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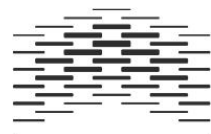
Infant feeding practices among mothers with and without HIV in Western Cape, South Africa.



Møyfrid Elin Nordstrand

Faculty of Health Science

Department of Health, Nutrition and Management



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OF APPLIED SCIENCES

Acknowledgements

My childhood in Kenya made me want to help people around the world who are not as fortunate as I am. With a bachelor in public health nutrition focusing mostly on the nutritional situation in Norway, I decided to further my understanding of international nutrition issues through my master thesis.

It was difficult to find an on-going research project where I could be a part of the field work. Fafo Institute for Applied International Studies [Fafo AIS]¹ in Oslo had data on infant feeding and HIV/AIDS from South Africa that needed to be analysed (Fafo, 2011). Given that I was positive to learn more about the topic and Fafo seemed happy to have me join their team, it was decided that my master thesis would be based on the available data from South Africa. Though I did not know much about HIV/AIDS and infant feeding when I started, relevant literature and good help from many wonderful people have strengthened my knowledge in the field. As a public health nutritionist, I am happy that I have been given the opportunity to gain a deeper insight in this topic in my future career.

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Oslo, May 2012

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¹ Fafo is an independent and multidisciplinary research foundation focusing on social welfare and trade policy, labour and living conditions, public health, migration and integration, and transnational security and development issues. Fafo AIS conducts policy-related research at the international level and one of their four main areas of research is global health and environment (Fafo, 2011).

Abstract

Background: The HIV prevalence in adults and children in South Africa is high. South Africa is also a country where the breastfeeding rate is low and the child mortality rate is high. HIV-infected mothers have to weigh the risk of mother-to-child transmission of HIV (MTCT) through breastfeeding versus the risk of infections and other diseases from formula feeding when choosing infant feeding practice. Varying and changing national and international recommendations on infant feeding may add an extra layer of complexity to the mothers' choice of feeding practice.

Objectives: Describe the infant feeding practices of HIV-infected mothers and mothers without HIV or with unknown HIV status living in Western Cape, South Africa. Secondary objectives were to investigate what advice the mothers had been given about infant feeding when they were pregnant and their knowledge about MTCT and infant feeding.

Method: In 2007 researches conducted a third and last wave in a panel survey in Khayelitsha. In the last wave questions on infant feeding as well as a qualitative investigation were added. In this thesis data on infant feeding among 58 mothers with HIV (KSPS) and 106 mothers without HIV or with unknown HIV status (KPS) were analysed. In-depth interviews in other townships in Western Cape with three female doctors and nine HIV-infected mothers were added to complement the quantitative data.

Findings: Almost all the mothers in KSPS had been formula feeding their infants during the first year (89%). Of the mothers in KPS, 53% had been breastfeeding their infants exclusively the first three months. Thirty-eight percent of the mothers in KPS had been giving breastfeeding and other foods (mixed feeding) to their infants from the age of four months. Many of the mothers in KSPS had been advised to formula feed (77%) while the majority of the mothers in KPS had been advised to breastfeed (81%) or exclusively breastfeed (6%). The majority of the mothers in each group knew that MTCT is possible through labour, delivery and breastfeeding. More mothers in KSPS knew that the risk of MTCT is greater through mixed feeding than exclusive breastfeeding compared to the mothers in KPS.

Conclusion: The percentage of HIV-infected mothers who had been advised to give infant formula and who had been giving formula was high. Among mothers without HIV or with unknown HIV status, on the other hand, a large proportion had been advised to breastfeed and had breastfed their infants. In Western Cape infant formula was supported and provided for HIV-infected mothers while non-infected mothers were recommended to breastfeed exclusively. This might explain the differences between the two groups of mothers.

Sammendrag

Bakgrunn: HIV forekomsten blant voksne og barn i Sør-Afrika er høy. Sør-Afrika er også et land hvor andelen som ammer er lav og barnedødeligheten er høy. Når HIV-positive mødre skal mate barna sine må de veie risikoen for mor-barn-smitte av HIV under amming opp mot risikoen for andre sykdommer ved å gi morsmelkerstatning. Samtidig kan nasjonale og internasjonale anbefalinger om spedbarnsernæring som stadig er blitt endret, gjøre det ekstra vanskelig for mødre å velge en bestemt måte å mate barna på.

Formål: Beskrive hvordan HIV-positive mødre og mødre uten eller med ukjent HIV-status i Western Cape, Sør Afrika, matet barna sine. Delmål var å undersøke hvilke råd om spedbarnsernæring mødre fikk når de var gravide, samt deres kunnskap om mor-barn-smitte av HIV og spedbarnsernæring.

Metode: I 2007 ble det gjennomført en tredje og siste bølge i en panelstudie i Khayelitsha. I denne siste studien ble spørsmål om spedbarnsernæring, samt en kvalitativ undersøkelse, inkludert. Masteroppgaven ser nærmere på hvordan 58 mødre med HIV (KSPS) og 106 mødre uten eller med ukjent HIV-status (KPS) matet barna sine. Kvalitative dybdeintervjuer med tre kvinnelige leger og ni HIV-positive mødre i andre bydeler i Western Cape ble inkludert for å utfylle de kvantitative funnene.

Resultat: Nesten alle mødre i KSPS hadde gitt barna sine morsmelkerstatning det første året (89%). Flertallet av mødre i KPS hadde ammet barna sine eksklusivt de første tre månedene (53%). Fra fire måneder hadde flertallet av mødre i KPS gitt en kombinasjon av morsmelk og annen mat (38%). Flesteparten av mødre i KSPS hadde blitt rådet til å gi morsmelkerstatning (77%) mens flertallet av mødre i KPS hadde blitt rådet til å amme eller amme eksklusivt (henholdsvis 81% og 6%). Flertallet av mødre i begge gruppene visste at mor-barn-smitte er mulig under svangerskapet, fødselen og gjennom amming. Flere mødre i KSPS enn KPS visste at risikoen for mor-barn-smitte er større ved å gi en kombinasjon av morsmelk og annen mat i forhold til eksklusiv amming.

Konklusjon: Andelen HIV-positive mødre som hadde blitt rådet til å gi og hadde gitt morsmelkerstatning var høy. Flertallet av mødre uten eller med ukjent HIV-status hadde derimot blitt rådet til å amme og hadde ammet sine barn. I Western Cape ble morsmelkerstatning anbefalt og utdelt gratis til HIV-positive mødre mens HIV-negative mødre ble anbefalt å amme eksklusivt. Dette kan kanskje forklare forskjellen mellom disse to gruppene med mødre.

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Abbreviations and acronyms

AFASS: Acceptable, feasible, affordable, sustainable and safe

AIDS: Acquired immunodeficiency syndrome

ART: Antiretroviral therapy

ARVs: Antiretrovirals

ASRU: AIDS and Society Research Unit

CD4: Cluster of differentiation 4

CSSR: Centre for Social Science Research

DHS: Demographic and Health Survey

DOH: Department of Health

EAs: Enumerator areas

Fafo AIS: Fafo Institute for Applied International Studies

FANTA: Food and Nutrition Technical Assistance

GIS: Geographical Information Systems

HAART: Highly active antiretroviral therapy

HIOA: Oslo and Akershus University College of applied science

HIV: Human immunodeficiency virus

HSRC: Human Science Research Council

ICN: International Conference on Nutrition

IGME: Inter-agency Group for Child Mortality Estimation

IMR: Infant mortality rate

IKMD: Information and Knowledge Management Department

IYCN: Infant & Young child Nutrition Project

KMP: Khayelitsha Mitchell's Plain

KPS: Khayelitsha Panel Survey

KSPS: Khayelitsha Select Panel Survey

MDG: Millennium Development Goal

MOU: Midwife Obstetric Unit

MSF: Médecins Sans Frontières

MTCT: Mother-to-child transmission of HIV

NCHS: National Center for Health Statistics

NMR: Neonatal mortality rate

PAWC: the Provincial Administration of the Western Cape

PhD: Doctor of Philosophy
PLWH: People living with HIV
PMTCT: Prevention of mother-to-child transmission of HIV
PTCT: Parent-to-child transmission of HIV
Republic of SA: Republic of South Africa
SALDRU: Southern African Labour and Development Research Unit
SANAC: South African National AIDS Council
SPSS: Statistical Package for the Social Sciences
Statistics SA: Statistics South Africa
WB: The World Bank
WHO: World Health Organization
UCT: University of Cape Town
U5MR: Under-five mortality rate
UN: United Nations
UNAIDS: The Joint United Nations Programme on HIV/AIDS
UNDP: The United Nations Population Division
UNFPA: United Nations Population Fund
UNICEF: The United Nations Children's Fund
WFS: World Food Summit

Glossary

AFASS refer to the conditions that should be in place for replacement feeding: acceptable (socially welcome), feasible (facilities and help are available to prepare formula), affordable (formula can be purchased for six months), sustainable (feeding can be sustained for six months) and safe (formula is prepared with safe water and in hygienic conditions).

Antiretroviral therapy is a combination of three or more different antiretroviral medications used in the treatment of those infected with HIV to reduce viral load (amount of HIV in plasma).

Antiretrovirals are medications/drugs/prophylaxis for the treatment of infection by retroviruses like HIV. Zidovudine and Nevirapine are examples of ARVs used in the prevention of MTCT. When several ARVs (typically three or four) are taken in combination, the approach is known as antiretroviral therapy [ART] or highly active antiretroviral therapy [HAART]. In the master thesis ARVs is used instead of ART and HAART.

CD4 stands for cluster of differentiation 4 and is a glycoprotein expressed on the surface of key components of the immune system mainly CD4 positive T cells (T-helper cells) and macrophages. These are the main target cells for HIV.

Cessation of breastfeeding means completely stopping breastfeeding, which includes no more suckling at the breast.

Complementary food means any food, whether manufactured or locally prepared, used as a complement to breast milk or to a breast milk substitute, when either becomes insufficient to satisfy the nutritional requirements of the infant.

Exclusive breastfeeding means an infant receives no other food or drink (not even water) other than breast milk, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.

Highly active antiretroviral therapy is a combination of three or more different medications used in the treatment of HIV.

HIV refers here to HIV-1. Cases of mother-to-child transmission of HIV-2 are rare.

Infant feeding practices refers to a child from birth to 12 months of age and includes how the infants were fed the first year of life. Sometimes in the text child is used instead of infant.

Infant feeding formula involves the use of commercial formula that is formulated industrially in accordance with applicable standards to satisfy the nutritional requirements of infants during the first months of life up to the introduction of complementary foods. In the text infant feeding formula is sometimes referred to as formula.

Low birth weight means than a child weighted less than 2500 grams at birth.

Mixed feeding means an infant receives a mix of breast milk and other foods (infant feeding formula, water, cow's milk, etc.).

Mother/parent-to-child transmission of HIV indicates instances of transmission of HIV to a child from an HIV-infected mother. In the master thesis the common term MTCT is used instead of the similar term parent-to-child transmission of HIV [PTCT]. This is because the immediate source of the child's HIV infection is the mother and mothers are most likely to be the once receiving advice about infant feeding and feeding their children. The term MTCT was also chosen since the study sample included here were mothers.

Stunting refers to a child that is below minus two standard deviations from median height for age using the WHO Child Growth Standards.

Under-five mortality rate is the probability of dying between birth and exactly 5 years of age, expressed per 1000 live births. Infant mortality rate and neonatal mortality rate are respectively the probability of dying between birth and exactly 1 year of age and the probability of dying during the first 28 completed days of life, expressed per 1000 live births.

Wasting refers to a child that is below minus two standard deviations from median weight for height of the WHO Child Growth Standards.

1.0 Introduction

The millennium development goals [MDG]² were set in 2000 and MDG 6A aims to halt and begin to reverse the spread of human immunodeficiency virus and acquired immunodeficiency syndrome [HIV/AIDS] by 2015 (UN, 2000; UNstats, 2008). The growth of the global HIV/AIDS epidemic appears to have stabilized and the HIV incidence rate has been steadily declining the past decade (UN, 2011; UNAIDS, 2010b). This includes some of the world's largest epidemics in Ethiopia, Nigeria, Zambia, Zimbabwe and South Africa (UNAIDS, 2010b, 2011b). There has also been a significant reduction in mortality related to AIDS (UNAIDS, 2011b). A total of 2.5 million deaths have been averted in low- and middle-income countries since 1995. This is mainly due to the increased number of people being tested and receiving antiretrovirals [ARVs] (UNAIDS, 2010b, 2011b).

Despite the positive trends in the HIV/AIDS epidemic, the HIV prevalence is increasing and more people than ever are living with HIV. In 2010 more than two thirds of all people living with HIV [PLWH] lived in sub-Saharan Africa and this region also accounted for 70% of new HIV infections (UNAIDS, 2011b). With an estimated 5.6 million PLWH, South Africa have more PLWH than any other country in the world (UNAIDS, 2010b).

Eliminating new HIV infections in children

The Joint United Nations Programme on HIV/AIDS [UNAIDS] has a vision of “Getting to Zero” by 2015: zero new HIV infections, zero discrimination, and zero AIDS-related deaths (UNAIDS, 2010c). International commitments to reach this vision are to achieve MDG 6 and other health-related goals through the achievement of universal access to HIV prevention, treatment, care and support to all in need (UNAIDS, 2010c; WHO, 2011). Achieving MDG 6 will be difficult, unless there is a dramatic decrease in new HIV infections in mothers and children (HSRC, 2010)³. A global plan aims to eliminate new HIV infections in children by 2015 (compared with 2009) (UNAIDS, 2011a). This plan requires ambitious targets including reducing the number of children newly infected with HIV due to mother-to-child transmission of HIV [MTCT] by 90% and reducing the MTCT rate to less than 5% (SANAC, 2011; WHO, 2011; WHO, UNAIDS, &

² In 2000, 189 nations made a promise to free people from extreme poverty and multiple deprivations. This pledge became the eight MDGs to be achieved by 2015.

³ The core business of South African Human Science Research Council [HSRC] is to conduct large-scale, policy-relevant projects for public-sector users, non-governmental organisations and international agencies (HSRC, 2012).

UNICEF, 2011). Even though the goal of elimination might sound unachievable, the number of new HIV infections in children worldwide has fallen significantly since 2001 due to programmes striving for prevention of mother-to-child transmission of HIV [PMTCT] (WHO, 2011). Such programmes provide HIV testing and ARVs for mothers and infants as well as counselling and support on infant feeding to help mothers safeguard their infants against the HIV virus. Expanding comprehensive PMTCT programmes and focusing on reducing MTCT are recommended country actions for eliminating new HIV infections in children (WHO, 2011).

South Africa and its people

The Republic of South Africa [Republic of SA] is located on the southern tip of Africa. South Africa falls in the upper-middle income category of countries (WB, 2011). In 2011 the mid-year population was estimated as 50.6 million (Statistics SA, 2011). The country is multi-ethnic and represents diverse racial groups, languages and cultures. Almost 80% of the inhabitants are black African, 9% are coloured (mixed race), 9% are white and around 2% are Indian/Asian (Statistics SA, 2011). South Africa has eleven official languages; nine African languages in addition to Afrikaans and English. In 2011 the life expectancy at birth was estimated at approximately 55 years for males and 59 years for females (Statistics SA, 2011). HIV/AIDS has a significantly negative impact on life expectancy and partly explains the low life expectancy at birth in South Africa (Statistics SA, 2010, 2011).

Table 1 gives an overview of the HIV/AIDS epidemic among adults and children worldwide and in South Africa. In South Africa the number of new HIV infections and the annual number of AIDS deaths are decreasing while the number of PLWH has increased since 1990 (Statistics SA, 2011; UNAIDS, 2010b). Though the prevalence of HIV in the country is high, the number of PLWH might be much higher due to for instance underreporting as a result of stigmatisation (Iversen, 2009).

The HIV prevalence varies markedly by population group, sex and age group. Black Africans and women seem to bear the burden of the HIV/AIDS epidemic. In 2005 the HIV prevalence was highest among South Africa's majority black African population, which also has the highest rate of unemployment and the lowest per capita income compared to the other racial groups (SANAC, 2007). In nearly all countries in sub-Saharan Africa, the majority of PLWH

are women. In South Africa, women aged 20 to 24 is approximately three times more likely to be HIV-infected than males in the same age group (SANAC, 2007; UNAIDS, 2010b).

HIV/AIDS has left many families and children in the country economically vulnerable and often socially stigmatized. Many children are also in risk of being HIV-infected through MTCT, become AIDS orphans or die young (Statistics SA, 2010). South Africa has made a considerable progress in providing ARVs to children and has achieved over 95% coverage of PMTCT treatment (Statistics SA, 2010; WHO, et al., 2011). Despite these successful initiatives, 48 thousand new children were infected in 2010 due to MTCT (compared to 61 thousand in 2009) and the MTCT rate was 18% (WHO, et al., 2011). Intensified efforts and focus on achieving greater impact is therefore essential to reach the aim of elimination of new HIV infections in South African children (SANAC, 2011; UNAIDS, 2010c).

Table 1: The HIV/AIDS epidemic worldwide and in South Africa^a

	Worldwide	South Africa
Adult/children		
Number of people newly infected with HIV	2.7 mill (2010) ^b	380 thousand (2011) ^c
Number of PLWH	34 mill (2010) ^b	5.6 mill (2009) ^b
Deaths due to AIDS	1.8 mill (2010) ^b	258 thousand (2011) ^c
Receiving ARVs	6.6 mill (2010) ^{b, d}	1.4 mill (2010) ^b
Children		
Number of children newly infected with HIV	390 thousand (2010) ^b	48 thousand (2010) ^b
Number of children living with HIV	2.5 mill (2009) ^f	330 thousand (2009) ^c
Receiving ARVs	456 thousand (2010) ^{b, d}	105 thousand (2010) ^c
Coverage of ARVs for PMTCT	48% (2010) ^{b, d}	>95% (2010) ^b
Lost one or both parents due to AIDS	16.6 mill (2009) ^f	1.9 mill (2009) ^f

^a The numbers are based on estimations

^b (WHO, et al., 2011)

^c (Statistics SA, 2011)

^d In low- and middle-income countries

^e (UNICEF, 2011b)

^f (UNAIDS, 2010a)

1.1 Context and delimitation

In 2007, Norwegian and South African researchers teamed up to develop the project *Poverty reduction strategies in a public health perspective: social grants, HIV/AIDS and the roll-out of HAART in South Africa* (de Paoli, Grønningsæter, & Mills, 2010). The project built on previous work of the AIDS and Society Research Unit [ASRU]⁴ at the Centre for Social Science Research

⁴ ASRU is a unit supporting innovative qualitative and quantitative research into the social dimensions of AIDS in South Africa (Magruder & Natrass, 2005).

[CSSR]⁵ at the University of Cape Town [UCT] that had been conducting a panel survey since 2004. Data included in this master thesis was collected through the third round of the panel survey in 2007. The panel survey included two groups: one consisted of PLWH and was called Khayelitsha Select Panel Survey [KSPS] and the other one was a group of people without or with unknown HIV status called Khayelitsha Panel Survey [KPS]. A qualitative investigation was also conducted in 2007. There were six specific issues explored in the project. This master thesis became part of issue five namely the trade-offs that occur between health status, income-generating activities and infant feeding practices.

The fact that all the data was already collected made it impossible for me to play a role as a researcher in this part of the project. Information available from the questionnaire used in the panel survey in 2007 (appendix 1) gave me however the opportunity to formulate and explore specific objectives on the topic “infant feeding practices”. National and international recommendations on infant feeding in the presence of HIV have varied and changed the last decade (section 3.4). The newest recommendations are now promoting and supporting exclusive breastfeeding for six months as the main infant feeding practice for mothers in general, but also for HIV-infected mothers (SANAC, 2011; WHO, 2010c). The breastfeeding rate and especially the exclusive breastfeeding rate in South Africa, is low (Bland, Rollins, Coutsooudis, & Coovadia, 2002; Moland, van Esterik, et al., 2010; National DOH, 1999, 2007b). This made the breastfeeding practices of the mothers in KSPS and KPS of particular interest in this master thesis.

The 2007 panel survey was the primary data material explored. If however information related to the specific objectives was available from the qualitative investigation (in-depth interviews with doctors and HIV-infected mothers), information from the qualitative investigation was added to complement and help validate the quantitative data.

⁵ The CSSR is an umbrella organisation at the university of Cape Town comprising of five units where the AIDS and Society Research Unit is one (Magruder & Natrass, 2005).

2.0 Objectives

Objectives

The main objective of this master thesis was to describe the infant feeding practices of HIV-infected mothers and mothers without HIV or with unknown HIV status living in Western Cape, South Africa. Secondary objectives were to investigate what advice the mothers had been given about infant feeding when they were pregnant and their knowledge about MTCT and infant feeding.

Specific objectives

- 1.1 Describe the infant feeding advice given to the mothers in KSPS and KPS when they were pregnant.
- 1.2 Assess the relationship between HIV status and advice received about breastfeeding.

- 2.1 Describe the knowledge among mothers in KSPS and KPS about MTCT and infant feeding.
- 2.2 Assess the relationship between HIV status and knowledge about MTCT and breastfeeding.

- 3.1 Describe the infant feeding practices of the mothers in KSPS and KPS the first year of their infants' life.
- 3.2 Assess the relationship between HIV status and exclusive breastfeeding practices.

- 4.1 Describe the relationship between the mothers' infant feeding practices and other factors such as:
 - the advice given to them during pregnancy
 - their knowledge about MTCT through breastfeeding
 - their educational level
 - their age

3.0 Theoretical background

Part one in this chapter gives a short description of HIV/AIDS. The chapter continues by exploring infant feeding practices, causes to malnutrition and death in children as well as recommendations on infant feeding since 2000 in the light of HIV/AIDS.

3.1 HIV/AIDS

The characteristics of the AIDS disease pattern was first described in USA in 1981, but it was soon discovered that a number of cases with the same disease pattern had already appeared long before this (UNAIDS, 2006). HIV is a retrovirus that infects, destroys or impairs the function of key components of the human immune system, mainly the T-helper cells and macrophages (UNAIDS, 2008b). Infection with this virus results in weakening of the immune system, leading to 'immune deficiency'. The immune system is considered deficient when it can no longer fulfil its role of fighting off infections and diseases (UNAIDS, 2008b). Often PLWH do not know that they have become infected, because they have no symptoms immediately after infection. However, some people develop 'acute retroviral syndrome' which is an illness with fever, rash, joint pains and enlarged lymph nodes (UNAIDS, 2008b). This syndrome might take place between one and six weeks after the HIV infection has happened and during this period the body develops antibodies to HIV. An HIV-infected person is highly infectious during this initial period and can transmit the virus to another person whether or not the HIV infection causes symptoms (UNAIDS, 2008b). The most common routes of transmission of HIV are unsafe sex, contaminated needles and MTCT (UNAIDS, 2010b).

After HIV has caused progressive weakening of the immune system, symptoms are more visible. People with immune deficiency are furthermore more vulnerable to a wide range of infections, most of which are rare among people without immune deficiency (UNAIDS, 2008b). AIDS is caused by infection from HIV and is a surveillance definition based on signs, symptoms, infections and cancers associated with the deficiency of the immune system that stems from infection with HIV (UNAIDS, 2008b). The World Health Organization [WHO] has classified four clinical stages of established HIV-associated symptoms of infection: asymptomatic (clinical stage 1), mild symptomatic (clinical stage 2), advanced symptoms (clinical stage 3) and severe symptoms (clinical stage 4) (WHO, 2007). The clinical stages are furthermore divided into asymptomatic phase (clinical stage 1) and symptomatic phase (clinical stages 2 through 4).

Ways to determine whether HIV is present in a person's body is by testing for HIV antibodies (CD4 count expressed as cells/ μ l) or for HIV itself (UNAIDS, 2008b). According to revised WHO treatment guidelines in 2010, all adolescents and adults (including pregnant women) with HIV infection and CD4 count less than 350 cells/ μ l, should start treatment with ARVs (WHO, 2010b).

3.2 Infant feeding practices and the risk of MTCT

MTCT can happen during pregnancy, during labour and delivery or in the postnatal period through breastfeeding (Prendergast, Tudor-Williams, Jeena, Burchett, & Goulder, 2007; UNAIDS, 2010b). More than 90% of children under the age of 15 years living with HIV acquired the virus from the mother through these routes (UNAIDS, 2008a). One of the most effective ways to address the paediatric HIV/AIDS epidemic is PMTCT (Prendergast, et al., 2007; Simon, Ho, & Abdool Karim, 2006). In the absence of any preventive interventions, estimated risk of MTCT is 5-10% during pregnancy, 10-20% during labour and delivery, and 5-20% through breastfeeding (De Cock et al., 2000).

