**Barriers to and facilitators of paediatric adherence to antiretroviral therapy (ART)**

amongst children younger than five years in rural South Africa

by

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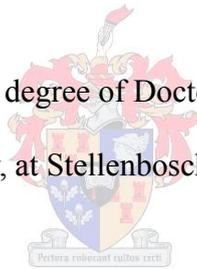
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ABSTRACT

In the context of the limited availability of antiretroviral drugs for young children and the emergence of drug resistance, excellent adherence is required to achieve an undetectable viral load (VL) and an elevated CD4 count. However, characteristics of the caregiver, child, regimen, clinic and social context affect clinic attendance and medication-taking, both of which constitute adherent behaviour. In this thesis, through the lens of Bronfenbrenner's Ecological Systems Theory (EST), I explored the barriers to and facilitators of ART administration to children younger than five years in a rural area of South Africa with a high prevalence of HIV.

The research was conducted in two phases. Phase 1 included nine interviews and three focus groups to determine how doctors, nurses, counsellors, traditional healers and caregivers understood the barriers and facilitators to ART adherence among children residing in rural South Africa. The data were transcribed, translated into English from isiZulu where necessary, and coded using ATLAS.ti version 7. At the level of the microsystem, the unpalatability of medication and large volumes of medication were problematic for young children. The characteristics of the caregivers that contribute to poor adherence were absent mothers, grandmothers as caregivers and denial of HIV amongst fathers. At the level of the mesosystem, language barriers and inconsistent attendance of caregivers to monthly clinic visits were factors affecting adherence. At the level of the exosystem, the nature of adherence counselling and training of counsellors were the most problematic features influencing adherence. At the level of the macrosystem, the effects of food insecurity and the controversy surrounding the use of traditional medicines were most salient. I concluded Phase 1 of the thesis by recommending increased supervision and regular training amongst lay adherence counsellors, as well as regular monitoring of the persons attending the clinic on the child's behalf.

In Phase 2, I purposively recruited 33 caregiver-child dyads from the Hlabisa HIV Treatment and Care Programme database. Children were divided into three groups based on their VL at the time of recruitment. Children with a VL $\geq$ 400cps/ml were grouped as unsuppressed (n=11); children with a VL $\leq$ 400 cps/ml were grouped as suppressed (n=12); and children with no VL data were grouped as newly-initiated (n=10). I observed caregiver-child dyads at their monthly adherence counselling visit to document information they received from adherence counsellors. I then visited caregiver-child dyads at their households to document, by means of video-recording, how treatment was administered to the child. Observational notes and video-recordings were entered into ATLAS.ti v 7 and analysed thematically.

On average counselling sessions lasted 8.1 minutes (range 2 - 18). Little behaviour change counselling was conducted, even in instances where children were doing poorly on treatment. Thematic video analysis indicated five key areas of caregiver practices that may contribute to poor outcomes. These were context-related, medication-related, caregiver-related, and child-related factors and interactions between caregiver and child. Although the majority of children in this sample took their medicine successfully, the way in which medications were prepared and administered by their caregivers was problematic. I concluded Phase 2 of the thesis by recommending that with emerging drug resistance, efforts are needed to carefully monitor caregiver knowledge of treatment administration by counsellors during monthly clinic visits.

OPSOMMING

Binne die konteks van die beperkte beskikbaarheid van antiretrovirale behandeling vir jong kinders en die verskynsel van weerstand teen middele is uitstekende navolging nodig om by 'n onwaarneembare virale lading (VL) en 'n verhoogde CD4-telling uit te kom. Die kenmerke van die versorger, kind, regimen, kliniek en die sosiale konteks affekteer egter kliniekbywoning en die neem van medikasie, wat albei navolgingsmaatstawwe is. Ek het in hierdie studie die struikelblokke en fasiliteerders tot ARV-behandeling van kinders jonger as vyf jaar in die landelike streke van Suid-Afrika verken aan die hand van Bronfenbrenner se Ekologiese Stelselteorie (EST).

Die navorsing is in twee fases gedoen. Fase 1 het nege onderhoude en drie fokusgroepbesprekings ingesluit ten einde vas te stel hoe dokters, verpleegsters, beraders, tradisionele genesers en versorgers die struikelblokke en fasiliteerders tot ARV-navolging sien. Die data is getranskribeer en in isiZulu vertaal waar nodig, en gekodeer met behulp van ATLAS.ti weergawe 7. Op die vlak van die mikrosisteem was die onsmaaklikheid van medikasie en die groot hoeveelhede medikasie vir jong kinders problematies. Die kenmerke van versorgers wat bydra tot swak navolging is afwesige moeders, oumas as versorgers en ontkenning van MIV onder vaders. Op die vlak van die mesosisteem is taalhindernisse en ongereelde kliniekbywoning geidentifiseer as faktore wat navolging beïnvloed. Op die vlak van die eksosisteem is die aard van navolgingsberading en die opleiding van beraders uitgelig as die mees problematiese faktore wat navolging beïnvloed. Op die vlak van die makrosisteem is die gevolge van voedselonsekerheid en die kontroversie rondom die gebruik van tradisionele behandelings geopenbaar as die mees opvallend. Fase 1 van die tesis sluit af met 'n aanbeveling dat daar meer toesig en gereelde opleiding vir die leke navolgingsberaders moet wees, sowel as gereelde monitering van die persone wat die kliniek bywoon namens die kind.

Gedurende Fase 2 het ek 33 versorger-kind-pare doelgerig gewerf uit die Hlabisa MIV Behandelings- en Sorgprogram se databasis. Kinders is verdeel in drie groepe gebaseer op hulle VL ten tyde van werwing. Kinders met 'n VL ≥ 400kps/ml is gegroepeer as nie-onderdruk (n=11); kinders met 'n VL ≤400kps/ml is gegroepeer as onderdruk (n=12); en kinders met geen VL data is gegroepeer as nuut-geinisieer (n=10). Ek het die versorger-kind-pare waargeneem tydens hulle maandelikse navolgingsberadingsbesoek om te dokumenteer watter inligting hulle van navolgingsberaders ontvang. Ek het daarna die versorger-kind-pare in hulle huishoudings besoek om met behulp van video-opname te dokumenteer hoe behandeling toegedien is. Waarnemingsnotas en video-opnames is in ATLAS.ti v 7 ingevoer en tematies geanaliseer.

Beradingsessies het gemiddeld 8.1 minute (range 2 - 18) geduur. Min berading oor gedragsverandering het plaasgevind, selfs in gevalle waar kinders sleg gevaar het op die behandeling. Die tematiese video-analise toon vyf sleutelareas binne versorgerpraktyke wat moontlik bydra tot swak uitkomste. Hierdie areas is die konteksverwante-, medikasieverwante-, versorgerverwante- en kindverwante faktore en die interaksies tussen versorger en kind. Alhoewel die meerderheid van kinders in hierdie monster hulle medikasie suksesvol geneem het, was die manier waarop medikasies deur versorgers voorberei en toegedien is problematies. Fase 2 sluit af met die aanbeveling dat beraders in die lig van stygende medikasieweerstand moeite moet doen om versorgers se kennis van die toediening van behandeling te monitor.

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LIST OF ABBREVIATIONS

3TC	Lamuvidine
ABC	Abacavir
ART	Antiretroviral therapy
ARV	Antiretrovirals
AUDIT	Alcohol use disorders identification test
AZT	Zidovudine/Azidothymidine
BDI	Beck depression inventory
CAB	Community advisory board
CAQDAS	Computer-aided qualitative data analysis
CD4	Cluster of differentiation 4
CHBM	Children's health belief model
CLO	Community liaison office
CLWH	Children living with HIV
CSG	Child support grant
d4T	Stavudine
ddl	Didanosine
DNA	Deoxyribonucleic acid
DRC	Democratic Republic of Congo
DSA	Demographic surveillance area
EDM	Electronic drug monitoring
EFV	Efavirenz
EST	Ecological systems theory
FDC	Fixed dose combination
FGD	Focus group discussion
HAART	Highly active antiretroviral therapy
HBM	Health belief model
HIV	Human immunodeficiency virus
HREC	Health research ethics committee
IMB	Information-motivation-behavioural skills model
IeDEA	International epidemiologic Databases to Evaluate AIDS
IRB	Institutional review board
LASSO	Least Absolute Shrinkage and Selection Operator

LMIC	Low- and middle-income
LPV/r	Lopinavir/ritonavir
MEMS	Medication events monitoring system
MI	Motivational interviewing
MST	Multisystemic therapy
MTCT	Mother-to-child transmission
NiMART	Nurse-initiation and management of ART
NNRTI	Non-nucleoside reverse transcriptase inhibitor
NRTI	Nucleoside reverse transcriptase inhibitor
NVP	Nevirapine
PEP	Post-exposure prophylaxis
PEPFAR	President's Emergency Plan for AIDS relief
PI	Protease inhibitor
PLWH	People living with HIV
PMTCT	Prevention of mother-to-child transmission
RA	Research assistant
RCT	Randomized control trial
RDP	Reconstruction and Development Programme
RNA	Ribonucleic acid
RTV	Ritonavir
SCT	Social cognitive theory
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
TB	Tuberculosis
THP	Traditional health practitioner
TPB	Theory of Reasoned Action
TRA	Theory of Planned Behaviour
TTM	Transtheoretical model
UKZN	University of KwaZulu-Natal
UNAIDS	Joint United Nations Programme on HIV/AIDS
VAS	Visual analogue scale
VL	Viral load
WHO	World Health Organization

GLOSSARY

Adherence counsellors	Lay health personnel that provide (inter alia) voluntary counselling and testing, pre-ART initiation education training, psychosocial support and adherence counselling services to ART users in the public healthcare system.
Adolescent	Aged 10 to 19 years old.
Adult	Aged 19 years and older.
ART	A combination of three or more antiretroviral drugs to achieve viral suppression in HIV-infected persons.
ARV	The medications to treat HIV infection.
Caregiver	The individual responsible for administering ART to the child AND/OR attending clinic visits on behalf of the child.
Child	Aged 10 years and younger.
Clinic adherence	Attending monthly clinic visits to collect prescribed medications.
Infant	Child younger than one year of age.
Medication adherence	The extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider.
Newly initiated	Not yet had a viral load test since initiation on ART.
Older child	Aged 3 to 5 years old.
Pre-ART education	Three compulsory HIV education sessions undertaken by HIV infected individuals prior to initiation on ART.
Primary caregiver	The individual responsible for administering ART to the child AND attending clinic visits on behalf of the child.
Suppressed (viral suppression)	Number of copies of HIV present in the blood is below the detectable level (<400cps/ml).
Treatment event	The time period in which the caregiver was seen measuring and administering ART to the child at the household.
Unsuppressed (treatment failure)	Two consecutive occasions where the number of copies of HIV present has been detectable in the blood (>400cps/ml).
Young child	Aged 2 to 3 years old.

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CHAPTER 1

Introduction

This thesis aims to examine the barriers and facilitators of adherence to antiretroviral therapy (ART) among children younger than five years on ART in rural South Africa. The research uses Bronfenbrenner's Ecological Systems Theory (EST) (Bronfenbrenner, 1979) and multiple qualitative approaches to explore the factors influencing adherence to ART among children in this age group.

HIV/AIDS in infants and young children

Since the first documented cases of paediatric Human Immunodeficiency Virus (HIV) in 1982 (Centers for Disease Control, 1982; Sepkowitz, 2001), countries throughout the world have responded to this major public health concern. Now, more than 30 years later, despite considerable advances in the field and the availability of life-saving treatments, children continue to become infected with HIV and die of HIV-related causes.

Of the estimated 3.2 million children under the age of 15 years living with HIV at the end of 2013, 240 000 were new HIV infections (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2014). Sub-Saharan Africa (SSA) bears more than 90% of the global burden of HIV, with an estimated 2.9 million children infected by end of 2012 (UNAIDS, 2013). More than 80% (210 000) of new infections occurred in this region. In South Africa an estimated 360 000 children aged 0 -14 years were living with HIV in 2013, representing close to 7% (16 000) of new infections globally among children in that age range during that year (UNAIDS, 2014).

Prevention of mother-to-child transmission (PMTCT)

New infections in children occur mainly as a result of transmission of HIV during pregnancy (Taha et al., 2011), birth (Dunn et al., 1994) or breast feeding (Newell, 1998). The most important public health intervention to date to eliminate new infections in HIV-exposed

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children has been the prevention of mother-to-child transmission (PMTCT) programme. Following international and local guidelines for PMTCT, all pregnant women who are HIV positive are required to receive ART as soon as possible, regardless of CD4 count or clinical staging (Department of Health South Africa, 2014; World Health Organization [WHO], 2013).

Scale-up of the PMTCT programme has virtually eliminated mother-to-child transmission (MTCT) of HIV in most high income countries and in some low income countries (UNAIDS, 2014). For example, MTCT in Cuba has now been completely eliminated, making Cuba the first country in the world to do so (WHO, 2015).

In South Africa, the available evidence shows that MTCT rates have decreased from 3.5% in 2010 to 2.7% in 2011(Goga, Dinh, & Jackson, 2012). The success of PMTCT in South Africa may be seen in the reduced number of infant, younger than five years and maternal mortality rates. In 2011, infant mortality rates decreased from 40 to 30 deaths per 1000 live births; younger than five years mortality rates decreased from 56/1000 live births in 2009 to 42/1000 live births (a 25% reduction); maternal mortality decreased from 188.9/100 000 in 2009 to 156.5/100 000 (a 17% reduction) (Pillay et al., 2014).

In other resource-limited settings in SSA such as Ghana, HIV transmission from mother to child has decreased from 31% in 2009, to 9% in 2012 (UNAIDS, 2013). These results indicate major successes in implementing large scale preventative interventions amongst persons living with HIV in these settings.

Paediatric ART

Since the approval of the first drug, Zidovudine (also known as, Azidothymidine [AZT]), to treat HIV in 1987 and the availability of highly active antiretroviral therapy (HAART) in the 1990's (Sepkowitz, 2001), ART has averted close to 8 million early deaths globally, with 5 million deaths averted in SSA alone (UNAIDS, 2014). Evidently, the

introduction and availability of ART has transformed a once fatal illness into a chronic and manageable illness (Mofenson & Cotton, 2013; Nischal, Khopkar, & Saple, 2005). ART has shown to slow down and delay the progression to AIDS (Jordan, Gold, Cummins, & Hyde, 2002), and increase life expectancy (Mills et al., 2011). In addition to improving the lifespan and overall health of people living with HIV (PLWH), ART has also markedly reduced the rates of HIV transmission to uninfected individuals (Cohen, 2011; Tanser, Bärnighausen, Grapsa, Zaidi, & Newell, 2013).

Following protracted delays for political reasons, the national roll-out of ART in South Africa occurred at the end of 2003 (Rohleder, Swartz, Kalichman, & Simbayi, 2009). Since then, ART provision has continued to expand and by mid-2014 the Department of Health was providing ART to more than 2.6 million PLWH (Department of Health South Africa, 2014).

Compared to adults (37% global ART coverage), ART coverage among children still remains unacceptably low (UNAIDS, 2014). Worldwide, an estimated 630 000 children aged 15 years and younger were receiving ART in 2012, of which an estimated 544 000 (86%) were residing in SSA, suggesting a meagre 23% global coverage (UNAIDS, 2014). In 2013, an estimated 44% (156 706) of children eligible for treatment (0-14 years) living with HIV in South Africa were receiving ART (UNAIDS, 2014).

Low coverage of ART amongst children persists due to poor awareness of the disease and socio-economic barriers (Meyers et al., 2007; Yeap et al., 2010). In the absence of timely initiation on ART, evidence suggests that at least a third of children will die before they are 1 year old, and more than half will die before the age of 2 years (Newell et al., 2004). In the context of rapid disease progression, higher levels of co-morbidity with equally life threatening illnesses (such as tuberculosis (TB), malaria and malnutrition), and high mortality rates among untreated children younger than five years, current global and national

guidelines recommend immediate ART initiation for infected children younger than five years (Department of Health South Africa, 2014; WHO, 2014).

Paediatric adherence to ART

Near perfect levels of adherence (≥95%) to ART are necessary to ensure favourable treatment outcomes such as a suppressed viral load (VL), a CD4 count >500 cells/mm^3, slower disease progression, fewer opportunistic infections and decreased mortality rates (Bangsberg, Hecht, & Charlebois, 2000; Bangsberg et al., 2003). While perfect adherence to the regimen remains a priority, lower levels of adherence (<80%) have been associated with viral suppression among children on ART (Nyogea et al., 2015). Despite initial concerns that paediatric ART was not feasible for children living in resource-limited settings given their poorer access to healthcare (Dijk, Sutcliffe, & Munsanje, 2011), evidence shows that estimates of adherence rates in low- and middle-income (LMIC) countries (Vreeman, Wiehe, Pearce, & Nyandiko, 2008) are comparable and often higher than those in high-income countries (Simoni et al., 2007). However, in the absence of a gold standard to measure adherence, these estimates of adherence vary widely (Haberer et al., 2012).

