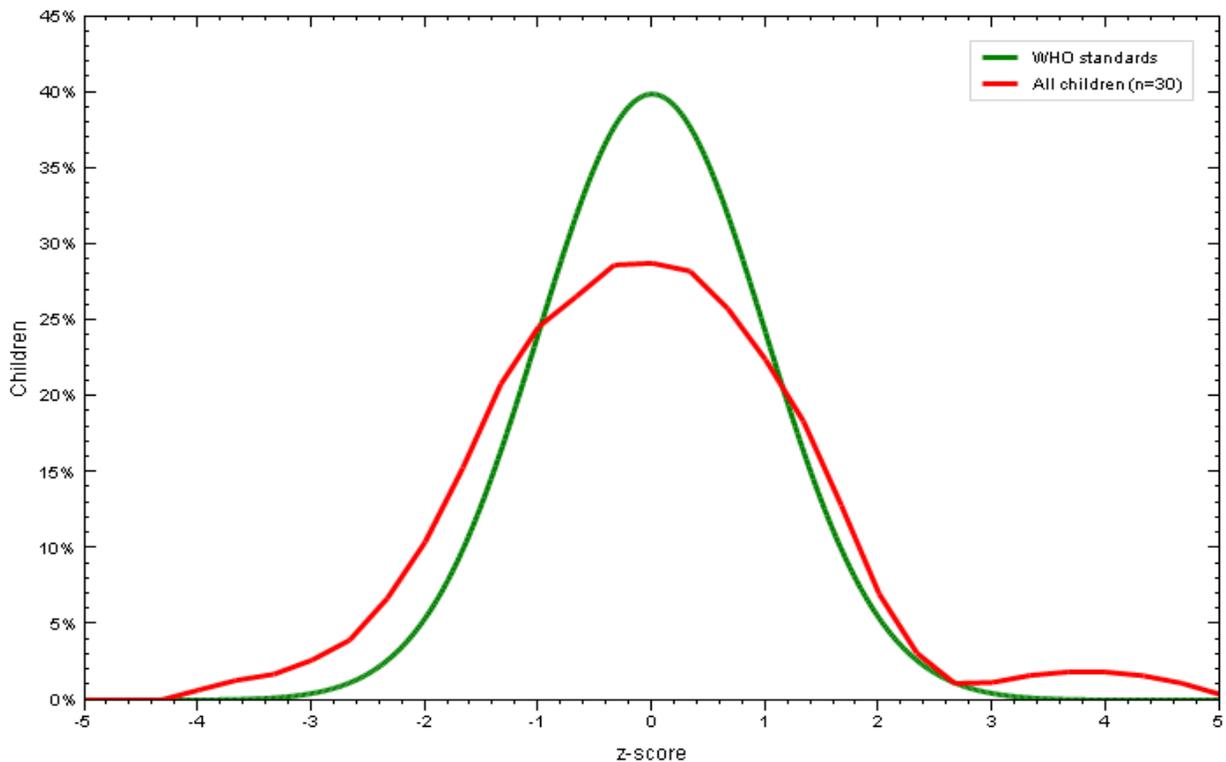
### 3.6.1.5 Weight-for-length

The mean W/L z-score for the infant sample was -0.06 (1.3 SD). One infant (3%) had a W/L z-score below -2SD (wasted) while none had a z-score below -3SD.

Twenty-eight infants (93.3%) had a normal W/L with a z-score between -2 SD and +2 SD. One infant had a W/L z-score above +3, which is classified as obese (Table 3.7, Figure 3.16).

**Table 3.7: W/L z-score distribution of infant sample**

Age groups	N	W/L (%)									Mean	SD
			% < -2SD	(95% CI)	% > +1SD	(95% CI)	% > +2SD	(95% CI)	% > +3SD	(95% CI)		
<b>Total:</b>	30	3.3	(0%, 11.4%)	16.7	(1.7%, 31.7%)	3.3	(0%, 11.4%)	3.3	(0%, 11.4%)	-0.06	1.3	
<b>(0-5)</b>	13	0	(0%, 3.8%)	7.7	(0%, 26%)	0	(0%, 3.8%)	0	(0%, 3.8%)	-0.27	1.03	
<b>(6-11)</b>	17	5.9	(0%, 20%)	23.5	(0.4%, 46.6%)	5.9	(0%, 20%)	5.9	(0%, 20%)	0.1	1.49	



**Figure 3.16: W/L z-score distribution of infant sample against WHO W/L z-score standards**

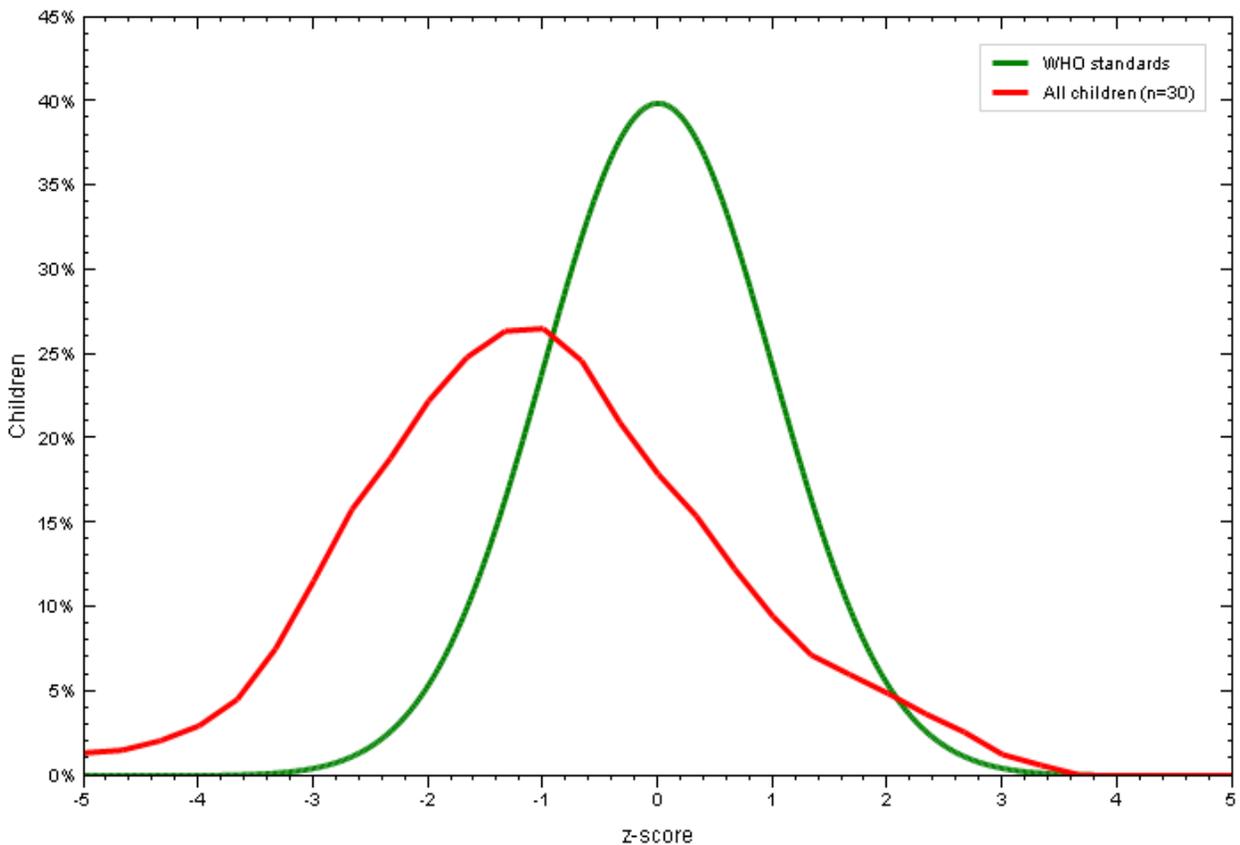
### 3.6.1.6 BMI-for-age

The BMI-for-age is an indicator that is useful for screening for overweight and obesity but it is not a good indicator to screen for wasting or stunting.

The mean BMI-for-age z-score for the infant sample was -0.33 (1.39SD). Two infants (6.7%) had a BMI-for-age z-score below -2SD, of these two, 1 infant had a z-score below -3SD. One infant had z-score above +3SD. This concurs with the W/A and W/H indicators which also showed this infant to be obese. This obese infant was older than six months. Twenty-seven infants (90%) had a normal BMI-for-age with a z-score between -2 SD and +2 SD (Table 3.8, Figure 3.17).

**Table 3.8: BMI-for-age z-score distribution of infant sample**

Age groups	N	BMI-for-age (%)											Mean	SD
			% < -3SD	(95% CI)	% < -2SD	(95% CI)	% > +1SD	(95% CI)	% > +2SD	(95% CI)	% > +3SD	(95% CI)		
<b>Total:</b>	30	3.3	(0%, 11.4%)	6.7	(0%, 17.3%)	10	(0%, 22.4%)	3.3	(0%, 11.4%)	3.3	(0%, 11.4%)	-0.33	1.39	
<b>(0-5)</b>	13	0	(0%, 3.8%)	7.7	(0%, 26%)	0	(0%, 3.8%)	0	(0%, 3.8%)	0	(0%, 3.8%)	-0.82	0.84	
<b>(6-11)</b>	17	5.9	(0%, 20%)	5.9	(0%, 20%)	17.6	(0%, 38.7%)	5.9	(0%, 20%)	5.9	(0%, 20%)	0.04	1.63	



**Figure 3.17: BMI-for-age z-score distribution of infant sample against WHO BMI-for-age z-score standards**

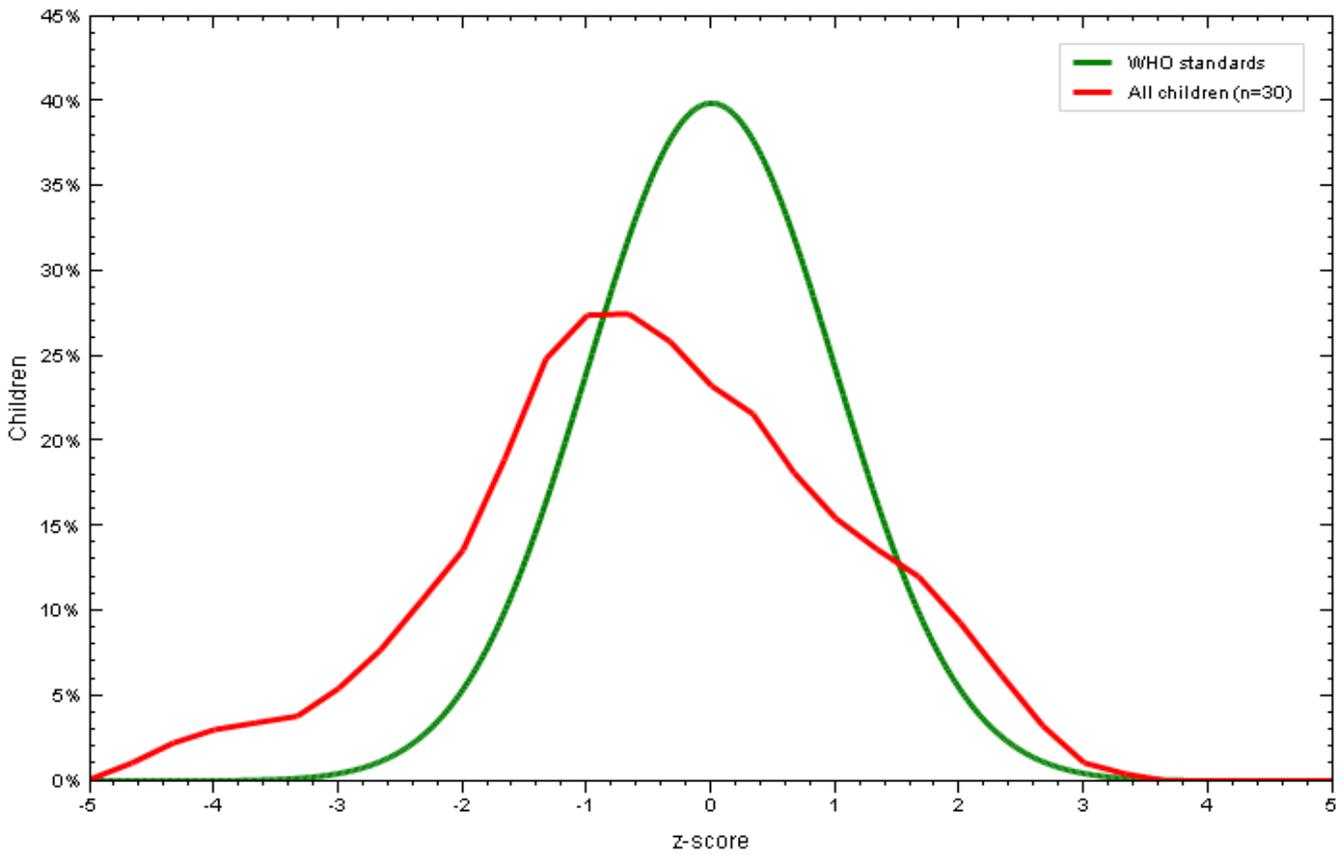
### 3.6.1.7 Head circumference-for-age

The mean HC-for-age z-score for the infant sample was -0.47 (1.4SD). Three infants (10%) had a HC-for-age z-score below -2SD, and two (6.7%) of these infants had a z-score below -3SD. Two of the three infants with a z-score below -2SD were older than six months.

One infant had z-score above +2SD. Twenty-six infants (86.7%) had a normal HC-for-age with a z-score between -2 SD and +2 SD (Table 3.9, Figure 3.18).

**Table 3.9: HC-for-age z-score distribution of infant sample**

Age groups	N	HC-for-age (%)		95% CI		95% CI		95% CI		Mean	SD
		% < -3SD	(95% CI)	% < -2SD	(95% CI)	% > +1SD	(95% CI)	% > +2SD	(95% CI)		
<b>Total:</b>	30	6.7	(0%, 17.3%)	10	(0%, 22.4%)	20	(4%, 36%)	3.3	(0%, 11.4%)	-0.47	1.4
<b>(0-5)</b>	13	7.7	(0%, 26%)	7.7	(0%, 26%)	15.4	(0%, 38.8%)	0	(0%, 3.8%)	-0.52	1.26
<b>(6-11)</b>	17	5.9	(0%, 20%)	11.8	(0%, 30%)	23.5	(0.4%, 46.6%)	5.9	(0%, 20%)	-0.43	1.53



**Figure 3.18: HC-for-age z-score distribution of infant sample against WHO HC-for-age z-score standards**

### 3.6.1.8 Mid-upper arm circumference-for-age

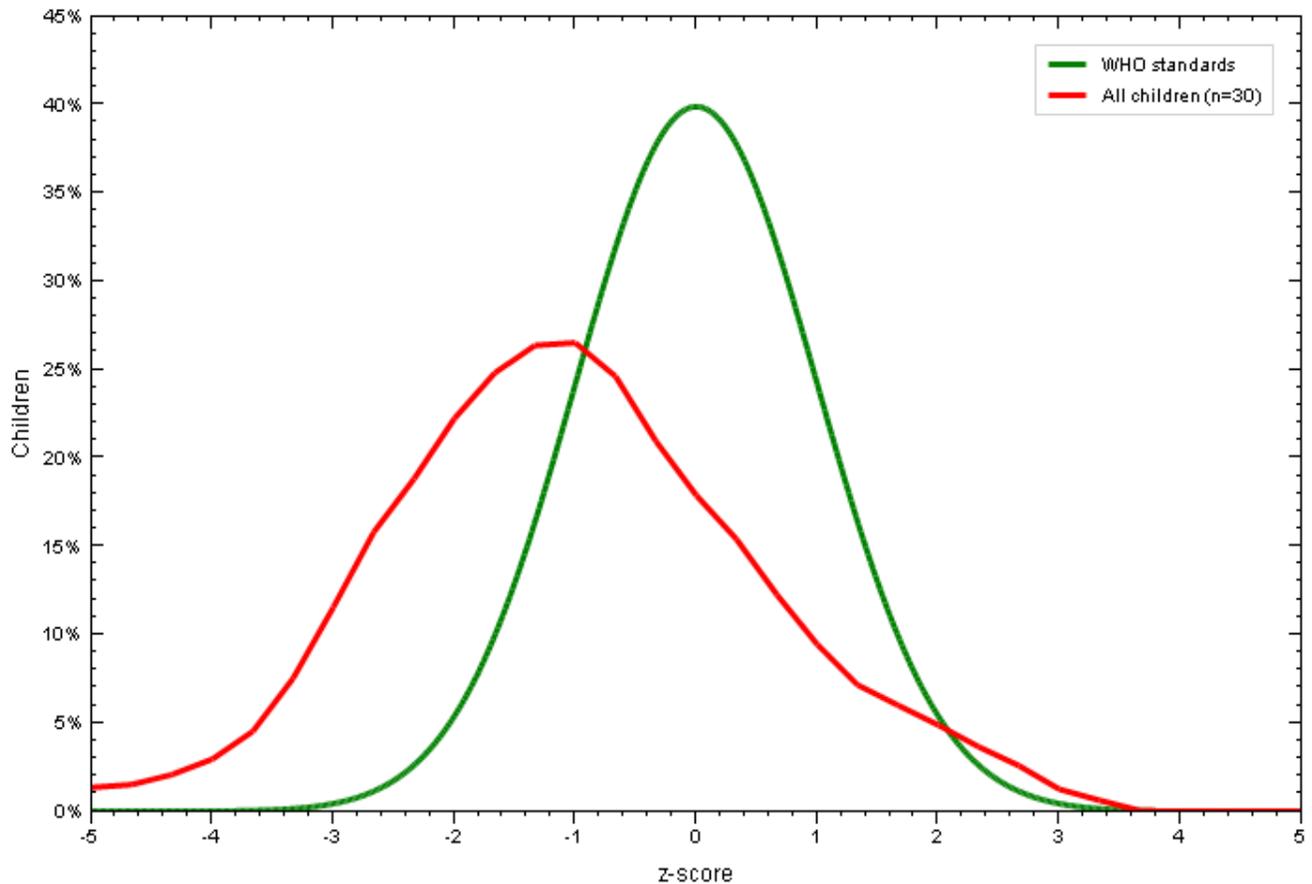
The MUAC measurement can only be interpreted for infants over 3 months<sup>149</sup>; therefore the sub-sample included for analyses purposes was 27.

The mean MUAC-for-age z-score for the infant sample was -0.01 (SD 1.58). Two infants (7.4%) had a MUAC-for-age z-score below -2SD, and one (3.7%) of these infants had a z-score below -3SD. Three infants had a z-score above +2SD and one of these infants had z-score above +3SD. All the infants with a z-score above +2SD were older than six months.

Twenty-two infants (81.5%) had a normal MUAC-for-age with a z-score between -2 SD and +2 SD (Table 3.10, Figure 3.19).

**Table 3.10: MUAC-for-age z-score distribution of infant sample**

Age group	N	MUAC-for-age (%)		MUAC-for-age (%)		MUAC-for-age (%)		MUAC-for-age (%)		MUAC-for-age (%)		Mean	SD
		% < -3SD	(95% CI)	% < -2SD	(95% CI)	% > +1SD	(95% CI)	% > +2SD	(95% CI)	% > +3SD	(95% CI)		
<b>Total:</b>	27	3.7	(0%, 12.7%)	7.4	(0%, 19.1%)	18.5	(2%, 35%)	11.1	(0%, 24.8%)	3.7	(0%, 12.7%)	-0.01	1.58
<b>(0-5)</b>	10	0	(0%, 5%)	10	(0%, 33.6%)	10	(0%, 33.6%)	0	(0%, 5%)	0	(0%, 5%)	-0.73	1.09
<b>(6-11)</b>	17	5.9	(0%, 20%)	5.9	(0%, 20%)	23.5	(0.4%, 46.6%)	17.6	(0%, 38.7%)	5.9	(0%, 20%)	0.42	1.69



**Figure 3.19: MUAC-for-age z-score distribution of infant sample against WHO MUAC-for-age z-score standards**

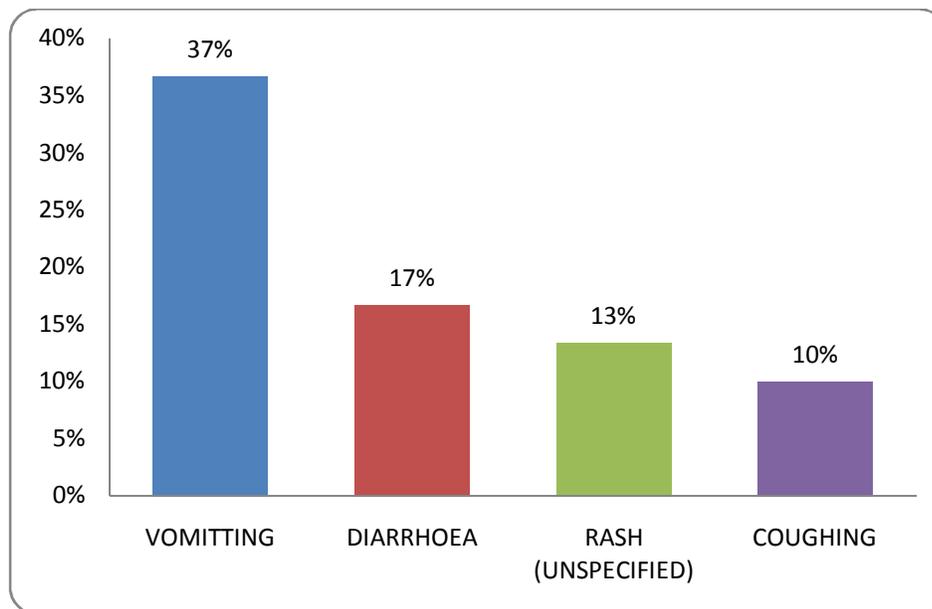
### 3.6.1.9 Summary of anthropometric z-scores obtained

**Table 3.11: Summary of anthropometric z-scores obtained**

Indicator	Mean z-score	SD	% < -3SD	% < -2SD	% $\geq$ +2SD	% > +2SD	% > +3SD
W/A	-1.12	1.56	6.7	23.3	73.4	0	3.3
L/A	-1.52	1.55	23.3	40	60	0	0
W/L	-0.06	1.3	0	3.3	93.3	3.3	3.3
BMI	-0.33	1.39	3.3	6.7	90	3.3	3.3
HC	-0.47	1.4	6.7	10	86.7	3.3	0
MUAC	-0.01	1.58	3.7	7.4	81.5	11.1	3.7

### 3.7 Nutrition-related problems of infants

The caregivers were asked questions on how well their infants were drinking or eating (feeding) and what feeding related problems their infants experienced. Twenty-four (80%) of the infants were reportedly feeding well, four (13%) were feeding “OK” and two (7%) were not feeding well. The most common nutrition-related problems reportedly experienced were vomiting (n = 11, 37%) and diarrhoea (n = 5, 17%), (Figure 3.20, Table 3.11).



**Figure 3.20: Frequency of most common nutrition related problems reported by caregivers**

The researcher asked the caregivers to indicate how frequently since birth, if ever, their infant experienced any of the problems commonly associated with HIV and ART (Table 3.11).

Problems most reported as “never experienced” were loss of appetite, bloated stomach, difficulty with swallowing and choking on food/milk. Ten caregivers (33%) reported that their infants experienced diarrhoea “occasionally” and four (13%) reported “frequently”. Nine caregivers (30%) reported that their infants “occasionally” vomited, two (7%) reported frequent vomiting and one reported that her infant vomited “all the time”. Three caregivers reported that their infants frequently experienced difficulty with swallowing and one caregiver reported that her infant had difficulty with swallowing “all the time”.

**Table 3.12: Nutrition-related problems, most commonly associated with HIV and ART, experienced by infants since birth**

PROBLEM	PERCENTAGE (%)				
	Never	Once	Occasionally	Frequently	All the time
Oral thrush	73	13	7	7	0
Mouth sores/ulcers	67	17	10	7	0
Diarrhoea	17	33	33	13	0
Vomiting	47	17	30	7	3
Loss of appetite	83	0	10	7	0
Bloated stomach	83	0	17	0	0
Difficulty swallowing	87	0	0	10	3
Choking on food/milk	87	3	3	7	0

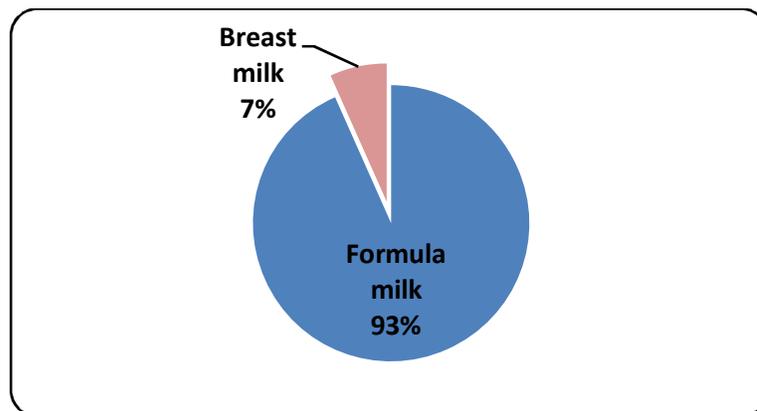
When caregivers were asked what the most common problems were that they experienced with feeding their infant, two (6%) reported that they did not know what food to give their infants, one (3%) said she was not sure how much food to give and one other (3%) said that getting money to buy food was a problem. Four caregivers (13%) struggled with the administration of antiretrovirals, reporting that the infants either spat it out or vomited after administration.

### 3.8 Infant feeding

Thirty-one caregivers and 30 infants were included in the sample population. Of the 31 caregivers, 29 formula-fed and two breastfed their infants. There were therefore 28 infants who received formula milk and two infants who received breastmilk.

#### 3.8.1 Dietary intake of infants

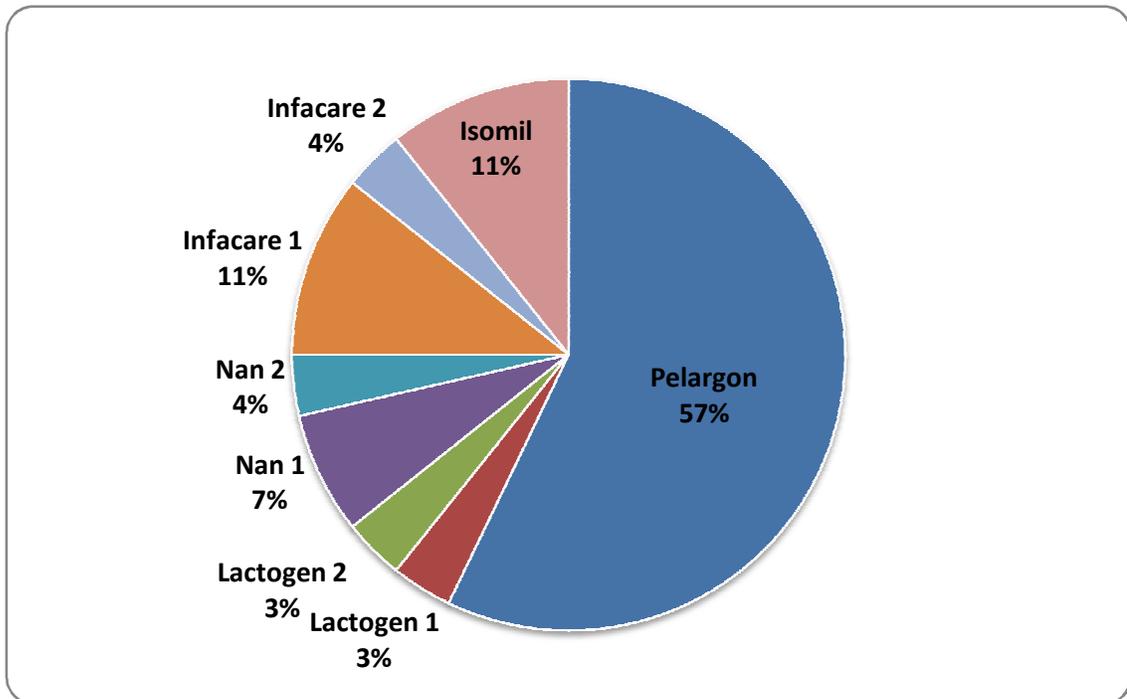
Most of the infants in the sample ( $n=28$ ; 93%) were receiving infant formula milk, only two (7%) were receiving breastmilk (Figure 3.21).



**Figure 3.21: Breast versus formula milk intake distribution in infants**

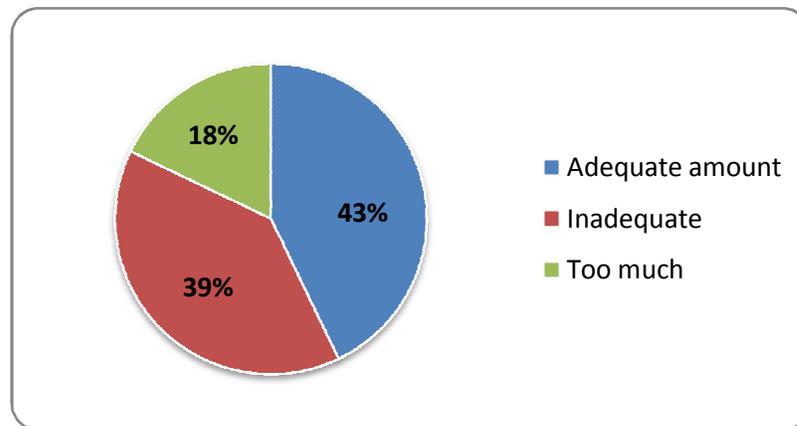
##### 3.8.1.1 Infant Formula intake

Twenty-eight infants (93%) were receiving formula milk. Nan Pelargon, the formula on government tender for the PMTCT programme, was the infant formula given to infants ( $n = 16$ , 57%) most often. Isomil and Infacare 1 were given to three infants (11%) each. Other formula milk given to the infants were Nan1 ( $n=2$ , 7%), Nan2 ( $n=1$ , 3%), Lactogen1 ( $n=1$ , 3%), Lactogen2 ( $n=1$ , 3%) and Infacare2 ( $n=1$ , 3%), (Figure 3.22).



**Figure 3.22: Distribution of types of infant formula used by caregivers**

All the non-breastfed (formula-fed) infants, between 6-11 months had received at least two milk feeds the previous day. To determine whether each infant was receiving an adequate amount of milk in a day, the researcher calculated each infants milk requirements<sup>155</sup> or used the amount as prescribed by the dietician working in the clinic. Eleven (39%) infants were not receiving an adequate amount of milk per day, five (18%) were receiving more than the recommended volume per day and 12 (43%) were receiving the correct amount of milk per day (Figure 3.23).



**Figure 3.23: Percentage of infants receiving an adequate amount of milk per day**

### 3.8.1.2 Breastmilk intake

The two breastfed infants in the sample were both younger than six months and exclusively breastfed at the time of the interview. Both infants were put to the breast within one hour after birth, had received only breastmilk the previous day and were being fed on demand, not according to a time schedule. The mothers both reported giving on average seven feeds in a 24-hour day. The number of wet nappies in a 24-hour day was reportedly 4 – 6, which was normal.

### 3.8.1.3 Solid food intake

Solid, semi-solid or soft foods had been introduced to 16 (53%) of the infant sample. Only two (15%) of these infants who had been introduced to solids were younger than six months at the time of data collection. A total of 14 infants who were six months or older had thus been introduced to solids. Eight infants (27%) in the sample were between 6 – 8 months of age and three (38%) of them had not received solid food the previous day. In the sample, 17 infants (57%) were older than six months, all were formula fed and three (18%) had not been introduced to solid food at the time of data collection. Eleven (65%) of the infants older than six months did not receive a diet the previous day which met the minimum dietary diversity indicator, that is an intake of four or more of the prescribed seven food groups. All of these infants had received a minimum meal frequency of at least four or more solid, semi-solid, soft foods or milk feeds the previous day.<sup>87</sup>

To determine whether infants (6 months or older) received the prescribed minimum acceptable diet, formula fed infants had to receive at least two milk feeds plus four meals (solid food+milk feeds) as well as at least four foods of the prescribed six food groups (dairy products excluded) the previous day.<sup>87</sup> Only three infants (18%) in the sub-sample (n=17) met all the conditions and received a minimum acceptable diet.

#### **3.8.1.4 Consumption of iron-rich or iron-fortified foods**

Seven (41%) of the infants between 6 – 11 months (n=17) received flesh food (meat, poultry, eggs, fish or organ meat) the previous day. Thirteen (76%) of these infants received commercially fortified iron-rich foods, especially designed for infants and young children (e.g. infant cereals) the previous day and none received food that was fortified at home with an iron-containing micronutrient powder or lipid-based nutrient supplement. Of the 17 infants older than six months, five (29%) did not receive any iron-rich food or food products the previous day.

All of the infants who had been introduced to solid food were eating infant cereal or maize meal at least once a day. Three (10%) caregivers reported giving “pap bottles” to their infants, which were prepared by adding 2 – 6 teaspoons of porridge into 125ml formula milk and given 2 – 3 times per day.

#### **3.8.1.5 Fluid, tea and treats intake**

Fifteen (50%) infants were also receiving other fluids than milk daily. Three (20%) of these 15 infants were receiving only water as additional fluid, seven (47%) were receiving water and juice and 5 (33%) were only receiving juice as extra fluid. Most of the caregivers reported diluting the juice. Two of these infants (13%) receiving fluids other than milk were younger than six months and four (24%) of the infants older than six months were not receiving any additional fluid to their milk intake.

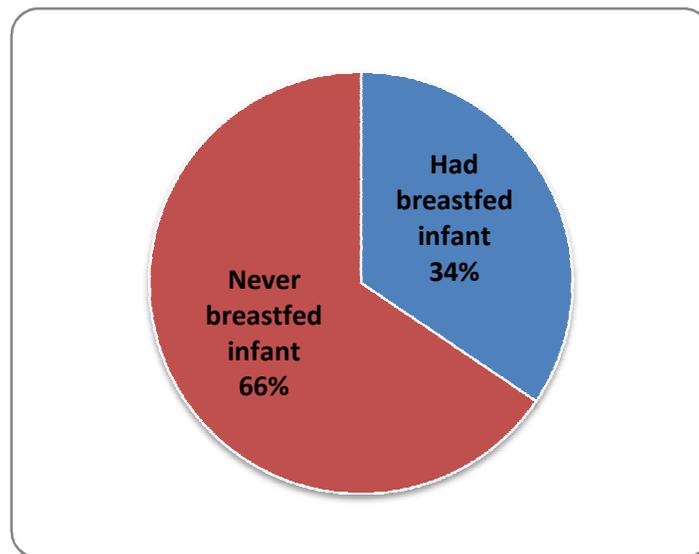
Four caregivers (13%) reported giving Rooibos “tea bottles” to their infants, one caregiver (3%) gave a bottle of sugar water to her infant daily and one (3%) gave water mixed with “gripe water” to her infant. The Rooibos tea bottles were all prepared without milk and with approximately 1 teaspoon of sugar added to 150 – 225ml of water.

Only six caregivers (20%) reported giving any kind of treats (sweets, popcorn, chips, biscuits etc.) to their infants.

### 3.8.2 Caregiver practices

#### 3.8.2.1 Breastfeeding practices

Two caregivers (6%) were breastfeeding their own infants during the time of data collection. Of the 29 caregivers who were formula-feeding their infants, 10 (34%) reported that they had breastfed after birth, but were not breastfeeding anymore at the time of data collection. The mean period of breastfeeding for this sub-sample was 6.7 weeks, with the longest period being 16 weeks (4 months) and the shortest period of breastfeeding, one week. The total number of caregivers who had ever breastfed or were still breastfeeding at the time of data collection was 12 (39%), (Figure 3.24).



**Figure 3.24: Percentage of caregivers giving formula milk who had breastfed their infants previously**

Both of the caregivers who were breastfeeding during the time of data collection, were breastfeeding their infant exclusively, on demand and not timing the amount of time spent on each breast by the infant, but allowing the infant to finish drinking on a breast before offering the other. The average number of feeds in a 24-hour day was seven. When asked until what age

they planned to breastfeed their infants, both reported “for 6 months”. The reasons for this decision were not assessed.

There were no infants older than six months being breastfed at the time of data collection.

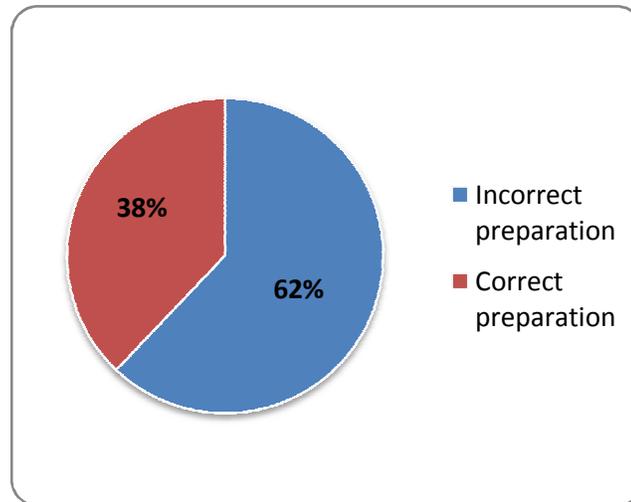
### **3.8.2.2 Formula feeding practices**

Twenty-nine caregivers (94%) were giving formula milk to their infants. All except one caregiver (97%) were using a bottle to give formula milk to their infants. The one not using a bottle were prescribed to give extremely thickened milk feeds to her infant using a teaspoon and bowl, due to inco-ordinated swallowing. None were using a cup to give formula milk to their infants. The average number of formula feeds given to infants in a 24-hour day was five, with the minimum of two feeds and a maximum of eight. Ninety percent (n=26) of the caregivers were giving an adequate number (i.e. often enough, but not necessarily enough in volume, as reported in 3.8.1.1) of milk feeds per day.

### **3.8.2.3 Preparation of infant formula feeds**

To assess formula feeding practices amongst the non-breastfeeding caregivers in the sample (n=29), the researcher asked the caregivers questions on: the volume of milk prepared per feed; whether water or powder was added to the bottle first; what kind of water they used to prepare feeds, the amount of water used to prepare a feed, the number of scoops of powder they added per feed and whether the scoop was heaped or level.

Of the 29 caregivers giving formula milk to their infants, more than half [18(62%)] were not preparing the feeds correctly (Figure 3.25).



**Figure 3.25: Percentage of caregivers preparing formula feeds correctly**

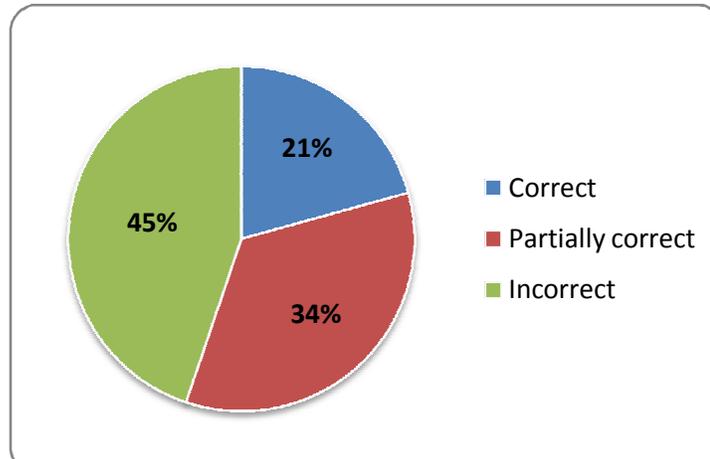
All caregivers reported using cooled down, boiled water to prepare formula milk feeds. Twenty-eight percent of the caregivers ( $n=8$ ) were adding formula milk powder into the bottle before adding the water, which is incorrect. Only one caregiver (3%) used heaped powder scoops for preparation, the rest all used level scoops.

Sixteen (55%) caregivers were adding the correct amount of powder into the correct amount of water, as specified on the tins of the formula milk. Six (21%) of the caregivers were over-diluting the formula milk and seven (24%) increased the recommended concentration.

#### **3.8.2.4 Hygiene practices**

The caregivers were asked to explain how they cleaned/washed the feeding bottles or tools used to feed and prepare formula milk.

Of the 29 who were giving formula milk to their infants, only six (21%) were correctly cleaning and sterilising the bottles as prescribed by the South African DoH<sup>156</sup> (See Methodology 2.5.5.3). Ten (34%) caregivers were doing it partially correct, skipping one of the stages (e.g. not rinsing) or not sterilising the bottles correctly (e.g. only boiling for five minutes, or boiling the bottles before it is washed). Thirteen of the caregivers (45%) were not cleaning the bottles correctly at all, either not sterilising the bottles, not washing it with soap (by only boiling the bottles) or using a cloth to dry the bottles (Figure 3.26).



**Figure 3.26: Percentage of caregiver cleaning and sterilizing feeding bottles correctly**

Only 10 (34%) of the caregivers formula feeding their infants were applying an adequate sterilizing method in their cleaning regime. Nineteen caregivers (66%) were not sterilizing their bottles, but of these 19 caregivers, eight (28%) applied an incorrect form of sterilizing technique, believing that they were sterilizing the bottles.

The 29 caregivers formula-feeding their infants were asked when feeding bottles should be washed and when hands should be washed. Only 28 answers were obtained for these two questions. Eighty-two percent (n=23) said bottles should be washed after every time it is used, 11% (n=3) said twice a day and 7% (n=2) said first thing in the morning.

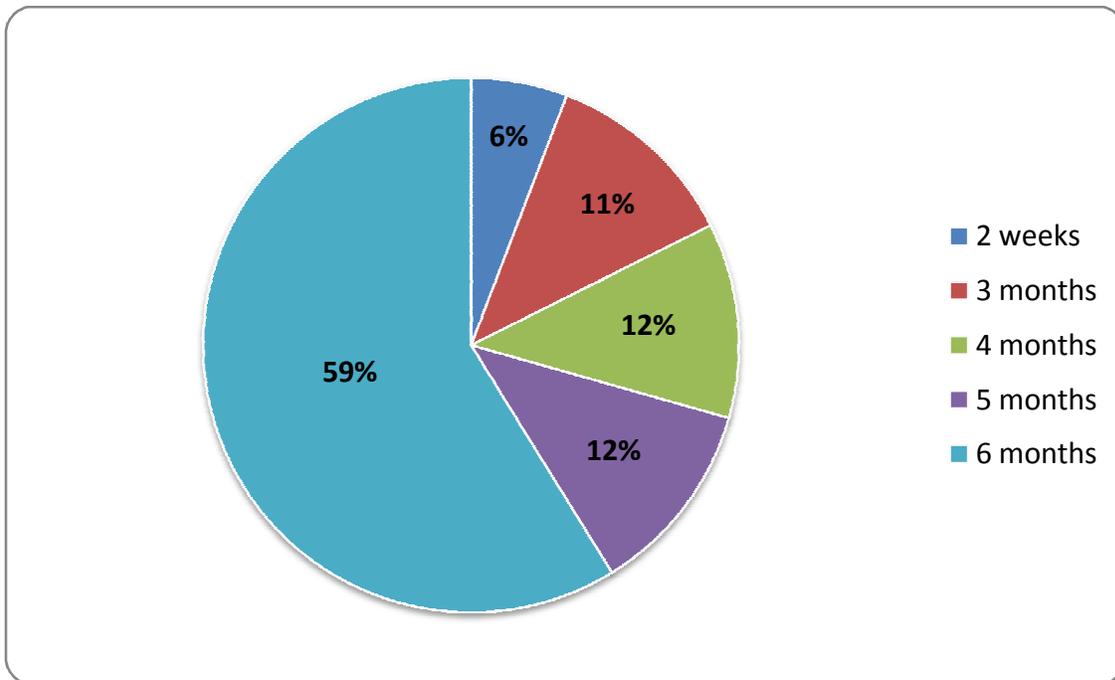
Ninety-six percent (n=27) of caregivers said hands should be washed every time before preparing a milk feed, while one(4%) said it should only be washed at the end of the day.

When caregivers were asked what they do with left over prepared formula milk after a feed, 22 (76%) reported throwing it away, while nine (31%) reported keeping it for the next feed. The reliability of this report could not be tested.

### 3.8.2.5 Introduction of solid food practices

Solid, semi-solid or soft foods had been introduced to 17 (57%) of the infants, but only 16 caregivers (52%) reported that solid food introduction had taken place. The caregiver misreporting on solid food introduction did not perceive cereal as “solid food” and therefore did not report correctly when asked about this.

The mean age of solid food introduction was five months. The earliest introduction took place at two weeks of age (Figure 3.27), with the caregiver reporting mixing cereal into a formula milk bottle.



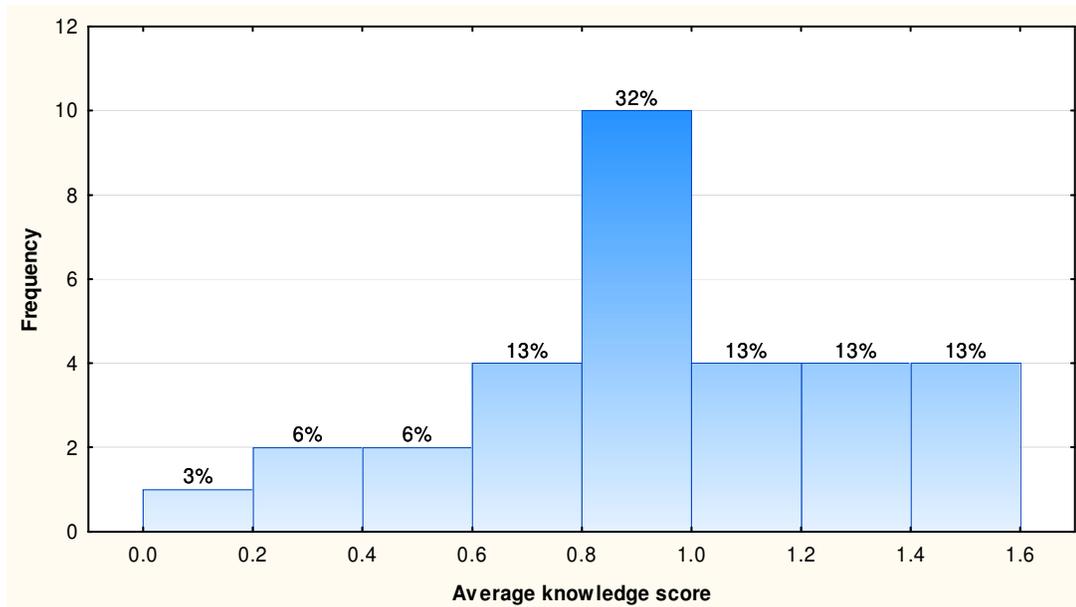
**Figure 3.27: Distribution of age when solid food was introduced**

As previously mentioned 13 infants (43%, N=30) in the sample were younger than six months and two (7%) of these infants had been introduced to solid food at the time of data collection. Of the 17 infants that were older than six months, three (18%) had not yet been introduced to solid food at the time of data collection.

### 3.9 Knowledge of caregivers regarding HIV infant feeding

#### 3.9.1 General knowledge scores

The mean general knowledge score of the sample (n=31) was 0.92 (SD=0.36). The minimum score obtained was 0.18 and the maximum score 1.45. Nineteen (61%) caregivers obtained an average score of less than 1 and 12 caregivers (39%) obtained a score of more than 1 (Figure 3.28).



**Figure 3.28: Distribution of caregivers' average general knowledge scores**

Less than a sixth (n=4, 13%) of the caregivers knew the complete correct definition of exclusive breast- or formula feeding. Ten (32%) gave a partially correct answer and more than half (n=17, 55%) had no idea what it included.

When asked the meaning of mixed feeding, only two (6%) could provide the correct definition. Eight (26%) gave an incomplete answer, knowing that it is when breastmilk and formula milk are mixed, but did not mention that it includes solid food. Sixty-eight percent of the caregivers (n=21) did not know what it meant. Only one caregiver (3%) knew about the dangers of mixed feeding, eight (26%) knew it increased the infant's risk of becoming sick, but did not know what kind of sickness and 71% (n=22) did not know at all about the dangers of mixed feeding.

When asked at what age solid food should be introduced into an infant's diet, 27 (87%) reported the correct answer, i.e. at six months. Four caregivers (13%) thought solid food could be introduced at an earlier stage (between 3 – 5 months). In two cases (6%) the caregivers gave the correct answer for this question, but in practice they did not do the same. One caregiver had introduced solid food to her infant younger than six months and the other caregiver's infant was already older than six months, but she still had not started giving complementary foods.

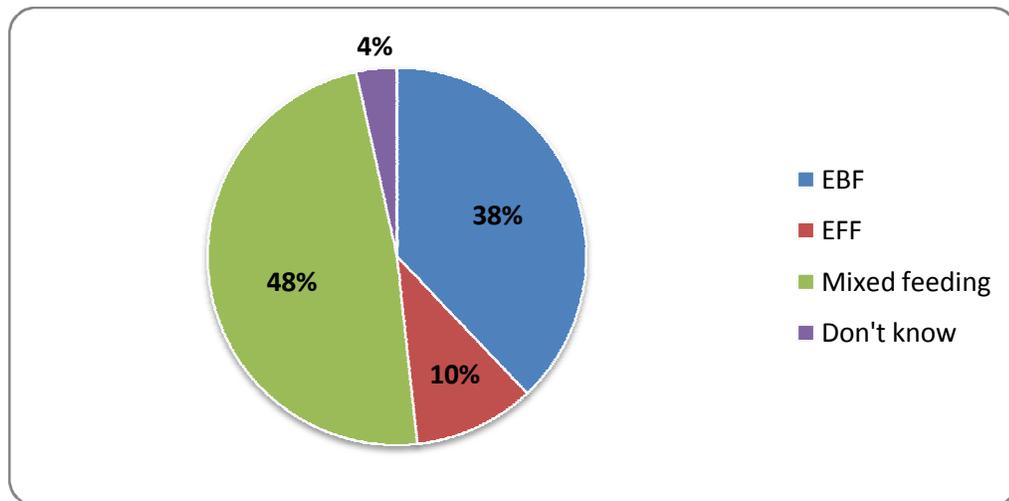
Most of the caregivers (n=25, 81%) knew what kind of complementary foods to give. Thirteen percent (n=4) reported not knowing at all. The caregivers mostly reported that introduction should start with cereal, (n=27, 74%), with "Nestum" mentioned most often, and/or pureed vegetables or "Purity".

Twenty-five caregivers (81%) knew that you should continue feeding the infant and give extra oral rehydration solution (ORS) in the case of diarrhoea. Two (6%) reported that you should stop giving milk and only give ORS. Although this is practiced for severe cases of diarrhoea, it is not the recommendation DoH prescribes should be given to caregivers and should not be practiced at home.<sup>157</sup> Four (13%) reported not knowing what to do if an infant gets diarrhoea. Even though 81% (n=25) of the caregivers knew that they had to give ORS when their infants get diarrhoea, less than half of the caregivers (n=15, 48%) knew how to prepare the solution correctly and only two caregivers (6%) knew how much and how often to give it to their infants when they had diarrhoea.

Twenty (65%) caregivers did not know what to do if an infant started vomiting. Eleven (35%) knew that the infant should be taken to a clinic, but only three (10%) knew that ORS should also be given to an infant when vomiting.

More than half of the caregivers (n=19, 61%) did not know what to do when an infant has anorexia (stops eating and drinking or does not want to eat or drink anything). One caregiver reported that multi-vitamin syrup should be given to the infant. Thirty-nine percent of the caregivers (n=12) said the infant must be taken to the nearest clinic.

When asked what infant feeding option is the most unsafe option for an HIV-positive woman to choose for her infant, 38% (n=12) reported exclusive breastfeeding, 10% (n=3) exclusive formula feeding, 48% (n=15) mixed feeding (breast- and formula feeding) and one caregiver (3%) did not know (Figure 3.29).