Breastfeeding

MTCT via breastfeeding occurs throughout lactation and there are several characteristics both in the mother and the infant associated with increased risk of MTCT (Horvath et al., 2009; WHO, UNICEF, UNAIDS, & UNFPA, 2008). Maternal breast abnormalities, recent maternal HIV infection and poor maternal immune status (reflected by low CD4 count and high viral load) is associated with increased MTCT (Iloff et al., 2005; Richardson et al., 2003). MTCT is also correlated with the duration of breastfeeding, HIV-levels in breast milk, characteristics of breast milk and type of infant feeding (exclusive or mixed feeding) (Horvath, et al., 2009). The fact that breastfeeding is a route of transmission is problematic as breastfeeding is the ideal food for the healthy growth and development of infant and provides important protection against infectious diseases. Breastfeeding promotion is also one of the public health actions that have the biggest potential to reduce child mortality globally and especially in low-income countries (Black et al., 2008; Jones, Steketee, Black, Bhutta, & Morris, 2003; UNICEF, 2011a; WHO, 2000). The risk of illness, malnutrition and death due to the use of unsafe infant feeding formula might at the same time in some cases be higher than the risk of MTCT through breastfeeding (Bergström, 2003; Thior et al., 2006).

Exclusive breastfeeding with the use of ARVs

Early cessation from breastfeeding decreases the risk of MTCT. Still several studies in sub-Saharan Africa have demonstrated significant morbidity associated with early cessation (Horvath, et al., 2009). Thus exclusive breastfeeding for six months with continued breastfeeding in combination with ARVs to the mother or infant is recommended to reduce MTCT and improve HIV survival (Horvath, et al., 2009; Siegfried, van der Merwe, Brocklehurst, & Sint, 2011; WHO, 2010d). A randomized trial in Botswana found that breastfeeding with ARVs was associated with a lower mortality rate at 7 months compared to formula feeding (Thior, et al., 2006). A study led by WHO in different countries in Africa found that giving HIV-infected mothers a combination of ARVs during pregnancy, delivery and breastfeeding reduced the risk of MTCT by 42% and improved survival (de Vincenzi, 2011). Another study in Malawi shows that the risk of MTCT through breastfeeding was reduced to 1.7% when the infants were given ARVs for 28 weeks (Chasela et al., 2010). ARVs can reduce MTCT by lowering plasma viral load in pregnant women, through post-exposure prophylaxis in infants after delivery or through reducing transmission via breastfeeding (Siegfried, et al., 2011).

Mixed feeding

Infants who are exclusively breastfed the first six months may have a significantly lower risk of being HIV-infected than those who are partially breastfed in populations not on ARVs intervention (Coovadia et al., 2007; Coutsoydis, Pillay, Spooner, Kuhn, & Coovadia, 1999; Iliff, et al., 2005; Kuhn et al., 2008). A study in Zambia found that non-exclusive breastfeeding more than doubles the risk of early postnatal MTCT (Kuhn et al., 2007). Findings from South Africa have shown that infants of HIV-infected mothers who were mixed fed during the first two to three months had a 15-month HIV transmission risk of 36% in contrast to 25% for exclusively breastfed infants (Coutsoydis et al., 2001). There are several possible mechanisms for why exclusive breastfeeding has a lower risk of MTCT than mixed feeding. Exclusive breastfeeding is associated with fewer breast health problems and elements of breast milk may normally hinder passage of HIV through the intestinal mucosa. Mixed feeding might include contaminated water, fluids and foods which may damage the intestinal mucosa, disrupt the immune barriers and result in small lesions in the undeveloped gut of the infant where the virus can pass to infect the infant (Coovadia, et al., 2007; Coutsoydis, et al., 2001; Coutsoydis, et al., 1999).

Formula feeding

Complete avoidance of breastfeeding is efficacious in PMTCT as formula feeding unquestionably prevents all postnatal transmission (Coetzee et al., 2005; Goga et al., 2011; Horvath, et al., 2009; WHO, 2010c). Still morbidity associated with complete avoidance of breastfeeding, in addition to the cost of purchasing infant formula and the stigmatization associated with not breastfeeding make formula feeding in many situations unfeasible (Horvath, et al., 2009). Data from a multicentre controlled trial on 9424 infants and their mothers from Ghana, India and Peru concluded that there is an extremely high risk of infant mortality associated with not being breastfed in resource poor settings and that this needs to be seriously taken into account when informing HIV-infected mothers about options for feeding their infants (Bahl et al., 2005). Non-breastfed infants had a 10.5% (10.5; 95% CI=5.0-22.0) increased risk of dying when compared with those who had been predominantly breastfed (Bahl, et al., 2005). According to WHO formula should only be recommended as an alternative to breastfeeding of HIV-exposed infants when it is acceptable, feasible, affordable, sustainable and safe [AFASS] (WHO, 2010c). Research from PMTCT sites in South Africa found that formula feeding that do not meet the AFASS criteria carries a greater risk of HIV transmission or death than breastfeeding (Doherty et al., 2007). A paper modelling the effects of different infant feeding strategies on infant survival and MTCT concluded that under conditions common in countries with high HIV prevalence, replacement feeding by HIV-infected mothers should not be generally encouraged until after the infant is approximately 6 months old (Ross & Labbok, 2004).

3.3 Causes to malnutrition or death in children in the context of HIV/AIDS

The United Nations Children's Fund [UNICEF] has developed the UNICEF conceptual framework as a tool for understanding causes of malnutrition or death in children (appendix 2) (UNICEF, 1990). In the conceptual framework malnutrition in children and child death are viewed as outcomes of larger development challenges that can be analysed in terms of immediate, underlying and basic causes (UNICEF & WB, 2002). The immediate causes are inadequate dietary intake and disease. The underlying causes at household or family level are inadequate access to food, inadequate maternal and child care and inadequate health services and health environment. In the framework these three overlap meaning that they are related to each other in complex ways and that they should be analysed and properly understood in relation to each other. The basic causes at societal level include formal and non-formal institutions, political

and ideological superstructure, economic structure and potential resources. UNICEF’s framework has since 1990 become one of the most familiar illustrations within the international nutrition community and has improved the understandings and dialogue about the causes of malnutrition and death in children (UNICEF & WB, 2002).

The study from 2007 did not look directly on the outcome of malnutrition and death, but rather examined some possible underlying causes to these outcomes. Based on the UNICEF conceptual framework, a similar framework was made in this thesis to draw attention to the topic infant feeding practices in the context of HIV/AIDS. Figure 1 illustrates possible causes of malnutrition or death in children in a HIV/AIDS context. The different elements in the framework are explained in brief in the text below the figure.

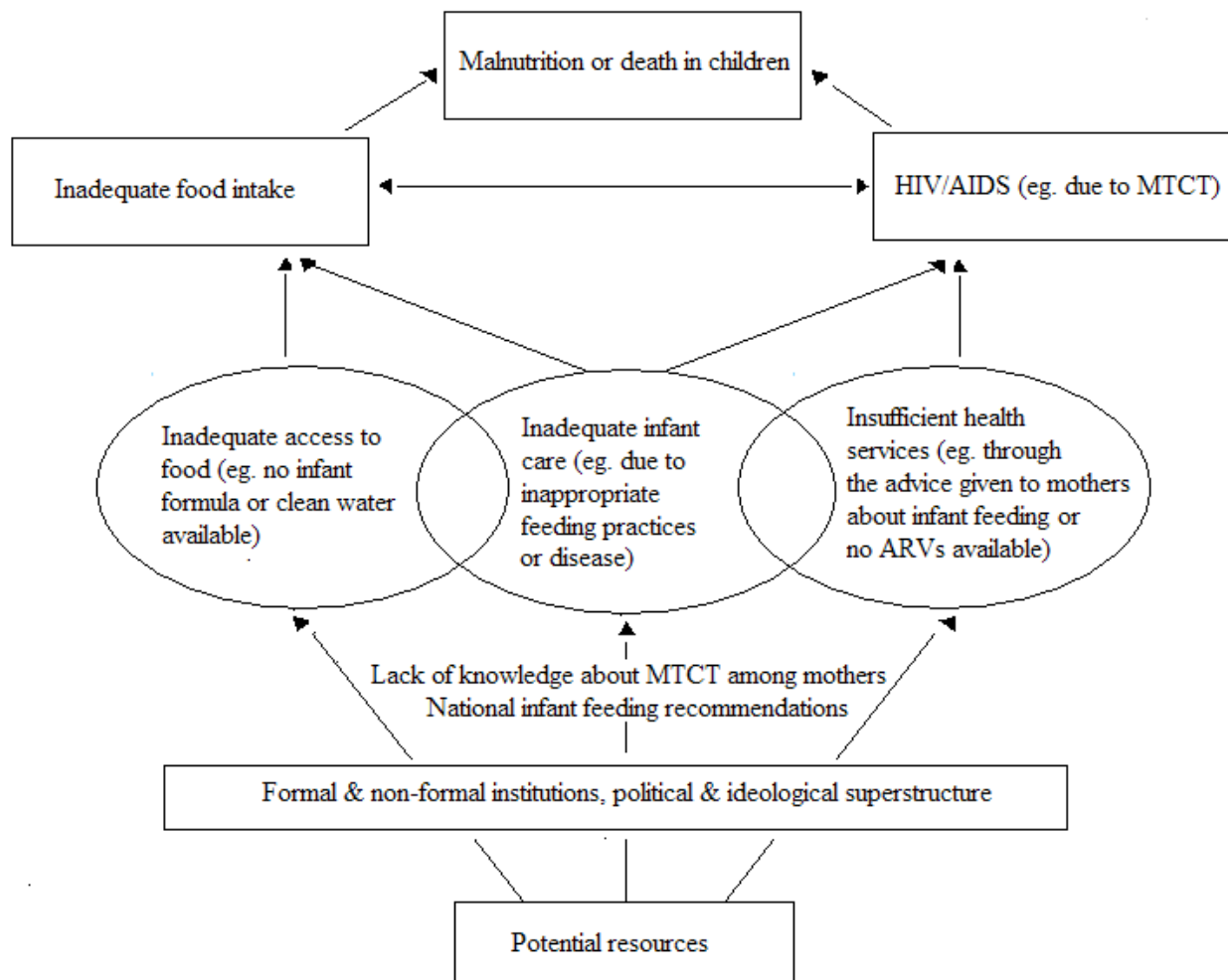


Figure 1: Causes to malnutrition or death in children in a HIV/AIDS context (adapted from UNICEF, 1990).

Outcome

Malnutrition

Malnutrition referring to the condition undernutrition, encompasses stunting, wasting and deficiencies of essential micronutrients. Maternal and child undernutrition is the underlying cause of more than one third of the disease burden in children younger than five years (Black, et al., 2008). MDG 1 aims to halve, between 1990 and 2015, the proportion of people who suffer from hunger (UNstats, 2008). An indicator for monitoring the progress is to monitor the prevalence of underweight children less than five years of age. Worldwide 22% of children younger than five years suffered from moderate and severe underweight and 9% of severe underweight⁶ in 2009 (UNICEF, 2011b). The same year 12% of the children were wasted and 34% stunted while an estimated 15% of the newborn infants had low birth weight. Despite some progress since 1990, one in four children in the developing world is still underweight.

HIV/AIDS, which is highly prevalent in sub-Saharan Africa, is a risk factor for malnutrition and may complicate child malnutrition in settings with high HIV prevalence. A study based on secondary analysis of Demographic and Health Survey [DHS] data collected during 2003 and 2008 from 18 countries in sub-Saharan Africa suggested that children whose mothers are infected with HIV are significantly more likely to be stunted, wasted or underweight compared to their counterparts of similar demographic and socio-economic background whose mothers are not infected (Magadi, 2011). A study from South Africa found that HIV-infected children had significantly poorer nutritional outcomes than their HIV negative counterparts (Kimani-Murage et al., 2011).

The rates of malnutrition among South African children are high (Iversen, 2009; Kimani-Murage, et al., 2011). Based on UNICEF's report on the State of the World's Children from 2011 almost 15% infants had low birth weight at birth in the period between 2005 and 2009 (UNICEF, 2011b)⁷. Among children younger than five years, 12% of the children were underweight⁸, 27% stunted and 5% wasted in the same period (National DOH, 2007b; UNICEF, 2011b).

⁶ Underweight refers here to the percentage of children who are below minus two standard deviations from median weight for age of the WHO Child Growth Standards (UNICEF, 2011b).

⁷ The report notes that the data might refer to years or periods other than those specified, differ from the standard definitions or refer only to parts of the country (UNICEF, 2011b).

⁸ Underweight refers here to the percentage of children who are below minus two standard deviations from median weight for age of the former National Center of Health Statistics [NCHS]/WHO reference population (UNICEF, 2011b).

Child mortality

Death in children below five years, also referred to as child mortality, is used globally as an indicator of a nation's health and level of development (HSRC, 2010). MDG 4 aims to reduce the child mortality by two thirds from the level in 1990 within 2015 (UNstats, 2008). Despite gradual improvements in child survival, 7.6 million children worldwide die each year before they reach their fifth birthday (IGME, 2011)⁹. Nearly 21 thousand children under five died every day in 2010 (IGME, 2011). In 2010 the highest number of child mortality was in sub-Saharan Africa where approximately half of the under five deaths occurred (IGME, 2011).

The fact that sub-Saharan Africa remains the region most adversely affected by the HIV/AIDS epidemic is believed to be influencing the retarded progress in the reduction of the under-five mortality rate [U5MR] in this region (Magadi, 2011). Mortality in young children seem to be associated with both HIV in children and maternal HIV status (Gillespie & Kadiyala, 2005). Studies in Africa found that the mortality rate among children under two years of age born to HIV-infected mothers was higher than among children of HIV-negative mothers (Urassa et al., 2001; Zaba et al., 2005). HIV/AIDS seem to impact child mortality directly through MTCT and indirectly through higher mortality rates associated with maternal deaths (Zaba, et al., 2005). Mortality in children is significantly lower for those with late infection (during labour or breastfeeding) than those with early infection (during pregnancy) (Newell et al., 2004). In 2008 AIDS was the cause of 2% of the child deaths globally (Black et al., 2010). Approximately 50% of the deaths due to AIDS occurred in Nigeria, Mozambique, Tanzania, Uganda and South Africa (Black, et al., 2010).

The child mortality in South Africa is high. Between 1990 and 2010 the U5MR had only fallen from 60 to 57 and the infant mortality rate [IMR] from 47 to 41. In the same period the neonatal mortality rate [NMR] at 18 had not changed (IGME, 2011). The annual number of under-five deaths in South Africa in 2010 was 58 thousand (IGME, 2011). HIV/AIDS accounted for 46% of the child deaths in South Africa in 2008 (WHO & UNICEF, 2010).

⁹ Experts at UNICEF, the World Bank [WB], WHO, the United Nations Population Division [UNDP] and members of the academic community established the Inter-agency Group for Child Mortality Estimation [IGME] in order to agree on the best way to calculate infant and child mortality levels and trends.

Immediate causes

Immediate causes to malnutrition or death in children in Figure 1 is inadequate food intake and HIV/AIDS. In section 3.4 infant feeding recommendations in general and in the presence of HIV are presented. An intake that follows these recommendations should meet the infant's nutritional requirements to achieve optimal growth, development and health. For infants born to HIV-infected mothers the recommendations should in addition give the infant the greatest likelihood of HIV-free survival.

To achieve optimal growth, development and health, infants born to uninfected mothers or mothers whose HIV status is unknown, should be exclusively breastfed the first six months followed by nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond (WHO & UNICEF, 2003).

To reduce the risk of MTCT in infants born to HIV-infected mothers, newest recommendations show that infants should either be exclusive breastfed for six months while receiving ARVs or not be breastfed at all (WHO, 2010c). The risk of MTCT through breastfeeding has thus to be weighed with the risk of illness, malnutrition and death from formula feeding (section 3.2).

If an infant is HIV-infected, the infant should, as per the general recommendations, be exclusively breastfed for the first six months of life followed by continued breastfeeding up to two years of age or beyond (WHO, 2010c). In HIV-infected pregnant or lactating women and infants the nutritional situation might be challenged since inadequate food intake and HIV/AIDS influence each other in a vicious cycle (Figure 2).

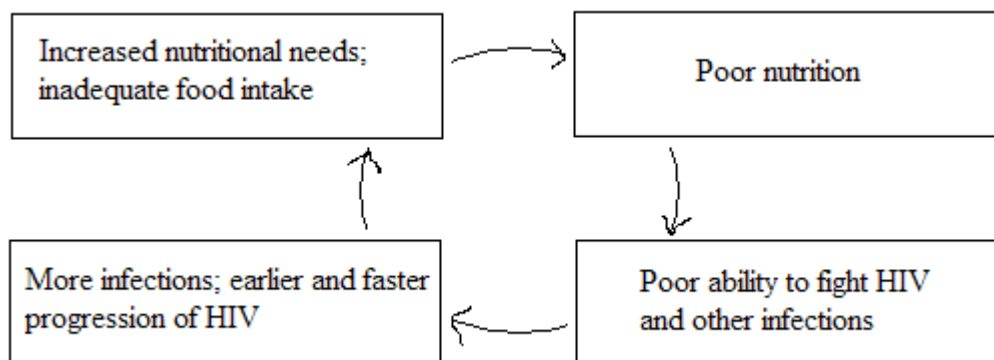


Figure 2: The vicious cycle of poor nutrition and HIV/AIDS (Semba & Tang, 1999).

The importance of an adequate food intake is reinforced with the increased nutritional needs as a consequence of the disease (Semba & Tang, 1999). HIV attacking the sensitive tissue in and around the mouth leading to sores and eating problems may result in an inadequate food intake (Piwoz & Preble, 2000). A food intake that is inadequate can as well be a result of loss of appetite associated with HIV, abdominal pain or side effects from medication. PLWH may also have increased nutritional needs due to destroyed immune cells, poor absorption and altered metabolism (Semba & Tang, 1999; WB, 2007). HIV infection of intestinal cells and frequent diarrhoea and vomiting may lead to poor absorption of fats, carbohydrates and fat-soluble vitamins (Piwoz & Preble, 2000). HIV may furthermore lead to several metabolic changes in the body and increased resting energy expenditure resulting in a higher use and need of energy (Piwoz & Preble, 2000; WB, 2007; WHO, 2003b). The use of ARVs may in addition interact with food and nutrients and lead to metabolic complications (WHO, 2003b).

Table 2 gives an overview of nutrient-specific recommendations for HIV-infected children and pregnant and lactating women.

Table 2: Nutrient-specific recommendations^{a, b}

Nutrient	Recommendations
Energy	For children and pregnant and lactating women energy requirements increase by 10% during the asymptomatic phase and 20% to 30% during the symptomatic phase. In children experiencing weight loss the energy requirements during the symptomatic phase increase by 50% to 100%. Energy requirements may also be higher for pregnant and lactating women experiencing inadequate rate of weight gain during pregnancy.
Macronutrients	For pregnant and lactating women macronutrient requirements are the same as for uninfected individuals. Though no evidence supports the need for increased protein intake in PLWH, increase in protein is often suggested in resource-sufficient settings. In pregnant and lactating women essential fatty acids needs are 30% higher than those of non pregnant women.
Micronutrients	Deficiencies of micronutrients which are needed by the immune system to fight infection (such as vitamins A, B, C, E, selenium and zinc) are common among PLWH (FANTA, 2004; Gillespie & Kadiyala, 2005; Semba & Tang, 1999; WB, 2007). Considering that deficiencies are more common among women, food insecurity is likely and micronutrient needs are higher during pregnancy and lactation, supplementations are recommended for pregnant and lactating women.

^a Compared with the intake levels recommended for healthy uninfected individuals of the same age, sex, and physical activity level

^b (Raiten, Mulligan, Papathakis, & Wanke, 2011; WB, 2007; WHO, 2003b)

Inadequate food intake and unmet nutritional needs result in poor nutrition (WB, 2007). Poor nutrition and HIV attacking the immune cells might furthermore lead to poor ability to fight infections due to inadequate immune system (Semba & Tang, 1999). This may in turn result in earlier and faster development of HIV and accelerate the onset of AIDS and death (Gillespie & Kadiyala, 2005).

Underlying causes

HIV/AIDS in children is in most cases linked to the mothers HIV status and the risk of MTCT. The child's food intake is furthermore dependent on the mother's¹⁰ infant feeding practices. The mother's infant feeding practices is in turn influenced by a range of other underlying factors.

Inadequate access to food

Household food insecurity and the mother's inadequate access to the food she needs to feed her child is one of the underlying causes that may influence the mother's feeding practices. The World Food Summit [WFS]¹¹ of 1996 defined food security as existing "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (WFS, 1996). An infant's food intake thus depends on the mother's access to the food not only financially, but also physically and socially (UNICEF, 1998). A breastfeeding mother relies for instance on enough breast milk, time and support to practice this feeding method. A mother relies on the other hand upon access to infant feeding formula and clean water if this is the feeding practice she chooses for her infant. In some countries like South Africa, free commercial infant formula is provided for six months to HIV-infected mothers who choose this infant feeding practice (National DOH, 2010). This is not the case in every country. Access to clean water is also essential when giving formula to an infant to reduce the risk of malnutrition or death in children (Bergström, 2003; Thior, et al., 2006).

¹⁰ In the text the mother is referred to as the main "caregiver" the child is depending on since the focus in this thesis is the mothers' infant feeding practices.

¹¹ The WFS was called in response to the continued existence of widespread undernutrition and growing concern about the capacity of agriculture to meet future food needs (WFS, 1996).

Inadequate infant care

At the International Conference on Nutrition [ICN]¹² in 1992, care was defined as “the provision in the household and the community of time, attention, and support to meet the physical, mental, and social needs of the growing child and other household members” (ICN, 1992). Care for children is manifested in the ways a child is fed, nurtured, taught and guided (UNICEF, 1998). The use of care can be divided in two directions where one is directed towards the mother and the other one towards the child (Engle, Menon, & Haddad, 1997). The care a child receives is also linked to the situation of the household (UNICEF, 1990).

A mother’s access to and control of resources affect the care she can provide for her child. Resources a mother draws on in giving care include education and knowledge, income, physical health and nutritional status, reasonable workload, availability of time and social support from family and community (Engle, et al., 1997; UNICEF, 1990). If a mother is HIV-infected she may not know enough about infant feeding and the risk of MTCT to feed the child the way she ought too. An HIV-infected mother may furthermore not be able to give her child the care it is in need for because of poor health.

There are many caring behaviours that will affect the child nutrition and health, but the most critical are infant feeding, protecting the child’s health as well as support and cognitive stimulation for the child (UNICEF, 1998). The newest recommended infant feeding for reducing the risk of MTCT is exclusive breastfeeding. Breastfeeding provides the best nutrition as well as support and stimulation to the infant. It also enables mothers and their infants to develop a close emotional bond that benefits both (UNICEF, 1998). To ensure that the child get the needed care, this should be kept in mind when mothers are advised to formula feed. The child’s characteristics may also play a role in the kind of care the child receives (Engle, et al., 1997). If a child is HIV-infected the child may be in need of extra care which the mother may not be capable of giving.

HIV/AIDS may affect the size and composition of households. As a result the child may not be given the needed care from either the mother or other family members. If the HIV prevalence in a community is high, the proportion of orphaned children might be high while the share to take care of the children is low. Potential social impacts of HIV/AIDS are thus increased

¹² ICN was a conference held in Rome (in December 1992) where delegates of governments, international and non-governmental organizations met to work together for a world free from hunger and malnutrition.

reliance on extended family and formal and informal community organisations for child care and child fostering (Gillespie & Kadiyala, 2005).

Insufficient health services

Access to sufficient, curative and preventive health services that are affordable and of good quality is essential for PLWH (UNICEF, 1998). When looking closer at health services in the light of HIV and mothers' infant feeding practices, HIV testing and counselling, access to ARVs and PMTCT programmes are important elements that should be in place. Though there has been an increase in the HIV prevalence in South Africa since 1990, the HIV prevalence now appears to be stabilising (Statistics SA, 2011). In 2004 South Africa started roll-out of ARVs and by 2010 more than 970 thousand people received the treatment (Statistics SA, 2010; UNAIDS, 2010b). The country now seems to have one the largest ARVs programme in the world and this has probably contributed to the current stabilised HIV prevalence (Statistics SA, 2010). Other factors that might have contributed are successful national HIV/AIDS initiatives like effective scale-up of implementation of voluntary counselling and testing, the distribution of condoms and the PMTCT programmes provided in more than 95% of health facilities (Statistics SA, 2010).

National recommendations on infant feeding and the actual advice given to the HIV-infected mothers about infant feeding should also be satisfactory. Section 3.4.1 summarises some of the national infant feeding recommendations in South Africa the last decade. Despite some limitation in the recommendations, the country seems to attempt to stay updated with the newest evidence on the topic as well as international recommendations.