Despite increasing reports of high adherence rates among children in SSA (Haberer et al., 2011; Nyogea et al., 2015; Olds, Kiwanuka, & Ware, 2015), these reports do not consistently predict viral suppression. Consequently, children can remain on failing regimens (i.e. regimens that no longer suppress viral replication in the blood) for prolonged periods of time, and this eventually causes drug resistance (Pillay et al., 2014). Drug resistance to treatment occurs when plasma concentrations of the ARV agents are no longer sufficient to inhibit the replication of the virus (Steele & Grauer, 2003; WHO, 2010).

In the context of limited ARV drug options available for adults and children in South Africa (Davies et al., 2011), adherence to first-line regimen is key to ensure optimal and prolonged benefits of treatment. Second-line regimens, although available, remains costly

and often difficult to access (Davies et al., 2011). Particular concern has been raised regarding developing resistance to second-line regimens in resource-limited settings, especially as monitoring of patient VLs is either sub-standard or absent (Davies et al., 2011; Fox, Ive, Long, Maskew, & Sanne, 2010; Lessells et al., 2014).

For young children, especially those younger than five years who rely on parental or non-parental caregivers to administer their medication to them daily, adherence becomes an even greater task to manage. Developmentally, a child's first five years of life are critical for acquiring fundamental cognitive, physical, emotional, and social capacity (Richter, 2004). For children the world over, these fundamental needs require careful attention and considerable commitment from a caregiver, as without these their development is likely to suffer. For children living with HIV (CLWH), the majority of whom reside in SSA in areas that are predominantly poverty stricken and under-resourced, meeting their very basic needs is a daily struggle and requires overwhelming commitment (Rochat, Mitchell, & Richter, 2008).

In addition to having to provide for children's most basic needs, caregivers of children younger than five years on ART have to integrate and manage complicated regimens into their daily lives. For example, in the absence of fixed dose combinations available to children younger than five years, caregivers of children in this age group are required to carefully and accurately measure and administer volumes of liquid drug formulations to children on ART twice a day (WHO, 2013). As children grow older and gain weight, the doses have to be adjusted and can change up to three times in the first year of ART (Department of Health South Africa, 2014). Moreover, some of the medications have special storage requirements and some are highly unpleasant and require creative strategies to mask their taste in order to aid administration (Department of Health South Africa, 2014).

The above-mentioned factors highlight several characteristics of paediatric ART that complicates adherence. In addition to regimen-related factors, factors related to the child-, caregiver-, healthcare system and cultural context influence paediatric adherence to ART and may be inhibitory (i.e. act as barriers) or facilitative (Biadgilign, Deribew, Amberbir, & Deribe, 2009; Fetzer et al., 2011; Olds et al., 2015). For example, child-related factors influencing adherence to ART include biological characteristics such as a lack of tolerance of the side effects of medication (Bikaako-Kajura et al., 2006; Van Dyke et al., 2002), regimen characteristics such as the poor palatability of certain drug formulations (Byrne, Honig, Jurgrau, Heffernan, & Donahue, 2002; Mukhtar-Yola, Adeleke, Gwarzo, & Ladan, 2006; Pontali, 2005), and psychosocial characteristics such as the influence of knowledge of HIV status on adherence to ART (Biadgilign et al., 2009; Bikaako-Kajura et al., 2006; Vreeman, Gramelspacher, Gisore, Scanlon, & Nyandiko, 2013). Similarly, caregivers may face psychosocial factors that affect adherence, such as depression and substance abuse (Jaspan, Mueller, Myer, Bekker, & Orrell, 2011). Caregiver forgetfulness (Chesney, 2003; Fetzer et al., 2011) and difficulty adjusting the regimen to their lifestyle routines (Hammami et al., 2004; Mills et al., 2006; Santer, Ring, Yardley, Geraghty, & Wyke, 2014) have also influenced ART adherence in children.

Healthcare system factors that negatively impact on adherence to ART include long waiting times at clinics and hospitals that may not be child-friendly (Coetzee, Kagee, & Vermeulen, 2011) and staff that are inadequately trained to treat HIV-infected children (Rochat et al., 2008). These factors, often referred to as structural barriers to adherence to ART, are the socio-economic, institutional, political, and cultural domains (Shriver, Everett, & Morin, 2000) that may influence the extent to which caregivers are able to follow a treatment regimen. Facilitative factors include health literacy among the caregivers (Ciampa et al., 2012; Howard et al., 2014; Yin et al., 2008), positive relationships with clinic

personnel, on-going counselling to caregivers on adherence (Biadgilign et al., 2009; Mills et al., 2006) and social support (Katz et al., 2013; Olds, Kiwanuka, Ware, et al., 2015).

Other structural barriers to adherence to ART are socio-economic problems in the household, such as a lack of money for food and transport (Coetzee et al., 2011; Hardon et al., 2007; Tuller et al., 2010), and a fear of stigma and discrimination following disclosure of the child's HIV status to others (Bhattacharya & Dubey, 2011; Biadgilign, Deribew, & Amberbir, 2011; Biadgilign et al., 2009; Fetzer et al., 2011). Unlike other chronic illnesses, HIV is uniquely challenged by the perceived stigma associated with the illness. Cultural factors include the influence of cultural norms (Wachira, Middlestadt, Vreeman, & Braitstein, 2012), religion (Park & Nachman, 2010) and traditional medicines on adherence to ART (Haberer & Mellins, 2009; Wasti, Simkhada, Randall, Freeman, & van Teijlingen, 2012).

Most of our knowledge regarding the barriers to and facilitators of paediatric adherence to ART has been obtained through quantitative studies (Haberer & Mellins, 2009; Simoni et al., 2007; Vreeman et al., 2008), the majority of which have been conducted in high-income countries (Simoni et al., 2007). Quantitative studies, however, have not been able to adequately explain the associations between various determinants of adherence. In addition, the associations are rarely found consistently across different settings and studies often include children across a wide age range.

A growing body of qualitative literature is beginning to contribute considerable and much-needed depth to the understanding of these factors that influence adherence in various contexts (Coetzee, Kagee, & Bland, 2015; Nyogea et al., 2015; Olds, Kiwanuka, Ware, et al., 2015; Santer et al., 2014). A good example of the problematic nature of identifying factors affecting adherence to ART in children via quantitative means alone was recently demonstrated in a mixed-method study among children (aged 2 – 19 years) on ART living in rural Tanzania (Nyogea et al., 2015). Based on data showing a strong positive association

between education level and non-adherence, Nyogea et al.(2015) have argued that secondary school-aged children (≥12 years) who only had primary level education or were still in primary school were more likely to be non-adherent to ART compared to those of secondary school-age (Nyogea et al., 2015). Given that half of these children lived with non-parental caregivers, Nyogea et al. (2015) have argued that a possible explanation for the finding was that non-parental caregivers were possibly providing less support to the children than parental caregivers. In contrast, qualitative findings showed that children attending school sometimes skipped morning doses when they were in a rush to leave for school, or when food was not prepared beforehand (Nyogea et al., 2015). The findings thus present different interpretations of the data, with qualitative data representing actual experiences.

A large proportion of the available qualitative data largely adopts interview and focus group methodologies to explore key stakeholder perspectives. While these methods may not be useful or appropriate with children younger than five years, observational methods have been useful among children in this age group (Rochat et al., 2008). Given the dynamic and changing contexts that many children infected and affected by HIV live in, a better understanding of treatment adherence within a child's particular context is necessary. Understanding the factors that affect adherence to ART will go a long way to designing interventions aimed at improving adherence. To my knowledge, at the time of writing, no study has observed and documented the barriers and facilitators associated with treatment administration of ART to children younger than five years by their caregivers in their homes during medication times in the morning and evening.

Problem statement and rationale

Paediatric adherence to ART may be conceptualized at two levels, namely adherence to the medication, and adherence to clinic appointments (Coetzee & Kagee, 2013). Thus, the success of ART for the treatment of HIV relies predominantly on optimal adherence to

treatment, which may be defined as daily medication taken as prescribed at the correct times with appropriate nutrition (Schönnesson, Diamond, Ross, Williams, & Bratt, 2006), as well as monthly clinic attendance to collect prescribed medication. For children younger than five years, caregivers are responsible for the measurement and administration of medication doses to children and attendance of monthly clinic visits to collect prescribed medication. Failure to adhere to the regimen as prescribed may lead to high VLs, immune suppression and ultimately drug resistance (Pillay et al., 2014). Acquired drug resistance to ART is prevalent amongst children in South Africa (Davies et al., 2011; Pillay et al., 2014), and poor adherence to the dosing regimen by caregivers is associated with this problem.

Study aim and objectives

The aim of this study was to explore the barriers to and facilitators of adherence to ART among young children (younger than five years) who rely on caregiver administration of ART in rural KwaZulu-Natal. The study triangulated interview and focus group data from the perspectives of doctors, nurses, adherence counsellors, caregivers and traditional healers with observational data of treatment administration practices by caregivers to children on ART. The objectives of the study were:

1. to explore caregivers', doctors', nurses', HIV counsellors', and traditional healers' perspectives on the barriers and facilitators to the administration of medication to children younger than five years by their caregivers (Phase 1: Interviews and focus groups);

2. to observe and document what information caregivers received during their routine adherence counselling sessions at their monthly clinic visits (Phase 2: Direct observation);

3. to directly observe and document the administration of medication to children younger than five years by their caregivers (Phase 2: Direct observation).

General positioning in the Social Sciences

This dissertation is located within the interpretivist paradigm (Creswell, 2013). The research sought to understand the underlying phenomenon in context, with the researcher adopting an empathic manner that prioritizes the subjective experiences of those involved (Blanche, Durrheim, & Painter, 2006). Such information is adequately captured through qualitative research, which is flexible in nature and concerned with understanding a particular phenomenon from multiple interpretations and meanings (Creswell, 2013). An interpretivist paradigm will allow an in-depth understanding of the context in which paediatric adherence to ART occurs through various interpretations of the behaviours and circumstances that influence it.

Theoretical framework

Ecological theories of health

This study was conceptualized, interpreted and understood through the lens of EST as laid out by Urie Bronfenbrenner in 1979. Ecological theories of health, like EST, consider individual as well as environmental (contextual) factors when trying to understand or when examining a target behaviour. Several ecological theories of health have been put forward by various authors. Some of these theories (e.g. Ecological Psychology (Lewin, 1951), Social Ecology (Moos, 1979) and EST (Bronfenbrenner, 1979)) were specifically designed to explain health behaviours (Glanz, Rimer, & Viswanath, 2008), while others, for example the Operant Learning Theory (Skinner, 1953), Social Ecology Model for Health Promotion (Stokols, 1992), and the Ecological Model of Health Behaviour (McLeroy, Bibeau, Steckler, & Glanz, 1988) were specifically designed to guide behavioural interventions (Glanz et al., 2008). Thus, unlike individual theories (described below), ecological theories consider multiple levels of influence on individual health behaviour (Glanz et al., 2008; Grzywacz & Fuqua, 2000; Vreeman et al., 2009). By giving explicit consideration to multiple levels of

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influence, ecological models help guide more comprehensive interventions (Glanz et al., 2008).

Bronfenbrenner's Ecological Systems Theory (EST)

Bronfenbrenner (1979) put forward the EST in his work titled 'The Ecology of Human Development' in 1979 and theorized that the socio-ecological environment played an important role in the psychological and social aspects of human development.

The ecological environment is made up of four levels of interrelated systems, represented as concentric circles in his model, where all of the systems interact with one another. Bronfenbrenner describes levels of context in his model, which situates a child at the centre of the model nested inside each of the other levels (Figure 1.1). He refers to each of these levels as the micro-, meso-, exo- and macrosystems.
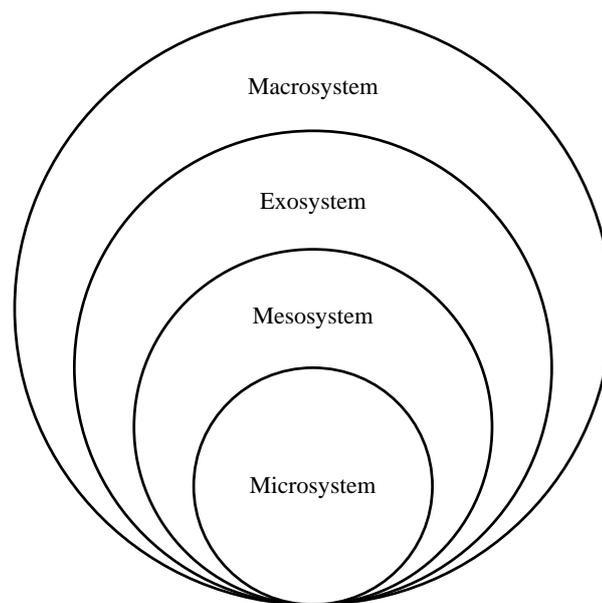
Figure 1.1. The four systems of Bronfenbrenner's EST

The microsystem is at the centre of all the levels and is also the level where the child is embedded. The microsystem demonstrates the environment in which a child lives and moves, like for instance the interactions children have with their immediate surroundings. Occupying the microsystem alongside the child are immediate family members, and depending on the age of the child, also school teachers and peers. A very young child will

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have a smaller number of microsystems (Bronfenbrenner, 1979). The microsystem thus represents the most important setting in which a child develops, as this is where the child is likely to spend most of his/her time. In the context of this research study and a child younger than five years, the microsystems include the caregiver(s) and any other person(s) responsible for direct care and treatment of the child.

The microsystem is nested within the mesosystem level. The mesosystem refers to the interactions that occur between the members of the microsystem, so the child is not directly involved in this level. Interactions may therefore occur between parents and childcare providers or between neighbours (Bronfenbrenner, 1979).

The mesosystem is nested within the exosystem. The exosystem demonstrates the broader context or community in which a child lives. These contexts include extended family and family networks, media, workplaces, family friends, and community health services, legal and social welfare. Although the child has no direct contact with any of the exosystems, these systems may affect the development and socialization of the child.

The outermost level, the macrosystem, contains the attitudes, ideologies, values, laws and customs of a particular culture or subculture. Bronfenbrenner's theory is a suitable lens through which to both design and interpret this research as we consider adherence to ART behaviours of a child younger than five years as nested within a complex environment predominantly overseen by a primary caregiver.

Bronfenbrenner's EST (1979) has been used as a framework for understanding factors influencing adherence to ART in both the adult (Coetzee et al., 2011; Kagee, Nothling, & Coetzee, 2012) and paediatric HIV literature (Coetzee et al., 2015; Naar-King et al., 2006; Vreeman et al., 2009). For example in the literature on adults, EST has been used to understand and contextualize structural barriers to adherence to ART among adults in South Africa (Coetzee et al., 2011). In their study, Coetzee et al. (2011) have sought to identify the

structural barriers to adherence to adult ART users attending a peri-urban primary healthcare facility in South Africa from the perspectives of patients' healthcare providers (doctors and nurses). Using EST, the authors have argued that at an individual level, disclosure to members within patients' microsystem facilitated adherence through the social support gains that disclosure offered. However, fear of stigma and discrimination prohibited many ART users from disclosing. Lack of disclosure to members within their microsystem impeded patients' ability to access healthcare, thereby disrupting their interactions with healthcare providers (mesosystem). Coetzee et al. (2011) have also argued that disruptions in the microsystem are likely to have a cascading effect throughout the meso-, exo- and macrosystem.

In a seminal qualitative study by Vreeman et al. (2009) the authors have provided a conceptual model for understanding childcare amongst HIV-infected children in Western Kenya (Vreeman et al., 2009). The researchers drew on Bronfenbrenner's EST (1979), as well as further interpretations of Bronfenbrenner's model by Grzywacz and Fuqua (2000) and Moos (1979, 2003). Vreeman et al. (2009) have stated that, "Pediatric adherence could not be conceptualized as primarily an individual behavior, or even a child–caregiver behavior, but was best understood as a set of behaviors crucially influenced by the many integrated factors that defined the context in which adherence-related behaviors occurred" (Vreeman et al., 2009 p. 1724).

As with Bronfenbrenner's model, Vreeman et al. (2009) have placed the child at the centre of the nested arrangement, with parents/caregivers and household factors situated at the next level, followed by community factors at the level after that, ethnic group factors at the next level and healthcare system related factors at the outmost level. Vreeman et al. (2009) have found that optimal adherence relied on the successful integration of the various domains by means of ongoing information-sharing between key role players. Conversely, a

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failure to maintain the dynamic process of information-sharing was likely to disrupt the care domains and limit access to a supportive culture and context necessary for optimal adherence.

The authors have argued that other theories (such as the Health Belief Model (HBM) and the Children's Health Belief Model (CHBM)), "did not adequately conceptualize the importance of cohesively integrating multiple cultural factors, the dynamic process of information sharing and response, and the developmental continuum central to pediatrics that emerged from the shared experiences of our interview participants" (Vreeman et al., 2009 p 1724-1725).