**Figure 3.29: Distribution of answers when caregivers were asked about the most unsafe infant feeding option for HIV+ women**

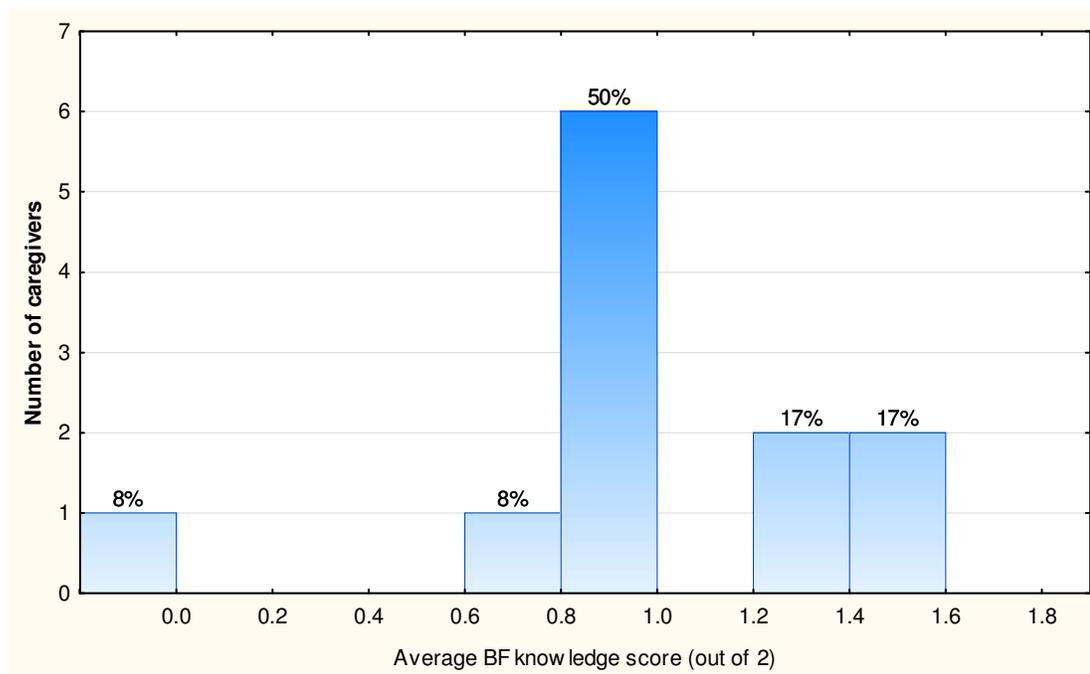
The researcher also asked the question “how should solid food be introduced to a baby”. Due to the answer of this question being very extensive and without specific set guidelines, it was decided, after discussion with the study leaders, not to include the question into the score analyses.

There was missing data for one section of questionnaire D for one of the caregivers. An attempt was made to contact the specific caregiver to ask the questions telephonically, before data was analysed by the statistician. The telephone number given to the researcher was invalid and the data could therefore not be obtained for those specific questions.

### **3.9.2 Breastfeeding knowledge scores**

The mean breastfeeding knowledge score of the sub-sample (n=12) was 1.03 (SD=0.4). The minimum score obtained was 0 and the maximum score 1.5.

Eight (67%) caregivers obtained an average score of less than 1 and four caregivers (33%) obtained a score of more than 1 (Figure 3.30).



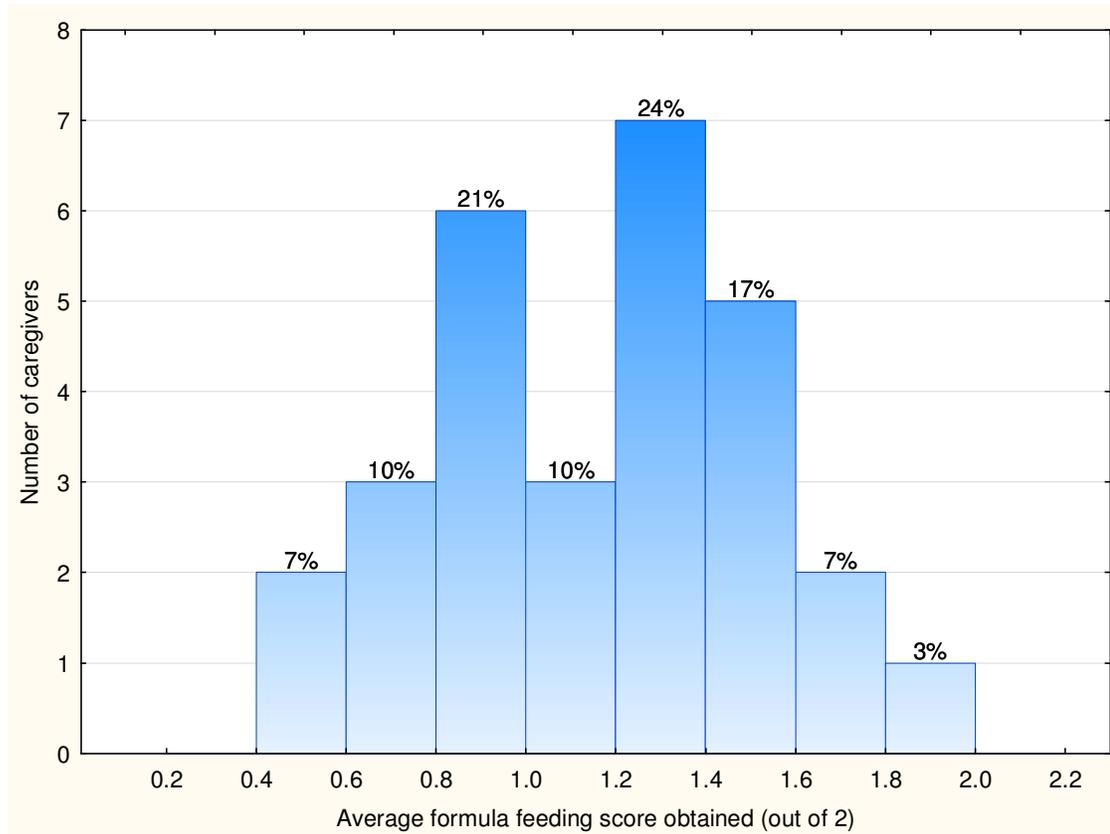
**Figure 3.30: Distribution of caregivers' average breastfeeding knowledge scores**

When asked how often a breastfed infant should be fed, 75% (n=9) of the caregivers in this sub-sample (n=12) reported that a breastfed infant should be fed on demand. When asked how much time an infant should spend on each breast when feeding, 11 (92%) reported until the infant is finished with the breast, therefore not a specific number of times. Seventy-five percent of caregivers (n=9) did not know what should be done when experiencing any kind of breast problems (e.g. cracked nipples, thrush, mastitis). Only one caregiver gave the complete correct answer, to stop feeding on the affected breast, express and discard the milk and go to the nearest clinic as soon as possible.

Most of the caregivers (92%) did either not know what heat treatment or pasteurisation of breastmilk was, or the purpose of it. These participants also did not know how to pasteurise or heat treat breastmilk. Only one caregiver, who gave birth to a VLBW premature infant and spent a month in hospital, knew the exact process of heat treatment. When asked about cup feeding, only the one caregiver (8%), mentioned above, knew how to heat treat breastmilk and also knew exactly how to cup-feed and that it was the safest way to give formula milk to an infant. Eleven (38%) caregivers knew that formula milk could also be given in a cup, but did not know why it is recommended and 17 (59%) did not know what cup feeding was.

### 3.9.3 Formula feeding knowledge scores

The mean formulafeeding knowledge score of the formula-feeding sub-sample (n=29) was 1.17 (SD=0.37). The minimum score obtained was 0.5 and the maximum score 2. Eleven (38%) caregivers obtained an average score of less than 1 and 18 caregivers (62%) obtained a score of more than 1 (Figure 3.31).

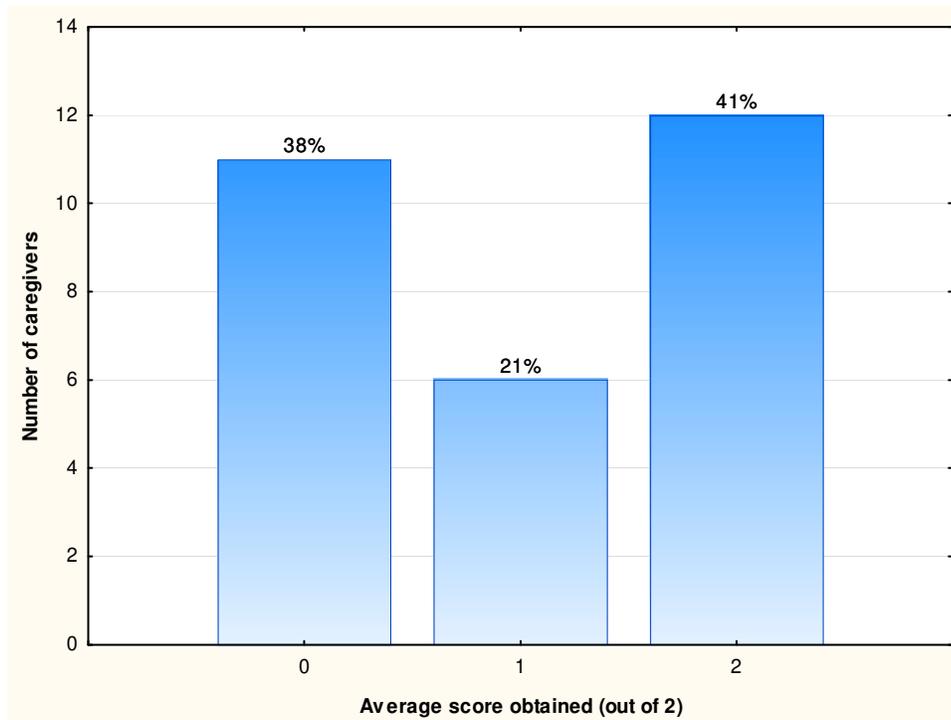


**Figure 3.31: Distribution of caregivers' average formulafeeding knowledge scores**

When asked what the safest way to give formula milk to an infant was, 75% (n=21) reported with bottle and teat. Only 25% (n=7) knew the correct answer was “with a cup”, although not one was practising it.

Eleven (38%) caregivers did not know what their infants' daily milk requirements were, 6 (21%) had some idea, but their answers were not exactly correct for their infants' specific needs and 12 (48%) knew exactly how much milk their infants required.

Less than half (n=14, 48%) of the caregivers in this sub-sample knew exactly how often formula milk feeds should be given specifically to their infants. Twelve (41%) had an idea of how often feeds should be given, but their answers were not specifically correct for their infants. Three caregivers (10%) did not know how often to give feeds to their infants (Figure 3.32). Twenty (69%) caregivers knew that left-over prepared formula milk had to be discarded after a feed. Nine (31%) caregivers thought it could be kept for the next feed.



**Figure 3.32: Distribution of average scores obtained by caregivers when asked how much formula milk their infants needed in a day**

### 3.9.4 Total knowledge scores

The mean total knowledge score of the sample was 1.04 (SD=0.25). The minimum score obtained was 0.4 and the maximum score 1.45. Thirteen (42%) caregivers obtained an average score of less than 1 and 18 caregivers (58%) obtained a score of more than 1 (Figure 3.33).

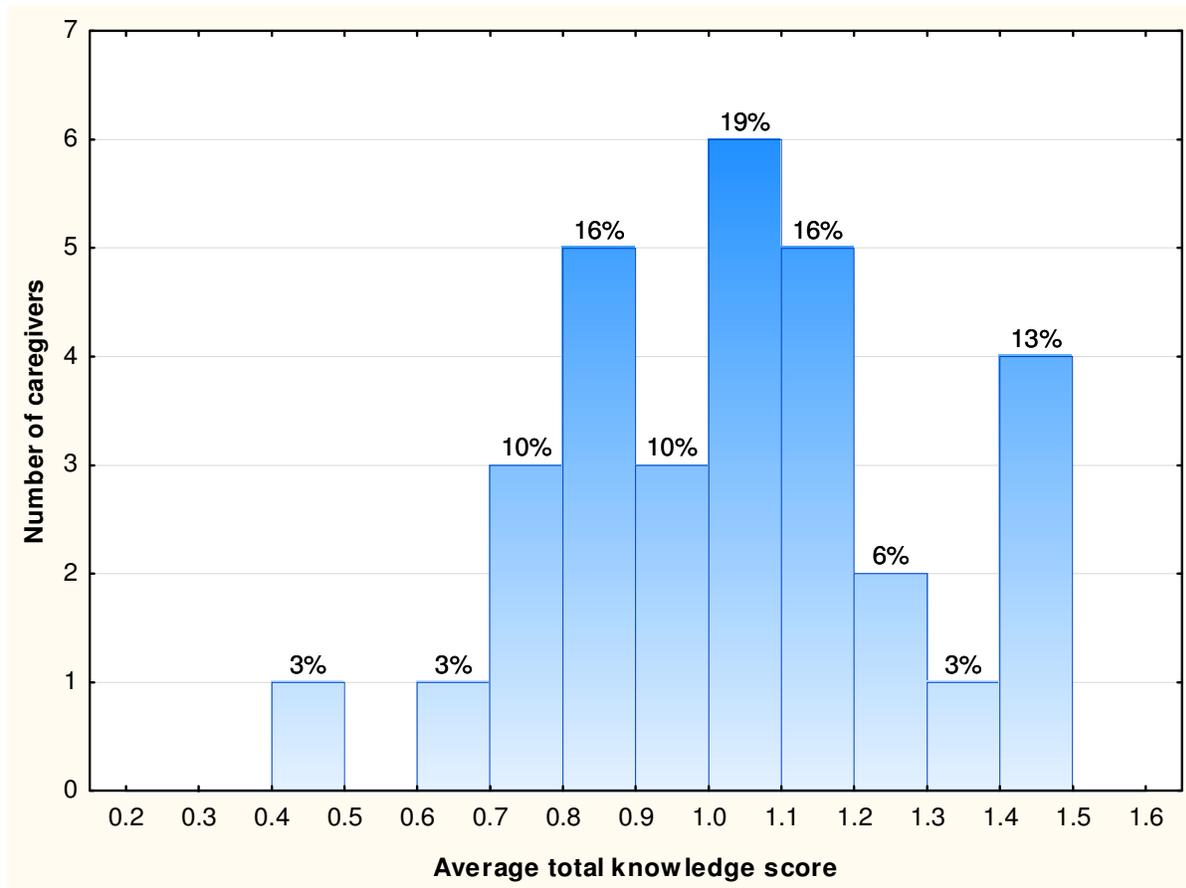
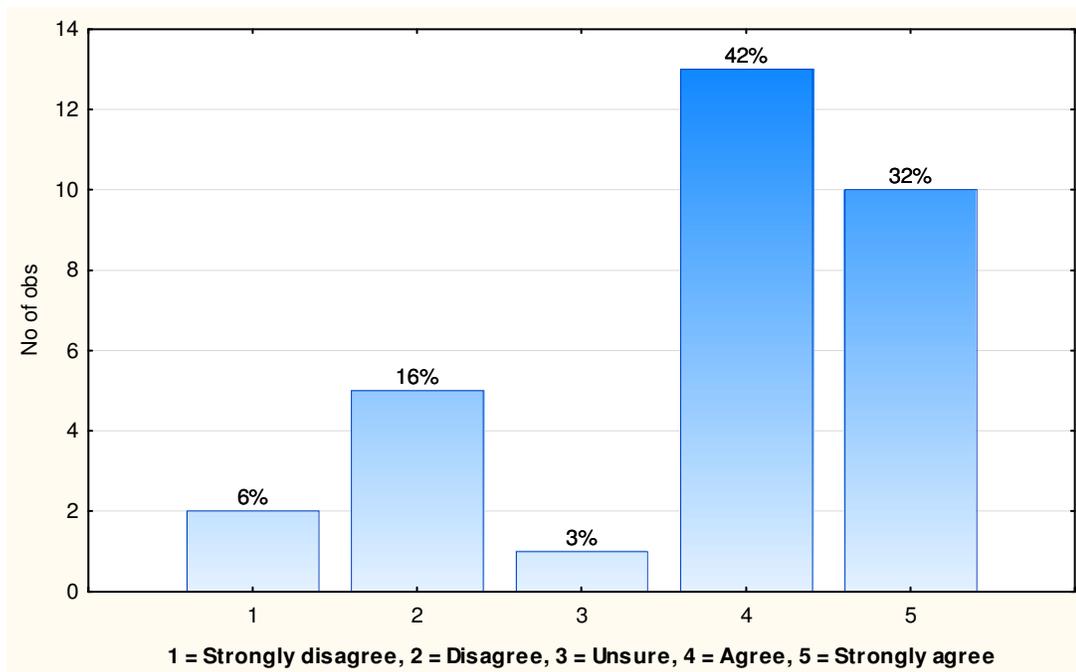


Figure 3.33: Distribution of caregivers' average total knowledge scores

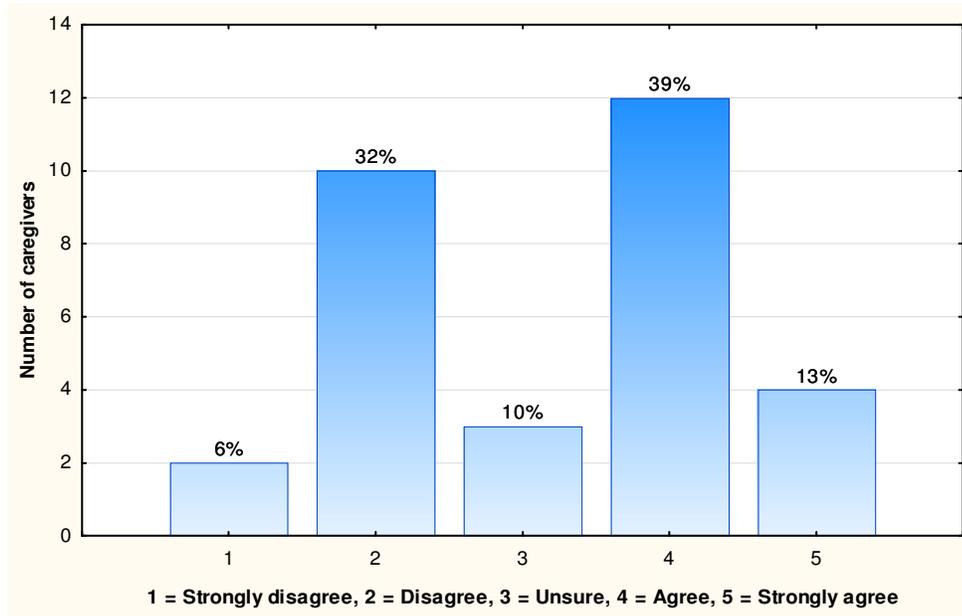
### 3.10 Beliefs of caregivers regarding HIV infant feeding

Seventy-four percent of caregivers (n=23) either agreed (n= 13, 42%) or strongly agreed (n=10, 32%) that breastfeeding was the best feeding for all babies and 22% (n=7) either disagreed or strongly disagreed with the statement (Figure 3.34).

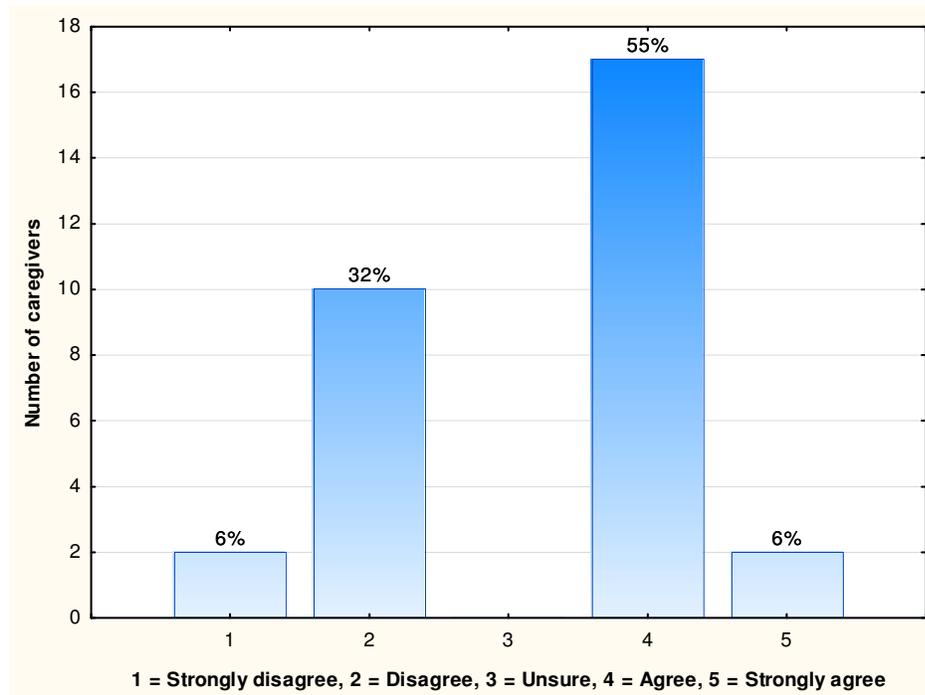


**Figure 3.34: Distribution of caregivers' beliefs on whether breastfeeding was the best feeding for all babies**

In total 52% (n=16) either agreed or strongly agreed that breastfeeding was the best feeding option for HIV-negative women and 38% (n=12) either disagreed or strongly disagreed with the statement (Figure 3.35). Sixty-one percent (n=19) of the caregivers believed that if a woman was HIV positive, breastfeeding should be avoided. Thirty-eight percent (n=12) disagreed or strongly disagreed with the statement that breastfeeding should be avoided if a woman was HIV positive (Figure 3.36).



**Figure 3.35: Distribution of caregivers' beliefs on whether breastfeeding was the best feeding option for HIV-negative women**



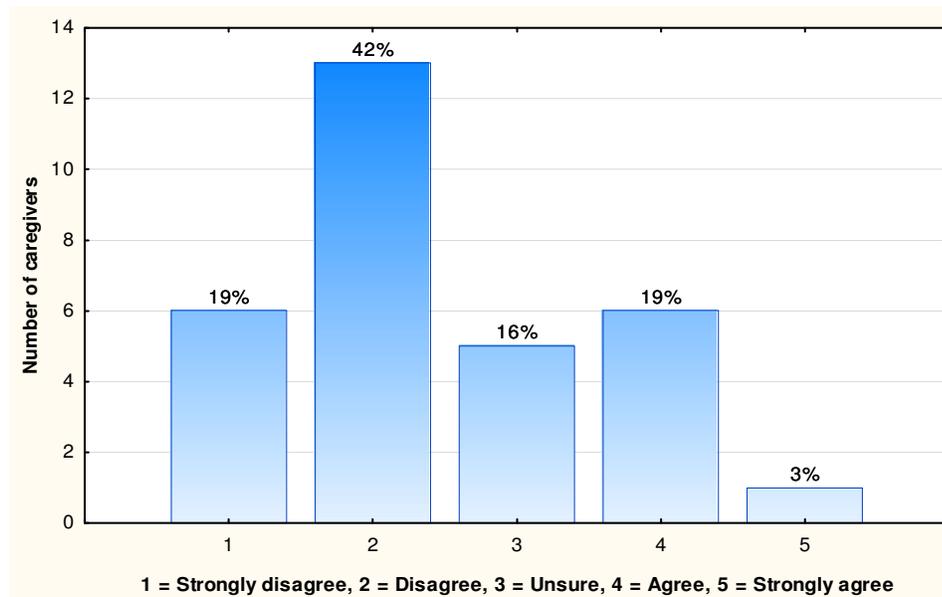
**Figure 3.36: Distribution of caregivers' beliefs on whether breastfeeding should be avoided by a woman who was HIV-positive**

Sixty-four percent of the caregivers (n=20) believed that if a woman was HIV positive she would definitely transmit HIV to her infant and 35% (n=11) of the caregivers either disagreed or strongly disagreed that HIV would definitely be transmitted through breastfeeding.

Of the total sample, 58% (n=18) either agreed or strongly agreed that formula feeding was always the best feeding option for a HIV-positive woman. Thirty-five percent (n=11) either disagreed or strongly disagreed and 6% (n=2) were unsure of their beliefs regarding this issue.

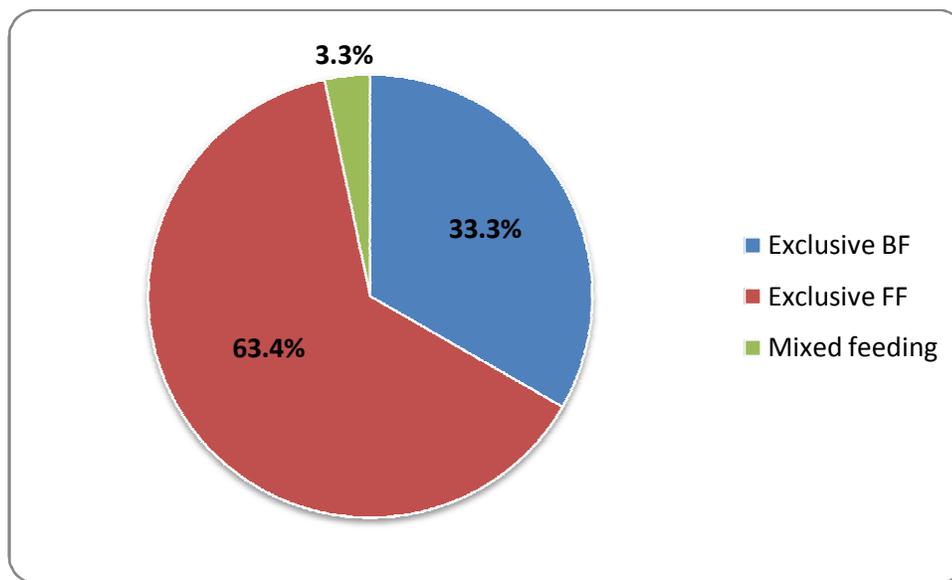
Most caregivers (n=28, 90%) did not believe that all women who formula feed were HIV positive. Caregivers did not have strong beliefs on whether mothers who are on ART could breastfeed their babies. Nineteen percent (n=6) were unsure and 35% (n=11) either disagreed or strongly disagreed with the statement.

Seventy-eight percent of the caregivers (n=24) believed that if an infant was on ART, the milk and food the infant received is still important. Six percent (n=2) were unsure whether it is still important and 16% (n=5) either agreed or strongly agreed that it was not important. When asked whether infants on antiretroviral medication would become HIV negative, 22% (n=7) either agreed or strongly agreed that they would. Sixteen percent (n=5) was unsure, 42% (n=13) disagreed and 19% (n=6) strongly disagreed that they would become HIV-negative (Figure 3.37).



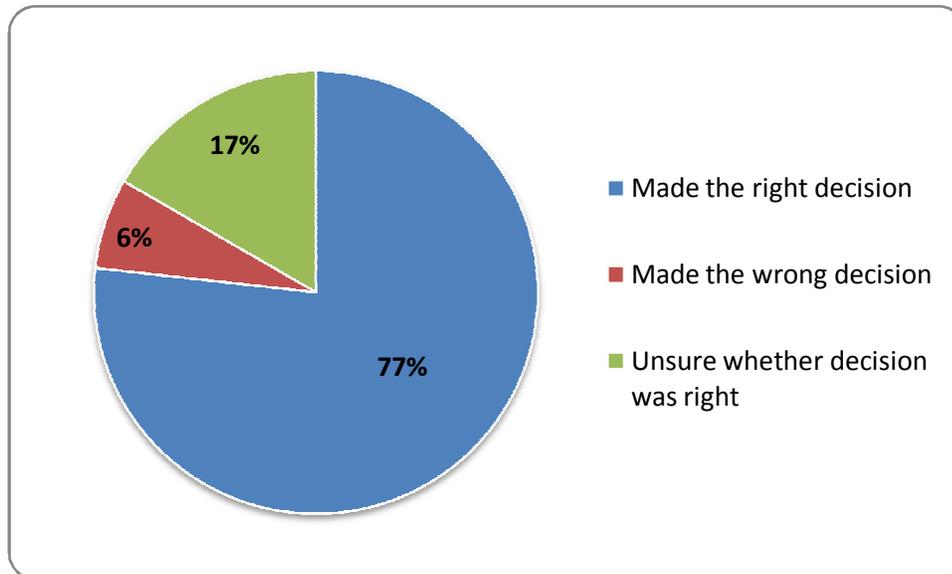
**Figure 3.37: Distribution of caregivers' beliefs on whether an infant on ART will become HIV negative**

Caregivers were also asked on their beliefs regarding their own infants and practices. When asked what feeding option they believe was the best option for their infants, 63% (n=20) reported believing that exclusive formula feeding was the best feeding option, 33% (n=10) believed exclusive breastfeeding was the best option and one (3%) caregiver believed mixed feeding (breast- and formula milk) was the best option (Figure 3.38).



**Figure 3.38: Pie chart of caregivers' beliefs on what infant feeding method is best for their infants**

Seventy-seven percent (n=24) of the caregivers believed that they had chosen the right infant feeding option for their infants, 17% (n=5) felt they had made the wrong decision and 7% (n=2) were unsure whether they had made the right decision (Figure 3.39).



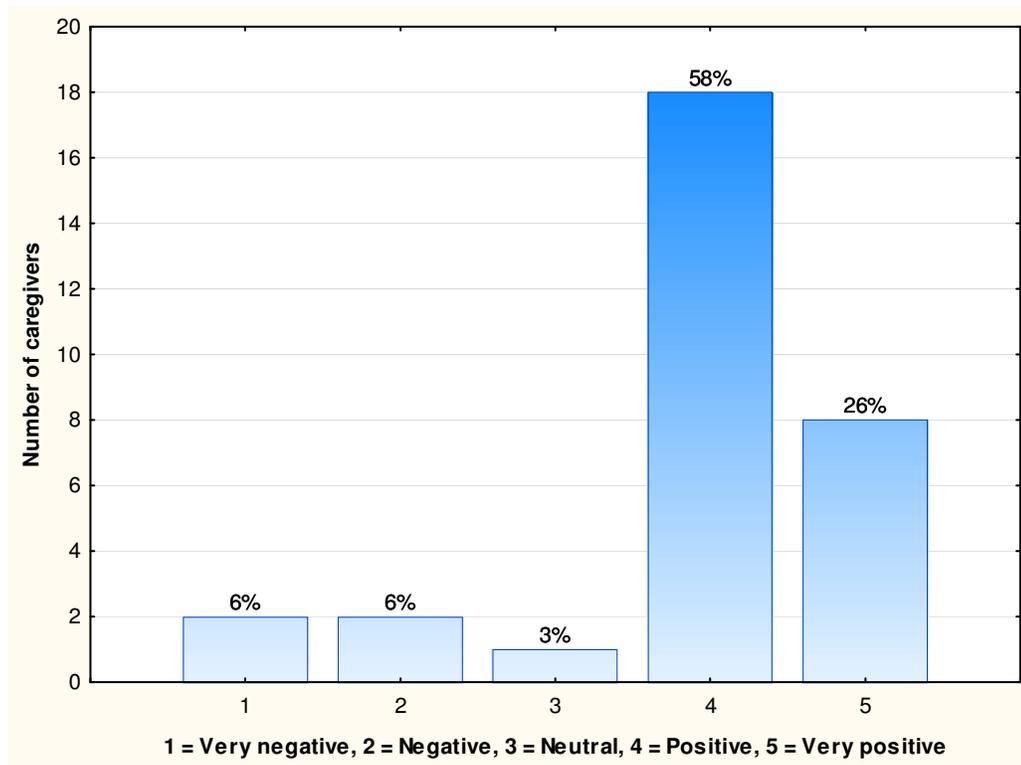
**Figure 3.39: Caregivers' beliefs on the correctness of their infant feeding decision**

Fifty-three percent of the caregivers (n=16) felt they knew exactly how to feed their infants correctly. Forty percent (n=12) reported not always being sure how and what to feed their infants and 7% (n=2) admitted to feeling that they did not know how to feed their infants correctly.

### 3.11 Attitudes of caregivers regarding HIV infant feeding

Eighty-one percent of the caregivers (n=25) felt either positive or very positive about the infant feeding choice they had made and 17% (n=5) felt negative about their choice.

Irrespective of the infant feeding choice the caregiver had made, when asked how they felt about formula feeding in general, 68% (n=21) either felt positive or very positive about it and 29% (n=9) felt either negative or very negative about it. When asked about their feelings in general regarding breastfeeding, 84% of caregivers (n=26) felt either positive or very positive about it and only 12% (n=4) felt either negative or very negative about it (Figure 3.40).



**Figure 3.40: Distribution of caregivers' attitude on breastfeeding in general**

Seventy-one percent of caregivers ( $n=22$ ) felt either positive or very positive about their ability to feed their infants correctly, while 16% ( $n=5$ ) felt negative and 13% ( $n=4$ ) were unsure on how they felt.

When asked how they felt about the antiretroviral medication their infants received, 68% ( $n=21$ ) reported feeling positive or very positive about it. Sixteen percent ( $n=5$ ) felt negative and the other 16% ( $n=5$ ) were unsure of their feelings.

At the time of data collection, 81% ( $n=25$ ) of the caregivers felt either positive or very positive about their infants' overall health and 13% ( $n=4$ ) reported feeling negative and worried about it. Eighty-three percent of the caregivers ( $n=26$ ) were also feeling either positive or very positive about the growth of their infants. When asked how they felt about their infants' chance to grow up and become a healthy strong child, the majority ( $n=27$ , 87%) felt either positive or very positive. Only 4 caregivers (13%) reported not feeling positive about their infants' future health.

## 3.12 Inferential statistics

### 3.12.1 Correlation between an infant's duration on ART and CD4%

The Spearman's Rank Correlation was used to test whether correlation between an infant's duration on ART and CD4% exists. No significant correlation was found. ( $p=0.84$ ,  $r = -0.04$ ), (Figure 3.41).

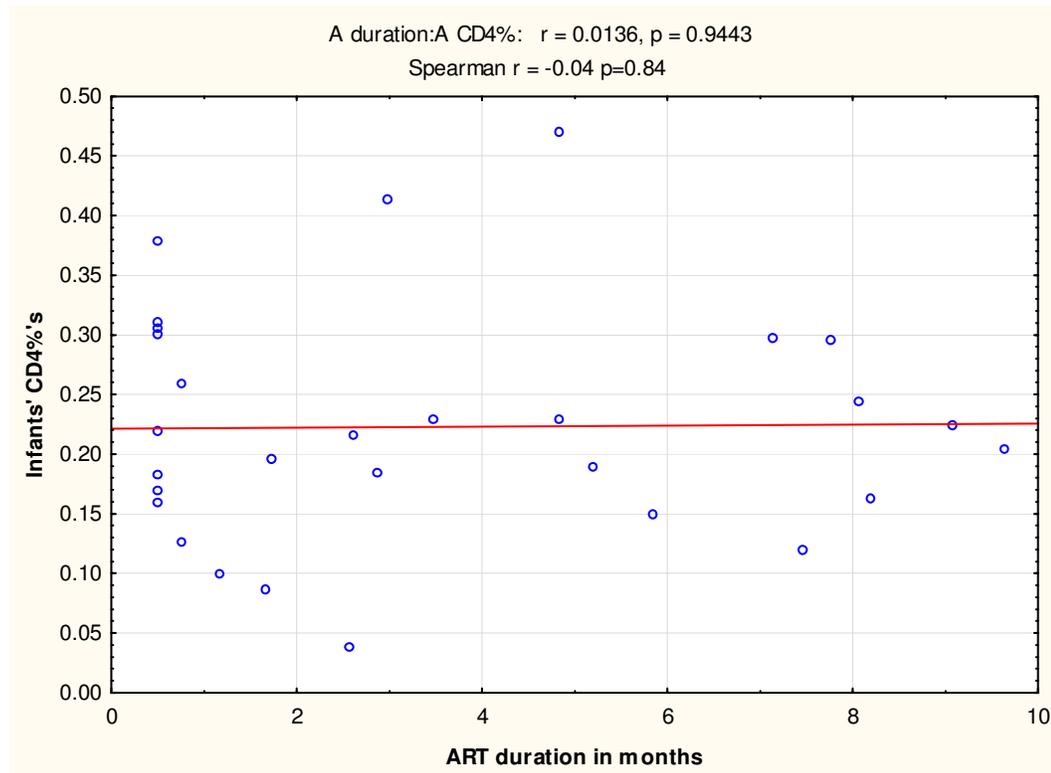
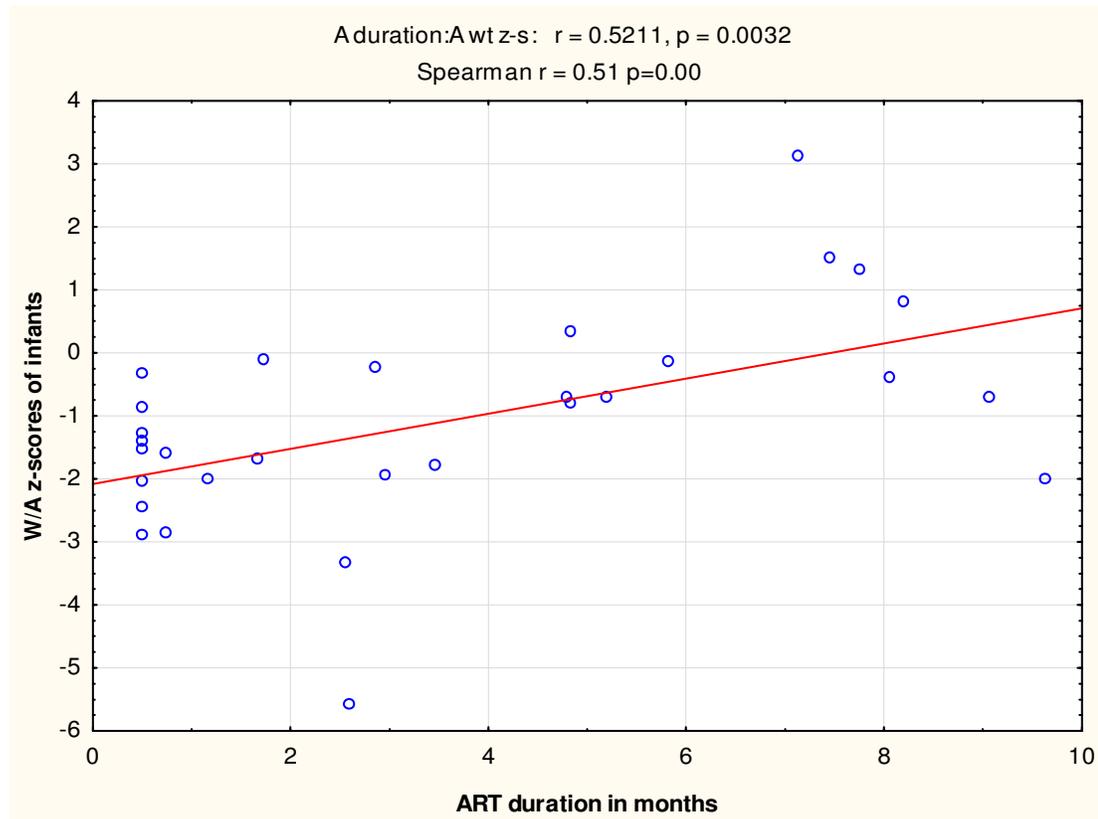


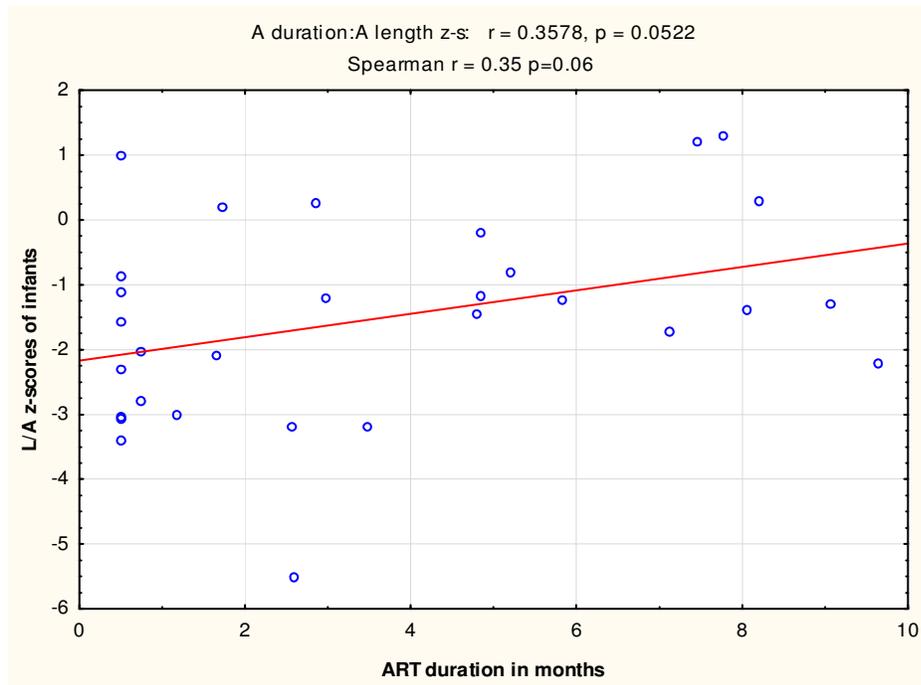
Figure 3.41: Spearman's Rank Correlation for infants' duration on ART and CD 4%

### 3.12.2 Correlation between an infant's duration on ART and growth

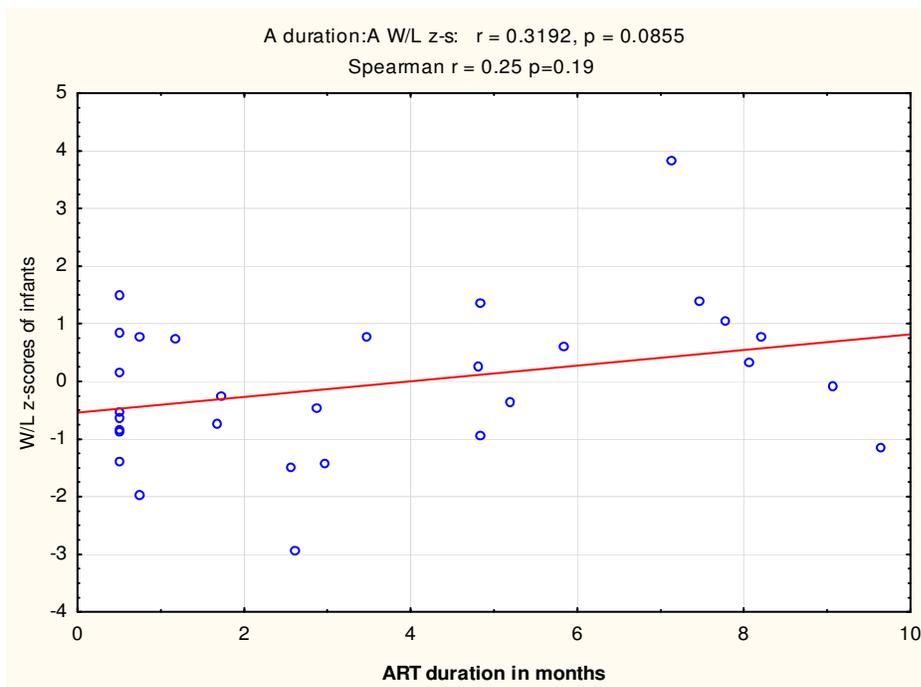
The Spearman's Rank Correlation was used to test whether a positive correlation between an infant's duration on ART and W/A z-score existed. A statistical significant positive correlation was found ( $p = 0.00$ ,  $r = 0.51$ ) (Figure 3.42).



The Spearman's Rank Correlation was used to test whether a correlation between an infant's duration on ART and L/A and W/L z-score existed. No significant correlation was found in either one (Figures 3.43 and 3.44).



**Figure 3.43: Spearman's Rank Correlation for infants' duration on ART and L/A z-scores**

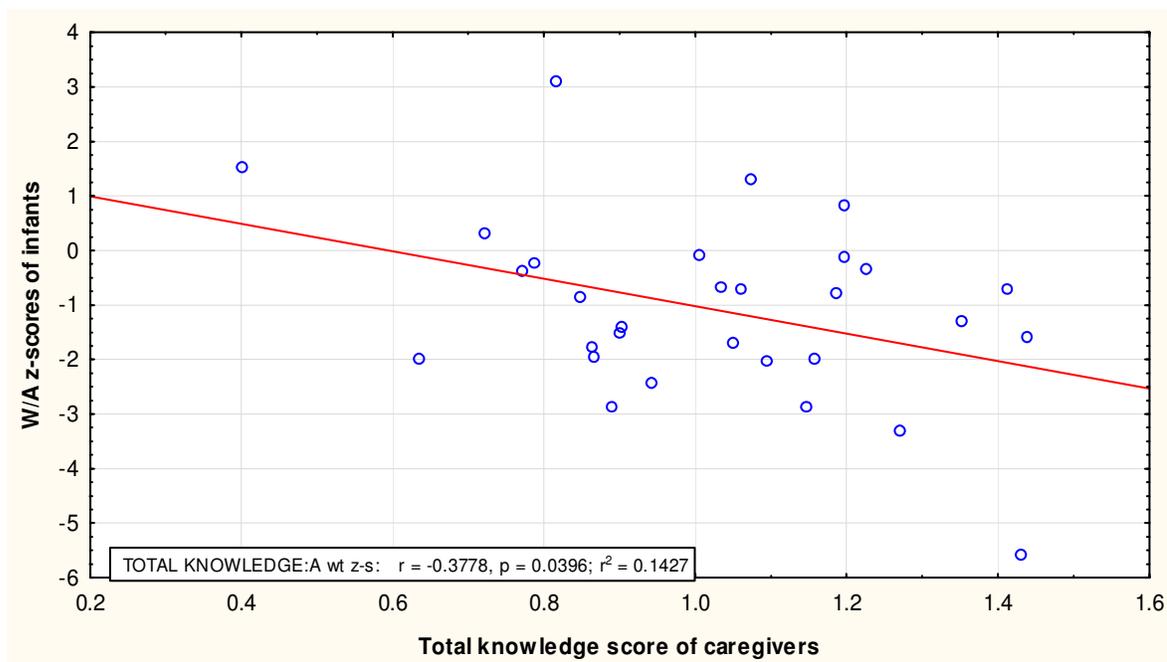


**Figure 3.44: Spearman's Rank Correlation for infants' duration on ART and W/L z-scores**

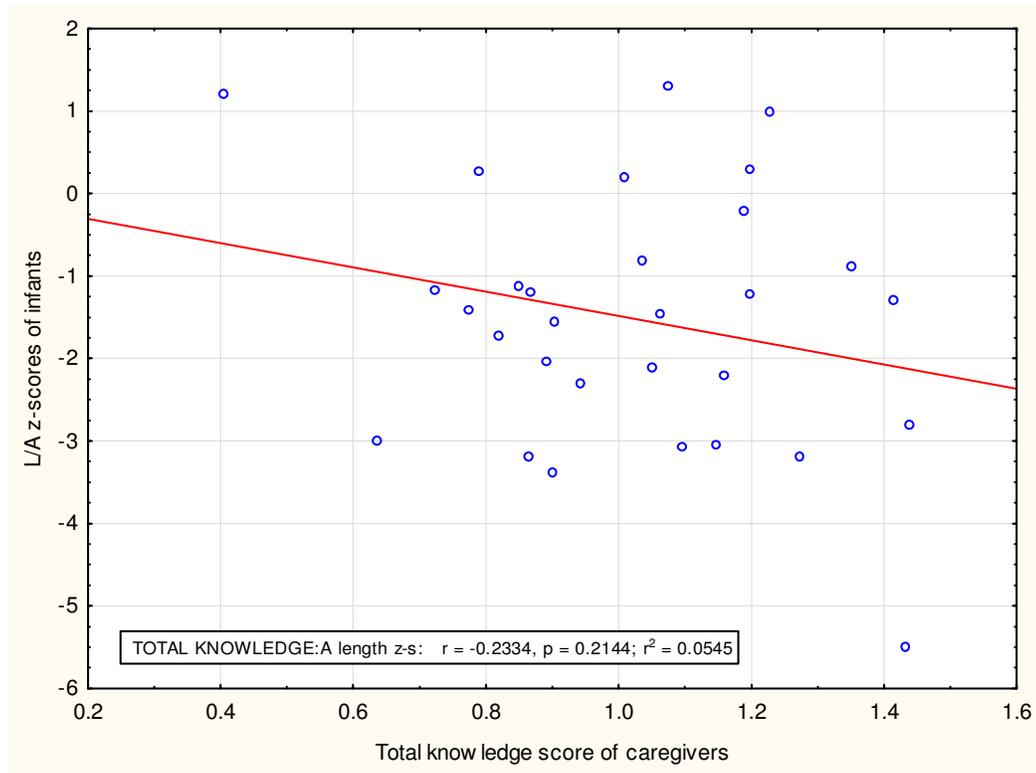
### 3.12.3 Correlation between caregivers' knowledge on infant feeding and growth of their infants

Pearson's test was used to determine whether correlation exist between the caregivers' knowledge (total knowledge score) and the growth of their infants. A statistical significant negative correlation was found between the W/A z-scores of infants and their caregivers' total knowledge scores ( $p = 0.039$ ,  $r = -0,38$ ), (Figure 45).

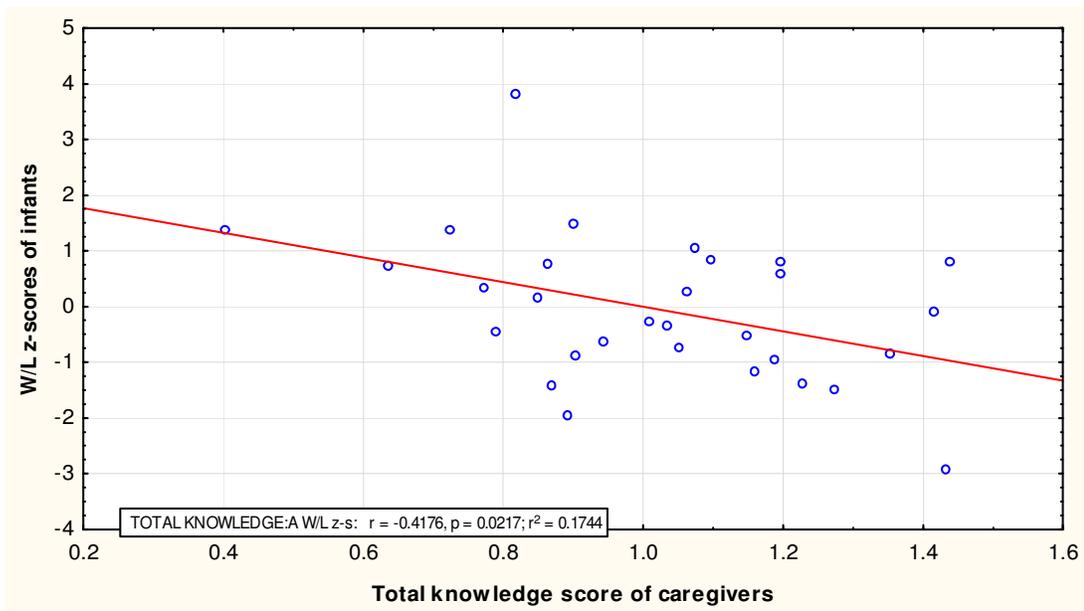
Negative, but not statistical significant correlations were found between the L/A and W/L z-scores of infants and their caregivers' total knowledge scores (Figures 3.45, 3.46 and 3.47).