Basic causes

Analysis of basic causes to the outcomes should be undertaken (UNICEF & WB, 2002). This includes specifically the human, economic and organizational resources potentially available and how those resources are controlled by formal and non-formal institutions, political and ideological superstructure and power (UNICEF & WB, 2002). In a country where HIV/AIDS is common, such analyses are particularly necessary. The successful national HIV/AIDS initiatives achieved in health services in South Africa shows how actions at a higher level influence a larger development problem. If a country like South Africa is capable of and continue to strive towards defeating root causes to the problem, this will most likely have a huge impact on the outcomes.

3.4 Infant feeding recommendations after year 2000

Several recommendations have been published on infant feeding sub-nationally and nationally in South Africa as well as internationally. The following presents the main general infant feeding recommendations and recommendations in the presence of HIV from around year 2000 to date¹³.

3.4.0 International recommendations on infant feeding

General recommendations

In 2003 WHO and UNICEF developed the ‘Global strategy for infant and young child feeding’ (WHO & UNICEF, 2003). The global strategy build on past and continuing achievements, particularly the International Code of Marketing of breast milk substitutes (1981)¹⁴, the Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding (1990)¹⁵ and the Baby-friendly Hospital Initiative (1991)¹⁶. According to the strategy infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond (WHO & UNICEF, 2003). The recommendations are consistent today, but in addition recent evidence underscore the importance of the global recommendation that breastfeeding should be initiated within the first hour of birth (UNICEF, 2011a).

When the complementary feeding period begins at six months, infants are particularly vulnerable. There are thus different criteria that should be in place to make sure that the infants’ nutritional needs are met through the complementary food. The food should be timely meaning that the foods are introduced when the need for energy and nutrients exceeds what can be provided through exclusive and frequent breastfeeding (WHO & UNICEF, 2003). The food

¹³ Year 2000 was chosen because the mothers included in the analysis had children younger than 8 years and hence had children born around year 2000 or later. Recommendations published after the year of the study from 2007 are included to provide an indication of what direction the latest evidence has taken.

¹⁴ The International Code of Marketing of breast milk Substitutes is an international health policy framework for breastfeeding promotion adopted by WHO in 1981 (WHO, 1981). The Code was developed as a global public health strategy and recommends restrictions on the marketing of breast milk substitutes (such as infant feeding formula) to ensure that mothers are not discouraged from breastfeeding and that substitutes are used safely if needed.

¹⁵ The Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding recognised the unique process of breastfeeding and was produced and adopted by participants at the WHO/UNICEF policymakers' meeting on "Breastfeeding in the 1990s: A Global Initiative" (UNICEF, 2012).

¹⁶ The Baby-friendly Hospital Initiative was launched by WHO and UNICEF in 1991, following the Innocenti Declaration of 1990 (WHO, 2012a). The initiative is a global effort to implement practices that protect, promote and support breastfeeding.

should be adequate in such a way that it provides sufficient energy, protein and micronutrients to meet a growing child's nutritional needs. The food should also be safe through food being hygienically stored and prepared and fed with clean hands using clean utensils and not bottles and teats. The children should furthermore be properly fed meaning that the complementary foods are given consistent with a child's signals of appetite and satiety, and that meal frequency and feeding method are suitable for age (WHO & UNICEF, 2003).

Recommendations in the presence of HIV

Figure 3 gives a summary of the main international and national recommendations on HIV and infant feeding since around year 2000.

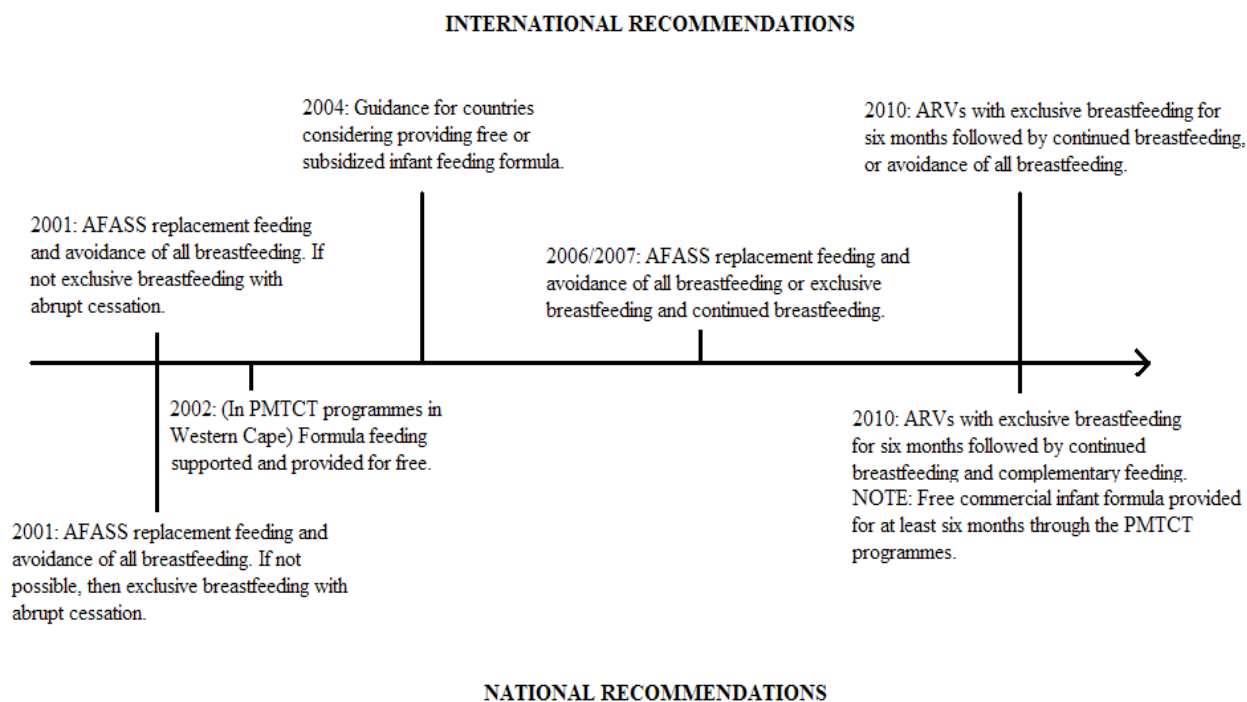


Figure 3: Overview of main international and national recommendations on HIV and infant feeding between 2001 and 2010

In October 2000 a WHO task team on MTCT had a technical consultation on the most recent scientific data on the use of regimens of ARVs to prevent MTCT (WHO, 2001b). HIV-infected mothers were advised use replacement feeding that was AFASS while avoiding all breastfeeding. These AFASS criteria were introduced to bring the local context of infant feeding

and the circumstances of the individual mother into the decision-making process. If the replacement feeding did not meet the AFASS criteria, exclusive breastfeeding the first months of life with abrupt cessation was recommended.

The global strategy for infant and young child feeding from 2003 recommended that all HIV-infected mothers should be provided with ARVs to prevent MTCT and furthermore counselled on the risks and benefits of various infant feeding options (WHO & UNICEF, 2003). When replacement feeding was AFASS, avoidance of all breastfeeding by HIV-infected mothers was recommended. Otherwise, exclusive breastfeeding should be practised until six months followed by rapid cessation of breastfeeding (WHO & UNICEF, 2003). The same year two guidelines on HIV and infant feeding were developed for healthcare managers and supervisors as well as for decision makers (WHO, UNICEF, UNAIDS, & UNFPA, 2003a, 2003b). A framework for priority action in regards to HIV and infant feeding was also prepared (WHO, 2003a). All these three recommendations were similar to the global strategy from 2003. In 2004 new guidelines based on the 2001 and 2003 guidelines were published to provide programme managers, researchers, and policy makers with basic guidance on how to conduct local assessments to establish free or subsidized infant formula (WHO, 2004). The guidelines from 2004 also intended to provide more concise information on prevention of HIV infections in infants and to include new research findings.

After strong evidence of the risk of childhood infections and malnutrition associated with replacement feeding and evidence on a higher HIV free survival rate among exclusively breastfed than among replacement fed infants, the guidelines from WHO were updated. Based on new findings the updated guidelines in 2006/2007 stated that early cessation was no longer recommended (WHO, UNICEF, UNAIDS, & UNFPA, 2007). The most appropriate infant feeding option for an HIV-infected mother thus depended on her individual circumstances, including her health status and the local situation. If replacement feeding was AFASS, HIV-infected mothers were recommended to avoid all breastfeeding. If not, exclusive breastfeeding was recommended for HIV-infected mothers for the first six months of life. If replacement feeding was still not AFASS at six months, the mothers were recommended to continue breastfeeding with additional complementary foods. All breastfeeding should stop once a nutritionally adequate and safe diet without breast milk could be provided.

In 2010 WHO in collaboration with UNAIDS, UNICEF and United Nations Population Fund [UNFPA], produced revised guidelines on HIV and infant feeding (WHO, 2010c). These guidelines were generally consistent with the guidance from 2006/2007, while recognizing the effects of ARVs during the breastfeeding period. HIV-infected mothers with CD4 count less than 350 cells/ μ l should receive lifelong antiretroviral treatment for their own health. For HIV-infected pregnant women who do not need treatment for their own health, the mothers and their infant should receive ARVs to prevent MTCT¹⁷ (WHO, 2010a). The guidelines on infant feeding furthermore highlighted that the prioritization of PMTCT needs to be balanced with meeting the nutritional requirements and protection of infants against morbidity and mortality due to other causes but HIV (WHO, 2010c). According to the guidelines mothers known to be HIV-infected who receive ARVs are recommended to exclusively breastfeed in the first six months of age and continue breastfeeding thereafter, or avoid all breastfeeding. National or sub-national health authorities should decide which of the two recommendations the health services will principally counsel and support as the strategy that will most likely give infants the greatest chance of HIV-free survival (WHO, 2010c). Mothers who are known to be HIV uninfected or whose HIV status is unknown are recommended to exclusively breastfeed their infants for the first six months of life and then introduce complementary foods while continuing breastfeeding for 24 months or beyond. The recommendations that replacement feeding should not be used unless it is AFASS remains though the acronym is replaced by more common, everyday language and terms (WHO, 2010c).

3.4.1 National recommendations on infant feeding

General recommendations

According to a national policy on infant and young child feeding in South Africa from 2007, levels of exclusive breastfeeding in the country is unacceptably low and breastfeeding should thus be promoted, protected and supported (National DOH, 2007a). The common recommendations to mothers in general have been similar to the global strategy on infant feeding from 2003 (National DOH, 2007a; WHO & UNICEF, 2003).

¹⁷ There were different ARVs options recommended for HIV-infected pregnant women who do not need treatment for their own health, but these options are not specified or emphasized here (WHO, 2010a).

In the presence of HIV

The first PMTCT programme was conceptualized in South Africa in 2000, and has been implemented at pilot sites since 2001 and nationally since 2002 (National DOH, 2008). In 2008 updated policy and guidelines for the implementation of the PMTCT programme was introduced. PMTCT programmes should encourage and support safe infant feeding and provide free infant feeding formula for at least six months (National DOH, 2008). The national policy on infant feeding from 2007 and the updated guidelines for PMTCT programmes from 2008 stated that HIV-infected mothers should receive counselling on infant feeding options to enable them to make informed choices on the infant feeding practice that was most suited for their circumstances (National DOH, 2007a). Still avoidance of all breastfeeding was recommended to all HIV-infected mothers if the infant feeding formula was AFASS. Exclusive breastfeeding for HIV-infected mothers the first six months of life was recommended if the formula was not AFASS. Across sub-Saharan Africa it is predominantly this recommendation promoting replacement feeding that has been particularly influential and used in most provincial PMTCT programmes the past decade (Moland, de Paoli, et al., 2010).

In April 2010 South Africa released revised clinical guidelines for the PMTCT (National DOH, 2010). The revised guidelines contain many changes including ARVs for all HIV-infected pregnant women with CD4 counts of less than 350 cells/ μ l and ARVs for infants. According to the guidelines all mothers who are known to be HIV-infected and on or not on ARVs, who choose to exclusively breastfeed their infants should do so for six months. After six months appropriate complementary foods should be introduced while continuing breastfeeding for the first twelve months. Free commercial infant formula will as earlier be provided for at least six months to HIV-infected mothers who choose this infant feeding practice (National DOH, 2010). The revised guidelines for the PMTCT are in line with a new national strategic plan on HIV for South Africa highlighting that PMTCT programmes must provide HIV-testing and ARVs as well support exclusive breastfeeding for at least the first six months (SANAC, 2011).

Though South Africa has national infant feeding policies, recommendations concerning infant feeding for HIV-infected mothers have varied between the provinces of South Africa. In KwaZulu-Natal for instance, the health authorities have acknowledged the risk of MTCT through breastfeeding, but recommended exclusive breastfeeding for the first six months, followed by

rapid cessation (KwaZulu-Natal DOH, 2001). This differs from the recommendations in Western Cape.

In March 2002 Department of Health [DOH] of the Provincial Administration of the Western Cape [PAWC] made a protocol on PMTCT programmes (PAWC, 2002). According to the protocol, the staff at Midwife Obstetric Units [MOU] or clinics should ensure that mothers understood the risks and benefits of formula and breastfeeding and help them determine their choices regarding feeding. At the same time the protocol emphasized that the risk of MTCT increases through breast milk and that this route of infection is prevented if the mothers chose exclusive formula feeding instead of breastfeeding. As a consequence of this formula feeding was promoted and offered for free in the PMTCT programmes¹⁸. Mothers who chose to breastfeed should be advised to practice exclusive breastfeeding. These mothers should furthermore be encouraged to rapidly wean from breastfeeding at age 4 to 6 months in order to decrease the risk of MTCT. The protocol stated that in breastfeeding infants, oral lesions on the infant, mastitis and cracked and bleeding nipples increase the risk MTCT. Mothers should therefore be instructed to come to the clinic if they experience signs of such problems. There they would most likely be advised not to breastfeed (PAWC, 2002).

According to newer Western Cape government information on infant feeding, mothers who go to a MOU or a clinic should receive voluntary testing (Western Cape DOH, 2011). If the mother takes the test and it turns out that she is HIV-positive, she will have the option to join a PMTCT programme free of charge. A CD4 count will then be done to determine the need for ARVs to the mother during the antenatal period. A mother with CD4 count less than 250 cells/ μ l will receive ARVs. The HIV-infected mother will receive counselling and advice about infant feeding. Though the PMTCT programmes promote exclusive formula feeding and provide formula free of charge for six months, the mother should be given a choice to either exclusive breastfeed for six months or exclusive formula feed (Western Cape DOH, 2011).

¹⁸ In PMTCT programmes in Khayelitsha in 1999 and 2001, HIV-infected mothers were offered the replacement feeding with the brand name Pelargon ® for respectively nine and six months (PAWC, 2002).

4.0 Methodology

A triangulation of methods was applied in the study from 2007, combining quantitative and qualitative methods in triangulation (Ringdal, 2007). The methods may be equal or one of the methods chosen as the main method (Ringdal, 2007). In this master thesis, the quantitative method was the main analysis method.

4.1 Study site

Of the roughly 51 million inhabitants in South Africa today, 10.5% live in the Western Cape Province where the study from 2007 was conducted (Statistics SA, 2011). This province is one of the nine provinces in South Africa and is situated on the south-western side of South Africa (Western Cape Government, 2011). Western Cape is culturally diverse and is one of the world's greatest tourist attractions. The province has three major population groups, the black, the coloured and the white. Cape Town is the provincial capital of the Western Cape, as well as the legislative capital of South Africa (Western Cape Government, 2011). In Cape Town there are so called government-built townships. The townships are rapidly growing because of an on-going influx of migrants from the rural areas in the Western and Eastern Cape Provinces in search for a job and a better future (Statistics SA, 2011).



Figure 4: Area where the study was conducted (TOURSA, 2007; Wikipedia, 2011)

Figure 4 shows the area in Western Cape where the study from 2007 took place. The squared area to the right is called the Cape Flats and is an expansive, flat valley area situated southeast of Cape Town. Khayelitsha is one of many townships located on the Cape Flats and this is where the quantitative survey took place. Khayelitsha is reputed to be the largest and fastest

growing township in South Africa. A population census in Khayelitsha in 2001 compiled by the Information and Knowledge Management Department [IKMD] in Cape Town found that IsiXhosa was the most common home language of the population (96.8%) (IKMD, 2005). The majority of the population lives in informal housing and the rates of poverty, unemployment and crime are exceptionally high. Furthermore Khayelitsha has one of the highest HIV prevalence rates in South Africa (MSF, Western Cape DOH, City of Cape Town DOH, & UCT, 2008). Khayelitsha is Cape Town's largest black township and was the site in South Africa where the first program offering ARVs was established (Coetzee, Boulle, et al., 2004; Coetzee, Hildebrand, et al., 2004; Venkataramani, Maughan-Brown, Natrass, & Ruger, 2010; WHO, 2003c). The qualitative interviews were collected in 2007/2008 in a number of urban and peri-urban townships in the Cape Flats, including Khayelitsha, Nyanga, New Crossroads, Somerset West and Hout Bay.

4.2 The quantitative method

This section starts by giving a summary of all the related quantitative surveys from 2000, 2004 and 2005/6 leading up to the survey in 2007. Information on the quantitative methodology was obtained by communication with key informants and review of literature on this work. The main literature used was articles of David Coetzee and co-workers in 2004 (Coetzee, Boulle, et al., 2004; Coetzee, Hildebrand, et al., 2004) a working paper from CSSR in 2005 (Magruder & Natrass, 2005) and a summary report by researchers at Fafo (de Paoli, et al., 2010).

4.2.0 The panel surveys

In 2000 a survey called Khayelitsha Mitchell's Plain [KMP] was conducted in the Mitchell's Plain magisterial district of Cape Town by researchers from the UCT (Magruder & Natrass, 2005). The survey was conducted under the support of the Southern African Labour and Development Research Unit [SALDRU]¹⁹, a research unit which later became part of the CSSR. The main objective of the KMP survey was to investigate labour market behaviour, socio economic characteristics and social/political attitudes amongst working class people. The Mitchell's Plain magisterial district was chosen because it included the predominantly coloured working class in Mitchell's Plain as well as the major African townships of Khayelitsha, Langa,

¹⁹ SALDRU conducts research on changing patterns of well-being in South Africa and assesses the impact of government policy on the poor (Magruder & Natrass, 2005).

Gugulethu, Nyanga and Crossroads (Magruder & Natrass, 2005). In 2004 researchers from CSSR decided to convert KMP 2000 into a panel survey, and to only track Khayelitsha residents. The Khayelitsha respondents were thus revisited to see how their labour market and health status had changed over time and the KMP survey became the KPS (Magruder & Natrass, 2005). Khayelitsha was selected because it is Cape Town's largest African township and because Khayelitsha became the first place to provide ARVs for poor PLWH in 2001 (a year after the KMP survey). This last reason resulted in the use of a parallel panel survey of people on ARVs in Khayelitsha (KSPS) in 2004. In 2005/2006 the next wave in the panel survey was conducted in the same area with the same two samples. In 2007 the South African researchers teamed up with Norwegian researchers from Fafo and undertook a third and last wave with the participants in KSPS and the KPS. Funding for the project was received from the Research Council of Norway. The overarching goal in the survey from 2007 was to investigate what PLWH knew about different support systems, and how they were being utilized in light of the ARVs roll-out. Some additional questions were included in the questionnaire at the same time as a qualitative investigation was added to the 2007-survey.

Though the quantitative survey was based on a series of panel surveys, data on infant feeding practices among mothers with and without HIV was only asked in the last wave in the panel survey in 2007. Therefore only the data from the 2007 survey has been used in this master thesis, and the quantitative design in this thesis was thus cross-sectional. A cross-sectional survey is a type of observational or descriptive survey that involves identifying a defined population at a planned point in time (Cade, 1997; Coggon, Rose, & Barker, 2003). A cross-sectional survey also involves measuring different variables on individual which for instance can include past and current dietary intake (Cade, 1997).

4.2.1 The participants in the KSPS and the KPS

In this section, the inclusion of the participants in the KSPS is described first by looking back on relevant projects and surveys from Khayelitsha from 1999. Then the participants in the KPS are described by going through different surveys building up to the survey in 2007. A schematic overview of the participants included in KSPS and KPS is presented in the end (Figure 6).

KSPS

In 1999 Médecins Sans Frontières [MSF]²⁰ started working in Khayelitsha to support the first provincial government-run project to prevent MTCT in South Africa (WHO, 2003c). In April 2000 MSF in cooperation with PAWC, set up three HIV/AIDS dedicated clinics within Khayelitsha's primary health care centres. One year later the HIV/AIDS clinics began to offer ARVs free of charge to people in an advanced stage of HIV infection. Only patients who attended the HIV/AIDS clinics regularly or lived in Khayelitsha received ARVs (Coetzee, Boulle, et al., 2004). Furthermore only patients who had a CD4 count less than 200 cells/ μ l were offered ARVs. Between May 2001 and December 2002 a total of 287 patients got ARVs from the three clinics (Coetzee, Boulle, et al., 2004). The aim of the project by MSF was to show that treating HIV/AIDS with ARVs in a primary health care setting and in a resource-limited environment is feasible and replicable (WHO, 2003c).

In 2004 ASRU at UCT decided to try to survey as many people as possible who had received ARVs from the clinics. These people were soon included in the KSPS (also called Khayelitsha HAART Panel Survey) which then became a parallel panel survey to the KPS. The survey sample in the KSPS was recruited through social networks and contacts with clinics and support groups (Venkataramani, et al., 2010). People on ARVs were asked to volunteer and further asked to approach and suggest others they knew were on ARVs to volunteer. The sample method thus became in a sense a snowball sample. All together 242 patients receiving ARVs and living in Khayelitsha took part in the KSPS. Though the survey sample was not a random sample, the survey recruited more than two thirds of the patients who were the first to receive ARVs in 2001. Out of these, more than a third of those included in the survey were known to have been on ARVs for more than a year (Venkataramani, et al., 2010).

There were 224 respondents in the KSPS in 2005/2006 and 216 respondents in 2007. Lack of information made it impossible to get an overview of the reasons for attrition between the different waves.

²⁰ MSF is an international, independent, medical humanitarian organization that delivers emergency aid to people affected by armed conflict, epidemics, healthcare exclusion and natural or man-made disasters.

KPS

The sample for the 2000 KMP survey was drawn to represent all adults in the Mitchell's Plain Magisterial district. According to the 1996 Population census, there were 728.916 people living in the district. A two-stage cluster technique was chosen as the most cost-efficient method to interview residents representing such a large area and to obtain equal subsample sizes across the two stages of selection (Crankshaw, Welch, & Butcher, 2001; Magruder & Natrass, 2005).

In the first stage clusters, households were selected based on the enumerator areas [EAs] defined by Statistics South Africa for the 1996 Population census, namely areas with neighbourhoods between 50 and 200 households. Before selecting EAs, all non-residential and institutional EAs (except hostels) were excluded. Then a random sample of EAs was drawn with probability of selection being proportional to population size. According to the 1996 Population census, the district consisted of 1486 populated EAs and the average number of adults per household was 2.66. The researches in the survey intended to administer 2875 questionnaires. Dividing the desired number of questionnaires (2875) by the average number of adults per household (2.66), it was determined that 1081 household should be selected. The target was further to interview at least 10 households from each selected EA. Dividing the number of household needed to reach the intended number of administered questionnaires (1081) by the number of households to be interviewed per EA (10), gave a total of 108 EAs. The 108 EAs were then listed in geographical order and by housing type which resulted in an implicit stratification of the sample by location and housing type. Forty-one of the EAs were in Khayelitsha.

In the second stage the households themselves were selected. The EAs were stored as digital data using Geographical Information Systems [GIS] technology²¹. Households were listed and a sampling interval was selected based on the number of households and an expected response rate of 80% to ensure that at least 10 households per EA were visited. 13 households were thus selected and all dwellings were listed always starting with the South-West corner. The first dwelling was selected on a random basis, and then subsequent households were selected according to the sampling interval. Supervisors were responsible for checking to see how many households there were in each dwelling to ensure that all households fell within the sampling frame.

²¹ This technology enables the boundaries of the different EAs to be superimposed on aerial images called orthophotos along with additional information such as street names. The 2000 KMP survey used orthophotos to locate and select respondents.

All adults aged 18 years and older in the selected households were interviewed. Households were revisited up to three times or more to obtain the necessary interviews. Some households in different EAs did not respond and not all individuals in selected households could be found or agreed to be interviewed. Still most of the individuals in sampled households were actually interviewed. For the entire KMP sample in 2000, 85% of selected households were found and agreed to let the interviewers through the door and the overall household response rate in Khayelitsha was 83%. The survey consisted of a total of 2644 individuals and of the respondents 69% were African, 30% were coloured and 1% were white and Indian people. Over half of African respondents in the survey (966 individuals) were living in Khayelitsha. Figure 5 gives an overview of the drawing of participants in the KMP survey.