Criticisms. Ecological health models, like EST, have largely been criticized for lacking specificity about those influences hypothesized to be most central to a specific behaviour. In addition, even those ecological models that are behaviour-specific have been criticized for not adequately addressing how the broader environmental levels operate, interact and influence factors across the different levels. Individuals level theories thus become useful for identifying and specifying salient factors at each level and how they influence behaviour (Glanz et al., 2008).

Individual level theories

The theories listed and described in the table below (Table 1.1) are known as individual level theories of adherence (Munro, Lewin, Swart, & Volmink, 2007). Although all of them are supported empirically across various populations, the most important criticism of each of these theories is that the focus is predominantly on the individual with little consideration of the environmental, social and contextual factors that influence adherence behaviour. These theories have been somewhat useful in paediatric intervention designs aimed at improving adherence (Mbuagbaw et al., 2015).

Since I did not measure adherence as an outcome and rather explored the complex interacting factors that contribute to poor adherence, the theories were of limited applicability

in this study. However, I used concepts associated with the Information-Motivation-Behavioural Skills Model (IMB) by Fisher, Fisher, Amico, and Harman (2006) to discuss and explain specific observed behaviours in Phase 2 of this study (Fisher, Fisher, Amico, & Harman, 2006). The table is based on information obtained from Rapoff (2010) and Munro et al. (2007). Rapoff (2010) has provided a description, critical appraisal, and a discussion of the clinical implications of the adherence theories in the paediatric chronic disease literature (Rapoff, 2010). Munro et al. (2007) have provided a review article on health behaviours and have determined their usefulness for developing interventions specific to long term medication adherence for the treatment of TB and HIV/AIDS. The table is not exhaustive of all the theories and models that are currently used to describe and predict behaviour change in adherence research, but it presents the main theories. Among the theories presented, only the CHBM has been tailored to some extent to consider multiple key role players as would be needed in the case of paediatric adherence. Amongst children residing in LMIC, where multiple female caregivers is usually the norm, consideration of multiple levels of influence is needed to accurately depict factors influencing adherence behaviours.

Table 1.1

Individual level adherence theories

Theory	Author(s)	Description	Key elements of the theory
HBM/CHBM	(Bush & Iannotti, 1990; Janz & Becker, 1984)	The model posits that the extent to which a person perceives a disease as a threat is determined by the perceived susceptibility to or seriousness of the disease. Internal and external cues (triggers) and perceived barriers influence the degree to which the threat is perceived. CHBM is similar to HBM, but includes the caregivers' beliefs of the benefits of treatment adherence.	The theory identifies six elements to explain and predict adherence: 1) Perceived susceptibility: refers to the beliefs held by an individual about the prospect of being susceptible to an illness. 2) Perceived severity: refers to a person's assessment of the consequences of contracting an illness, or of not taking or receiving treatment. Perceived susceptibility and perceived severity are collectively known as perceived threat. 3) Perceived benefits: the beliefs held by the person that taking the recommended treatment or health action will be beneficial. 4) Perceived barriers: the perceived factors that may influence the extent to which the person is able to adhere to recommended treatments or health actions. The barriers and facilitators of taking treatment or taking a particular health action are usually weighed up against one another. 5) Cues to action: refers to triggers such as the onset of symptoms or encouragement by others to seek treatment. 6) Self-efficacy: The HBM also incorporates concepts such as self-efficacy to describe the extent to which the persons believe that they are able to adhere to the recommended treatment or health action.

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Table 1.1 *(continued)*

Theory	Author(s)	Description	Key elements of the theory
Social cognitive theory (SCT)	(Bandura, 1989)	Also referred to as self-efficacy theory. It emphasizes the social nature of learning and knowledge acquisition through observation. The SCT model considers behavioural, interpersonal and environmental factors as key determinants of human agency, of which perceived self-efficacy, especially in the context of medication adherence, is considered a key aspect. The theory thus posits that behaviour change will occur when the individual believes they have control over the outcome, experience few barriers and have a strong belief in their ability to perform the desired behaviour.	Key organizing principle: reciprocal determinism – continuous dynamic interaction between the person and the environment. Perceived self-efficacy: belief in your own ability to accomplish a task or behaviour through enactive mastery, vicarious experience, verbal persuasion, physical and emotional states. Outcome expectancies: judgements of the possible consequences on one's actions.

Table 1.1 *(continued)*

Theory	Author(s)	Description	Key elements of the theory
Theory of reasoned action/planned behaviour (TRA/TPB)	(Fishbein & Ajzen, 1975)	TRA/TPB developed to understand why attitudinal measures inaccurately predicted behaviour. The TRA was also used to determine ways to improve the predictive ability of the measures. The theory posits that in order for an individual to engage in a certain action or behaviour there has to be sufficient intention to perform the behaviour. The intention is influenced by the individual's attitude towards the behaviour, subjective norms, the individual's perceived behavioural control.	The theory identifies four elements needed to improve the ability of attitudinal measures to predict behavioural outcomes using attitudinal measures: 1. The measure should contain the action or behaviour that has to be executed. 2. The measure should contain the target at which the behaviour is directed. 3. The measure should contain the context or situation. 4. The measure should contain the time frame. Behavioural intention refers to the perceived likelihood that the individual will perform the desired behaviour. Attitude toward behaviour refers to the behavioural beliefs and evaluation of behavioural outcomes (opinions about the behaviour and consequences of performing the behaviour). Subjective norms include normative beliefs and motivation to comply (whether important members in their lives approve or disapprove of the behaviour - whether motivated to meet their expectations). Perceived behavioural control refers to control beliefs, perceived power (belief in performing the behaviour and the outcome of performing the behaviour).

Table 1.1 *(continued)*

Theory	Author(s)	Description	Key elements of the theory
Transtheoretical model (TTM)	(Prochaska, 1979)	Focuses on intentional change. The theory posits that individuals go through various stages and processes in order to bring about behavioural change.	The theory states that two dimensions are necessary for intentional change: 1) progression through stages of change and 2) processes of change (i.e. strategies undertaken by individuals to make the behavioural change. 1) Stages of change: There are 5 stages through which an individual progresses when changing a particular health behaviour. 1. Precontemplation stage: no immediate intention to change. 2. Contemplation stage: intention to change. 3. Preparation stage: immediate intention to change. 4. Action stage: visible lifestyle changes made. 5. Maintenance stage: strategies undertaken to avoid relapse. 2) Processes of change: 1. Decisional balance: weighing-up of pro's and con's. 2. Self-efficacy: confidence to cope with and prevent the intensity of urges to relapse.

Table 1.1 *(continued)*

Theory	Author(s)	Description	Key elements of the theory
Information–Motivation–Behavioural Skills Model (IMB)	(Fisher et al., 2006)	The theory posits that behaviour change is dependent on information, motivation and behaviour skills. The model specifies causal relationships between determinants of adherence. Thus, adherence to medication is reliant on sufficient information about adherence, motivation to adhere and behavioural skills to perform the necessary tasks. Positive health outcomes reinforce the individual's motivation and acts as a positive feedback loop. Moderating factors (psychological ill health, unstable living condition, poor access to medical services etc.) affect adherence behaviour and health outcomes.	The theory identifies three components that result in behaviour change: 1. Information: basic knowledge about HIV and adherence that is accurate and facilitates adherence - necessary for consistent and correct use of ART. 2. Motivation: motivation to adhere is based on personal (own attitude towards ART, and beliefs about outcome) and social motivation (social support from significant others) to adhere.3. Behaviour skills: objective abilities and perceived self-efficacy to perform adherence-related tasks.

Chapter conclusion

Infants and young children receiving ART in resource-limited settings such as South Africa are uniquely challenged by the complex array of factors that influence their adherence to treatment. This research sought to gather information-rich data from children and key members in their microsystems (caregivers, doctors, nurses, counsellors and traditional healers) in order to conceptualize and understand how these factors contribute to poor adherence. Following this chapter is the literature review, which provides a lens through which the findings could be understood and interpreted.

Thesis layout

Chapter 2 presents the literature review. The review summarizes and synthesizes the literature related to the barriers and facilitators associated with adherence to paediatric ART.

Chapter 3 describes the research context and provides information on the study location and the HIV programme. The chapter also gives a methodological overview of the research.

Chapter 4 describes the methods and data analysis approach used during Phase 1 of this research.

Chapter 5 offers the results of Phase 1. The results reflect several themes emanating from the thematic analytic approach employed during the analysis.

Chapter 6 presents a discussion of the results presented in Chapter 5. The chapter also contains the strengths and limitations of this research.

Chapter 7 describes the methods used during Phase 2 of this research.

Chapter 8 presents the results of Phase 2. The results provide data on the participant and household characteristics, counselling and household observations. The chapter concludes with an overview of the main findings.

Chapter 9 offers a discussion of the results presented in Chapter 8. The chapter also contains the strengths and limitations of this research.

Chapter 10 presents the research conclusions. The chapter describes the implications of this research and makes recommendations for the future research.

CHAPTER 2

Literature review

Introduction

The literature review aims to summarize and synthesize the literature related to the barriers and facilitators associated with adherence to paediatric ART. The review process drew on an ecological approach (Bronfenbrenner, 1979), situating the child at the centre of a complex and dynamic set of systems that influence adherence to ART. First, I provide an overview of the search strategy. Second, I provide definitions of adherence and highlight various components that are necessary for optimal adherence. Third, I provide the current estimates of the rates of paediatric adherence across settings and emphasize their variability in the absence of a gold standard. Fourth, I provide a review of the factors influencing paediatric adherence to ART. Fifth, I provide evidence on interventions that have aimed to improve adherence to ART. Last, I identify the gaps in knowledge.

Literature search strategy

The title of this thesis, research question and sub-questions formed the key terminology and search strings that I used to gather and review the evidence and theory for this thesis. I searched Scopus, Academic Search Premier (Ebscohost), Web of Science, PubMed, Google Scholar, PsycInfo and Medline. Further, I searched the Cochrane Library for systematic reviews and meta-analyses involving paediatric adherence rates to ART. I also searched grey literature, including unpublished masters and doctoral dissertations using World Cat. I used a combination of separate search strings (Search 1 to Search 4 as seen below) to locate the literature on this topic. In addition, I surveyed and obtained references from the reference lists of articles considered of particular importance to the literature review.

Search 1: (paediatric OR pediatric) AND (adherence OR compliance) AND (medication) AND (chronic)

Search 2: (barrier*) AND (adherence) AND (antiretroviral*) AND (HIV OR AIDS)

AND (paediatric OR pediatric) AND (high-income) AND (low-income)

Search 3: (facilitator*) AND (adherence) AND (antiretroviral*) AND (HIV OR AIDS)

AND (paediatric OR pediatric) AND (high-income) AND (low-income)

Search 4: (paediatric OR pediatric) AND (adherence OR compliance) AND

(medication) AND (chronic) AND (caregiver*)

I organized the review of the literature thematically (Mouton, 2001) and in keeping

with the overarching theoretical framework. The literature review subsequently considers

paediatric adherence on a micro-, meso-, exo- and macrolevel.

Definitions of adherence

The most widely used and quoted definition of adherence to medication in the

literature states that adherence is, ". . . the extent to which a person's behaviour (in terms of

taking medications, following diets, or executing lifestyle changes) coincides with medical or

health advice" (Haynes, 1979, pp. 1–2).

Rapoff (2010) has provided three reasons why this definition is preferred over others.

Firstly, the definition is preferred to others as it specifies the behaviours necessary to satisfy

regimen requirements. Secondly, the word "extent" conveys that there are various factors that

contribute to non-adherence and that it is not a unidimensional phenomenon. Lastly, the

definition also brings into focus the degree to which patient behaviour coincides with the

recommendations from the clinician, in other words whether patients are taking the

medication in the way it has been prescribed to them (Rapoff, 2010).

The World Health Organization (WHO) has offered a similar definition of adherence

and defines it as, "the extent to which a person's behaviour – taking medication, following a

diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a

healthcare provider" (WHO, 2003, pp. 3–4). Rapoff (2010) has stated that this definition

captures all the elements of the Haynes definition, but has added "agreed recommendations", which suggests that patients consent to, and agree with, the regimen as prescribed. Similarly, Nunes et al., (2009) have defined adherence as, "the extent to which the patients behaviour matches agreed recommendations from the prescriber" (Nunes et al., 2009, pp 367).

Patients are therefore expected to adhere to dose, schedule and dietary aspects of adherence (Nilsson Schönnesson et al., 2006), as agreed to in consultation with their prescriber. Nilsson Schönnesson et al. (2006) have proposed definitions of dose, schedule and dietary adherence. Dose adherence refers to the quantity of a drug or medicine that is taken as recommended or prescribed (by a clinician) at a particular time daily (Nilsson Schönnesson et al., 2006). In the context of HIV and ART, dose adherence refers to taking the correct number of ARV pills (or liquid formulations), as recommended or prescribed, at a single time. In the context of adherence to ART, schedule adherence refers to taking the correct number of pills at the correct time every day. According to the South African Department of Health (2004), ARVs are meant to be taken at strict twelve-hour intervals (e.g. at 7am in the morning and at 7pm in the evening) (Department of Health South Africa, 2004). For adults, dose and schedule adherence usually requires taking a single dose of medication, or a combination of pills, once daily. However, dose and schedule adherence in infants and young children is more complicated as they ordinarily receive a combination of three liquid antiretroviral preparations, each requiring specific measurements and accuracy (Department of Health South Africa, 2004). For example, for a young child in South Africa weighing between 5kg and 7kg and on triple combination regimen consisting of Abacavir (ABC), Lamuvidine (3TC) and Lopinavir/ritonavir (LPV/r), a typical prescription would be: 3ml of ABC + 3ml 3TC + 1.5ml LPV/r (Department of Health South Africa, 2013b). Each of these medications should be accurately measured by a caregiver and administered to the child. A description of the

ART available for infants and young children in South Africa is provided in Chapter 3 (section: ART for infants and young children).

Dietary adherence describes doses taken correctly with food (if food is required) (Nilsson Schönnesson et al., 2006). Although several of the medications can be taken with or without food, some of the liquid formulations administered to young children have to be administered on an empty stomach (e.g. for children older than three years, Didanosine must be taken alone, on an empty stomach, at least half an hour before (or 2 hours after) a meal), (Department of Health South Africa, 2004). Other formulation requirements include refrigeration. It is recommended that LPV/r and d4T (in oral solution) be kept in a fridge or stored at room temperature (25°C) for a maximum of 6 weeks (Department of Health South Africa, 2013b).

The definitions above emphasize a patient-provider, as well as family-centred approach to adherence. These aspects of adherence (dose-, schedule- and dietary adherence) are especially important for adherence in children, where regimen requirements may be shared amongst several people that may be involved in the treatment and care of the child (Haberer & Mellins, 2009).

To achieve optimal results from ART, all of these aspects of adherence have to be satisfied (Nilsson Schönnesson et al., 2006). In the case of paediatric adherence, dose, schedule, and dietary adherence are chiefly the responsibility of the primary caregiver. In most cases, caregivers are directly responsible for the administration of medication doses and reporting of doses to clinicians at monthly clinic visits. Moreover, as explained by De Civita and Dobkin (2004), adherence to paediatric ART involves a 'triadic partnership' (De Civita & Dobkin, 2004, p.571), which involves constant and meaningful engagement between the caregiver, the healthcare team, and the child. In the context of a triadic partnership, non-

adherence is then likely to occur when either party in the partnership is unable to fulfil the requirements necessary to adhere to the regimen, whether intentionally or unintentionally.

Bauman (2000) has distinguished between volitional and inadvertent nonadherence. Volitional nonadherence refers to the consistent decision made by the patient (or in this case caregiver) to not administer medication to the child, despite a clear understanding of the regimen as prescribed to them by their health provider (Bauman, 2000). The decision is likely due to conflicting ideas of the goals of therapy, the intrusion of therapy on daily life, or the differences between patient and provider in health beliefs. Inadvertent nonadherence refers to patients (or in this instance caregivers) that make the decision to administer the medication, as they are accepting of their providers' instructions and are convinced that they are doing so satisfactorily, but are not in fact sufficiently adherent. According to Bauman (2000), inadvertent nonadherence is likely due to caregivers' poor understanding of the regimen, an inability to overcome the number of barriers they face with the regimen despite being highly motivated to adhere optimally, and caregivers who miss doses but still feel that they are sufficiently adherent to the regimen (Bauman, 2000).

Estimating paediatric adherence rates in the absence of a gold standard

Much like the estimates of adherence amongst adult ART users globally (Mills et al., 2006, 2011), estimates of adherence from literature on paediatric patients (Simoni et al., 2007; Vreeman, Wiehe, Ayaya, Musick, & Nyandiko, 2008) suggest that it is sub-optimal. Simoni et al. (2007) have reviewed 50 research articles on paediatric adherence to ART, of which the majority were purely descriptive in nature. Thirty-two of the articles provided adherence estimates, with a large proportion of the studies (69%) providing adherence rates from research conducted in the United States. Estimating adherence across these studies was challenging due to wide ranges in sample size (ranging from 10 to 262 participants), patient age (ranging from three months to 24 years old), various methods of adherence assessment

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(pill counts, self-reports, pharmacy refill etc.), and differences in assessment intervals (ranged from one day to one year) (Simoni et al., 2007).