**Figure 3.45: Pearson's test for the correlation between caregivers' knowledge on infant feeding and W/A z-scores of their infants**



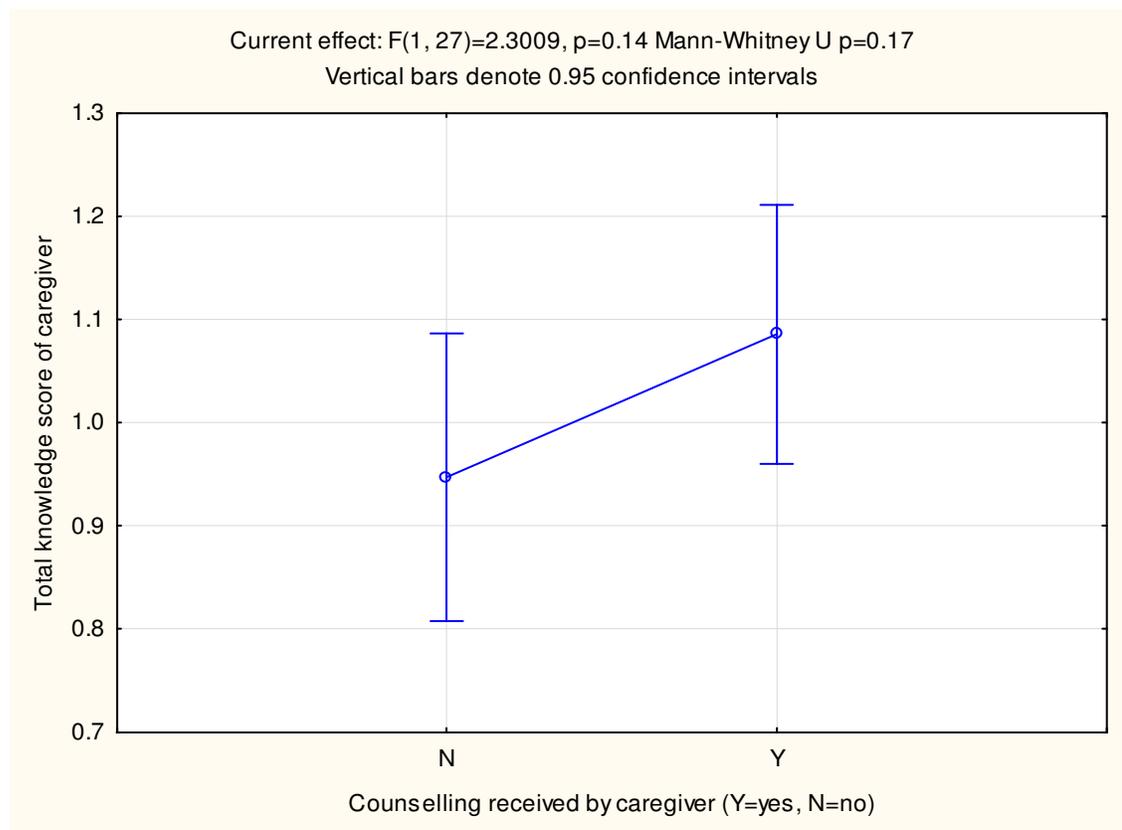
**Figure 3.46: Pearson’s test for the correlation between caregivers’ knowledge on infant feeding and L/A z-scores of their infants**



**Figure 3.47: Pearson’s test for the correlation between caregivers’ knowledge on infant feeding and W/L z-scores of their infants**

### 3.12.4 Relationship between the amount of infant feeding counselling caregivers received and their knowledge on infant feeding

Analysis of variance (ANOVA) was used to determine whether a relationship exists between caregiver knowledge on infant feeding and infant feeding counselling received. No significant difference was observed ( $p = 0.14$ , Mann–Whitney U  $p = 0.17$ ) between the group who received counselling and the group who did not receive counselling. (Figure 3.48)

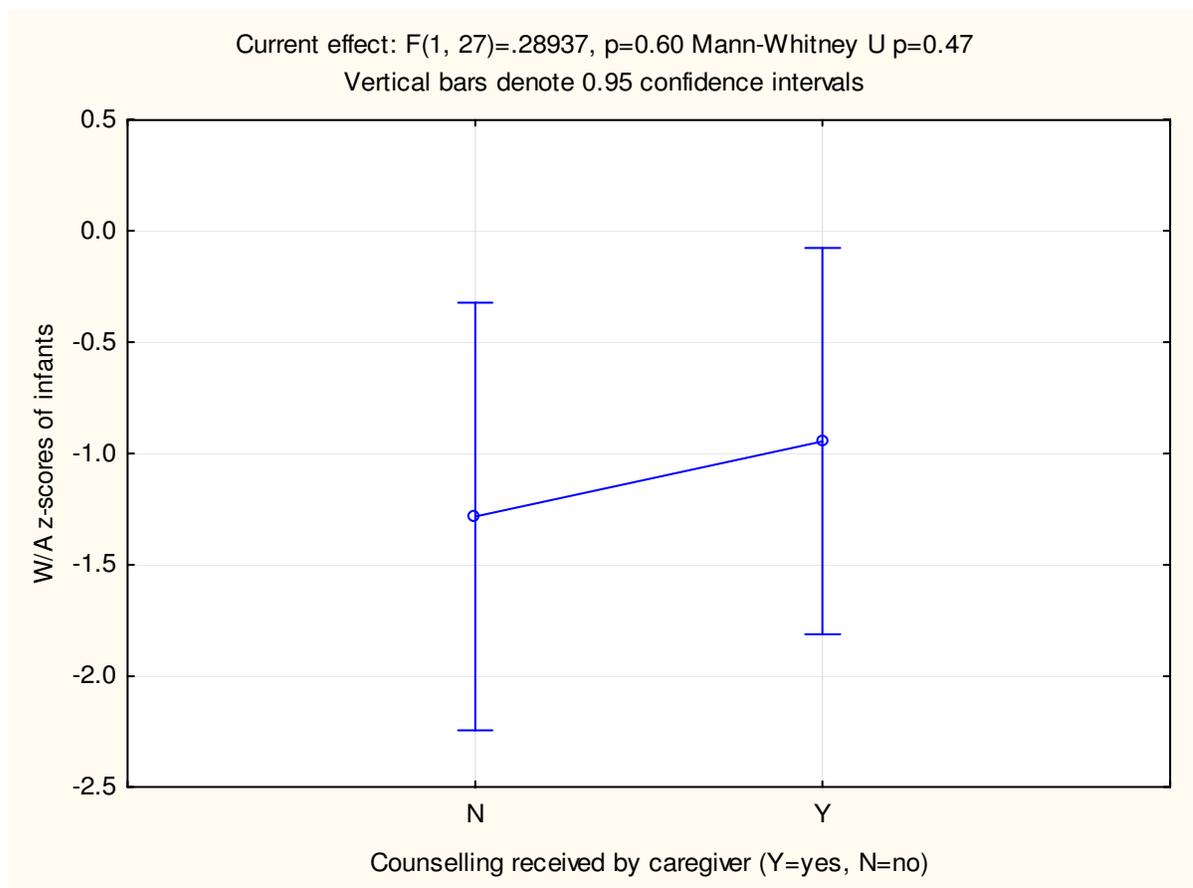


**Figure 3.48: Knowledge of caregivers against any counselling received**

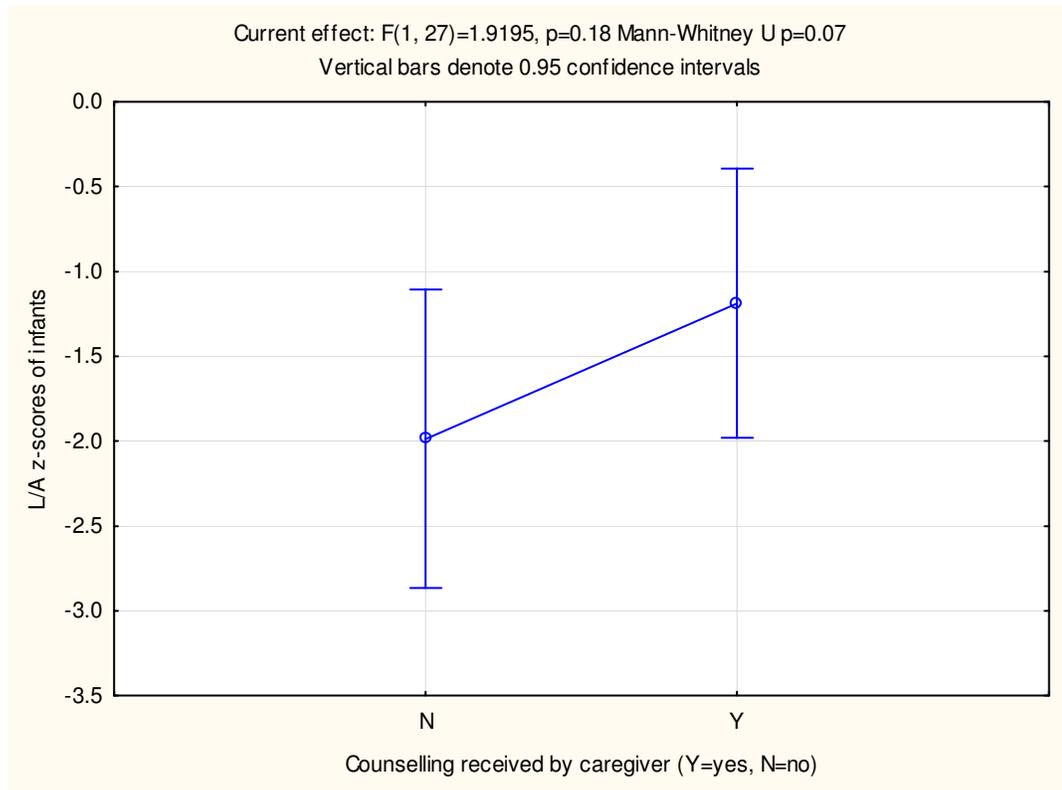
### 3.12.5 Relationship between the amount of infant feeding counselling caregivers received and the growth of their infants

Analysis of variance (ANOVA) was used to determine whether a relationship exists between the growth of infants and whether their caregivers received any infant feeding counselling.

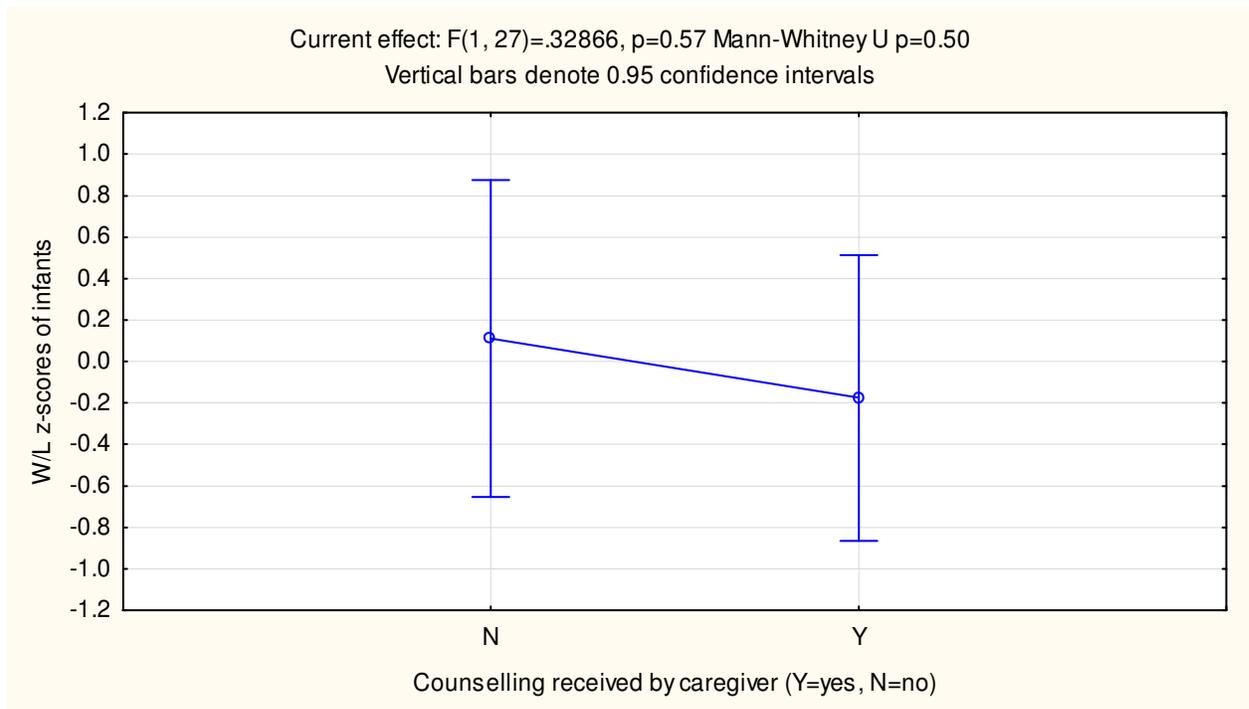
No significant difference was observed in the W/A z-scores, the L/A z-scores or W/L z-scores of infants whose caregivers received counselling and infants whose caregivers did not receive counselling (Figures 3.49, 50 and 51).



**Figure 3.49: W/A z-scores of infants against counselling received by caregivers**



**Figure 3.50: L/A z-scores of infants against counselling received by caregivers**



**Figure 3.51: W/L z-scores of infants against counselling received by caregivers**

## **CHAPTER 4: DISCUSSION**

## 4.1 Discussion

This study set out to describe the growth patterns, dietary intake and nutrition-related problems in infants (< 12 months) on ART attending RCCH's ARV clinic. It also aimed to describe the knowledge, practices, attitude and beliefs of the caregivers of these infants regarding infant feeding and nutrition-related problems and lastly, the most common nutrition-related problems these caregivers experienced with infant feeding.

In this study all the caregivers were females within the age range of adult women in SA with the highest HIV prevalence, i.e. 15 – 49 years.<sup>3</sup> All the caregivers came from within the Cape Metropole region, which in 2008 had a HIV prevalence of 17.9%.<sup>4</sup> The majority were single or had a partner, but were not married, had secondary schooling and were unemployed. More than a third of the caregivers lived in a shack, while the rest lived in a brick house or a flat. This is a much higher prevalence of informal dwelling than was found by the General Household Survey (GHS), done by the Human Sciences Research Council, in 2010.<sup>158</sup> The GHS showed that approximately 16% of people in the Western Cape lived in shacks. Most of the caregivers had electricity, but only half had running water inside the dwelling, which is less than the 71% found in the GHS. Almost all of the caregivers owned a cellular phone. The overall level of education of these caregivers was higher than found by the SA NFCS-FB study<sup>29</sup> in the Western Cape and in South Africa, but tertiary level education was much lower, fewer caregivers were married and a much higher rate of unemployment was present. In 2010, 28% of the general population in the Western Cape received a grant as their main source of income.<sup>158</sup> In this sample, more than half of the caregivers reported receiving a child support grant as their only source of income. Taking into account that all of the caregivers were HIV positive and made use of public health facilities, these socio-demographic statistics give a clear indication of the poor socio-economic situation of this study population. It should therefore be considered that this study population cannot be compared to the average, healthy population of the Western Cape.

The National DoH's objective is to have all pregnant women tested for HIV prior to delivery and enrolled into the PMTCT programme if HIV positive. Furthermore, according to the PMTCT guidelines, all pregnant mothers should be counselled on HIV testing prior to giving birth and if a mother is HIV-positive, she should receive at least four infant feeding counselling sessions before the infant is born.<sup>98</sup> In this caregiver sample, more than a third of the mothers reported not receiving any form of infant feeding counselling and only a third received the prescribed number of counselling sessions. A few of the mothers in this study indicated that they had a HIV test only after giving birth and was therefore not part of the PMTCT programme during pregnancy. The reasons for this were not assessed. This finding indicates, however, that either counselling was not being done in the PMTCT programme as prescribed or that uptake into the PMTCT programme was not optimal.

There are many reasons for poor uptake into the PMTCT programme. A qualitative study done in South Africa in 2008 explored the health system weaknesses which constrained access to PMTCT and maternal HIV services.<sup>159</sup> Results showed that mothers failed entering the PMTCT programme mostly due to HIV testing not being done in antenatal care. Reasons for this were shortages of test kits, insufficient staff assigned to HIV services and a lack of counsellors. Most prominent individual factors undermining access encompassed psychosocial concerns, such as maternal apprehension around HIV testing, fearing a positive test result or a partner's reaction, stigma associated with HIV as well as psychosocial support. HIV also has an impact on mental health which in turn can affect a person's willingness and ability to seek health services and care. Denial, shock and uncertainty after a positive test can delay a woman's return to the clinic for the next step in HIV service provision.<sup>159</sup>

Another qualitative study done in Malawi depicted many community- and provider-related operational and cultural barriers hindering the acceptability of the PMTCT programme.<sup>160</sup> Other reasons found for poor PMTCT uptake in different countries were pre-term delivery, delayed antenatal clinic attendance because of facility-related barriers<sup>161</sup>, having two children, late antenatal care attendance, not being informed about PMTCT at the first antenatal care visit,<sup>162</sup> avoidance of involuntary HIV disclosure, fear of negative community reactions and a lack of support from husbands.<sup>163,164</sup>

More antenatal clinic visits and counselling prior to birth have been identified as being protective from mixed feeding practices.<sup>116</sup> It is therefore unacceptable for an HIV-positive mother to

receive only one infant feeding counselling session, as a quarter of the mothers in this sample did. The reasons for this high incidence of having received no counselling as well as the report of the poor counselling received needs to be further investigated. Most caregivers who received counselling felt positive about the antenatal infant feeding counselling. The reasons for the few caregivers who had negative feelings about the counselling were not assessed, but one of the caregivers explained that the manner in which they were called for counselling was indiscrete and done in a way which exposed their HIV status to the rest of the patients in the clinic's waiting area. The manner in which counselling is conducted as well as caregivers' experiences and their perceptions of counselling are all areas which could be further investigated.

The findings of the quality and quantity of counselling sessions received by caregivers in this study concurs with other such studies done in SA which showed that the quality of HIV infant feeding counselling given at antenatal visits is poor.<sup>84,88,105,165</sup> This is a huge cause of concern. Evidence has shown several associations between good HIV infant feeding counselling and appropriate or optimal infant feeding practices<sup>62,64,92,103,166</sup> and poor-quality counselling and sub-optimal infant feeding practices, i.e. the "spill-over effect" to HIV-negative women, mixed feeding and inappropriate choices.<sup>84,90,91</sup>

A high incidence of prematurity and low birth weights were found in this sample. Several associations between maternal HIV and the incidence of premature delivery have been made.<sup>167</sup> A study done in Zaire, by Ryder *et al.*<sup>168</sup> found a 13% incidence of premature births in HIV-positive women, compared to 3% in HIV-negative women. A European Collaborative study found that the frequency of HIV-positive mothers delivering infants prematurely and/or with a very low birth weight (LBW) has increased significantly since the introduction of HAART in Europe<sup>169</sup>. Although the researcher did not record how many of the mothers were on HAART prior to delivery, this might be a contributing factor to this high incidence. The prevalence of LBW in this sample was higher than the 2007 DoH's national birth weight statistics, which indicated that 9.3% of South African children are born with a LBW.<sup>170</sup> It is known that the growth and nutritional status of HIV-exposed infants are already affected *in utero* and that LBW was found to be a common problem among such infants.<sup>23,24,37,38</sup> A high incidence of LBW in this sample was therefore expected.

Studies done in SA and the rest of Africa on HIV-infected children showed that growth faltering, stunting, underweight, severe malnutrition, wasting, severe wasting and multiple micronutrient

deficiencies were very common in these children.<sup>33,40-46,48-50</sup> Findings in this study with reference to underweight and stunting were similar. A variety of disturbed growth patterns have been described for HIV-infected children ranging from symmetric delays in weight and height, to severe wasting with normal height,<sup>37,39,40,46,49,50</sup> but the growth patterns of infants on ART have never been described and were therefore analysed in this sample.

The W/A z-score growth charts of the infant sample showed a variety of erratic growth patterns ranging from catch-up growth, moderate growth faltering to severe weight loss. It indicated that weight loss mostly occurred in this sample between five and six months of age and that more than half of the infants had a normal growth pattern in the two months prior to data collection. Reasons for the occurrence of growth faltering at specific durations in months were not evident. Previous studies have shown that the amount of formula milk supplied by the PMTCT programme sometimes becomes insufficient as infants get closer to six months of age and their milk intake increases or milk supply can be erratic.<sup>69,88</sup> The fact that most of the caregiver sample were unemployed and probably did not have the financial ability to buy extra formula milk in such scenarios, might explain this weight loss, but illnesses and subsequent hospitalisation might also be an explanation. The statistically significant positive correlation found between an infant's duration on ART and W/A z-score agrees with findings from many other studies which showed that ART significantly improves the weight or catch-up weight in children.<sup>120,125,127-131</sup>

The prevalence of stunting, in this infant sample, comprising HIV-positive infants attending an ARV clinic, was much higher than the findings of the two community-based national studies, i.e. the South African Vitamin A Consultative Group (SAVACG) study in 1999 and the NFCS-FB in 2005, i.e. where 17% of infants between 6 – 11 months, were stunted<sup>171</sup> and 18% of children between 1 – 9 years were stunted and 5.1% severely stunted.<sup>29</sup>

The W/L z-score calculation masked the problem of poor growth in this sample, and was not interpreted as a reliable parameter, due to the weights and lengths of this sample both indicating poor growth. The BMI-for-age is a useful indicator for screening for overweight and obesity. As with the W/H indicator, this was not seen as a reliable growth parameter to indicate poor growth in this sample, but rather only used to confirm the low prevalence of overweight or obesity in the sample. The MUAC of infants older than three months is an indicator of muscle and

subcutaneous adipose tissue and the low MUAC z-scores in this study supports the findings of underweight.

The erratic growth patterns and growth faltering, especially the high prevalence of stunting in the infant sample, causes huge concern. Stunting is considered a consequence of chronic poor nutrition and is associated with developmental delay and impaired cognitive function. It is considered to be the strongest predictor of child mortality in children younger than five years.<sup>172</sup> Evidence also shows that growth faltering, especially stunting, adversely affects a child's quality of life, particularly at the onset of adolescence.<sup>173</sup> Even more of a concern is that malnutrition accelerates the progression of asymptomatic HIV to AIDS,<sup>174</sup> it adversely affects an infant's physical and mental capacity<sup>175</sup> and could, in severe cases, lead to death.

The dietary intake of the infant sample showed a possible explanation of the high prevalence of stunting and underweight found in this sample. Most of the infants were receiving infant formula milk, only two were being breastfed. This correlates with the most recent Demographic and Health Survey done in SA, which found that only 8% of infants younger than six months were exclusively breastfed.<sup>66</sup> Nan Pelargon, Isomil and Infacare 1 were the infant formulas most often given to these infants. Nan Pelargon is the infant formula provided free of charge at clinics to caregivers on the current PMTCT program for six months after delivery. It was therefore expected to be the most commonly used infant formula in this sample, but this also shows the strong influence and spill-over effect the PMTCT programme has had.<sup>83,84,88</sup>

The dietary intake of the infants older than six months in this study was not optimal. Only a third of these infants had received a diet the previous day which met the minimum dietary diversity indicator<sup>iv</sup> and only a fifth received a minimum acceptable diet<sup>v</sup>.<sup>147</sup> All of these infants at least had received the prescribed minimum meal frequency<sup>vi</sup> the previous day. Although most of the infants in the sample were receiving at least two milk feeds per day, less than half of the formula-fed infants were receiving adequate amounts of milk per day. These findings can partly explain the underweight and stunting figures found in this group.

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<sup>iv</sup>An intake of at least four or more of the prescribed seven food groups the previous day

<sup>v</sup>For non-breastfed infants (6-23 months) an intake of at least four foods of the prescribed seven food groups (excluding dairy products) as well as at least two formula milk feeds plus four meals (solid food+ formula milk feeds)the previous day

<sup>vi</sup>For non-breastfed infants (6-23 months) an intake of at least four or more solid, semi-solid, soft foods or formula milk feeds the previous day

Half of the infants in the sample were also daily receiving other fluids than milk; two of these infants were younger than six months. Rooibos “tea bottles” and “pap bottles” and giving treats are a common practice seen in communities in the Western Cape and this group was no exception.<sup>176</sup> One of the many reasons why mixed feeding of infants below six months is such a common practice in South Africa,<sup>68</sup> might be due to the fact that caregivers do not regard cereal as “solid food” or mixed feeding, as was noted in a study done in Malawi.<sup>92</sup> This was also seen in this study with a caregiver misreporting on solid food introduction because she did not perceive cereal as “solid food”. Despite the poor dietary intake and nutritional status found in this group, the caregivers’ perceptions were that they experienced no serious problems with the feeding of their infants. Although it is encouraging that the caregivers were not encountering serious practical problems with the feeding of their infants, it is worrying that they do not perceive the lack of dietary diversity as a problem.

Most of the infants in the sample were reportedly feeding well or “OK”. Caregivers reported that the nutrition-related side-effects associated with HIV and ART that their infants most commonly experienced were diarrhoea, vomiting, mouth ulcers and oral thrush. This report was verified by the infants’ medical records. Almost all of the infants were at some stage hospitalised prior to data collection, due to an opportunistic infection (pneumonia, diarrhoea/gastro-enteritis or TB), with pneumonia being the cause more than half of the time. More than a quarter of the infants had diarrhoea prior to data collection and most caregivers knew what to do in this situation. Unfortunately even though most knew that they had to give ORS, less than half knew how to prepare the solution correctly and only two caregivers knew how much and how often to give it to their infants when they had diarrhoea. This shows a definite need for better education on the preparation and administration of ORS. More than half of the caregivers did not know what to do if an infant starts vomiting or what to do when an infant has anorexia.

The low prevalence of breastfeeding in this sample was as disappointing as the figures for mothers breastfeeding their infants on the PMTCT programme in most areas of the Western Cape.<sup>176</sup> Breastfeeding has been consistently shown to reduce infant morbidity and mortality associated with infectious diseases, particularly in the first few months after birth, compared with the use of formula milk.<sup>56</sup> Therefore, taking into consideration that all of the infants in the sample were HIV positive, this low prevalence is a huge cause of concern, specifically when considering their socio-economic circumstances relating to income, housing and availability of water inside their dwellings. The high incidence of pneumonia and diarrhoea in this sample could be one of

the consequences of the low breastfeeding prevalence, because breastfeeding has shown to be protective against such infectious diseases.<sup>177,178,179</sup> This low prevalence can be attributed to the following possible causes which were evident in this study sample: Poor quality and quantity of HIV infant feeding counselling sessions at antenatal visits<sup>62,64,92,103</sup>; the “spill-over effect” of the promotion of formula feeding to HIV-positive mothers<sup>84,90,91</sup>; a lack of support after delivery and discharge from the hospital<sup>64,66,103,116</sup>; as well as an excessive fear of HIV transmission due to an over estimation of the risk of HIV transmission during breastfeeding.<sup>84,86</sup>

Even more of a concern is that 40% of the infants were at some time breastfed after birth, but only two infants were still receiving breastmilk at the time of data collection. Why cessation of breastfeeding took place was not assessed, and this practice should be further investigated. However, the researcher did observe that for some infants, the date of their hospitalisation and the age at which breastfeeding ceased, corresponded. This might imply that the hospital was not baby-friendly. The reasons for the two breastfeeding mothers indicating that they will be breastfeeding until only six months were not assessed, but the researcher suspected it was derived from the old PMTCT recommendations that breastfeeding HIV-positive women should rapidly wean their infants at six months.<sup>17</sup> The researcher mentioned this report to the dietician working in the clinic, and after comprehensive counselling, both mothers indicated that they were relieved to hear that they could carry on with breastfeeding after six months and were planning to do so. This indicates that infant feeding counselling is not being done sufficiently at PMTCT clinics, or that the new recommendations have not been implemented in the counselling process. These issues need to be further explored and addressed. Nevertheless, it is encouraging to know that if infant feeding counselling is done properly and mothers are supported, optimal feeding practices can be achieved.

The poor formula preparation, feeding and hygiene practices found in this sample are another cause of concern. The correct preparation, handling and storage of infant formula are of utmost importance to protect formula-fed infants from illnesses and malnutrition caused by bacterial contamination of milk feeds, as well as over-dilution of milk.<sup>180,181,182,183,184</sup> In this sample, less than half of the caregivers were giving an adequate amount of formula milk to their infants per day, nearly two-thirds of the caregivers were not preparing formula feeds correctly and less than a third were cleaning and sterilising their infant’s feeding bottles correctly. These findings concur with several studies done in South Africa which showed poor formula feeding practices.<sup>82-84,176</sup> One such study done at a PMTCT clinic in Durban, SA, found that in prepared formula samples

obtained at the clinic, 28% were over-diluted.<sup>106</sup> This correlates well with the percentage of over-dilution of formula milk found in this study.

According to the National PMTCT guidelines, a caregiver who chooses to formula feed should be educated and shown how to correctly prepare formula feeds and then should also monthly be followed up and checked upon to assess whether it is done correctly.<sup>98</sup> These findings clearly indicate once again that infant feeding counselling and education are not being done properly at PMTCT clinics. Furthermore, studies done in SA have shown that the AFASS criteria is often not taken into account when HIV infant feeding counselling is done.<sup>81,84</sup> Considering the socio-demographic picture of these caregivers, it is questionable whether the AFASS conditions were taken into account with the infant feeding decision-making process in this sample.

The caregivers had poor general infant feeding knowledge. Less than a quarter of the caregivers knew the complete correct definition of exclusive breast- or formula feeding and more than half had no idea what it meant. More than two-thirds of the caregivers did not know what mixed feeding meant, or the dangers associated with mixed feeding. This poor knowledge on exclusive feeding practices and the dangers of mixed feeding is alarming. A study done in SA by Doherty *et al.* showed that some key characteristics in HIV-positive women who achieved success in exclusive feeding included having knowledge on the importance of exclusive feeding and being able to recall key messages on MTCT risks and mixed feeding.<sup>83</sup> Moreover, evidence show that when infant feeding advice, especially for EBF, is well defined and women understand the advice well, they succeed in following it.<sup>64,103,116</sup> The fact that the caregivers did not know the most unsafe feeding option for an HIV-positive woman indicates a clear lack of understanding and over-estimation of the risk of HIV transmission through exclusive breastfeeding. This finding is verified by results from other studies which showed that fears of HIV transmission through breastmilk often resulted from information given by HCW or other family members that over-estimated this risk and had mothers believe that HIV transmission through breastmilk is a certainty instead of a probability.<sup>84,86</sup>

The correct age for complementary food introduction into an infant's diet of six months was known by the majority of the caregivers as well as what kind of complementary foods to give with the introduction of solid food. This is an extremely important message for health and survival in the context of HIV, since growth faltering may occur if complementary foods are not introduced at this age or if they are given inappropriately. The period of complementary feeding (6 – 23

months) is the time of peak incidence of growth faltering, micronutrient deficiencies and infectious diseases and also the most critical period for child nutrition after which sub-optimal growth is hard to reverse.<sup>185</sup> Complementary foods need to be nutritionally adequate, safe, and appropriately fed in order to meet a young child's energy and nutrient needs. Both food and feeding practices influence the quality of complementary feeding, and caregivers need support to practise good complementary feeding.<sup>142</sup> When complementary food is introduced, an infant tends to drink less milk and the food effectively displaces some of the milk in the diet. If complementary food is therefore introduced too early, the infant's total energy intake may be less than what it was while exclusively breast- or formula feeding, since complementary foods are often introduced which are less energy dense than the milk. This can be another cause of malnutrition.<sup>186</sup> These findings with regards to complementary food introduction were therefore welcomed.

Caregivers had average breastfeeding knowledge. Alarmingly, three quarters of caregivers did not know what should be done when experiencing any kind of breast problems (for example: cracked nipples, thrush and mastitis). Only one caregiver knew exactly what to do. Heat treatment of breastmilk was an unknown concept to almost all of the caregivers. A few knew what it was, but did not know how to do it. Taken into account that all these caregivers were HIV positive and breastfeeding at a stage, this clearly indicates that breastfeeding counselling is not done sufficiently at clinics. One caregiver who received intense infant feeding counselling and breastfeeding support for a month while she was in hospital with her VLBW infant, ceased to breastfeed when she was discharged, reporting that her infant did not want to latch properly at home. This is a good example indicating the importance of breastfeeding counselling and support for mothers to sustain exclusive breastfeeding after they have left the hospital as proven in a study done by Bland *et al.* in 2008.<sup>64</sup> Furthermore, with none of the caregivers in this sample cup-feeding their infants and more than half of the caregivers not knowing what cup feeding is, the extent to which education on cup feeding is being done and the perceived feasibility of HCW on the recommendation to cup-feed should be further investigated. A previous research study conducted on the breastfeeding practices of mothers attending private breastfeeding clinics, of which the researcher was a co-author, found that only 15% of mothers were recommended to cup-feed by HCW's if they were unable to breastfeed their infants.<sup>187</sup> It seems that education on cup feeding and the recommendation thereof also did not take place in this study or were not understood by caregivers.

Caregivers had average knowledge on formula feeding. A quarter of the caregivers knew that the safest way to give formula milk is with a cup, but as mentioned, none was practicing it. This again indicates that the need for further investigation into this recommendation. The rest all thought that a bottle and teat is the safest way to give formula milk. The total infant feeding knowledge of the caregiver sample was also sufficient. An unexpected statistically significant negative correlation was found between the W/A z-scores of infants and their caregivers' total knowledge scores. Reasons for this are unclear, but it might indicate that sufficient knowledge does not guarantee appropriate practices, that beliefs and attitudes of caregivers play a significant role in their practices,<sup>83,87</sup> and as mentioned before, that the role of support to obtain appropriate practices is very important.<sup>62,64,84,88</sup>

The beliefs of caregivers on HIV transmission during breastfeeding were worrying. More than two-thirds of the caregivers believed that if a woman is HIV-positive she will definitely transmit HIV to her infant and also believed that formula feeding was the best feeding choice an HIV-positive mother can make for her infant. These reports indicate the confusion which exists on the superiority of breastfeeding and the risk of HIV transmission during breastfeeding. It supports the previous finding in this study that a misperception existed in the caregiver sample on the risk of HIV transmission during breastfeeding. Most of the caregivers believed that if an infant is on ART, the milk and food the infant receives are still important. Caregivers did not have strong beliefs on whether mothers who are on ART can breastfeed their babies, but a third either disagreed or strongly disagreed with the statement. Great effort should be made to educate individuals and communities better on the benefits of ART for HIV-positive women during breastfeeding, especially seen in the light of the plea expressed in the scientific literature that the provision of free formula milk to HIV-positive mothers should be done away with and that all HIV-positive mothers should receive ART and be encouraged to exclusively breastfeed.<sup>55</sup>

A quarter of the caregivers were uncertain whether they made the right infant feeding choice or felt they made the wrong one. The uncertainty about their choice of feeding option concurs with a study done at three different PMTCT sites in SA.<sup>84</sup> That study found that many mothers doubted their ability to carry out certain feeding practices, especially EBF, had lowered beliefs in their own ability to care for their children, and that they felt confused and unsure about the best infant feeding choice for their infant, which consequently led to choosing whatever they were told would provide the best protection for their child.<sup>84</sup> Even though uncertainty existed in the caregivers on whether they made the right infant feeding choice, most of the caregivers still felt

either positive or very positive about the choice they made. The researcher observed that caregivers had mixed emotions or feelings about their infants receiving ART. It seemed as if caregivers felt they were expected to be positive about the medication or had no choice other than to be positive because they knew it would benefit their infant and that they had to give it. It seemed as if they were scared to give an honest answer if they were not feeling positive about the medication. Nearly a quarter of the caregivers indicated that they believed the misconception that the antiretroviral medication would make their infant's HIV status negative, while five caregivers were unsure about this. The researcher observed that few of the caregivers, although knowing medically that the infants would not become HIV negative, still chose to believe and hoped that they would and therefore then reported that they believed the infant would become HIV negative. At the time of data collection only four caregivers were not feeling positive about their infants' health and reported being very worried about their future. The majority of caregivers felt either positive or very positive about their infants overall health, the way their infants were growing and about their chances to grow up and become healthy strong children.

The latest development in the support, protection and promotion of breastfeeding in South Africa, as captured in the "Tshwane Declaration of support for breastfeeding in South Africa" (Addendum L), a commitment made at a national breastfeeding consultative meeting in the latter part of August 2011 is highly promising. The stakeholders and government should be commended for taking bold steps at this meeting to ensure that SA adopt the 2010 WHO guidelines on HIV and Infant feeding and to recommend that all HIV-infected mothers should breastfeed their infants and receive ARV drugs to prevent HIV transmission. Furthermore, formula milk will no longer be provided at public health facilities, except on prescription by an appropriate healthcare professional for mothers, infants and children with approved medical conditions. Action on this declaration is eagerly awaited.

#### 4.1 Limitations of the study

- A statistically significant sample population could not be predetermined for this study, due to difficulty obtaining statistics of infants (< 12 months) on ART in the Western Cape. The sample population was then limited by time constraints and fluctuations in the number of infants attending the clinic on a monthly basis. A few infants were referred to clinics in the community before the researcher could see them.
- Most infants attending RCCH's outpatient antiretroviral clinic are referred to their nearest clinic upon being discharged from RCCH. The sample population were therefore not a typical sample of healthy HIV-positive infants in the community.
- The caregivers' participation in the provincial PMTCT programme was not assessed and a clear definition of what infant feeding counselling entails were not given to caregivers. Caregivers could therefore have under- or over-reported the number of infant feeding counselling sessions received.
- Caregiver disclosure of their and/or their infants' HIV status to family members or boyfriends was not determined. Disclosure of HIV status have shown to impact adherence to exclusive feeding practices and would have given more insight into the caregivers' infant feeding practices.
- The birth weights and monthly weights used to determine growth patterns were taken from the RtHC and medical files. The accuracy, validity and reliability of these weights taken by other HCW's in clinics could not be ensured. The accuracy and consistency of the measurements could not be verified due to more than one HCW taking the measurements and the reliability of these measurements were therefore compromised.
- Even though most mothers indicated that they were able to understand and speak English well and saying that an interpreter was not necessary, the researcher observed that their understanding of certain terms were not good and their explanations constrained by the fact that English or Afrikaans were their second language. This might have negatively influenced the comprehensiveness and reliability of their answers.
- Caregivers all knew that the researcher was a dietician and could therefore have given answers they knew were expected of them to give, but which were not a true reflection of their practices at home.
- RCCH is the leading paediatric tertiary health facility in the country. The findings of this study may therefore not be representative of other antiretroviral clinics in the community or country.

## **CHAPTER 5: CONCLUSION AND RECOMMENDATIONS**

## 5.1 Conclusions

This study indicated that the dietary intake of infants and infant feeding practices of the caregivers attending RCCH's ART clinic were poor. The general infant feeding knowledge of caregivers was insufficient and is a cause of concern. Breastfeeding, formula feeding and total infant feeding knowledge of the caregiver sample was average, but not deemed sufficient to translate into appropriate, safe and optimal infant feeding practices in an extremely vulnerable population.

At the same time, this study showed that even though infant feeding practices were not ideal and that the growth of infants was poor, most of the caregivers still felt either positive or very positive about their infants' overall health, the way they were growing and their future health. It is interesting to note, although most caregivers had poor social circumstances, all of their infants were HIV positive and the prevalence of stunting and underweight was high, the majority of caregivers still believed they chose the right infant feeding option for their infants and felt either positive or very positive about the choice they made, which was for the major part formula feeding.

Furthermore many findings of this study were consistent with what has been written in the literature on HIV infant feeding and growth of HIV-positive infants. These include:

- AFASS conditions are often not taken into account with the infant feeding decision-making process of HIV-positive caregivers.
- The quality and quantity of HIV infant feeding counselling sessions received by caregivers at antenatal clinic visits are poor, with more than a third of caregivers in this study indicating not receiving any infant feeding counselling prior to birth and many not receiving the prescribed number of at least four counselling sessions.
- Disturbed growth patterns, growth faltering, stunting, underweight and severe malnutrition are also common in HIV-infected children younger than one year.
- ART significantly improves the weight or catch-up weight in infants younger than one year.
- A lack of understanding and over-estimation of the risk of HIV transmission through exclusive breastfeeding exists amongst caregivers and many caregivers believe that HIV transmission through breastmilk is a certainty instead of a probability.
- Hygiene and infant formula milk preparation practices are poor.

- Many mothers doubt their ability to carry out certain feeding practices; they do not believe strongly in their own ability to care for their children and also feel confused and unsure about the best infant feeding choices for their infants.

According to UNICEF's conceptual framework on the causes of malnutrition, there are several factors that can impact on the nutritional status of infants and children leading to malnutrition. Immediate causes include inadequate dietary intake and disease; underlying causes include insufficient access to food, inadequate maternal and childcare, poor sanitation and health care; and basic causes include the quantity and quality of actual resources (i.e. insufficient knowledge of caregivers and discrimination) and limitations on the use of potential resources.<sup>188</sup> Keeping this framework in mind, the causes for the high prevalence of stunting and underweight in this study sample are evident. The infant sample were all HIV positive and most have had an opportunistic infection; breastfeeding prevalence was very low; the dietary intake was poor, caregivers were not well educated, had average infant feeding knowledge and showed poor formula feeding practices. Such results from the Western Cape, the province in South Africa with the second lowest HIV prevalence, structured health care systems and well-defined PMTCT and ART protocols, show once again that the current HIV infant feeding policies are still failing those who are supposed to be protected by it, namely the infants.

## 5.2 Recommendations

- The reasons for mothers not being enrolled into the PMTCT programme during pregnancy and not receiving sufficient counselling when in the programme should be investigated.
- The quality and correctness of counselling given at antenatal PMTCT clinics should be investigated. It should be assessed whether all clinics have implemented the South African Infant and Young Child feeding policy and revised PMTCT guidelines and also whether these guidelines are conveyed during counselling.
- The manner in which infant feeding counselling is conducted, caregivers' experiences and their perceptions of counselling at antenatal clinics are all areas which needs further investigation in order to improve the efficacy of this intervention activity.
- The high incidence of cessation of breastfeeding in HIV-positive mothers and the beliefs that breastfeeding should only continue for six months after birth must be investigated and corrected.
- Caregiver counselling and education on the preparation and administration of ORS should be improved.
- The extent to which education on cup feeding is being done, the reasons for the low prevalence of cup feeding and the perceived feasibility of HCW on the recommendation to cup feed, should be further investigated.
- The belief that a mother on ART cannot breastfeed her infant should be further investigated and effort should be made to educate individuals and communities better on the benefits of ART during breastfeeding.
- Further research is needed to examine the institutional and maternal factors that influence the uptake of PMTCT services and maternal ART.
- Follow-up investigations should be made into the commitments made in the Tswane declaration and support for breastfeeding in South Africa to ensure national adherence.

## REFERENCES

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- <sup>1</sup>ASSAF study panel. HIV/AIDS, TB and Nutrition. Scientific inquiry into the nutritional influences on human immunity with special reference to HIV infection and active TB in South Africa. 2007
- <sup>2</sup>UNAIDS 2010. UNAIDS report on the global AIDS epidemic 2010. [Online] Accessed 07 June 2011. Available from: [http://www.unaids.org/documents/20101123\\_GlobalReport\\_em.pdf](http://www.unaids.org/documents/20101123_GlobalReport_em.pdf).
- <sup>3</sup> Dorrington RE, Johnson LF, Bradshaw D, Daniel T. The Demographic Impact of HIV/AIDS in South Africa. National and Provincial Indicators for 2006. Centre for Actuarial Research, South African Medical Research Council and Actuarial Society of South Africa: Cape Town. Available at: <http://www.mrc.ac.za/bod>.
- <sup>4</sup> National Department of Health. 2008 National Antenatal Sentinel HIV and Syphilis Prevalence Report, South Africa. Pretoria. National Department of Health. 2009. [Online] Accessed: 21 June 2011. Available from: <http://www.info.gov.za/view/DownloadFileAction?id=109007>.
- <sup>5</sup> Bradshaw D, Groenewald P, Laubscher, R, Nannan, N, Nojilana B, Norman R, *et al.* Initial burden of disease estimates for South Africa, 2000. South Africa Medical Journal 2003; 93:682–688.
- <sup>6</sup> 2010 Countdown to 2015: Decade report (2000 – 2010). [Online] Accessed 29 June 2011. Available at: <http://www.countdown2015mnch.org/reports-publications/2010-report>.
- <sup>7</sup> Mid-year population estimates 2009. Statistics South Africa. [Online] Accessed 18 November 2009. Available from: <http://www.statssa.gov.za/publications/statsdownload.asp>.
- <sup>8</sup> Jacquet D, [Lévine M](#), [Ortega-Rodriguez E](#), [Faye A](#), [Polak M](#), [Vilmer E](#), [Lévy-Marchal C](#). Clinical and metabolic presentation of the lipodystrophic syndrome in HIV infected children. AIDS 2000; 14:2123–2128.
- <sup>9</sup> WHO/UNAIDS/UNICEF. Towards Universal Access: Scaling Up Priority HIV/AIDS Interventions in the Health Sector. 2008. [Online] Accessed 27 May 2009. Available from: [http://www.who.int/hiv/pub/towards\\_universal\\_access\\_report\\_2008pdf](http://www.who.int/hiv/pub/towards_universal_access_report_2008pdf).
- <sup>10</sup> Department of Health. National Guidelines for People Living with HIV, AIDS, TB and Other Debilitating Conditions. Department of Health: Pretoria. 2006. [Online] Accessed 27 May 2009. Available from: [www.doh.gov.za/docs/factsheets/guidelines/tb/part1.pdf](http://www.doh.gov.za/docs/factsheets/guidelines/tb/part1.pdf)
- <sup>11</sup> Coovadia H, Schaller J. HIV/AIDS in children: a disaster in the making. Lancet 2008; 372:9635
- <sup>12</sup> UNICEF. A call to action: Children the missing face of AIDS. 2005. [Online] Accessed 27 May 2009. Available from: [www.unicef.org/publications/files/AIDS\\_Launch\\_final\\_14Oct.pdf](http://www.unicef.org/publications/files/AIDS_Launch_final_14Oct.pdf).

- 
- <sup>13</sup> National Department of Health. HIV and AIDS and STI Strategic Plan for South Africa 2007-2011. Pretoria: National Department of Health, 2007. [Online] Accessed 27 May 2009. Available from: <http://www.doh.gov.za/docs/misc/stratplan/2007-2011/part1.pdf>.
- <sup>14</sup> United Nations. The Millennium Development Goals Report 2008. New York: United Nations Department of Economic and Social Affairs (DESA). [Online] Accessed 14 April 2011. Available from: <http://www.un.org/millenniumgoals/>
- <sup>15</sup> World Health Organization. Antiretroviral Drugs for Treating Pregnant Women and Preventing HIV Infection in Infants in Resource-limited Settings: Towards Universal Access. Recommendations for a Public Health Approach. Geneva: WHO, 2006.
- <sup>16</sup> Coovadia H, Goga A, Schowalter L. Call to action: Prevention of mother-to-child-transmission of HIV. South African Journal of HIV Medicine. 2009;36:12-15.
- <sup>17</sup> Department of Health & Provincial Government of the Western Cape. Summary of the PMTCT Revised Protocol, Western Cape. Department of Health: Cape Town. 2004 [Online] Accessed 19 March 2010. Available from: [www.doh.gov.za/docs/policy/pmtct.pdf](http://www.doh.gov.za/docs/policy/pmtct.pdf)
- <sup>18</sup> Lallemand M, Jourdain G., Le Coeur S., Mary J.Y., Ngo-Giang-Huong N, Koetsawang S. *et al.* Single dose perinatal nevirapine plus standard zidovudine to prevent mother-to-child transmission of HIV-1 in Thailand. New England Journal of Medicine. 2004;251: 217-228.
- <sup>19</sup> Meyers T, Moultrie H, Naidoo K, Cotton M, Eley B, Sherman G. Challenges to Pediatric HIV care and treatment in South Africa. JID. 2007;196(Suppl 3):474-481.
- <sup>20</sup> Doherty T, Besser M, Donohue S, *et al.* An Evaluation of the Prevention of Mother-to-Child Transmission (PMTCT) of HIV Initiative in South Africa: Outcomes and Key Recommendations. Durban: Health Systems Trust, 2003
- <sup>21</sup> Colvin M, Chopra M, Doherty T, *et al.* For the Good Start study team. Operational effectiveness of single dose nevirapine in the South African programme to prevent mother-to-child transmission of HIV. Bull World Health Organ. 2007;85:466-473.
- <sup>22</sup> Coetzee D, Hilderbrand K, Boule A, *et al.* Effectiveness of the first district-wide programme for the prevention of mother-to-child transmission of HIV in South Africa. Bull World Health Organ. 2006;83:489-494.
- <sup>23</sup> Rollins N, Little K, Mzoloa S, Horwood C, Newell ML. Surveillance of mother-to-child transmission prevention programmes at immunization clinics: the case for universal screening. AIDS. 2007;21:1341-1347.

- 
- <sup>24</sup> Jackson D, Chopra M, Doherty T, *et al.* For the Good Start study team. Operational effectiveness and 36 week HIV-free survival in the South African programme to prevent mother-to-child transmission of HIV-1. *AIDS*. 2007;21:509-516.
- <sup>25</sup> Goga A, van Wyk EB, Doherty T, *et al.* For the Good Start Study team. Operational effectiveness of guidelines on complete breast-feeding cessation to reduce mother-to-child transmission of HIV: Results from a prospective observational cohort study at routine prevention of mother-to-child transmission sites, South Africa. *J Acquir Immune Defic Syndr*. 2009;50:521-528.
- <sup>26</sup> Department of Health, South Africa. Guidelines for the management of HIV-infected children. 2<sup>nd</sup> Edition 2010. [Online] Accessed 13 September 2010. Available from: <http://www.doh.gov.za/docs/policy-f.html>.
- <sup>27</sup> Department of Health. South Africa. Integrated Nutrition Programme: A foundation for life. Issue 5, 2008
- <sup>28</sup> Department of Health, South Africa. Infant and young child feeding policy. 2008. [Online] Accessed 07 June 2011. Available from: <http://www.doh.gov.za/docs/policy/infantfeed.pdf>
- <sup>29</sup> Kruger HS, Swart R, Labadarios D, Dannhauser A and Nel J.H. (2007) The National Food Consumption Survey – Fortification Baseline (NFCS-FB): The knowledge, attitude, behavior and procurement regarding fortified foods, a measure of hunger and the anthropometric and selected micronutrient status of children aged 1 – 9 years and women of child-bearing age: South Africa, 2005. Pretoria: Directorate: Nutrition, Department of Health.
- <sup>30</sup> Bosman L, Herselman MG, Kruger HS, Labadarios D. Secondary Analysis of Anthropometric Data from a South African National Food Consumption Survey, Using Different Growth Reference Standards. *Matern Child Health J*. 2010; Sep 22. DOI: 10.1007/s10995-010-0685-5
- <sup>31</sup> Bourne LT. South African paediatric food-based dietary guidelines. *Maternal and Child Nutrition*. 2007;3: 227-229.
- <sup>32</sup> Bourne LT, Hendricks MK, Marais D, Eley B. Addressing malnutrition in young children in South Africa. Setting the national context for paediatric food-based dietary guidelines. *Maternal and Child Nutrition*. 2007;3:230-238.
- <sup>33</sup> Eley BS, Davies M, Apolles P., Cowburn C., Buys H., Zampoli M, *et al.* Antiretroviral treatment for children. *Southern African Medical Journal*. 2006;96:988–993.
- <sup>34</sup> Meyers T, Moultrie H, Sherman G, Cotton M and Eley B. (2006) Chapter 14: Management of HIV-Infected Children. *South African Health Review*, Health System Trust: Durban.