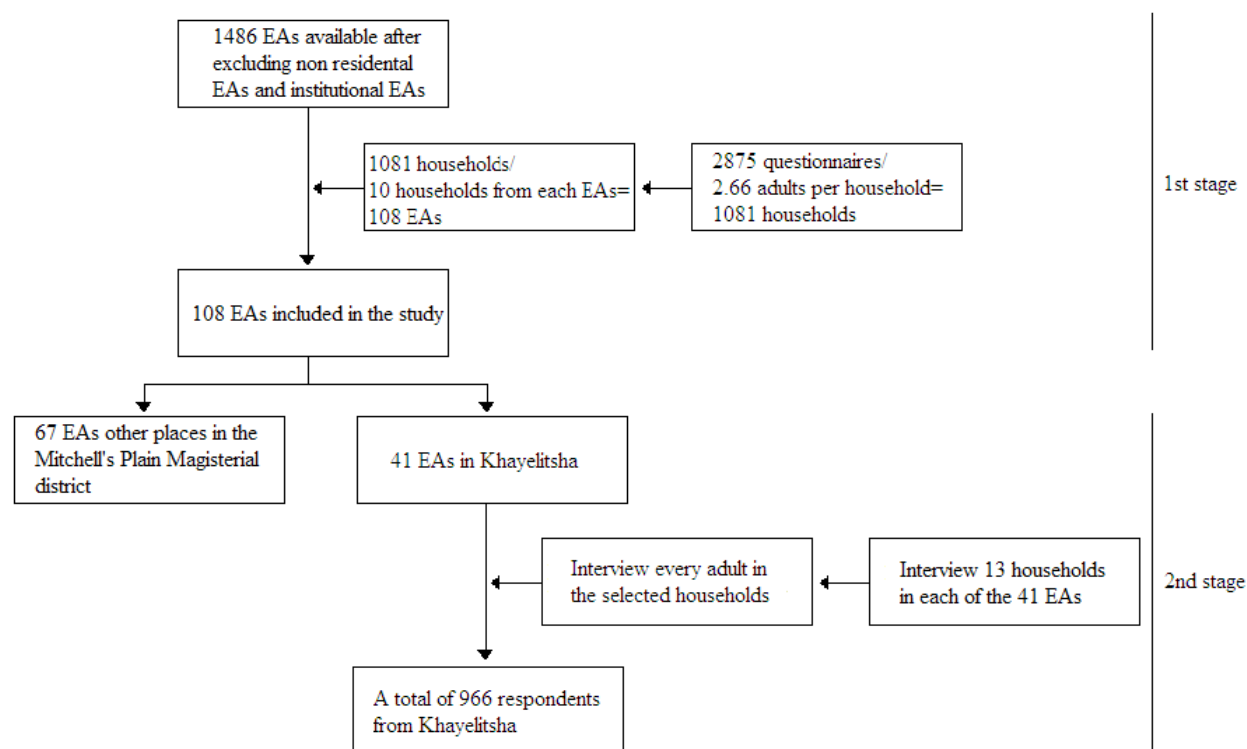


Figure 5: Overview of the drawing of participants in the KMP survey

As noted earlier, the original KMP survey was not designed as a panel survey. Very little identification information was thus collected in 2000. Surnames were hardly ever collected and address information was often broadly descriptive. This was because in many informal settlement areas there was no adequate numbering system for dwellings. Fieldworkers in one of the informal settlement areas failed to find an entire EA through a combination of a poor aerial photograph

and the construction of new houses in the area. Though this resulted in some changes in the 2004 survey, the fieldworkers managed to find most of the households and were able to follow many of those who had moved within Khayelitsha. The response rate was thus reasonably good in the 2004 survey. Of the 966 potential Khayelitsha respondents in the KMP survey from 2000, 570 (60%) respondents were re-interviewed in 2004. Reasons for attrition between 2000 and 2004 were many and most were due to failure to interview the individuals. A total number of 373 could not be interviewed mainly because they had moved outside Khayelitsha (no address available) or had died. Another 23 potential respondents were lost due to survey management problems in the field. From the survey in 2004 to the survey in 2007, the number of respondents from Khayelitsha fell to 517. The reasons for attrition between the survey from 2004 to 2005/2006 and furthermore to 2007 was not available, but was most likely similar to the 2004 survey.

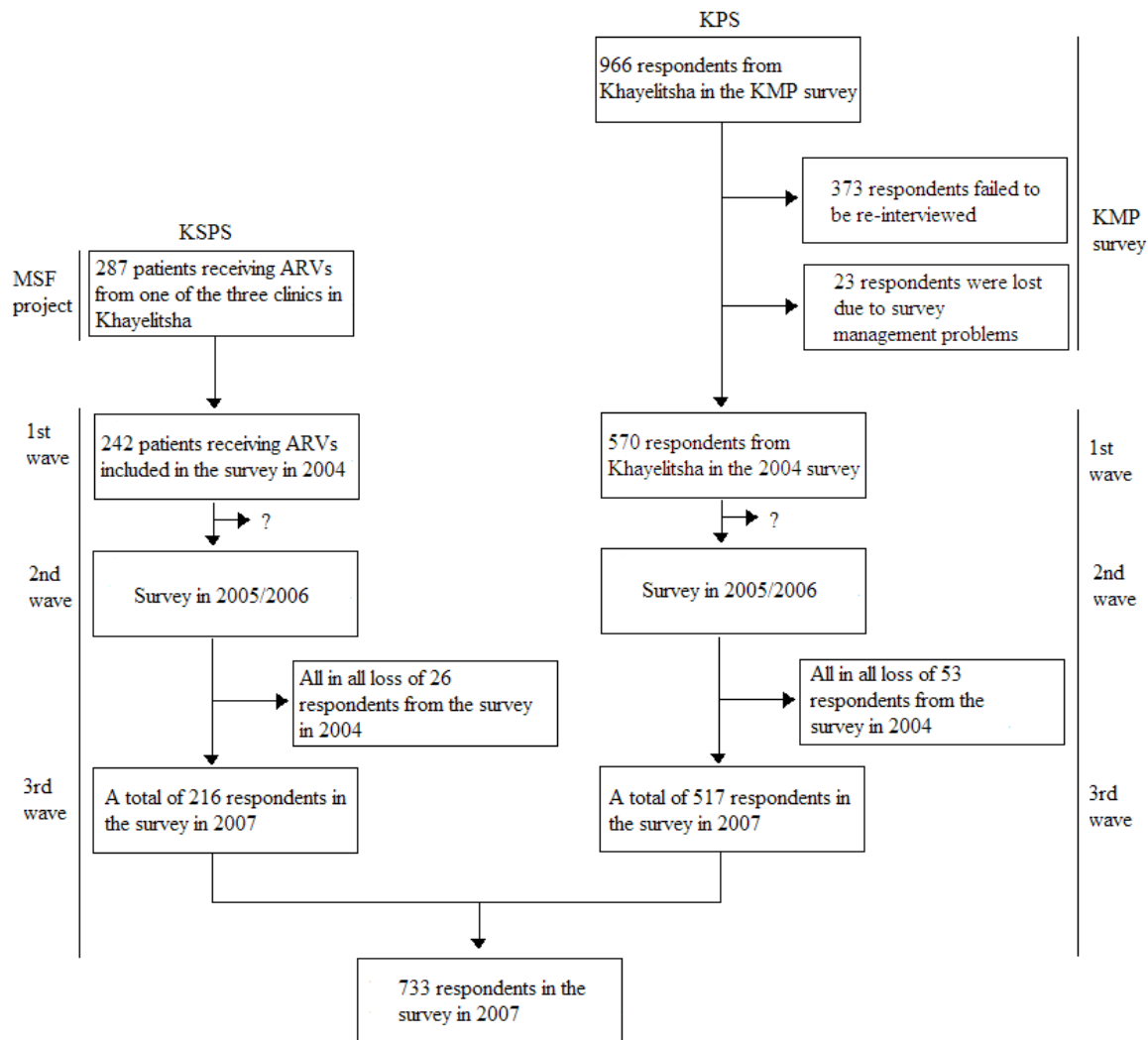


Figure 6: Overview of the participants included in KSPS and KPS

4.2.2 Inclusion of study subjects from the quantitative survey

Several exclusion criteria were set to get a sample of study subjects relevant for the topic in this master thesis.

First all participants who were not parents were excluded. After that all the participants in KSPS who were not HIV-infected when they were pregnant or conceived a child, were excluded. This was done to assure that when they answered questions about infant feeding practices and advice, their practices and the advice given to them was based on the fact that they were HIV-infected. The next step was to exclude all the parents who had children eight years or older. Age seven years or younger was chosen since this is the year children in South Africa start school. Although the participants might have been able to recall how they had been feeding their children and what advice they had been given more than 8 years ago, they were excluded. This was done to reduce the chance for recall bias.

Though fathers had been asked how they or their partner had been feeding their last born child, fathers were not included in the analysis. This was because mothers are most likely to have been the ones feeding their children and receiving advice about infant feeding. The fathers are thus not given much attention in the discussion of the findings.

Last participants in KPS, who had tested positive on their last HIV test were excluded. Though the HIV-infected participants in KPS could have been included in KSPS, this was not done to reduce the chance of bias (through for instance difference in the way information was obtained, recorded, processed and interpreted in KSPS and KPS). Participants in KPS, who had tested negative, did not know or refused to answer the question on the result of their last HIV test were included. Participants who had been pregnant or conceived a child and had received advice about infant feeding, but at the time of the enrolment to the survey in 2007 reported that they did not have any biological children, were excluded. Figure 7 gives a schematic overview of the total number of participants, exclusion criteria and the final study sample included in the analysis.

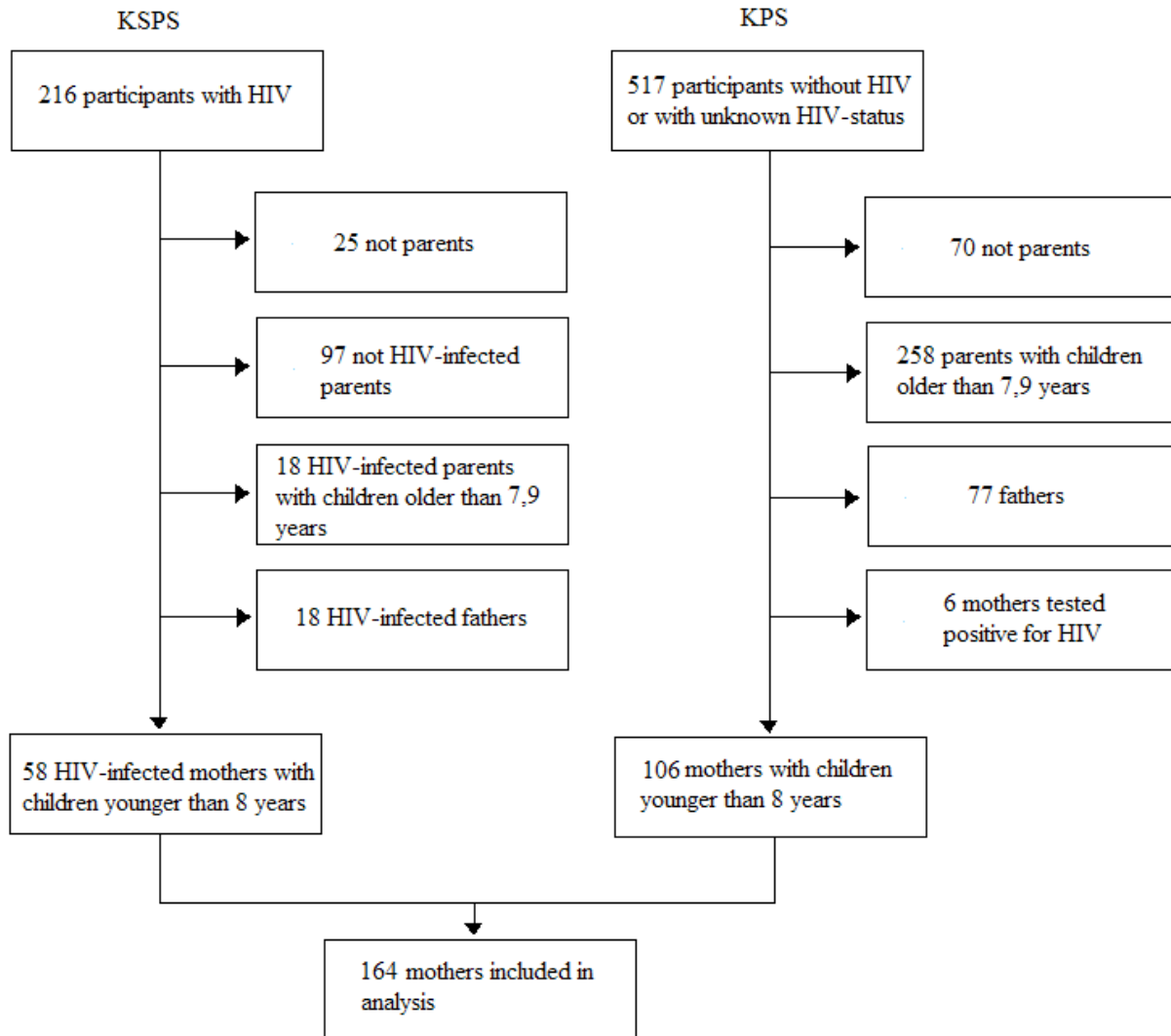


Figure 7: Overview of the study sample

A total of 733 participants (216 in KSPS and 517 in KPS) were part of the survey from 2007 and were available for analysis. 95 of these (25 in KSPS and 70 in KPS) were not parents and had not answered the questions about infant feeding. In KSPS 97 of the participants had not been pregnant or conceived a child since their first HIV diagnosis and were thus excluded. A total number of 376 participants had children older than 7.9 years old (18 in KSPS and 258 in KPS). Ninety-five of the participants were fathers (18 in KSPS and 77 in KPS) and were excluded. Six of the participants in KPS were excluded since it turned out that they were HIV-infected and had been so the last couple of years. All in all 58 HIV-infected mothers (KSPS) and 106 mothers without HIV or with unknown HIV status (KPS) were included. A total number of 164 mothers with children younger than 8 years were thus part of most of the analysis made in this thesis.

4.2.3 Questions included in this master thesis

The survey from 2007 consisted of a structured interview questionnaire. The interviews varied in length, but lasted between sixty and ninety minutes. Trained interviewers conducted the interviews. The interviewers conducting the interviews were HIV-infected. Even though some of the interviews took place at public places like the clinic, supermarkets and cafés, most of the interviews took place in the homes of the participants. Appendix 1 (Module N on pregnancy and childcare and Module O on infant feeding) was a small part of the main questionnaire used in the survey. The questionnaire used in the survey from 2007 was a collaborative effort, but Marina de Paoli was responsible for the questions on infant feeding. This part contained modules with the most relevant questions for this master thesis and thus constituted the main analysis material.

In Module N four questions (N.1 through N.4) were analysed to examine the mothers' knowledge about MTCT. MTCT is possible during pregnancy, during labour and through breastfeeding and a child is more likely to contract HIV through mixed feeding than exclusive breastfeeding. The correct answer to all of the four questions was therefore yes. Next in the module the women were asked how many times they had been pregnant while the men were asked how many times they had conceived a child. (N.5 and N.6). Everyone was then asked how many biological children they had including the name and age of these children (N.7 and N.8). These questions were used in order to exclude fathers as well as all parents with children older than eight years. The participants were also asked how healthy they would say their children were compared to other children of the same age in their neighbourhood (better, same or worse) (N.9).

In Module O questions measuring to what extent the mothers agreed or disagreed to different statements about the best ways to feed small children (O.1.1 through O.1.6) were included to examine the mothers' knowledge about infant feeding. Next women only were asked what infant feeding advice they had been given when they were pregnant and went for check-ups (O.2). This question contained six possible answers; breastfeeding, exclusive breastfeeding, infant feeding formula, cow's milk, mixed feeding and not received any advice. In the same module everyone was asked how they or their partner fed their last born child the first one to twelve months (O.3 through O.6). The question was divided into four categorical periods and included three main answer options being exclusive breastfeeding, mixed feeding and infant feeding formula. Mixed feeding meant that the mothers had been giving their infants a mix of breast milk and other foods like infant feeding formula or cow's milk. Infant feeding formula

encompassed purchased formula, free clinic supply of formula as well as a combination of bought and clinic supplied formula. Two questions about the clinic supply of free infant feeding formula were included to explore the mothers' access to formula (O.9 and O.10).

In other modules of the questionnaire the participants were asked how old they were, where they spent the most time growing up, if they grew up in an urban or rural area, if they were currently working and if they were taking ARVs (only relevant for the participants in KSPS). The participants were also asked how their health was in general. Measures of health were based on a self-reported health status on a 1-5 Likert scale, with 1 being poor and 5 being excellent health. The mothers were also asked what their highest passed school grade was. The school grades were divided into two levels of education existing in South Africa's general and further education (Department of Basic Education, 2011)²². The education system in South Africa spans 13 grades from grade 0 through to grade 12. General education runs from grade 0 to grade 9 and is divided into three phases²³. Further education runs from grade 10 to grade 12. Under the South African Schools Act of 1996, general education is compulsory for all children (or children aged seven to fifteen years old, whichever comes first). The mothers were divided into educational level based on completion of all or some levels of general education or completion of all or some levels of further education.

The questionnaire contained a section for household questions, covering information about number of people in the household and material status. The participants were also asked to list things they or anyone else in the household owned and information about the mothers' access to gas/electric stove and microwave was included. This information was added because of the importance of this equipment when it comes to preparing infant feeding formula. The water should be boiled before adding the powder and the formula should then be lukewarm when giving it to the child.

4.2.4 Data analyses

Crosstabs were used to describe the infant feeding practices of the mothers in KSPS and KPS, the advice about infant feeding given to them when they were pregnant and their knowledge about MTCT. The frequencies of HIV-mothers' who had been giving purchased formula, free clinic

²² The levels are actually called general education and training and further education and training, but are here just referred to as general and further education.

²³ Foundation phase incorporates grades 0 to 3, intermediate phase incorporates grades 4 to 6 and senior phase incorporates grades 7 to 9.

supply or a combination of these two was explored. A few of the mothers had children younger than the time period the questions referred to and these were set to “missing” in the analysis. Some mothers answered that they did not know the answer to the questions on the knowledge questions about infant feeding and HIV. Though this may have meant that they could be included among the mothers who answered wrong on the question, these mothers were set as missing to reduce the risk of misjudgement of the answers.

In some of the analysis, Pearson’s chi-square test was employed. This descriptive statistic was used to investigate if there were any differences between the infant feeding practices of the mothers in KSPS and KPS. The approximation to the chi-squared distribution is not valid if expected frequencies are too low. It will normally be acceptable as long as no more than 20% of the events have expected frequencies below five (Coggon, et al., 2003; Preacher, 2001). When the sample distribution and thus the expected frequencies appeared to be insufficient, any statistical analysis was either excluded or included with caution in the interpretation of the findings.

Crosstabs were also created to describe the relationship between the mothers’ infant feeding practices and other factors besides their HIV status. The mothers in KSPS and KPS were looked at separately. This made the sample sizes in most of cases very small and it was thus not correct to use Pearson’s chi-square. In the lack of statistical analysis, only descriptive findings are presented.

Statistical Package for the Social Sciences version 19 [SPSS] was used to analyse the quantitative data. For all the tests the statistical significance level was set at 0.05.

4.3 The qualitative method

The qualitative investigation added to the project in 2007 is only briefly described, as the qualitative findings were only added to underline the quantitative findings. Information on the qualitative investigation was found through verbal and written communication with key informants as well as literature of Marina M. de Paoli and Elizabeth Mills who both were responsible of the in-depth interviews (de Paoli, et al., 2010).

4.3.0 The qualitative investigation

The qualitative investigation included in-depth semi-structured interviews and focus group discussions. The purpose of the qualitative investigation was to collect a wide range of

information with regard to challenges faced by PLWH, the communities' responses to these challenges, and to overarching recommendations by key stakeholders. For this reason, a number of key stakeholders were identified for participation in the qualitative research. Eight medical doctors working in the public sector throughout the Cape Peninsula and 16 HIV-infected men and 13 HIV-infected women were interviewed in-depth. Programme managers and stake holders participated in the three focus group discussions. Infant feeding issues were, as mentioned earlier not the major topic of investigation. Still the interview guide to the in-depth interviews with HIV-infected men and women included three questions concerning infant feeding. These were questions on decision making about infant feeding, infant feeding advice received and infant feeding practices (0-6 months, 6-12 months).

4.3.1 Inclusion of subjects from the qualitative investigation

Four in-depth interviews with female physicians were available. One of the four doctors was not asked anything about infant feeding and was thus excluded. Two of the interviews took place at their work place, while one of the interviews took place in the doctor's home. Though infant feeding practices were not the major topic of the investigation, the doctors were asked a few questions on the topic.

Of the 13 interviews with women, three were excluded since they had no children younger than eight years old. This was done to reduce the risk of recall bias, but also because these women had not been asked specifically about their infant feeding practices and what advice that had been given to them. One of the mothers had a child younger than eight years, but was not asked about what infant feeding practice she had chosen and thus she was excluded. However she said that most HIV-infected mothers were advised not to breastfeed, because breast milk might infect their children. Nine of the women were asked about their infant feeding practice and what advice they had been given. These women were therefore included in the analysis. The interviews with the nine HIV-infected mothers were conducted in health centres or in the homes of the mothers. The interviews took place in August to October 2007. The 16 in-depth interviews with men were not included in the analysis.

Qualitative interviews are well suited to provide information about people's experiences, views and self-understanding (Thagaard, 2010). Those interviewed can also tell the interviewer how they experience their life situation and how they understand their experiences. The goal with qualitative data was not to quantify, but to try to understand more of the mothers' perceptions and

experiences of the topic (Ringdal, 2007). The in-depth interviews with the three female doctors and the nine HIV-infected mothers were added to supplement and hopefully explain the quantitative findings.

4.3.2 Analyses of the qualitative data

All the interviews had been collected and transcribed from audio tape to text. The in-depth interviews with the HIV-infected mothers were conducted with the help of a translator. This probably led to difficulties in the transcription of the interviews because many of the qualitative interviews available contained incomplete sentences and was at some times very hard to understand. This meant that some small changes had to be made to a few of the answers to make them more understandable previous to including them in the analysis.

Since questions on infant feeding were only a small part in the qualitative interviews, simple analysis methods of the in-depth interviews were employed. Still concepts in the grounded theory were used when analysing the qualitative data. Grounded theory is often used in qualitative research and is a systematic methodology in the social sciences involving the generation of theory from data (Thagaard, 2010). Based on grounded theory the next step after data collection is to code or categorize key points and group these into similar concepts in order to make them more workable. The three questions about infant feeding helped categorize the interviews. Furthermore concepts related to the objectives made the categorizing of the in-depth interviews easier. These concepts were "infant feeding," "breastfeeding," "infant feeding advice," and "knowledge". The findings were then grouped based on these concepts. "Stigmatization", "fear" and "time-pressure" appeared to be factors influencing the mothers' infant feeding practices.

4.4 Ethical considerations

The study from 2007 was strictly in adherence to the ethical and human right principles outlined by the Norwegian Committee for Medical and Health Research Ethics and the Ethical Committee at the University of KwaZulu-Natal. The ethical Board of the Centre of Social Science Research approved the study and the city of Cape Town gave the researchers permission to conduct research in principal health care centres and with health care professionals working in the public health sector. Informed consent was secured from each participant, and all names and identifying characteristics were removed in order to ensure confidentiality. Participation was voluntary and

the participants were informed that they could withdraw at any time during the study without any further consequences. Social research on PLWH entails some special challenges as this is a stigmatised and vulnerable group. The study from 2007 did not include any procedure that was harmful for the participants. There was however a risk of inadvertent disclosure of HIV status (as not all participants had disclosed their status). The researches sought to establish trust in their interaction with the participants; they ensured that participation was voluntary, and that the interviews took place in locations that the participants had chosen, in order to safeguard confidentiality.

The infection status of the HIV-infected mothers and the potential risk of infection when breastfeeding their infants could cause worries. Women who experienced any discomfort were offered further counselling and support by experienced counsellors. Due to the general fear of disclosure among HIV-infected women however, confidentiality issues were taken seriously.

The data collected was only used for research purposes and the identity of any the participants was not revealed. Copies of original data remained in South Africa and were available for the involved staff at Fafo.

5.0 Findings

This chapter starts by giving an overview of the characteristics of the study sample. The findings are then divided into four sections based on the specific objectives.