Based on the small number of studies included in the review and the aforementioned factors, Simoni et al. (2007) have been unable to provide a global estimate of adherence. The adherence rates provided were grouped according to method of assessment, with the most widely used method of assessment being self- and caregiver report. Estimates of adherence ranged widely across, as well as within, similar methods of assessment. For example, self-reported data on adherence showed that 20% to 58% of respondents reported 100% adherence. Similarly, data from caregiver reports of adherence showed that 34% to 100% of caregivers reported 100% adherence. Studies that used more than one method of assessment allowed for a better suited comparison as multiple methods controlled for the effects of sample size (Simoni et al., 2007).

Vreeman et al. (2008) have also provided a systematic review of paediatric adherence to ART and showed that estimated adherence rates among children in developing countries ranged between 45% and 100 %, with estimates averaging at around 75%. Both reviews on paediatric adherence to ART have been unable to provide pooled estimates of adherence due to the variable definitions, in other words whether patients needed to take their medications as prescribed more than 85%, or 90%, or 95% or 100% of the time. Furthermore, pooled estimates of adherence were limited by broad ranges in recall periods for estimating adherence using self-report measures, in other words whether patients had taken their drugs (based on the percentage level required) in the past three days, in the past week, or within the past year (Simoni et al., 2006, 2007; Vreeman, Wiehe, Pearce, et al., 2008).

With no available gold standard for ART adherence (Haberer et al., 2012; Vreeman, Nyandiko, & Liu, 2015), several subjective and objective measures exist to measure medication adherence amongst adults and children on chronic and acute medication regimens

(Rapoff, 2010). Adherence measures may be categorized into either direct methods or indirect methods (Osterberg & Blaschke, 2005; Reda & Biadgilign, 2012). Table 2.1 summarizes the available direct and indirect methods to measure adherence to ART. In the section following the table, a description of each of the methods is given.

Table 2.1

Direct and Indirect Measures of Paediatric Adherence to ART

Method	Measure
Direct methods	
	Biological markers
	Body fluid assays
Indirect methods	
Primary outcome measures	
	Caregiver self-report
	Pill counts/ volume measure
	Pharmacy re-fill records
	Clinic attendance records
	Electronic drug monitoring (EDM)
Secondary outcome measures	
	Clinical response assessment (VL, CD4 lymphocyte count)
	Physiological markers (Drug monitoring in hair, Resistance testing)

Direct methods. *Biological markers and body fluid assays.* Direct methods make use of laboratory tests to measure the amount of drug metabolite present in urine or blood using biological assays, and are also able to measure the amount of drug available in the blood by detecting biological markers associated with the different formulations (Osterberg & Blaschke, 2005). Laboratory tests such as these are expensive and require sophisticated laboratory infrastructure, but are also highly prone to confounding when patients take their medications shortly before a scheduled clinic visit (Osterberg & Blaschke, 2005). Furthermore, given the uncertainty of paediatric ARV pharmacokinetics, direct methods such

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as plasma drug levels have seldom been used as a measure of adherence in children globally (Bain-Brickley, Butler, Kennedy, & Rutherford, 2011).

In a recent study by Vreeman et al. (2014), the authors used EDM (in the form of the Medication Events Monitoring System (MEMS)), caregiver reports and blood drug concentration levels of Nevirapine (NVP) and Efavirenz (EFV) to assess adherence rates among 191 children with a mean age of 8.2 years at baseline. Plasma drug concentrations of NVP and EFV were dichotomized as 'adherent' when therapeutic (NVP 3.0–7.6 micrograms/millilitre [µg/mL] or EFV 1.0–4.0 µg/mL) and supra-therapeutic (NVP >7.6 µg/mL or EFV >4.0 µg/mL) drug levels were observed, and as 'non-adherent' when sub-therapeutic (NVP <3.0 µg/mL or EFV <1.0 µg/mL) levels were observed. MEMS adherence was estimated using the percentage of doses (NVP/EFV) returned and dichotomized as 'adherent' if more than 90% doses were taken, and 'non-adherent' if fewer than 90% of doses were taken over a one-month period. Using Kappa statistics to compare adherence estimates across the adherence measures, plasma drug concentrations of NVP and EFV showed poor agreement (Kappa statistics 0.04–0.37) with MEMS data (Vreeman et al., 2014).

One of the explanations for this finding was that the MEMS data represented a calculation of adherence across a one-month period, whereas drug concentrations only reflected adherence within the past hours or days of the medication being taken. The authors have stated that drug correlations were likely to have a higher correlation with MEMS data if MEMS calculations were restricted to doses taken within the past 2 to 3 days (Vreeman et al., 2014).

Indirect methods. Indirect measures include caregiver self-report questionnaires, clinical response assessments (VL monitoring, CD4 lymphocyte count monitoring), physiological markers (drug monitoring in hair, resistance testing), pill counts, pharmacy refill records, clinic attendance and EDM.

Caregiver self-report. Among the paediatric population, caregiver self-report is the predominant measure used to estimate adherence (Arage, Tessema, & Kassa, 2014; Bain-Brickley et al., 2011; Buchanan & Montepiedra, 2012; Müller et al., 2011; Teasdale et al., 2013; Usitalo et al., 2014). Caregiver self-report measures usually require caregivers to recall the number of doses administered in a specified time bracket (e.g. in the past week). In a recent study by Arage et al. (2014), adherence rates were estimated via caregiver self-report of children (mean age 9.4 years) attending hospitals in North-East Ethiopia. The authors collected data from 440 caregivers using face-to-face structured interviews. Caregivers reported adherence rates of 78.6% in the month prior to the structured interview (Arage et al., 2014). These adherence rates are comparable to other LMIC countries in Africa (Azmeraw & Wasie, 2012) and Vietnam (Do, Dunne, Kato, Pham, & Nguyen, 2013).

Despite the cost-effectiveness and reporting ease associated with self-report measures, estimates of adherence using caregiver self-report compared to other adherence indicators such as VL and CD4 count are inconsistent in the literature, with self-reports erring on overestimating adherence as a consequence of over-reporting, recall problems, as well as social desirability bias, in high, as well as LMIC. Consequently, researchers have tried to statistically validate self-report questionnaires against other indirect methods considered to be more objective measures (such as EDM) (Allison et al., 2010; Berg & Arnsten, 2006; Chalker et al., 2010; Davies, Boulle, Fakir, Nuttall, & Eley, 2008; Mellins, Brackis-Cott, Dolezal, & Abrams, 2004; Naar-King, Frey, Harris, & Arfken, 2005; Vreeman et al., 2015; Wagner & Miller, 2004).

Vreeman et al. (2015) are amongst the first authors to evaluate caregiver self-report against EDM in a resource-limited setting in a paediatric population. These authors developed a 48-item adherence questionnaire that includes items assessing missed doses by recall in the past 3, 7 and 30 days, as well as by visual analogue scale (VAS). The

questionnaire also includes items pertaining to barriers to adherence and household characteristics. MEMS adherence was dichotomized as either >90% or <90%. Children (aged new-born to 14 years) and caregivers were followed over a period of 6 months and caregivers completed the self-report measure every month. One hundred and ninety one caregivers completed the adherence measure (seven times each). Using a novel method for variable selection (the Least Absolute Shrinkage and Selection Operator (LASSO) (Meier et al., 2008)), the authors identified nine items that best predicted adherence and corresponded with MEMS adherence data (>90%) (Vreeman et al., 2015). The adherence questionnaire items are shown in Table 2.2 below.

Table 2.2

Nine item adherence questionnaire developed by Vreeman et al. (2015)

1	Ever have problems keeping time with the medicines
2	Currently enrolled in AMPATH nutrition programme
3	Ever have problems getting child to take medicines
4	How many doses of medicine has child missed in last month
5	Child-level factors make it difficult to give medicines
6	Caregiver-level factors make it difficult to give medicines
7	Number of days missed at least one dose in past week
8	Number of days dose given more than one hour late in past week
9	Number of extra doses in past week

Clinical response assessments (VL monitoring, CD4 lymphocyte count monitoring).

Clinical response assessments consist of VL monitoring and CD4 counts. In the research literature, these assessments are usually secondary outcome measures of adherence and are used alongside other indirect methods, such as caregiver self-report to estimate adherence rates (Simoni et al., 2007). In the context of resource-limited settings, VL monitoring alongside patient self-report is considered the best predictor of long-term adherence (Nieuwkerk & Oort, 2005; Vreeman et al., 2015). However, VL testing is not available everywhere, and thus many resource-limited countries still rely on indirect methods,

especially self-report measures (Haberer et al., 2012; Vreeman, Wiehe, Pearce, et al., 2008; Vreeman et al., 2014). In the absence of VL testing, self-report and pill counts have shown to correlate well with objective measures such as EDM (Haberer et al., 2012; Van Dyke et al., 2002).

   Physiological markers (drug monitoring in hair). Although not commonly used to assess adherence to ART in paediatric populations, assessing ARV drug levels using hair is considered a promising new approach to measuring adherence (Olds, Kiwanuka, Nansera, et al., 2015; Prasitsuebsai et al., 2015). The method reflects adherence levels over longer periods of time (weeks to months), is easy to collect and store, and correlates with drug levels in plasma and VL suppression (Gandhi et al., 2013; Olds, Kiwanuka, Nansera, et al., 2015; Prasitsuebsai et al., 2015). Given the cultural significance of hair among certain cultural groups, more evidence is needed to inform its use as a drug level testing application across different cultural contexts (Coetzee, Kagee, Tomlinson, Warnich, & Ikediobi, 2012).

   Pill counts/liquid formulation weights. Pill counts offer an estimation of adherence based on counting the number of pills or measuring/weighing the amount of liquid returned at each clinical follow-up visit compared to the amount previously prescribed (Chalker et al., 2010; Haberer et al., 2012; Ross-Degnan et al., 2010). Studies estimating paediatric adherence rates using pill counts have shown high rates (>80%) of adherence to ART (Bagenda et al., 2011; Eticha & Berhane, 2014; Haberer et al., 2011). However, pill counts may be confounded by patients who deliberately remove pills from their bottles (Haberer et al., 2011). Haberer et al. (2012) have estimated ART adherence using multiple subjective (Visual Analogues Scale (VAS), three-day recall, pill counts/liquid formulation weights) and objective (MEMS data, and six-monthly HIV/ ribonucleic acid [RNA] levels) measures of adherence among 121 children aged 2 to 10 years in Uganda. Although pill counts/liquid formulation weights were significantly correlated with MEMS data, they did not significantly

correlate with HIV RNA levels. The authors have argued that unannounced pill counts/liquid

formulation weights were resource intensive and possibly failed to significantly correlate

with HIV RNA levels due to the inability to accurately measure the amount of liquid

dispensed at refill visits (Haberer et al., 2012).

Pharmacy refill records. Similar to estimates based on caregiver self-report, studies

that estimate adherence using pharmacy refill are inconsistent with regard to the specific

period over which adherence is estimated (whether over three months or the past year)

(Bagenda et al., 2011; Burack, Gaur, Marone, & Petrova, 2010; Farley, Hines, Musk, Ferrus,

& Tepper, 2003; Marhefka, Tepper, Brown, & Farley, 2006; Müller et al., 2011). Furthermore,

complicating the usefulness of pharmacy refill data are the broad cut-off percentages used to

estimate adherence, with studies estimating adherence based on more than 75% of

medications refilled to more than 95% of medications refilled (Simoni et al., 2007).

Clinic attendance. In the context of paediatric HIV, caregiver attendance at the clinic

to collect medication has been used to monitor adherence (Yoder et al., 2012). However, as

with several other measures, adherence rates varied widely. Studies that have reported on

adherence as assessed by clinic attendance suggest that adherence to clinic attendance

decreases when estimated over longer periods of time (Simoni et al., 2007).

Electronic drug monitoring (EDM). EDM in the form of devices like MEMS-cap

and Wisepill (www.wisepill.com) have been considered among the most reliable methods of

adherence monitoring (Haberer et al., 2012; Olds, Kiwanuka, Nansera, et al., 2015). The

devices electronically capture the number of times the lid of the medication bottle, or the bag

containing liquid formulations, has been opened and wirelessly communicates this

information to the receiver (clinician or researcher) (Olds, Kiwanuka, Nansera, et al., 2015).

The device, however, is not able to capture whether pills were removed and subsequently

ingested, or only removed. EDM is considered the most favourable of the indirect methods as

it is less prone to respondent bias, and has been shown to correlate highly with secondary outcome measures like VL (Farley et al., 2003; Müller, Bode, Myer, Roux, & von Steinbüchel, 2008). However, the financial and logistical needs of this electronic device have made it unfeasible in resource-limited settings (Müller et al., 2011).

Despite the variability in adherence measures and adherence assessment criteria, the literature shows that adherence rates in SSA are comparable and in several instances higher than those in high-income countries. However, the higher rates are still not suggestive of optimal rates of adherence, and research suggests that adherence rates may worsen over time (Byakika-Tusiime et al., 2009; Gill, Hamer, Simon, Thea, & Sabin, 2005).

Consequences of poor adherence to ART

In order to achieve the optimal outcomes of HIV treatment (suppressed VL and an increased CD4 count), excellent adherence to ART is required. Excellent adherence requires taking ≥ 95% of the prescribed dose (Bangsberg, 2001). However, research amongst adults has shown that viral suppression can be achieved at lower rates of adherence (>70%) with different regimen types, for example nucleoside reverse transcriptase inhibitor (NNRTI) versus protease inhibitor (PI)-based regimens, with ART users on PI regimens achieving viral suppression at lower rates of adherence (Parienti et al., 2010). A similar finding was made amongst a small number of South African children (n=66), where children on boosted PI regimens achieved viral suppression with lower rates of adherence (<80%) (Muller et al., 2009). Nevertheless, the percentage adherence required to achieve viral suppression remains unclear among infants and children on ART (Teasdale et al., 2013). For example, amongst children in Zambia, more than 80% adherence was necessary to achieve viral suppression (Haberer et al., 2011), whereas amongst children in a South African cohort more than 90% adherence to ART was necessary to achieve viral suppression (Davies et al., 2008). Similar rates (>90%) of adherence were needed amongst children in the United States (Farley et al.,

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2008). In a study by Teasdale et al. (2013) amongst 269 children on ART, more than 85% adherence to ART was required for viral suppression. Non-adherence, especially to LPV/r, increased the likelihood of not achieving viral suppression (Teasdale et al., 2013).

Poor adherence is associated with minimalizing the effects of antiretrovirals (ARVs) (due to lower blood levels of ARVs), eventually resulting in virological resistance leading to opportunistic infection and ultimately to sustained drug failure (Davies et al., 2011; Genberg et al., 2012; Maggiolo et al., 2007; Pillay et al., 2014; Shekelle et al., 2007). Recent evidence from KwaZulu-Natal in South Africa shows that increasing numbers of children left on failing regimens are developing drug resistant mutations in their DNA, which if left uncontrolled have serious implications for future treatment options (Pillay et al., 2014).

In a study by Davies et al. (2011), data from more than 6000 children belonging to seven paediatric programmes in South Africa (International epidemiologic Databases to Evaluate AIDS (IeDEA) Southern Africa) was used to estimate the probability of virologic failure and a switch to a second-line regimen. The findings showed that the probability of virologic failure at three years was close to 20% (19.3%, 95% confidence interval (CI), 17.6 – 21.1). Two hundred and fifty-two children were followed up one year after failure, of which 38% were switched to a second-line regimen. These data suggest that children experienced virologic failure and increased access to second-line ART is needed (Davies et al., 2011). Viral resistance is problematic, especially in South Africa where access to second-line regimens is poor and no third-line options are available (Pillay et al., 2014). Untreated, resistant strains may be transmitted, especially amongst children maturing into adolescence and engaging in sexual relationships (Haberer & Mellins, 2009).

Factors affecting adherence to ART

Factors affecting paediatric adherence to ART have been identified via both quantitative and qualitative methods, with the majority of factors identified via quantitative

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means. Several systematic reviews of paediatric adherence to ART have been conducted (Haberer & Mellins, 2009; Pontali, 2005; Reda & Biadgilign, 2012; Santer et al., 2014; Simoni et al., 2007; Steele & Grauer, 2003; Vreeman, Wiehe, Pearce, et al., 2008), some of which have drawn on literature reporting on factors influencing adherence in order to provide a framework for and conceptualization of adherence (Haberer & Mellins, 2009); while others have specifically aimed to provide estimates on adherence rates across developing and developed settings, with an additional focus on predictors and correlates of adherence (Simoni et al., 2007; Vreeman, Wiehe, Pearce, et al., 2008).

In an attempt to provide a conceptual framework for understanding paediatric adherence to ART, Haberer et al. (2009) have suggested four dimensions for organising the factors, namely (1) child-related factors (e.g. the influence on adherence of physical and neurological development, as well as the role of health, nutrition and psychosocial function); (2) caregiver-related factors (e.g. the influence of caregivers' physical and mental health, knowledge and beliefs about ART); (3) regimen-related factors (e.g. difficulties involved with drug formulation, and changes in regimen); and (4) social- and cultural-related factors (e.g. the influence of traditional or other non-Western medicine on adherence) (Haberer & Mellins, 2009). An additional dimension includes health system-related factors (e.g. the influence of drug stock-outs, drug costs, healthcare facility accessibility, relationship with healthcare provider (s) and counselling services) on adherence to ART (Pontali, 2005; Reda & Biadgilign, 2012).