- 
- <sup>35</sup> Hira SK, Kamanga J, Bhat G.J, Mwale C, Tembo G. and Luo N, Perine PL. (1989) Perinatal transmission of HIV-1 in Zambia. *British Medical Journal*. 1989;299:1250–1252.
- <sup>36</sup> Bulterys M, Chao A., Munyemana S, Kurawige JB, Nawrocki P, Habimana P, *et al.* (1994) Maternal human immunodeficiency virus-1 infection and intrauterine growth: A prospective cohort study in Butare. *Rwanda Pediatrics Infection and Disease Journal*. 1994;13:94–100.
- <sup>37</sup> McKinney RE, Robertson RW. Duke Pediatric Clinical Trials Unit. Effect of human immunodeficiency virus infection on the growth of young children. *Journal of Pediatrics*. 1993; 123:579–582
- <sup>38</sup> Bobat R, Coovadia H, Moodley D, Coutsooudis A, Gouws E. Growth in early childhood in a cohort of children born to HIV-1 infected women from Durban, South Africa. *Ann Trop Paediatr*. 2001;21:203-210
- <sup>39</sup> Miller TL, Easley KA, Zhang W, *et al.* Maternal and infant factors associated with failure to thrive in children with vertically transmitted human immunodeficiency virus 1 infection: the Prospective, P2C2 Human Immunodeficiency Virus Multicenter Study. *Paediatrics*. 2001;108:1287–1296.
- <sup>40</sup> Arpadi SM. Growth failure in HIV-infected children. WHO Consultation on Nutrition and HIV/AIDS in Africa: Evidence, Lessons and recommendations for action. Durban, 10-13 April 2005. Geneva: WHO. 2005
- <sup>41</sup> Kurawige J, Gatsinzi T, Kleinfelt V, Rehle T and Bulterys M. (1993) HIV-1 infection among malnourished children in Butare, Rwanda. *Journal of Tropical Pediatrics*. 39;93–96.
- <sup>42</sup> Beau J.P. and Imboua-Coulibaly L. (1997) Kwashiorkor and HIV: New questions. *Journal of Tropical Pediatrics*. 43;50–51.
- <sup>43</sup> Kessler L., Daley H., Malenga G. and Graham S. (2000) The impact of the human immunodeficiency virus type 1 on the management of severe malnutrition in Malawi. *Annals of Tropical Paediatrics*. 20;50–56.
- <sup>44</sup> Grinspoon S, Mulligan K. Weight loss and wasting in patients infected with HIV. *Clin Infect Dis*. 2003;36(2):69-78.
- <sup>45</sup> Wheeler DA, Gilbert CL, Launer CA, *et al.* Weight loss as a predictor of survival and disease progression in HIV infection. *J Acquir Immune Defic Syndr*. 1998;18:80-85.
- <sup>46</sup> Miller TL, Evans SJ, Orav EJ, Morris V, McIntosh K, Winter HS. Growth and body composition in children infected with HIV-1. *Am J Clin Nutr*. 1993;57:588-592.

- 
- <sup>47</sup> Moyer JR, Rich KC, Kalish LA, Sheon AR, Diaz C, Cooper ER, Pitt J, Handelsman E. Natural history of somatic growth in infants born to women infected by human immunodeficiency virus. *J Pediatr*. 1996;128:58–69.
- <sup>48</sup> Saavedra JM, Henderson RA, Perman JA, Hotton N, Livingston RA, Yolken RH. Longitudinal assessment of growth in children born to mothers with human immunodeficiency virus infection. *Arch Pediatr Adolesc Med*. 1995;149:497–502.
- <sup>49</sup> Kotler DP. HIV infection and the gastrointestinal tract. *AIDS*. 2005;19:107-117.
- <sup>50</sup> Smith L, Eley B, Adams C. Neurocognitive outcome of HIV-infected children on antiretroviral therapy at Red Cross Children's Hospital. School of Child and Adolescent Health Annual Research Day, University of Cape Town. 2003
- <sup>51</sup> Tardieu M, Le Chenadec J, Persoz A, Meyer L, Blanche S, Mayaux MJ. HIV-1-related encephalopathy in infants compared with children and adults. French Pediatric HIV Infection Study and the SEROCO Group. *Neurology*. 2000;54:1089–1095.
- <sup>52</sup> Jones JM. The methodology of nutritional screening and assessment tools. *J Hum Nutr Dietet*. 2002;15:59-71.
- <sup>53</sup> Goga AE. Infant feeding and HIV. Towards new policy and implementation plan for minimising postnatal HIV transmission and maximising infant HIV-free survival. *Southern African Journal of HIV Medicine*. 2009;36:20-30.
- <sup>54</sup> World Health Organization. HIV and infant feeding: revised principles and recommendations, Geneva. 2009.
- <sup>55</sup> Doherty T, Sanders D, Goga A, Jackson D. Implications of the new WHO guidelines on HIV and infant feeding for child survival in South Africa. *Bull World Health Organ*. 2011;89:62-67.
- <sup>56</sup> Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS and the Bellagio Child Survival Study Group. How many child deaths can we prevent this year? *Lancet*. 2003;362:65-71.
- <sup>57</sup> Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? *Lancet*. 2003;361:2226-34.
- <sup>58</sup> Maternal and child undernutrition: Global and regional exposures and health consequences. *Lancet*. 2008;371:243-260.
- <sup>59</sup> Coovadia HM, Rollins NC, Bland RM, Little K, Coutsoodis A, Bennish ML, *et al*. Mother-to-child transmission of HIV-1 infection during exclusive breastfeeding in the first 6 months of life: an intervention cohort study. *Lancet*. 2007; 369:1107-16.

- 
- <sup>60</sup> Coutsooudis A, Pillay K, Kuhn L, *et al.* Method of feeding and transmission HIV-1 from mothers to children by 15 months of age: prospective cohort study from Durban, South Africa. *AIDS* 2001;15(3):379-387.
- <sup>61</sup> Iliff PJ, Piwoz EG, Tavengwa NV, Zunguza CD, Marinda ET, Nathoo KJ, Moulton LH, *et al.* ZVITAMBO study group. Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival. *AIDS*. 2005;19(7):699-708.
- <sup>62</sup> Bland RM, Rollins NC, Coovadia HM, Coutsooudis A, Newell ML. Infant feeding counseling for HIV-infected and uninfected women: appropriateness of choice and practice. *Bull of the World Health Organ*. 2007;85:4.
- <sup>63</sup> Patel D, Bland R, Coovadia H, Rollins N, Coutsooudis A, Newell ML. Breastfeeding, HIV status and weights in South African children: a comparison of HIV-exposed and unexposed children. *AIDS*. 2010;24:437-445.
- <sup>64</sup> Bland R, Little K, Coovadia H, Coutsooudis A, Rollins N, Newell M-L. Intervention to promote exclusive breast-feeding for the first 6 months of life in a high HIV prevalence area. *AIDS*. 2008; 4:27.
- <sup>65</sup> Becquet R, Bland R, Leroy V, Rollins NC, Ekouevi DK, Coutsooudis A, Dabis F, Coovadia HM, Salamon R, Newell ML. Duration, pattern of breastfeeding and postnatal transmission of HIV: Pooled analysis of individual data from West and South African cohorts. *PLoS ONE* 2009 Oct 16;4(10):e7397
- <sup>66</sup> South Africa Demographic and Health Survey 2003: full report. Pretoria: National Department of Health; 2004.
- <sup>67</sup> Doherty T, Chopra M, Nkonki L, Jackson D, Greiner T. Effect of the HIV epidemic on infant feeding in South Africa : 'When they see me coming with the tins they laugh at me'. *Bull World Health Organ*. 2005;84(2):90-96.
- <sup>68</sup> Tint K, Doherty T, Nkonki L, Witten C, Chopra M. An evaluation of PMTCT and infant feeding training in seven provinces of South Africa. Durban: Health System Trust; 2003
- <sup>69</sup> Bedri A, Gudetta B, Isehak A, Kumbi S, Lulseged S, Mengistu Y, *et al.* Extended-dose nevirapine to 6 weeks of age for infants to prevent HIV transmission via breastfeeding in Ethiopia, India, and Uganda: an analysis of three randomised controlled trials. *Lancet*. 2008;372:300-13.
- <sup>70</sup> Kumwenda NI, Hoover DR, Mofenson LM, Thigpen MC, Kafulafula G, Li Q, *et al.* Extended antiretroviral prophylaxis to reduce breast-milk HIV-1 transmission. *N Engl J Med*. 2008;359:119-29.

- 
- <sup>71</sup> Tonwe-Gold B, Ekouevi DK, Viho I, Amani-Bosse C, Toure S, Coffie PA, *et al.* Antiretroviral treatment and prevention of peripartum and postnatal HIV transmission in West Africa: evaluation of a two-tiered approach. *PLoS Med.* 2007;4:e257.
- <sup>72</sup> De Vincenzi I, Kesho Bora Study Group. Triple-antiretroviral (ARV) prophylaxis during pregnancy and breastfeeding compared to short-ARV prophylaxis to prevent mother-to-child transmission of HIV-1 (MTCT): The Kesho Bora randomized controlled clinical trial in five sites in Burkina Faso, Kenya. [Abstract LBPEC01]5th International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention, Cape Town, 19-22 July 2009.
- <sup>73</sup> Chasela C, Hudgens M, Jamieson D, Hosseinipour, M, Martinson F, Knight R, *et al.* Maternal or Infant Antiretroviral drugs to reduce HIV-1 transmission. *N Engl J Med.* 2010;362:2271-81.
- <sup>74</sup> HPTN 046. Phase III Trial to Determine the Efficacy and Safety of an Extended Regimen of Nevirapine in Infants Born to HIV Infected Women to Prevent Vertical HIV Transmission During Breastfeeding. Proceedings of the 18th Conference on Retroviruses and Opportunistic Infections (CROI) in Boston. 2 March 2011. [Online] Accessed 29 June 2011. Available from: [http://www.hptn.org/research\\_studies/hptn046.asp](http://www.hptn.org/research_studies/hptn046.asp).
- <sup>75</sup> Lockman S, Smeaton LM, Shapiro RL, Wester C, Heymann SJ, Gilbert PB, Stevens L, *et al.* Breastfeeding Plus Infant Zidovudine Prophylaxis for 6 Months vs Formula Feeding Plus Infant Zidovudine for 1 Month to Reduce Mother-to-Child HIV Transmission in Botswana. A Randomized Trial: The Mashai Study. *JAMA.* 2006;296:794-805.
- <sup>76</sup> Obimbo EM, Mbori-Ngacha DA, Ochieng JO, Richardson BA, Otieno PA, Bosire R, *et al.* Predictors of early mortality in a cohort of human immunodeficiency virus type 1-infected African children. *Pediatr Infect Dis J.* 2004;23:536-43.
- <sup>77</sup> Mbori-Ngacha D, Nduati R, John G, Reilly M, Richardson B, Mwatha A, *et al.* Morbidity and mortality in breastfed and formula-fed infants of HIV-1-infected women: a randomized clinical trial. *JAMA.* 2001;286:2413-20.
- <sup>78</sup> Taha T, Nour S, Li Q, Kumwenda N, Kafulafula G, Nkhoma C, *et al.* The effect of human immunodeficiency virus and breastfeeding on the nutritional status of African children. *Pediatr Infect Dis J.* 2010;29:514-8.
- <sup>79</sup> Doherty T, Chopra M, Jackson D, Goga A, Colvin M, Persson LA. Effectiveness of the WHO/UNICEF guidelines on infant feeding for HIV-positive women: results from a prospective cohort study in South Africa. *AIDS.* 2007;21:1791-7.

- 
- <sup>80</sup> Rollins NC, Becquet R, Bland RM, Coutsooudis A, Coovadia HM, Newell ML. Infant feeding, HIV transmission and mortality at 18 months: the need for appropriate choices by mothers and prioritization within programmes. *AIDS* 2008;22:2349-57.
- <sup>81</sup> World Health Organization. Summary of evidence for the revised WHO principles and recommendations on HIV and infant feeding. Geneva. 2010.
- <sup>82</sup> Sibeko L, Coutsooudis A, Nzuza S, Gray-Donald K. Mothers' infant feeding experiences: constraints and supports for optimal feeding in an HIV-impacted urban community in South Africa. *Public Health Nutrition*. 2009;12(11):1983-1990.
- <sup>83</sup> Doherty T, Chopra M, Nkonki L, Jackson D, Persson LA. A longitudinal qualitative study of infant feeding decision making and practices among HIV-positive women in South Africa. *J Nutr*. 2006;136:2421-2426.
- <sup>84</sup> Ghuman M, Saloojee H, Morris G. Infant feeding practices in a high HIV prevalence rural district of KwaZulu-Natal. *South African Journal of Clinical Nutrition*. 2009;22(2):74-79.
- <sup>85</sup> Oladokun RE, Brown BJ, Osinusi K. Infant feeding pattern of HIV-positive women in a prevention of mother-to-child transmission (PMTCT) programme. *AIDS Care*. 2010;22(9):1108-1114.
- <sup>86</sup> Buskens I, Jaffe A, Mkhathshwa H. Infant feeding practices: Realities and mindsets of mothers in southern Africa. *Aids Care*. 2007;19(9):1101-1109.
- <sup>87</sup> Adejuyigbe E, Orji E, Onayade A, Makinde N, Anayabolu H. Infant feeding intentions and practices of HIV-positive mother in Southwestern Nigeria. *J Hum Lact*. 2008;24(3):303-310.
- <sup>88</sup> Goga A. Improving child survival in South Africa – a case study on PMTCT: The special case of infant feeding. Presentation at Child Health Priorities Conference, Durban, 3 - 4 December 2007.
- <sup>89</sup> South African national HIV prevalence, incidence, behaviour and communication survey, 2008. Cape Town: Human Sciences Research Council; 2010.
- <sup>90</sup> Goga A, Colvin M, Doherty T, Jackson D, Sanders D, Chopra M, *et al*. Poor feeding practices at routine PMTCT sites, but more exclusive feeding amongst HIV-positive women compared with negative women. Pretoria: Medical Research Council; 2010.
- <sup>91</sup> Andresen E, Rollins NC, Sturm AW, Conana N, Greiner T. Bacterial contamination and over-dilution of commercial infant formula prepared by HIV-infected mothers in a prevention of mother-to-child transmission (PMTCT) programme, South Africa. *J Trop Pediatr*. 2007;53:409-14.

- 
- <sup>92</sup> Levy JM, Webb AL, Sellen DW. "On our own we can't manage": experiences with infant feeding recommendations among Malawian mothers living with HIV. *Int Breastfeeding Journal*. 2010;5:15.
- <sup>93</sup> Sadoh WE, Sadoh AE, Adeniran KA, Abhulimhen-Iyoha BI. Infant feeding practices among HIV-infected mothers in a HIV-treatment programme. *J Health Popul Nutr*. 2008;26(4):463-467.
- <sup>94</sup> Bii SC, Otieno-Nyunya B, Siika A, Rotich JK. Infant feeding practices among HIV infected women receiving prevention of mother-to-child-transmission services at Kitale District Hospital. *East Afr Med J*. 2008;85(4):156-61.
- <sup>95</sup> Omari AA, Luo C, Kankasa C, Bhat GJ, Bunn J. Infant feeding practices of mother of known HIV status in Lusaka, Zambia. *Health Policy Plan*. 2003;18(2):156-62.
- <sup>96</sup> Fadnes LT, Engebretsen IM, Wamani H, Semiyaga NB, Tylleskär T, Tumwine JK. Infant feeding among HIV-positive mothers and the general population mothers: comparison of two cross-sectional surveys in Eastern Uganda. *BMC Public Health*. 2009;9:124.
- <sup>97</sup> Ladzani R, Peltzer K, Mlambo MG, Phaweni K. Infant feeding practices and associated factors of HIV positive mothers at Gert Sibande, South Africa. Accepted Article; *Acta Paediatrica*; doi: 10.1111/j.1651-2227.2010.02080.
- <sup>98</sup> National Department of Health South Africa; South African National Aids Council. Clinical guidelines: Prevention of Mother-to-Child transmission 2010. [Online] Accessed 03 March 2010. Available from: [www.doh.gov.za/docs/factsheets/guidelines/pmtct.pdf](http://www.doh.gov.za/docs/factsheets/guidelines/pmtct.pdf).
- <sup>99</sup> Doherty T, McCoy D, Donohue S. Health systems constraints to optimal coverage of the prevention of mother-to-child transmission programme in South Africa: lessons from implementation of the national pilot programme. *Afr Health Sci*. 2005;5(3):213-218.
- <sup>100</sup> Shah S, Rollins N, Bland R for the Child Health Group. Breastfeeding knowledge amongst health workers in rural South Africa. *J Trop Pediatr*. 2005;51(1):33-38.
- <sup>101</sup> Leshabari S, Blystad A, de Paoli M, Moland K. HIV and infant feeding counselling: challenges faced by nurse-counsellors in northern Tanzania. *Human Resources for Health*. 2007;5(18) Published online 2007 July 24. doi:10.1186/1478-4491-5-18.
- <sup>102</sup> Rea MF, dos Santos RG, Sanchez-Moreno CC. Quality of infant feeding counseling for HIV+ mothers in Brazil: challenges and achievements. *Acta Paediatr*. 2007;96(1): 94-99.
- <sup>103</sup> Chopra M, Jackson, D, Ashworth A, Doherty T. Preventing HIV transmission to children: An evaluation of the quality of counselling provided to mothers in three PMTCT pilot sites in South Africa. *Acta Paediatr*. 2005;94: 357-363.

- 
- <sup>104</sup> Bland RM, Rollins NC, Coutsooudis A, Coovadia HM. Breastfeeding practices in an area of high HIV prevalence in rural South Africa. *Acta Paediatr.* 2002;91:704-711.
- <sup>105</sup> Chopra M, Doherty T, Jackson D, Ashworth A. Preventing HIV transmission to children: quality of counselling of mothers in South Africa. *Acta Paediatr.* 2005;94:357-63
- <sup>106</sup> Food and Nutrition Technical Assistance (FANTA) Project. HIV/AIDS: A Guide for Nutritional Care and support. 2<sup>nd</sup> ed. Washington, DC. Academy for Educational Development. 2004:86.
- <sup>107</sup> Hsu JWC, Pencharz PB, Macallan D, Tomkins A. Macronutrients and HIV/AIDS: A review of current evidence WHO Consultation on Nutrition and HIV/AIDS in Africa: Evidence, lessons and recommendation for action. Durban, 10-13 April 2005. Geneva. WHO. 2005.
- <sup>108</sup> Hendricks MK, Eley B, Bourne LT. Nutrition and HIV/AIDS in infants and children in South Africa. Implications for food-based dietary guidelines. *Maternal and Child Nutrition.* 2007;3:322-333.
- <sup>109</sup> Hussey G., Buys H., Cowburn C., Eley B, Hendricks M. Role of micronutrients in HIV infection. *Southern African Journal of HIV Medicine.* 2005;19:18-22.
- <sup>110</sup> Ndekha MJ, Manary MJ, Ashorn P, Briend A. Home-based therapy with ready-to-use therapeutic food is of benefit to malnourished, HIV-infected Malawian children. *Acta Paediatr.* 2005;94(2):222–225.
- <sup>111</sup> Sandige H, Ndekha MJ, Briend A, *et al.* Home-based treatment of malnourished Malawian children with locally produced or imported ready-to-use food. *J Pediatr Gastroenterol Nutr.* 2004;39(2):141–146.
- <sup>112</sup> Coutsooudis A, Bobat RA, Coovadia HM, Kuhn L, Tsai WY, Stein ZA. The effects of vitamin A supplementation on the morbidity of children born to HIV-infected women. *Am J Public Health.* 1995;85:1076–1081.
- <sup>113</sup> Fawzi WW, Mbise RL, Hertzmark E, Fataki MR, Herrera MG, Ndossi G, Spiegelman D. A randomized trial of vitamin A supplements in relation to mortality among human immunodeficiency virus-infected and uninfected children in Tanzania. *Pediatr Infect Dis J.* 1999;18:127–133.
- <sup>114</sup> Bobat R, Coovadia H, Stephen C, Naidoo KL, McKerrow N, Black RE, Moss WJ. Safety and efficacy of zinc supplementation for children with HIV-1 infection in South Africa: a randomised double-blind placebo-controlled trial. *Lancet.* 2005;366:1862–1867.
- <sup>115</sup> UNICEF. Children and AIDS. A stocktaking report 2008. [Online] Accessed 28 May 2009. Available from:

---

[http://www.unicef.org/publications/files/ChildrenanAIDSAStocktakingLoResPDF\\_EN\\_USLetter\\_15012007.pdf](http://www.unicef.org/publications/files/ChildrenanAIDSAStocktakingLoResPDF_EN_USLetter_15012007.pdf).

<sup>116</sup> Newell ML, Coovadia H, Cortina-Borja M, Rollins N, Gaillard P, Dabis F. Mortality of Infected and Uninfected Infants Born to HIV-infected Mothers in Africa: A pooled analysis. *Lancet*. 2004;364:1236–1243.

<sup>117</sup> Spira R, Lepage P, Msellati P, Van De Perre P, Leroy V, Simonon A. Natural History of HIV-1 infection in children: a five-year prospective study in Rwanda. *Paediatrics*. 1999;104(5):e56.

<sup>118</sup> Taha TE, Graham SM, Kumwenda NI, Broadhead RL, Hoover DR, Markakis D. Morbidity among HIV-1 infected and uninfected African Children. *Pediatrics* 2000;106(6):e77.

<sup>119</sup> Violari A, Cotton M, Gibb DM, Babiker AG, Steyn J, Madhi SA, *et al*. Early antiretroviral therapy and mortality among HIV-infected infants. *N Engl J Med*. 2008;359:2233-2244.

<sup>120</sup> Sutcliffe CG, van Dijk JH, Bolton C, Persaud D, Moss WJ. Effectiveness of ART among HIV-infected children in sub-Saharan Africa. *Lancet Infect Dis*. 2008;8:477-89.

<sup>121</sup> Reddi A, Leeper SC, Grobler AC, Geddes R, France KH, Dorse G.L., *et al*. Preliminary outcomes of a paediatric highly active antiretroviral therapy cohort from KwaZulu-Natal, South Africa. *BMC Paediatrics*. 2007, Mar 17;7:13.

<sup>122</sup> National Department of Health South Africa; South African National Aids Council. The South African Antiretroviral Treatment guidelines 2010. [Online] Accessed 12 April 2010. Available from: [www.doh.gov.za/docs/factsheets/guidelines/art.pdf](http://www.doh.gov.za/docs/factsheets/guidelines/art.pdf).

<sup>123</sup> Meyers T, Moultrie H, Naidoo K, Cotton M, Eley B, Sherman G. Challenges to Paediatric HIV care and treatment in South Africa. *JID*. 2007;196(3):474-481.

<sup>124</sup> South African Medicines Formulary. Sixth Edition. 2001. Division of Pharmacology Faculty of Health Sciences University of Cape Town.

<sup>125</sup> Nachman SA, Lindsey JC, Moye J, Stanley KE, Johnson GM, Krogstad PA, Wiznia AA. Growth of human immunodeficiency virus-infected children receiving highly active antiretroviral therapy. *Pediatr Infect Dis J*. 2005;24(4):352–357.

<sup>126</sup> Verweel G, van Rossum AM, Hartwig NG, Wolfs TF, Scherpbier HJ, de Groot R. Treatment with highly active antiretroviral therapy in human immunodeficiency virus type 1-infected children is associated with a sustained effect on growth. *Pediatrics*. 2002;109:E25.

<sup>127</sup> Buchacz K, Cervia JS, Lindsey JC, Hughes MD, Seage GR 3rd, Dankner WM. Impact of protease inhibitor containing combination antiretroviral therapies on height and weight growth in HIV-infected children. *Paediatrics*. 2001;108(4):E72.

- 
- <sup>128</sup> Guillén S, Ramos JT, Resino R, Bellón JM, Muñoz MA. Impact on Weight and Height with the use of HAART in HIV-infected children. *Pediatr Inf Dis J*. 2007;26(4):334-338.
- <sup>129</sup> Kabue MM, Kekitiinwa A, Maganda A, Risser JM, Chan W, Kline MW. Growth in HIV-infected children receiving ART at a Paediatric Infectious Diseases clinic in Uganda. *AIDS Patient Care and STD's*. 2008;22(3):245-251.
- <sup>130</sup> Jaspan HB, Berrisford AE, Boule AM. Two-year outcomes of children on Non-Nucleoside Reverse Transcriptase Inhibitor and Protease Inhibitor Regimens in a South African paediatric antiretroviral program. *Paediatr Infect Dis J*. 2008;27(11):993-998.
- <sup>131</sup> Sánchez JM, Ramos Amador JT, Fernández de Miguel S, González Tomée MI, Rojo Conejo P, Fernando Vivas P, *et al*. Impact of highly active antiretroviral therapy on the morbidity and mortality in Spanish human immunodeficiency virus-infected children. *Pediatr Infect Dis J*. 2003;22:863-867.
- <sup>132</sup> Carr A, Samaras K, Chisholm DJ, Cooper DA. Pathogenesis of HIV-1 protease inhibitor-associated peripheral lipodystrophy, hyperlipidemia, and insulin resistance. *Lancet*. 1998;351:1881-1883.
- <sup>133</sup> Arpadi SM, Cuff PA, Hurlck M, Wang J, Kotler DP. Lipodystrophy in HIV-infected children is associated with high viral load and low CD4-lymphocyte percentage at baseline and use of protease inhibitor and stavudine. *J Acquir Immune Defic Syndr*. 2001;27:30-34.
- <sup>134</sup> Melvin AJ, Lennon S, Mohan KM, Purnell JQ. Metabolic abnormalities in HIV type-1-infected children treated and not treated with protease inhibitors. *AIDS Res Hum Retroviruses*. 2001;10:1117-1123.
- <sup>135</sup> Miller T.L. Nutritional aspects of HIV-infected children receiving highly active antiretroviral therapy. *AIDS*. 2003;17(1):130-140.
- <sup>136</sup> Fiore P, Donelli E, Boni S, Pontali E, Tramalloni R, Bassetti D. Nutritional status changes in HIV-infected children receiving combined ART including protease inhibitors. *Int J of Antimicrobial Agents*. 2000;16:365-369.
- <sup>137</sup> Department of Health. Provincial Government Western Cape. 2005. Metro District Health Services. Annual report. 2003/2004 [Online] Accessed 27 July 2010. Available from: [www.capegateway.gov.za/eng/pubs/annual\\_reports/2003/99613](http://www.capegateway.gov.za/eng/pubs/annual_reports/2003/99613)
- <sup>138</sup> Summary of provincial HIV/AIDS statistics for South Africa. 2008. [Online] Accessed 27 July 2010. Available from: [www.metam.co.za/.../Provincial%20HIV%20and%20AIDS%20statistics%20for%202008](http://www.metam.co.za/.../Provincial%20HIV%20and%20AIDS%20statistics%20for%202008)

- 
- <sup>139</sup> Department of Health. Provincial Government Western Cape. 2005. Western Cape, HIV ASSA projection output. (Excel file). [Online] Accessed 27 July 2010. Available from: [http://www.capegateway.gov.za/eng/publications/reports\\_research/W/142134](http://www.capegateway.gov.za/eng/publications/reports_research/W/142134)
- <sup>140</sup> Centre for Actuarial Research. 2005. Population projections for the Western Cape, 2005 – 2015. [Online] Accessed 27 July 2010. Available from: [http://www.capegateway.gov.za/Text/2006/10/western\\_cape\\_hiv\\_aids\\_infection\\_mortality\\_fertility\\_population\\_projections\\_report.doc](http://www.capegateway.gov.za/Text/2006/10/western_cape_hiv_aids_infection_mortality_fertility_population_projections_report.doc).
- <sup>141</sup> Katzenellenbogen JM, Joubert G, Abdool Karim SS. Epidemiology. A manual for South Africa. Cape Town: Oxford South Africa; 2002. p. 74 – 81.
- <sup>142</sup> WHO. Guiding principles for complementary feeding of the breastfed child. 2003 [Online] Accessed 03 March 2010. Available from: [http://www.who.int/child\\_adolescent\\_health/documents/a85622/en/](http://www.who.int/child_adolescent_health/documents/a85622/en/)
- <sup>143</sup> WHO. Guiding principles for feeding the non-breastfed child age 6-24 months of age. 2005. [Online] Accessed 08 March 2010. Available from: [http://www.who.int/child\\_adolescent\\_health/documents/9241593431/en/](http://www.who.int/child_adolescent_health/documents/9241593431/en/)
- <sup>144</sup> WHO. Guidelines for an Integrated Approach to the Nutritional care of HIV-infected children (6 months – 14 years). Handbook. 2009. Preliminary version for country introduction. Available from: <http://www.who.int/nutrition/publications/hivaids/9789241597524/en/>
- <sup>145</sup> National Department of Health South Africa. Infant and young child feeding policy. 2008. [Online] Accessed 03 March 2010. Available from: [www.doh.gov.za/docs/policy/infantfeed.pdf](http://www.doh.gov.za/docs/policy/infantfeed.pdf)
- <sup>146</sup> Department of Health. Provincial Government Western Cape. 2009. Policy and guidelines for the prevention of mother-to-child transmission of HIV. [Online] Accessed 03 March 2010. Available from: [www.hst.org.za/uploads/files/Western\\_Cape\\_Provincial\\_PMTCT\\_guidelines\\_June\\_2009.pdf](http://www.hst.org.za/uploads/files/Western_Cape_Provincial_PMTCT_guidelines_June_2009.pdf)
- <sup>147</sup> WHO. Indicators for assessing infant and young child feeding practices. 2010 [Online] Accessed 20 April 2010. Available from: [http://www.who.int/child\\_adolescent\\_health/documents/9789241599757/en/](http://www.who.int/child_adolescent_health/documents/9789241599757/en/)
- <sup>148</sup> WHO. The WHO child growth Standards. 2006. [Online] Available from <http://www.who.int/childgrowth/en/>
- <sup>149</sup> Lee RD, Nieman DC. Nutritional Assessment. Third Edition. New York: McGraw-Hill Higher Education; 2003. p. 164, 165, 167.
- <sup>150</sup> Serenata C. Changes to the ART guidelines – An overview. South African Journal of HIV Medicine. 2010;37:28-30.

- 
- <sup>151</sup> WHO. Training course on child growth assessment. WHO child growth standards. Interpreting growth indicators. 2008. [Online]. Accessed 24 November 2010. Available from: <http://www.who.int/childgrowth/training/en/>
- <sup>152</sup> Department of Health. Provincial Government of the Western Cape. 2011. Circular No. H01/2011. Implementation of the redesigned Road to Health Booklets.
- <sup>153</sup> Kuczmarski Rj, Ogden Cl, Grummer-Strawn Lm, *et al.* CDC growth charts: United States. Advance data from vital and health statistics; no 314. Hyattsville, Maryland: National Centre for Health Statistics. 2000.
- <sup>154</sup> WHO. Child growth standards. 2011. WHO Anthro (version 3.2.2, January 2011). [Online] Accessed 25 Jan 2011. Available from: <http://www.who.int/childgrowth/software/>
- <sup>155</sup> Sabery N, Duggan C. A.S.P.E.N. Clinical Guidelines: Nutrition Support of Children with Human Immunodeficiency Virus. *J Parenter Enteral Nutr.* 2009;33:588. doi: 10.1177/0148607109346276
- <sup>156</sup> Department of Health. South Africa. 2009. Safe preparation, storage and handling of powdered infant formula.
- <sup>157</sup> Department of Health. South Africa. Pretoria. 2001. Directorates Nutrition and Child and Youth Health. Training Modules for Growth Monitoring and Promotion – The Road to Health.
- <sup>158</sup> General Household Survey 2010. Revised version. Statistics South Africa. [Online] Accessed 10 August 2011. Available from [www.statssa.gov.za/publications/P0318/P0318June2010.pdf](http://www.statssa.gov.za/publications/P0318/P0318June2010.pdf)
- <sup>159</sup> Sprague C, Cherisch MF, Black V. Health system weaknesses constrain access to PMTCT and maternal HIV services in South Africa a qualitative enquiry. *AIDS Research and Therapy.* 2011;8:10.
- <sup>160</sup> Bwirire LD, Fitzgerald M, Zachariah R, Chikafa V, Massaquoi M, *et al.* Reasons for loss to follow-up among mothers registered in a PMTCT program in rural Malawi. *Trans R Soc Trop Med Hyg.* 2008;12:1195-1200.
- <sup>161</sup> Laher F, Cescon A, Lazarus E, Kaida A, Makongoza M, Hogg RS, *et al.* Conversations With Mothers Exploring Reasons for Prevention of Mother-to-Child Transmission (PMTCT). Failures in the Era of Programmatic Scale-Up in Soweto, South Africa. *AIDS Behav.* 2011; DOI10.1007/s10461-010-9875-9
- <sup>162</sup> Hanh NT, Gammeltoft TM, Rasch V. Number and timing of antenatal HIV testing evidence from a community-based study in Northern Vietnam. *BMC Public Health.* 2011;11:183.

- 
- <sup>163</sup> Chinkonde JR, Sundby J, Martinson F. The prevention of mother-to-child HIV transmission programme in Lilongwe, Malawi why do so many women drop out. *Reprod Health Matters*. 2009;17(33):143-51.
- <sup>164</sup> O’Gorman DA, Nyirenda LJ, Theobald SJ Prevention of mother-to-child transmission of HIV infection: Views and perceptions about swallowing nevirapine in rural Lilongwe, Malawi. *BMC Public Health*. 2010;10:354.
- <sup>165</sup> Doherty TM, McCoy D, Donohue S. Health system constraints to optimal coverage of the prevention of mother-to-child HIV transmission programme in South Africa: Lessons from the implementation of the national pilot programme. *Afr Health Sci*. 2005;5:213–18.
- <sup>166</sup> Bhandari N, Bahl R, Mazumdar S, Martines J, Black RE, Bhan MK. Effect of community-based promotion of exclusive breastfeeding on diarrhoeal illness and growth: A cluster randomised controlled trial. *Lancet*. 2003;361:1418–23.
- <sup>167</sup> Stiehm RE. Newborn factors in maternal-infant transmission of pediatric HIV infection. *J Nutr*. 1996;126:2632S-2636S.
- <sup>168</sup> Ryder RW, Nsa W, Hassig SE, Behets F, Rayfield M, Ekungola B, *et al*. Perinatal transmission of the human immunodeficiency virus type 1 to infants of seropositive women in Zaire. *N Engl J Med*. 1989;320(25):1637-1642.
- <sup>169</sup> Alcorn K. Premature and low birth weight in babies becoming more frequent in HAART treated mothers. 2004. [Online] Accessed 24 May 2011. Available from: <http://www.aidsmap.com>.
- <sup>170</sup> Department of Health. District Health Information System Database. 2007. Cited in Health Systems Trust: Health Statistics Low birth weight rate (% live births <2500g). Accessed 24 May 2011. [Online] Available from: <http://www.hst.org.za/healthstats/153/data>
- <sup>171</sup> Anthropometric, vitamin A, iron and immunisation coverage status in children aged 6-71 months in South Africa, 1994. South African Vitamin A Consultative Group (SAVACG). *S Afr Med J*. 1996 Apr;86(4):354-7.
- <sup>172</sup> Pelletier DL. The relationship between child anthropometry and mortality in developing countries: Implications for policy, programs and future research. *The Journal of Nutrition*. 1994;124:2047S-2081S.
- <sup>173</sup> Newell ML, Borja MC, Peckham C. European Collaborative Study. Height, weight, growth in children born to mothers with HIV-1 infection in Europe. *Pediatrics*. 2003;111:52-60.
- <sup>174</sup> Berhane R, Bagenda D, Marum L, Aceng E, Ndugwa C, Bosch RJ, *et al*. Growth failure as a prognostic indicator of mortality in pediatric HIV infection. *Pediatrics*. 1997;100:7-11.

- 
- <sup>175</sup> Swart R, Sanders D & McLachlan M. Nutrition: A primary health care perspective. In: Barron P & Roma-Reardon J (eds) South African Health Review. 2008. Durban: Health Systems Trust.
- <sup>176</sup> Beukes C, Carolus E. Feeding HIV exposed and infected infants within the PMTC program. Community perspective, City of Cape Town Clinic. Proceedings of the 2<sup>nd</sup> Paediatric HIV Symposium, presented by the School of Paediatric Medicine and Child Health of the University of Cape Town; 2011 May 7. Red Cross Children's Hospital. Cape Town South Africa. Available from: <http://www.scah.uct.ac.za/infectious-diseases.html>
- <sup>177</sup> Brown JE. Nutrition during lactation. In: Nutrition through the Lifecycle. Wadsworth 2002:135-189
- <sup>178</sup> UNICEF Press Centre. Press Release. 15 Years after the Innocenti Declaration, Breastfeeding Saving Six Million Lives Annually. [Online] Accessed 28 June 2011. Available from: [http://www.unicef.org/media/media\\_30011.html](http://www.unicef.org/media/media_30011.html).
- <sup>179</sup> Kramer MS, Chalmers B, Hodnett ED, Sevkovskaya Z, Dzikovich I, Shapiro S, *et al.* Promotion of Breastfeeding Intervention Trial (PROBIT): A randomized trial in the Republic of Belarus. JAMA. 2001;285:413-420.
- <sup>180</sup> Black RE, Brown KH, Becker S, *et al.* Contamination of weaning foods and transmission of enterotoxigenic Escherichia coli diarrhoea in children in rural Bangladesh. J Roy Soc Trop Med H. 1982;76:259-64.
- <sup>181</sup> Motarjemi Y, Ka F, Moy G. Contaminated weaning food: A major risk factor for diarrhea and associated malnutrition. Bull WHO. 1993;71:79-92.
- <sup>182</sup> Morais TB, Gomes TAT, Sigulem DM. Enteroaggregative Escherichia coli in infant feeding bottles. Lancet. 1997;349:1448-9.
- <sup>183</sup> Agostoni C, Axelsson I, Goulet O, Koletzko B, Michaelsen KF, Puntis JW, *et al.* Preparation and handling of powdered infant formula: a commentary by the ESPGHAN Committee on Nutrition. J Pediatr Gastroenterol Nutr. 2004;39:320-2.
- <sup>184</sup> Surjono D, IsmadiSD, Suwardji, Rohde JE. Bacterial contamination and dilution of milk in infant feeding bottles. J Trop Pediatr. 1980;26:58-61.
- <sup>185</sup> Dewey KG, Adu-Afarwuah S. Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. Maternal and Child Nutrition. 2008;4(1):24-85.
- <sup>186</sup> Drewett R, Woolridge MW, Jackson DA, Imong SM, Mangklabruks A, Wongsawasdi L, *et al.* Relationships between nursing patterns, supplementary food intake, and breastmilk intake in a rural Thai population. Early Human Development. 1989;20:13-23.

---

<sup>187</sup> Smit K, Hertzog E, Treurnicht R, Du Plessis LM, Marais D. Knowledge, attitude and practices in private breastfeeding clinics in the Cape Metropole Region, Western Cape Province, SA concerning exclusive breastfeeding. ADSA/NSSA Nutrition Congress, Feather Market Centre, Port Elizabeth, 24-27 September 2006.

<sup>188</sup> UNICEF. Conceptual Framework for the causes of malnutrition in infants and children. [Online] Accessed 20 June 2011. Available from: <http://www.unicef.org>.

## **ADDENDA**

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## **Addenda A: Paediatric Food-Based Dietary Guidelines principles for complementary feeding of HIV-infected children**

### Consistency and quantity of complementary feeds

- Small quantities of feeds (1 -2 teaspoons) should be introduced at 6 months of age. The amount and consistency of feeds should be gradually increased between 6 and 12 months in relation to the infant's requirements and abilities. A transition from semi-solid foods to 'finger foods' should take place between 6 – 8 months, and to family foods at 12 months.

### Energy density and meal frequency

- The increased energy requirements of HIV-infected children should ideally be met through locally available and affordable foods. An increased energy intake should happen through an increase in the energy density of feeds, frequency of feeds and/or portion sizes.

### Nutrient content of food

- A varied diet should be consumed. Ideally animal-source foods such as meat, poultry, fish or eggs, which are rich in protein, iron and zinc, should be eaten daily.
- If adequate amount of animal source foods are consumed, the amount of milk needed is 200-400ml per day, otherwise 300-500ml of milk per day is required.
- The daily consumption of grains and legumes should be encouraged.
- To ensure adequate micronutrient intake, the daily consumption of vitamin A-, C-, B-rich foods, and fortified staples such as maize meal and bread, should be ensured.

### Use of fortified foods and micronutrient supplements

- In addition to a varied diet, the consumption of fortified complementary foods is recommended. All maize and wheat flour in South Africa are fortified. Complementary food supplements which are fortified, e.g. Nutributter, Foodlets, Sprinkles and Corn-Soy.
- Vit A supplementation should be provided to all children under the age of 5.
- WHO recommends zinc supplementation together with oral rehydration solution during episodes of acute diarrhoea.

### Fluid needs

- Non – breastfed infants need between 400 – 1200ml of extra fluid per day, depending on the climate. Clean water should be offered several times a day.

### Responsive feeding

- Children should be fed directly and older children should be assisted to feed themselves. Caregivers should encourage children to eat, talk to them during feeding, not force them to eat and use different food combinations, tastes and textures where children refuse to eat.

### Hygiene and proper food handling

- Caregivers' and children's' hands should be washed before food preparation and eating. Food should be served immediately after preparation and safe storage should take place. Clean utensils to prepare and serve food and avoiding the use of feeding bottles are also important.

### Feeding of an undernourished child and during illness

- High calorie, smooth and non-irritating foods should be offered.
- After the illness the child should be encouraged to eat more energy-dense and micronutrient-rich foods to ensure catch-up growth.

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Antiretroviral treatment

- Administration of protease inhibitors with food enhances absorption and reduces gastrointestinal side effects.
- Further research is needed to determine whether specific dietary recommendation can prevent or modify metabolic derangements such as the lipodystrophy syndrome during ART

Other measures to support growth

- Regular visits to primary healthcare facilities for growth monitoring and promotion, immunizations and psychosocial support for caregivers are very important.

**Reference:**

Hendricks MK, Eley B, Bourne LT. Nutrition and HIV/AIDS in infants and children in South Africa. Implications for food-based dietary guidelines. *Maternal and Child Nutrition 2007*; **3**: 322 – 333

**Addenda B: March 2010 Western Cape ART monthly summary**

Western Cape Antiretroviral monthly summary for March 2010						
	New			Total		
	Adults	Children	All	Adults	Children	All
<b>Academic Complex</b>						
GrooteSchoorHospital	4	0	4	304	362	666
RedCrossHospital	0	32	32	0	328	328
TygerbergHospital	38	9	47	1,038	329	1,367
<b>Subtotal</b>	<b>42</b>	<b>41</b>	<b>83</b>	<b>1,342</b>	<b>1,019</b>	<b>2,361</b>
<b>CapeWinelands</b>						
Brandvlei Correctional Facility	4	0	4	108	0	108
BrewelskloofHospital	14	1	15	67	8	75
CeresHospital	37	0	37	962	29	991
Groendal Clinic	14	0	14	160	0	160
IdasValley Clinic	10	1	11	695	86	781
Kayamandi Clinic	22	0	22	486	0	486
Mbekweni Clinic	18	0	18	354	0	354
PholaPark Clinic	27	0	27	365	0	365
RobertsonHospital	36	1	37	525	33	558
TC Newman CHC	26	3	29	1,412	315	1,727
TC Newman Outreach - Dalevale Clinic	7	0	7	176	0	176
Wellington Clinic	8	0	8	237	0	237
WorcesterHospital	39	6	45	1,541	140	1,681
<b>Subtotal</b>	<b>262</b>	<b>12</b>	<b>274</b>	<b>7,088</b>	<b>611</b>	<b>7,699</b>
<b>Central Karoo</b>						
BeaufortWestHospital	10	1	11	344	50	394
Prince Albert CHC	2	3	5	105	11	116
<b>Subtotal</b>	<b>12</b>	<b>4</b>	<b>16</b>	<b>449</b>	<b>61</b>	<b>510</b>
<b>City of Cape Town</b>						
AlbowGardens Clinic	40	1	41	912	40	952
Bloekombos Clinic	35	0	35	453	0	453
Delft South Clinic	65	0	65	639	1	640
Du Noon Clinic	47	3	50	1,406	94	1,500
HoutBay Clinic	27	0	27	957	47	1,004
Ikhwezi Clinic	84	1	85	1,746	70	1,816
Ivan Toms Clinic	21	0	21	918	28	946
Kuyasa Clinic	36	2	38	955	118	1,073
Langa Clinic	59	2	61	1,901	127	2,028
Masiphumelele Clinic	19	1	20	687	45	732

Mathew Goniwe CHC	33	2	35	1,356	65	1,421
Mayenzeke Clinic	13	0	13	169	0	169
Mzamomhle Clinic	59	0	59	530	1	531
Site B Youth Centre	8	0	8	116	0	116
Site C Youth Centre	9	0	9	142	0	142
Town II Clinic	27	0	27	306	0	306
Wallacedene Clinic	58	0	58	1,169	14	1,183
<b>Subtotal</b>	<b>640</b>	<b>12</b>	<b>652</b>	<b>14,362</b>	<b>650</b>	<b>15,012</b>
<b>Eden</b>						
George Clinic	28	6	34	1,127	157	1,284
KnysnaHospital	23	1	24	886	71	957
Knysna STRETCH - Khayaletu	0	0	0	166	0	166
Knysna STRETCH - Sedgefield	0	0	0	108	0	108
MosselBayHospital	42	1	43	1,062	84	1,146
OudtshoornHospital	7	0	7	493	65	558
Plettenberg Bay CHC	25	1	26	913	64	977
Riversdale Clinic	3	0	3	127	10	137
Thembalethu CHC	32	1	33	926	47	973
<b>Subtotal</b>	<b>160</b>	<b>10</b>	<b>170</b>	<b>5,808</b>	<b>498</b>	<b>6,306</b>
<b>Metro District Health Services</b>						
Brooklyn Chest TB Hospital	9	1	10	111	20	131
Crossroads CHC	66	8	74	2,933	458	3,391
D.P. Marais TB Hospital	31	0	31	169	0	169
Delft CHC	46	0	46	2,132	86	2,218
Durbanville CHC	18	0	18	418	14	432
EersterivierHospital	29	1	30	1,245	139	1,384
FALSE BayHospital	26	4	30	640	11	651
G.F.JoosteHospital	6	0	6	90	0	90
Guguletu CHC	51	2	53	3,026	272	3,298
Health 4 Men	11	0	11	192	0	192
Heideveld CHC	20	0	20	908	0	908
HelderbergHospital	32	3	35	1,293	148	1,441
Inzame Zabantu CHC	43	0	43	1,394	0	1,394
KarlBremerHospital	15	1	16	530	57	587
Kraaifontein CHC	29	3	32	1,627	154	1,781
Lady Michaelis CHC	25	0	25	414	0	414
Mfuleni CHC	18	0	18	521	0	521
Michael M CHC	77	5	82	3,392	163	3,555
Mitchell's Plain CHC	37	0	37	3,075	220	3,295
Nolungile CHC	87	9	96	3,009	240	3,249

Nyanga CHC	60	0	60	977	0	977
Pollsmoor Correctional Facility	7	0	7	55	0	55
Retreat CHC	52	1	53	1,054	34	1,088
Robbie Nurock CHC	20	1	21	1,418	33	1,451
Site B, Khayelitsha CHC	123	6	129	4,375	299	4,674
VictoriaHospital	10	0	10	308	95	403
WestfleurHospital	11	1	12	358	21	379
Woodstock CHC	27	0	27	657	0	657
<b>Subtotal</b>	<b>986</b>	<b>46</b>	<b>1,032</b>	<b>36,321</b>	<b>2,464</b>	<b>38,785</b>
<b>Metro Institutions</b>						
New SomersetHospital	17	5	22	233	98	331
<b>Subtotal</b>	<b>17</b>	<b>5</b>	<b>22</b>	<b>233</b>	<b>98</b>	<b>331</b>
<b>Overberg</b>						
CaledonHospital	8	1	9	290	15	305
Grabouw CHC	26	2	28	610	65	675
HermanusHospital	30	1	31	847	55	902
SwellendamHospital	2	0	2	232	23	255
<b>Subtotal</b>	<b>66</b>	<b>4</b>	<b>70</b>	<b>1,979</b>	<b>158</b>	<b>2,137</b>
<b>Westcoast</b>						
CitrusdalHospital	16	1	17	342	24	366
OaklahomaHospital	34	1	35	638	34	672
VredenbergHospital	17	1	18	527	60	587
VredendalHospital	3	0	3	215	23	238
<b>Subtotal</b>	<b>70</b>	<b>3</b>	<b>73</b>	<b>1,722</b>	<b>141</b>	<b>1,863</b>
<b>Grand Total</b>	<b>2,255</b>	<b>137</b>	<b>2,392</b>	<b>69,304</b>	<b>5,700</b>	<b>75,004</b>

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**Addenda C: Adult consent form (English, Afrikaans and Xhosa)****Participant information and informed consent form (adults)****Title of research project:**

*Growth patterns and nutrition related problems of infants attending Red Cross Children's Hospital's antiretroviral clinic, and the knowledge, attitude, beliefs and practices of their caregivers, concerning infant feeding.*

**Reference number:**

**Principal investigator:** Mrs. Estelle Wasserfall

**Address:** 19 Union Street, Gardens, Cape Town, 8001

**Contact number:** 021 9389259

You are being invited to take part in a research project. Please take some time to read the information, which will explain the details of this project. Please ask the investigator, Mrs. Wasserfall, any questions about any part of this project that you do not fully understand. It is very important that you clearly understand what this research is about and how you could be involved. Also your participation is **entirely voluntary** and you are free not to participate, or to withdraw from the study any time you wish to. If you do not want to participate, it will not affect you negatively in any way whatsoever. You can also participate in this study in Afrikaans or Xhosa.

This study **has been approved the Committee for Human Research at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) ethical guidelines for research

**More information about this research study:**

- This study will be done over 8 weeks at the antiretroviral clinic of Red Cross Children's hospital.. Approximately 50 babies and caregivers will be included in this study.
- With this study the researcher wants to do 3 things:
  - Gather information on the growth and development of babies receiving antiretroviral medication
  - Gain a better understanding on the feeding/nutrition-related problems these babies experience.

- 
- Obtain information on what the caregivers of these babies know about infant feeding, and how they feed their babies at home.
  - This information can help healthcare workers (nurses, doctors etc.) to take better care of HIV-positive babies, by knowing better what kind of nutritional care to give to these babies and what information is important to convey to their caregivers.
  - How information will be obtained:
    - Caregivers who have come to the clinic to collect their baby's antiretroviral medication will be asked to visit the researcher after they have received their medication.
    - After the caregiver has agreed to take part in the study, the baby's Road to Health Card or other medical records available will be examined to obtain a medical history of the baby.
    - The baby will then be weighed and measured to obtain the necessary information. The measurements, which will be taken, are the baby's height, head and arm circumference. The caregiver will need to undress the baby and help the researcher to measure the length of the baby.
    - After the measurements, the researcher will ask the caregiver a few questions about the feeding of the baby, feeding problems the baby experienced since birth and what is done at home if the baby experiences problems. The participation in the study is then finished.

### **Why have you been invited to take part in the study?**

The researcher is looking for as many as possible people who are caring for HIV-positive babies on antiretroviral medication, who are willing to share their information with her. Therefore, because you are the parent/main caregiver of the baby receiving antiretroviral medication, you and your baby have been invited to take part.

### **What will you have to do?**

You will only have to do 2 things:

1. Undress the baby and help the researcher to measure the baby, by holding the baby in the way the researcher asks you to.
2. Answer the questions asked by the researcher in the best and most truthful way possible.