5.1 Characteristics of the study sample

In Table 3 the characteristics of the mothers in KSPS (HIV-infected mothers) and the mothers in KPS (mothers without HIV or with unknown HIV status) who had children younger than 8 years old are presented. Almost half of the mothers in KSPS and 43% of the mothers in KPS had never been married and were not living with a partner. A little less than one third of the mothers in KSPS and 40% of the mothers in KPS were married. Of the mothers in KSPS 12% were not married, but living with partner compared to 4% in KPS.

Forty-two percent of the mothers in KSPS compared to 21% of the mothers in KPS lived in households consisting of four or less persons. The percentages of mothers living in households consisting of five or six persons were 35% in KSPS and 30% in KPS. Twenty-two percent of the mothers in KSPS compared to 48% of the mothers in KPS had seven or more people living in the same household. The majority of the mothers in KSPS were between 30 and 34 years old (40%) while the majority of the mothers in KPS were older than 35 years old (42%). Few of the mothers in KSPS and KPS were 24 years old or younger.

In the questionnaire the mothers were asked what their highest school grade passed was and in Table 3 the mothers' answers were categorized according to the two educational levels in South Africa namely general (grade 0-9) and further (grade 10-12) education. Even though only a small number of the mothers had completed all or some levels of general education, a larger number of the mothers had completed all or some levels of further education. This was the case for two thirds of the mothers in the KSPS and three fourths of the mothers in the KPS. A little less than half of the mothers in each of the groups were currently working in 2007.

In both of the groups a large proportion (around 70%) of the mothers had grown up in a rural area. Twenty-eight percent of the mothers in KSPS and 26% of the mothers in KPS had grown up in Western Cape.

Table 3: Characteristics of the mothers in KSPS and KPS

		Mothers in KSPS n (%)	Mothers in KPS n (%)
	Total	58 (100)	106 (100)
Material status			
	Never married and not living with partner	30 (53)	45 (43)
	Married	18 (31)	42 (40)
	Not married, but living with partner	7 (12)	4 (4)
	Divorced	2 (3)	6 (5)
	Widowed	0 (0)	8 (7)
	Missing	1 (1)	1 (1)
Number of people living in household			
	1-2	1 (2)	2 (2)
	3-4	23 (40)	20 (19)
	5-6	20 (35)	32 (30)
	>7	13 (22)	51 (48)
	Missing	1 (1)	1 (1)
Age (years)			
	20-24	1 (2)	4 (4)
	25-29	13 (22)	25 (24)
	30-34	23 (40)	32 (30)
	≥ 35	21 (36)	45 (42)
Educational level^a			
	No education	1 (2)	1 (1)
	General education	18 (31)	26 (24)
	Further education	39 (67)	79 (75)
Currently working			
	Yes	27 (47)	49 (46)
	No	31 (53)	57 (54)
Growing up area			
	Urban	16 (28)	33 (31)
	Rural	42 (72)	73 (69)
Health status			
	Poor	0 (0)	1 (1)
	Fair	58 (100)	8 (8)
	Good	0 (0)	16 (15)
	Very good	0 (0)	46 (43)
	Excellent	0 (0)	35 (33)
Biological children			
	1	17 (29)	33 (31)
	2	18 (31)	26 (24)
	3	19 (33)	24 (23)
	4	3 (5)	13 (12)
	≥5	1 (2)	10 (10)
Children younger than 8 years old			
	1	45 (78)	82 (77)
	2	12 (21)	19 (18)
	3	1 (1)	5 (5)
Compared to other children: how healthy are the children			
	Better	7 (12)	31 (29)
	Same	50 (86)	74 (70)
	Worse	1 (2)	1 (1)
Household assets			
	Own gas or electric stove	54 (93)	96 (91)
	Do not own	4 (7)	10 (9)
	Own microwave	24 (41)	57 (54)
	Do not own	34 (59)	49 (46)

^a Educational level: General education refers to the completion of all or some levels of general education (grade 0-9). Further education refers to the completion of all or some levels of further education (grade 10-12)

All the mothers in KSPS reported that they considered their health status to be fair (n=58). The mothers in KPS used all the levels on the scale when describing their health though most of the mothers reported that their health status was very good or excellent. The mothers in KPS were asked if they had ever had an HIV test and what the result of their last HIV test was. Seventy-six percent of the mothers had been tested and of these 93% had tested negative while 7% of the mothers did not know or refused to answer the question on the result of their last HIV test.

Most of the mothers in both of the groups had between one and three biological children, of which at least one was younger than 8 years. A majority of the mothers reported that their children were just as healthy compared to other children of the same age in the neighbourhood. This applied both to the mothers in KSPS (86%) and the mothers in KPS (70%). Approximately 10% of the mothers in KSPS and 30% of the mothers in KPS reported that their child's health was better than the health of other children. Almost all of the mothers owned a gas or electric stove. Not that many owned a microwave: 41% of the mothers in KSPS and 54% of the mothers in KPS. Approximately all the mothers in KSPS reported that they were taking ARVs (98%).

Four of the nine mothers in the in-depth interviews were married while five were single. One of the mothers did not mention how old she was, whereas the eight other mothers were between 26 and 42 years old. All the mothers had between one and four children, though the majority (6 mothers) had one child. The mothers were diagnosed with HIV somewhere between 1999 and 2006. Five of the mothers were employed and four of the mothers were unemployed during the time they were interviewed. Not all in-depth interviews included clear information about where the mothers lived, but it seemed like at least three lived in Khayelitsha, one lived in New Crossroad and one in Nyanga. The same applied to the in-depth interviews with the doctors. Not all of the interviews included information about where the doctors worked. The three doctors were 30, 40 and 50 years old. One of the doctors was general practitioner, one was general practitioner and homeopathy specialist and one was specialist in treatment with ARVs.

5.2 Infant feeding advice given to the mothers

The majority of the mothers in KSPS said they had been advised to give infant feeding formula (77%) (Table 4). Nine of the mothers in KSPS had been advised to breastfeed or breastfeed exclusively. Almost all the mothers in KPS had been advised to breastfeed (81%) or breastfeed exclusively (6%). Only a few mothers in KPS had been advised to give infant feeding formula or mixed feeding. Thus there seemed to be a difference in the advice given to the mothers in KSPS

and KPS about breastfeeding and infant feeding formula, but no statistical analysis could be made due to the low sample size.

Table 4: Infant feeding advice given to the mothers in KSPS and KPS during pregnancy

Advice given to the mothers	Mothers in KSPS n (%)	Mothers in KPS n (%)
Total	58 (100)	106 (100)
Breastfeeding	8 (14)	86 (81)
Exclusive breastfeeding	1 (2)	6 (6)
Infant feeding formula	45 (77)	5 (5)
Mixed feeding	1 (2)	3 (3)
Had not received any advice	2 (3)	6 (5)
Choice between exclusive breastfeeding and formula	1 (2)	0 (0)

To test if there was any relationship between HIV status and advice about breastfeeding, the advice given to the mothers during pregnancy was divided into advice about breastfeeding or exclusive breastfeeding and not advice about any of these two (Table 5).

Table 5: HIV status and advice given to the mothers in KSPS and KPS

Advice given to the mothers	Mothers in KSPS n (%)	Mothers in KPS n (%)	<i>p</i> ^a
Total	58 (100)	106 (100)	
Breastfeeding/exclusive breastfeeding	9 (16)	92 (87)	<0.001
Not breastfeeding/exclusive breastfeeding ^b	49 (84)	14 (13)	

^a Tested with Pearson chi-square χ^2

^b Not breastfeeding/exclusive breastfeeding: infant feeding formula, mixed feeding, had not received any advice or choice between exclusive breastfeeding and formula

Significantly fewer mothers in KSPS had been advised to breastfeed their children compared to the mothers in KPS ($p < 0.001$).

Two of the nine HIV-infected mothers in the qualitative interviews did not mention what advice they had been given about infant feeding. The remaining seven HIV-infected mothers had been advised not to breastfeed. Two of these mothers had also been told about their right of choosing their infant feeding practice. One of these two mothers said:

“I have been told at the clinic that we must not breastfeed, but it’s our choice. If you feel like you want to breastfeed you can, but they tell us the risks of breastfeeding. (...) I listened to the nurses at clinic.” (28 years old HIV-infected mother)

This answer reveals that although the mother had been given a choice to breastfeed or not, she had actually been advised not to breastfeed. The doctors were asked if the clinic had a policy on infant feeding:

“Well, mothers who are expecting, they are normally either exclusive breast or formula – we go for formula because we have that. Actually we do have that so why not rather go for that option? I must say I worked in facilities before, in rural Northern Cape, where we actually needed to either exclusive breastfeed them because there’s no access to safe running water, bottle hygiene, you know, all of that caused a whole lot of problems as well. But here we have safe running water, we’ve got formula. In those certain circumstances in the Northern Cape we didn’t always have formula, you know, we’d have formula for two months and then nothing. And then what? You end up mix-feeding them. So then we would opt for exclusive formula or exclusive breastfeeding. And if you go for exclusive formula you must be able to buy the formula for the times that, we actually as a facility didn’t have. It’s just a little bit of a rural method.” (30 years old female doctor)

“I don’t think there’s a kind of stand. I think everyone at this point kind of accepts that it’s important not to be dogmatic and that one has to make an individual decision in the particular context. We’ve got a very different context – we’re urban, patients live close to the clinics, we can provide milk. It’s just very different context to other contexts where artificial feeding is much more difficult. So it depends on the context and the individual.” (50 years old female doctor)

“We have this hysterical policy that all infants (of mothers) who are HIV-positive get Pelargon. (...) It’s some particular kind of formula in an orange tin.” (40 years old female doctor)

All the doctors seemed to advice HIV-infected mothers to give infant feeding formula, more specifically a formula with the brand name Pelargon. Still one of the doctors expressed that it is important not to be dogmatic and two of the doctors seemed to inform the mothers about the importance of either choosing exclusive formula or exclusive breastfeeding:

“(...) *the most important thing is that you exclusively breastfeed or you exclusively bottle-feed, but don’t mix them. If you mix them than the risk is just too much.*” (40 years old female doctor)

5.3 Knowledge about MTCT and infant feeding

Table 6: Knowledge about MTCT among the mothers in KSPS and KPS

		Mothers in KSPS n (%)	Mothers in KPS n (%)	<i>p</i> ^a
Knowledge about MTCT^b				
Is MTCT possible during pregnancy?	Total	58 (100)	100 (100)^c	0.96
	Yes	34 (59)	59 (59)	
	No	24 (41)	41 (41)	
Is MTCT possible during labour?	Total	58 (100)	101 (100)^d	0.10
	Yes	54 (93)	85 (84)	
	No	4 (7)	16 (6)	
Is MTCT possible through breastfeeding?	Total	58 (100)	101 (100)^d	0.95
	Yes	53 (91)	92 (91)	
	No	5 (9)	9 (9)	
Is a child more likely to contract HIV through mixed feeding than exclusive breastfeeding?	Total	58 (100)	94 (100)^e	<0.001
	Yes	56 (97)	70 (75)	
	No	2 (3)	24 (25)	

^a Tested with Pearson chi-square χ^2

^b MTCT: mother-to-child transmission of HIV

^c Six mothers missing because they did not know the answer

^d Five mothers missing because they did not know the answer

^e Twelve mothers missing because they did not know the answer

In both groups a majority of the mothers answered correctly on the four questions about MTCT (Table 6). Mothers who answered that they did not know the answer to the questions were as mentioned earlier set as missing and not included in the analyses. There were no statistical significant differences in the mothers’ knowledge about MTCT during pregnancy. Almost 60% of the mothers in both KSPS and KPS answered that MTCT is possible during pregnancy. More mothers in KSPS answered that MTCT is possible during labour (93%) compared to the mothers in KPS (84%), but there was no statistical significant difference. To the question if MTCT is possible through breastfeeding, 91% of the mothers in both KSPS and KPS answered yes to this question. There were thus no statistical significant differences in the mothers’ knowledge about MTCT during breastfeeding. There was a statistical significant difference in the answers to the question about the risk of MTCT through mixed feeding versus exclusive breastfeeding ($p < 0.001$). Fewer mothers in KPS (75%) answered that a child is more likely to be infected by HIV through mixed feeding than exclusive breastfeeding compared to the mothers in KSPS (97%).

Table 7: Options about infant feeding among the mothers in KSPS and KPS

		Mothers in KSPS n (%)	Mothers in KPS n (%)	<i>p</i> ^a
Infant feeding in general				
Cow's milk is the best	Total	56 (100)^b	106 (100)	0.76
	Strongly disagree/disagree	44 (79)	81 (76)	
	Neither agree nor disagree	3 (5)	9 (9)	
	Agree/strongly agree	9 (16)	16 (15)	
Infant feeding formula is the best	Total	58 (100)	106 (100)	0.01
	Strongly disagree/disagree	4 (7)	20 (19)	
	Neither agree nor disagree	2 (3)	13 (12)	
	Agree/strongly agree	52 (90)	73 (69)	
Breast milk is the best	Total	58 (100)	106 (100)	0.66 ^c
	Strongly disagree/disagree	1 (2)	1 (1)	
	Agree/strongly agree	57 (98)	105 (99)	
Infant feeding in the context of HIV				
Cow's milk is the best	Total	58 (100)	101 (100)^d	0.54
	Strongly disagree/disagree	47 (81)	78 (77)	
	Neither agree nor disagree	2 (3)	8 (8)	
	Agree/strongly agree	9 (16)	15 (15)	
Infant feeding formula is the best	Total	58 (100)	104 (100)^b	0.003 ^e
	Strongly disagree/disagree	0 (0)	12 (12)	
	Neither agree nor disagree	1 (2)	10 (9)	
	Agree/strongly agree	57 (98)	82 (79)	
Breast milk is the best	Total	55 (100)^e	100 (100)^f	0.01
	Strongly disagree/disagree	45 (82)	61 (61)	
	Neither agree nor disagree	3 (5)	22 (22)	
	Agree/strongly agree	7 (13)	17 (17)	

^a Tested with Pearson chi-square p (χ^2)

^b Two mothers missing because they did not know the answer

^c More than 20% of the cells have expected count less than 5

^d Five mothers missing because they did not know the answer

^e Three mothers missing because they did not know the answer

^f Six mothers missing because they did not know the answer

The majority of the mothers in KSPS and KPS disagreed or strongly disagreed that cow's milk was the best both for infants born to HIV-uninfected and HIV-infected mothers (Table 7). There was a statistical significant difference between the mothers in KSPS and KPS in their answer about infant feeding formula as the best for infants in general. More mothers in KSPS (90%) than KPS (69%) agreed or strongly agreed that infant feeding formula was best. The majority of mothers in each group agreed or strongly agreed however that both infant feeding formula and breast milk was the best for infants in general. The mothers were thus not consistent in what option they regarded the best and any conclusion should be carefully drawn.

In the case of an infant born to an HIV-infected mother, most of the mothers in each group agreed or strongly agreed that infant feeding formula was the best. At the same time most of the mothers disagreed or strongly disagreed that breast milk was the best. There seemed to be statistically significant differences between what the mothers in KSPS and KPS considered the

best way to feed infants in the context of HIV. More mothers in KSPS agreed or strongly agreed that formula was best (98%) and disagreed or strongly disagreed that breast milk was best (82%) compared to the mothers in KPS (respectively 79% and 61%). Still any conclusion should be drawn with caution due to the low expected frequencies and the inconsistencies in the mothers' answers.

Based on the in-depth interviews with the HIV-infected mothers, a mother who had exclusively breastfed her child the first six months, but stopped breastfeeding immediately when diagnosed with HIV, was asked if she thought MTCT is possible through pregnancy or breastfeeding:

"(...) it is breastfeeding." (30 years old HIV-infected mother)

Two of the doctors were asked about the general knowledge about HIV and how they would say it was for most people in the area:

"It's pretty good because if you go to this clinic for anything you get told about HIV, you get tested if you have come in for an ear-ache, if you've come in for a sore toe or anything – everybody get tested. Even if you don't have anything we still say don't you want to get tested? We have a lot of drives like every AIDS day or the different health days (...). So people are becoming much more involved in their management of treatment, because people are talking about it a lot more – it is amazing." (40 years old female doctor)

"There are some patients who are incredibly knowledgeable – they have done research, gone onto the internet (laughs). I mean it just varies (...). They got it from their counsellors; there are some amazing counsellors around (...). Like a very nice way of putting the whole infant feeding question – in terms of asking is it an acceptable, feasible, affordable, sustainable and safe system. I thought that's a fantastic way of approaching it." (50 years old female doctor)

The doctors expressed that the knowledge about HIV among PLWH was good mainly due to HIV-campaigns, general talk about HIV, individual research on HIV and counselling on HIV.

5.4 Infant feeding practices

Table 8: Infant feeding practices during the first year of the infants' life among the mothers

Infant feeding practices		Mothers in KSPS n (%)	Mothers in KPS n (%)	<i>P</i> ^a
The first month	Total	58 (100)	106 (100)	<0.001
	Exclusive breastfeeding	3 (5)	70 (66)	
	Mixed feeding	1 (2)	13 (12)	
	Infant feeding formula	54 (93)	23 (22)	
2-3 months	Total	58 (100)	105 (100)^b	<0.001
	Exclusive breastfeeding	3 (5)	56 (53)	
	Mixed feeding	1 (2)	24 (23)	
	Infant feeding formula	54 (93)	25 (24)	
4-6 months	Total	57 (100)^c	105 (100)^c	<0.001
	Exclusive breastfeeding	3 (5)	37 (35)	
	Mixed feeding	1 (2)	40 (38)	
	Infant feeding formula	53 (93)	28 (27)	
7-12 months	Total	56 (100)^d	104 (100)^d	<0.001
	Exclusive breastfeeding	3 (5.5)	27 (26)	
	Mixed feeding	3 (5.5)	46 (44)	
	Infant feeding formula	50 (89)	31 (30)	

^a Tested with Pearson chi-square χ^2

^b One mother missing because child was younger than 2 months

^c One mother missing because child was younger than 4 months

^d Two mothers missing because children were younger than 7 months

Almost all the mothers in KSPS had been giving infant feeding formula the first six months (93%) (Table 8). The first seven to twelve months fewer, but still many mothers had been giving formula (89%). Three of the mothers in KSPS said that they had undertaken exclusive breastfeeding up to twelve months. One mother had been giving mixed feeding the first six months, but this number increased some after seven months.

Two thirds of the mothers in KPS reported practicing exclusive breastfeeding the first month. The rest of the mothers in this group reported giving mixed feeding (12%) or infant feeding formula (22%). The first two to three months 53% of the mothers in KPS were still giving breast milk only, though more mothers gave mixed feeding (23%) or formula (24%) compared to the first month. From four to six months and from seven to twelve months there was a continuing decrease in number of mothers undertaking exclusive breastfeeding. In the same period the percentage of the mothers giving mixed feeding increased a lot while the percentage of mothers giving infant feeding formula increased some. None of the mothers in KPS had received free clinic supply of formula. There were statistically significant differences in the infant feeding practices between the mothers in KSPS and the mothers in KPS ($p < 0.001$).

Table 9: Sources to infant feeding formula among the mothers in KSPS

Source to infant feeding formula		Mothers in KSPS n (%)
The first month	Total	54 (100)
	Purchased infant feeding formula	5 (9)
	Free clinic supply of infant feeding formula	49 (91)
2-3 months	Total	54 (100)
	Purchased infant feeding formula	4 (7)
	Free clinic supply of infant feeding formula	50 (93)
4-6 months	Total	53 (100)
	Purchased infant feeding formula	4 (8)
	Free clinic supply of infant feeding formula	49 (92)
7-12 months	Total	50 (100)
	Purchased infant feeding formula	26 (52)
	Free clinic supply of infant feeding formula	23 (46)
	A combination of bought and clinic supply of infant feeding formula	1 (2)

Among the 53 mothers in KSPS who had been giving infant feeding formula the first six months, 92% of the mothers had received free clinic supply of formula (Table 9). After six months 50 mothers in KSPS had been giving infant feeding formula. Forty-six percent of these mothers had received formula free from the clinics.

Of the mothers in KSPS who had received free clinic supply of infant feeding formula from the clinic, 90% answered that the supply was reliable. Twenty-four percent of the mothers in KSPS answered that there were financial constraints that prevented them from continuing to formula feed the infant after the free provision came to an end.

To test if there were any relationship between HIV status and exclusive breastfeeding practices the first three months, the mothers' infant feeding practices were divided into exclusive breastfeeding and not exclusive breastfeeding (Table 10).

Table 10: HIV status and exclusive breastfeeding practices among the mothers

Infant feeding practices		Mothers in KSPS n (%)	Mothers in KPS n (%)	<i>p</i>^a
The first month	Total	58 (100)	106 (100)	<0.001
	Exclusive breastfeeding ^b	3 (5)	70 (66)	
	Not exclusive breastfeeding ^b	55 (95)	36 (34)	
2-3 months	Total	58 (100)	105 (100)^c	<0.001
	Exclusive breastfeeding ^b	3 (5)	56 (53)	
	Not exclusive breastfeeding ^b	55 (95)	49 (47)	

^a Tested with Pearson chi-square $p(x^2)$

^b Not exclusive breastfeeding: mixed feeding or infant feeding formula

^c One mother missing because child was younger than 2 months

There were statistically significant differences between the mothers in KSPS and the mothers in KPS regarding their exclusive breastfeeding practices (Table 10). More mothers in KPS had exclusively breastfed their infants the first months compared to the mothers in KSPS ($p < 0.001$).

Eight of the nine HIV-infected mothers who were interviewed in the qualitative investigation, reported that they had not breastfed. These mothers had been giving infant feeding formula of which two of the mothers had received free formula for a year or more, one mother had received formula free from the clinic for nine months, three mothers reported having gotten free formula from the clinic for six months and two mothers did not mention how long they had received free formula. One of the mothers who had received free formula for six months mentioned that she started introducing other foods like long life milk to the child while she was giving formula because she could not afford to buy formula from the store. Another mother who had received free formula for six months said that she had started giving water and other foods when the child was three months. One mother had exclusively breastfed her child the first six months, but was then diagnosed with HIV whereby she stopped breastfeeding immediately and started giving other foods.

5.5 The mothers' infant feeding practices in relation to other factors

The relationship between the mothers' infant feeding practices and other factors besides HIV status were investigated. Factors explored were the advice given to the mothers during pregnancy, the mothers' knowledge about MTCT through breastfeeding, the mothers' educational level and their age. As mentioned earlier no statistical analyses were computed and only descriptive findings are presented. The qualitative interviews with the HIV-infected mothers revealed additional factors related to the mothers' infant feeding practices. These findings are presented in the end of this section.

Advice

When looking closer at the mothers' infant feeding practices in relation to the advice given to the mothers during pregnancy, table 4 shows that the main advice given to the mothers in KSPS and KPS were respectively infant feeding formula and breastfeeding. These two were thus the only advice included in the analysis done here to reduce the possibility of too small sample sizes in each category. Breastfeeding and exclusive breastfeeding were also combined for this reason.

Table 11: The mothers' infant feeding practices by advice given to them during pregnancy

	Advice given to the mothers during pregnancy					
	Mothers in KSPS n (%)			Mothers in KPS n (%)		
	Breastfeeding ^a	Formula	Total	Breastfeeding ^a	Formula	Total
Infant feeding practice						
The first month						
Total	9 (100)	45 (100)	54 (100)^b	92 (100)	5 (100)	97 (100)^c
Exclusive breastfeeding	3 (33)	0 (0)	3 (6)	68 (74)	0 (0)	68 (70)
Mixed feeding	1 (11)	0 (0)	1 (2)	7 (8)	0 (0)	7 (7)
Formula	5 (56)	45 (100)	50 (92)	17 (18)	5 (100)	22 (23)
2-3 months						
Total	9 (100)	45 (100)	54 (100)^b	91 (100)	5 (100)	96 (100)^d
Exclusive breastfeeding	3 (33)	0 (0)	3 (6)	55 (60)	0 (0)	55 (57)
Mixed feeding	1 (11)	0 (0)	1 (2)	18 (20)	0 (0)	18 (19)
Formula	5 (56)	45 (100)	50 (92)	18 (20)	5 (100)	23 (24)

^a Breastfeeding referring to both advice about breastfeeding or exclusive breastfeeding

^b Four mothers missing because one had been advised to give mixed feeding, two had not received any advice and one had been given a choice between exclusive breastfeeding and formula

^c Nine mothers missing because three had been advised to give mixed feeding and six had not received any advice

^d Ten mothers missing because three had been advised to give mixed feeding, six had not received any advice and one had a child younger than two months

Table 11 shows that among the nine mothers in KSPS who had been given the advice to breastfeed, three of the mothers had followed this advice the first three months and had been exclusively breastfeeding. The six mothers remaining had been giving mixed feeding or formula. All the 45 mothers in KSPS who had been advised to give infant feeding formula had followed this advice.