The above-mentioned factors are in keeping with constructs related to EST (Bronfenbrenner, 1979). Child-related factors, and factors specific to the key role players (such as caregivers, family members and health providers) may be conceptualized as operating in the child's microsystem. Factors affecting the relationships between members of the microsystem that either directly or indirectly influence adherence may be conceptualized

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as operating within the mesosystem. Health systems-related factors may be conceptualized as operating within the exosystem, and social and cultural factors in the macrosystem (Naar-King et al., 2006; Vreeman et al., 2009). Table 2.3 summarizes factors influencing adherence as identified in the systematic reviews mentioned above.

Table 2.3

Factors Affecting Paediatric Adherence to ART

Level	Factors
Child-related factors	Developmental stage and age
	Health and nutrition
	Treatment fatigue
	Knowledge of HIV status
	Psychosocial function
	Orphan status
	Palatability
	Refusal of treatment
	Pill burden
	Lack of benefits associated with taking medications
	Forgetfulness
	Attitude and beliefs about ART
Caregiver and family-related factors	
	Nature of caregiver and caregiver permanence
	Caregiver knowledge and beliefs about ART
	Caregiver education and comprehension of ART administration
	Caregiver psychosocial function
	Disclosure of HIV status to child and others
	Caregiver-child relationship
	Poverty and food insecurity
	Caregiver ill health
	Substance abuse
	Family disruptions/extended caregiving

Table 2.3 *(continued)*

Level	Factors
Regimen-related factors	
	Changing regimen
	Drug formulation
	Taste and palatability
	Size of tablets and capsules
	Storage requirements
	Regimen complexity
	Toxicity and side effects
Health system-related factors	
	Drug stock-outs
	Drug costs
	Healthcare facility accessibility
	Relationship with healthcare provider
	Adherence counselling
Social and cultural-related factors	
	Traditional medicines and distrust in western medicine
	Cultural norms

Child related factors. *Developmental stage and age.* As children get older, the literature suggests that adherence becomes progressively worse (Marhefka et al., 2008; Mellins et al., 2004; Williams et al., 2006), as the need to be independent from the caregiver and to establish an identity amongst peers begins to outweigh the importance of adherence to medications (Azzopardi et al., 2014; Haberer & Mellins, 2009). However, the influence of age on adherence remains undecided as some studies have found no age relation with non-adherence (Marhefka et al., 2008). Marhefka et al. (2008) have argued that the lack of support for a definitive association may be due to mediating factors such as regimen responsibility. In

a qualitative study by Fetzer et al. (2011) children (aged 8 to 17 years) from the Democratic Republic of the Congo stated that they felt constrained by the regimen in that they had to take medication daily, and they were markedly aware that their peers did not have to deal with such issues. The frustration experienced with the treatment was especially salient amongst those who were unaware of their status, and those children who were older (Fetzer et al., 2011). In a quantitative study amongst 269 South African children (aged 6 to 104 weeks), the most commonly reported barrier to adherence as reported by their caregiver was the child being uncooperative when medication was administered (Teasdale et al., 2013).

Health and nutrition. Children with chronic illnesses often have several health-related complications that influence adherence. The relationship between adherence and health status, however, remains obscure. For example, Nabukeera-Barungi et al. (2007), have found that CLWH in Kampala, Uganda, who were hospitalized one or more times before commencing treatment were significantly more likely (OR 0.44, 95% CI 0.20-0.92) to have optimal rates of adherence, defined as taking more than 95% of the prescribed medication (Nabukeera-Barungi, Kalyesubula, Kekitiinwa, Byakika-Tusiime, & Musoke, 2007). The higher reported rates of adherence may have been a sign of motivation to get better (Haberer & Mellins, 2009).

Furthermore, children on ART predominantly reside in resource-limited settings where access to nutritional foods to aid growth and development are often lacking (Young, Wheeler, McCoy, & Weiser, 2014). In the absence of nutritional foods, children often experience side effects (e.g. nausea) associated with taking medication on an empty stomach. Children have reportedly experienced side effects such as a burning sensation when ART was taken on an empty stomach, dizziness or light-headedness when they did not take their medications with food (Fetzer et al., 2011). In the study by Fetzer et al. (2011), food was not always available and some of the children stated that they refused to take medication without

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food (Fetzer et al., 2011). In the absence of food some caregivers forgo ART administration, which affects adherence to ART (Coetzee et al., 2015).

Treatment fatigue. Although there appears to be no clear definition of treatment fatigue in the literature (Claborn, Meier, Miller, & Leffingwell, 2015), factors contributing to treatment fatigue in infants and young children include high pill burden and side effects (Marhefka et al., 2006), while increased autonomy of medication management among adolescents has been associated with lower levels of adherence (Mellins et al., 2004).

Knowledge of HIV status. As children age, it becomes increasingly important to communicate to them the nature of their health problems. Evidence from disclosure studies (discussed again further on) suggest that children's knowledge about the nature of their illness facilitates on-going participation in a treatment regimen, and also allows the child to adjust better to living with a chronic illness (Vreeman et al., 2013). A lack of open communication with a parent or caregiver may result in the child being unable to address difficulties surrounding the illness (Havens & Mellins, 2008). Effective communication between the child and the caregiver may be said to exist when the caregiver (provided he/she has been adequately advised on the treatment regimen) has communicated the importance of taking medication and the child understanding this, and thereby participating in the necessary activities. In a study by Fetzer et al. (2011), children living in Kinshasa in the Democratic Republic of the Congo who had not been disclosed to struggled to understand the rationale of continued medication taking while healthy (Fetzer et al., 2011).

Psychosocial function. Children living with chronic illnesses, particularly highly stigmatized illnesses such as HIV, experience psychological distress in the form of depression and anxiety, which has negative outcomes on adherence (Mellins et al., 2004; Reisner et al., 2009). In a study by Mellins et al. (2004), children reporting more stressful life events were more likely to be non-adherent than those not reporting stressful life events. CLWH

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experience emotional pain and complicated feelings related to being alone following the death of one or more family members. CLWH also experienced guilt and anger, as well as confusion, depression and fear (Battles & Wiener, 2002; Brown, Lourie, & Pao, 2000). The loss of a parent is psychologically traumatic, especially when no support is received during the period of bereavement (Battles & Wiener, 2002; Rao, Kekwaletswe, Hosek, Martinez, & Rodriguez, 2007).

Orphan status. Children orphaned by HIV face several difficulties associated with treatment initiation, family care and stability and adherence (Mokgatle & Madiba, 2015). Evidence from SSA show a high prevalence of orphanhood among undiagnosed children (Mokgatle & Madiba, 2015). For example, a recent cross-sectional survey from South Africa of primary caregivers' (n=406) reasons for seeking HIV testing among children aged 5-18 years showed that 45.1% were maternal orphans, 31.5% were paternal orphans and 39.9% were double orphans[1]. Thus, many CLWH in SSA are shown to present late for treatment initiation following several months or years of poor health (Mokgatle & Madiba, 2015). Several studies have shown that children initiating ART at an advanced disease stage are at a heightened risk for morbidity and mortality (Davies, Egger, Keiser, & Boulle, 2009; Davies, 2015; Fenner et al., 2010).

In many African settings, including South Africa, family members (usually grandparents) take responsibility for an orphaned child's care (Mokgatle & Madiba, 2015; Wacharasin & Homchampa, 2008). In many ways the disruption in family structure contributes to poor adherence. In a study by Bhattacharya and Dubey (2011) in India, orphan status was significantly associated (OR=3.57, 95% CI 1.13 -9.25) with poorer adherence. The authors have argued that this relationship may reflect the inability of extended families to

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[1] The percentage for orphan status exceeds 100% as double orphans were calculated from maternal and paternal orphans (Mokgatle et al., 2015).

care for orphaned children (Bhattacharya & Dubey, 2011). In addition to poorer access to healthcare and family disruption among orphaned children, the loss of a parent is traumatic and psychologically burdensome. Consequently, the trauma of losing a parent coupled with the psychosocial stressors related to living in poverty may contribute to depression and anxiety in some children (Rochat et al., 2008), often with long-lasting effects (Bowlby, 1969; Richter, 2004).

Palatability and refusal of treatment. Infants and young children (especially those younger than five years) struggle with palatability issues, especially with bitter tasting medications like LPV/r (Davies et al., 2008; Horace & Akbarian-Tefagh, 2013; Lowenthal et al., 2011), which often leads to vomiting, spitting out of medications or a refusal to take their medications (Biadgilign et al., 2009; Coetzee et al., 2015). Even for most adults, engaging in behaviour with noxious side effects for future health benefits is effortful (Havens & Mellins, 2008). For children, poor palatability of the medications is coupled with consistent refusal to take the medications, and instances of repeated vomiting where a caregiver may then be reluctant to re-administer the dose (Elise et al., 2005). In a recent study by Arage et al. (2014), child refusal of the medication (among 19% of the sample) constituted one of the major reasons for non-adherence, and is supported by several other studies (Arage et al., 2014; Biressaw, Abegaz, Abebe, Taye, & Belay, 2013; Wasti et al., 2012).

Although the literature suggests that young children struggle with medication palatability and often refuse treatment on this basis, there is evidence to point to the contrary. For example, amongst 48 children (younger than five years of age) enrolled in a qualitative study in South Africa, most children acknowledged taking medicine and liking it as well. A more important concern for children in this study was receiving an injection. Furthermore, none of the children reacted negatively when they were presented with treatment cues (medicine spoon and syringe). In fact, children demonstrated (using a toy doll) that they were

able to take ownership of the medication by showing the research staff how to administer medication (Rochat et al., 2008).

Pill burden. Young children usually take several ARV medications at the same time as other medications to treat opportunistic infections, including TB medications. Consequently, high pill burden has been associated with poor adherence in children on ART (Bhattacharya & Dubey, 2011; Biadgilign et al., 2009).

Forgetfulness. Among older children who have taken increased responsibility for their treatment, factors such as forgetfulness influence adherence (Buchanan & Montepiedra, 2012; Elise et al., 2005; Fetzer et al., 2011; Marhefka et al., 2008). Integration of the treatment into children and caregivers' daily routine has been shown to facilitate adherence and reduce forgetfulness (Hammami et al., 2004).

Caregiver and family-related factors. *Nature of caregiver and caregiver permanence.* The role of a caregiver or family member in the lives of young CLWH is vital (Richter, 2004; Rochat et al., 2008). Caregivers' behaviours and responses to the environment are studied, scrutinized and eventually modelled by the child (Bandura, 1989; Rochat et al., 2008). The influence of caregivers' biological relationship to the child on adherence is inconsistent throughout the literature. A study by Jaspan et al. (2011) among caregivers and children (median age of 4 years) in South Africa has shown an improvement in adherence when a mother was in charge of, and responsible for the treatment and care of the child. However, the authors never ascertained whether these mothers were the biological mothers of these children, as culturally (in isiXhosa, a language spoken in South African) the word "mother (mama)" is used to describe any female taking care of a child. Furthermore, the authors never assessed whether these children were living with their biological fathers (Jaspan et al., 2011). However, in a study in the United States among children with a mean

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age of 11 years, biological mothers were associated with poorer adherence (Williams et al., 2006).

Paediatric adherence may be disrupted by a change in caregivers due to reasons such as the death of caregiver, daily commitments to other activities, extended periods of work, migration to new areas for schooling purposes (Hosegood, Preston-Whyte, Busza, Moitse, & Timaeus, 2007), attending holy places or other places of residence for periods of time (Biadgilign et al., 2009), lack of disclosure and limited adherence counselling and education with a new caregiver (Haberer & Mellins, 2009). Some studies have found that younger children receiving ART from non-parental caregivers (e.g. foster parents) achieved superior levels of adherence than those receiving ART from their biological parents (Giacomet et al., 2003), whereas others have found worse levels of adherence (Cupsa, Gheonea, Bulucea, & Dinescu, 2000). Similarly, the influence of multiple caregivers (i.e. more than one person administering medication) on adherence to ART remains inconclusive (Fassinou et al., 2004; Haberer et al., 2011).

Caregiver knowledge and beliefs about ART. Caregiver education levels have been associated with adherence. For example, some studies have reported poorer rates of adherence amongst caregivers with low levels of education (Bhattacharya & Dubey, 2011), while others report that higher caregiver education levels are associated with poorer rates of adherence (Arage et al., 2014). Other studies have found that caregivers who are on ART themselves may draw from their own treatment experiences in order to optimize adherence for the child (Haberer & Mellins, 2009). In the study by Arage et al. (2014) Ethiopian caregivers who had education beyond primary level were less likely to adhere to the regimen than illiterate caregivers (Arage et al., 2014). Arage et al. (2014) have argued that caregivers with higher levels of education were more likely to be employed and spend less time with children to administer medications or to forget to do so on busy days (Arage et al., 2014).

While the influence of caregivers' education levels on adherence is inconsistent within the literature, studies have shown that children whose caregivers are knowledgeable about ART are more likely to be adherent than those with no knowledge about ART (Arage et al., 2014; Olds, Kiwanuka, Ware, et al., 2015; Wachira et al., 2012). For example, in the study by Arage et al. (2014), caregivers who were knowledgeable of the regimen were 2.7 times more likely to be adherent to the regimen compared to those with no knowledge. Caregivers with no knowledge of the benefits of ART may thus be poorly motivated to adhere to the treatment regimen (Arage et al., 2014).

Some caregivers find motivation to adhere to the regimen through the visible improvement of the child's overall health on ART. In the qualitative study by Olds et al. (2015), the authors have noted the impact of the 'Lazarus effect' on motivation to adhere to ART amongst caregivers to children on ART (median age of 7 years) in rural Uganda. Thus, the visible improvement in the child's overall health motivated caregivers to consistently provide the child's medication (Olds, Kiwanuka, Ware, et al., 2015). However, the benefits are often weighed against the costs of regular clinic attendance (Wachira et al., 2012). Administration of medication, especially liquids, to children is challenging as they spill easily during administration. Using a syringe and taking accurate measurements has also proved a difficult task, especially for elderly caregivers. Some studies have shown that caregivers' perceived difficulty with ART administration (i.e. their perceptions that they are not able to administer treatment to those in their care adequately) is negatively associated with adherence (Polisset, Ametonou, Arrivé, Aho, & Perez, 2009; Reddington et al., 2000).

Caregiver psychosocial function. Caregivers' ability to care for the various needs of children is severely compromised in the presence of mental health issues (Rochat et al., 2008), and psychosocial stress (Marhefka et al., 2006). Depression has consistently been linked with poor adherence in adults and adolescents on ART (Amberbir, Woldemichael,

Getachew, Girma, & Deribe, 2008; Byakika-Tusiime et al., 2009). The influence of caregiver depression on children's adherence to ART is not well described in the literature, and is almost absent in research from Africa (Jaspan et al., 2011). However, studies on maternal depression amongst HIV positive women have shown that symptoms of depression negatively impact caregiving ability, as depressed caregivers are less likely to interact meaningfully with their children (Murray, Fearon, & Cooper, 2015; Naar-King et al., 2006; Parsons, Young, Rochat, Kringelbach, & Stein, 2012). Gonzalez, Batchelder, Psaros and Safren (2011) have emphasized that interventions aimed at reducing depression should be a priority in behavioural research (Gonzalez, Batchelder, Psaros, & Safren, 2011). Ongoing adherence counselling and psychosocial support improve caregiving ability and have been associated with higher rates of adherence among children who rely on caregivers (Biadgilign et al., 2009). Caregivers who lack an adequate support structure have difficulty with consistently and accurately providing treatment to children on ART (Mellins et al., 2004; Polisset et al., 2009).

Disclosure of HIV status to child and others. For caregivers of children living with ART, disclosure of a child's HIV status to the child remains a controversial topic. A systematic review by Vreeman et al. (2013) of disclosure to children in resource-limited settings have shown that disclosure rates are low (ranging from 0% -62%, among samples aged between 0 and 21 years) (Vreeman et al., 2013). For example, Feinstein et al. (2010) have reported that among 492 children between the ages of four and 18 years in Soweto, South Africa – 3% of four- to six-year-olds knew their status, 17% of seven- to 10-year-olds knew their status and 77% of children older than 11 knew their status (Feinstein, Moultrie, Myers, & Rie, 2010).

The review identified seven studies (six qualitative (Demmer, 2011; Kouyoumdjian, Meyers, & Mtshizana, 2005; Moodley, Myer, Michaels, & Cotton, 2006; Myer, Moodley,

Hendricks, & Cotton, 2006; Petersen et al., 2010; Yeap et al., 2010) and one quantitative (Feinstein et al., 2010)) on disclosure to children in South Africa. Only three of the studies provided proportions of disclosure among their samples (Feinstein et al., 2010; Moodley et al., 2006; Petersen et al., 2010), while all provided factors influencing disclosure. Salient factors contributing to non-disclosure (across the studies included in the review) were 1) child was too young, 2) fear that the child would disclose to others and invite stigma, 3) concerns that the child's emotional and physical health would worsen, 4) feeling unprepared to disclose to the child and 5) and fear of resentment from the child.