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**Will you benefit from taking part in this research?**

You will not receive any personal benefits (money or presents) by taking part in this study. The only people who could possibly benefit from this study are health workers treating HIV-positive babies receiving antiretroviral medication, because this study will show whether the current way caregivers are taught how to care for their babies are good enough, or needs improvement.

**Are there any risks involved in your taking part in this research?**

There is absolutely no risk involved for either you or the baby taking part in this study.

**If you do not want to take part in this study, what then?**

You do not have to take part in this study. You are free to leave the clinic after you have received the necessary medication and care for your baby.

**Who will have access to the baby's medical records?**

All information collected will be treated as highly confidential and be protected. Your and your baby's identities/names will never be revealed, it will remain anonymous. The researcher will not put your name in any of her reports. Numbers will be given to you that will be used by the researcher whilst doing the research study. Study leaders or members of the Research Ethics committee may need to inspect the research records. The findings of this study will be published, but NO NAMES will be revealed only the necessary information.

**What will happen if you get injured , as a direct result of taking part in this research study?**

There is no risk of injury involved in you taking part in this study. The researcher will only be asking you questions and talking with you.

**Will you be paid to take part in this study or must you pay anything to take part in this study?**

You do not have to pay anything to take part in this study and you will also NOT BE PAID to take part in this study.

**Is there anything else that you should know or do?**

- You can contact the Committee for Human Research at 021 – 938 9207 if you have any worries or complaints that have not been answered by the study researcher
- You will receive a copy of this information and consent form for your own records.

**Declaration by participant**

By signing below, I ..... agree to take part in a research study entitled:

*“Growth patterns and nutrition related problems of infants attending Red Cross Children’s Hospital’s antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding”*

I declare that:

- I have read or had this information and consent form read to me and it is written in a language with which I understand.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurized to take part.
- I may choose to leave the study at any time **and it will not count against me** in any way.
- I may be asked to leave the study before it is finished, if the researcher feels it is in my best interest, or if I do not follow the study plan, as agreed to.

Signed at (*place*).....on (*date*) ..... 2011

.....  
**Signature of participant**

.....  
**Signature of witness**

**Declaration by investigator**

I (*name*) ..... declare that:

- I explained the information in this document to  
.....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did not use an interpreter to communicate with the participant.

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Signed at (*place*).....on ..... 2011

.....  
**Signature of investigator**

.....  
**Signature of witness**

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## **DEELNEMER INLIGTINGSBLAD EN –TOESTEMMINGS VORM (VOLWASSENE)**

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### **TITEL VAN DIE NAVORSINGSPROJEK:**

Groei patrone en voedingsverwante probleme van babas wat Rooi Kruis Kinderhospitaal se anti-retrovirale kliniek besoek en die kennis, houdings, oortuigings en praktyke van hul versorgers rakende kindervoeding.

*“Growth patterns and nutrition related problems of infants attending Red Cross Children’s Hospital’s antiretroviral clinic, and the knowledge, attitude, beliefs and practices of their caregivers, concerning infant feeding”*

### **VERWYSINGSNOMMER:**

**HOOFNAVORSER:** Mev Estelle Wasserfall

**ADRES:** Unionstraat 19, Gardens, Kaapstad, 8001

**KONTAKNOMMER:** 021 9389259

U word genooi om deel te neem aan ’n navorsingsprojek. Lees asseblief hierdie inligtingsblad op u tyd deur aangesien die detail van die navorsingsprojek daarin verduidelik word. Indien daar enige deel van die navorsingsprojek is wat u nie ten volle verstaan nie, is u welkom om die navorser, Mev Wasserfall, daaroor uit te vra. Dit is baie belangrik dat u ten volle moet verstaan wat die navorsingsprojek behels en hoe u kan deel wees. U deelname is ook **volkome vrywillig** en u is vry om deelname te weier. U sal op geen wyse hoegenaamd negatief beïnvloed word indien u sou weier om deel te neem nie. U mag ook ten enige tyd aan die navorsingsprojek onttrek, selfs al het u aan die begin ingestem om deel te neem. U kan aan die navorsingsprojek deelneem in Afrikaans, Engels of Xhosa.

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Hierdie navorsingsprojek is deur die **Komitee vir Mensnavorsing van die Universiteit Stellenbosch goedgekeur** en sal uitgevoer word volgens die etiese riglyne en beginsels van die Internasionale Verklaring van Helsinki en die Etiese Riglyne vir Navorsing van die Mediese Navorsingsraad (MNR).

### **Wat behels hierdie navorsingsprojek?**

- Hierdie studie word vir 8 weke in die anti-retrovirale kliniek van Rooi Kruis Kinderhospitaal gedoen. Ongeveer 50 babas en hul versorgers gaan in die studie deelneem.
- Met hierdie studie wil die navorser 3 goed doen:
  - Inligting in samel oor die groei en ontwikkeling van babas onder 1 jaar wat op antiretrovirale medikasie is
  - Inligting versamel oor die voedings- en voedingsverwante probleme wat hierdie babas ervaar
  - Uitvind wat die versorgers weet van babavoeding en hoe hulle, hul babas by die huis voed.
- Hierdie inligting sal moontlik in die toekoms gesondheids werkers (susters, dokters of verpleegsters) kan help om HIV positiewe babas beter te versorg, deur beter te weet watter tipe voedingsorg hierdie babas benodig en ook wat belangrik is vir versorgers van die hierdie babas om te weet, sodat hulle, hulle babas goed kan versorg.
- Die inligting gaan as volg ingesamel word:
  - Versorgers wat die antiretrovirale kliniek besoek om hul babas se medikasie op te tel, sal gevra word om die navorser te ontmoet nadat hulle die medikasie ontvang het.
  - Na u toestemming gegee het om deel te neem aan die studie, sal die baba se “Road to Health” kaart en/of enige ander mediese rekords deurgegaan word om ‘n mediese geskiedenis van die baba te kry. Die baba sal dan geweeg en gemeet word, om die nodige informasie in te samel. Die versorger sal gevra word om die baba uit te trek en om die navorser te help met van die metings, deur die baba vas te hou in die korrekte posisies. Die metings wat geneem gaan word is die baba se lengte, kop en arm omtrek. Die lengte sal mbv ‘n metings bord geneem word en die ander metings met ‘n maatband.

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- Na die metings sal die navorser die versorger 'n paar vrae vra oor die voeding van die baba, voedingsprobleme wat die baba ervaar het sedert geboorte en wat gedoen word as die baba probleme kry. Die deelname aan die studie is na afloop van die vrae verby.

### **Waarom is u genooi om deel te neem?**

Die navorser benodig soveel as moontlik mense wat die hoofversorgers is van babas onder 1 jaar wat antiretrovirale medikasie gebruik en wie gewillig is om hulle inligting met haar te deel. Omdat u, uself geïdentifiseer het as die ouer/hoof versorger van die baba wat antiretrovirale medikasie gebruik, is u en u baba gevra om deel te neem aan die studie.

### **Wat sal u verantwoordelikhede wees?**

U sal slegs 2 verantwoordelikhede hê gedurende die studie:

3. Om die baba uit te trek en vas te hou op die manier wat die navorser u vra, sodat die nodige metings geneem kan word.
4. Om die vrae wat die navorser u gaan vra, so goed en eerlik as moontlik te beantwoord.

### **Sal u voordeel trek deur deel te neem aan hierdie navorsingsprojek?**

U sal geen persoonlike vergoedings, bv geld of geskenke, ontvang vir u of die baba se deelname aan die studie nie.

Die enigste mense wat moontlik voordeel kan trek uit die studie is gesondheidswerkers wat HIV positiewe babas op anti-retrovirale medikasie is, versorg. Die studie sal wys of die manier wat versorgers geleer word hoe om hulle babas te versorg goed genoeg is en of dit verbetering benodig.

### **Is daar enige risiko's verbonde aan u deelname aan hierdie navorsingsprojek?**

Daar is absoluut geen risiko betrokke aan u of u baba se deelname aan die studie nie.

### **Wat moet u doen indien u nie wil deelneem nie??**

U is onder geen verpligting om deel te neem aan die studie nie. Indien u nie wil deelneem nie, is u vry om die kliniek te verlaat na u afspraak.

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**Wie sal toegang hê tot u mediese rekords?**

Alle inligting wat ingesamel word in die studie sal as hoogs vertroulik hanteer en beskerm word. U en u baba se identiteit/name sal nooit blootgestel word nie, dit sal anoniem bly. Die navorser sal nie u name op enige van die verslae gebruik nie. 'n Nommer sal aan u en u baba toegestaan word, wat die navorser sal gebruik om die inligting te interpreteer. Studie leiers of lede van die Navorsings Etiek komitee mag moontlik die navorsings rekords nagaan. Die resultate van die studie gaan gepubliseer word, maar GEEN NAME sal enigsins bekend gemaak word nie, slegs die nodige inligting.

**Wat sal gebeur indien u 'n besering opdoen as gevolg van u deelname aan hierdie navorsingsprojek?**

Daar is geen risiko vir besering met u deelname aan die navorsingsprojek nie. Die navorser gaan slegs met u gesels en vrae, vrae.

**Sal u betaal word vir deelname aan die navorsingsprojek en moet u enige iets betaal om deel te neem?**

U sal nie betaal word vir deelname aan die navorsingsprojek nie. Deelname aan die navorsingsprojek sal u niks kos nie.

**Is daar enigiets anders wat u moet weet of doen?**

- U kan die Etiek Komitee oor Gesondheidsnavorsing kontak by 021-938 9207 indien u enige bekommernis of klagte het wat nie bevredigend deur u studiedokter hanteer is nie.
- U sal 'n afskrif van hierdie inligtings- en toestemmingsvorm ontvang vir u eie rekords.

**Verklaring deur deelnemer**

Met die ondertekening van hierdie dokument onderneem ek, .....,  
om deel te neem aan 'n navorsingsprojek getiteld (*Growth patterns and nutrition related problems of infants attending Red Cross Children's Hospital's antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding.*).

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Ek verklaar dat:

- Ek hierdie inligtings- en toestemmingsvorm gelees het of aan my laat voorlees het en dat dit in 'n taal geskryf is wat ek verstaan.
- Ek 'n kans gehad het om vrae te vrae en dat al my vrae goed beantwoord is.
- Ek verstaan dat deelname aan hierdie navorsingsprojek **vrywillig** is en dat daar geen druk op my geplaas is om deel te neem nie.
- Ek ter enige tyd aan die navorsingsprojek mag onttrek en dat ek nie op enige wyse daardeur benadeel sal word nie.
- Ek gevra mag word om van die navorsingsprojek te onttrek voordat dit afgehandel is indien die navorser voel dat dit in my beste belang is.

Geteken te (*plek*) .....op (*datum*) ..... 2011.

.....

Handtekening van deelnemer

.....

Handtekening van getuie

### **Verklaring deur navorser**

Ek (*naam*) ..... verklaar dat:

- Ek die inligting in hierdie dokument verduidelik het aan .....
- Ek hom/haar aangemoedig het om vrae te vra en voldoende tyd gebruik het om dit te beantwoord.
- Ek tevrede is dat hy/sy al die aspekte van die navorsingsprojek soos hierbo bespreek, voldoende verstaan.
- Ek het nie 'n tolk gebruik nie.

Geteken te (*plek*) ..... op (*datum*) ..... 2011.

.....

Handtekening van navorser

.....

Handtekening van getuie

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**INCWADANA ENGOLWAZI NGOMTHATHI-NXAXHEBA KUNYE NEFOMU  
YEMVUMELWANO**

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**ISIHLOKO SEPROJEKTHI YOPHANDO:**

Imifuziselo yokukhula neengxaki ezinxulumene nezondlo zeentsana ezihamba kwisibhedlele sabantwana saseRed Cross kwikliniki yakhona yee-ARV, nolwazi, iimvakalelo, iinkolelo nezenzo zabo babakhathalelayo, malunga nokondliwa kweentsana.

**INOMBOLO YONXULUMANO: (Ref nr)**

**UMPHANDI OYINTLOKO:** Mrs. Estelle Wasserfall

**IDILESI:** 19 Union Street, Gardens, Cape Town, 8001

**INOMBOLO YOQHAGAMSHELWANO:** 021 9389259

Uyamenywa ukuba athathe inxaxheba kwiprojekthi yophando. Nceda thatha ixesha lokufunda ulwazi oluvezwe apha, oluzakuthi luchaze iinkcukacha zale projekthi. Nceda buza nayiphina imibuzo emalunga nayiphina indawo ongayiqondiyo ngokupheleleyo kubasebenzi besi sifundo okanye kugqirha. Kubaluleke kakhulu ukuba waniliseke ngokupheleleyo yinto yokuba ucacelwe kakuhle ukuba yintoni ebangwa sesi sifundo kwaye ungabandakanyeka njani. Kwakhona, ukuthatha kwakho inxaxheba **kungentando yakho ngokupheleleyo** kwaye ukhululekile ukuba ungarhoxa ekuthatheni inxaxheba. Ukuba uthi hayi, oku akusayi kuchaphazela ukungavumi kwakho nangayiphina indlela. Ukwakhululekile ukuba uyeke kwesi sifundo naninina, nkqu nokokuba uyavuma ukuthatha inxaxheba ekuqaleni.

**Olu phando luvunywe ziinqobo ezisesikwenize** Komiti yoPhando Lomntu kwiYunivesithi yaseStellenbosch kwaye **luzakwenziwa ngokwemigaqo esesikweni lo phando elamkelekileyo kwiSaziso seHlabathi sika-Helsinki, iMigaqo eLungileyo yoMzantsi Afrika yokuSebenza eKliniki kunye neBhunga lezoPhando ngamaYeza (MRC) iMigaqo yeNqobo yezoPhando.**

**Simalunga nantoni esi sifundo sophando?**

- Esi sifundo siza kwenziwa iiveki ezisi-8 kwikliniki yee-ARV kwisibhedlele sabantwana saseRed Cross. Malunga neentsana ezingama-50 nabanonopheli bazo baza kubandakanywa kwesi sifundo.
- Ngesi sifundo umphandi ufuna ukwenza izinto ezi-3:

- 
- Ukufumana iinkcukacha zokukhula nokuphuhla kweentsana ezifumana amayeza ee-ARV
  - Ukwazi ukuqonda ngcono ngeengxaki zokondliwa/ezinxulumene nezesondlo ezifunyanwa ngezi ntsana.
  - Ukufumana iinkcukacha ngokuba ingaba abanonopheli bezi ntsana bazi ntoni ngokondliwa kweentsana, nokuba nokuba bazityisa njani iintsana zabo emakhaya.
  - Ezi nkcukacha zinganceda abasebenza ngezempilo (abongikazi, oogqirha njlnjl) ukuba bazikhathalele ngcono iintsana ezineNtsholongwane kaGawulayo, ngokwazi ngcono ukuba zeziphi izondlo abanokuzinika iintsana zabo nokuba zeziphi na iinkcukacha ezibalulekileyo ezinokudluliselwa kubanonopheli bazo.
  - Ziza kufunyanwa njani iinkcukacha:
    - Abanonopheli abaye beza ekliniki ukuqokelela amayeza ee-ARV eentsana zabo baza kucelwa ukuba baye kumphandi emva kokuba befumene amayeza abo.
    - Emva kokuba abanonopheli bevumelene ngokuthatha inxaxheba kwesi sifundo, iKhadi lomntwana aya ngalo ekliniki okanye iingxelo zakhe zezempilo ezikhoyo ziza kuhlolwa ukuze kufunyanwe iingxelo zonyango zomntwana.
    - Usana luza kuthathwa umlinganiselo wobukhulu balo ukuze kufunyanwe iinkcukacha ezifunekayo. Umlinganiselo oza kuthatyathwa bubukhulu bomntwana, ubungakanani bentloko nobude beengalo. Umnonopheli kuza kufuneka elukhulule usana aze ancede umphandi ukuze athathe umlinganiselo wobude bomntwana.
    - Emva kokuthathwa kwale milinganiselo, umphandi uza kubuza umnonopheli imibuzo embalwa ngokondliwa kweentsana, iingxaki zokondla ezifunyaniswa lusana ukususela oko lwazalwa nokuba ekhaya yintoni eyenziwayo xa usana lufumana ezi ngxaki. Ukuthatha inxaxheba kwisifundo kuyagqitywa.

### **Kutheni umenyiwe ukuba uthathe inxaxheba?**

Umphandi ufuna abantu abaninzi kangangoko abathwele iintsana ezineNtsholongwane

kaGawulayo abafumana amayeza ee-ARV, abanqwenela ukwabelana ngezi nkcukacha naye.

Ngoko ke, ngenxa yokuba ungumzali/ungoyena mntu unonophela umntwana ofumana amayeza ee-ARV, wena nosana lwakho nimenywe ukuba nithathe inxaxheba.

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**Luyakuba yintoni uxanduva lwakho?**

Kuza kufuneka wenze izinto ezi-2 kuphela:

1. Ukhulule usana uncedise umphandi ukuba athathe umlinganiselo womntwana, ngokumbamba ngale ndlele akucele ukuba umbambe ngayo umphandi.
2. Uphendule imibuzo ebuzwa ngumphandi ngeyona ndlela inyanisekileyo kangangoko unako.

**Ingaba uza kuzuzisa ekuthatheni inxaxheba kolu phando?**

Aawuzi kufumana nayiphi na inzuzo eza ngakuwe (imali okanye izipho) ngokuthatha kwakho inxaxheba kwesi sifundo. Abantu abanokuzuzisa kwesi sifundo ngoonompilo abanyanga iintsana ezineNtsholongwane kaGawulayo ezifumana amayeza ee-ARV, kuba esi sifundo siza kubonakalisa ukuba ingaba indlela ekhoyo abafundiswa ngayo abanonopheli ukukhathalela iintsana zabo ingaba ilunge ngokwaneleyo na, okanye ifuna ukuphuculwa.

**Ingaba zikho iingozi ezibandakanyekayo ekuthatheni kwakho inxaxheba kolu phando?**

Akukho bungozi kwaphela obubandakanyekayo kuwe okanye kusana oluthatha inxaxheba kwesi sifundo.

**Ukuba awuvumi ukuthatha inxaxheba, loluphi olunye unyango onalo?**

Akunyanzelekanga ukuba uthathe inxaxheba kwesi sifundo. Ukhululekile ukuba ungayishiya le kliniki emva kokuba ufumene amayeza afunekayo nokukhathalela usana lwakho.

**Ngubani uza kufumana ingxelo yakho yamayeza?**

Zonke iinkcukacha ezifunyenweyo ziza kubayimfihlelo kwaye zikhuselwe. Izinto ezikwazisayo/amagama akho nawomntwana wakho akazi kuchazwa kwaphela, aza kuhlala engaziwa. Umphandi akazi kulifaka igama lakho nakweziphi na iingxelo zakhe. Uza kunikwa iinombolo eziza kusetyenziswa ngumphandi ngeli xesha enza esi sifundo sophando. Iinkokheli kwesi sifundo okanye amalungu ekomiti ejongene nokuziphatha kuphando kuza kufuneka azihlole iingxelo zophando. Okufunyanisiweyo kwesi sifundo kuza kupapashwa, kodwa AKUKHO MAGAMA aza kuchazwa ziinkcukacha eziyimfuneko kuphela eziza kuchazwa.

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**Kuza kwenzeka ntoni kwimeko yesiganeko esingalindekanga sokwenzakala ngenxa yokuthatha kwakho inxaxheba kwesi sifundo sophando?**

Akukho bungozi bomonzakalo obubandakanyekayo ngokuthatha kwakho inxaxheba kwesi sifundo. Umphandi uza kukubuza nje kuphela imibuzo kwaye athethe nawe.

**Ingaba uza kuhlawulwa ngokuthatha inxaxheba kwesi sifundo kwaye ingaba kukho iindleko ezibandakanyekayo?**

Akukho nto kufuneka uyihlawule ngokuthatha kwakho inxaxheba kwesi sifundo kwaye AWUZI KUHLAWULWA ngokuthatha kwakho inxaxheba kwesi sifundo.

**Ingaba ikho enye into ekumele uyazi okanye uyenze?**

- Ungaqhagamshelana neKomiti yoPhando ngoMntu kwa-021 – 938 9207 xa kukho nantoni na ekuxhalabisayo okanye izikhalazo onazo ezingaphendulwanga ngumphandi okwesi sifundo
- Uza kufumana ikopi enezi nkcukacha nefomu yesivumelwano ukuze uzigcinele.

**Isifungo somthathi-nxaxheba (participant)**

Ngokuytyikitya ngezantsi, Mna ..... ndiyavuma ukuthatha inxaxheba kwisifundo sophando semfuzo esibizwa ngokuba:

Imifuziselo yokukhula neengxaki ezinxulumene nezondlo zeentsana ezihamba kwisibhedlele sabantwana saseRed Cross kwikliniki yakhona yee-ARV, nolwazi, iimvakalelo, iinkolelo nezenzo zabo babakhathalelayo, malunga nokondliwa kweentsana.

**Ndazisa ukuba:**

- Ndilufundile okanye ndalufunda olu lwazi kunye nefomu yemvumelwano kwaye ibhalwe ngolwimi endiliciko nendikhululekileyo kulo
- Bendinalo ithuba lokuba ndibuze imibuzo kwaye yonke imibuzo yam iphendulwe ngokwanelisayo.
- Ndiyakuqonda ukuba ukuthatha inxaxheba kolu phando kube **kukuzithandela kwam** kwaye andikhange ndinyanzelwe ukuba ndithathe inxaxheba.

- 
- Ndingakhetha ukusishiya isifundo naninina kwaye andisayi kohlwaywa okanye uqal' ugwetywe nangayiphi indlela.
  - Usenokucelwa ukuba usishiye isifundo phambi kokuba siphela, ukuba ugqirha wesifundo okanye umphandi ukubona kuyinzuzo kuwe, okanye ukuba andisilandeli isicwangciso sesifundo, ekuvunyelenwe ngaso.

Kutyikitywee-(indawo).....(place) ngo-(usuku)..... 2011.

.....  
**Umtyikityo womthathi-nxaxheba (participant)**

.....  
**Umtyikityo wengqina (witness)**

**Isifungo somphandi (declaration by researcher)**

Mna (*igama*) .....(r) ndiyafunga ukuba:

- Ndilucacisile ulwazi olu kweli xwebhu ku-.....(p)
- Ndimkhuthazile ukuba abuze imibuzo kwaye athathe ixesha elifanelekileyo ukuba ayiphendule.
- Ndiyaneliseka kukuba uyakuqonda ngokwanelisayo konke okumalunga nophando okuxoxwe ngasentla.
- Ndisebenzise/andisebenzisanga toliki. (*Ukuba itoliki isetyenzisiwe kumele ityikitye isaziso ngezantsi*)

Kutyikitywe e-(indawo) ..... ngo-(usuku) ..... 2011.

.....  
Umtyikityo womphandi (r)

.....  
Umtyikityo wengqina (w)

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**Addenda D: Infant consent form (English, Afrikaans and Xhosa)**

**PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR USE BY  
PARENTS/LEGAL GUARDIANS**

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**TITLE OF THE RESEARCH PROJECT:**

Growth patterns and nutrition related problems of infants attending Red Cross Children's Hospital's antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding

**REFERENCE NUMBER:**

**PRINCIPAL INVESTIGATOR:** Mrs Estelle Wasserfall

**ADDRESS:** 19 Union Street, Gardens, Cape Town, 8001

**CONTACT NUMBER:** 021 9389259

Your baby is being invited to take part in a research project. Please take some time to read this information, which will explain the details of this project. Please ask the investigator, Mrs Wasserfall any questions about any part of this project that you do not fully understand. It is very important that you clearly understand what this research is about and how your baby could be involved. Also, your baby's participation is **entirely voluntary** and you are free to not to let your baby take part. If you say no, this will not affect you or your baby negatively in any way. You are also free to withdraw him/her from the study at any point, even if you do initially agree to let him/her take part.

This study has been approved by the Health Research Ethics Committee at StellenboschUniversity and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

**More information about this research study:**

- This study will be done over 8 weeks at the antiretroviral clinic of Red Cross Children's Hospital. Approximately 50 babies and their caregivers will take part in this study.

- 
- With this study the researcher wants to do 3 things:
    - Gather information on the growth and development of babies receiving antiretroviral medication
    - Gain a better understanding on the feeding/nutrition-related problems these babies experience.
    - Obtain information on what the caregivers of these babies know about infant feeding and how they feed their babies at home.
  - This information can help healthcare workers (nurses, doctors etc.) to take better care of HIV-positive babies, by knowing better what kind of nutritional care to give to these babies and what information is important to convey to their caregivers.
  - How information will be obtained:
    - Caregivers who have come to the clinic to collect their baby's antiretroviral medication will be asked to visit the researcher after they have received their medication.
    - After the caregiver has agreed to let her baby take part in the study, the baby's Road to Health Card or other medical records available will be examined to obtain a medical history of the baby.
    - The baby will then be weighed and measured to obtain the necessary information. The measurements which will be taken are the baby's height, head and arm circumference. The caregiver will need to undress the baby and help the researcher to measure the length of the baby.
    - After the measurements, the researcher will ask the caregiver a few questions about the feeding of the baby, feeding problems the baby experienced since birth and what is done at home if the baby experiences problems. After the questions have been answered the baby's participation in the study is finished.

**Why has your baby been invited to take part in this study?**

The researcher is looking for as many as possible babies under 1 year of age, receiving antiretroviral medication, to take part in this study. The more babies the researcher can include, the better the information will be that can be used to describe the growth and feeding problems these babies experience.

Therefore because your baby is under 1 year of age and receiving antiretrovirals, your baby has been invited to take part.

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**What will you have to do?**

You will only have to do 2 things:

1. Undress the baby and help the researcher to measure the baby, by holding the baby in the way the researcher asks of you.
2. Answer the questions asked by the researcher in the best and most truthful way possible.

**Will your baby benefit from taking part in this research?**

Your baby will not receive any personal benefits (money or presents) for taking part in this research study. The only people who could possibly benefit from this study are healthcare workers treating HIV-positive babies receiving antiretroviral medication, because the outcome of this study will show whether the current way caregivers are taught how to care for their babies are good enough, or needs improvement.

**Are there any risks involved in your baby taking part in this research?**

There is absolutely no risk involved for either you or the baby taking part in this study.

**If you do not want your baby to take part in this study , what then?**

You do not have to take part in this study. You are free to leave the clinic after you have received the necessary medication and care for your baby.

**Who will have access to your baby's medical records?**

All information collected will be treated as highly confidential and be protected. Your and your baby's identity/names will never be revealed, it will remain anonymous. The researcher will not put the baby's name in any of her reports. Numbers will be given to you that will be used by the researcher whilst doing the research study. Study leaders or members of the Research Ethics committee may need to inspect the research records. The findings of this study will be published, but NO NAMES will be revealed only the necessary information.

**What will happen if your baby gets injured as a direct result of taking part in this research study?**

No medical procedures will take place in this study. Your baby will only be weighed and measured according to standard clinic procedures. Therefore the chance of injury is very small.

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**Will you or your child be paid to take part in this study and do you have to pay anything to take part?**

You do not have to pay anything to take part in this study. You and your baby will also NOT BE PAID to take part in this study.

**Is there any thing else that you should know or do?**

- You can contact the Committee for Human Research at 021 – 938 9207 if you have any worries or complaints that have not been answered by the study researcher.
- You will receive a copy of this information and consent form for your own records.

**Declaration by parent/legal guardian**

By signing below, I (*name of parent/legal guardian*) ..... agree to allow my baby (*name of baby*) ..... who is ..... months old, to take part in a research study entitled:

*“Growth patterns and nutrition related problems of infants attending Red Cross Children’s Hospital’s antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding”*

I declare that:

- I have read or had this information and consent form read to me and that it is written in a language with which I understand.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to let my baby take part.
- I may choose to withdraw my baby from the study at any time and it will not be held against my baby in any way.
- My baby may be asked to leave the study before it has finished if the researcher feels it is in my baby’s best interests, or if my baby does not follow the study plan as agreed to.

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Signed at (*place*) ..... on (*date*) .....2011.

.....

Signature of parent/legal guardian

.....

Signature of witness

**Declaration by investigator**

I (*name*) ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understand all aspects of the research, as discussed above
- I did not use a interpreter

Signed at (*place*) .....on (*date*) .....2011.

Signature of investigator .....

Witness .....

**DEELNEMERINLIGTINGSBLAD EN -TOESTEMMINGSVORM VIR GEBRUIK DEUR  
OUERS/WETTIGE VOOGDE**

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**TITEL VAN DIE NAVORSINGSPROJEK:**

Groei patrone en voedingsverwante probleme van babas wat Rooi Kruis Kinderhospitaal se anti-retrovirale kliniek besoek en die kennis, houdings, oortuigings en praktyke van hul versorgers rakende kindervoeding.

*“Growth patterns and nutrition related problems of infants attending Red Cross Children’s Hospital’s antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding”*

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**VERWYSINGSNOMMER:****HOOFNAVORSER:** Mev Estelle Wasserfall**ADRES:** Unionstraat 19, Gardens, Kaapstad, 8001**KONTAKNOMMER:** 021 9389259

U baba (*of baba wat deur u versorg word*) word genooi om deel te neem aan 'n navorsingsprojek. Lees asseblief hierdie inligtingsblad op u tyd deur aangesien die detail van die projek daarin verduidelik word. Indien daar enige deel van die projek is wat u nie ten volle verstaan nie, is u welkom om die navorser, Mev Wasserfall, daarvoor uit te vra. Dit is baie belangrik dat u ten volle moet verstaan wat die navorsing behels en hoe u baba daarby betrokke kan wees. U baba se deelname is ook **volkome vrywillig** en u is vry om deelname te weier. U baba sal op geen wyse hoegenaamd negatief beïnvloed word indien u sou weier om hom/haar te laat deelneem nie. U mag u baba ook ter enige tyd aan die studie onttrek, selfs al het u ingestem om hom/haar te laat deelneem.

Hierdie studie is deur die Etiek Komitee oor Gesondheidsnavorsing van die Universiteit Stellenbosch goedgekeur en sal uitgevoer word volgens die etiese riglyne en beginsels van die Internasionale Verklaring van Helsinki en die Etiese Riglyne vir Navorsing van die Mediese Navorsingsraad (MNR).

Wat behels hierdie navorsingsprojek?

- Hierdie studie word vir 8 weke in die anti-retrovirale kliniek van Rooi Kruis Kinderhospitaal gedoen. Ongeveer 50 babas en hul versorgers gaan in die studie deelneem.
- Met hierdie studie wil die navorser 3 goed doen:
  - Inligting in samel oor die groei en ontwikkeling van babas onder 1 jaar wat op antiretrovirale medikasie is.
  - Inligting versamel oor die voedings- en voedingsverwante probleme wat hierdie babas ervaar
  - Uitvind wat die versorgers weet van babavoeding en hoe hulle, hul babas by die huis voed.

- 
- Hierdie inligting sal moontlik gesondheidswerkers (susters, dokters of verpleegsters) kan help om HIV positiewe babas beter te versorg, deur beter te weet watter tipe voedingsorg hierdie babas benodig en ook wat belangrik is vir versorgers van hierdie babas om te weet, sodat hulle, hulle babas die beste sorg moontlik kan gee.
  - Die inligting gaan as volg ingesamel word:
    - Versorgers wat die antiretrovirale kliniek besoek om hul babas se medikasie op te tel, sal gevra word om die navorser te ontmoet nadat hulle die medikasie ontvang het.
    - Na toestemming gegee het om deel te neem aan die studie, sal die baba se “Road to Health” kaart en/of enige ander mediese rekords deurgegaan word om ‘n mediese geskiedenis van die baba te kry. Die baba sal dan geweeg en gemeet word, om die nodige informasie in te samel. Die versorger sal gevra word om die baba uit te trek en om die navorser te help met van die metings, deur die baba vas te hou in die korrekte posisies. Die metings wat geneem gaan word is die baba se lengte, kop en arm omtrek. Die lengte sal mbv ‘n metings bord geneem word en die ander metings met ‘n maatband.
    - Na die metings sal die navorser die versorger ‘n paar vrae vra oor die voeding van die baba, voedingsprobleme wat die baba ervaar het sedert geboorte en wat gedoen word as die baba probleme kry. Die deelname aan die studie is na afloop van die vrae verby.

### **Waarom is u baba genooi om deel te neem?**

Die navorser soek soveel as moontlik babas onder 1 jaar wat op antiretrovirale medikasie is, om deel te neem aan die studie. Hoe meer babas die navorser kan sien, hoe beter die resultate van die studie wees om die groei en voedingsprobleme van die babas te beskryf.

U word genooi om deel te neem aan die studie omdat u baba onder 1 jaar is en antiretrovirale medikasie.

### **Wat sal u verantwoordelikhede wees?**

U sal slegs 2 verantwoordelikhede hê gedurende die studie:

1. Om die baba uit te trek en vas te hou op die manier wat die navorser u vra, sodat die nodige metings geneem kan word.
2. Om die vrae wat die navorser u gaan vra, so goed en eerlik as moontlik te beantwoord.

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**Sal u baba voordeel trek deur deel te neem aan hierdie navorsing?**

U sal geen persoonlike vergoeding, bv. geld of geskenke, ontvang vir u baba se deelname aan die studie nie.

Die mense wat moontlik gaan voordeel trek uit die studie is gesondheidswerkers wat HIV positiewe babas op anti-retrovirale medikasie versorg. Die studie sal wys of die manier wat versorgers geleer word hoe om hulle babas te versorg goed genoeg is en of dit verbetering benodig.

***Is daar enige risiko's verbonde aan u baba se deelname aan hierdie navorsing?***

Daar is geen risiko betrokke aan u of u baba se deelname aan die studie nie.

**Wat moet u doen indien u nie wil hê u baba moet deelneem aan die studie nie?**

U baba is onder geen verpligting om deel te neem aan die studie nie. Indien u nie wil hê u baba moet deelneem nie, is u vry om die kliniek te verlaat na u afspraak.

**Wie sal toegang hê tot u baba se mediese rekords?**

Alle inligting wat ingesamel word in die studie sal as hoogs vertroulik hanteer en beskerm word.

U en u baba se identiteit/name sal nooit bekendgemaak word nie, dit sal anoniem bly.

Die navorser sal nie u name op enige van die verslae gebruik nie. 'n Nommer sal aan u en u baba toegestaan word, wat die navorser sal gebruik om die inligting te interpreteer. Die resultate van die studie gaan gepubliseer word, maar GEEN NAME sal enigsins bekend gemaak word nie, slegs die nodige inligting.

**Wat sal gebeur indien u baba 'n besering opdoen as gevolg van sy/haar deelname aan hierdie navorsingsprojek?**

Geen mediese prosedures (soos bv bloedtrek) gaan gedoen word in die studie nie. U baba gaan slegs geweeg en gemeet word volgens standaard kliniek prosedures, dus is die kans dat u baba 'n besering kan opdoen byna onmoontlik.

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**Sal u of u baba betaal word vir deelname aan die projek en moet u enige iets betaal om u baba te laat deelneem?**

Nie u of u baba sal betaal word vir deelname aan die projek nie. Deelname aan die projek sal u ook niks kos nie.

**Is daar enigiets anders wat u moet weet of doen?**

- U kan die Etiek Komitee oor Gesondheidsnavorsing kontak by 021-938 9207 indien u enige bekommernis of klagte het wat nie bevredigend deur u studiedokter hanteer is nie.
- U sal 'n afskrif van hierdie inligtings- en toestemmingsvorm ontvang vir u eie rekords

**Verklaring deur ouer/wettig voog**

Met die ondertekening van hierdie dokument onderneem ek, (*naam van ouer/wettige voog*)  
....., om my kind (*naam van baba*)  
....., wat ..... maande oud is, te laat  
deelneem aan 'n navorsingsprojek getiteld:

*“Growth patterns and nutrition related problems of infants attending Red Cross Children’s Hospital’s antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding.”*

Ek verklaar dat:

- Ek hierdie inligtings- en toestemmingsvorm gelees het of aan my laat voorlees het en dat dit in 'n taal geskryf is waarin ek verstaan.
- Ek geleentheid gehad het om vrae te stel en dat al my vrae bevredigend beantwoord is.
- Ek verstaan dat deelname aan hierdie projek **vrywillig** is en dat daar geen druk op my geplaas is om my baba te laat deelneem nie.
- My baba te eniger tyd aan die projek mag onttrek en dat hy/sy nie op enige wyse daardeur benadeel sal word nie.

My baba gevra mag word om aan die projek te onttrek voordat dit afgehandel is indien die navorser voel dit is in sy/haar beste belang is

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Geteken te (*plek*) ..... op (*datum*) ..... 2011.

.....  
Handtekening van ouer/wettige voog

.....  
Handtekening van getuie

**Verklaring deur navorser**

Ek (naam ) ..... verklaar dat:

- Ek die inligting in hierdie dokument verduidelik het aan: .....
- Ek hom/haar aangemoedig het om vrae te vra en voldoende tyd gebruik het om dit te beantwoord.
- Ek tevrede is dat hy/sy al die aspekte van die navorsingsprojek soos hierbo bespreek, voldoende verstaan.
- Ek het nie 'n tolk gebruik nie.

Geteken te (*plek*) ..... op (*datum*) ..... 2011.

.....  
Handtekening van navorser

.....  
Handtekening van getuie

**INCWADANA ENGOLWAZI NGOMTHATHI-NXAXHEBA KUNYE NEFOMU  
YEMVUMELWANO EKUMELE ISETYENZISWE NGUMZALI/NGUMGCINI-MNTWANA  
OSEMTHETHWENI**

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ISIHLOKO SEPROJEKTHI YOPHANDO:

Imifuziselo yokukhula neengxaki ezinxulumene nezondlo zeentsana ezihamba kwisibhedlele sabantwana saseRed Cross kwikliniki yakhona yee-ARV, nolwazi, iimvakalelo, iinkolelo nezenzo zabo babakhathalelayo, malunga nokondliwa kweentsana.

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**INOMBOLO YONXULUMANO: (ref nr)**

**UMPHANDI OYINTLOKO:** Ms Estelle Wasserfall

**IDILESI:** 19 Union Street, Gardens, Cape Town, 8001

**INOMBOLO YOQHAGAMSHELWANO:** 021 9389259

Umntwana wakho uyamenywa ukuba athathe inxaxheba kwiprojekthi yophando. Nceda thatha ixesha lokufunda ulwazi oluvezwe apha, oluzakuthi luchaze iinkcukacha zale projekthi. Nceda buza nayiphina imibuzo emalunga nayiphina indawo ongayiqondiyo ngokupheleleyo kubasebenzi besi sifundo okanye kugqirha. Kubaluleke kakhulu ukuba waniliseke ngokupheleleyo yinto yokuba ucacelwe kakuhle ukuba yintoni ebangwa sesi sifundo kwaye ungabandakanyeka njani. Kwakhona, ukuthatha komntwana wakho inxaxheba **kungentando yakhe ngokupheleleyo** kwaye ukhululekile ukuba angarhoxa ekuthatheni inxaxheba. Ukuba uthi hayi, oku akusayi kuchaphazela ukungavumi kwakhe nangayiphina indlela. Ukwakhululekile ukuba ukumyeka kwesi sifundo naninina, nkqu nokokuba ubuvumile ukuba athatha inxaxheba ekuqaleni.

Olu phando luvunywe ziinqobo ezisesikwenizeKomiti yoPhando Lomntu kwiYunivesithi yaseStellenbosch kwaye luzakwenziwa ngokwemigaqo esesikweni lophando elamkelekileyo kwiSaziso seHlabathi sika-Helsinki, iMigaqo eLungileyo yoMzantsi Afrika yokuSebenza eKliniki kunye neBhunga lezoPhando ngamaYeza (MRC) iMigaqo yeNqobo yezoPhando.

### **Simalunga nantoni esi sifundo sophando?**

- Esi sifundo siza kwenziwa iiveki ezisi-8 kwikliniki yee-ARV kwisibhedlele sabantwana saseRed Cross. Malunga neentsana ezingama-50 nabanonopheli bazo baza kubandakanywa kwesi sifundo.
- Ngesi sifundo umphandi ufuna ukwenza izinto ezi-3:
  - Ukufumana iinkcukacha zokukhula nokuphuhla kweentsana ezifumana amayeza ee-ARV
  - Ukwazi ukuqonda ngcono ngeengxaki zokondliwa/ezinxulumene nezesondlo ezifunyanwa ngezi ntsana.
  - Ukufumana iinkcukacha ngokuba ingaba abanonopheli bezi ntsana bazi ntoni ngokondliwa kweentsana, nokuba nokuba bazityisa njani iintsana zabo emakhaya.
- Ezi nkcukacha zinganceda abasebenza ngezempilo (abongikazi, oogqirha njlnjl) ukuba bazikhathalele ngcono iintsana ezineNtsholongwane kaGawulayo, ngokwazi ngcono ukuba

zeziphi izondlo abanokuzinika iintsana zabo nokuba zeziphi na iinkcukacha ezibalulekileyo ezinokudluliselwa kubanonopheli bazo.

- Ziza kufunyanwa njani iinkcukacha:
  - Abanonopheli abaye beza ekliniki ukuqokelela amayeza ee-ARV eentsana zabo baza kucelwa ukuba baye kumphandi emva kokuba befumene amayeza abo.
  - Emva kokuba abanonopheli bevumelene ngokuthatha inxaxheba kwesi sifundo, iKhadi lomntwana aya ngalo ekliniki okanye iingxelo zakhe zezempilo ezikhoyo ziza kuhlolwa ukuze kufunyanwe iingxelo zonyango zomntwana.
  - Usana luza kuthathwa umlinganiselo wobukhulu balo ukuze kufunyanwe iinkcukacha ezifunekayo. Umlinganiselo oza kuthatyathwa bubukhulu bomntwana, ubungakanani bentloko nobude beengalo. Umnonopheli kuza kufuneka elukhulule usana aze ancede umphandi ukuze athathe umlinganiselo wobude bomntwana.
  - Emva kokuthathwa kwale milinganiselo, umphandi uza kubuza umnonopheli imibuzo embalwa ngokondliwa kweentsana, iingxaki zokondla ezifunyaniswa lusana ukususela oko lwazalwa nokuba ekhaya yintoni eyenziwayo xa usana lufumana ezi ngxaki. Ukuthatha inxaxheba kwisifundo kuyagqitywa.

### **Kutheni emenyiwe umntwana wakho ukuba uthathe inxaxheba?**

Umphandi ukhangela iintsana ezininzi kangangoko anako ezineminyaka engaphantsi ko-1, ezifumana amayeza ee-ARV, ukuba bathathe inxaxheba kwesi sifundo. Xa umphandi enokufumana iintsana ezininzi anokuziphanda, neenkukacha ezinokusetyenziswa zingenza kubengcono ukuba kuchazwe kucaciswe ngeengxaki zokukhula nezokuphuhla kwezi ntsana. Ngoko ke kuba usana lwakho oluneminyaka engaphantsi konyaka ubudala nolufumana amayeza ee-ARV, usana lwakho luye lwamenywa ukuba luthathe inxaxheba.

### **Luyakuba yintoni uxanduva lwakho?**

Kuza kufuneka wenze izinto ezi-2 kuphela:

1. Ukhulule usana uncedise umphandi ukuba athathe umlinganiselo womntwana, ngokumbamba ngale ndlele akucele ukuba umbambe ngayo umphandi.
2. Uphendule imibuzo ebuzwa ngumphandi ngeyona ndlela inyanisekileyo kangangoko unako.

### **Ingaba uza kuzuza umntwana wakho ekuthatheni inxaxheba kolu phando?**

Usana lwakho aluzi kuzuza nantoni na eza kuye (imali okanye izipho) ngokuthatha kwakhe inxaxheba kwesi sifundo sophando.

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Abantu abanokuzuzwa kwesi sifundo ngoonompilo abanyanga iintsana ezineNtsholongwane kaGawulayo ezifumana amayeza ee-ARV, kuba esi sifundo siza kubonakalisa ukuba ingaba indlela ekhoyo abafundiswa ngayo abanonopheli ukukhathalela iintsana zabo ingaba ilunge ngokwaneleyo na, okanye ifuna ukuphuculwa.

**Ingaba zikho iingozi ezibandakanyekayo ekuthatheni komntwana wakho inxaxheba kolu phando?**

Akukho bungozi kwaphela obubandakanyekayo kuwe okanye kusana oluthatha inxaxheba kwesi sifundo.

**Ukuba awuvumi ukuvumela umntwana wakho ukuba athatha inxaxheba, loluphi olunye unyango analo umntwana wakho?**

Akunyanzelekanga ukuba uthathe inxaxheba kwesi sifundo. Ukhululekile ukuba ungayishiya le kliniki emva kokuba ufumene amayeza afunekayo nokukhathalela usana lwakho.

**Ngubani uza kufumana ingxelo yomntwana wakho yamayeza?**

Zonke iinkcukacha ezifunyenweyo ziza kubayimfihlelo kwaye zikhuselwe. Izinto ezikwazisayo/amagama akho nawomntwana wakho akazi kuchazwa kwaphela, aza kuhlala engaziwa. Umphandi akazi kulifaka igama lakho nakweziphi na iingxelo zakhe. Uza kunikwa iinombolo eziza kusetyenziswa ngumphandi ngeli xesha enza esi sifundo sophando. Iinkokheli kwesi sifundo okanye amalungu ekomiti ejongene nokuziphatha kuphando kuza kufuneka azihlole iingxelo zophando. Okufunyanisiweyo kwesi sifundo kuza kupapashwa, kodwa AKUKHO MAGAMA aza kuchazwa ziinkcukacha eziyimfuneko kuphela eziza kuchazwa.

**Kuza kwenzeka ntoni kwimeko yesiganeko esingalindekanga sokwenzakala komntwana wakho nangephina indlela; ngenxa yokuthatha kwakhe inxaxheba kwesi sifundo sophando?**

Akukho migaqo yezonyango eza kwenzeka kwesi sifundo. Usana lwakho luza kuthatjwa umlinganiselo wobungakanani ngokwemigaqo esemgangathweni yasekliniki. Ngoko ke amathuba okwenzakala mancinci kakhulu.

**Ingaba wean okanye umntwana uza kuhlalulwa ngokuthatha inxaxheba kwesi sifundo kwaye ingaba kukho iindleko ezibandakanyekayo?**

---

Akukho mali kufuneka uyihlawule ngokuthatha kwakho inxaxheba kwesi sifundo. Wena nosana lwakho ANIZOKUHLAWULWA ngokuthatha kwenu inxaxheba kwesi sifundo.

### **Ingaba ikho enye into ekumele uyazi okanye uyenze?**

- Ungaqhagamshelana neKomiti yoPhando ngoMntu kwa-021 – 938 9207 xa kukho nantoni na ekuxhalabisayo okanye izikhalazo onazo ezingaphendulwanga ngumphandi okwesi sifundo
- Uza kufumana ikopi enezi nkukacha nefomu yesivumelwano ukuze uzigcinele.

### **Isifungo somzali/somngcini-mntwana osemthethweni**

Ngokutyikitya apha ngezantsi, Mna (*igama lomzali/lomgcini-mntwana osemthethweni*)

.....ndiyamvumela umntwana wam (igama lomntwana)

.....oneminyaka .....ubudala, ukuba athathe inxaxheba

kwisifundo sophando esinesi sihloko:

Imifuziselo yokukhula neengxaki ezinxulumene nezondlo zeentsana ezihamba kwisibhedlele sabantwana saseRed Cross kwikliniki yakhona yee-ARV, nolwazi, iimvakalelo, iinkolelo nezenzo zabo babakhathalelayo, malunga nokondliwa kweentsana.

Ndiyafunga ukuba:

- Ndilufundile okanye ndalufunda olu lwazi kunye nefomu yemvumelwano kwaye ibhalwe ngolwimi endiliciko nendikhululekileyo kulo
- Umntwana wam uneminyaka esi-7 ubudala, kumele avume ukuthatha inxaxheba kwisifundo kwaye IMVUME yakhe kumele ishicilelwe kule fomu.
- Bendinalo ithuba lokuba ndibuze imibuzo kwaye yonke imibuzo yam iphendulwe ngokwanelisayo.
- Ndiyakuqonda ukuba ukuthatha inxaxheba kolu phando **kukuzithandela** kwaye andikhangane ndinyanzelwe ukuba ndivumele umntwana wam athathe inxaxheba.
- Ndingakhetha ukuba asishiya isifundo naninina umntwana wam kwaye akasayi kohlwaywa okanye aqal' agwetywe nangayiphi indlela.
- Umntwana wam usenokucelwa ukuba asishiye isifundo phambi kokuba sipele, ukuba ugqirha wesifundo okanye umphandi ukubona kuyinzuzo kumntwana wam,

---

okanye ukuba umntwana wam akandisilandeli isicwangciso sesifundo ekuvunyelenwe ngaso.

Kutyikitywe e-(indawo) ..... ngo-(usuku) ..... 2011.

.....

.....

**Umtyikityo womzali/womgcini-mntwana  
Osemthethweni(p)**

**Umtyikityo wengqina (w)**

**Isifungo somphandi (investigator)**

Mna (*igama*) ..... ndiyafunga ukuba:

- Ndilucacisile ulwazi olu kweli xwebhu ku-.....
- Ndimkhuthazile ukuba abuze imibuzo kwaye athathe ixesha elifanelekileyo ukuba ayiphendule.
- Ndiyaneliseka kukuba uyakuqonda ngokwanelisayo konke okumalunga nophando okuxoxwe ngasentla.
- Ndisebenzise/andisebenzisanga toliki. (*Ukuba itoliki isetyenzisiwe kumele ityikitye isaziso ngezantsi.*)

Kutyikitywe e-(indawo) ..... ngo-(usuku) ..... 2011.

.....

.....

**Umtyikityo womphandi (i)**

**Umtyikityo wengqina (w)**

**Addenda E: Questionnaire A: Infant socio-demographic, medical history, nutrition related problems and anthropometry (English and Afrikaans)**

Infant code	
Date	

**A. SOCIO-DEMOGRAPHIC AND MEDICAL HISTORY OF INFANT**

Date of birth			
Age			
Sex	M / F		
Gestation period	..... weeks		
Birth weight	..... grams		
CD4%		Classification	
Date of ART initiation			
Duration of ART			
ART regime			
Other medication			
Medical history			
Other information			

**B. DESCRIPTION OF GROWTH PATTERN ACCORDING TO THE RTHC:**

Record actual weight in kg for each month (if available)

Birth	1	2	3	4	5	6	7	8	9	10	11	12

Indicate for each month of infant's life, whether growth was normal (**N**), faltering (**GF**) or weight loss (**WL**) occurred according to RTHC percentiles. If growth chart is incomplete, mark month with **X**.

1	2	3	4	5	6	7	8	9	10	11	12

Percentile of current weight			
Velocity of curve (past 2-3 months)	Normal weight gain	Growth faltering	Weight loss

**C. ANTHROPOMETRIC INFORMATION OF INFANT:**

	1 <sup>st</sup> measurement	2 <sup>nd</sup> measurement	Average	Z – score
<b>Weight</b> (0.01kg)				
<b>Length</b> (0.1cm)				
<b>Head circumference</b> (0.1cm)				
<b>MUAC</b> (0.1cm)				

**D. INFANT FEEDING AND NUTRITION-RELATED PROBLEMS**

YES	NO
-----	----

1. Did you receive infant feeding counseling at the clinic or hospital before the baby was born

2. If yes, complete

a. When did you receive the counseling?

.....

b. Who gave the counseling

.....

c. How many counseling sessions did you receive

.....

d. Are you still receiving counseling or advice on infant feeding? If yes, from whom?

.....

3. How is your infant eating/drinking at the moment?

Eating well	Eating OK	Not eating well	Hardly eating
-------------	-----------	-----------------	---------------

4. What kind of problems does your infant experience with regards to feeding, e.g. sore mouth, runny stomach, constipation, vomiting?