Among the 92 mothers in KPS who had been advised to breastfeed the first month, more than 70% had followed this advice and had been exclusively breastfeeding. Almost the same number of mothers in KPS had been advised to breastfeed the next two to three months as well, but fewer of the mothers had chosen this infant feeding practice. These mothers had rather chosen mixed feeding or infant feeding formula during this period. Five mothers in KPS had been advised to formula feed their infant and had practiced formula feeding the first three months.

Knowledge

There was some inconsistency in the mothers' answers about what infant feeding practice they regarded as best for infants in general and in the case of HIV. These knowledge questions were thus not included here. In view of the fact that the mothers' knowledge about MTCT only was a possible relevant factor influencing the infant feeding practices of the mothers in KSPS, the mothers in KPS were not included in the analysis. Furthermore since only one of the mothers in

KSPS had been giving mixed feeding the first three months, only the question about the mothers' knowledge about MTCT related to breastfeeding was included. Since the mothers' infant feeding practices the first three months were the same, these months were combined.

Table 12: The KSPS mothers' breastfeeding practices by knowledge about MTCT^a through breastfeeding

Infant feeding practices the first three months	Mothers in KSPS n (%)		
	MTCT possible through breastfeeding?		
	Yes	No	Total
Total	53 (100)	5 (100)	58 (100)
Any breastfeeding ^b	2 (4)	2 (40)	4 (5)
Not breastfeeding ^c	51 (96)	3 (60)	54 (95)

^a MTCT: mother-to-child transmission of HIV

^b Any breastfeeding: breastfeeding, exclusive breastfeeding or mixed feeding

^c Not exclusive breastfeeding: infant feeding formula

Only four mothers in KSPS had been practicing any breastfeeding the first three months. Two of these mothers had answered that MTCT is possible through breastfeeding (Table 12).

Educational level

Table 13: The mothers' infant feeding practices by educational level

Infant feeding practices	Educational level ^a					
	Mothers in KSPS n (%)			Mothers in KPS n (%)		
	General	Further	Total	General	Further	Total
The first month						
Total	18 (100)	39 (100)	57 (100)^b	26 (100)	79 (100)	105 (100)^b
Exclusive breastfeeding	2 (11)	1 (3)	3 (5)	20 (77)	50 (63)	70 (66)
Mixed feeding	0 (0)	1 (3)	1 (2)	4 (15)	8 (10)	12 (12)
Infant feeding formula	16 (89)	37 (94)	53 (93)	2 (8)	21 (27)	23 (22)
2-3 months						
Total	18 (100)	39 (100)	57 (100)^b	26 (100)	78 (100)	104 (100)^c
Exclusive breastfeeding	2 (11)	1 (3)	3 (5)	16 (61)	40 (51)	56 (54)
Mixed feeding	0 (0)	1 (3)	1 (2)	8 (31)	15 (19)	23 (22)
Infant feeding formula	16 (89)	37 (94)	53 (93)	2 (8)	23 (30)	25 (24)

^a Educational level: General education refers to the completion of all or some levels of general education (grade 0-9).

Further education refers to the completion of all or some levels of further education (grade 10-12)

^b One mother missing because one had no education

^c Two mother missing because one had no education and one had a child younger than two months

The data suggests that more mothers in KSPS who had completed all or some levels of further education had been giving infant feeding formula compared to the mothers who had completed all or some levels of general education (respectively 94% and 89%) (Table 13). More mothers in KPS who had completed all or some levels of general education had been exclusively breastfeeding compared to the mothers who had completed all or some levels of further

education. The opposite pattern was seen regarding formula feeding. More mothers in KPS who had completed all or some levels of further education had been giving infant feeding formula compared to the mothers who had completed all or some levels of general education.

Age

Table 14: The mothers' infant feeding practices by age

Infant feeding practices	Age							
	Mothers in KSPS n (%)				Mothers in KPS n (%)			
	<29	30-34	35>	Total	<29	30-34	35>	Total
The first month								
Total	14 (100)	23 (100)	21 (100)	58 (100)	29 (100)	32 (100)	45 (100)	106 (100)
Exclusive breastfeeding	1 (7)	0 (0)	2 (9)	3 (5)	13 (45)	25 (78)	32 (71)	70 (67)
Mixed feeding	0 (0)	1 (4)	0 (0)	1 (2)	7 (24)	3 (9)	3 (7)	13 (11)
Formula	13 (93)	22 (96)	19 (91)	54 (93)	9 (31)	4 (13)	10 (22)	23 (22)
2-3 months								
Total	14 (100)	23 (100)	21 (100)	58 (100)	29 (100)	31 (100)	45 (100)	105 (100)^a
Exclusive breastfeeding	1 (7)	0 (0)	2 (9)	3 (5)	12 (41)	21 (68)	23 (51)	56 (53)
Mixed feeding	0 (0)	1 (4)	0 (0)	1 (2)	8 (28)	6 (19)	10 (22)	24 (23)
Formula	13 (93)	22 (96)	19 (91)	54 (93)	9 (31)	4 (13)	12 (27)	25 (24)

^aOne mother missing because one had a child younger than two months

In all the three age groups in KSPS most of the mothers had been giving formula the first months (Table 14). None of the mothers in KSPS between 30 and 34 years had been exclusive breastfeeding the first months. The majority of the mothers in all the three age groups in KPS had been exclusive breastfeeding the first months. It could seem like more mothers in KPS younger than 29 years old had been giving mixed feeding or infant feeding formula the first months compared to the mothers older than 30 years old.

Stigmatization

A mother, who was asked during an in-depth interview what the most common infant feeding practice among HIV-infected mothers were, expressed that stigmatization did not influence the mothers' infant feeding practices:

“They (the mothers) go for formula feeding and they are not scared walking of the clinic with boxes so that everyone knows that they are HIV-positive.” (33 years old HIV-infected mother)

Still two of the doctors uttered that stigmatization could seem to have an impact on the mothers' infant feeding practices. This was especially related to the HIV-infected mothers receiving free formula in tins from the clinics:

“Everybody who gets the orange tin knows that the mother is HIV positive and the baby is HIV positive, but nobody says anything. (...) It does put some mums off and some mums will actually go and buy Nan so that nobody knows that they are HIV positive. (...) If you are going to feel stigmatized because you are not breastfeeding than rather exclusively breastfeed for four months and do whatever, but also don't get water don't get anything – it's difficult.” (40 years old female doctor)

“A lot of them (the mothers) will actually collect the formula here and what we give them is Pelargon, but when they come back they'll actually have Nan. So, because everybody knows... (...) Or they actually ask you if they can change the baby tin to Nan and when we explore then – it's actually because of that (fear of stigmatization by using the formula associated with HIV).” (30 years old female doctor)

These answers reveal the possibilities of stigmatization related to not only infant feeding practice, but also a specific formula brand or tin. It could seem like the more common commercial brand of infant feeding formula Nan was used by the mothers to protect them from HIV-disclosure. A HIV-infected mother noted that she had been concerned about stigmatization associated with her decision to not breastfeed her child in the clinic:

“I wanted to go out of the hospital because, you know, it was not nice the way women in the room were staring. Some were breastfeeding and I think it was one or two of us who were not breastfeeding.” (30 years old HIV-infected mother)

Fear of MTCT

An in-depth interview with an HIV-infected mother revealed a widespread fear of MTCT concerning breastfeeding as the infant feeding practice:

Findings

“Some they are scared of infecting their children. They are afraid of infecting their children if the child was not infected (when born).” (28 years old HIV-infected mother)

The in-depth interviews with the HIV-infected mother who had exclusively breastfed her child the first six months, but stopped breastfeeding immediately when diagnosed with HIV, expressed that she thought she had infected her child with HIV because she had been breastfeeding. The mother seemed to blame herself for her child’s HIV status:

“If I never fed a child with breast milk the child wouldn’t have this kind of diseases.” (30 years old HIV-infected mother)

One mother who had breastfed her two older children, but not the last one due to her HIV status was asked how she felt about this:

“It was painful, but I couldn’t do otherwise.” (42 years old HIV-infected mother)

Lack of time

Lack of time could also seem to be a potential factor influencing the mothers’ choice of infant feeding practice. One of the mothers, who had been told to not to breastfeed, listened to the nurses at the clinics because of her working situation:

“Sometimes I am very busy working all the time and then it would be easy for me to give that child a bottle because I am not at home.” (28 years old HIV-infected mother)

6.0 Discussion

This chapter starts by discussing the methodology, followed by a discussion of the findings. The main findings were as follow:

- The majority of the HIV-infected mothers (in KSPS and in the in-depth interviews) had been advised to give infant feeding formula while most of the mothers without HIV or with unknown HIV status (KPS) had been advised to breastfeed or exclusively breastfeed.
- Most of the mothers in KSPS and KPS knew that MTCT is possible during pregnancy, labour and breastfeeding. More mothers in KSPS compared to the mothers in KPS knew that the risk of MTCT is greater through mixed feeding than through exclusive breastfeeding.
- Almost all the mothers in KSPS had been giving infant formula the first year. The qualitative findings found similarly that almost all the HIV-infected mothers had been formula feeding. Most of the mothers in KPS had been practicing exclusive breastfeeding the first month. The first two to three months the majority of the mothers in KPS were still giving breast milk only, though more mothers gave mixed feeding or formula compared to the first month.
- Despite limitations in the analysis, there seemed to be a relationship between the mothers' infant feeding practices and advice, knowledge, education, stigmatization and fear of MTCT.

6.1 Discussion of the quantitative methodology

The quantitative findings were based on a cross-sectional survey from 2007. A check-list for assessing prevalence studies from the Norwegian knowledge centre for the health services was used to assess the quality of the cross-sectional survey (Kunnskapssenteret, 2008). In a cross-sectional survey association must be interpreted with caution due to difficulties in establishing the cause and the effect (Coggon, et al., 2003). A cross-sectional survey may also make it difficult to establish confounders and biases that may have occurred in the sample selection (Coggon, et al., 2003). Despite limitations in the use of a cross-sectional survey, the method was deemed useful to help answer the main objective of this master thesis (Kunnskapssenteret, 2008).

6.1.0 The interviews

There are different techniques to collect data (Ringdal, 2007). In the cross-sectional survey from 2007 data was collected through a structured interview questionnaire asked by professional and trained interviewers. This technique is very flexible in communication because both the

interviewer and the respondent can comment if there are any misunderstandings in the questions or in the answers. The interviewers noted the answers straight into the paper questionnaire making it possible to make sure that everything was included and correctly written. The data collection thus seemed to be standardized meaning that the data collection was identical for the whole study sample (Kunnskapscenteret, 2008). The possible weakness with this type of data collection is that there might be a lack of privacy related to the fact that the interviewer is present and that others might have overheard the interview (Ringdal, 2007).

In 2001 WHO made an assessment tool for research on the topic of breastfeeding and replacement feeding practices in the context of MTCT (WHO, 2001a). This tool was made to provide guidance and suggestions to core questions that should be part of all studies seeking to assess infant feeding practices in the context of MTCT (WHO, 2001a). The tool is divided into six modules. The tool from WHO is quite old and the cross-sectional survey from 2007 could not be used to say anything about the relationship between infant feeding practices and the risk of MTCT. The tool could however have been useful formulating the questions on infant feeding. Table 15 gives an overview of some of the questions included in the survey from 2007 (these are written in italics) as well as suggestions to core questions (from the WHO tool) that could have been included when describing the mothers' infant feeding practices.

The tool from WHO states that the dynamics of infant feeding are complex and the infant feeding practices should thus be continuously assessed. This was not done in the cross-sectional survey in 2007. It furthermore appears that many potential changes and additional relevant questions regarding the mothers' infant feeding practices in the cross-sectional survey could have been added to strengthen the questions' relevance for the main objective of this master thesis. An example is the questions about breast health and breastfeeding difficulties. Such information would reveal important information to why some mothers for instance did not breastfeed.

All the mothers in KSPS had been part of the MSF project in 2001/2002 meaning that they since that time had been patients receiving ARVs from one of the three clinics in Khayelitsha. Since the mothers included in this master thesis had children less than eight years old, this most likely means that the majority of the mothers had been receiving ARVs either during or after pregnancy. Information about if ARVs were given to the infant and how long after delivery they were given, were however not included. This could have added valuable information.

Table 15: The questionnaire seen in the light of WHO's tool for describing infant feeding practices in the context of HIV^{a, b, c}

Assessment tool from WHO	Additional questions in the 2007 survey
Module 1: Baseline data	
Socio-demographic and economic data	
<i>Education of mothers (years of schooling)</i>	
<i>Age of mother</i>	
<i>Marital status</i>	
<i>Reproductive health history</i>	
<i>Number of people living in the household</i>	
<i>Number of deaths in the household</i>	
Maternal health status	
Viral load during pregnancy	<i>Health status poor, fair, good, very good or excellent?</i>
Clinical stage of HIV	
Nutritional status (body mass index)	
Obstetric information	
Duration of labour	
Type of delivery	
<i>ARVs given to mothers and child (time before and after delivery, and how long after delivery they were given)</i>	
Infant's birth weight	
Module 2: Feeding practices	
<i>Infant breastfed the first month?</i>	<i>Infant breastfed the first month, two-three months, four-six months, seven-twelve months?</i>
- How soon after delivery was breastfeeding initiated?	
- How many times breastfed during day/night?	
Infant given other foods?	<i>Mixed feeding or formula the first month, two-three months, four-six months, seven-twelve months?</i>
- The first hours?	<i>Access to free clinic supply of formula.</i>
- How often during a day?	
- Expressed milk?	
Anyone else ever breastfed infant?	
- Whom and why?	
Module 3: Maternal health	
Consequences of maternal health on feeding practices	
Module 4: Breast health and breastfeeding difficulties	
Appearance of the breast	
Appearance of the nipple	
Pain	
Fever	
Consequences of breast health and breastfeeding difficulties on feeding practices	
Module 5: Infant health	
Infant weight	<i>The health of the child better, same or worse compared to other children of the same age in the neighborhood?</i>
Possible signs in the infant (mouth sores, difficult breathing, fever and diarrhoea)	
Consequences of the infant's health on feeding practices	
Module 6: Cessation of breastfeeding	
<i>Cessation of breastfeeding</i>	
- How, when and why stopped?	
- <i>Age of infant?</i>	

^a (WHO, 2001a)

^b The questions included from the tool were chosen based on what was most relevant for this master thesis

^c Italics denote questions which were included in the questionnaire from the cross-sectional survey in 2007

Other questions, apart from the WHO tool, that could have been included to add more comprehensive information to the topic of this master thesis are more specific questions regarding the mothers' knowledge about MTCT, infant feeding advice given to them and possible stigmatization and fear related to infant feeding. The mothers could also have been asked about their access to clean water, indicators for accessing the mothers' ability to care for their child and the mothers' access to curative and preventive health services. More questions including determinants to meet the AFASS criteria should also have been included.

6.1.1 The study sample

The participants included in the panel survey in 2007 seemed to be satisfactory when it comes to the definition of the population from which the participants were drawn, inclusion of participants and the response rate (Kunnskapssenteret, 2008). There were however weaknesses with the study sample included in this master thesis due to the fact that several exclusion criteria were set after the data was collected (Figure 7). First of all this led to a study sample that was lower than desired. If the study sample in both KSPS and KPS had included more mothers, it would have been easier to do statistical comparisons between the two groups. Secondly, the distribution of mothers in each group ended up being very uneven with twice as many mothers in KPS (n=106) compared to KSPS (n=58). Thirdly, the response rate among the mothers included in the study from 2007 was probably not high enough to represent the population from which the mothers were drawn (Kunnskapssenteret, 2008). Despite such disadvantages, the exclusion criteria were set to include a study sample building on a group of participants most relevant for this master thesis.

Characteristics of the mothers in KSPS and KPS are later discussed and compared with the general population of women in Western Cape to assess how the study sample differed from the population from which it was drawn (Kunnskapssenteret, 2008). The HIV-infected mothers in KSPS were all patients at one of the three clinics in Khayelitsha and received free ARVs from the clinics. This means that the findings can not be generalized to apply all mothers with HIV in Khayelitsha. Though ASRU in 2004 decided to try to survey as many as possible of the people who received ARVs from the clinics, the survey recruited only two thirds of the patients who were the first to receive ARVs in 2001 (Venkataramani, et al., 2010). The loss of respondents from the survey in 2004 to the survey in 2007 and the exclusion criteria set for this master thesis

means additionally that the mothers in KSPS could not represent all HIV-infected mothers receiving ARVs from one of the clinics.

The participants in KPS were included based on a stratified sample method using a two-stage cluster technique and GIS technology. Still the mothers in KPS may not reflect the population from which cases were drawn. Though the findings in this master thesis almost certainly cannot be generalized to apply to all mothers with or without HIV, the findings can give a picture of how the infant feeding practices among a sample of mothers with and without HIV and with children younger than eight years were in Khayelitsha in 2007.

If the objectives of this master thesis had been the main objectives of the survey, the study sample would include mothers with and without HIV, mothers in the same age group and mothers with infants younger than 2 years old. Such a study sample would as a result most likely have strengthened the validity, reliability and the overall quality in the master thesis.

The mothers included in the panel surveys had been part of either KSPS or KPS for several years. This could be a disadvantage if the mothers were tired of being part of the surveys and as a consequence did not answer the questions thoroughly. The fact that the mothers were used to research is a possible advantage with the study participants.

6.1.2 Assessment of the validity and reliability of the survey

Validity

Validity is whether one actually measures what one intends to measure (Coggon, et al., 2003). A study is considered to be valid if the findings can be taken as being a reasonable representation of the true situation (Margetts & Nelson, 1997). In this case this means whether the mothers' actual infant feeding practices were measured. The questions about the mothers' infant feeding practices should ideally have been tested or validated (Kunnskapssenteret, 2008). Some of the questions on infant feeding were used in a pre-tested, structured questionnaire used in a cross-sectional survey in Tanzania from 1999 which was part of Marina M. de Paoli's Doctor of Philosophy [PhD] (de Paoli, 2004). All the questions were however not pre-tested.

There are different aspects of validity (Ringdal, 2007). One is called face validity which concerns whether the questions about infant feeding really covers the aspects of interest in the term "infant feeding practices". In the survey from 2007 questions about infant feeding practices involved how the infants had been fed, what advice the mothers had been given and the mothers' knowledge about MTCT and infant feeding. Another aspect of validity is content validity where

the use of term is essential (Ringdal, 2007). Related to the term “infant feeding practices”, the content validity refers to the degree to which the aspects of interest are covered through the questions in the questionnaire. The WHO assessment tool from 2001 was presented in Table 15 to give a description of questions that could have been useful for describing the mothers’ infant feeding practices.

External validity refers to the way results of a study sample can be generalized to apply the study population (Ringdal, 2007). As described in section 6.1.1 the findings in this master thesis can most likely not be generalized to apply to all mothers with or without HIV in Khayelitsha in 2007. To be externally validated a study must be internally valid (Margetts & Nelson, 1997). The assessment of the validity of the measures used in the study and the conduct of the study are often referred to as the internal validity (Margetts & Nelson, 1997). High internal validity requires good control of possible bias in the way the data is collected, analysed and interpreted (section 6.1.3) (Margetts & Nelson, 1997).

Reliability

High reliability is a prerequisite for high validity. Reliability is whether repeated measurements with the same measuring instrument give the same result (Ringdal, 2007). In this master thesis the main measuring instrument was the questionnaire used in the cross-sectional survey from 2007. There are several ways to assess the reliability of data (Ringdal, 2007). One is based on general criticism of the data. Since this master thesis was based on data that was already collected it was important to understand how the data had been collected. It was then necessary to look closely and carefully at how the questions about infant feeding and other relevant questions had been formulated to discover and reveal possible biases. A comparison with the assessment tool from WHO, was done for this purpose. Though many of the questions in the questionnaire were relevant for the topic of this master thesis, mistakes and weaknesses with some of the questions were found. Table 16 presents some examples of suggestions to improved question formulations.

The time-intervals in questions O.3 through O.6 overlapped and this could have led to misunderstandings. Still the answers to these questions were interpreted based on the suggested improved formulations in Table 16 when presenting the findings. There were several weaknesses in the formulation of the questions on what food the mothers regarded as best for small children. The questions did for instance not directly say anything about the mothers’ knowledge about

MTCT and infant feeding. The questions were furthermore formulated in such a way that the mothers could give the same answer to every question. It was thus not paid much attention to these questions in the analysis.

Table 16: Suggestions to improved question formulations in the questionnaire

Questions in the questionnaire used in the 2007 survey	Suggestions to improved question formulations
Questions O.3 - O.6	
How did you or your partner feed your last born child? The first month The first 1-3 months The first 3-6 months The first 6-12 months	How did you or your partner feed your last born child? (according to his/her age) Age 0-1 month Age 2-3 months Age 4-6 months Age 7-12 months
Question O.1.1 (- O.1.6)	
In general, cow's milk is the best (food) for a small child. (0-6 months). - Strongly disagree - Disagree - Neither agree nor disagree - Agree - Strongly agree - Don't know	In general, what is the best food for a small child the first 0-6 months? OR In general, what is the best and worst food for a small child the first 0-6 months on a scale from 1 to four (where 1 being best and 4 worse)? - Cow's milk - Breast milk - Infant feeding formula - Mixed feeding - Don't know
Question O.2	
When you were pregnant and went for check-up, what infant feeding advice were you given?	When you were pregnant with your last born child and went for check-up, what infant feeding advice were you given? Follow-up questions: - Who gave you the advice? - What age of the child was the advice referring to? - Were you HIV-positive at that time?

The quality of the data and the data analyses affects the reliability (Ringdal, 2007). It was thus important to look at the accuracy in the registration of the data and search for errors and correct these. Another way to assess reliability is by using the so called test-retest-technique. This technique is about measuring the degree of correlation between two repeated measurements of the same variable (Ringdal, 2007). A test-retest technique was not done after the survey in 2007.

6.1.3 Bias, the role of chance and confounders

Bias

The collected answers could include errors that can be both systematic and random (Ringdal, 2007). Systematic errors are biases in measurement affecting the validity while random errors

will affect the reliability (Ringdal, 2007). Examples of systematic errors are related to selection bias and information bias (Margetts & Nelson, 1997). Referral bias is an example of a specific type of selection bias most likely present here (Margetts & Nelson, 1997). Since for instance the study sample in this master thesis builds on many exclusion criteria that were set after the sample had been selected, there is a great chance that the findings were different for those participants who were included compared with those who were eligible to participate but did not (Margetts & Nelson, 1997).

Information bias occurs when there are either random or systematic differences in the way information is collected in the study groups (Margetts & Nelson, 1997). The information obtained can be both systematically different in the different groups or between the two groups. Such differential misclassification biases may lead over- or underestimation. Social desirability bias is an example of a potential source of information bias. This sort of bias occurs when the individual wishes to communicate a desirable image or to convey an image in keeping with social norms (Margetts & Nelson, 1997). The mothers with unknown HIV status in KPS could for instance have answered the questions in such a way that they did not reveal their HIV status. All the mothers might furthermore have answered according to how they think they should have been feeding their infant and not based on what they really did.

Recall bias is another example of information bias (Margetts & Nelson, 1997). Recall bias can be affected by for instance the time interval, the degree of details needed to answer the questions and personal characteristics of the subjects (memory). Recall bias is most likely present here since the mothers included in the analysis had children younger than eight years. This means that some of the mothers answered what their infant feeding practices had been between one and seven years ago depending on their last born child's age. According to WHO parents should not be asked about infant feeding if their children are older than 2 years old (WHO & UNICEF, 2003). Still mothers with children seven years old or younger were included to not get a too small study sample.

A last example of a potential source of information bias is interviewer bias (Margetts & Nelson, 1997). Such biases occur when there is any difference in the way information in different groups (KSPS and KPS) is obtained, recorded and interpreted by the interviewer. The use of similar questionnaires among the mothers in KSPS and KPS most likely reduced the chance of

bias in the information obtained and recorded by the interviewers. Still the interviewers may have interpreted the information differently.

Biases may also occur between interviewers. The questions in the questionnaire could also have led to biases if they had been formulated in such a way that what was meant by a question was misunderstood by the interviewers or the mothers. This is something that could have been reduced if all the questions had been pre-tested and validated. Some examples of this are related to the question about advice. First one can question the use of exclusive breastfeeding versus breastfeeding. One could assume that if the mothers had been advised to “exclusively breastfeed”, she had been advised to give nothing else but breast milk. If the mother had been advised to “breastfeed”, it is not easy to know if this means that the mother had been advised to give other foods apart from the breast milk (mix feed) or that she actually had been advised to breastfeed exclusively. In some of the analysis done here, breastfeeding was however included with exclusive breastfeeding. The use and understanding of the term “mixed feeding” is another example of a possible misunderstood formulation in the question about advice. Misunderstandings could have occurred both regarding the meaning of the term “mixed feeding” and in the interpretation of the answer. Since so few mothers seemed to have been advised to give mixed feeding, this did not seem to be a problem here.