Caregivers to children in high-income countries share many of these fears and concerns (Hammami et al., 2004). For example, in a qualitative study by Hamammi et al (2004), caregivers in Belgium stated that children who were not physically ill had difficulty understanding why they needed to take their medicines. Caregivers stated that they felt their children were too young to be disclosed to and they commonly told children that taking the medication was necessary for them not to feel sick again (Hammami et al., 2004).

Studies reporting on the impact of disclosure on adherence to ART remain inconclusive, although Vreeman et al. (2013) have argued that based on available evidence (mostly from qualitative studies), disclosure plays an important role in adherence (Bikaako-Kajura et al., 2006; Corneli et al., 2009; Fetzer et al., 2011; Hejoaka, 2009). In a recent cross-sectional study among 440 children on ART in Ethiopia (aged 0 – 14 years, mean = 9.4 years), at least half knew their status. Children who knew their HIV status were nearly four times (Adjusted Odds Ratio [AOR] = 3.47(95% CI: 2.10, 6.81) more likely to be adherent than those without knowledge of their status (Arage et al., 2014).

Disclosure provides children with the opportunity to become involved and take increased responsibility for their own treatment (Fetzer et al., 2011; Hammami et al., 2004). Growing evidence supports a gradual process of disclosure where children receive age-

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appropriate information about their illness until they are older and considered emotionally and cognitively equipped to deal with the knowledge of their illness (Atwiine, Kiwanuka, & Musinguzi, 2015; Vreeman et al., 2013). Despite available guidelines for disclosure (e.g. World Health Organization, 2011), more evidence is needed to include context specific and culturally informed recommendations (Vreeman et al., 2013).

Equally burdensome to many caregivers is the disclosure of their own status to the child, and disclosure of their own status and the child's status to others (Vreeman et al., 2013). In a study conducted by Wachira et al. (2012) in Kenya, disclosure of the caregivers' HIV status to the child as well as to family and other community members presented various challenges to the caregivers interviewed. Disclosure to close family members was done as a means to access both emotional and financial support. Non-disclosure was largely attributed to a fear of being stigmatized by others and losing financial support from a male partner. The inability to disclose meant that caregivers had difficulty in getting time off from work to attend clinic visits and were unable to access valuable sources of support (Wachira et al., 2012). Supportive relationships with adult family members, healthcare providers and teachers have also shown to improve adherence to ART (Bikaako-Kajura et al., 2006).

Busza, Dauya, Bandason, Mujuru, and Ferrand (2014) have found that a lack of disclosure to others limited ways in which Zimbabwean caregivers were able to administer medications to the child while in the company of others and often led to skipping doses (Busza, Dauya, Bandason, Mujuru, & Ferrand, 2014). Similarly, in a qualitative study by Biadgilign et al. (2009), both caregivers and healthcare providers reported that children seldom knew their HIV status and that this impacted on the available space to administer treatment to the child when others were visiting (Biadgilign et al., 2009). Non-disclosure may also force caregivers to become secretive about the treatment and hide medications. When

medications are hidden away caregivers may miss dosing times, which may negatively impact on the child's health (Calabrese et al., 2012).

Caregiver-child relationship. Among infants and young children, caregivers are responsible for every aspect of a child's needs (Richter, 2004). Strong and supportive caregiver-child relationships are fundamental to child development, especially in the first three years of life. However, the quality of the care a child receives from their carer is based on how sensitive the caregiver is to the child's needs (sensitivity) and whether the caregiver responds appropriately (responsiveness) to any distress the child may be experiencing (Richter, 2004).

In the context of triple combination therapy treatment for children on ART and distasteful medications, medication events are likely to be stressful for young children. Caregivers should be able to respond appropriately to stressful cues (such as crying) in a child, as failure to do so might contribute to poor health outcomes in the child (Richter, 2004). There is evidence to suggest that poor relationships between caregivers and children contribute to poor adherence. In a study amongst caregivers and children in New York, Mellins et al. (2004) have shown that poor parent-child communication, as assessed by the Parent-Child Relationship Inventory (Gerard, 1994), was significantly associated (t =2.45, P=0.017) with non-adherence (Mellins et al., 2004). A strong caregiver-child relationship has also been shown to foster a sense of motivation and obligation amongst caregivers to keep the child healthy and nourished (Olds, Kiwanuka, Ware et al., 2015).

Poverty and food insecurity. Poverty is one of the most debilitating barriers to adherence to ART and fuels many other barriers associated with non-adherence, such as financial and food insecurity. Structural barriers as a result of poverty include the lack of money for transport to adhere to monthly clinic appointments and the inability to take time off from work to attend appointments in the context of unemployment (Coetzee et al., 2011;

Hardon et al., 2007; Olds, Kiwanuka, Ware, et al., 2015). The prohibitive costs of transport and inability to attend clinic appointments are well documented in the literature (Hardon et al., 2007; Kagee et al., 2011; Tuller et al., 2010).

Children with HIV living in resource-limited settings are at risk of increased food insecurity and malnutrition, which may interrupt treatment administration and also result in treatment discontinuation (Weiser et al., 2010; Young et al., 2014). Children on ART are known to experience a large increase in appetite even after a short period on ART (Nagata et al., 2012; Walakira, Ddumba-Nyanzi, & Kaawa-Mafigiri, 2014) and they require food to mitigate medication-related side effects (Nagata et al., 2012).

However, in the context of poor households where the majority of children on ART in SSA reside, poor adherence to ART has been described as a consequence of the poor availability of food (Biadgilign et al., 2009; Coetzee et al., 2015; Fetzer et al., 2011; Skovdal, Campbell, Madanhire, Nyamukapa, & Gregson, 2011; Vreeman et al., 2009). In qualitative interviews with key stakeholders in the treatment and care of children younger than five years on ART in South Africa, Coetzee et al. (2015) have demonstrated that caregivers were reluctant to administer ART in the absence of food (Coetzee et al., 2015). Biadgilign et al. (2009) and Fetzer et al. (2011) have reported similar reasons for refusal to provide ART in Ethiopia and Congo respectively (Biadgilign et al., 2009; Fetzer et al., 2011). In Zimbabwe, elderly caregivers faced additional challenges in procuring food as their immobility and inability to work limited the extent to which they could provide food and care for the child (Skovdal et al., 2011). In a study by Kundu et al. (2012), food supplementation for children on ART in Eastern India resulted in regular clinic attendance, improved CD4 counts, and contributed to fewer deaths (Kundu, Samanta, Sarkar, Bhattacharyya, & Chatterjee, 2012). In one study, caregivers felt obliged to go without food themselves if food was scarce in the

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household in order to make sure that the children were able to take their medications with food (Olds, Kiwanuka, Ware, et al., 2015).

According to the WHO (2009), children on ART need to consume at least 10% more calories than HIV-uninfected children following enrolment on ART (WHO, 2009). Consequently, poor nutrition influences the progression to HIV morbidity and mortality (Walakira et al., 2014).

Caregiver ill health. Caregiver ill health negatively impacts on adherence to ART in children (Azzopardi et al., 2014; Mellins, Kang, Leu, Havens, & Chesney, 2003) as caregivers often have to cope with the competing demands of their own health needs and that of the children in their care. Caregiver ill health influences the quality of care that the caregiver is able to provide to the child. For example, caregiver ill health may result in poor treatment supervision and forgetfulness, both of which have been associated poor adherence (Azzopardi et al., 2014).

Substance abuse. In a study by Arage et al. (2014) caregiver use of substances such as alcohol, chat ('*Khat*' a naturally occurring stimulant in Ethiopia), and nicotine was associated with poorer adherence in children on ART. Caregivers who reported no substance abuse were twice as likely to be adherent to the regimen than those reporting substance use (Arage et al., 2014). A study in Vietnam (Do et al., 2013), and Nepal (Wasti et al., 2012) showed similar findings. In South Africa, available evidence suggests that alcohol abuse among caregivers of children on ART is rare and therefore limited data exist to assess the association of alcohol use on paediatric adherence to ART (Jaspan et al., 2011). Jaspan et al. (2011) have conducted a cross-sectional study assessing the effects of caregivers' depression and alcohol use on paediatric adherence to ART. Jaspan et al. (2011) have recruited 56 children (median age = 4 years) on ART and their caregivers (median age = 31 years) attending a public healthcare clinic in Cape Town, South Africa. Depression was assessed

using the Beck Depression Inventory (BDI1) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and substance abuse was assessed the Alcohol Use Disorders Identification Test (AUDIT) scale (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). While depression rates were high (33%) among caregivers in their study, alcohol abuse was rare. Only one caregiver scored above 8 on the AUDIT, which is indicative of alcohol abuse and problems with drinking. However, Jaspan et al. (2011) have cautioned that the small sample size might not be representative of the population (Jaspan et al., 2011).

Family disruptions/extended caregiving. In many instances the biological parents of CLWH are either too ill to look after their children, have died of HIV or migrated to other areas to find employment (Hosegood et al., 2007; Kuo & Operario, 2010). Some studies have indicated that older caregivers (in most instances grandparents to the children) often become the caregiver to the child when the biological mother has died or moved away for work (Mokgatle & Madiba, 2015; Sikstrom, 2014; Skovdal et al., 2011; Ssengonzi, 2007). In the event that grandparents become responsible for the child, studies have also suggested that grandparents have difficulty understanding the regimen requirements due to low levels of education and not seeing the overall benefits associated with ART (Coetzee et al., 2015).

In several instances, caregiving responsibilities become shared amongst available, often female, members of the households (Okomo, Togun, Oko, Peterson, & Jaye, 2012; Yeap et al., 2010). Disorganized family structures have shown to impact negatively on adherence to ART (Bhattacharya & Dubey, 2011; Cupsa et al., 2000). Shared responsibility among household members contributes to poor adherence when caregivers become occupied with other daily household requirements, and also when information sharing among those involved in the treatment and care of the child is poor or lacking (Coetzee et al., 2015; Vreeman et al., 2009).

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Regimen-related factors. *Changing regimen and regimen complexity.* Compared to adults, children on ART have fewer treatment options available to them in South Africa and most resource-limited settings. Children on ART experience regular dose changes as they grow older and their weight increases (Department of Health South Africa, 2014). Furthermore, children who experience more than one raised VL on a particular regimen may be switched to other medications that may require different methods of preparation and administration. In the context of caregiver inconsistency, changes to the regimen may not be communicated effectively to the various individuals responsible for the medication of the child (Coetzee et al., 2015). Furthermore, in the context of poorly educated caregivers, regimen instructions may be difficult to follow and further disrupted with regular changes. Changing regimens may also be required when primary healthcare facilities experience drug stock-outs (Haberer et al., 2009). Despite the perceived complexity associated with the ART regimen, studies have also indicated no significant associations between regimen complexity and non-adherence (Mellins et al., 2004).

Formulation (liquid, tablet, capsule). Children younger than five years of age on ART receive either a combination of liquid formulations or a regimen consisting of both liquids and either pills or capsules. In the context of fixed-dose combinations (FDC) becoming readily available to children on ART, emerging evidence shows that caregivers and children prefer tablets over formulations (Bagenda et al., 2011). Despite the preference for tablets and capsules, large tablets are difficult to crush and many children experience difficulty in swallowing tablets whole. Liquid formulations spill easily and require accurate administration, which may be problematic when there is poor communication about dosing size amongst multiple caregivers, or caregivers who struggle to understand the dosing requirements (Coetzee et al., 2015; Nahirya-Ntege et al., 2012). Older caregivers may find it

difficult to read measurements on the syringe or on a medication measurement cup (Haberer & Mellins, 2009; Nahirya-Ntege et al., 2012).

Storage requirements. Liquid formulations such as LPV/r and d4T require refrigeration or to be kept in a cool place (<25 °C) (Department of Health South Africa, 2014). CLWH typically reside in poor communities where access to refrigeration and electricity may be scarce.

Toxicity and side effects. Life-long use of ART exposes children to long-term toxicities, metabolic complications (Barlow-Mosha, Eckard, McComsey, & Musoke, 2013) and kidney disease (Bhimma, Purswani, & Kala, 2013). For example, Stavudine (d4T), which used to be a recommended first-line nucleoside reverse transcriptase inhibitor (NRTI) medication for children, led to lipoatrophy and lactic acidosis (Palmer et al., 2013). Current recommendations have replaced d4T with ABC (Department of Health South Africa, 2014).

Health system-related factors. *Drug stock-outs and costs.* Drug stock-outs and delays in dispensing patient prescriptions have been associated with non-adherence. Delays in dispensing prescriptions make it necessary for patients to attend healthcare facilities more often than is necessary to collect their medication supplies, which in turn interferes with family responsibilities and adds financial strain(Busza et al., 2014; Mukherjee, Ivers, Leandre, Farmer, & Behforouz, 2006). Although ART is available freely in many resource-limited settings, added costs such as clinic enrolment fees and costs associated with treating opportunistic infections have contributed to difficulties with accessing treatment (Kimani-Murage, Manderson, Norris, & Kahn, 2013).

Healthcare facility accessibility. In a study by Arage (2014), distance from the clinic was significantly associated with poorer adherence. Children who lived more than 10km away were less likely to be adherent than those who lived closer. Studies from Ethiopia (Biadgilign et al., 2009) and Nepal (Wasti et al., 2012) also reported distance from the clinic

as a barrier to adherence. Child-friendly healthcare facilities that include play equipment for children have been suggested as facilitators to adherence (Biadgilign et al., 2009). In a qualitative study, it was found that Ethiopian children liked attending the hospital as they were able to engage with children their own age and partake in child-orientated activities such as picture drawing and painting (Biadgilign et al., 2009).

Relationship with healthcare provider (s). The healthcare environment in resource-limited settings is largely overburdened and characterized by inadequate infrastructure and staff resources, which often leads to frustration and burnout among healthcare staff (Coetzee et al., 2011; Murray et al., 2009; Smit, 2005). The influence of these structural barriers places significant strain on the relationship between ART users and healthcare workers. Unsatisfactory work conditions may cause healthcare staff to behave in an unsympathetic way towards caregivers or ART users (Coetzee et al., 2011). In a study by Wachira et al. (2012), Kenyan caregivers to children on ART viewed clinic and healthcare staff as impolite and unprofessional. They also viewed the staff as lacking valuable empathetic skills and feared verbal abuse or being treated differently from others, resulting in caregivers postponing clinic appointments. Among caregivers in Mpumalanga, South Africa, many had disclosed the child's status to close family members, especially fathers (Kimani-Murage et al., 2013). However, almost half wished they could keep it a secret from healthcare workers. Caregivers were particularly concerned that some of the healthcare staff would compromise their confidentiality. This perceived threat of identification prevented caregivers from attending healthcare facilities in the first place. Caregivers believed disclosure resulted in increased stigmatization and discrimination, subsequently affecting their child's development. Caregivers reported that healthcare staff treated them badly and they did not feel comfortable with the way they had been addressed.

The nature of communication between patient and provider is important for overall treatment success with ART and establishing meaningful healthcare partnerships (De Civita & Dobkin, 2004; Schwartz & Axelrad, 2015). A failure to communicate effectively exposes ART users and caregivers of children to possible misunderstandings of treatment requirements (De Civita & Dobkin, 2004). In several resource-limited settings ART nurses and adherence counsellors are predominantly responsible for educating ART users and caregivers on ART via pre-ART adherence counselling sessions (Remien et al., 2013), while doctors often communicate to caregivers through an interpreter (Bland, Ndirangu, & Newell, 2013; Coetzee et al., 2015). Doctors frequenting primary health facilities in resource-limited settings often work on a rotational basis that may disrupt the opportunity for effective rapport building, which is necessary in addressing adherence difficulties with the treatment regimen. Regular and in-depth engagement between caregivers and healthcare providers has shown to influence adherence to ART (Biadgilign et al., 2009).

Adherence counselling. Inadequate psychosocial support to ART users and their caregivers by skilled healthcare workers is characteristic of many resource-limited settings. In the context of an expanding ART programme in South Africa and the prevailing concerns of poor patient adherence to ART, lay healthcare personnel (adherence counsellors) have been tasked with providing psychosocial support to ART users (Dewing et al., 2012, 2015). Yet, adherence counsellors are known to receive short periods of unstandardized training with little to no follow-up in the form of supervision, monitoring and debriefing (Kagee, 2013; Petersen, Fairall, Egbe, & Bhana, 2014; Remien et al., 2013, Gibson, Swartz, & Sandenbergh, 2009). Furthermore, the brief training periods usually equip counsellors with knowledge of HIV and ART and not with the counselling skills necessary to promote behaviour change (Dewing et al., 2012; Kagee, 2013).