.....  
 .....  
 .....

5. What are the most common problems you experience with feeding your infant?

.....  
 .....  
 .....

6. Has your infant experienced any of the below mentioned problems since birth and how often did it occur?

Problem	Occurrence				
<b>Oral thrush</b>	Never	Once	Occasionally	Frequently	All the time
<b>Mouth sores/ulcers</b>	Never	Once	Occasionally	Frequently	All the time
<b>Diarrhoea</b>	Never	Once	Occasionally	Frequently	All the time
<b>Vomiting</b>	Never	Once	Occasionally	Frequently	All the time
<b>Loss of appetite</b>	Never	Once	Occasionally	Frequently	All the time
<b>Bloated stomach</b>	Never	Once	Occasionally	Frequently	All the time
<b>Difficulty swallowing</b>	Never	Once	Occasionally	Frequently	All the time
<b>Choking on food/milk</b>	Never	Once	Occasionally	Frequently	All the time
<b>Other: specify</b>					

**NOTES from medical records to confirm answers of question D2 and 3 or other relevant information:**

.....  
 .....  
 .....

**Vraelys A: Sosio-demografiese, mediese geskiedenis, antropometrie en voedings verwante probleme van die baba**

**D. VOEDINGS VERWANTE PROBLEME VAN DIE BABA**

Ja	Nee
----	-----

1. Het jy enige voorligting/raad by die voorgeboorte kliniek ontvang oor babavoeding voor die baba gebore is?

2. Indien ja, voltooi:

a. Wanneer het jy die voorligting ontvang?

.....

b. Wie het die voorligting gegee?

.....

c. Hoeveel sessies het jy ontvang?

.....

d. Kry jy steeds voorligting/raad oor hoe om die baba te voed/kos te gee?  
Indien wel, by wie?

.....

.....

3. Hoe eet en drink jou baba op die oomblik?

Eet goed	Eet OK	Eet nie goed nie	Eet amper glad nie
----------	--------	------------------	--------------------

4. Watter tipe voedings verwante probleme sukkel jou baba mee op die oomblik?  
(bv. seertjies in die mond, loop maag, hardlywigheid, naarheid)

.....

.....

.....

5. Ervaar jy enige probleme om jou baba te voed of kos te gee? En indien wel, watter tipe probleme?

.....

.....

.....

6. Het jou baba al enige van die onderstaande probleme gehad sedert geboorte en indien wel, hoe gereeld kom dit voor?

<b>Probleem</b>	<b>Voorkoms</b>				
<b>Orale sproei</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Mond sere/ulcers</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Diarree/loop maag</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Vomering (opgooi)</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Verlies aan aptyt</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Buikswelling</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Sukkel om te sluk</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Verstik aan kos of melk</b>	Nooit	Een keer	Af en toe	Gereeld	Heeltyd
<b>Ander? Spesifiseer</b>					

**NOTAS vanuit mediese rekords om vraag D2 en 3 se antwoorde te bevestig of enige ander relevante inligting:**

.....  
 .....

**Addenda F: Questionnaire B: Caregiver socio-demographic information**

Caregiver code	
Infant code	
DATE	

Date of birth					
Age					
Sex					
Relationship to infant					
Marital status					
Number of children under care					
Level of education	Primary school	High school	Diploma	University grade	Other:
Occupational status	Employed	Unemployed	Other:		
Income	Regular	Irregular	No income	Description:	
Home address					
Type of house					
<b>Basic services available in the house</b>	Yes / No	Substitute / Description of facility/service			
Electricity					
Running water					
Sewerage (toilet/latrine/bucket)					
Personal washing facilities (bath/shower/wash basin)					
<b>Facilities in the house</b>	Yes / No	Substitute or Description			
Refrigerator					
Stove or kettle to boil water					
Dish/bottle washing facilities?					
Cleaning tools (soap, sponge, bottle brush)					
<b>Other commodities in the house</b>	Yes / No	Substitute or Description			
Cellphone					
Radio					
Television set					
Microwave					
Motor vehicle					

## Vraelys B: Sosio-demografiese inligting van versorger

Geboorte datum					
Ouderdom					
Geslag					
Verhouding tot baba					
Huweliks status					
Aantal kinders onder versorging					
Opvoedings vlak	Laerskool	Hoër skool	Diploma	Universiteits graad	Ander:
Beroeps status	In diens	Werkloos	Ander:		
Inkomste	Gereeld	Ongereeld	Geen inkomste	Beskryf:	
Huis adres					
Tipe huis					
<b>Basiese dienste beskikbaar in die huis</b>	Ja / Nee	Plaasvervanger / Beskrywing van fasiliteit/diens			
Elektrisiteit					
Lopende water					
Toilet / rioolering					
Persoonlike was geriewe (bad/stort/waskom)					
<b>Fasiliteite in die huis</b>	Ja / Nee	Plaasvervanger / beskrywing			
Yskas					
Stoof of ketel om water te kook					
Opwas fasiliteite (wasbak, skottel)					
Opwas middels en gereedskap (seep, spons, bottel borsel)					
<b>Ander goedere in die huis</b>	Ja / Nee	Plaasvervanger / beskrywing			
Selfoon					
Radio					
Televisie stel					
Mikrogolf					
Motorvoertuig					

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**Addenda G: Questionnaire C: Infant feeding and nutritional care – Caregiver knowledge & practices**

Infant code	
Caregiver code	
DATE	

**SECTION A: INFANT FEEDING AND NUTRITIONAL CARE**

**Knowledge and practices of caregivers**

Please describe what you know about the following topics:

1. The meaning of exclusive breast or exclusive formula feeding	
2. The meaning of mixed feeding	
3. The dangers of mixed feeding	
4. At what age solid food can be introduced into a baby's diet	
5. What kind of food to give a baby when introducing solid food into the diet	
6. How to introduce solid food to a baby	
7. What to do if a baby gets diarrhea	
8. What to do if a baby vomits	
9. What to do if a baby does not want to feed	
10. Oral Rehydration Therapy. Preparation and use of.	

**SECTION B: INFANT DIETARY INTAKE**  
**Caregiver practices and knowledge**

1. Age of the baby (in months) .....

Exclusive breastfeeding	Exclusive formula	Mixed
-------------------------	-------------------	-------

2. Milk feeding choice:

3. If the baby is **younger than 6 months and breastfeeding**, complete:

1. Does the baby only receive breastmilk or does the baby receive formula or food with breastmilk?	Exclusive	Mixed
2. Was your baby put to the breast within 1 hour after birth?	Yes	No
3. Did your baby <b>only</b> receive breastmilk yesterday?	Yes	No
	0 – 1 months	
	2 – 3 months	
	4 – 5 months	
	0 – 3 months	
4. Did your baby receive mostly breastmilk yesterday?	Yes	No
5. Do you feed on demand or according to a schedule?	On demand	Schedule
6. If according a schedule, every ____ hours?		
7. If on demand, how many feeds does the baby take during the day and night?		
8. Total number of wet nappies in a 24-hour day?		
9. Until what age do you plan to breastfeed your baby?		

4. If the baby is **older than 6 months and breastfeeding**, complete

1. When the baby was younger than 6 months did you give him/her only breastmilk, or did you give formula or food with the breastmilk?	Exclusive	Mixed	Not sure
2. Was your baby predominantly receiving breastmilk when he/she was younger than 6 months?	Yes	No	Not sure
3. Is the baby currently receiving only breastmilk or formula milk as well?	Only breastmilk	Formula + breastmilk	
4. Did your baby receive breastmilk yesterday?	Yes	No	
5. How many times during the day and night does your baby breastfeed?			
6. Until what age do you plan to breastfeed your baby?			

5. If **breastfeeding**, describe what you know about the following topics:

1. How often to breast feed your infant	
2. Amount of time to spend on each feed	
3. What you should do if you experience breast problems, e.g. cracked nipples	
4. Heat treatment of breastmilk	

6. If **formula feeding** or **mixed feeding** complete:

1. Did you feed your baby with a bottle yesterday?	0 – 5 months	Yes	No
	6 – 11 months	Yes	No
2. Did your non-breastfed baby, <b>aged 6 – 11 months</b> receive at least 2 milk feeds yesterday?	Yes	No	Not applicable
3. Type of formula feed (name)			
4. Number of formula feeds per day and night			
5. Preparation of formula feeds	Volume of milk prepared per feed		
	Do you add water or powder first into the bottle	Water	Powder
	What water do you use to mix the feed with?		
	Volume of water used to prepare feed		
	Number of scoops of powder per feed		
	Scoop heaped, level or below level marking		
	Correct preparation of formula feed	Yes	No
6. Has the baby ever been breastfed? If yes, for how long?			
7. Is the baby still receiving breastmilk? If yes, how many times during the day and night?			

7. If **formula feeding**, describe what you know about the following topics:

1. The volume of milk your infant requires daily	
2. How often to feed your infant	
3. What to do with left over prepared formula milk	
4. Cup feeding	
5. How to clean bottles and tools used to prepare formula milk:	
6. Caring for bottles	

8. Does your baby receive any other fluids during the day? If yes, the amount per day?

FLUID	Water	Juice / diluted juice	Other:
VOLUME			

9. Has the introduction of solid, semi-solid or soft foods taken place? If yes please complete the questions below:

1. At what age did you start giving your baby food other than milk?					
2. Did your baby aged <b>6 – 8 months</b> receive solid, semi-solid or soft foods yesterday?	Yes	No	Not applicable		
3. Indicate which of the following foods your baby aged <b>6 – 11 months</b> ate yesterday	Grains or starchy vegetables (e.g. wheat, maize, potato, sweet potato etc)				
	Beans, soya, lentils or nuts				
	Dairy products (Milk, yoghurt, cheese, maas)				
	Meat, fish, chicken, liver, kidneys or other organ meats				
	Eggs				
	Vit A rich fruit and vegetables (e.g. pumpkin, carrots, spinach, broccoli, sweet potato, apricot, peach, mango)				
	Other fruit and vegetables				
	6 – 8 months		Received 4 or more of the food groups above	Yes	No
	9 – 11 months			Yes	No
<b>“Meals” in Question 4&amp;5 includes both meals and snacks and frequency is based on caregiver report</b>					
4. If <b>breastfeeding</b> , how many times did your baby receive solid, semi-solid or soft foods yesterday?	6 – 8 months		2 or more times	Yes	No
	9 – 11 months		3 or more times	Yes	No
5. If <b>formula feeding</b> , how many times did your baby receive solid, semi-solid, soft foods or milk feeds yesterday?	6 – 11 months		4 or more times	Yes	No
6. Did your baby, aged <b>6 -11 months</b> , receive an iron-rich food or iron-fortified food that is especially designed for infants and young children, or that is fortified at home, yesterday?	Flesh food, e.g. meat, poultry, eggs, organ meat			Yes	No
	Commercially fortified foods, especially designed for infants and young children that contain iron e.g. baby cereals			Yes	No
	Foods fortified at home with a micronutrient powder containing iron or a lipid-based nutrient supplement containing iron			Yes	No
QUESTION NOT APPLICABLE					
7. Does your baby eat cereal? If yes, what kind of cereal and how often?					
8. Does your baby get tea bottles? If yes, how many times a day and how is it prepared?					
9. Does your baby get “pap bottles”? If yes, do you give “pap bottles” and milk bottles? Or do you mix cereal into all your baby’s milk bottles?					

10. How is the "pap bottle" prepared?		
11. How many "pap bottles" does your baby receive per day?		
12. Does your baby get any sweets/treats in a day?	Yes	No
13. If yes, how often and what kind of sweets/treats		

## Vraelys C: Baba voeding – Kennis en praktyke van versorger

### AFDELING A: BABA VOEDING

#### Kennis en praktyke van versorger

Verduidelik asseblief wat jy van die volgende onderwerpe af weet:

1. Die betekenis van eksklusiewe bors- of eksklusiewe formule voeding	
2. Die betekenis van gemengde voeding (Mixed feeding)	
3. Die gevare van gemengde voeding	
4. Op watter ouderdom 'n baba vaste kos kan begin eet	
5. Watter tipe kos om vir 'n baba te gee wanneer vaste kos in 'n baba se dieet ingesluit word	
6. Hoe om vaste kos aan 'n baba bekend te stel	
7. Wat om te doen as 'n baba diarree kry	

8. Wat om te doen as 'n baba opgooi	
9. Wat om te doen as 'n baba nie wil eet nie	
10. Orale Rehidrasie Terapie (ORS). Voorbereiding en gebruik.	

### AFDELING B: DIEET INNAME VAN BABA Kennis en praktyke van versorger

1. Ouderdom van baba (in maande).....

Eksklusiewe borsvoeding	Eksklusiewe Formule	Gemengde voeding
----------------------------	------------------------	---------------------

2. Melkvoedings keuse:

3. Indien die baba **jonger as 6 maande** is en **geborsvoed** word, voltooi:

1. Ontvang die baba slegs borsmelk , of kry die baba formule melk of kos saam met die borsmelk?	Eksklusief	Gemeng
2. Is jou baba aan die bors gesit, binne 1 uur na geboorte?	Ja	Nee
3. Het jou baba gister <b>SLEGS borsmelk</b> ontvang?	0 – 1 maande	Ja Nee
	2 – 3 maande	
	4 – 5 maande	
	0 – 3 maande	
4. Het jou baba gister meestal borsmelk ontvang?	Ja	Nee
5. Voed jy op aanvraag, of volgens 'n skedule?	Op aanvraag	Skedule
6. Indien volgens 'n skedule, elke hoeveel uur voed jy?		
7. Indien op aanvraag, hoeveel voedings vind plaas gedurende die dag en nag?		
8. Totale hoeveelheid nat doeke in 24 uur?		
9. Tot op watter ouderdom beplan jy om jou baba te borsvoed?		

4. Indien die baba **ouer as 6 maande** is en **geborsvoed** word, voltooi:

1. Toe die baba jonger as 6 maande oud was, het hy/sy slegs borsmelk ontvang of het hy/sy formule melk of kos saam met borsmelk ontvang?	Ekklusief	Gemeng	Onseker
2. Het jou baba hoofsaaklik borsmelk ontvang toe hy/sy jonger as 6 maande oud was?	Ja	Nee	Onseker
3. Ontvang jou baba tans slegs borsmelk, of formule melk ook	Slegs borsmelk	Formule + borsmelk	
4. Het jou baba gister borsmelk ontvang?	Ja	Nee	
5. Hoeveel keer gedurende die dag en nag borsvoed jy jou baba?			
6. Tot op watter ouderdom beplan jy om jou baba te borsvoed?			

5. Indien **geborsvoed** word, beskryf wat jy weet van die volgende onderwerpe:

5. Hoe gereeld om te borsvoed	
6. Hoeveelheid tyd om te spandeer op elke voeding	
7. Wat om te doen indien jy bors probleme ontwikkel, bv. gebarste tepels, mastitis	
8. Hitte behandeling van borsmelk	

6. Indien **formule voeding** plaasvind, voltooi:

1. Het jy gister jou baba met 'n bottel gevoed?	0 – 5 maande	Ja	Nee
	6 – 11 maande	Ja	Nee
2. Het jou baba, <b>ouderdom 6 – 11</b> maande, wat nie geborsvoed word nie, gister ten minste 2 melk voedings ontvang?	Ja	Nee	NVT
3. Naam van formule melk wat gegee word			
4. Aantal formule voedings wat plaasvind in die dag en nag			

5. Voorbereiding van formule voedings	Volume melk wat per voeding voor berei word		
	Gooi jy water of poeier eerste in die bottel?	Water	Poeier
	Watter water gebruik jy om die formule melk mee aan te maak?		
	Volume water wat gebruik word om een voeding aan te maak		
	Aantal "scoops" poeier wat per voeding gebruik word		
	"Scoop" opgehoop, gelyk of onder gemerkte vlak		
	Korrekte voorbereiding van formule voeding?	Yes	No
6. Is die baba al ooit geborsvoed? Indien wel, vir hoe lank?			
7. Ontvang die baba steeds borsmelk? Indien wel hoeveel voedings vind plaas in die dag en nag?			

7. Indien **formule voeding** plaasvind, beskryf wat jy weet van die volgende onderwerpe:

1. Die volume melk wat jou baba daaglik benodig	
2. Hoe gereeld om jou baba te voed	
3. Wat om te doen met formule melk wat oorbly na 'n voeding	
4. Koppie voeding	
5. Hoe om bottels en toerusting wat gebruik is om formule melk te meng skoon te maak.	
6. Versorging van bottels	

8. Ontvang jou baba enige ander vloeistowwe gedurende die dag? Indien wel, wat ontvang hy/sy en hoeveel per dag?

Vloeistof	Water	Sap/verdunde sap	Ander:
<b>VOLUME</b>			

9. Is vaste, semi-vaste of sagte kosse al ingesluit in die baba se dieet? Indien wel, voltooi die vrae onder.

1. Op watter ouderdom het jy jou baba ander kos as melk begin gee?					
2. Het jou baba, ouderdom <b>6 – 8 maande</b> gister vaste, semi-vaste of sagte kosse ontvang?	Ja		Nee		NVT
3. Dui aan watter van die volgende kosse die baba, ouderdom <b>6 – 11 maande</b> , gister geëet het.	Grane of styselryke groente (bv. koring, meliemeel, aartappel, patat, samp ens.)				
	Bone, soja, lensies of neute				
	Melk produkte (Melk, joghurt, kaas, maas)				
	Vleis, vis, hoender, lewer, niertjies of ander orgaan vleis				
	Eiers				
	Vit A ryke vrugte en groente (bv pampoen, wortels, spinasies, brokkoli, patat, appelkose, perske, mango)				
	Ander vrugte en groente				
	6 – 8 maande		Het 4 of meer van bg voedsel groepe ontvang	Ja	Nee
	9 – 11 maande			Ja	Nee
<b>“Maaltye” in vraag 4&amp;5 sluit beide maaltye en tussen voedings in en frekwensie is gebaseer op rapportering van versorger</b>					
4. Indien <b>geborsvoed</b> word, hoeveel keer het die baba gister vaste, semi-vaste of sagte kosse ontvang?	6 – 8 maande		2 of meer keer	Ja	Nee
	9 – 11 maande		3 of meer keer	Ja	Nee
5. Indien <b>formula melk</b> gegee word, hoeveel keer het die baba gister vaste, semi-vaste, sagte kosse <b>OF</b> melk voedings ontvang?	6 – 11 maande		4 or meer keer	Ja	Nee
6. Het die baba, ouderdom <b>6 -11 maande</b> , gister 'n yster ryke kos, of yster verrykte kos wat spesiaal ontwikkel is vir babas en jong kinders of kos wat gefortifiseer is by die huis, ontvang?	Vleis, vis, hoender, eiers, orgaan vleis			Ja	Nee
	Kommersieël verrykte kos wat spesiaal vir babas en kinders ontwerp is en wat YSTER bevat, bv baba pappe			Ja	Nee
	Kos wat verryk word by die huis met 'n mikro-nutriënt poeier wat YSTER bevat of met ander nutriënt supplemente wat yster bevat.			Ja	Nee
	VRAAG NIE VAN TOEPASSING				
7. Eet die baba pap/"cereal"? Indien wel, watter soort en hoe gereeld?					

8. Kry jou baba tee bottels? Indien wel, hoeveel keer 'n dag en hoe word dit voorberei?		
9. Kry die baba "pap bottels"? Indien wel, gee jy pap en melk bottels, of meng jy pap in al die melk bottels in?		
10. Hoe word die "pap bottle" voorberei?		
11. Hoeveel "pap bottles" kry die baba per dag?		
12. Kry die baba enige lekkers of "treats" gedurende die dag?	Ja	Nee
13. Indien wel, hoe gereeld en watter tipe lekkers?		

## Addenda H: Questionnaire D: Infant feeding and nutritional care – Caregiver attitude and beliefs

Caregiver code	
Infant code	
DATE	

### Section A: Beliefs

Indicate whether you strongly agree, agree, disagree, strongly disagree or are unsure about each statement below.

1. Breastfeeding is the best feeding for all babies

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

2. Breastfeeding is only the best feeding option for HIV-negative women

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

3. If a woman is HIV-positive, breastfeeding should be avoided

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

4. If a woman is HIV-positive and she breastfeeds, she will definitely give her baby HIV

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

5. If mothers are on antiretroviral medication, they can breastfeed their babies

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

6. Formula feeding is always the best feeding option for a HIV positive woman

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

7. All women who formula feed are HIV-positive

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

8. If babies are on antiretroviral medication, the milk and food they receive is not important

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

9. Babies on antiretroviral medication will become HIV-negative

Strongly agree	Agree	Disagree	Strongly disagree	Unsure
----------------	-------	----------	-------------------	--------

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**Section B: Beliefs****Choose one answer per question**

1. What is the best feeding option for your baby?
  - a. Exclusive breastfeeding (only breastmilk)
  - b. Exclusive formula feeding (only formula milk)
  - c. Breastmilk and formula milk (i.e. mixed feeding)
  - d. Cow's or goat's milk
  - e. Tea and juice
  
2. Which feeding option is the most unsafe option for your baby?
  - a. Exclusive breastfeeding
  - b. Exclusive formula feeding
  - c. Mixed feeding, i.e. formula- and breastmilk
  
3. How do you feel about the feeding option you chose to feed your baby?
  - a. It was the right decision
  - b. I am not sure whether it was the right decision
  - c. I made the wrong decision
  
4. How do you feel about your knowledge/ability to feed your baby correctly?
  - a. I know exactly how to feed my baby correctly
  - b. I am not always sure how and what to feed my baby
  - c. I do not know how to feed my baby correctly

**If formula feeding:**

5. The safest way to give formula milk to your baby is with a:
  - a. Bottle and teat
  - b. Cup
  - c. "Sippy" cup
  - d. Don't know
  
6. The utensils and bottles used to prepare formula feeds for your baby should be washed:
  - a. At the end of the day
  - b. First thing in the morning
  - c. Twice a day
  - d. After every time it is used
  
7. When should you wash your hands?
  - a. Every time before preparing a formula feed
  - b. Just before you give the prepared formula milk to your baby
  - c. Only once in the morning when you get out of bed
  - d. Only at the end of the day before you go to bed

**If breastfeeding:**

8. You need to feed your baby:
  - a. According to a strict time schedule
  - b. Every 3 hours during the day and 4 hours at night
  - c. When he/she is hungry or wants to drink
  - d. When the granny says the baby is hungry and needs to drink
  
9. What do you have to do when you get breast problems?
  - a. Stop breastfeeding completely and start with formula feeding
  - b. Ignore it and keep on breastfeeding as usual
  - c. Go to the clinic as soon as possible to get help
  - d. Apply vaseline and keep on breastfeeding

**Section C: Attitudes**

1. How did you feel about the counseling you received at the antenatal clinic on how to feed your baby?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

2. How do you feel about the choice you made on how to feed your baby?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

3. How do you feel about formula feeding in general?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

4. How do you feel about breastfeeding in general?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

5. How do you feel about your ability to feed your baby correctly?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

6. How do you feel about the antiretroviral medication your baby receives?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

7. How do you feel about your baby's overall health

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

8. How do you feel about the way your baby is growing?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

9. How do you feel about your baby's chance to grow to become a healthy, strong child?

Very positive	Positive	Neutral	Negative	Very negative
---------------	----------	---------	----------	---------------

**Vraelys D:****HIV kindervoeding: Houdings en oortuigings van versorger****Afdeling A: Oortuigings**

**Dui aan of jy sterk saam stem, saam stem, nie saam stem nie, glad nie saam stem nie of onseker is oor die stellings hieronder.**

1. Borsvoeding is die beste voeding vir alle babas

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

2. Borsvoeding is slegs die beste voedings opsie vir HIV negatiewe vrouens.

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

3. Indien 'n vrou HIV positief is moet borsvoeding vermy word.

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

4. Indien 'n vrou HIV positief is en sy borsvoed, gaan sy definitief haar baba HIV gee.

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

5. Indien vrouens op anti-retrovirale middels is kan hulle, hul babas borsvoed.

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

6. Formule voeding is altyd die beste voedings opsie vir 'n HIV positiewe vrou

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

7. Alle vrouens wat hulle babas formule voeding gee is HIV positief

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

8. Indien babas op anti-retrovirale middels is, is die melk en kos wat hulle ontvang nie belangrik nie

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

9. Babas op anti-retrovirale middels sal HIV negatief raak

Stem sterk saam	Stem saam	Stem nie saam nie	Stem glad nie saam nie	Onseker
-----------------	-----------	-------------------	------------------------	---------

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**Afdeling B: Oortuigings (Kies een antwoord per vraag)**

1. Wat is die beste voedings opsie vir jou baba?
  - a. Eksklusiewe borsvoeding (slegs borsmelk)
  - b. Eksklusiewe formule voeding (slegs formule melk)
  - c. Borsmelk en formule melk (gemengde voedings)
  - d. Koei of bokmelk
  - e. Tee en sap
2. Watter voedings opsie is die onveiligste opsie vir jou baba?
  - a. Eksklusiewe borsvoeding (slegs borsmelk)
  - b. Eksklusiewe formule voeding (slegs formule melk)
  - c. Gemengde voeding (borsmelk en formule melk)
3. Hoe voel jy oor die keuse wat jy gemaak het ten opsigte van jou baba se voeding?
  - a. Dit was die regte keuse
  - b. Ek is nie seker of dit die regte keuse was nie
  - c. Ek het die verkeerde keuse gemaak
4. Hoe voel jy oor jou vermoë/kennis om jou baba reg te voed
  - a. Ek weet presies hoe om my baba te voed
  - b. Ek is nie altyd seker hoe of wat om my baba te voed nie
  - c. Ek weet nie hoe om my baba reg te voed nie

**Indien formule voeding gegee word, beantwoord vraag 5 - 7:**

5. Die veiligste manier om formule melk vir jou baba te gee is met 'n:
  - a. Bottel en tiet
  - b. Koppie
  - c. "Sippy" cup
  - d. Ek weet nie
6. Die toerusting en bottels wat gebruik word om formule melk voor te berei vir jou baba moet gewas word:
  - a. Aan die einde van die dag
  - b. Eerste ding in die oggend
  - c. Twee keer 'n dag
  - d. Elke keer nadat dit gebruik is
7. Wanneer moet jy jou hande was?
  - a. Elke keer voor jy 'n formule voeding aan maak
  - b. Net voordat jy die voorbereide formule melk vir jou baba gee
  - c. Slegs een keer in die oggend as jy opstaan
  - d. Slegs aan die einde van die dag, voor jy bed toe gaan

**Indien borsvoeding plaasvind, beantwoord vraag 8 en 9:**

8. Jou baba moet gevoed word:
  - a. Volgens 'n streng skedule
  - b. Elke 3 ure gedurende die dag en elke 4 ure in die nag
  - c. Wanneer hy/sy honger is en wil drink
  - d. Wanneer ouma sê die baba is honger en moet drink
  
9. Wat moet jy doen indien jy bors probleme ontwikkel?
  - a. Borsvoeding onmiddelik stop en formule voeding begin gee
  - b. Die probleem ignoreer en aanhou borsvoed soos van te vore
  - c. So gou as moontlik na die naaste kliniek gaan om hulp te kry
  - d. Vaseline aansmeer en voortgaan met borsvoeding

**Afdeling C: Houdings**

1. Hoe voel jy oor die voorligting/raad wat jy ontvang het by die voorgeboorte kliniek oor baba voeding?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

2. Hoe voel jy oor die voedings keuse wat jy gemaak het vir jou baba?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

3. Hoe voel jy oor die algemeen oor formule voeding?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

4. Hoe voel jy oor die algemeen oor borsvoeding?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

5. Hoe voel jy oor jou vermoë om jou baba reg te voed?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

6. Hoe voel jy oor die anti-retrovirale medikasie wat jou baba ontvang?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
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7. Hoe voel jy oor jou baba se algehele gesondheid?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

8. Hoe voel jy oor hoe jou baba op die oomblik groei?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
---------------	----------	----------	----------	---------------

9. Hoe voel jy oor jou baba se kans om eendag 'n gesonde, sterk kind te wees?

Baie positief	Positief	Neutraal	Negatief	Baie negatief
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**Addendum I: Final Ethics Approval\_Mrs Wasserfall – N10/10/319**

29 October 2010

**MAILED**

Dietician  
Ms E Wasserfall  
Human Nutrition  
3rd Floor  
Clinical Building  
Tygerberg Campus  
7505

Dear Ms Wasserfall

**"Growth patterns and nutrition related problems of infants under one year attending Red Cross Children's Hospital's antiretroviral clinic, and the knowledge, attitude, beliefs and practices of their caregivers, concerning infant feeding."**

**ETHICS REFERENCE NO: N10/10/319**

**RE : APPROVED**

It is a pleasure to inform you that a review panel of the Health Research Ethics Committee has approved the abovementioned project on 26 October 2010, including the ethical aspects involved, for a period of one year from this date.

This project is therefore now registered and you can proceed with the work. Please quote the above-mentioned project number in ALL future correspondence. You may start with the project. Notwithstanding this approval, the Committee can request that work on this project be halted temporarily in anticipation of more information that they might deem necessary.

Please note a template of the progress report is obtainable on [www.sun.ac.za/rds](http://www.sun.ac.za/rds) and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly and subjected to an external audit.

Translations of the consent document in the languages applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372  
Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Please note that for research at primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol.

Contact persons are Ms Claudette Abrahams at Western Cape Department of Health ([healthres@pgwc.gov.za](mailto:healthres@pgwc.gov.za) Tel: +27 21 483 9907) and Dr Hélène Visser at City Health ([Helene.Visser@capetown.gov.za](mailto:Helene.Visser@capetown.gov.za) Tel: +27 21 400 3981).

Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

Approval Date: 26 October 2010

Expiry Date: 26 October 2011

**MRS MERTRUDE DAVIDS**  
**RESEARCH DEVELOPMENT AND SUPPORT**  
Tel: 021 938 9207 / E-mail: [mertrude@sun.ac.za](mailto:mertrude@sun.ac.za)  
Fax: 021 931 3352

18 November 2010 14:45

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**Addendum J: Request and Approval of Research from RCCH's research committee**



UNIVERSITEIT • STELLENBOSCH • UNIVERSITY  
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September 2010

Dear Dr Blake,

I am a dietician, currently busy with my Master of Nutrition degree at Stellenbosch University. My research will investigate the infant feeding practices of HIV + infants. My proposed research study is entitled:

*“Growth patterns and nutrition related problems of infants under one year attending Red Cross Children’s Hospital’s antiretroviral clinic, and the knowledge, attitude beliefs and practices of their caregivers, concerning infant feeding.”*

With the specific objectives:

1. To describe, in *HIV-positive infants* younger than 1 year of age on ART:
  - Growth patterns
  - Dietary intake
  - Nutrition related problems experienced
  
2. To describe, in *caregivers* of HIV-positive infants younger than 1 year of age on ART:
  - Knowledge, attitudes, beliefs and practices regarding infant feeding and management of nutrition-related problems
  - Most common problems experienced with infant feeding

Red Cross Children’s hospital’s ARV clinic was identified as the most suitable site for data gathering for the study, due to the amount of infants at the clinic receiving ART, as well as its location.

The study protocol has been submitted for approval to the Health Research Ethics Committee, Faculty of Health Sciences, Stellenbosch University and I will be hearing back from them after the 20<sup>th</sup> of October. If need be I will also follow due process and obtain permission to do the research study from the Research committee of the Western Cape Provincial Department of Health.

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I hope to do data gathering over a maximum time period of 6 weeks in November and December 2010. All the data gathering will be done by myself, thus none of the clinic staff will be asked to help or given any extra work to do. A translator will assist me with the Xhosa speaking patients. I will however require an allocated area where anthropometry measurements of the infants can be done and interviews be conducted with their caregivers, after they have seen the doctor/nurse. I know space is a big problem at the clinic and have therefore spoken with the dietician's working in the clinic and they will assist me in that regard. I have also been in contact with Dr Nuttall and Prof Eley with regards to the proposed study.

If you have any questions regarding the study, or require more information, please contact me or any of my study leaders at the University.

Study leader: Lisanne du Plessis

Co-study leaders: Liesbet Koornhof and Prof Jimmy Volmink

Division of Human Nutrition: 021 938 9259

Your kind consideration and support of this research project by granting permission to conduct data gathering at RCCH's ARV clinic will be greatly appreciated.

Yours sincerely,

Estelle Wasserfall (Hertzog), RD (SA)  
082 413 4656



Fakulteit Gesondheidswetenskappe • Faculty of Health Sciences



**Verbind tot Optimale Gesondheid • Committed to Optimal Health**

Division of Human Nutrition • Department of Interdisciplinary Health Sciences

PO Box 19063 • Tygerberg 7505 • South Africa

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Webblad / Web page: [www.sun.ac.za/nutrition](http://www.sun.ac.za/nutrition); [www.sun.ac.za/nicus](http://www.sun.ac.za/nicus)

<b>RESEARCH PROPOSAL SUMMARY FOR RCCH'S RESEARCH COMMITTEE:</b>	
Name of the Institution/organization	Department of Human Nutrition, StellenboschUniversity
Name of the investigators and qualifications	<p><b>Main investigator:</b> Estelle Wasserfall (Hertzog) BSc Dietetics</p> <p><b>Study Leaders:</b> LM du Plessis, (RD) BSc Dietetics, Masters of Nutrition</p> <p>HE Koornhof BSc Dietetics, Masters of Nutrition</p>
Telephone number	021 9389259 (Dep of Human Nutrition)
Fax number	
Cell phone number	082 4134656
Email address	Estelle.wasserfall@gmail.com
Institution which gave ethics approval	Health Research Ethics Committee of StellenboschUniversity. Reference number: N10/10/319
Date of ethics approval	26 October 2010
Date research expected to commence	12 January 2011
Date research expected to end	25 February 2011
Date research reports should be expected	May 2011
Research title	Growth patterns and nutrition related problems of infants under one year attending Red Cross Children's Hospital's antiretroviral clinic, and the knowledge, attitude, beliefs and practices of their caregivers, concerning infant feeding.
Keywords	HIV Infant feeding Growth patterns Nutrition related problems Anti retroviral therapy
General research goal	To describe the growth and nutrition related problems of infants under 1 year attending the ARV clinic at Red Cross Children's Hospital, as well as the knowledge, attitudes, beliefs and practices of their caregivers concerning infant feeding.

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Special research objectives	<ol style="list-style-type: none"><li>3. To describe, in <i>HIV-positive infants</i> on ART:<ul style="list-style-type: none"><li>• Growth patterns</li><li>• Dietary intake</li><li>• Nutrition related problems</li></ul></li> <li>4. To describe, in <i>caregivers</i> of HIV-positive infants on ART:<ul style="list-style-type: none"><li>• Knowledge, attitudes, beliefs and practices regarding infant feeding and management of nutrition related problems</li><li>• Most common nutritional problems experienced with infant feeding</li></ul></li></ol>
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Brief description of methods	<p><b>Study type</b> A descriptive, cross-sectional study</p> <p><b>Sample size</b> The total number of infants attending Red Cross Children's Hospital's ARV clinic in June 2010 was obtained to give an indication of a possible sample size. The specific number of infants to be included in this study could not be exactly pre-determined, due to monthly fluctuations in numbers of the sample population at the clinic. According to attendancenumbers obtained from the clinic, the researcher expects to include an estimated 50 infants.</p> <p><b>Sampling of study population</b> Census sampling of all under 1 year old infants attending the clinic will be conducted over a time period of 2 months. The researcher will include every infant, who complies with the inclusion criteria, attending the ARV clinic at Red Cross Children's Hospital during the time period set out for data collection.</p> <p><b>Inclusion and exclusion criteria</b></p> <p><u>Infants</u> <i>Inclusion criteria:</i> All HIV-positive infants under 1 year, receiving ART, attending Red Cross Children's Hospital ARV clinic, will be included in this study. <i>Exclusion criteria:</i> Infants who's caregivers do not give consent to participate in the study. Infants born with a known genetic disorder or clinical condition, other than HIV, affecting normal growth, will be excluded. Institutionalized infants.</p> <p><u>Caregivers</u> <i>Inclusion criteria:</i> Any person accompanying the above mentioned infant to the antiretroviral clinic who identifies him/herself as the primary caregiver of the infant and gives consent to participate, will be included. <i>Exclusion criteria:</i> - Caregivers who are not English, Afrikaans or Xhosa speaking - Caregivers who do not give consent to participate in the study</p> <p><b>Study methods:</b></p> <ul style="list-style-type: none"> <li>• Anthropometric measurements including weight, height, mid-arm circumference and head circumference will be performed by the researcher according to standard procedures. Two measurements will be taken and the average will be calculated.</li> </ul>
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Budget for research	±R5400		
Source of funding for the research	Researcher will fund the study		
	Yes	No	
Additional load on nursing		x	
Support services		x	
Consumables		x	
Laboratory tests		x	
Equipment	x		The clinics baby scale and measuring board will be used
Space	x		Will share space with the dietician working in the antiretroviral OPD.
Communications		x	
Additional OPD visits		x	There is a possibility that the researcher will need to ask the patients to return on another day for interviews, to include all the patients attending the OPD. The researcher will then carry the patients taxi fee and arrange with the clinicians in charge of the clinic for a space to conduct the interviews. The researcher will first try and see all patients on the day of their appointments, to avoid any additional visits.
Admission of patients		x	
The research will have implications for the requested facilities regarding:	There will be no implications for the antiretroviral OPD. The researcher will see the patients after they have been with the dietician or the doctor. The researcher will not interfere with the patient's doctor's appointment or any other procedure that needs to take place.		
If yes, what are these implications and how does your project plan to mitigate the impact			
Have you informed the Operational Manager of your intention?	Yes. I have had a meeting with Dr Nuttall, Sr Patti and Shihaam Cader of the Dietetics department. Prof Eley is also aware of the proposed research. None of them had any problems with regards to the proposed research.		
What is your results dissemination plan? What are your sustainability or exit plans?	The data obtained from this study will be submitted for presentation at national and international conferences and be published in peer-reviewed journals. A summarized report on the outcomes of this study will be provided to the Management of Red Cross Children's Hospital and OPD.		



**Red Cross War Memorial Children's Hospital**

Tblake@pgwc.gov.za  
Tel: +27 21 658 5788; fax: +27 21658 5166  
Klipfontein Rd, Rondebosch, 7700  
Private Bag X5, Rondebosch, 7701

**REFERENCE:** Approval of Research

**ENQUIRIES:** Dr. TA BLAKE

**Ms Estelle Wasserfall**  
**Department of Human Nutrition**  
**Stellenbosch University**

Dear Ms Wasserfall

**RE: APPROVAL OF RESEARCH**

Your request to do research at the Red Cross War Memorial Children's Hospital has been approved.

Please inform the committee and the area where the research will be done of the start date.

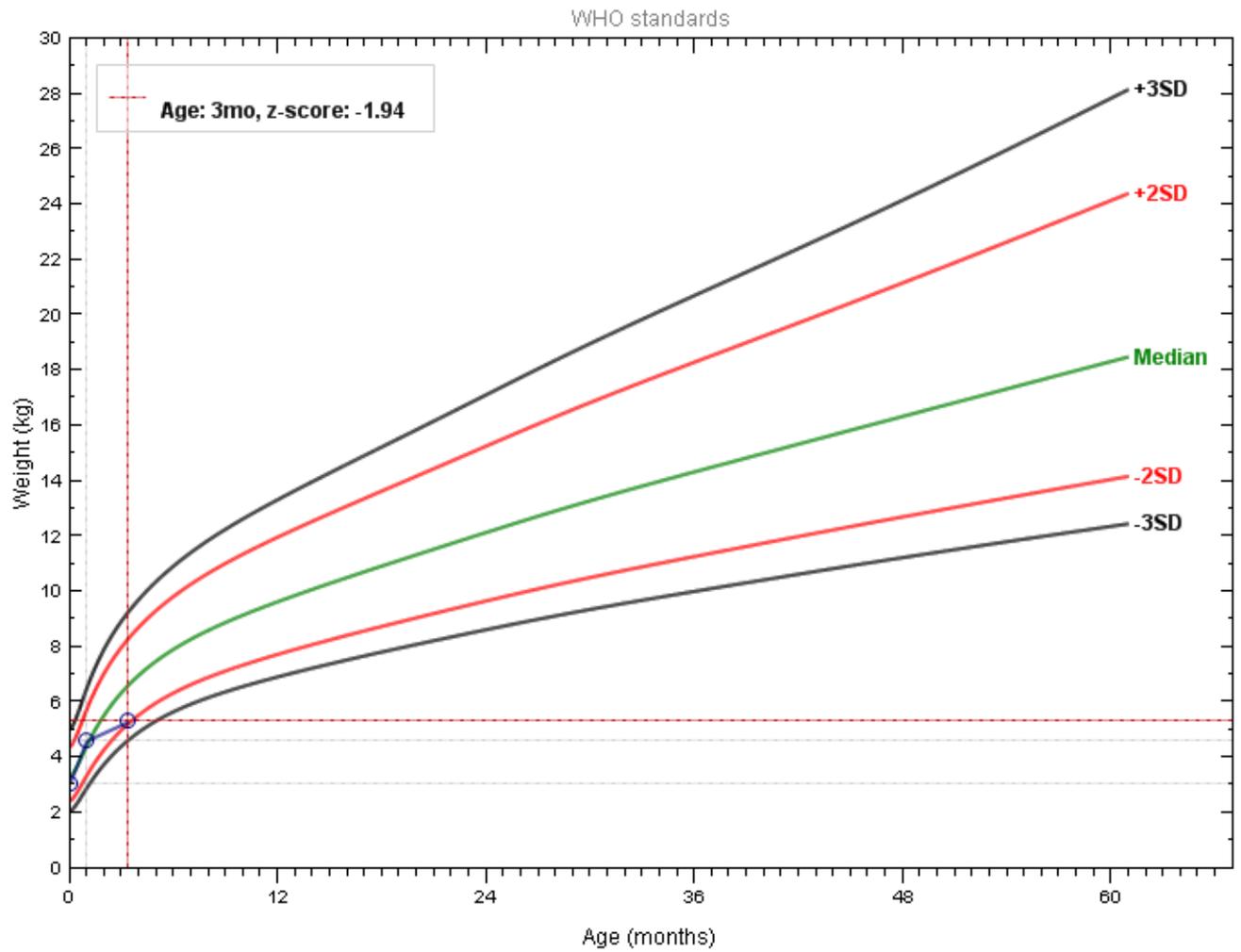
Yours faithfully,

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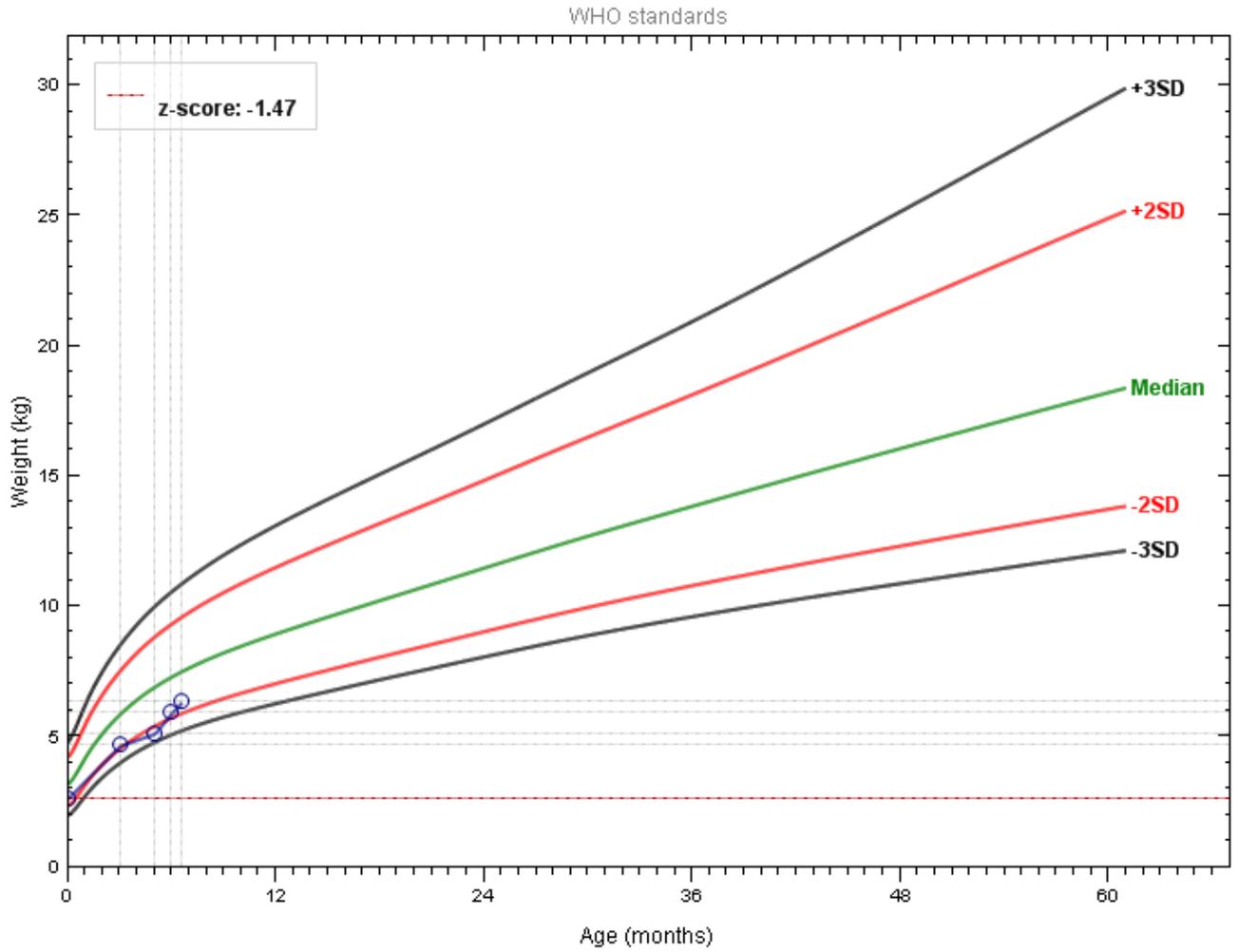
**DR T A BLAKE**  
**SENIOR MEDICAL SUPERINTENDENT**  
**RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL**  
**DATE: 12 January 2011**

## Addendum K: Individual growth charts of infants

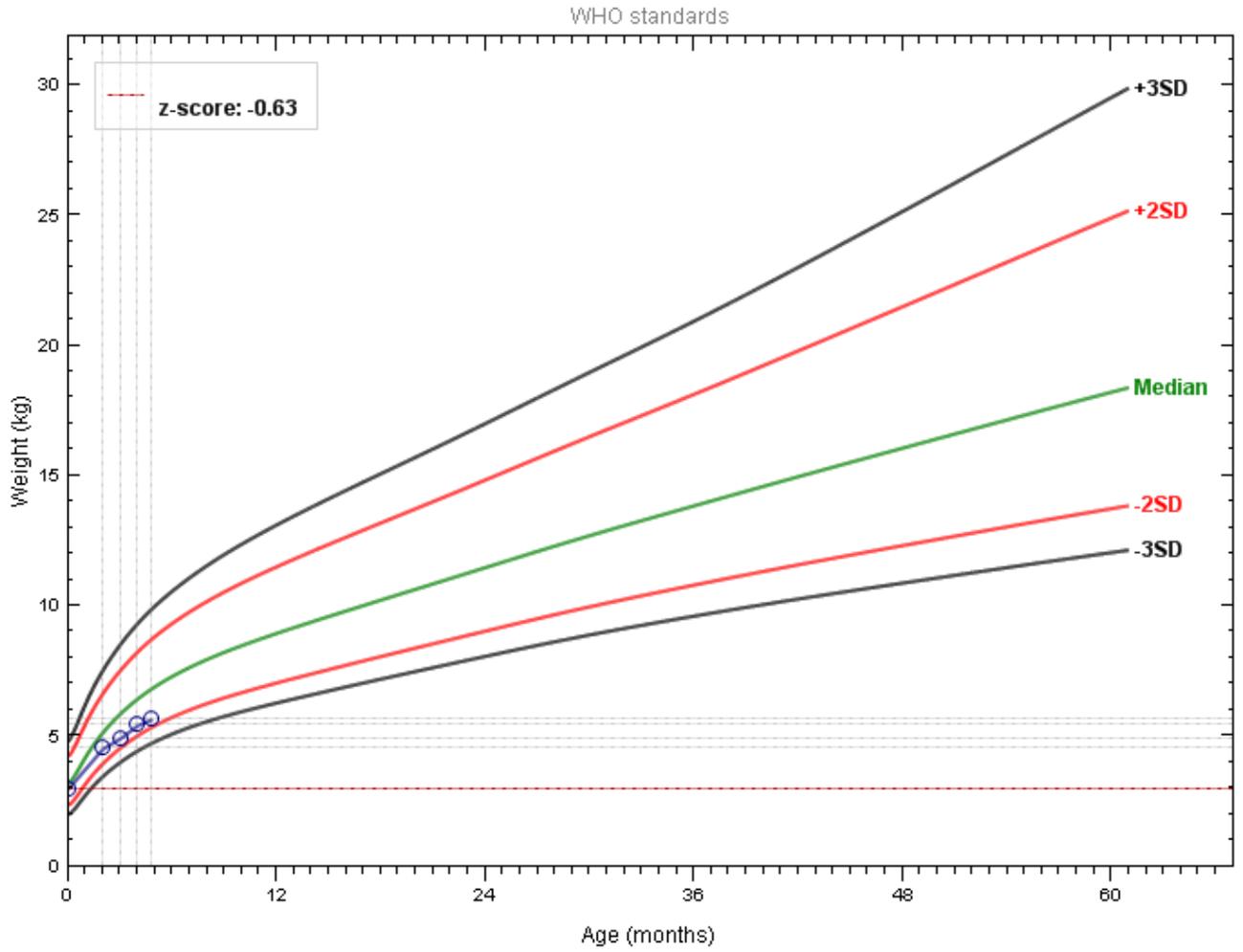
Infant 1:



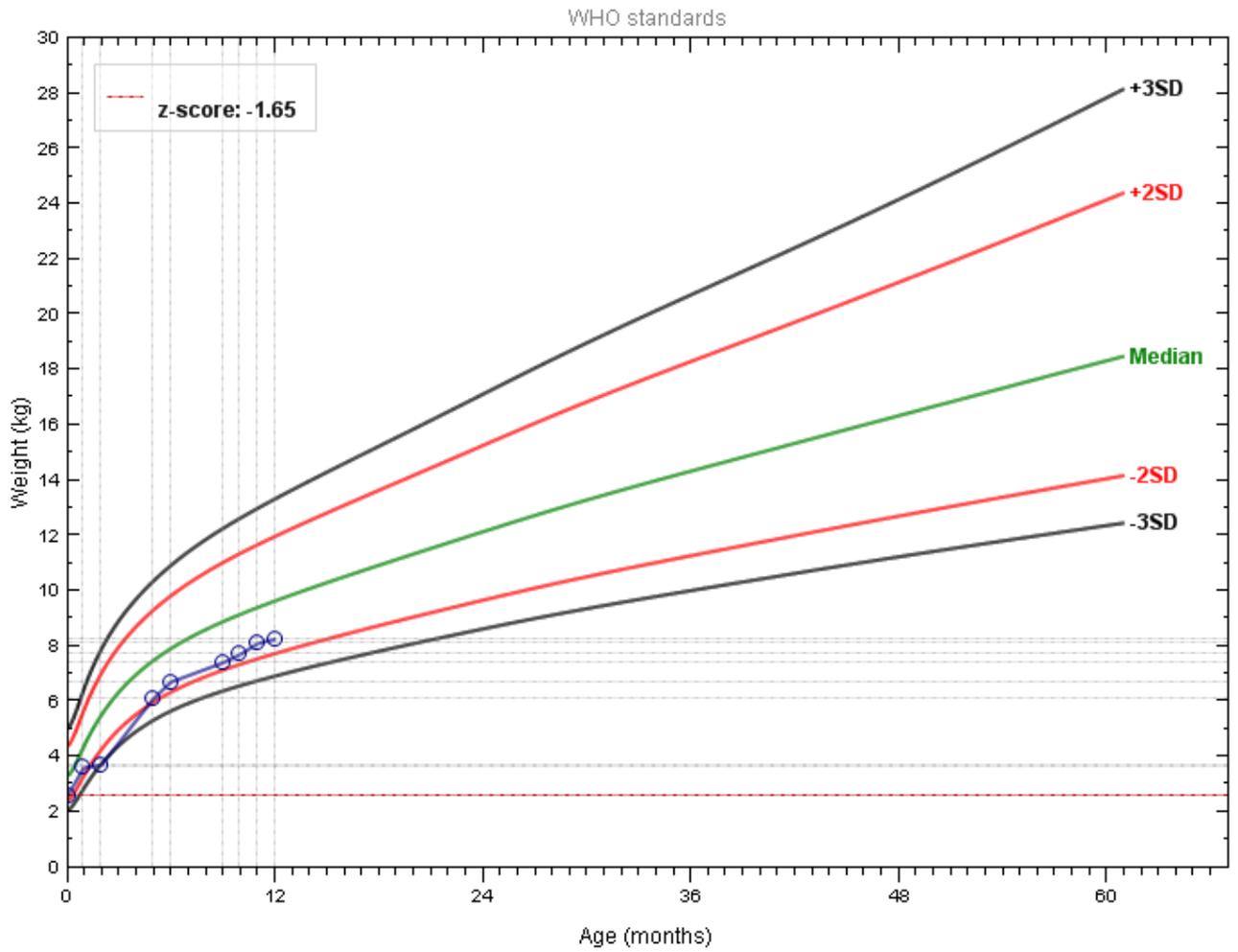
Infant 2



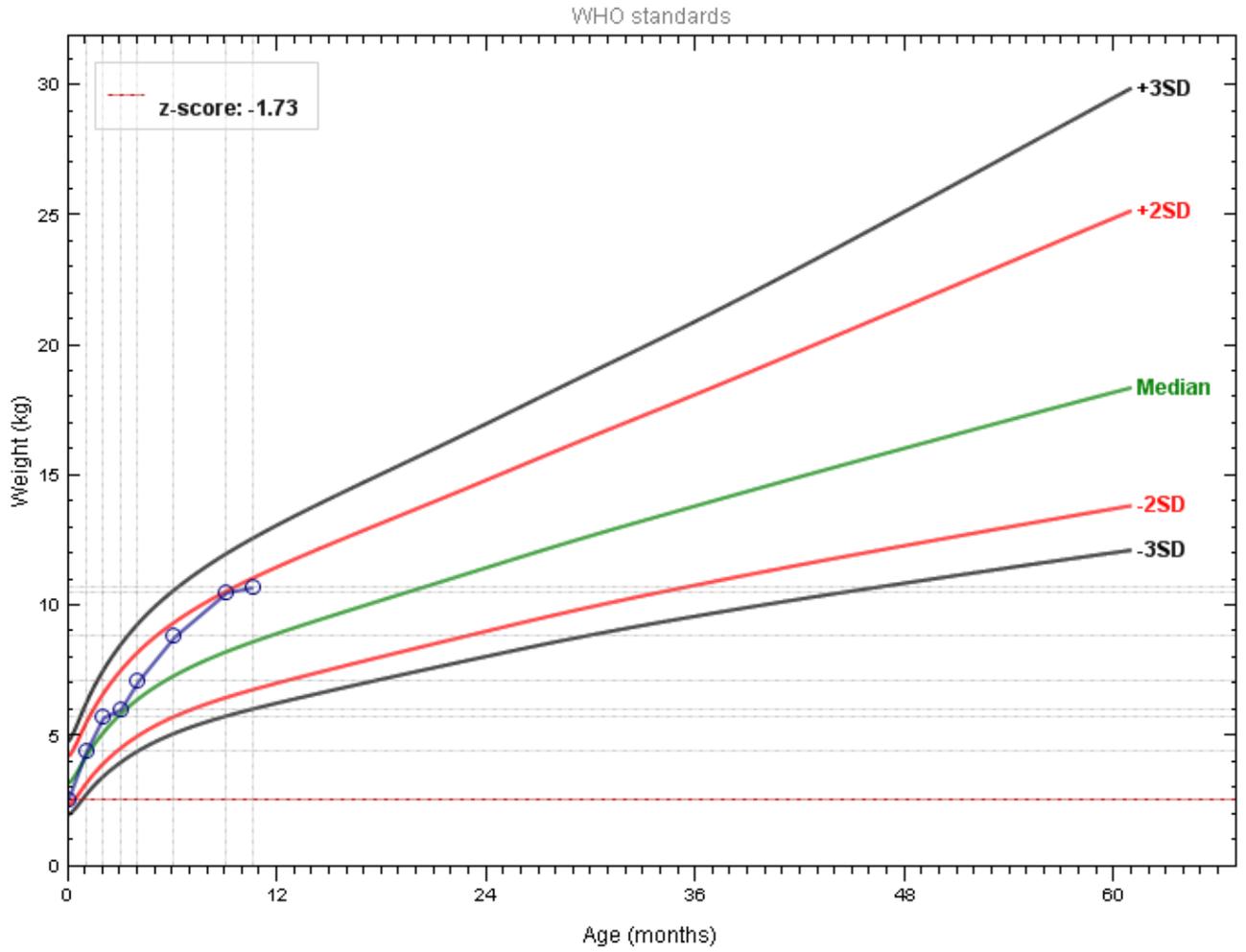
Infant 4 (Exclusively breastfed)



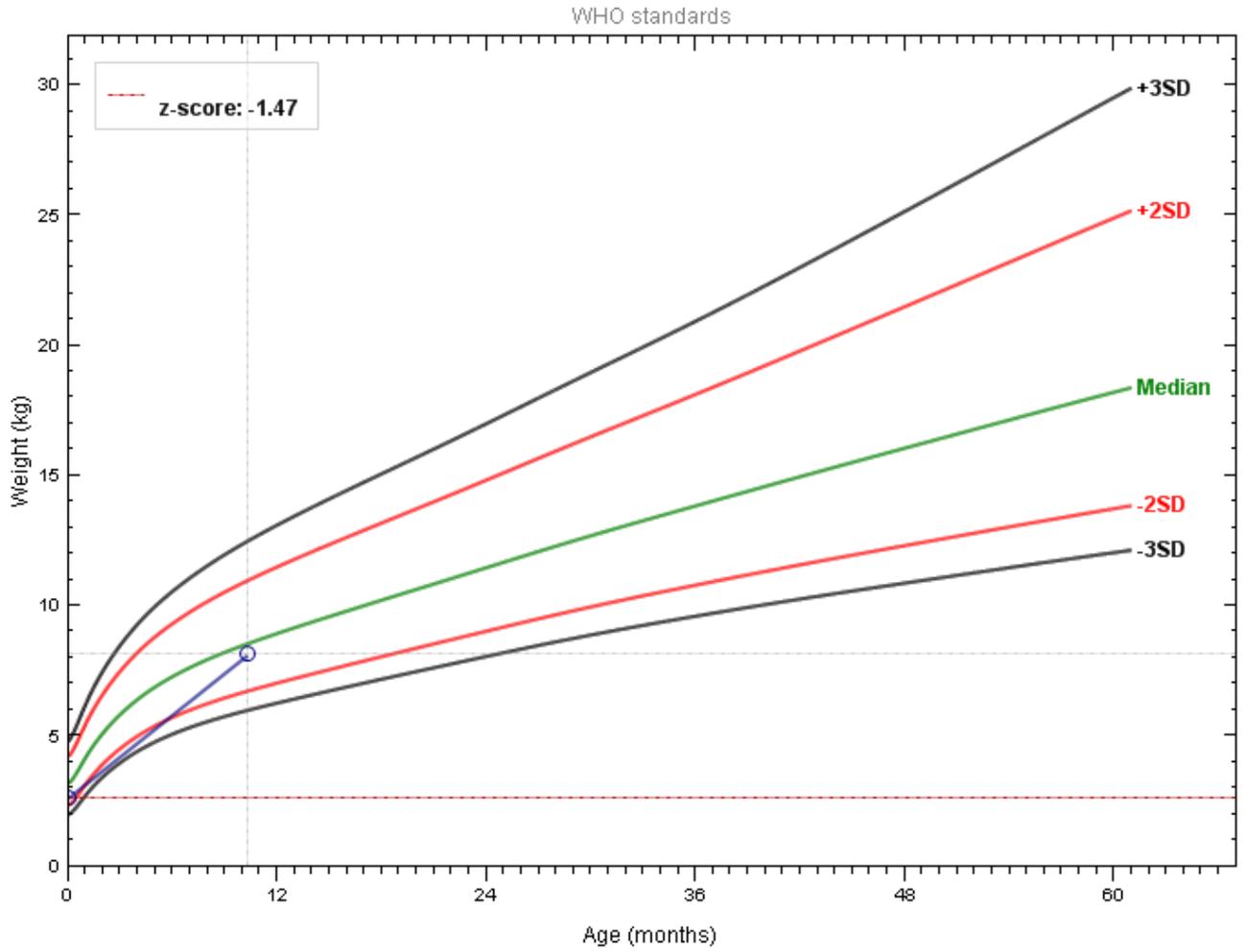
Infant 5



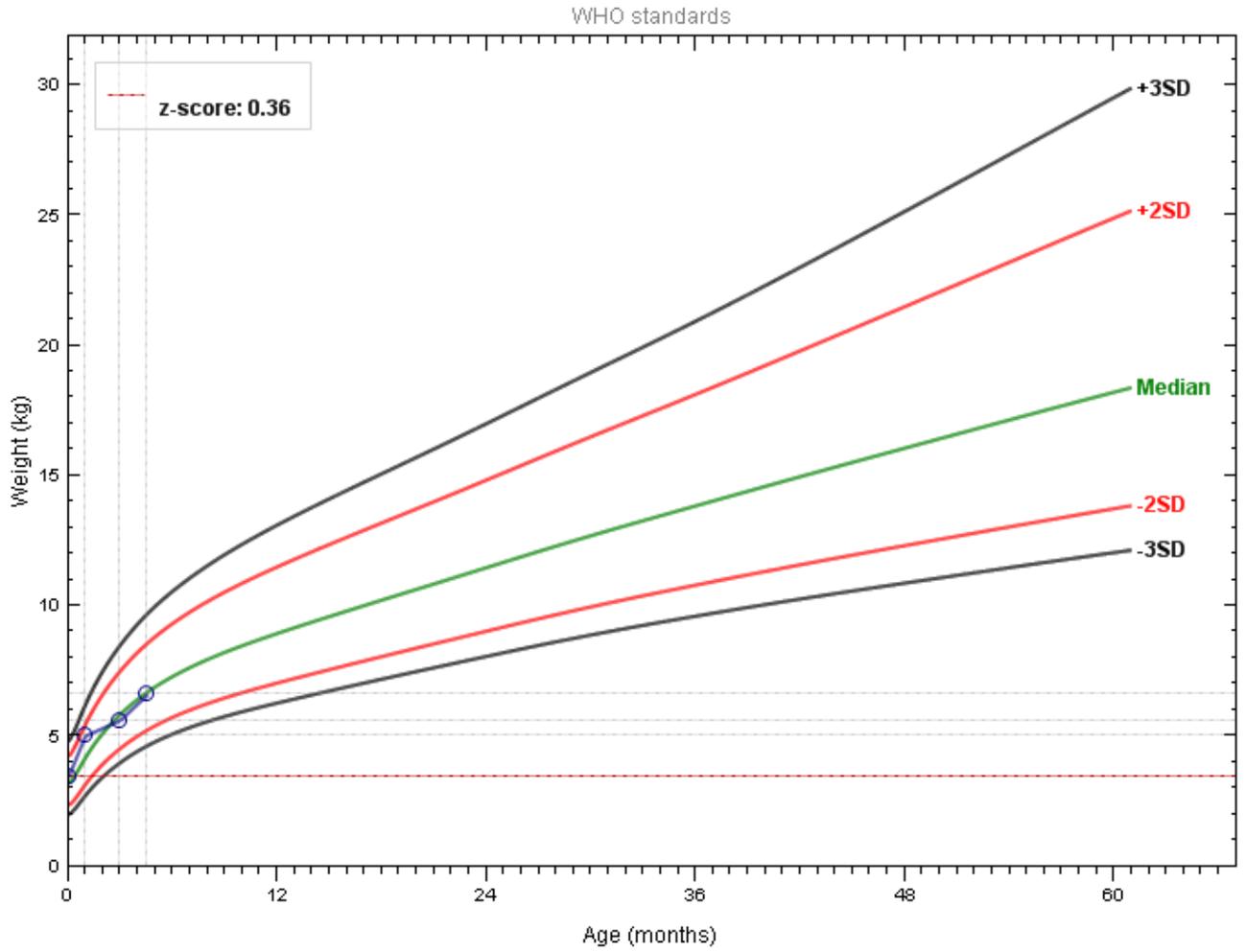
Infant 6



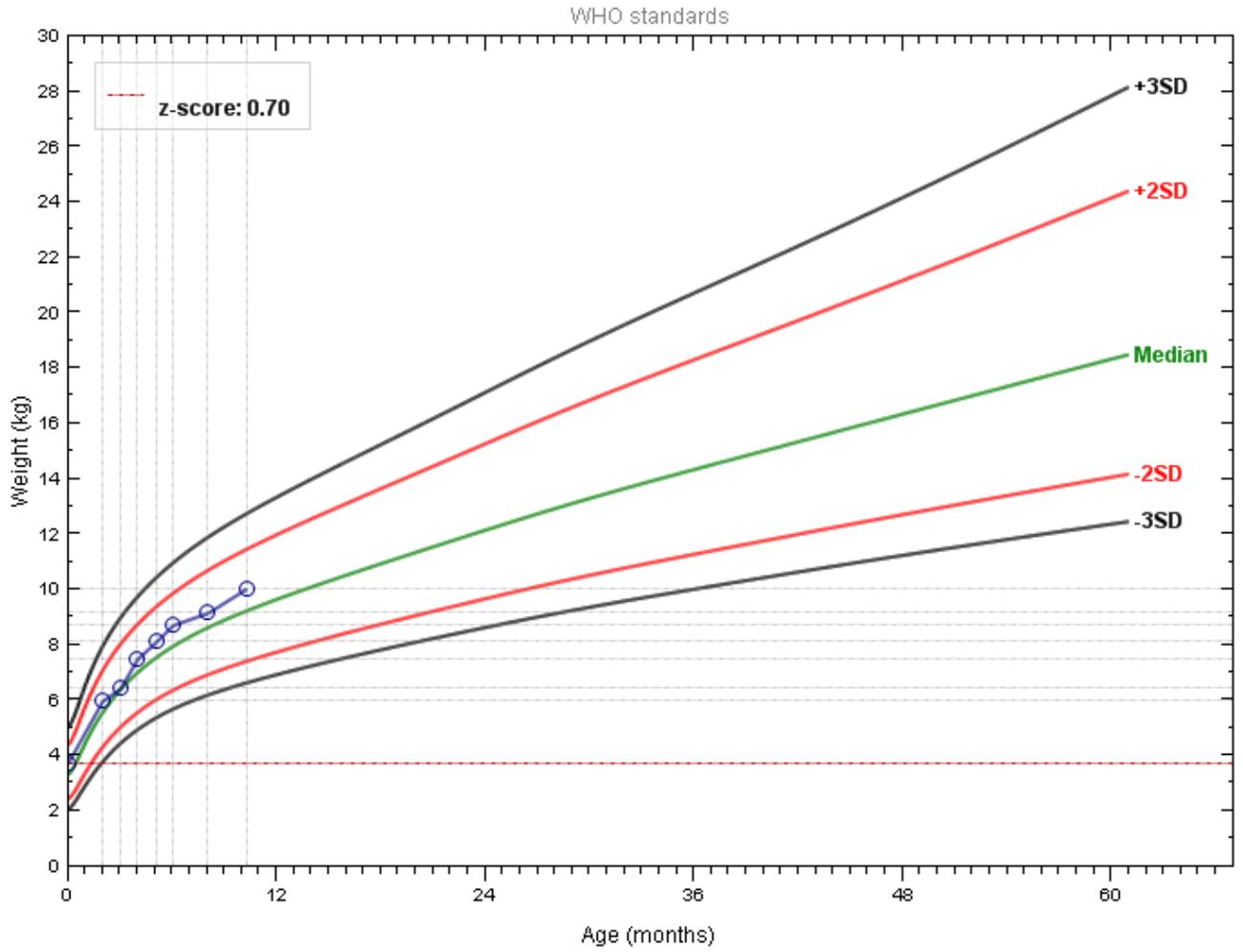
Infant 7 (RtHC not available) (Breastfed for 2/12)



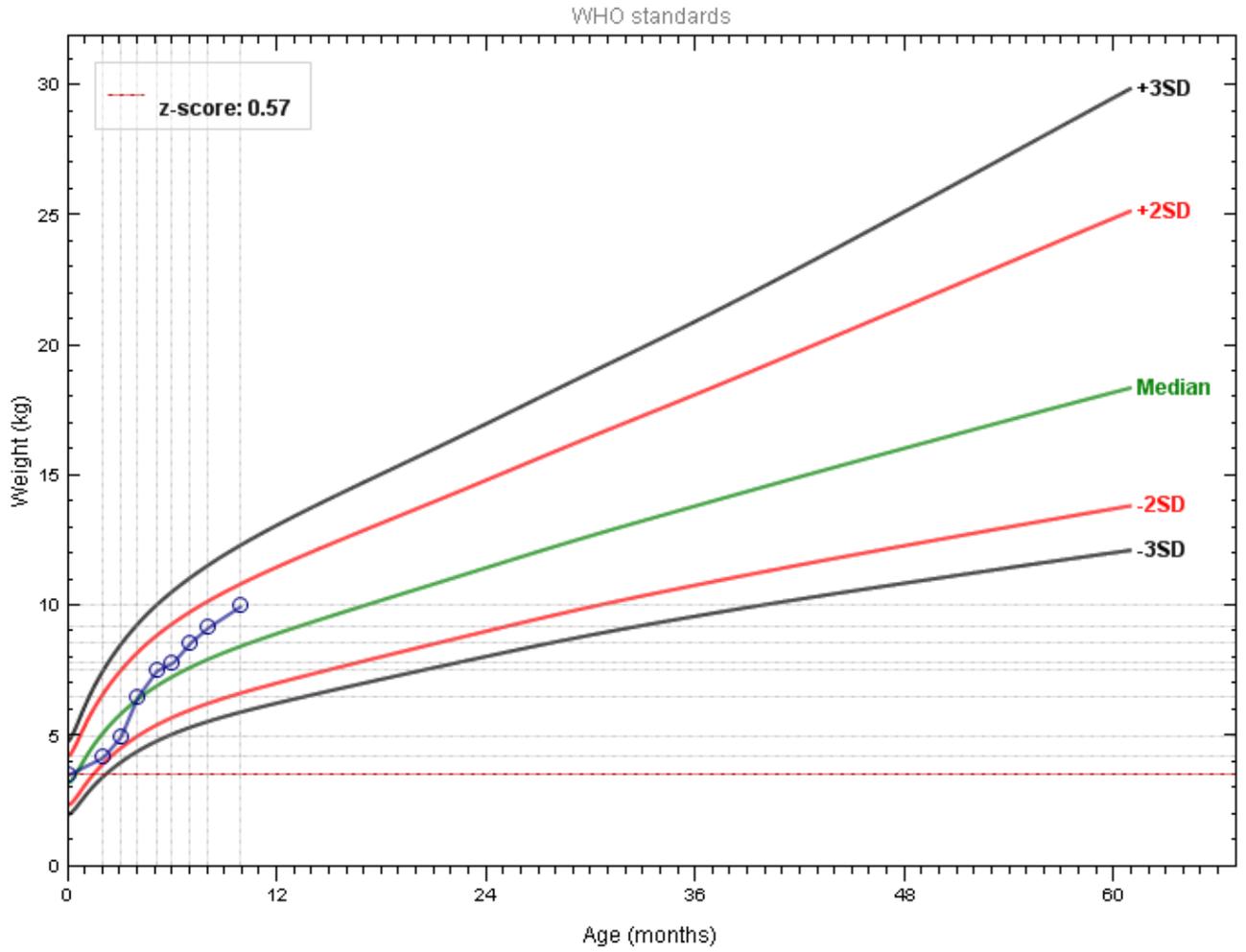
Infant 8 (Breastfed for 2/12)



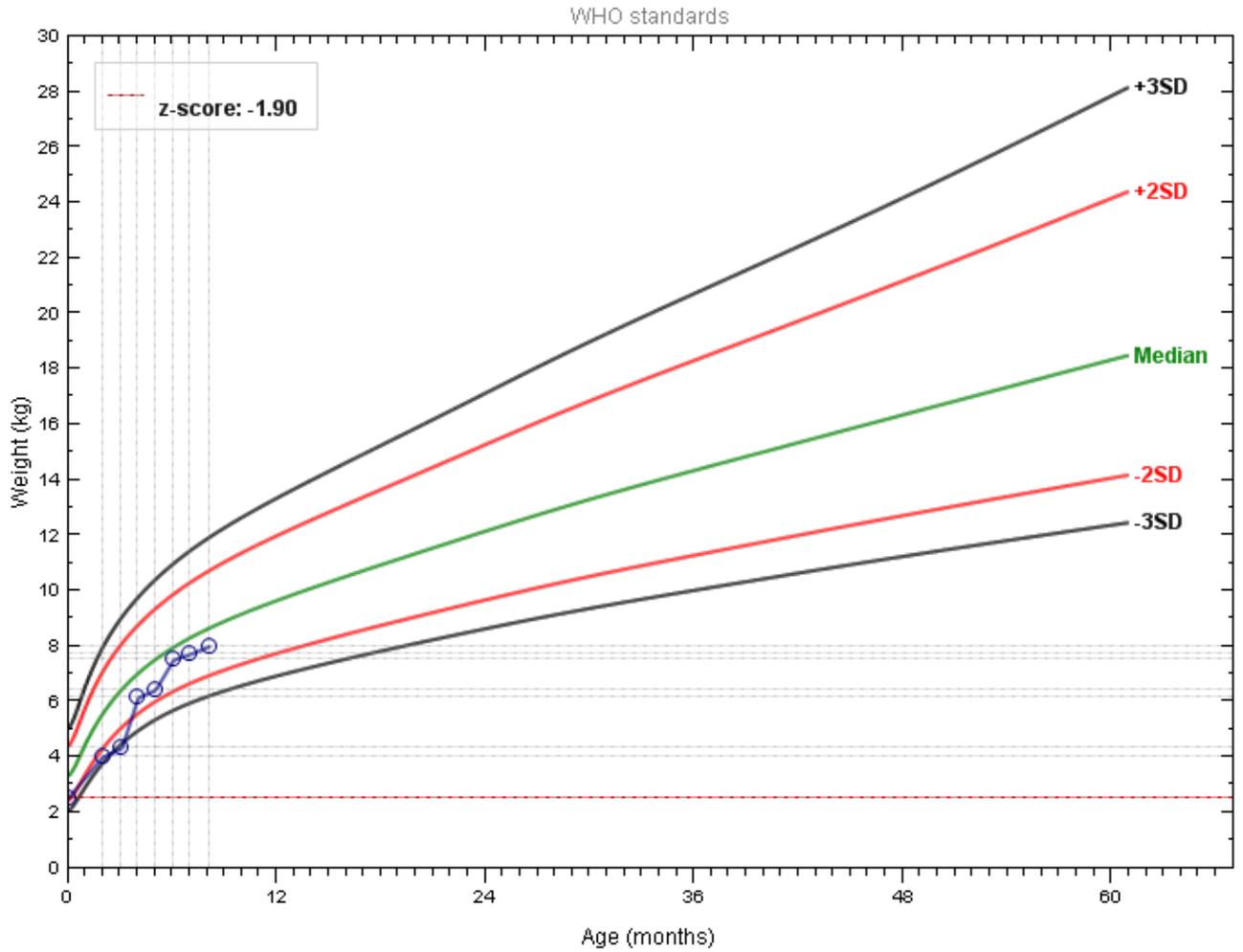
Infant 9 (Breastfed for 1/12)



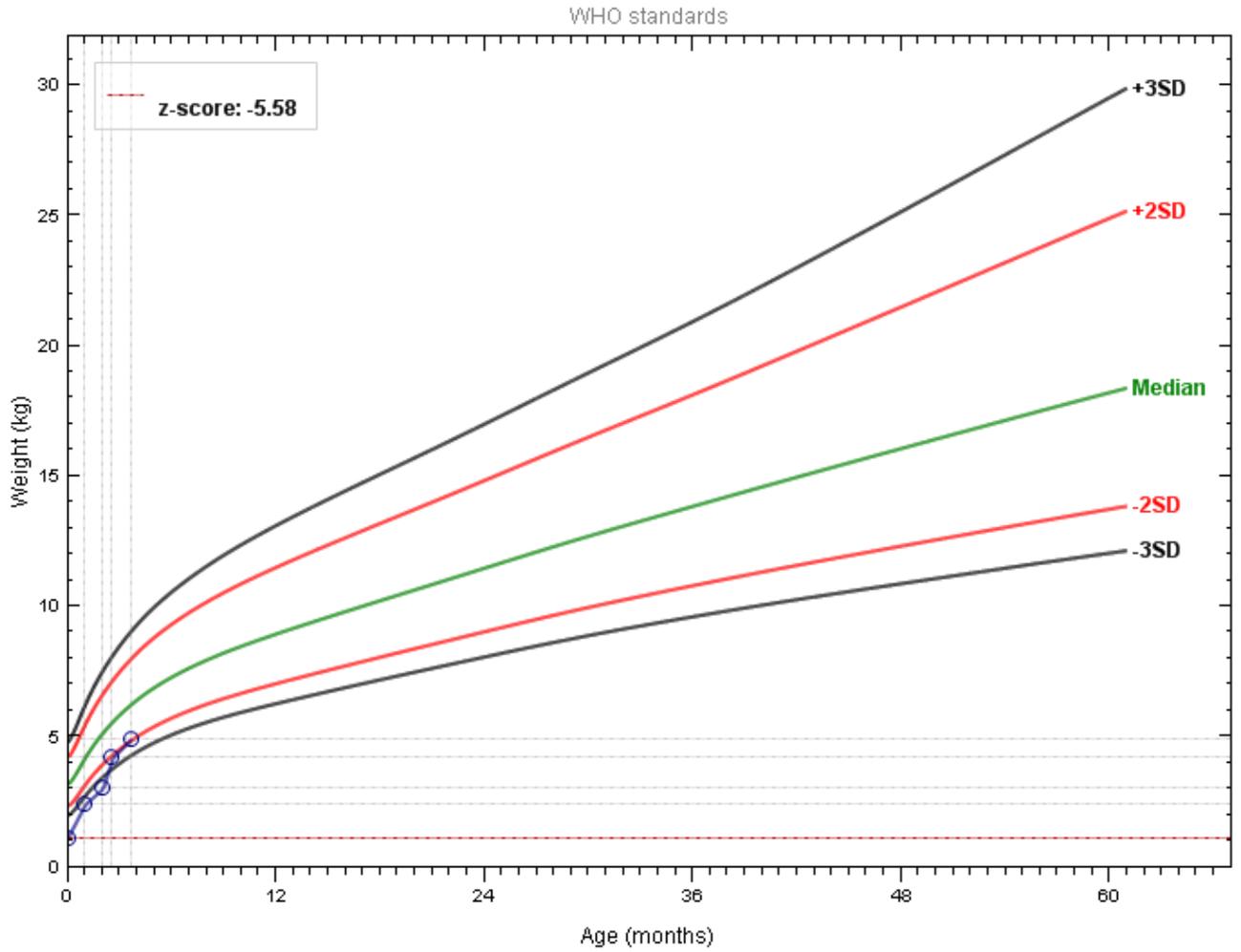
Infant 10



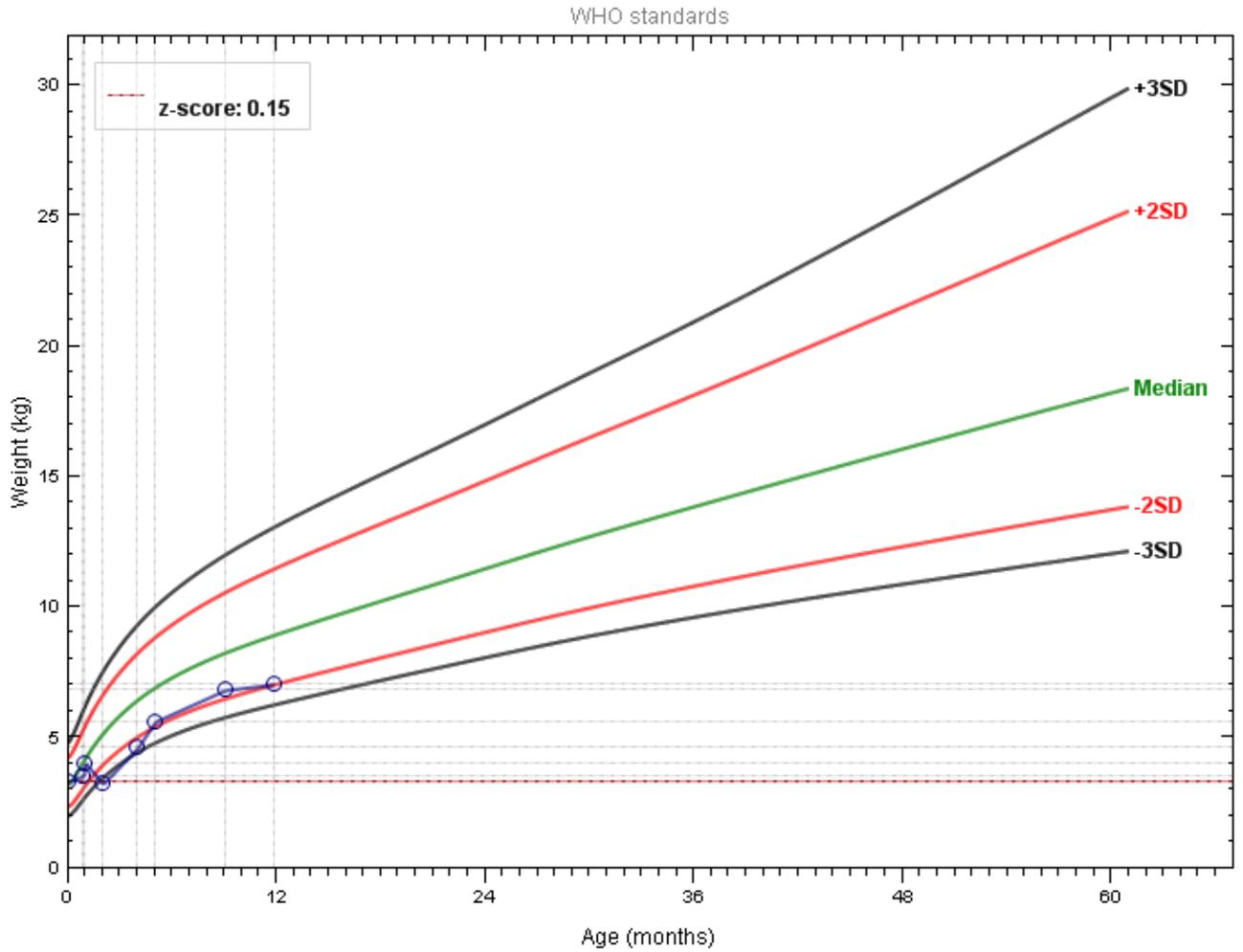
Infant 11



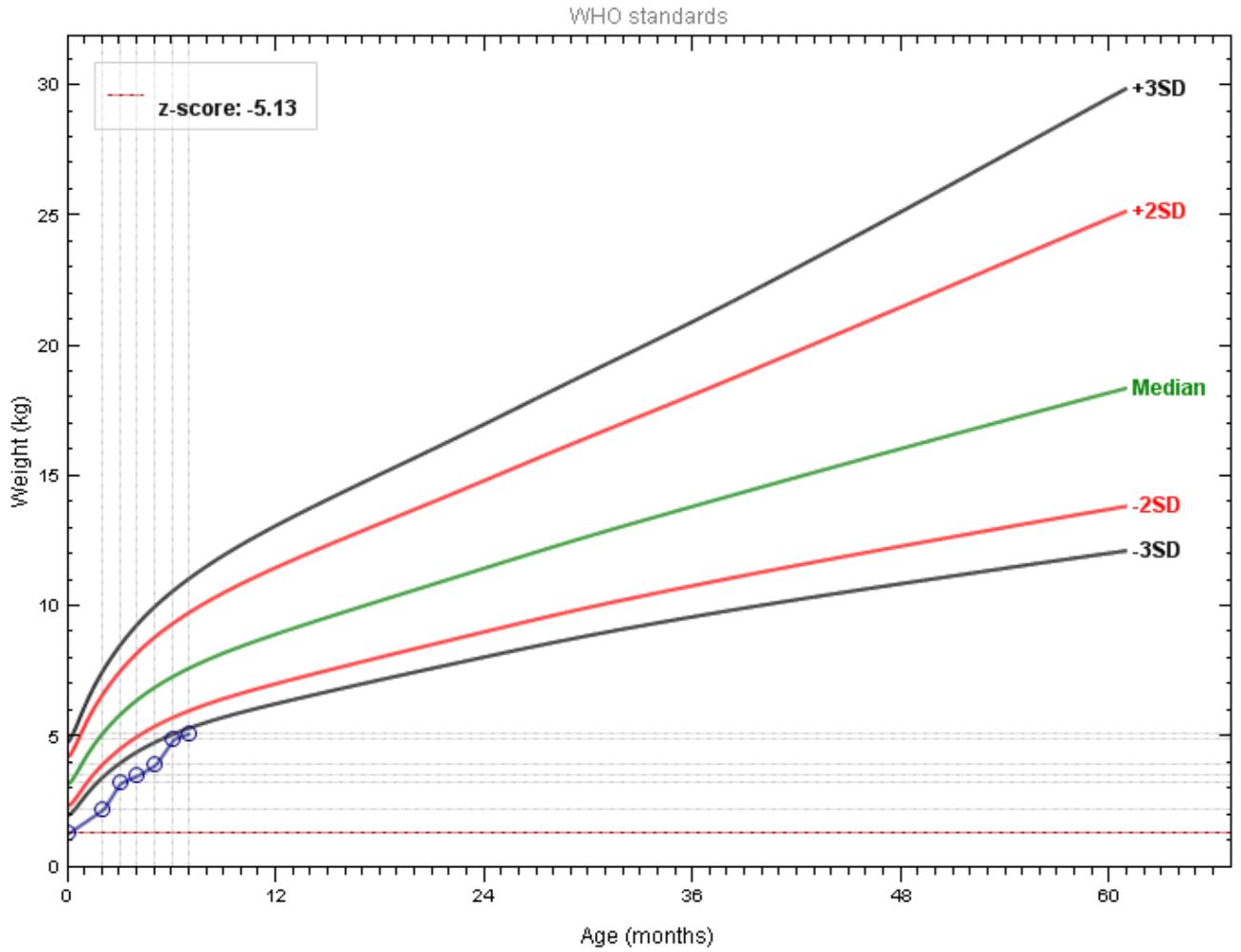
Infant 12 (Breastfed for 1/12)



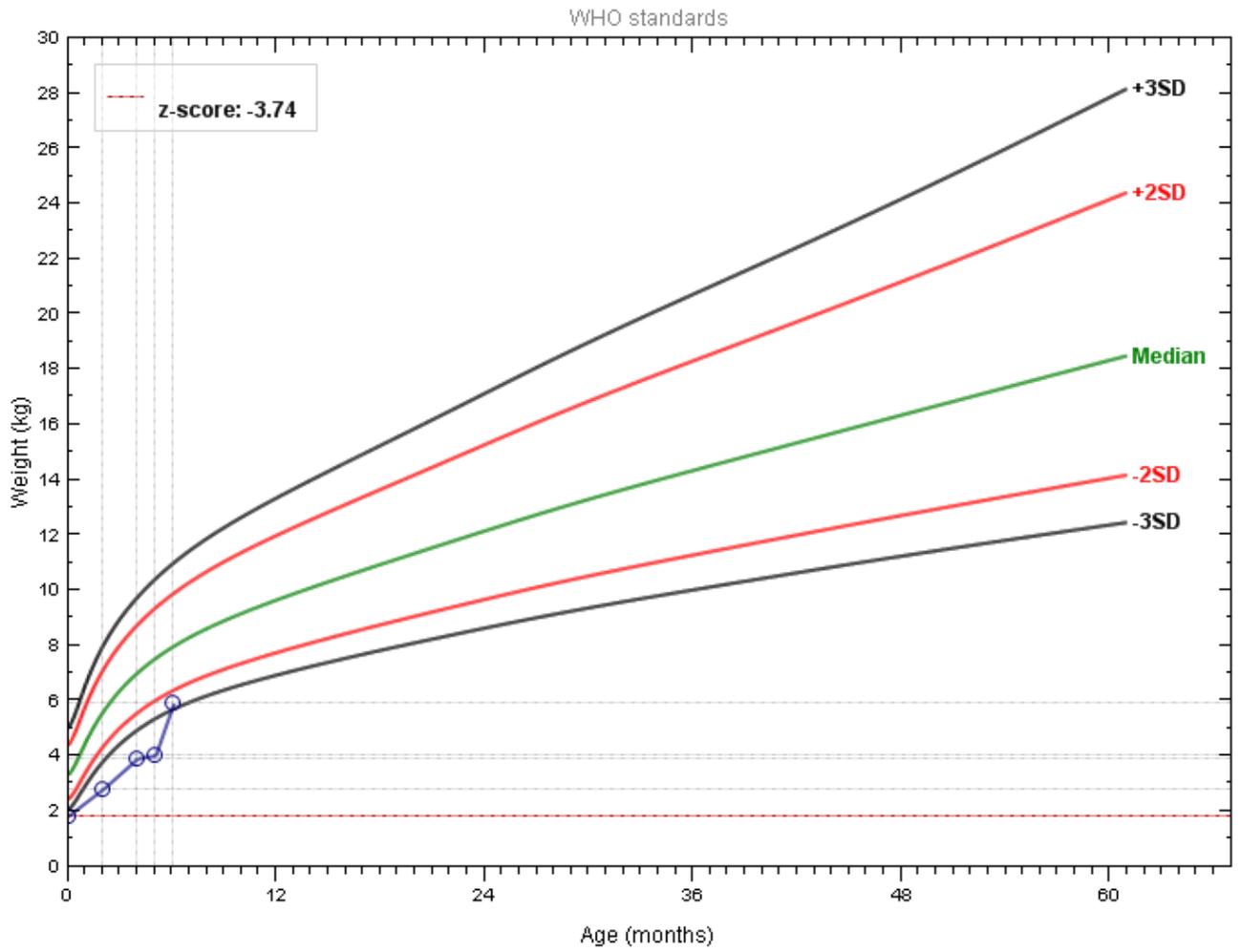
Infant 13



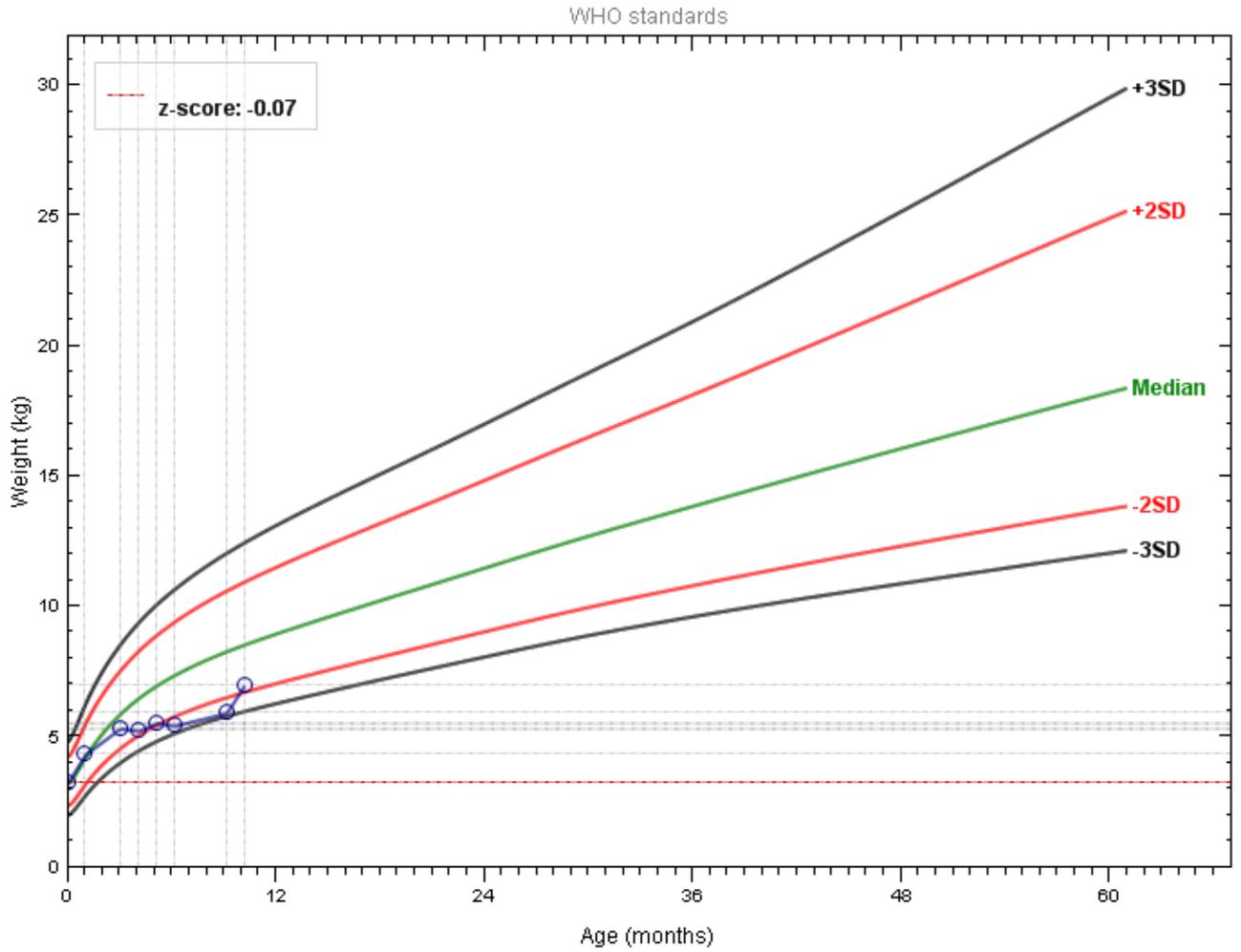
Infant 14(Breastfed for 1/12)



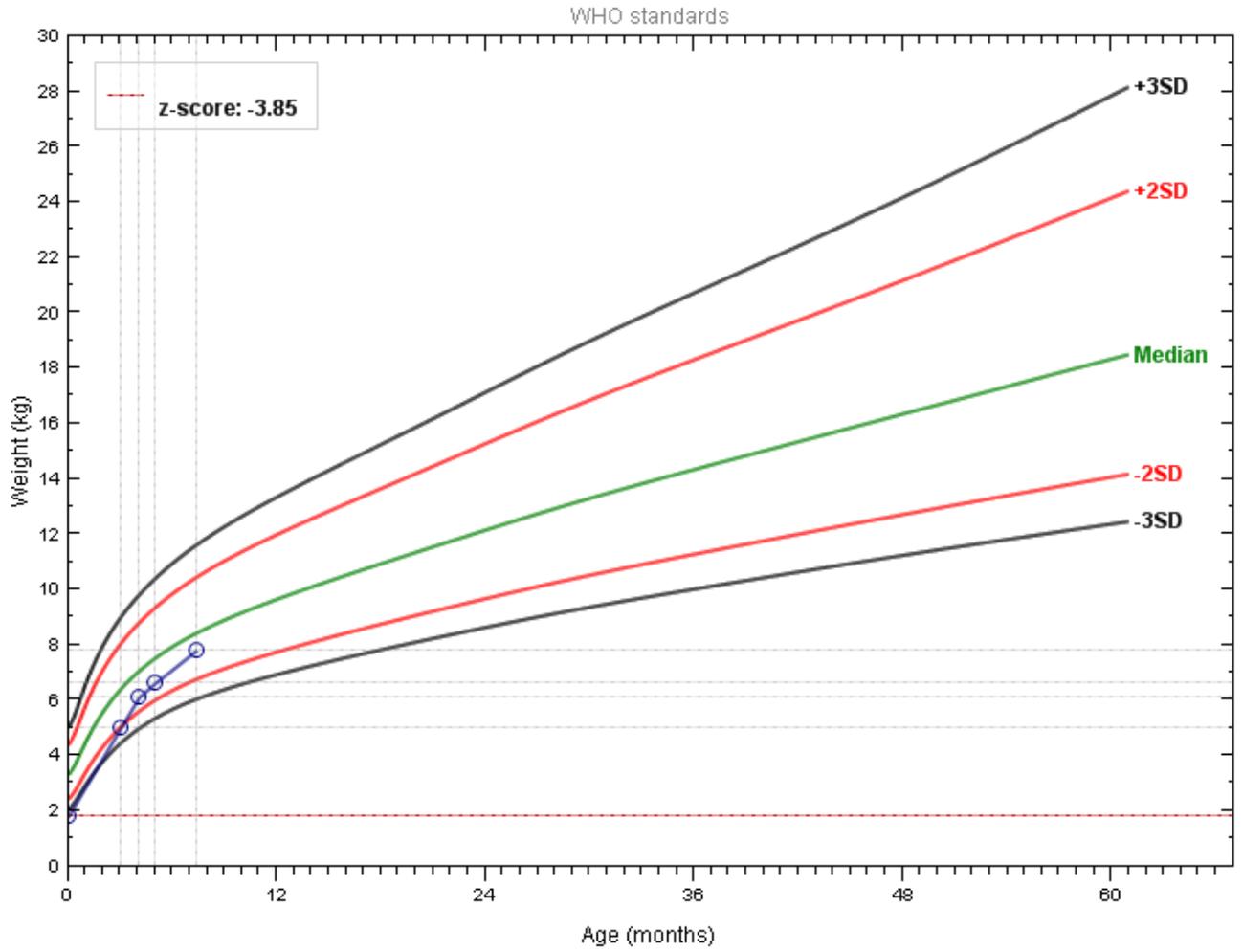
Infant 15



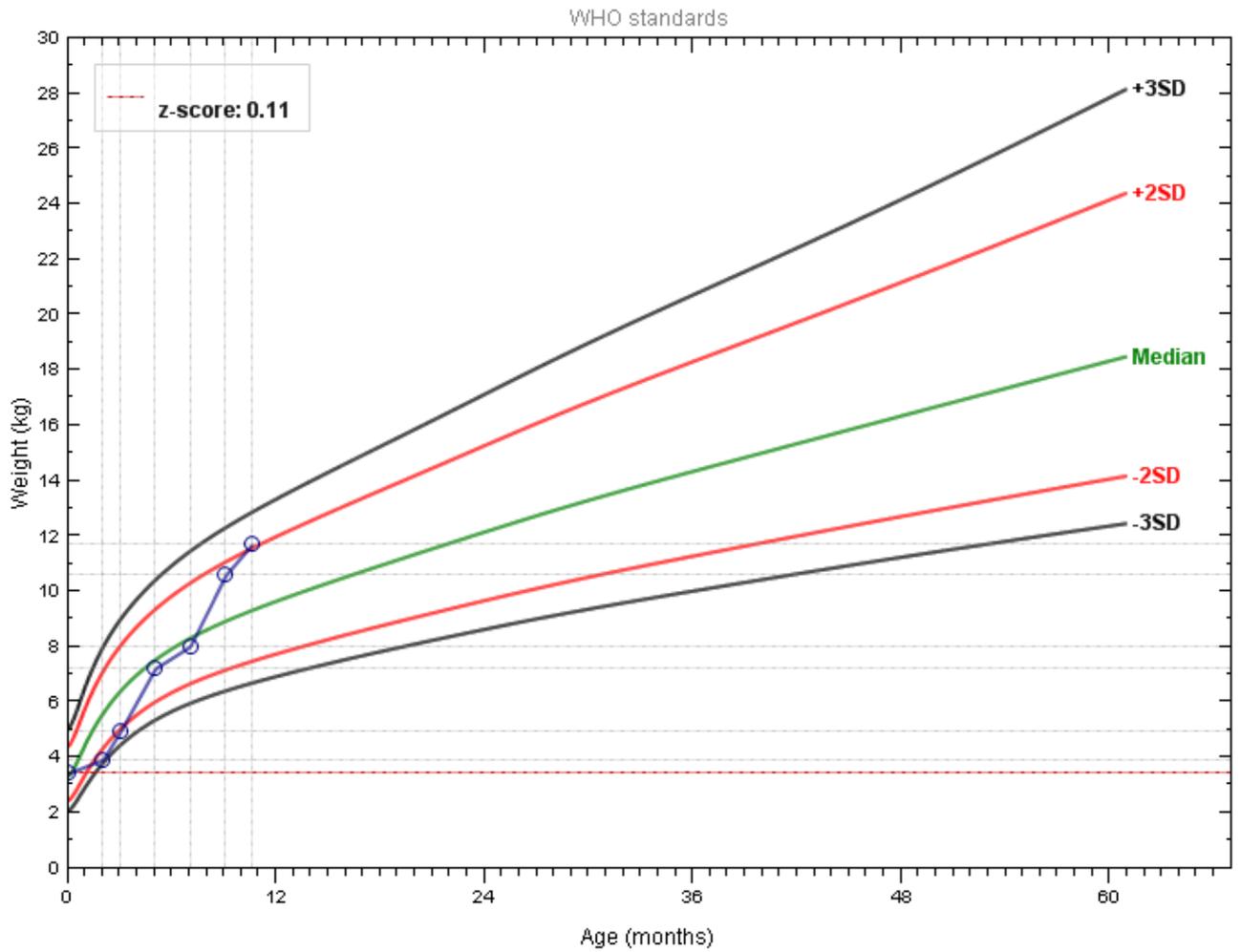
Infant 16 (Breastfed for 3/12)