Other possible errors are related to potential random errors that will affect the reliability. Common random errors are mistakes or inaccuracies in selection of study subjects, choice of survey methodology or evaluation of the findings (Ringdal, 2007). It is for instance likely that though the interviewers were trained, they made have made mistakes in the noting and data registry of the answers.

The role of chance

In assessing the findings of a study it is important to know whether the findings obtained could have occurred by chance (Margetts & Nelson, 1997). This can be assessed by hypothesis testing. Though this master thesis did not include any formulated hypothesis, some of the objectives were formulated based on assumptions on what was expected to be found. To assess the probability that the findings had not occurred by chance, Pearson chi-square test was employed. The level of statistical significance was expressed in terms of how likely it was that the findings would have occurred by chance if there really were no association (Margetts & Nelson, 1997). The larger the

value of the test of statistical significance the smaller the p-value meaning that it was less likely that such a finding would occur by chance alone. For all the tests of statistical significance in the thesis the statistical significance level was set at 0.05. This p-value was chosen to represent the statistical significance and was only used as a guide (Margetts & Nelson, 1997). Since the analysis build on chi-square tests where the sample size sometimes seemed to be too small, a Type II error might have occurred (Ringdal, 2007). Then the tests could yield an inaccurate inference or even worse a wrong decision and the drawing of wrong conclusions. Some of the findings were thus only descriptive and did not include any statistical analysis.

Confounders

Confounders are associated with both exposure and outcome and typically include age, educational level and social class (Cade, 1997; Margetts & Nelson, 1997). Confounders may not have been equally distributed between the groups being compared. Such unequal distribution may as a consequence have led to biases followed by misinterpretation of the findings (Cade, 1997). No statistical analyses were made when investigating the relationship between the mothers' infant feeding practices and other factors besides HIV status. Yet some of the factors might have worked as confounders when interpreting the findings.

Taking for instance the educational level and age of the mothers in KPS as an example, the findings show that the mothers who had completed all or some levels of further education had to a lower extent been exclusively breastfeeding the first months compared to the mothers who had completed all or some levels of general education. At the same time the findings shows that fewer mothers younger than 29 years old had been exclusively breastfeeding their infant compared to the mothers older than 30 years old. If the reality is that more mothers younger than 29 years old in KPS also have higher educational level, then educational level can work as a confounder when looking at the association between age and infant feeding practices.

Another example is related to advice given to the mothers in KSPS when pregnant and their knowledge about MTCT through breastfeeding. The mothers' knowledge about MTCT through breastfeeding might in the reality be based on what they were advised to do and not reflect what they actually knew about the risk of MTCT through breastfeeding.

Multiple logistical regressions could have been useful to assess confounding factors as well as the mothers' infant feeding practices in relation to other factors, but this multivariate

statistical procedure was not considered an ideal procedure in this master thesis. This was mainly because of the small sample size, low expected frequencies and weaknesses in the questionnaire.

6.2 Discussion of the qualitative methodology

Within the context of global health research, there is an increasing use of qualitative research. Consequently there is an increased focus for the qualitative research field to move toward developing and establishing coherent mechanisms for quality assurance (Reynolds et al., 2011). It is argued that quality as assessment of output based on criteria like validity, relevance and representativeness may not be a true indication of the quality of the activities and decisions made in the research process (Reynolds, et al., 2011). A characteristic of qualitative interviews is furthermore that the researcher establishes a direct contact with the people being studied (Thagaard, 2010). The relationship that develops between the researcher and participant is important for the material the researcher obtains. This important relationship is lacking in the interpretation of the qualitative findings, since I was not part of the qualitative interviews. This is a great disadvantage. Another disadvantage with the qualitative investigation added to the third wave in 2007 is the fact that the topic “infant feeding practices” was not given much attention in the interviews and thus made it difficult to give a very clear description of the mothers’ infant feeding practices. It was furthermore random in which interviews this topic was raised. This questions the credibility of the findings. The qualitative findings are discussed having in mind these inconveniences.

Examining consistency between the quantitative and qualitative findings was a way of validating and supplementing the findings. Many of the findings in the two methodologies appeared to be similar especially when it came to what advice the mothers had been given and their infant feeding practice. Though the qualitative approach could not fully explain all the quantitative findings, the qualitative findings added some information about other factors that might be related to the mothers’ infant feeding practices.

The goal with qualitative investigation is not to quantify (Ringdal, 2007). Still the number of HIV-infected mothers, who had been giving formula and was advised to do so, was presented to give a picture of this infant feeding practice that seemed to be the most common one. The mothers’ and the doctors’ answers in the in-depth interviews were to a great extent consistent when it came to infant feeding advice and practice. Yet the HIV-infected mothers and the doctors were purposively selected, and the qualitative findings cannot be generalised.

Only HIV-infected mothers were included in the qualitative in-depth interviews. Though these mothers were of particular interest, it would have been preferable to have included some mothers without HIV as well. In-depth interviews with mothers without HIV could have added valuable information about their infant feeding practices.

In the transcribed interviews with the HIV-infected mothers, many of the interviews lacked information about where the interviews had taken place. Since this information was only available for some of the mothers, this information was not included to ensure confidentiality. Ideally all the qualitative interviews should have taken place in Khayelitsha and not in selected townships in Western Cape. This could have ensured that the infant feeding practices of the mothers in the qualitative interviews and the advice given to them was similar to the HIV-infected mothers in KSPS and Khayelitsha.

There were weaknesses in the transcribing of some of the in-depth interviews. Some of the interviews consisted for instance of incomplete sentences or seemed to include the translators' own interpretation of the answers rather than the doctors' or mothers' actual answer. Still a few quotes were added to give a deeper description to some of specific objectives explored. If it had been possible for me as a researcher to participate in the in-depth interviews, changes would have been made in the choice of questions and formulation of some of the questions. Some of the questions added would also probably be more consistent with the questions in the quantitative survey.

6.3 Discussion of the findings

This chapter starts by giving an overview of the characteristics of the study sample compared with a reference population. The discussion of the findings is then divided into four sections based on the specific objectives. Even if mothers without HIV were included and compared with HIV-infected mothers, it was drawn most attention to the HIV-infected mothers.

6.3.0 The characteristics of the study sample

Table 17 gives an overview of some characteristics of the general population of women in Western Cape compared with the same characteristics of the mothers in KSPS and KPS. There were some differences between the reference population and the mothers in KSPS and KPS. Fewer women in the reference population were for instance married. Approximately 40% of the mothers in both KSPS and KPS were married or living with a partner. This means that the

remaining mothers were not living together with the father of the child and had then thus most likely been the ones responsible for feeding their child.

Table 17: Characteristics of the reference population and the mothers in KSPS and KPS

	Reference population	Mothers in KSPS	Mothers in KPS
	%	%	%
Total	100	100	100
Material status			
Never married	56 ^a	53	43
Married	27	31	40
Living together as partners	8	12	4
Divorced/widowed/other	9	4	13
Number of people living in household			
1-4	69.5 ^b	42	21
5-6	19	35	30
>7	11.5	22	48
Missing		1	1
Educational level^c			
No education	2 ^a	2	1
General education	38	31	24
Further education	54	67	75
Higher education	6		
Labour status			
Employed	39 ^a	47	46
Unemployed	29	53	54
Other ^d	32		
Energy sources			
Electricity/gas/paraffin	98 ^e	93	91
Other	2	7	9

^a Interactive data from Community Survey 2007 by province (Western Cape), population group (black African), gender (females), material status, level of education and labour status (Statistics SA, 2007b)

^b Census data from Khayelitsha in 2001 (IKMD, 2005)

^c Educational level: General education refers to the completion of all or some levels of general education (grade 0-9) and further education to the completion of all or some levels of further education (grade 10-12). Higher education refers to bachelor degree, post graduate diploma, etc.

^d Not economically active, unspecified or institutions

^e Western Cape census from 2001 on energy source for cooking, heating and lighting by population group (black African) and gender (female) (Statistics SA, 2005)

More mothers in the reference population were living in smaller households as compared to the mothers in the study from 2007. In addition the community survey from 2007 found that the majority of the women in the reference population had completed all or some levels of further education or higher education (60%). This was almost similar to the findings among the mothers in KSPS and KPS, shown through the high number of mothers who had completed all or some levels of further education. More mothers in KSPS and KPS seemed to be employed. Still the questions about labour status varied in the questionnaires. In the Community Survey which represents the reference population, there were several definitions of labour status (not

economically active, unspecified or institutions), while the KSPS/KPS study from 2007 only asked the participants whether they were currently working in 2007. These differences made it difficult to actually compare the reference population with the mothers in KSPS and KPS.

Almost all the mothers owned a gas or electric stove, both in the reference population and in this study. This shows that the mothers' access to cooking and thus their possibility to boil the water used for preparing the infant feeding formula apparently was not a problem.

The majority of the mothers in both KSPS and KPS were between 30 and 34 years old or older. The mothers would most likely have been younger if the survey from 2007 had been based on participants selected for the main objective of this thesis. This is because the study sample would have been selected based on mothers with children younger than two years old.

It was striking that all the HIV-infected mothers said that their health status was fair whereas the mothers without or with un-known HIV status said that their health status was everything from poor to excellent. This might mean that the mothers in KSPS have perceived the question on health status differently from the mothers in KPS. The HIV-infected mothers might for instance be used to possible HIV symptoms and not consider other health aspects as relevant to mention. Their health status might thus in absolute terms have been poorer than what they expressed. For the mothers in KPS the varying health conditions underline that these are regular mothers with varying health.

More mothers in KPS (29%) than in KSPS (12%) reported that their child's health was better compared to other children in the neighbourhood. It was however impossible to say if this was related to the HIV status of the child. This was because no additional questions were asked about the children's HIV status or nutritional status. Such questions could have added important information about possible associations between infant feeding practices and the presence or absence of HIV/AIDS or other health related outcomes in the children (Cade, 1997). However, a cross-sectional design would not have made it possible to establish the causes and effects. For instance, since the data only gave a picture of the mothers' infant feeding practices, it would have been impossible to determine whether the exposure (infant feeding practice) and the outcome (HIV/AIDS or other health related outcomes) were causally related (Cade, 1997; Coggon, et al., 2003).

The estimated number of HIV-infected pregnant women receiving ARVs for PMTCT in South Africa in 2009 was 88% (UNAIDS, 2010a). Almost all the HIV-infected mothers reported

that they were taking ARVs (98%). This is not unexpected since one of the criteria for joining the KSPS was that they received free ARVs from one of the three clinics in Khayelitsha.

6.3.1 The advice given to the mothers during pregnancy

When exploring the relationship between HIV status and advice received about breastfeeding, the findings were in line with the expectations. The advice about infant feeding given to the mothers in KSPS varied from the advice given to the mothers in KPS. More mothers without HIV or with unknown HIV status than mothers with HIV had been advised to breastfeed or exclusively breastfeed their infants (respectively 87% and 16%) (Table 5).

The mothers in KSPS

International recommendations on infant feeding for HIV-infected mothers vary and have changed the last decade. The 2001 and the 2010 guidelines are very different from one another both in terms of recommended first alternative of feeding method, breastfeeding cessation and in terms of the principle of informed choice (Moland, de Paoli, et al., 2010). This can be challenging both for a country, a community, a clinic, a health worker and a mother (Blystad et al., 2010). The changes may be difficult to follow and implement in new national policies (Moland, de Paoli, et al., 2010). The changes may also lead to shortcomings in the most basic knowledge of MTCT through breastfeeding amongst health workers and community members (Chopra & Rollins, 2008). As a result it may be complicated for a mother to listen to an advice, weigh the risk and then choose what infant feeding to actually give the infant. The advice given to the mothers in KSPS will be discussed having in mind the challenges related to the varying and changing recommendations.

Recommended first alternative of feeding method

Almost all the mothers in KSPS (77%) had been advised to give infant feeding formula when they were HIV-infected, pregnant and went for check-up (Table 4). Only nine mothers in KSPS had been advised to breastfeed or exclusively breastfeed. The qualitative findings confirmed the quantitative findings as all the HIV-infected mothers in the in-depth interviews answered that they had been advised to give formula. The three doctors in the in-depth interviews also seemed to advice HIV-infected mothers to give infant feeding formula. This underlines and validates the quantitative findings.

The findings in this master thesis are in concordance with national recommendations (National DOH, 2007a) and the PMTCT programmes in Western Cape offering free formula while promoting infant feeding formula and avoidance of all breastfeeding (PAWC, 2002). AFASS replacement feeding was also the first alternative of feeding method in the international recommendations from 2001 (WHO, 2001b). This differs from the new recommendations on infant feeding highlighting the importance of exclusive breastfeeding and suggesting that every effort should be made to accelerate access to ARVs for both maternal health and PMTCT (SANAC, 2011; WHO, 2010c).

Breastfeeding cessation

Nine mothers in KSPS had been advised to breastfeed or exclusively breastfeed, but no information was available as to how long the mothers had been recommended to breastfeed and whether they had been recommended abrupt cessation. In the recommendations from 2001 rapid cessation of breastfeeding was recommended (WHO, 2001b). The 2010 recommendations however, advises exclusive breastfeeding for six months followed by continued breastfeeding and complementary feeding (WHO, 2010c).

Principle of informed choice

Only one mother in KSPS expressed that she had been given the choice to either exclusively breastfeed or give formula exclusively whereas this was the case for two of the HIV-infected mothers in the in-depth interviews. Two of the doctors in the in-depth interviews seemed to advise the mothers to give formula, while one of them also said that it was important to make an individual decision in the particular context. The third doctor referred to a widespread policy of formula feeding (labelling the policy a “hysterical policy”) while at the same time highlighting the importance of either exclusive breastfeeding or exclusive formula. These findings show that the principle of informed choice has not been uniformly practiced in Western Cape. When advice about infant feeding varies between the different maternal and child services, this may add a layer of complexity to the already confusing setting of changing recommendations. This not only encompasses changes in the content of the recommendations, but also the principle of informed choice which has varied in the international recommendations on infant feeding the last years. In 2001 the informed choice was recommended to be at individual level while in 2010 at national or

sub-national level (WHO, 2001b). The 2010 recommendations states that the national or sub-national health authorities in each country should decide what infant feeding practice they want to recommend to their citizens (breastfeeding with ARVs or avoidance of all breastfeeding) as the practice that will most likely give infants greatest chance of HIV-free survival (WHO, 2010c).

Informed choice at individual level

The principle of informed infant feeding choice in the presence of HIV at individual versus national or sub-national level highlights a central dilemma for public health workers and for the mothers. When taking an individual informed choice perspective, the counselling on infant feeding should be of high quality and provide mothers an opportunity to choose between possible infant feeding practices. The health workers should thus have good knowledge about the different feeding methods. Several studies on PMTCT in South Africa have found that the quality of counselling on infant feeding is poor and that AFASS conditions are not taken into account (Buskens & Jaffe, 2008; Chopra, Doherty, Jackson, & Ashworth, 2005; Doherty, et al., 2007; Sibeko, Coutsooudis, Nzuza, & Gray-Donald, 2009). An informed choice at individual level means that the mothers have to weigh the risk of MTCT through breastfeeding versus the risk of illness, malnutrition and death from formula feeding. This illustrate the challenging dilemma HIV-infected mothers are faced with when choosing infant feeding practices (Moland, de Paoli, et al., 2010; WHO, 2010c).

Nationally in South Africa, the principle that HIV-infected mothers should receive counselling on infant feeding options to enable them to make informed choices regarding infant feeding has been similar to international recommendations from 2001 (National DOH, 2007a). The findings in this master thesis highlight however that almost all the mothers in KSPS had been advised to give formula. This might be explained by the lack of social support promoting breastfeeding when clinics and PMTCT programmes offers free infant feeding formula (Moland, van Esterik, et al., 2010). The assumed benefits and hand out of free infant feeding formula for HIV-infected mothers may in complex ways have changed public ideas about infant feeding (Moland, van Esterik, et al., 2010). Access to free formula may in addition have introduced an important threat to established breastfeeding practices for mothers in general in countries south for Sahara (Moland, de Paoli, et al., 2010).

According to the newest recommendations on infant feeding from WHO, it was concluded that making recommendations either for or against breastfeeding is fully consistent with an individual rights framework (WHO, 2010c). However, the infant feeding formula offered for free for six months through the PMTCT programmes in South Africa has been raised as a human right issue (Moland, van Esterik, et al., 2010). The continued provision of free infant formula might be an incentive that could lead to confused feeding decisions, making it difficult for the mothers to take an individual choice (Doherty, Sanders, Goga, & Jackson, 2011). The mothers should be able to make a choice based on their own right to breastfeed and the children's right to be breastfed (Kent, 2006).

Informed choice at national or sub-national level

It is from a national or sub-national informed choice perspective stressed that standardizing simple and clear messages about infant feeding practices in an already varying policy area is important (John-Stewart, 2008). Support and provision of infant feeding formula seem to have had an extreme influence in the PMTCT programmes in South Africa. An example of this is the findings in this master thesis showing that formula seems to have been the main infant feeding advice given to the mothers in KSPS. It is however suggested that national programmes and health services worldwide should overcome the confusion created by the shifting international recommendations the past decade and strive for exclusive breastfeeding as the only way to feed the infant regardless of HIV status (Doherty, et al., 2011; John-Stewart, 2008; Moland, de Paoli, et al., 2010; WHO, 2010c). Programs to support exclusive breastfeeding should especially be expanded universally in low resource settings (Kuhn, et al., 2007). South Africa now seems to adhere to this informed choice perspective at national level.

It was namely the health minister in South Africa Dr Aaron Motsoaledi who presented the revised clinical guidelines for the PMTCT in 2010 (National DOH, 2010). In August 23, 2011 the health minister addressed a media conference on the outcomes of a two-day consultative summit on the use of infant formula in South Africa (National DOH, 2011a). The focus of the summit was on the unacceptable progress in the infant mortality rate in South Africa the past decade and breastfeeding's vital position as a child survival strategy (National DOH, 2011b). South Africa decided as a result of these realities to adopt the WHO 2010 recommendations and move to an exclusive breastfeeding strategy for all mothers. The distribution of free infant

feeding formula for HIV-infected mothers through health facilities would as a consequence of this be put to an end. Formula should only be recommended by an authorised health practitioner to those mothers who, for medical reasons cannot breastfeed. The health minister disclosed his speech at the media with this invitation (National DOH, 2011b):

“I invite the media to partner with us to ensure that we publicise this policy shift as widely as possible so that every mother, mother to be, granny and partner knows this policy and supports it. Mothers must be supported to exclusively breastfeed.”

South Africa seems to attempt to reach a goal of an informed choice at national level supporting and advising all HIV-infected mothers to exclusively breastfeed their infants with the use of ARVs (SANAC, 2011; WHO, 2010c). These new recommendations may involve both advantages and disadvantages (WHO, 2010d).

Advantages with PMTCT through exclusive breastfeeding

Some benefits of breastfeeding and exclusive breastfeeding were earlier described in section 3.2. Counselling and support for exclusive breastfeeding have been shown to increase the proportion of women who choose this infant feeding practice (Horvath, et al., 2009). Recommendations of exclusive breastfeeding with ARVs may thus besides reducing the risk of MTCT, lead to increased breastfeeding rates. The recommendations may as well be a response to the framework described in section 3.3 resulting in fewer children suffering from malnutrition and reduced child mortality in a country like South Africa where opposite patterns are found. Exclusive breastfeeding may lead to additional infant developmental and other health benefits for infants who do not become HIV-infected (WHO, 2010d).

HIV-infected mothers might find it difficult to grasp and carry out AFASS formula feeding (John-Stewart, 2008). Exclusive breastfeeding is AFASS and reduces MTCT providing HIV-infected women with a means to protect their children's lives (Kuhn, et al., 2007). Identical recommendations on exclusive breastfeeding for all mothers might put an end to the varying province recommendations complicating the infant feeding decisions for HIV-infected mothers (Mkwanazi, 2009). Identical recommendations may as well make it easier for HIV-infected mothers to choose an infant feeding practice that help ensure that the infant's food intake is adequate. Breastfeeding may also be an infant feeding practice that is culturally acceptable and

reduce the possibility of stigmatization and discrimination compared to formula feeding. There are also minimal cost implications of supporting exclusive breastfeeding for the health systems compared to for instance the provision of free infant feeding formula (WHO, 2010d).

Disadvantages with PMTCT through exclusive breastfeeding

The achievement of exclusive breastfeeding may require rigorous design and implementation in order to have a significant effect in terms of increasing HIV-free survival (Horvath, et al., 2009). This is perhaps especially true for an area like Western Cape where the advice and practice of no breastfeeding seem to have a strong position. In the consultative summit in South Africa in 2011, barriers to exclusive breastfeeding were identified (National DOH, 2011a). Examples of possible barriers were aggressive promotion of formula by manufacturers, challenges for working mothers to breastfeed in the workplace and confusion around the risks of MTCT and breastfeeding. Other barriers might be lack of support from partner, family and community efforts to promote exclusive breastfeeding. The practice may also be difficult to achieve nationally because of the currently low exclusive breastfeeding rates in the country (National DOH, 2011b). Health workers may as well not believe in the sufficiency of exclusive breastfeeding and thus not support this infant feeding practice (WHO, 2010d). The provision of free formula was previously discussed in a human right perspective. Exclusive breastfeeding may also be difficult for a mother to practice because of for instance time-pressure, sore breasts or lack of milk. The recommendations of exclusive breastfeeding may similarly be seen as denying women's right to choose formula feeding (WHO, 2010d).

Another aspect of the recommendations of exclusive breastfeeding is the use of ARVs. Recommendations on the use of ARVs in PMTCT programmes are continuously monitored and updated (WHO, 2012b). This is both important and necessary. There is for instance a lack of proper longitudinal studies on the use of ARVs (Engebretsen & Fadnes, 2010). The effect and harms of perinatal ARVs to infants who are breastfed versus those who are formula fed will thus require further study (Siegfried, et al., 2011). This research should focus on all the outcomes of breastfeeding versus formula feeding in mothers taking ARVs and include the impact of formula feeding on mortality and morbidity from other infectious diseases. It is also important that ARVs are available to all in need and that they are taken correctly. In 2009 the estimated percentage of HIV-infected pregnant women who received ARVs for PMTCT was 88% (UNAIDS, 2010a). Of

the mothers in KSPS 98% said that they were taking ARVs. These mothers receiving ARVs could thus be recommended to exclusively breastfeed. Still it is important that ARVs is available to all breastfeeding HIV-infected mothers to ensure that the risk of MTCT is reduced.

The mothers in KPS

Almost all the mothers in KPS had been advised to breastfeed or exclusively breastfeed their infants (respectively 81% and 6%). Despite weaknesses in the formulation of the question about advice, the advice about infant feeding seemed to be somewhat in line with both national and international recommendations for mothers in general the last decade (WHO & UNICEF, 2003).

6.3.2 The mothers' knowledge about MTCT and infant feeding

The questions included in the questionnaire from the survey in 2007 could not explain in full the mothers' knowledge about MTCT and infant feeding. There were also weaknesses with some of the formulated questions (especially questions O.1.1 through O.1.6 on the best infant feeding options). Yet the mothers' answers could give an idea of their knowledge on the topic.

Knowledge about MTCT

When exploring the relationship between HIV status and knowledge about MTCT, the findings differed to some extent from the expectations. The mothers' knowledge about MTCT in both KSPS and KPS seemed to be somewhat similar. It was expected that more mothers in KSPS would give the correct answer, but this only applied to one of the four questions.

Table 6 shows that in both groups the majority of the mothers in KSPS and KPS gave correct answers to the four questions. On the question about the risk of MTCT through breastfeeding 91% of the mothers in both KSPS and KPS answered yes on this question. More mothers in KSPS compared to the mothers in KPS answered correct on the question about the risk of MTCT through mixed feeding versus exclusive breastfeeding. Two of the doctors in the in-depth interviews expressed the increased risk of MTCT through mixed feeding. One can thus assume that these doctors most likely informed the HIV-infected mothers about this risk and advised them to not mix feed their infants. This might explain why more mothers in KSPS compared to KPS knew the correct answer to this question.

The knowledge questions on MTCT were included in the cross-sectional survey in Tanzania which was part of Marina M. de Paoli's PhD (de Paoli, 2004). Thirty-seven percent of

the 500 women answered correctly on all four questions on possible routes of MTCT. It was furthermore concluded that the knowledge of MTCT through breastfeeding was high (90% of the 500 women responded correctly). A cross-sectional survey of 70 caregivers attending a PMTCT programme in Khayelitsha found that the caregivers had good knowledge of the spread and prevention of HIV and that a majority knew that breastfeeding can transmit HIV (Chopra et al., 2002). The in-depth interviews with the three doctors revealed that the general knowledge about HIV among HIV-infected people was quite good. The fact that all the mothers lived in an area where HIV is common might explain their high knowledge about MTCT and why there was no big differences in the level of knowledge about MTCT among the mothers with or without HIV.