Despite the caveats in training, some evidence shows that the counselling skills of adherence counsellors may be improved with training programmes (Igumbor, Scheepers, Ebrahim, Jason, & Grimwood, 2011; Kagee, 2013). However, the effects of the training on adherence to ART is not well described. In the context of an overburdened healthcare system, adherence counsellors often have limited counselling space as well as little privacy for consultations (Bland, Ndirangu, & Newell, 2013). Further, long waiting times at the clinic have repeatedly been reported as a disincentive to clinic attendance (Coetzee et al., 2011; Hardon et al., 2007; Roura et al., 2009).

Social and cultural-related factors. *Traditional healing and medicines.* The influence of traditional healers and traditional medicines in the fight against HIV has been somewhat controversial in the literature. For example, in a qualitative study among 31 caregivers in Mpumalanga, South Africa, Kimani-Murage et al. (2013) reported that some caregivers sought traditional healing for HIV-infected children in instances where healthcare providers had told them that children were too young for ART. Caregivers who sought traditional healing reported that traditional healers referred to their children as being bewitched and provided them with several herbal remedies believed to cure the child of HIV (Kimani-Murage et al., 2013). In contrast, other studies from South Africa (specifically from KwaZulu-Natal) have shown that traditional healers acknowledge HIV and are accepting of ART as treatment and its use in conjunction with traditional medicines (Appelbaum Belisle et al., 2015). Several studies have examined the negative impacts of traditional medicines on adherence to ART (Dahab et al., 2008; Peltzer et al., 2011). In the case of children, the uses of traditional medicines such as herbal enemas have resulted in numerous child deaths (Bland et al., 2004).

Cultural norms. In the context of child-rearing and caregiving, women traditionally assume the responsibility to look after children's needs. Women-headed households are still

the norm in many African settings today, and women often have to take care of several children (Wachira et al., 2012). Traditionally women provide physical and emotional care to children, while men provide financial support and are consulted on important household decisions (Makusha & Richter, 2014).

Interventions to improve paediatric adherence to ART

Globally, very few interventions, especially randomized control trials (RCTs), have been conducted to improve medication adherence in CLWH. Moreover, those that have been conducted have demonstrated little improvement in adherence (Bain-Brickley et al., 2011).

In 2011, Bain-Brickley et al. (2011) published a global review on interventions aimed to improve adherence to ART in children with HIV. Their review focused specifically on adherence interventions that included a control group, measured adherence to ART as an outcome and included children younger than 18 years. Four studies met their inclusion criteria. Two of the studies were RCTs, of which one was conducted in the United States (Berrien, Salazar, Reynolds, & Mckay, 2004) and the other in Kenya (Wamalwa et al., 2009). The other two studies were non-randomized trials of which one was conducted in France (Funck-Brentano et al., 2005) and the other in South Africa (Müller, Myer, & Jaspan, 2009).

Berrien et al. (2004) have conducted a home-based nursing intervention with 37 patients (aged 1.5 years – 20 years, mean age = 10 years) and their parents to improve HIV and ART knowledge and adherence. The intervention group received eight structured home visits from the same nurse over a three-month period. The home visits were structured to improve participants' understanding of HIV and to overcome barriers to medication adherence. The control group received the standard training on HIV and ART, which includes one home visit and reminder aids such as pill box organizers and beepers. Self-report measures and pharmacy refill data were used to assess adherence. While self-report measures showed an improvement in adherence immediately after the intervention the difference

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compared to the control group was not significant (p=0.07). However, using pharmacy refill data there was a significant improvement in adherence in the intervention group compared to the control group (p=0.02). Despite improved adherence, neither of the groups showed changes in VL as measured three to eight months after the intervention (Berrien et al., 2004).

Wamalwa et al. (2009) have conducted an intervention in Kenya with the caregivers of 99 children (aged 15 months – 12 years, median = 4.7 years) to improve adherence to ART in children. The intervention group received medication diaries and counselling, while the control group only received counselling. Caregivers kept the medication diaries for nine months, and were checked by staff at each clinic/hospital visit. Although caregivers in the intervention group reported higher adherence (as measured by caregiver self-report), compared to the control group, this was not statistically significant (p = 0.08). There was no difference between groups regarding VL. However, mean CD4 counts at six months was higher in the control group compared to the intervention group (although not significantly different) (Wamalwa et al., 2009).

Funck-Brentano et al. (2005) have conducted a three-arm non-randomized trial using a peer support group among HIV-infected adolescents (aged 12 – 17 years) attending an outpatient clinic in France. Thirty adolescents formed the study population and were grouped according to those who could attend support groups, those who declined the support group and those who lived too far to attend the session. The intervention group received 90 minute therapy sessions every six weeks from trained therapists over 26 months. After two years, there was no statistical difference in adherence across the three groups using patient self-report. There was also no statistical difference in VL and CD4 count (Funck-Brentano et al., 2005).

Muller et al. (2009) have conducted a three-arm non-randomized trial comparing the effects of three different ART regimens on adherence and VL outcome among 66 children

(mean age = 51 months) in South Africa. Adherence was assessed using MEMS data every month for three months, and VL data was collected every six months. There was no statistical difference in adherence between the groups. However, children receiving a boosted and unboosted PI -based regimen had significantly lower VLs compared to those on non-nucleoside reverse transcriptase inhibitor (NNRTI)-based regimens (p = 0.002) (Müller et al., 2009).

In 2014, Nieuwlaat et al. (2014) updated the comprehensive review on 'Interventions for enhancing medication adherence' across the spectrum of chronic illnesses on which RCTs have been conducted. The review includes evidence from 182 randomized controlled trials (RCT's) that met their inclusion criteria. Thus, the RCT's included had data on medication adherence as well as clinical outcomes. Comparability across these reviews is challenged by a broad range of adherence measures. Despite studies reporting similar conclusions, the small samples sizes and inadequate methods often prevented definitive and convincing conclusions. Furthermore, many studies lacked any theoretical underpinning to their findings. Moreover, Nieuwlaat et al. (2014) have stated that despite the large number of RCTs added to the review since their last publication in 2008, their conclusions are only slightly altered - adherence interventions to date remain complex and mostly ineffective (Nieuwlaat et al., 2014).

Of these interventions included, 36 were identified as interventions to improve medication adherence among ART users. Only two interventions were with individuals younger than 16 years of age (Abrahams et al., 2010; Berrien et al., 2004), of which one was conducted in South Africa (Abrahams et al., 2010), and the other in the United States. Both have been described above (Berrien et al., 2004).

The study conducted in South Africa by Abrahams et al (2010) included 274 girls aged younger than 16 years, assessing adherence to a post-exposure prophylaxis (PEP) for HIV after rape with telephone counselling. Participants were randomized into an intervention

(n=136) and a control (n=138) group. The intervention group received the PEP along with standard care and telephone counselling. The control group received the PEP and only standard care. Measures of adherence included pill counts and liquid measure. There was no statistical difference or improvement in adherence to the PEP between the two groups (Abrahams et al., 2010).

In 2015, Mbuagbaw et al. (2015) conducted a systematic review of interventions to improve ART across populations and age groups (Mbuagbaw et al., 2015). They identified 49 RCTS on ART, of which three were focused on youths younger than 18 years old and caregivers (Abrahams et al., 2010; Berrien et al., 2004; Letourneau et al., 2012).

Letourneau et al. (2012) have conducted a pilot RCT among 34 youth (aged 9-17 years) in the United States and their caregivers to compare multisystemic therapy (MST) (Ellis, Naar-King, Cunningham, & Secord, 2006)with standard care plus one session of motivational interviewing (MI) (Miller & Rollnick, 2002). MST therapy was adapted in this intervention to target HIV-related problems at the level of the child, caregiver, family and broader community. The intervention involved intensive therapeutic support from trained therapists. Participants were seen on average twice a week at either their home, school or clinic over a six-month period. The control group received the standard care plus one session of MI. MI interviewing was provided by two trained therapists and aimed at increasing participants' motivation and self-efficacy. Adherence was assessed via self-report measures, and clinical data on CD4 count and VL were obtained at baseline and post-intervention. There was no improvement in adherence or clinical outcomes in either of the groups (Letourneau et al., 2012).

Research gaps

Despite a growing body of qualitative literature identifying barriers and facilitators of adherence among children on ART in SSA, studies often include children across wide age ranges and at various developmental stages. Consequently, limited age-specific knowledge is available that may contribute to intervention development. Children younger than five years are largely excluded from qualitative research studies as interviewing and focus group methodologies are not a useful means of capturing treatment experiences directly from these children. Observational methods are needed to provide information-rich cases of children's direct experiences. These methods have been useful among children younger than five years (Rochat et al., 2008). In addition, given the complexity and fluidity of caregiving among these children (Coetzee et al., 2015), a better understanding of household environments are needed, including how they may influence adherence to ART.

CHAPTER 3

The research context

Introduction

The following chapter is organized into two parts. Part one describes the research context and provides information on the study location and the HIV programme. Part two describes the methodological overview of the research.

KwaZulu-Natal, Umkhanyakude district (study area)

The research was conducted in the Umkhanyakude district of Northern KwaZulu-Natal, South Africa (Figure 3.1). KwaZulu-Natal, situated on the east coast of South Africa, is one of nine provinces in South Africa with 11 municipal and health districts. KwaZulu-Natal has the second largest population in the country, estimated at 10, 694, 400 in 2014 (Statistics South Africa, 2014). A large proportion of the population is Black African, and the primary language amongst residents of the area is isiZulu (Statistics South Africa, 2011). KwaZulu-Natal is estimated to have the highest HIV prevalence rate in South Africa, estimated at 27.0% in the age group 15-49 years at the end of 2012 (Department of Health South Africa, 2013a). The Umkhanyakude district, the northern most district of KwaZulu-Natal, is predominantly rural and has five municipalities; Jozini, The Big Five False Bay, Hlabisa, Mtubatuba, Umhlabuyalingana.

Figure 3.1. Map of South Africa and location of KwaZulu-Natal province

The Hlabisa sub-district (study location)

This research took place in the Hlabisa sub-district within the Umkhanyakude district (Figure 3.2). The Hlabisa sub-district is predominantly rural, with 80% of the area under traditional authority (Hlabisa Local Municipality, 2013). The Hlabisa sub-district includes two large towns, Mtubatuba and Hlabisa, and one peri-urban area, KwaMsane. Residents of the area live in scattered and multigenerational households with an average of seven members per household (Tanser et al., 2008). Approximately 10% of the land is commercial farmland, and 6% is urban (Hlabisa Local Municipality, 2013). At the end of 2011, the Hlabisa sub-district health services serviced a population of 220 000 individuals with 37.8% (83 160) of the population being children between the ages of one and 15 years old, and 2.4% of the population being infants less than a year old (Bland et al., 2013).
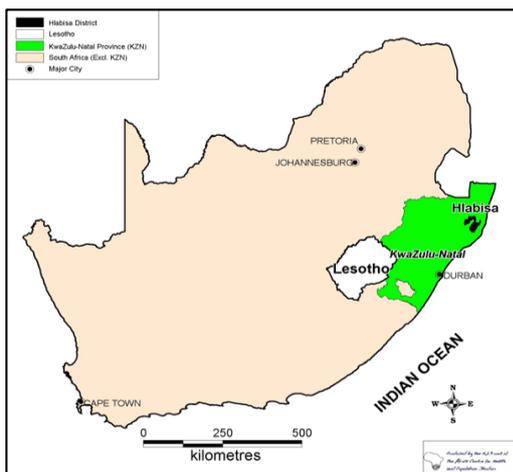
Figure 3.2. Map of the study area (Hlabisa) within KwaZulu-Natal Province of South Africa

Africa Centre for Health and Population Studies (Africa Centre)

The research took place under the auspices of the Wellcome Trust-funded Africa Centre for Health and Population Studies (www.africacentre.ac.za), established in late 1997 to monitor health and demographic change brought about by the rapid escalation of HIV in South Africa and the study area. The Africa Centre collects data from household members within the surveillance area (study area), known as the demographic surveillance area (DSA).

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The DSA is 440 km^2 and covers a population of 87 000, of which 75 000 are resident within 11 000 households and predominantly isiZulu-speaking (Tanser et al., 2008). Based on data from the Africa Centre, the DSA shares characteristics similar to that of LMIC countries (Muhwava & Nyirenda, 2008). The area is characterized by high rates of unemployment, and families typically rely on state pensions and social grants (Tanser et al., 2008).

Ethical permissions to conduct research. Since its establishment, the Africa Centre reached agreements with the local Department of Health (DoH) allowing researchers to conduct their studies in the study area and in primary healthcare clinics that fall within the DSA. Prior to undertaking research at any of the primary healthcare clinics within the DSA, researchers are required to obtain permission from the Hlabisa Hospital Management Committee as well as the permission of the Head Nurse at each facility. Since its establishment, the Africa Centre has built close ties with the surrounding members of the community. The Africa Centre established a community liaison office (CLO), which has for the past 12 years fostered close ties with the surrounding heads of the community. These community heads meet once a month in the form of a community advisory board (CAB) to review new research studies undertaken at the Africa Centre. Even in instances where a study receives ethical clearance from an institutional review board (IRB), researchers cannot begin data collection without approval from the CAB.

Hlabisa HIV Treatment and Care Programme (HIV programme)

Residents of the Hlabisa sub-district receive HIV-related healthcare under the Hlabisa HIV Treatment and Care Programme (HIV programme) (Bland et al., 2013; Houlihan et al., 2011). Initially the HIV programme was a joint initiative between the Africa Centre and the local Department of Health, but since 2012 it has been entirely managed by the KwaZulu-Natal Department of Health (Bland et al., 2013). By the middle of 2012, the HIV programme had initiated more than 20 000 PLWH onto ART across one 250-bed hospital (Hlabisa

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Hospital), and 17 community-based primary healthcare clinics (Tanser et al., 2013). ART coverage has increased substantially since the roll-out of ART in the area in 2006, when only 1800 people living HIV had been initiated (Bland et al., 2013). Six of the primary healthcare clinics fall within the DSA of the Africa Centre (Figure 3.3). The figure below shows the Africa Centre in relation to the 17 primary healthcare clinics in the Hlabisa sub-district, as well as the location of Hlabisa Hospital.
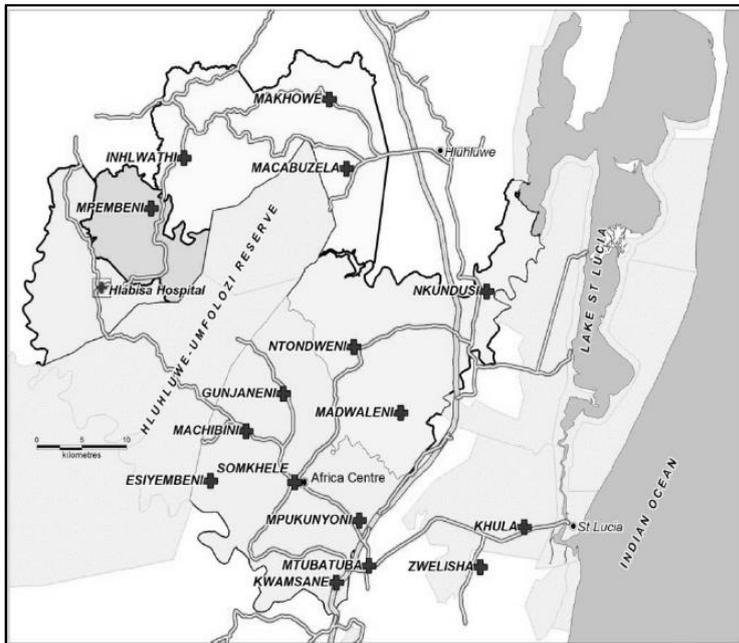
Figure 3.3. Map of the Hlabisa sub-district within the Umkhanyakude district, Northern KwaZulu-Natal

The Africa Centre provided 15 of the 17 primary healthcare clinics with park homes, funded by the President's Emergency Plan for AIDS relief (PEPFAR), where patients receive HIV and TB services. At the end of 2011, ART treatment coverage of all HIV-infected individuals in the community had risen from 0% in 2004 to 31% in 2011(Zaidi, Grapsa, Tanser, Newell, & Bärnighausen, 2013).

ART clinics in the HIV programme. Following the national roll-out of ART in South Africa in 2004, ART services were only available at Hlabisa Hospital. In 2005, ART services expanded to KwaMsane clinic, the largest clinic in the sub-district. At the end of

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2006, an additional 6 clinics were providing ART services to clinic users and by the end of 2007, all 17 clinics in the sub-district were providing ART services. The ART clinics operating within the Hlabisa sub-district are small, limited in terms of space and often short-staffed, typical of rural facilities in South Africa (Bland et al., 2013).

The HIV programme is largely nurse- and counsellor-led, with doctors visiting the clinics to initiate patients on ART and to follow up on clinical problems as they occur (Bland et al., 2013). At the end of 2008, the HIV programme had between 20 and 30 nurses, and approximately 60 adherence counsellors (Houlihan, Seigel, Buckley, Copelyn, & Lessells, 2009). Each clinic has at least two HIV counsellors and up to four primary healthcare nurses overseeing and managing the services provided. Given the shortage of doctors in most LMIC countries, as well as within the Hlabisa sub-district, task-shifting in the form of 'nurse-initiation and management of ART (NiMART)' allowed for nurses to initiate and manage patients stable on ART (Georgeu et al., 2012). Patient data from the clinics are uploaded onto the database known as ARTemis. The Africa Centre established the database and it contains all the clinical information of patients receiving treatment at the clinics (www.africacentre.ac.za).