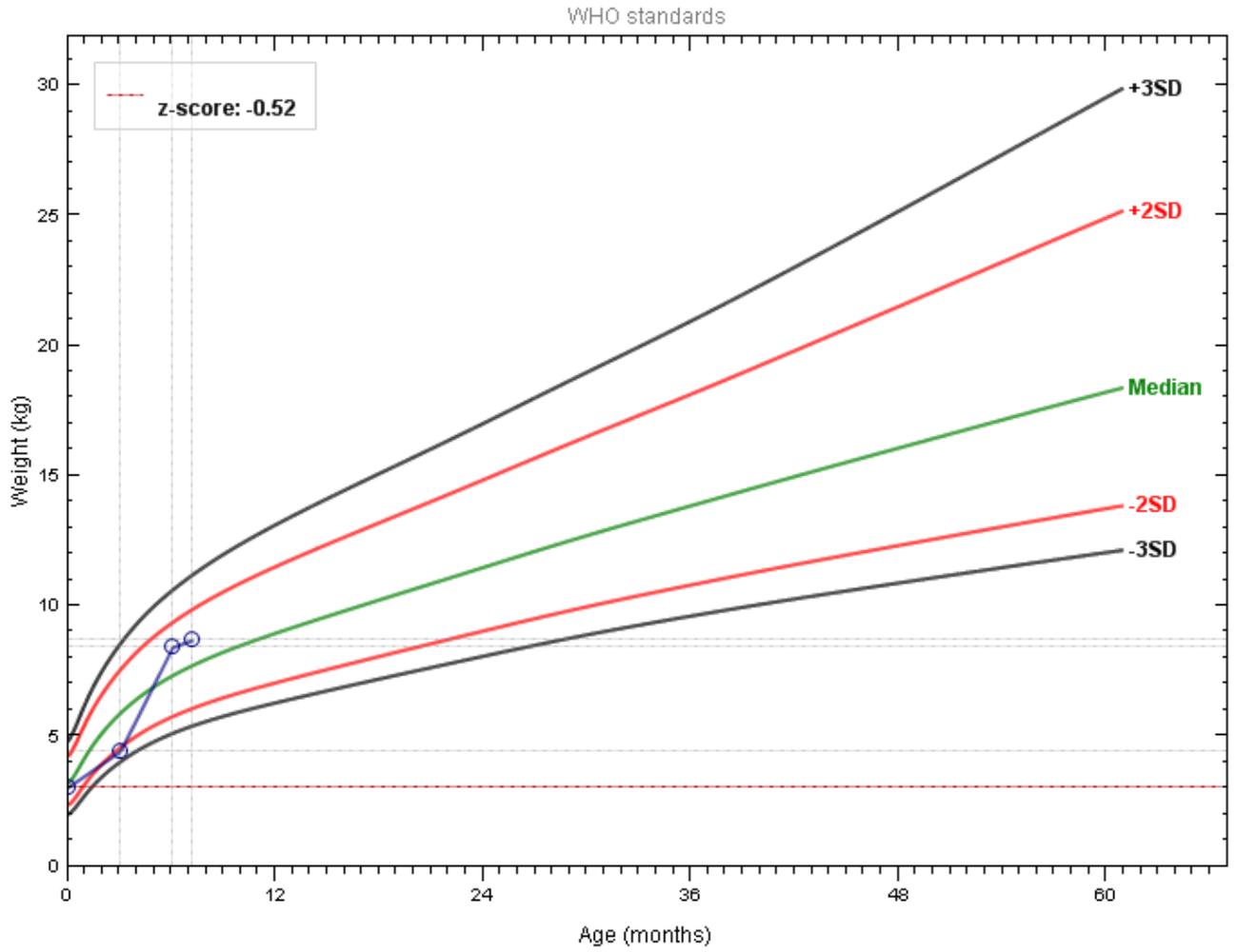
Infant 17



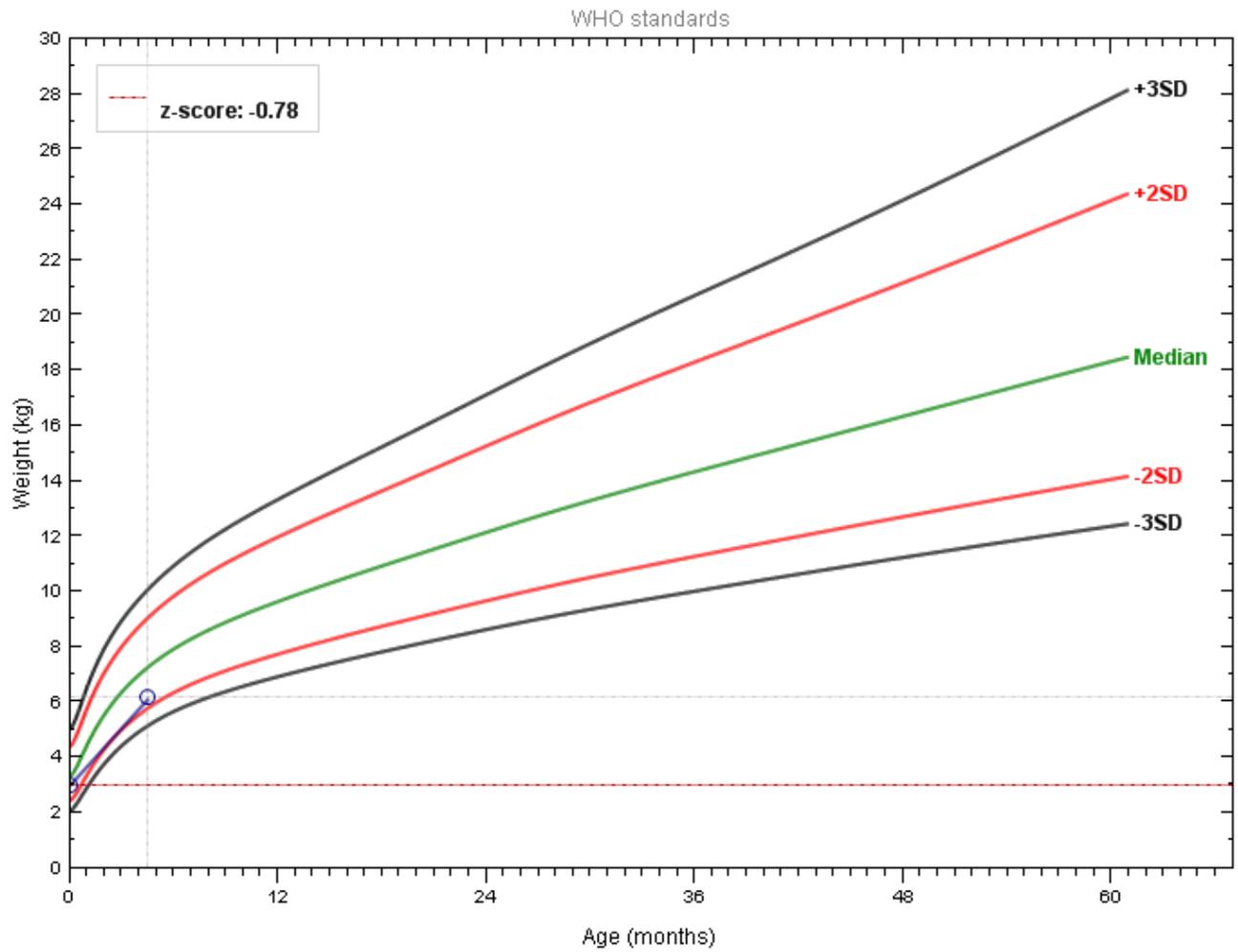
Infant 18



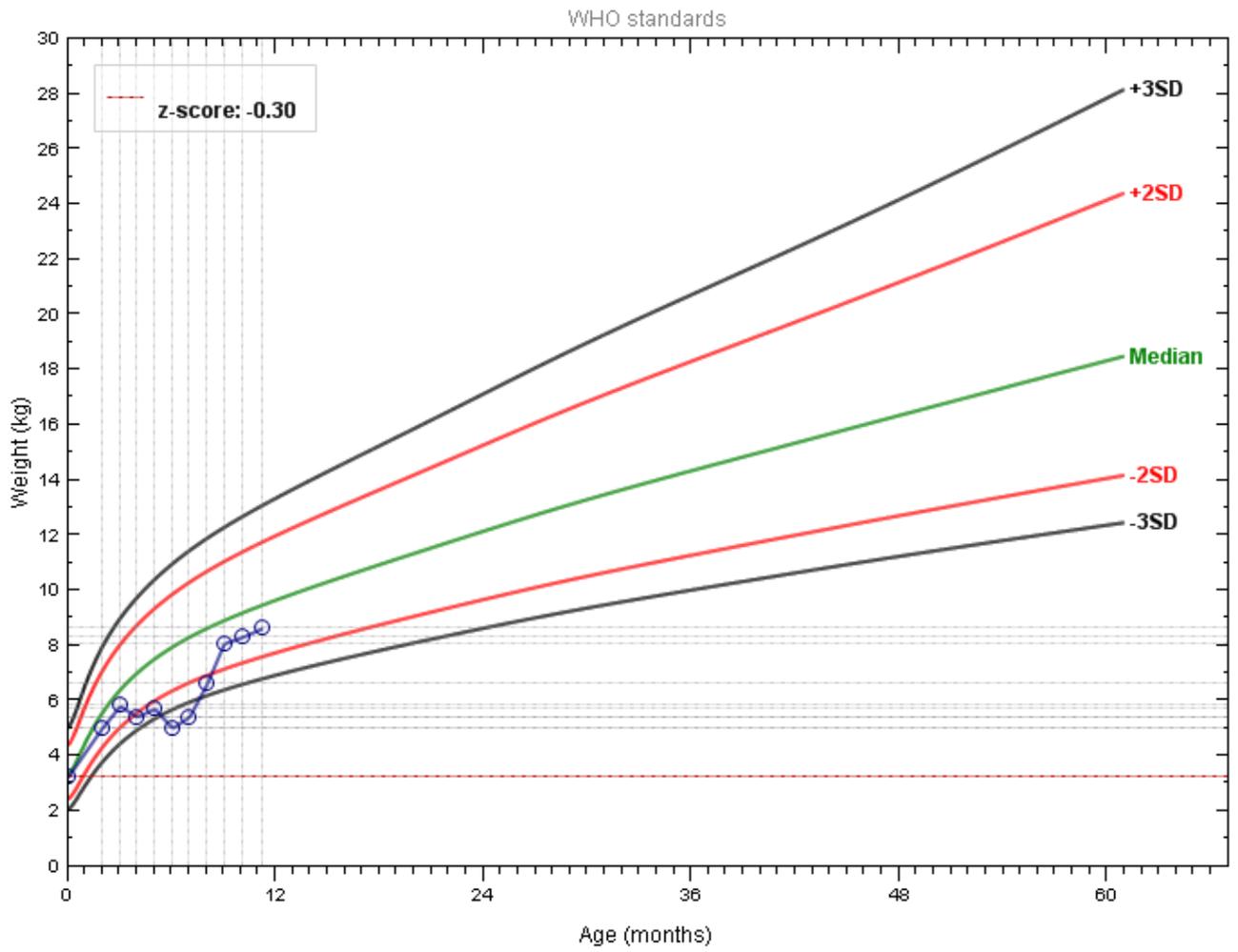
Infant 19 (BF for 1 week)



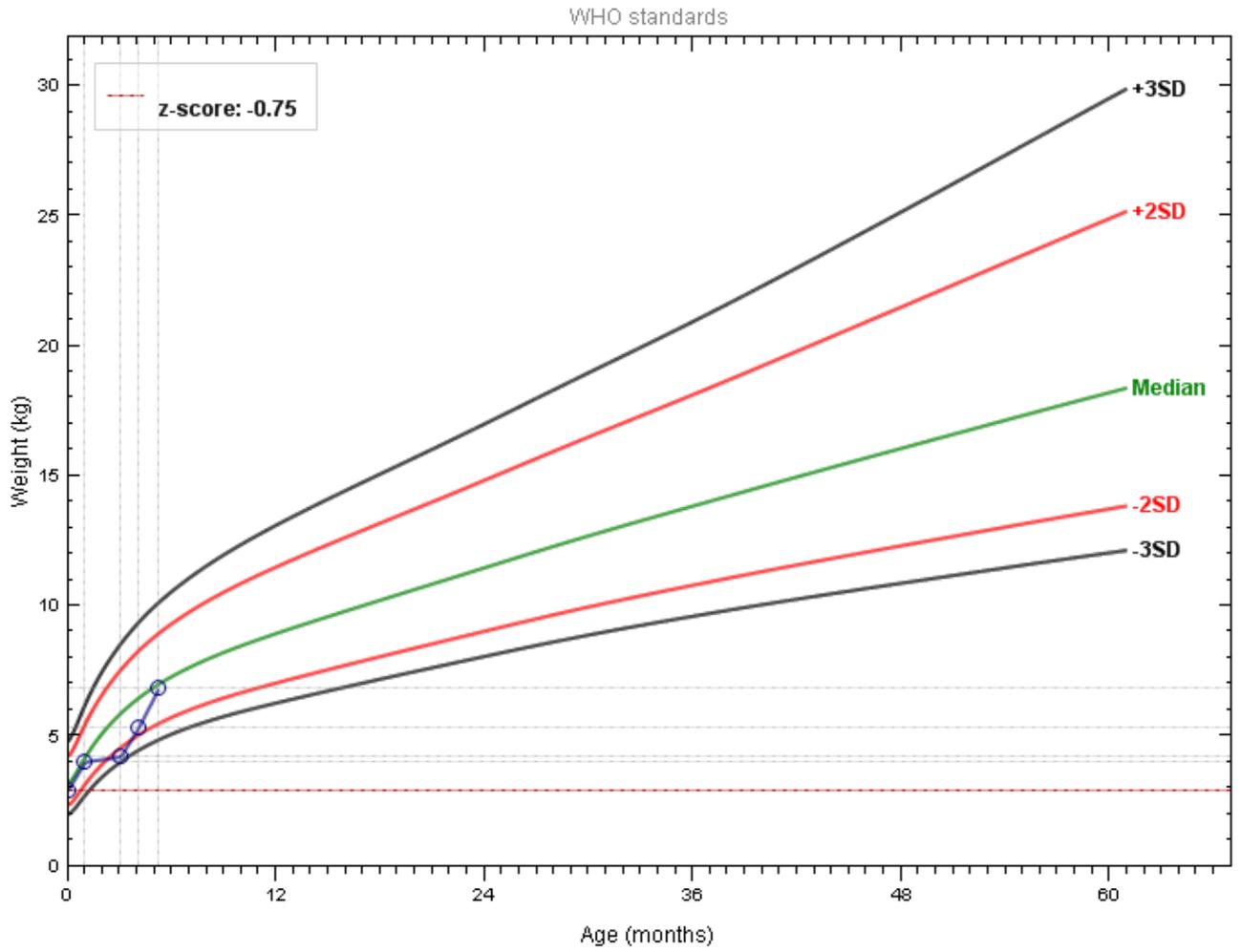
Infant 20 (RtHC not available; breastfed for 1/12)



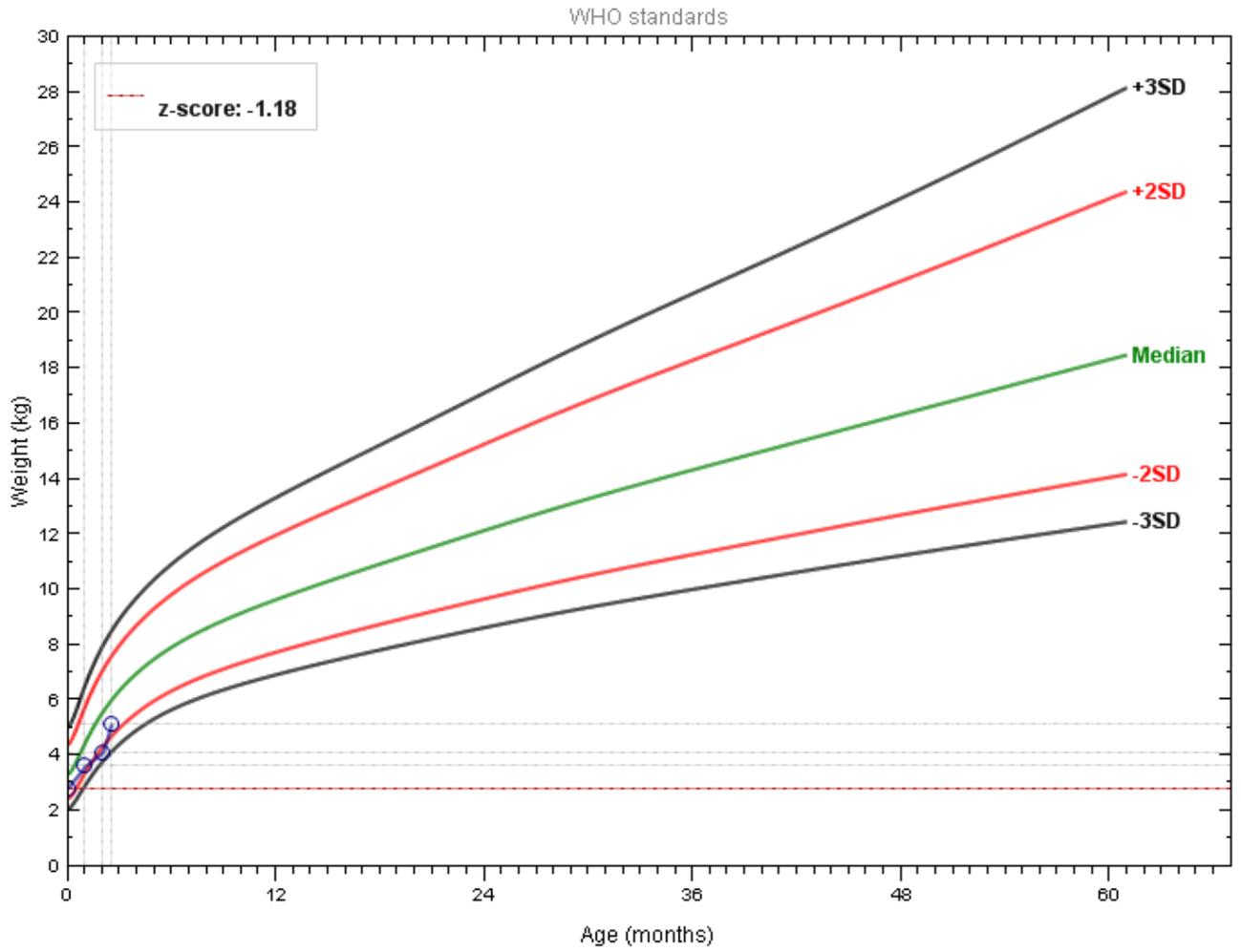
Infant 21 (Breastfed for 4/12)



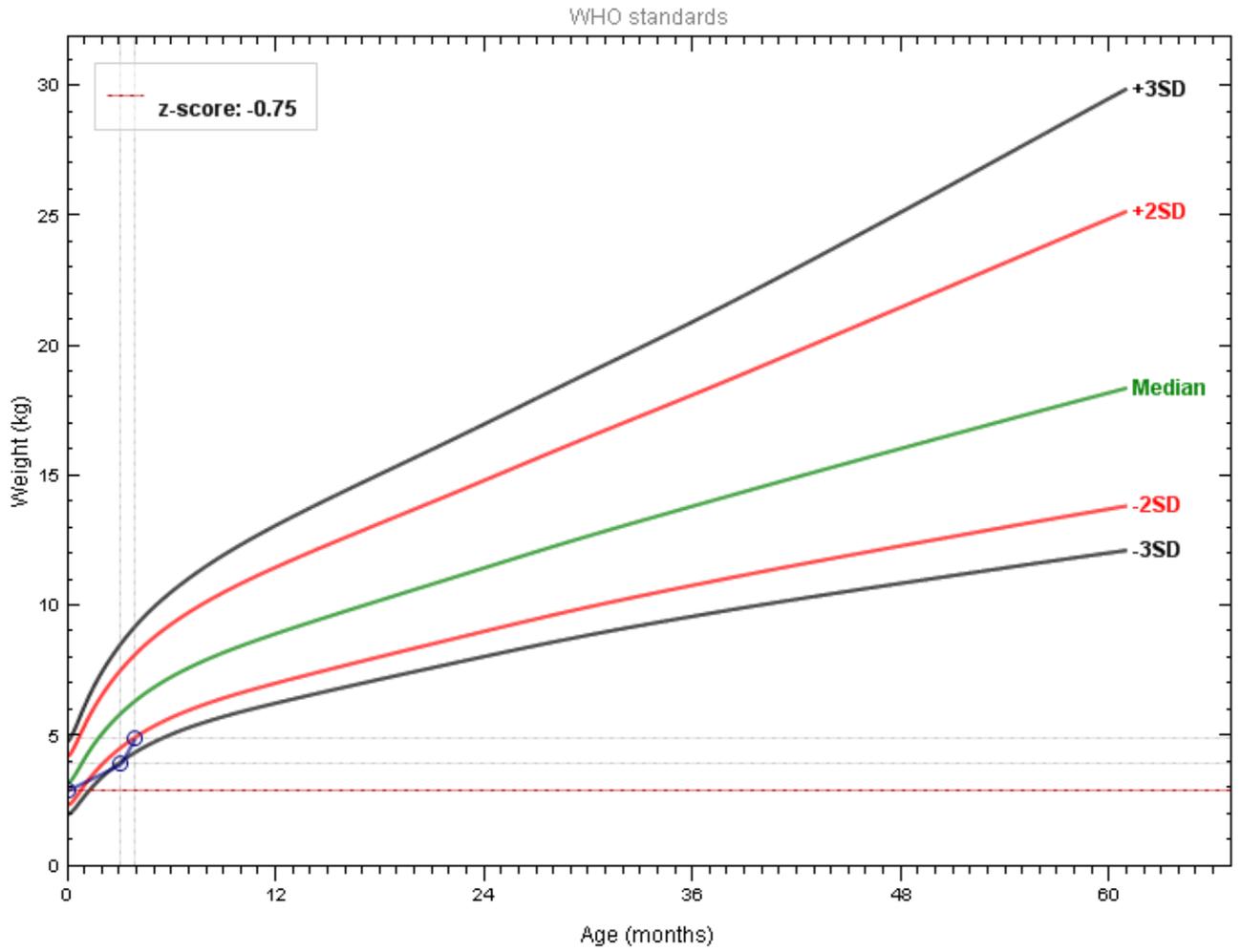
Infant 22



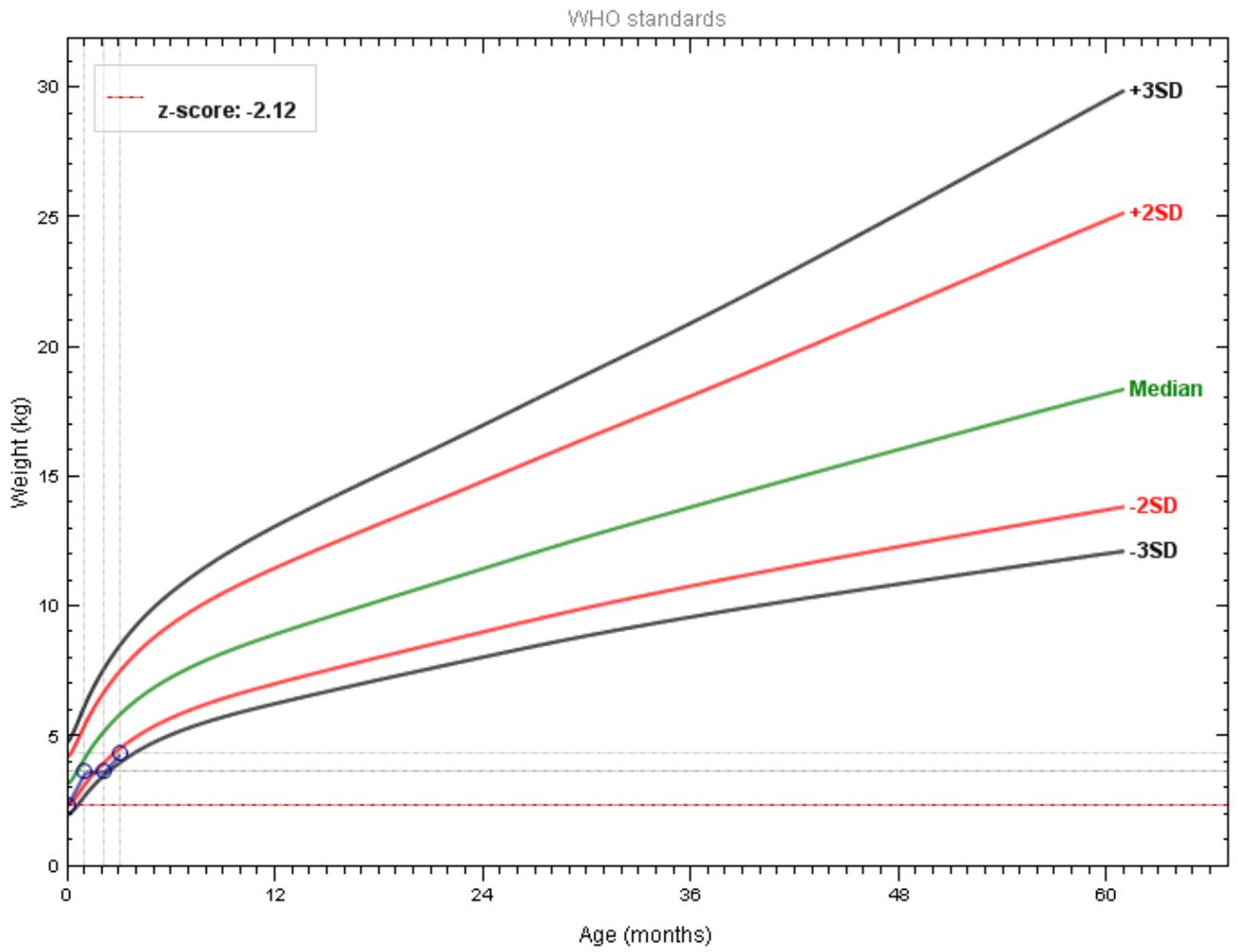
Infant 23



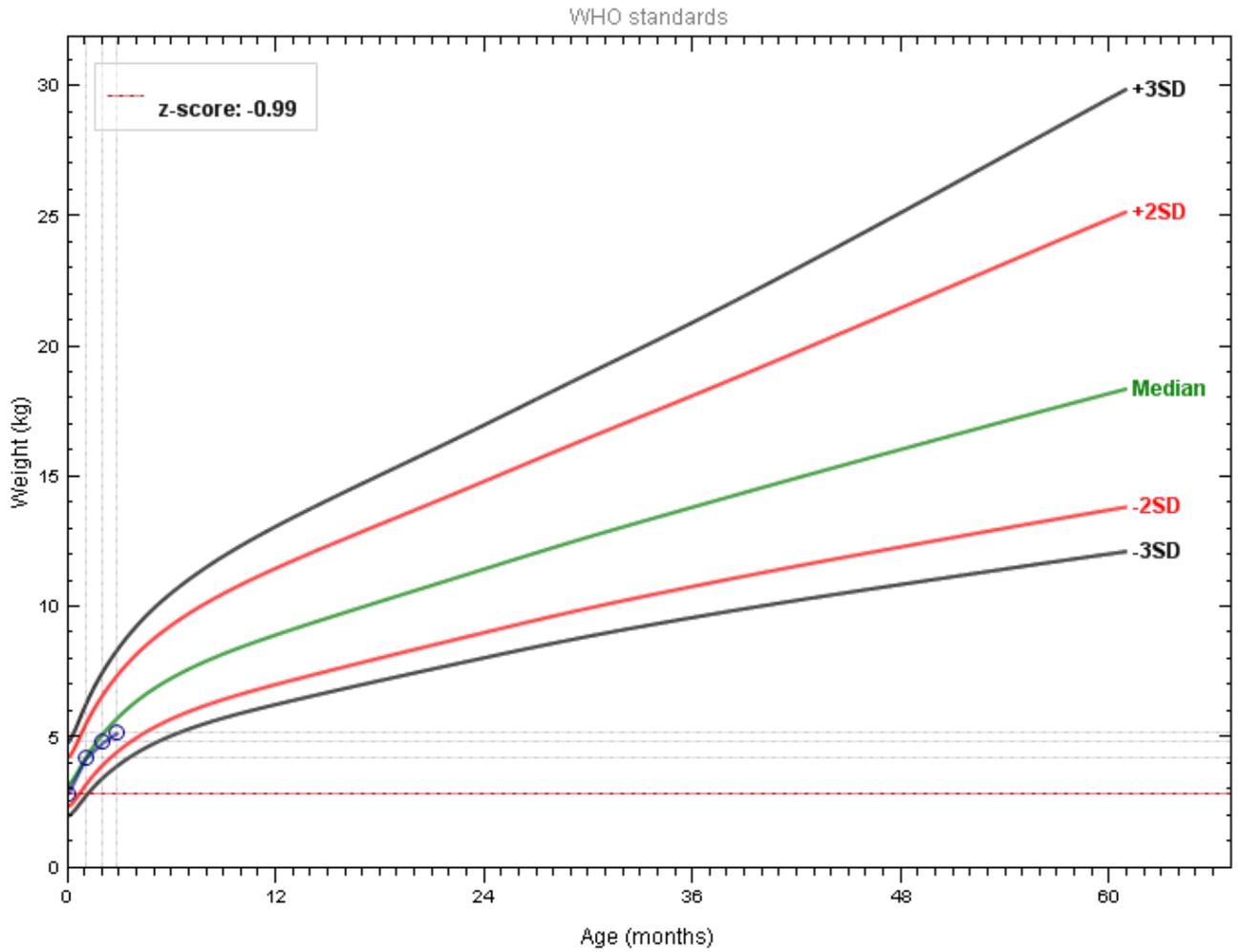
Infant 24



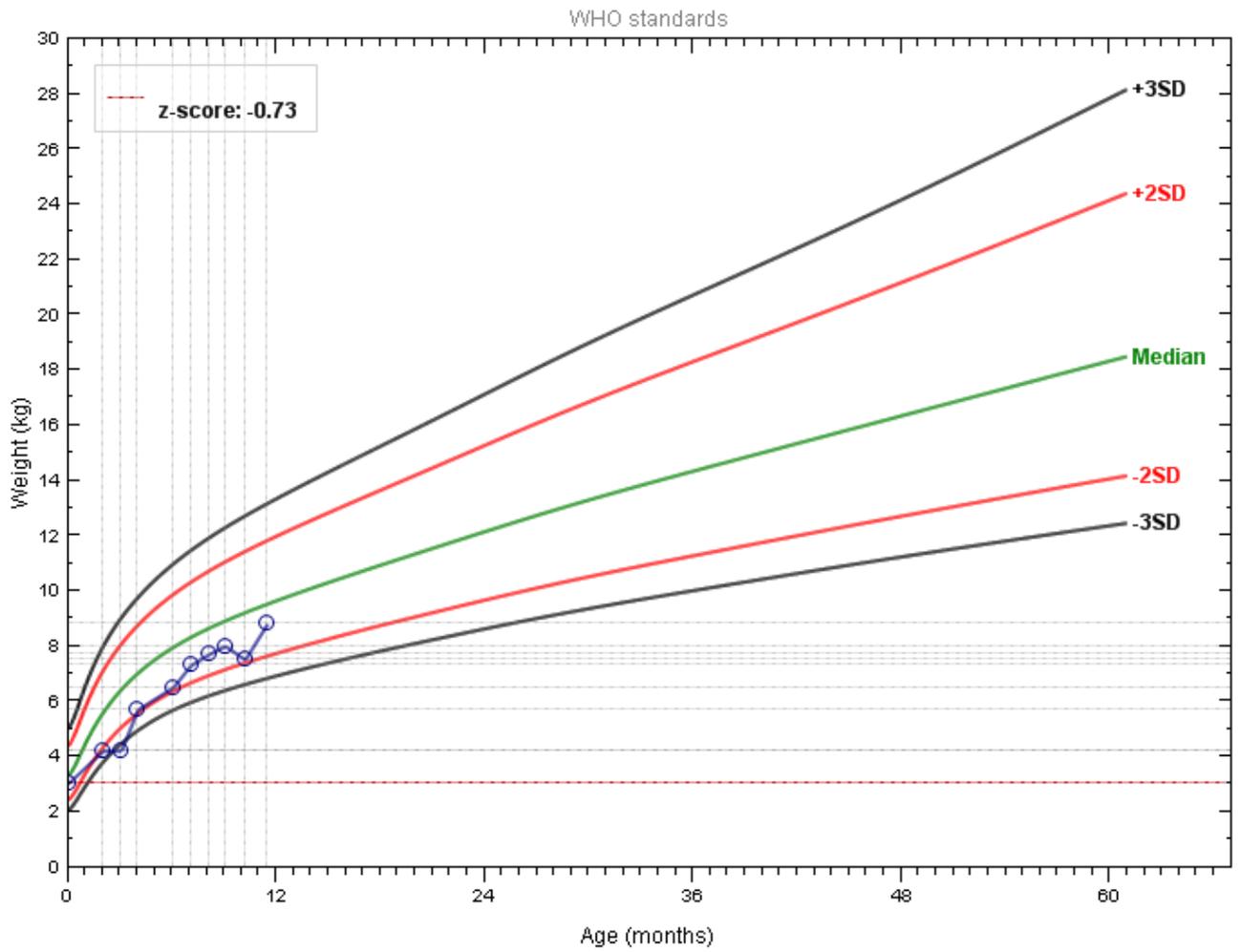
Infant 25



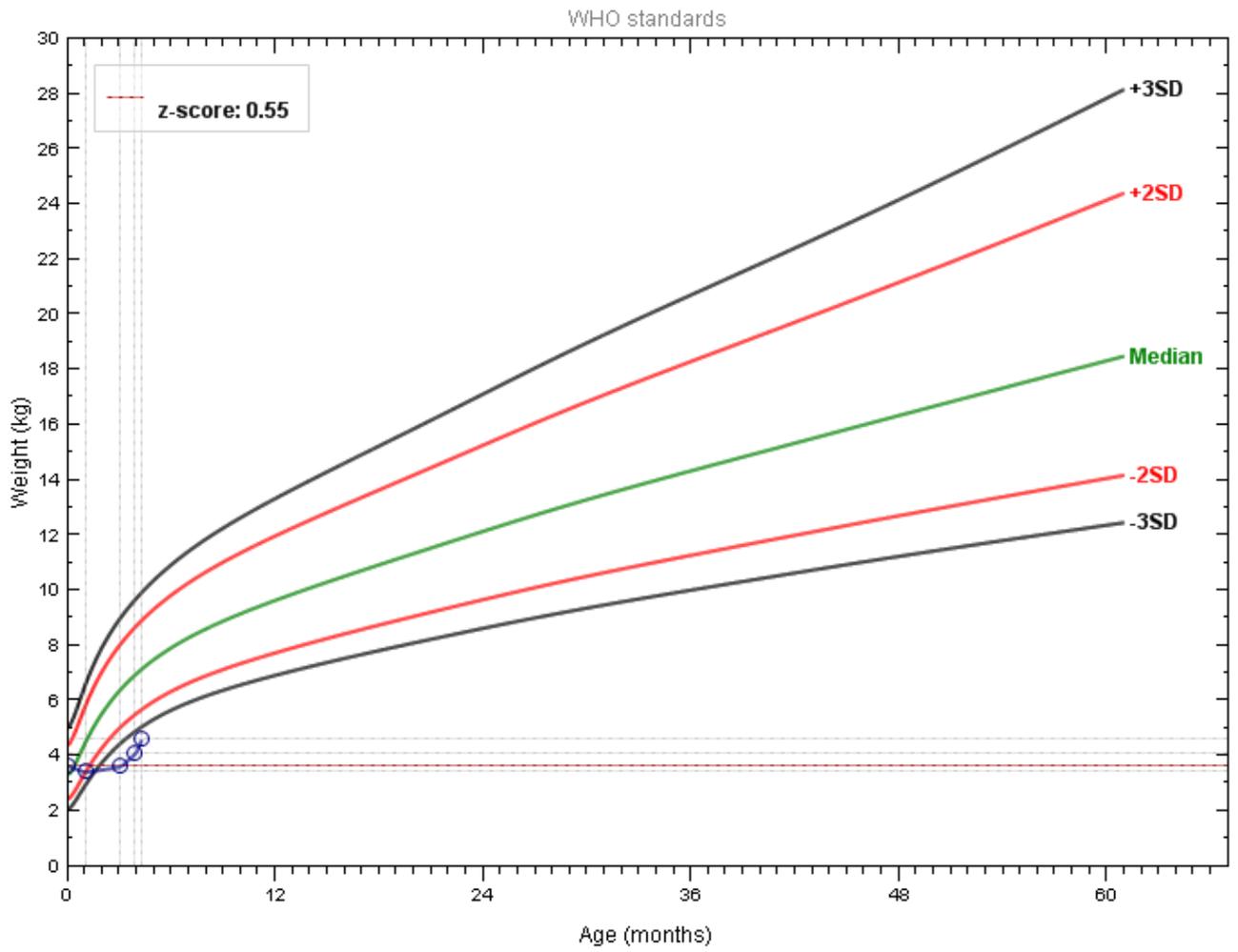
Infant 26 (Exclusively breastfed)



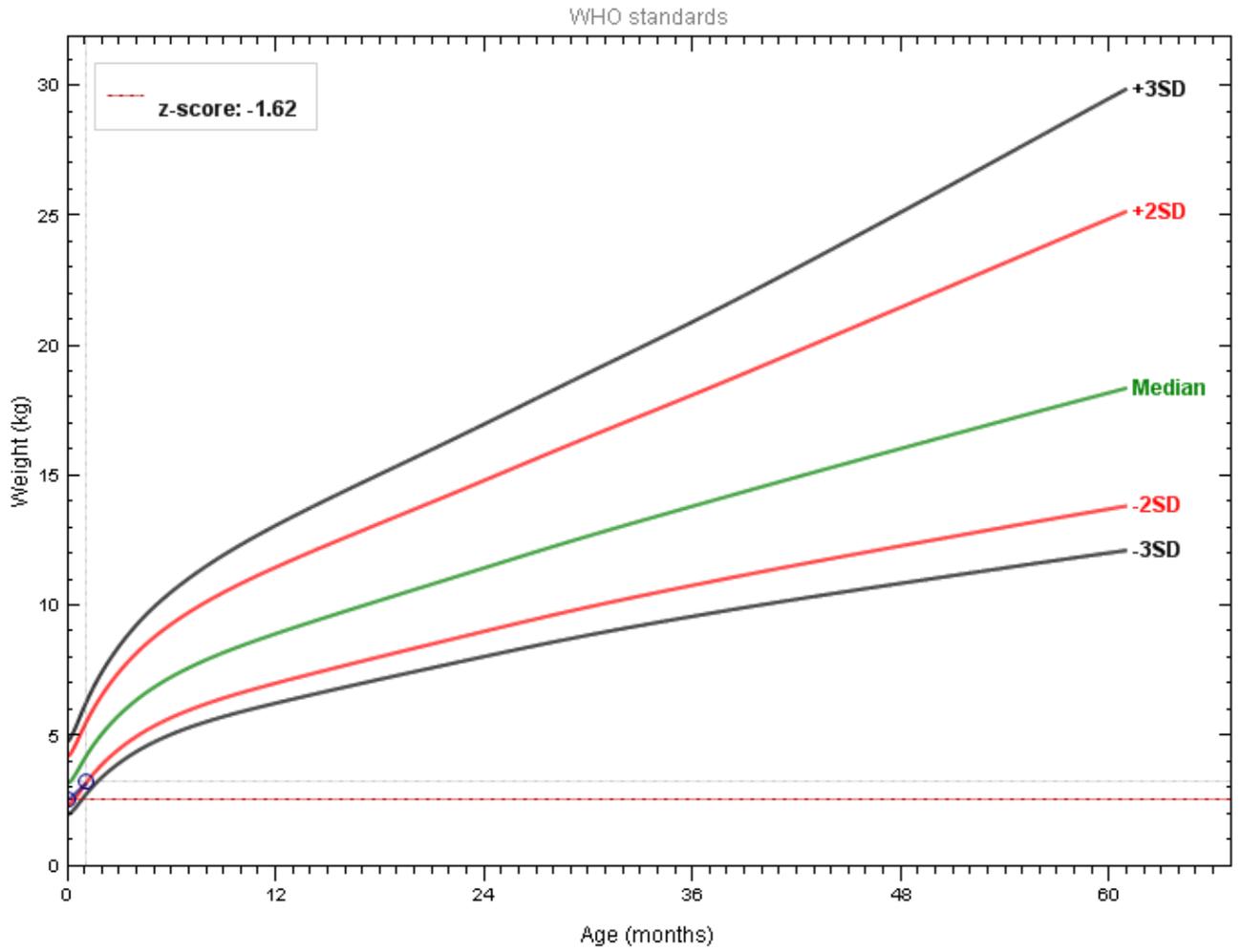
Infant 28



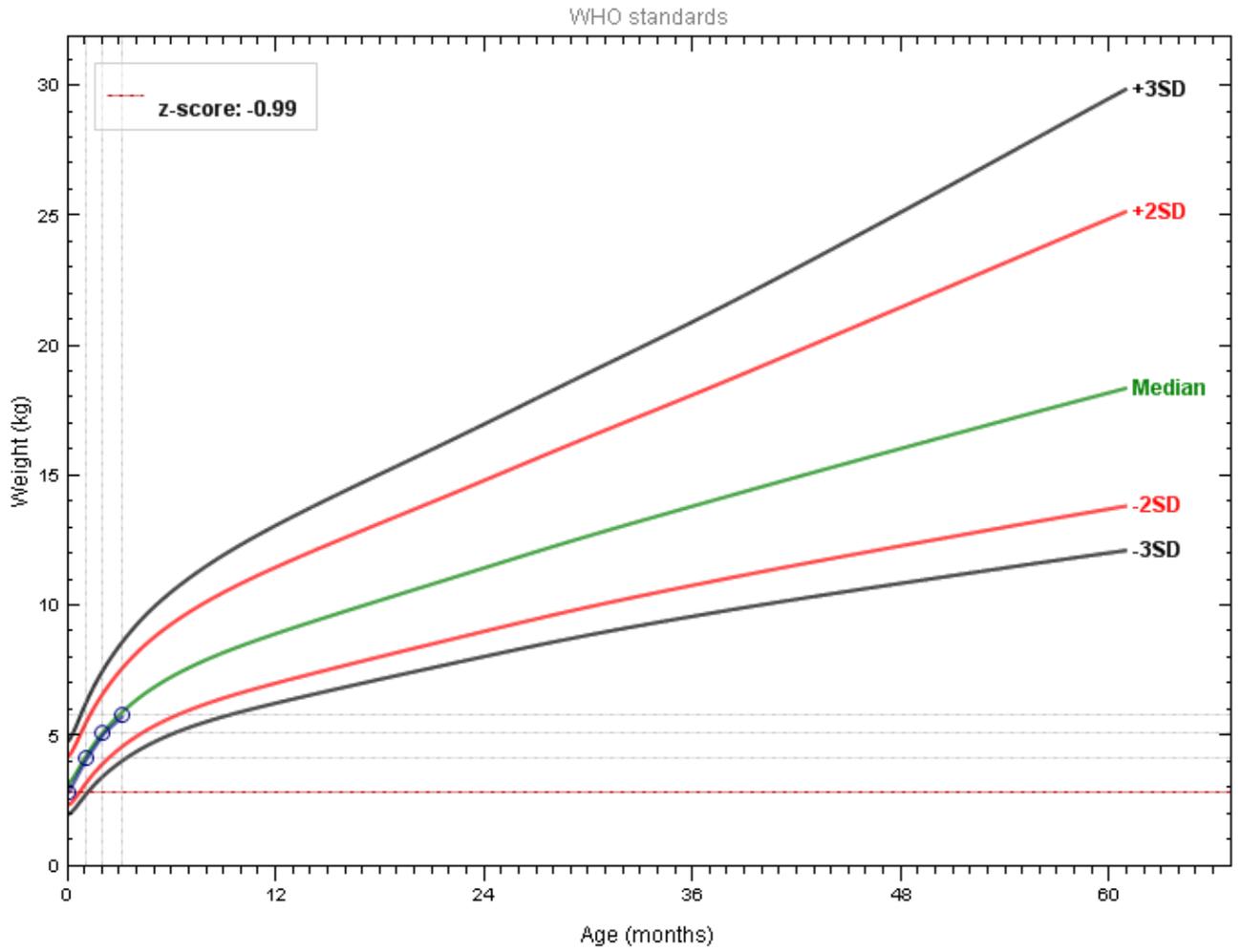
Infant 29 (Breastfed for 6 weeks)



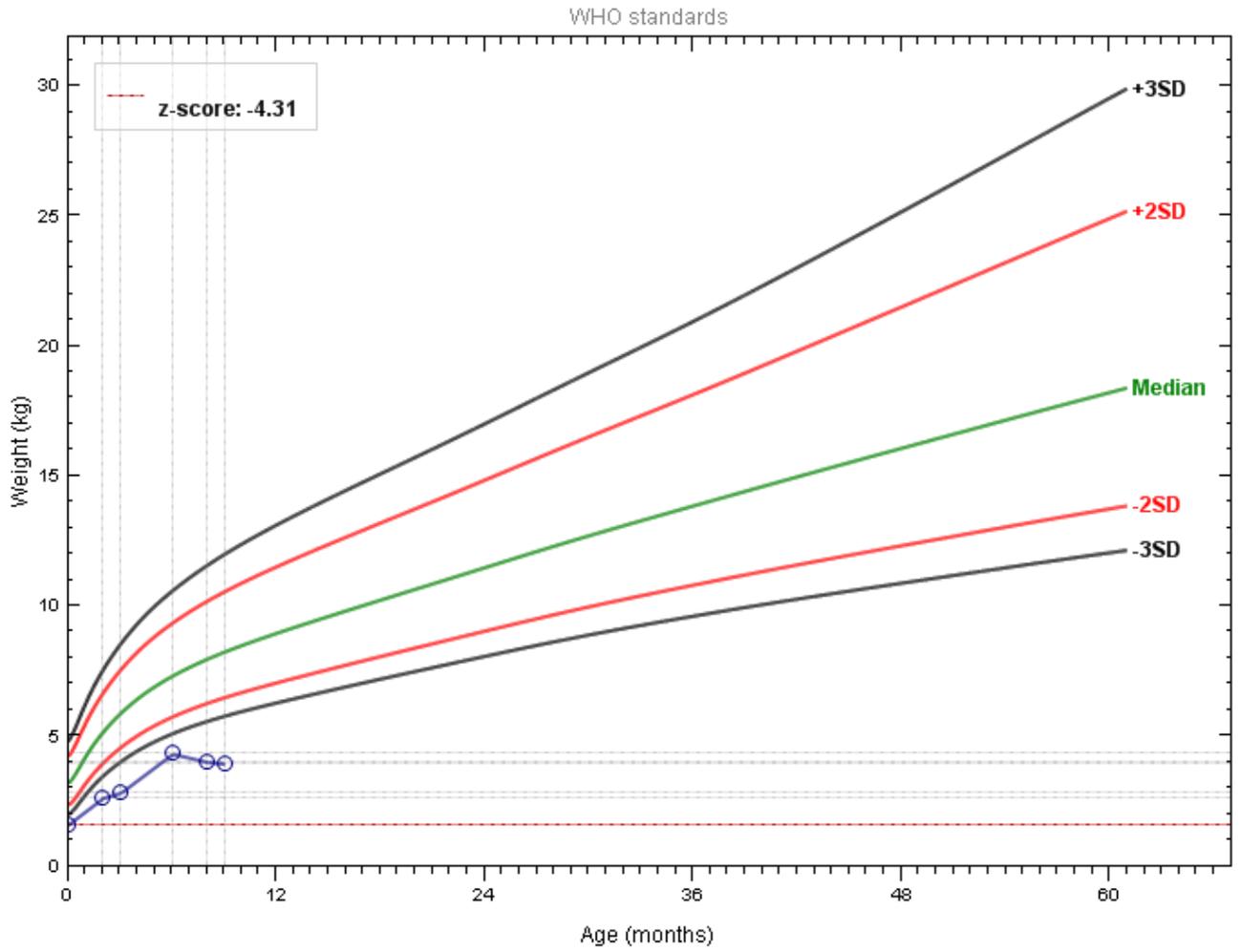
Infant 30



Infant 31



Infant 32



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**Addendum L: Tshwane Declaration of support for breastfeeding in South Africa**

We, the participants of the National Breastfeeding Consultative Meeting, including Minister of Health, Deputy Minister of Health, MEC'S, DG's, HOD's, health managers and workers, experts, academics, traditional leaders and traditional health practitioners, NGOs, civil society, UNICEF and WHO, held at the St George Hotel, Gauteng on the 22<sup>nd</sup> and 23<sup>rd</sup> of August 2011,

**Concerned that:**

- Infant and child mortality rates in South Africa remain unacceptably high and the Millennium Development Goals (MDGs) target of reducing the rate of under five mortality by 2/3s may not be achieved;
- Breastfeeding rates in South Africa, and especially exclusive breastfeeding rates, remain very low;
- Breastfeeding practices have been undermined by aggressive promotion and marketing of formula feeds, social and cultural perceptions and the distribution of formula milk in the past to prevent Mother To Child Transmission (MTCT) of HIV;
- Formula feeding, which is very frequently practiced by mothers in South Africa, increases the risk of death from diarrhoea, pneumonia and malnutrition;

**And noting that:**

- Reducing child mortality is a priority of the Government of South Africa;
- Promoting, protecting and supporting breastfeeding will reduce child mortality and improve the health and development of young children and their mothers;
- Overwhelming scientific evidence demonstrates the benefits of exclusive breastfeeding and continued breastfeeding for all children, including those that are HIV exposed and HIV positive;
- WHO and other international agencies acknowledge the research evidence that anti-retroviral drugs very significantly reduce the risk of HIV transmission through breastfeeding and improve HIV free survival of HIV exposed infants. These data transform the landscape for decision making about infant feeding practices in the context of HIV;

- 
- Promotion, protection and support of breastfeeding requires commitment and action from all stakeholders including government and legislators, community leaders, traditional leaders and traditional healers, civil society, health care workers and managers, researchers, private sector, employers, women's sector the media and every citizen;
  - Government initiatives aim to achieve universal coverage of essential health services, including maternal, newborn and child health, through initiatives such as the introduction of the National Health Insurance System;
  - The Primary Health Care Re-engineering initiative by government, provides an excellent opportunity to support breastfeeding through strengthening of the District Health System, the re-introduction of a school health programme, establishment of ward based health teams and experts;

**And therefore commit ourselves and call on all stake-holders to support and strengthen efforts to promote breastfeeding. We specifically resolve:**

- South Africa to declare itself as a country that actively promotes, protects and supports exclusive breastfeeding, and takes actions to demonstrate this commitment. This includes further mainstreaming of breastfeeding in all relevant policies, legislation, strategies and protocols;
- South Africa to adopt the 2010 WHO guidelines on HIV and Infant feeding and to recommend that all HIV infected mothers should breastfeed their infants and receive anti-retroviral drugs to prevent HIV transmission. Antiretroviral drugs to prevent HIV through breastfeeding and to improve the health and survival of HIV infected mothers should be scaled up and sustained;
- National regulations on the Code on Marketing of Breastmilk substitutes to be finalised, adopted into legislation within twelve months, fully implemented and outcomes monitored;
- Resources to be committed by government and other relevant bilaterals, partners and funders, but excluding the formula industry, to promote, protect and support breastfeeding including updated guidelines on HIV and infant feeding;
- Legislation regarding maternity among working mothers to be reviewed in order to protect and extend maternity leave, and for measures to be implemented to ensure that all workers, including domestic and farm workers benefit from maternity protection, including enabling work place;

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- Comprehensive services are provided to ensure that all mothers are supported to exclusively breastfeed their infants for six months and thereafter to give appropriate complimentary foods and continue breastfeeding up to two years of age and beyond. Mothers with HIV should breastfeed for twelve months according to National guidelines. This will require skilled support by health workers at all levels of the public and private health services including hospitals, primary health care facilities and community based services;
  - Human milk banks to be promoted and supported as an effective approach, especially in post natal wards and neonatal intensive care units, to reduce early neonatal and postnatal morbidity and mortality for babies who cannot breastfeed;
  - Implementation of Baby Friendly Health Initiative (BFHI) and Kangaroo Mother Care (KMC) to be mandated such that:
    - All public hospitals and health facilities are BFHI accredited by 2015,
    - All private hospitals and health facilities are partnered to be BFHI accredited by 2015,
    - Communities are supported to be 'Baby Friendly';
  - Community based interventions and support are implemented as part of the continuum of care with facility based services to promote, protect and support breastfeeding;
  - Continued research, monitoring and evaluation should inform policy development and strengthen implementation;
  - Formula feeds will no longer be provided at public health facilities with the following exceptions:
    - Nutritional supplements including formula feeds will be available on prescription by appropriate healthcare professionals for mothers, infants and children with approved medical conditions.