Options about the best way to feed an infant

The mothers were asked what infant feeding practice they regarded as best for a child born to a mother with or without HIV. It appeared that some of the answers the mothers gave were not consistent. The majority of mothers in KSPS and KPS agreed or strongly agreed for example that both formula and breast milk was the best for infants in general. The fact that there was some inconsistency in the way the mothers had answered the question made it hard to really draw any conclusion on what infant feeding practice the mothers actually regarded as best in the presence or absence of HIV. At the same time any conclusion should be drawn with caution due to the low expected frequencies.

Table 7 shows that the majority of the mothers in both of the groups disagreed or strongly disagreed that cow's milk was the best both for infants born to HIV-uninfected and HIV-infected mothers. This might be explained by the findings showing that none of the mothers in KSPS and KPS had been advised to give cow's milk (Table 4). Not surprisingly as many as 99% of the mothers in KPS agreed or strongly agreed that breast milk generally was best for infants. Almost the same percentage of mothers in KSPS (98%) agreed or strongly agreed to the same question. This is similar to the advice given to most of the mothers in KPS as well as national and international recommendations highlighted breastfeeding as the infant feeding practice for mothers in general.

In the case of an infant born by an HIV-infected mother, most of the mothers in both groups agreed or strongly agreed that formula was the best as well as disagreed or strongly

disagreed that breast milk was the best. This might reflect the national recommendations in Western Cape and in addition the clinics in Khayelitsha supporting formula feeding.

6.3.3 The mothers' infant feeding practices

When exploring the relationship between HIV status and exclusive breastfeeding practices, the findings were in line with the expectations. The analysis shows that there were statistical significant differences in the infant feeding practices of the mothers in KSPS and the mothers in KPS the first 12 months. More mothers without HIV than with HIV had been exclusively breastfeeding their infants the first months of their infants' life.

The mothers in KSPS

The majority of the mothers in KSPS had been giving infant feeding formula the first year (89%). This is similar to other studies in Khayelitsha. A survey of 70 caregivers attending a PMTCT programme in Khayelitsha found that all the mothers on the programme reported exclusive formula feeding (Chopra, et al., 2002). Another survey of 113 women attending a PMTCT programme in Khayelitsha found that over 95% of the women formula fed their infants and did not breastfeed at all (Hilderbrand, Goemaere, & Coetzee, 2003). A study aiming at estimating the field efficacy of the PMTCT programme in Khayelitsha found that of 535 mother and infant pairs, almost all the mothers (99%) had been giving formula feeding exclusively (Coetzee, et al., 2005). Studies showing that HIV-infected mothers in Khayelitsha seem to have been practicing exclusive formula feeding can most likely be explained by the recommendations of formula feeding and the hand out of free formula the first six months in this area.

The qualitative findings regarding infant feeding practices of HIV-infected mothers were in line with the quantitative findings: eight of nine HIV-infected mothers reported that they had not breastfed and had been giving infant feeding formula. Still the qualitative findings did not specify what period in the infants life the mothers were referring to and whether the mothers gave exclusively formula to their infant or if they also gave breast milk or other foods the first months of life. Though there were weaknesses with the qualitative findings, the interviews with the HIV-infected mothers validated the quantitative findings and gave a clearer picture of the infant feeding practices among HIV-infected mothers in Western Cape.

Exclusive breastfeeding

The findings shows that few of the mothers in KSPS breastfed their infants exclusively the first six months (5%). An impact evaluation on the PMTCT programme in South Africa found that 23% of the 2888 HIV-infected mothers had been exclusively breastfeeding their four to eight week old infants²⁴ (Goga, et al., 2011). Sixty-two per cent of the mothers had not breastfed (Goga, et al., 2011). There might be disadvantages with PMTCT through exclusive breastfeeding (section 6.3.1). Still exclusive breastfeeding rates could be improved with sustained support to mothers through culturally sensitive interventions. An implemented and evaluated education and counselling program for mothers in Zimbabwe found that mothers who were enrolled when the program was being fully implemented were 8.4 times more likely to exclusively breastfeed than mothers who were enrolled before the program began (Piwoz et al., 2005). One could furthermore expect that a clear, national policy supporting exclusive breastfeeding for all mothers would increase the number of mother's breastfeeding exclusively if implemented locally.

The study aiming at estimating the field efficacy of a PMTCT programme in Khayelitsha, found that 99% of the mothers reported exclusive formula feeding and that the rate of MTCT was low (8.8%). The conclusion was thus that the programme was effective (Coetzee, et al., 2005). The impact evaluation of the national PMTCT programme in South Africa found that the PMTCT programme seemed to reduce MTCT to less than 4% (Goga, et al., 2011). The impact evaluation found additionally that while exclusive breastfeeding and ARVs were both protective factors, mixed feeding seemed to be a risk factor associated with MTCT. Though the use of infant formula may have reduced MTCT, no data was included about the risk of possible increased mortality rates in the long term in the absence of breastfeeding (Goga, et al., 2011). This was also the case for the KSPS and KPS study.

AFASS formula feeding

According to all the recommendations on infant feeding both nationally and internationally since 2000, HIV-infected mothers who choose to formula feed should give infant formula that meets the AFASS criteria. It is a great advantage that most of the mothers in KSPS reported that they had been giving only formula the first year. This hopefully means that they had not mixed fed

²⁴ Results presented at the Sixth International AIDS Society conference in Rome 2011 by Thu-Ha Dinh of Centers for Disease Control and Prevention, USA, Global AIDS Program, Atlanta.

and as a consequence increased the risk of MTCT. There are however many conditions that should be in place to meet the AFASS criteria (WHO, 2001b; WHO & UNICEF, 2003).

First of all the formula should be acceptable and socially welcome. The qualitative findings found that some of the mothers revealed fear of disclosure concerning the orange tin which they got from the clinics. The stigmatization associated with the orange tin may thus question the acceptance of the use of formula.

Secondly the formula should be feasible. A mother who chooses to formula feed must have adequate time, knowledge, skills and other resources to prepare the formula. A mother who chooses this feeding practice should also be trained on how to prepare and give the formula (Western Cape DOH, 2011). The mothers in KSPS should thus have been given necessary information, but data on this was lacking in the cross-sectional survey from 2007.

Thirdly the formula should be affordable and safe. According to the protocol on PMTCT programmes from 2002, formula should be offered for free for six months through the programme (PAWC, 2002). Ninety-two percent of the 53 mothers in KSPS who said that they had been giving infant feeding formula the first six months received this for free from the clinics. Though the mothers in KSPS had themselves to obtain the equipment needed to formula feed (bottles, cooking facilities, etc.), the formula itself was affordable and sustainable since most of the mothers received formula for free for six months (WHO, 2001b; WHO & UNICEF, 2003). A study in South Africa exploring how the HIV/AIDS epidemic affected the infant feeding practices of HIV-infected mothers found that mothers who chose to formula feed faced a constant struggle to access formula supplies because of their dependency on the clinics to obtain milk for their infants (Doherty, Chopra, Nkonki, Jackson, & Greiner, 2006). Some of the mothers with scarce resources for sustaining formula feeding also expressed despair at having nothing to feed their children when the supplies ended early or the clinic stock ran out (Doherty, et al., 2006). After six months, 23 of the mothers in KSPS reported that they still received free clinic supply of formula, meaning that the rest of the mothers who gave formula after six months (n=26) had to purchase the formula. It thus appears that the mothers' access to free formula varied. Despair of having nothing to feed the children with did however not seem to be the case in the study from 2007. Most of the mothers in KSPS answered that the free clinic supply of infant formula from the clinic was reliable and almost 75% said that there were no financial constrains that prevented them from continuing to formula the infant after the free provision came to an end.

Last as a criterion the formula should be safe. Despite lack of data on the KSPS and KPS mothers access to safe water, a cross-sectional survey among 113 women attending a PMTCT programme in Khayelitsha concluded that formula feeding is safe and feasible in an urban environment where sufficient potable water is available (Hilderbrand, et al., 2003). Studies from 2007 and 2008 in South Africa found respectively that the majority (88%) of the households had access to piped water and 91% of the total population were using improved drinking-water sources (Statistics SA, 2007a; UNICEF, 2011b). The population census in Khayelitsha in 2001 found that 61.6 % of the households in Khayelitsha had access to piped water either in dwelling or on site (IKMD, 2005). It appeared that almost all the mothers in both KSPS and KPS owned gas or electric stove. It is however not clear to what extent the mothers in the study from 2007 prepared the formula with safe water and in hygienic conditions.

The mothers in KPS

Despite the fact that some of the mothers in KPS had been giving infant feeding formula the first three months, the majority of the mothers in KPS had been exclusively breastfeeding. There was a clear reduction in the percentage of mothers who had exclusively breastfed the first month (66%) and the first four to six months (35%). According to national and international recommendations on infant feeding for mothers in general the last decade, the mothers should exclusively breastfed the first six months. Though some of the mothers in KPS said that they had been exclusively breastfeeding the first four to six months, it is not clear if these mothers had been breastfeeding for as long as six months. It is also impossible to say if the mothers in KPS who had chosen to give mixed feeding from seven to twelve months (44%), had followed the recommendations of continued breastfeeding up to two years of age or beyond. The fact that the majority of mothers said that they had been given mixed feeding after six months, is according to the recommendations of introducing complementary foods at this age. No data was available on the criteria that should be in place to make sure that the infants' nutritional needs were met through the complementary food (mixed feeding).

Mixed feeding

Studies show that although breastfeeding is a common practice in South Africa, mixed feeding rather than exclusive breastfeeding seems to be the norm (Bland, et al., 2002; National DOH,

1999, 2007b). In the period between 2005 and 2009, 8% of the infants less than six months were exclusively breastfed and approximately 50% were breastfed with complementary food at six to nine months (UNICEF, 2011b). In 2008 a HSRC study found that 25.7% of infants were exclusively breastfed the first six months (HSRC, 2010). By comparison 51.3% were mixed fed and the remaining 22.5% were given infant feeding formula exclusively (HSRC, 2010). The findings in this master thesis were somewhat in line with other studies showing that mixed feeding seems to be the norm in South Africa.

There might be several reasons for the high percentage of mothers giving mixed feeding. A qualitative investigation among mothers with and without HIV in South Africa found that several barriers to exclusive breastfeeding remained, which contributed to a preference for mixed feeding (Nor et al., 2011). The understanding of the advice of 'exclusive' feeding was furthermore limited to not mixing breast and formula milk and did not address early introduction of other foods and liquids. The high rate of mixed feeding among mothers might also be explained by the varying recommendations given to mothers with and without HIV. This might confuse mothers without HIV and highlights the importance of giving clear messages about infant feeding. According to the WHO recommendations from 2010, counselling and support to mothers known to be HIV-infected, and health messaging to the general population, should be carefully delivered so that the optimal breastfeeding practices among the general population is not undermined (WHO, 2010c).

6.3.4 The mothers' infant feeding practices in relation to other factors

The small sample sizes (especially in KSPS) made it difficult to describe in full the relationship between the relationship between the mothers' infant feeding practices and other factors like the advice given to them during pregnancy, their knowledge about MTCT through breastfeeding, their educational level, their age, stigmatization and fear of MTCT.

Advice

All the mothers in KSPS who said that they had been advised to give formula had adhered to this advice. This is comparable to another study in South Africa showing that health workers seemed to have the greatest influence over mothers' infant feeding choices (Doherty, et al., 2006). Similarly the majority of the mothers in KPS who had been advised to breastfeed, did so. The five mothers in KPS who had been advised to formula feed their infant the first three months had

also adhered to the advice given to them. This might be true, but these five mothers might for various reasons also have chosen to formula feed and consequently reported that they had been advised to do so to defend their choice of feeding method. The mothers might also have been told that they could formula feed their infants if they experienced difficulties with the breastfeeding. One can also question if some of these mothers who had been advised to formula feed their infants perhaps were among the ones categorised as participants with unknown HIV status in KPS. Maybe they actually were HIV-infected and had thus been advised to formula feed, but did not want to disclose their HIV status in the survey.

The fact that some of the mothers in KPS who had been advised to exclusively breastfeed, had been giving formula or mixed feeding is not surprising. Difficulties with the breastfeeding may for instance have made it difficult for some of the mothers to follow the advice given to them.

Mothers and fathers may be more influenced by community attitudes than by the advice of health workers (WHO & UNICEF, 2003). Nevertheless, despite the lack of statistical analysis in Table 11, this table could indicate that the advice given to the mothers in KSPS and KPS influenced their infant feeding practices.

Knowledge

Almost all the mothers in KSPS seemed to be aware of the risk of MTCT through breastfeeding. This might be a reason for the low percentage of mothers choosing breastfeeding as their infant feeding practice. It could thus seem like there was a relationship between the mothers in KSPS's infant feeding practices and their knowledge about the risk of MTCT through breastfeeding.

Educational level

The findings presented in Table 13 may suggest that more of the mothers in KSPS who had completed all or some levels of further education had been giving infant feeding formula the first months compared to the mothers who had only completed all or some levels of general education. The fact that most of the mothers in KSPS had been giving formula feeding made it however difficult to compare the two educational levels. More of the mothers in KPS who had completed all or some levels of further education had been giving infant feeding formula the first months compared to the mothers who had only completed all or some levels of general education.

Consequently fewer of the mothers in KPS who had completed all or some levels of further education had breastfed exclusively the first months compared to the mothers who had completed all or some levels of general education. Perhaps mothers in KPS with lower education could not afford to buy infant formula and considered breastfeeding the only possible infant feeding practice available. Higher education might also be associated with higher socio-economic status and the preference of wanting to buy affordable formula.

Education might in addition to this also be associated with labour status meaning that mothers with higher education are working mothers. The qualitative findings revealed that lack of time due to work made it easy for a mother to listen to the advice about infant feeding formula and choose this feeding method. Many employed mothers may have short maternity leave and thus have to start working again when the infant is only a couple of months (Malan, 2011). This puts them in a situation of not being able to breastfeed their infant at all or for the recommended duration of time.

Age

The high number of mothers in KSPS who had been giving infant feeding formula the first months made it difficult to discover any clear pattern between the mothers' infant feeding practices and their age (Table 14). This also went for the mothers in KPS where the majority of the mothers in this group had been exclusive breastfeeding the first months. Still it could seem like more mothers in KPS younger than 29 years old had been giving mixed feeding or infant feeding formula the first months compared to the mothers older than 30 years old.

Stigmatization and fear of MTCT

The qualitative investigation revealed common concerns about stigmatisation associated with the orange tin, expressing that those who receive this tin are HIV-infected and everybody knows it. This is similar to a quote chosen as the title of an article from a study in South Africa exploring how the HIV/AIDS epidemic affected the infant feeding practices of HIV-infected mothers: "When they see me coming with the tins they laugh at me" (Doherty, et al., 2006).

The maternal HIV status may be unintentionally disclosed when mothers do not breastfeed in a setting where breastfeeding is a common practice (John-Stewart, 2008). Though the qualitative findings identify signs of stigmatization related to the orange tin, the majority of

the mothers in KSPS had been giving this infant formula. These mothers who practiced this infant feeding practice hence put themselves in a position of risking disclosing their HIV status.

The mothers' fear of MTCT through breastfeeding could seem to be a factor influencing the infant feeding practice chosen. A study from South Africa exploring how the HIV/AIDS epidemic affected the infant feeding practices of HIV-infected mothers found that the reasoning behind HIV-infected mothers infant feeding choices was related to the a desire to protect the child (Doherty, et al., 2006).

Summary

The findings show that there seemed to be a relationship between the mothers' infant feeding practices and their HIV status. It was on the other hand impossible to draw any conclusions on the relationship between the mothers' feeding practices and the factors explored above. Multiple logistical regressions could as mentioned earlier have been useful to describe the mothers' infant feeding practices in relation to the different factors, but this multivariate statistical procedure was not considered an ideal procedure in this master thesis. The mothers' (especially the HIV-infected mothers') chosen infant feeding practices were however undoubtedly influenced by various factors and loaded with several difficulties.

7.0 Conclusion

This master thesis found that most of the mothers in KSPS had been advised to give infant feeding formula while almost all the mothers in KPS had been advised to breastfeed or exclusively breastfeed. This matched former national recommendations in Western Cape supporting and providing HIV-infected mothers with infant formula and recommending mothers without HIV to breastfeed. The majority of the mothers in each group seemed to know about the risk of MTCT through labour, delivery and breastfeeding. Still more mothers in KSPS knew that the risk of MTCT is greater through mixed feeding than exclusive breastfeeding compared to the mothers in KPS. The findings on infant feeding practices showed through the high percentage of mothers in KSPS who had been giving infant feeding formula the first year, confirm previous findings among HIV-infected mothers in Western Cape. The majority of the mothers in KPS had been breastfeeding their infants exclusively the first three months. Still 23% had been giving mixed feeding the first two to three months and after four months 38% had been giving mixed feeding. These findings were also similar to other findings on infant feeding among South African mothers in general.

The findings in this master thesis have contributed to describe the infant feeding practices among mothers with and without HIV living in Western Cape in 2007. Even though the findings point out that most of the HIV-infected mothers had been advised to give and had been giving infant feeding formula, there now seems to be a turn in the tide in the recommendations on infant feeding and HIV in South Africa. The question is whether it will be possible for HIV-infected mothers in a region like Western Cape to adhere to the latest recommendations and choose exclusive breastfeeding with the use of ARVs as their infant feeding practice. To witness such a shift in feeding practices, challenges ahead seems to be to change the mindset of PMTCT counsellors, other health workers, families and mothers towards protecting, promoting and supporting breastfeeding as the safest way to feed an infant (de Paoli, Manongi, Helsing, & Klepp, 2001; Moland, van Esterik, et al., 2010). The opportunity is present to move beyond a primary focus on PMTCT to an infant feeding practice that will help to ensure that children are not only protected from HIV but have a better chance of a healthy life and survival (IYCN, 2012).

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Appendix 1

MODULE N – PREGNANCY AND CHILD CARE

INTERVIEWER READOUT: Now we would like to ask you some questions about pregnancy and child care

N.1 (M.1 KSPS07)	Can HIV be transmitted from mother to child during pregnancy?	Yes	1
		No	2
		Don't know	9
N.2 (M.2 KSPS07)	Can HIV be transmitted from mother to child during labour?	Yes	1
		No	2
		Don't know	9
N.3 (M.3 KSPS07)	Can HIV be transmitted from mother to child through breastfeeding?	Yes	1
		No	2
		Don't know	9
N.4 (M.4 KSPS07)	Is a child more likely to contract HIV through mixed feeding practices (breast milk, infant formula and other foods) than through exclusive breastfeeding practice?	Yes	1
		No	2
		Don't know	9

INTERVIEWER READOUT: In this next section, we would like to ask you about your own experience of pregnancy and child care

INTERVIEWER INSTRUCTION: Ask WOMEN only

N.5 (M.5 KSPS07)	How many times have you been pregnant? DO NOT ASK MEN	None	0	GO TO O.1
		Once	1	
		Twice	2	
		Three times	3	
		Four times	4	
		Five Times	5	
		Other SPECIFY:	6	

INTERVIEWER INSTRUCTION: Ask MEN only

N.6 (M.7 KSPS07)	How many times have you ever conceived a child? DO NOT ASK WOMEN	None	0	GO TO O.1
		Once	1	
		Twice	2	
		Three times	3	
		Four times	4	
		Five Times	5	
		Other SPECIFY:	6	

INTERVIEWER INSTRUCTION: Ask EVERYONE

N.7 (M.9 KSPS07)	How many biological children do you have (including those not living at home with you)?	None	0	GO TO O.1
		One	1	
		Two	2	
		Three	3	
		Four	4	
		Five	5	
		Other SPECIFY:	6	

N.8 (M.10 KSPS07)	Name and age of all your biological children. Please give years and months for age.	Child 1	N.8.1a	Name				N/A	95
			N.8.1b	Years		N.8.1c	Months		
		Child 2	N.8.2a	Name				N/A	95
			N.8.2b	Years		N.8.2c	Months		
		Child 3	N.8.3a	Name				N/A	95
			N.8.3b	Years		N.8.3c	Months		
		Child 4	N.8.4a	Name				N/A	95
			N.8.4b	Years		N.8.4c	Months		
		Child 5	N.8.5a	Name				N/A	95
			N.8.5b	Years		N.8.5c	Months		
		Child 6	N.8.6a	Name				N/A	95
			N.8.6b	Years		N.8.6c	Months		

N.9 (M.11 KSPS07)	In general, how healthy would you say your children are compared to other children of the same age in your neighbourhood? Would you say they are better, the same or worse?	Better	1
		Same	2
		Worse	3

MODULE O – INFANT FEEDING

INTERVIEWER READOUT: I would like to ask you about ways to feed small children.

To what extent do you agree or disagree with the following?							
SHOW CARD							
O.1 (N.1 KSPS07)		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know
O.1.1 (N.1.1 KSPS07)	In general, cow's milk is the best (food) for a small child. (0-6 months)	1	2	3	4	5	9
O.1.2 (N.1.2 KSPS07)	Cow's milk is the best (food) for a small child (0-6 months) born to an HIV-infected mother	1	2	3	4	5	9
O.1.3 (N.1.3 KSPS07)	In general, infant feeding formula is the best (food) for a small child (0-6 months)	1	2	3	4	5	9
O.1.4 (N.1.4 KSPS07)	Infant feeding formula is the best (food) for a small child born (0-6 months) to an HIV-infected mother	1	2	3	4	5	9
O.1.5 (N.1.5 KSPS07)	In general, breast milk is the best (food) for a small child (0-6 months)	1	2	3	4	5	9
O.1.6 (N.1.6 KSPS07)	Breast milk is the best (food) for a small child born to an HIV-infected mother (0-6 months)	1	2	3	4	5	9

INTERVIEWER INSTRUCTION: Ask WOMEN only

O.2 (N.2 KSPS07)	When you were pregnant and went for check-up, what infant feeding advice were you given?	Breastfeeding	1
		Exclusive breastfeeding	2
		Infant feeding formula	3
		Cow's milk	4
		Mixed feeding (IFF, cow's milk and breast milk)	5
		I did not receive advice	6
		I have never been pregnant	7
		Other SPECIFY:	8

INTERVIEWER INSTRUCTION: Ask EVERYONE

O.2A (N.2A KSPS07)	Have you ever had a child?	Yes	1	
		No	2	GO TO P.1
O.3 (N.3 KSPS07)	How did you or your partner feed your last born child for the first one month? READ OPTIONS	Exclusive breastfeeding		1
		Mixed feeding (Infant feeding formula, cow's milk and breast milk)		2
		Purchased Infant feeding formula		3
		Free clinic supply of infant feeding formula		4
		A combination of bought and clinic supply of infant feeding formula		5
		Other SPECIFY:		6
O.4 (N.4 KSPS07)	How did you or your partner feed your last born child for the first 1-3 months? READ OPTIONS	Exclusive breastfeeding		1
		Mixed feeding (Infant feeding formula, cow's milk and breastmilk)		2
		Purchased Infant feeding formula		3
		Free clinic supply of infant feeding formula		4
		A combination of bought and clinic supply of infant feeding formula		5
		Other SPECIFY:		6
O.5 (N.5 KSPS07)	How did you or your partner feed your last born child for the first 3-6 months? READ OPTIONS	Exclusive breastfeeding		1
		Mixed feeding (Infant feeding formula, cow's milk and breastmilk)		2
		Purchased infant feeding formula (IFF)		3
		Free clinic supply of infant feeding formula		4
		A combination of bought and clinic supply of infant feeding formula		5
		Other SPECIFY:		6

O.6 (N.6 KSPS07)	How did you or your partner feed your last born child for the first 6-12 months? READ OPTIONS	Exclusive breastfeeding	1
		Mixed feeding (Infant feeding formula, cow's milk and breast milk)	2
		Purchased Infant feeding formula	3
		Free clinic supply of infant feeding formula	4
		A combination of bought and clinic supply of infant feeding formula	5
		Other SPECIFY:	6

O.7 (N.7 KSPS07)	Did you or your partner receive free infant feeding formula from the clinic?	Yes	1	GO TO O.10
		No	2	
		Don't know	9	

O.8 (N.8 KSPS07)	How long did you or your partner receive this?	1 month	1
		2 months	2
		3 months	3
		4 months	4
		5 months	5
		6 months	6
		Other SPECIFY:	7

O.9 (N.9 KSPS07)	Was the clinic supply of free infant feeding formula reliable?	Yes	1
		No	2
		Don't know	9

O.10 (N.10 KSPS07)	Were there any financial constraints that prevented you or your partner from continuing to feed your child with infant feeding formula after the free provision came to an end after six months?	Yes	1
		No	2
		Don't know	9

Appendix 2