Clinic A. Clinic A was the primary recruitment site (Clinic B was also used in Phase 2) for both phases of this study. Clinic A is the largest peri-urban clinic in the Hlabisa sub-district. The clinic is situated within a large township, and in the early 2000's a Reconstruction and Development Programme (RDP) development was added to it. The RDP was established following the first democratic elections in South Africa in 1994. The government stated that housing was a constitutional right to previously disadvantaged South Africans and initiated the RDP housing project. A typical house built under RDP regulations has an area of 36m^2, and is built with cement bricks and mortar, with corrugated iron roofs and between two and three windows. The units are largely open-plan, this includes a

bedroom, kitchen and lounge. The lavatory area is built separately (Moolla, Kotze, & Block, 2011).

Clinic A manages around 10 000 individual patients (including HIV patients) a month (Houlihan et al., 2009). The clinic is the only clinic in sub-district that offers 24-hour health services (Muhwava, Nyirenda, Mutevedzi, Herbst, & Hosegood, 2008). The clinic is frequented by a physician from Hlabisa Hospital and, at the time of this study, a specialist paediatrician (Dr Ruth Bland) ran a Family Clinic for children on ART. Dr Bland established the Family Clinic in 2008, and by 2009 there were 41 infants less than a year old on ART (Cooke, Little, Bland, Thulare, & Newell, 2009). At the end of September 2013, 2390 children were initiated onto ART across all clinics in the sub-district, with the majority of the children initiated at the Family Clinic.

Children in the HIV programme. The HIV programme adheres to the South African HIV treatment guidelines (Department of Health South Africa, 2014), which reflects WHO recommendations for treatment and management of HIV in children (WHO, 2014). The South African government has made healthcare and medications (including ARV's) free for children (Bland et al., 2013). According to the latest guidelines on ART initiation among infants, children and adolescents in South Africa, all children younger than five years old should be initiated on ART. The latest guidelines also state that social criteria necessary for initiation include that at least one person is identified as a caregiver and should be able to supervise all administration of the medication. Children between the ages of 5 and 10 years are eligible for ART if they meet the symptom criteria of WHO clinical stage 3 or 4 (WHO, 2005) regardless of CD4 count, or if they have a CD4 count < 500 cells/ microlitre (cells/μl) (Department of Health South Africa, 2014).

ART for infants and young children. There are currently nine antiretroviral drugs available to infants and young children on ART in South Africa. These are ABC, 3TC, d4T,

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LPV/r, EFV, AZT, Didanosine (ddl), Ritonavir (RTV), and Nevirapine (NVP). Each of these drugs have specific dosing instructions (e.g. if administered in pill form whether the tablet may be crushed or chewed, or the capsule opened and diluted in water or mixed with something sweet), and some (d4T, LPV/r) have specific storage requirements (refrigeration or stored below <25°C).

The above-mentioned drugs are available in triple combination as three treatment regimens, namely first-line, second-line and third-line ART regimens. Children are usually initiated on first-line ART. Second-line and third-line regimens are recommended following consistent indications of raised VLs or, in rare cases, drugs may be changed after adverse reactions (Department of Health South Africa, 2014).

First-line regimen. The first-line regimen is usually a combination of three ARVs, although some fixed-dose combinations for children do exist. Two first-line regimens exist; namely, a PI -based regimen, and non-nucleoside reverse transcriptase inhibitor (NNRTI)-based regimen.

For children under three years (< 10 kgs), a first-line regimen is a combination of ABC, 3TC and LPV/r. This combination constitutes a first-line PI-based regimen. All three of these medications are available as liquid formulations, and dose changes vary depending on the weight of the child. Caregivers are required to measure the millilitres prescribed for each medication (usually ranging between 1ml and 5ml) and administer it to the child. The guidelines do not provide specific instructions on how caregivers should measure and administer the doses.

For children between three and 10 years old (>10kg), a combination of ABC, 3TC and EFV is recommended. This combination constitutes a first-line NNRTI-based regimen. The guidelines state that children should be taken off liquid medications and switched to tablets and capsules as soon as possible. Recent evidence from a randomized trial on paediatric ART

monitoring and treatment strategies amongst children in Uganda and Zimbabwe on ART showed that children under three years are able to take tablets and that caregivers preferred administering tablets to liquids (Nahirya-Ntege et al., 2012). Furthermore, the latest guidelines state that LPV/r should be stored in a cool place (<25°C). For children on ART, routine monitoring includes VL testing at six months, one year on ART and then every 12 months.

Second-line regimen. A second-line regimen is recommended to children who have a VL > 1000 copies/millilitre despite reports of optimal adherence. Children failing first-line PI-based regimens are switched to second-line regimens based on consultation from an expert. Children failing first-line NNRTI-based regimens are switched to second-line regimens usually consisting of a combination of AZT, 3TC and LPV/r (for those previously on ABC, 3TC and EFV) or AZT, ABC and LPV/r (for those previously on d4T, 3TC and EFV).

Third-line regimen. All children failing a second-line regimen are referred to an expert to recommend ARVs for a third-line regimen. According to Department of Health guidelines (Department of Health South Africa, 2014), before initiating a child on ART, a primary caregiver is required to undergo three HIV education sessions. The sessions are conducted on three separate occasions to provide the necessary knowledge and understanding of HIV and treatment administration. At the time of writing, most of the children receiving ART in South Africa received three separate ARV drugs, available in tablet or liquid form for younger children. Drug doses are dependent on a child's weight. The drug's liquid formulations require precise measurements by the caregiver. Once initiated on treatment, caregivers are expected to attend monthly clinic visits to collect pharmacy refills and consult the HIV counsellor. Often persons receiving ART need to travel to the clinic more frequently

than once a month if there are drug shortages. If drugs are available, and patients are deemed stable by their doctor, they may receive a two months' supply of medication.

Children failing on first-line ART in the area. In 2014, scientists from the Africa Centre sought to characterize acquired drug resistance amongst HIV-infected children on ART, and failing first-line regimens in the HIV programme (Pillay et al., 2014). Pillay et al. (2014) have collected plasma samples from 101 children (under 15 years old) identified as failing first-line. Of the 101 children (79 on a NNRTI-based regimen and 16 on a PI-based regimen) enrolled into the study, these authors were able to successfully genotype the DNA from 89 children. They found that at least 80% of the children on an NNRTI-based regimen had mutations in their DNA that cause resistance to ARV's (resistance mutations). They found only one child on a PI-based regimen to have a major resistance mutation. Pillay et al. (2014) have expressed concern about the prevalence of high-level resistance mutations amongst this cohort and argued that it is an indicator of the prolonged time that children spent on a failing regimen. They highlighted the need for timely identification of children failing the first-line regimen, better adherence counselling and patient follow-up.

Conclusion

The research context used for the data collection of this thesis was well suited to address the research questions and to meet the overall objectives and aims of this thesis. The Hlabisa sub-district is characteristic of other impoverished areas in South Africa and has one of the highest HIV rates in the world. At the time of writing, children on ART in the Hlabisa sub-district are beginning to show possible signs of drug resistance. Drug resistance is problematic in the context of limited ART regimens available to CLWH in South Africa.

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Methodological overview

In keeping with the worldview and traditions of qualitative research I undertook a focused ethnography in order to answer the research question and sub-questions in two phases. Focused ethnography has emerged as a useful method to study very discrete subjects in certain cultures, sub-cultures or settings and has been used in health research, and more specifically in nursing research (Knoblauch & Schnettler, 2012; Venzon Cruz & Higginbottom, 2013). Focused ethnography has its origins in traditional ethnography. The method is appropriate for use amongst individuals believed to share common experiences and behaviours.

Due to the flexibility and wide variety of data collection tools available for use within a focused ethnography, the design allows the researcher to gain an understanding of the phenomenon directly from their participants (emic view) whilst also incorporating their own understanding of the phenomenon into the study (etic view) (Venzon Cruz & Higginbottom, 2013). Focused ethnography differs from traditional ethnography in that instead of studying an entire social field, it is only concerned with a specific aspect within a field. The scope of the investigation is pre-determined and does not evolve in the open context and nature of traditional ethnography (does not become adapted along the way) (Venzon Cruz & Higginbottom, 2013). Focused ethnography provided the best possible description of the research design used for this study. Under this umbrella term I was able to include and justify the various data collection methods used, and the time period in which I was engaged with data collection.

In order to make clear how each of my objectives were addressed, I have tabulated the objective and respective qualitative data collection methods and tools used below (Table 3.1). The study was conducted in two phases. Phase 1 consisted of interviews and focus group discussions (FGDs) with key stakeholders in the treatment and care of children on ART and

was used to structure and inform the observations undertaken in Phase 2. Phase 1 was conducted between August and December 2012, and Phase 2 was conducted between January 2013 and March 2014.

Table 3.1

Objectives of the Study Matched to the Data Collection Method

Phase 1 Objective	Data collection method	Materials and tools
1	In-depth interviews	Interview flyer (*Appendix* A)
	Doctors	Informed consent –doctor/nurse (*Appendix* B)
	Nurses	Doctor-nurse interview schedule (*Appendix* C)
		Audio recorder
	Semi-structured focus groups Caregivers of children ≤ 5 years on ART	Focus group flyer (*Appendix* D)
		Informed consent (*Appendix* E)
		Caregiver focus group guide (*Appendix* F)
	Adherence counsellors	Informed consent (*Appendix* E) Counsellors focus group guide (*Appendix* G)
	Traditional healers	Informed consent (*Appendix* E) Traditional healer focus group guide (*Appendix* H) Audio recorder

Table 3.1 *(continued)*

Phase 2		
Objective	Data collection method	Materials and tools
2	Naturalistic observation using observation schedules, video and field notes	
	Caregiver-child dyads	Caregiver consent form (*Appendix* I)
		Home visit 1 observation schedule (*Appendix* J)
		Home visit 2 and 3 observation schedule and video recorder (*Appendix* K)
	Participant journals	A4 college exercise book and pen
3	Naturalistic observation and field notes	
	Caregiver-child-counsellor interaction	Counsellor consent form (*Appendix* L)
		Counselling observation schedule (*Appendix* M)
		Stop-watch
		Field notes

CHAPTER 4

Phase 1 - Methods

Objective

In an effort to explore caregivers', doctors', nurses', HIV counsellors', and traditional healers' perspectives of the barriers and facilitators to the administration of medication to children under five years by their caregivers, I conducted semi-structured interviews with doctors and nurses that provide treatment and care to children younger than five years on ART. In addition, I conducted focus groups with HIV counsellors, traditional healers and caregivers of children younger than five years on ART.

Sample design and sampling methods

Sampling and procedure. I used purposive sampling methods to recruit participants for Phase 1 of the study. Purposive sampling is a non-random sampling technique that allows the researcher to select key informants based on the contribution that their knowledge will add to the understanding of the phenomenon being investigated (Bernard, 2011).

Individuals who were considered key stakeholders in the treatment and care of children below five years receiving ART were invited to take part in either an in-depth interview or focus group. I subsequently invited doctors, nurses and counsellors working in the Hlabisa HIV Treatment and Care Programme to participate in interviews. I furthermore invited individuals identified as primary caregivers of children younger than five years and attending clinic A to take part in a focus group discussion. And lastly, I invited traditional healers with experience in consulting with persons living with HIV to take part in FGDs.

Recruitment and data collection. *In-depth interviews with doctors and nurses*. Interviewing is the most commonly used method of qualitative data collection due to the flexibility and ease with which the interview can be arranged compared to other methods such as observation (Willig & Stainton-Rogers, 2007). Doctors and nurses were selected for

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individual in-depth interviews that were conducted at their earliest convenience to minimize time taken away from attending to their work responsibilities.

Doctors were approached via e-mail and verbally onsite during clinic visits in the "gaining entry"-phase (discussed below). Nurses were approached face-to-face at the clinic and/or hospital and were asked to indicate which days at the clinic were less busy for them. I then arranged to be at the clinic on those days and was accompanied by an isiZulu-speaking interpreter (for participants who wished to conduct the interview in isiZulu).

Despite the relative ease with which an interview may be arranged, the method itself required that I had good interviewing and note-taking capability, which are skills I had gained during my honours and masters degree training. More importantly, in order to gain a rich description of the data it was necessary to establish sufficient rapport with each of the participants. Rapport-building started with my initial introduction to each of the participants, and the subsequent acknowledgment of the importance of time constraints for staff.

Interviewing as a method does not go without some criticism from the research community. For example, some authors (Potter & Hepburn, 2005) have asserted that interviews do not acknowledge relevant contextual factors such as interviewer-participant interaction that may be important for considering the type of information elicited. Interview guides and note-taker forms were used to record and include field notes and setting descriptions in the transcriptions of the interview data.

Interviews were semi-structured and guided with the use of an interview schedule (Appendix C), lasting 30-60 minutes. The interview schedule contained demographic questions such as, "Can you state your occupation?" and experience questions such as, "Can you tell me about your experience in treating children under younger than five years living with HIV". The schedule also contained other open-ended questions like "What do you think are some of the difficulties that caregivers have with administering ART?"

In order to facilitate a rich description of the data, probes were used such as "Can you tell me more?", and "What else do you think?" to steer the conversation in a way that would elicit more information about a specific question. The interviews were audio recorded so that verbatim transcripts could be produced for further analysis.

Focus groups with counsellors, caregivers and traditional healers. Focus groups have emerged as a useful way to collect vast amounts of information in a relatively short amount of time (Willig & Stainton-Rogers, 2007). Focus groups are typically held with individuals who share a common experience or knowledge about a similar issue. Thus, focus groups allow for participant options and beliefs to be obtained in a manner that may be considered as culturally grounded (Krueger & Casey, 2000). The advantage of focus groups lies in the facilitator becoming aware of instances where participants agree, noting those who are most verbal versus those who remain quieter, and noting how participants respond to one another. Adequate monitoring of the information elicited from participants during the focus groups ensures that a rich description of the underlying phenomenon is obtained. Focus groups are intended to generate data that have higher ecological validity than interviews as participants are subjected to less formality than would be experienced in an interview (Willig & Stainton-Rogers, 2007). Focus groups were an appropriate method as the participants were thought to have similar experiences and were likely to share more about their experiences in the company of others who experienced similar situations.

In all three instances the focus groups were facilitated by one of two isiZulu speaking doctoral candidates (NM and TZ) and moderated by me. Each facilitator had met with me prior to the focus group to go through the focus group schedule and to establish whether questions were clear and concise. Facilitators were encouraged to mostly act as mediators between participants and to present the group with an initial stimulus to allow the conversation to progress based on participants' responses to one another.

Counsellors' focus group. I approached senior clinical staff working at the Africa Centre who had direct contact with the HIV counsellors working at the various clinics within the sub-district. At the time of this focus group the counsellors who were working at the clinics had been appointed by Africa Centre with PEPFAR funding. Counsellors met once a month at the Africa Centre for a meeting. I then arranged to conduct a focus group interview with the counsellors after their monthly meeting in September 2012. All counsellors gave written informed consent. The focus group was conducted in English, as all counsellors were fluent in English, and lasted 75 minutes. The focus group interview took place in a private meeting room at the Africa Centre, and participants were provided with lunch and refreshments to thank them for their time. Following the focus group, the note-taker and I met immediately afterwards to discuss the focus group and to debrief. The debriefing involved a discussion of some of the key themes that emerged from the focus group and whether any conflicts or tensions were noted during the discussion.

Caregivers' focus group. Caregivers to children younger than five years on ART and attending Clinic A were invited to take part in a focus group by their doctor (RMB), as well as by the Africa Centre nurse based at Clinic A. Caregivers were purposively recruited on the following basis:

1. Caregivers of children younger than five years on ART with suppressed VLs (≤ 400 copies per millilitre after one year on ART)

2. Caregivers of children younger than five years on ART with unsuppressed VLs (≥ 400 copies per millilitre after one year on ART)

3. Caregivers of children newly initiated on ART (on ART for less than one year)

Caregivers were asked to attend the focus group at the clinic in November 2012 and all provided written informed consent. The focus group was conducted in isiZulu in a private room at the clinic and lasted 120 minutes. Participants were reimbursed for travel costs, and

the caregivers and children were provided with lunch and refreshments to thank them for their time. After the focus group ended, the facilitator (NM) and I had met to debrief. We followed a similar procedure as outlined above.

Traditional healers' focus group. The CLO at the Africa Centre assisted with the recruitment of the traditional healers. One of the doctoral students at the Africa Centre (TZ) had met with a group of traditional healers a few months prior to my arrival and still remained in contact with many of them. She telephoned 10 healers who had agreed to take part in my study and they attended the focus group at the Africa Centre in November 2012. All provided written informed consent to participate in the study. The focus group took place in isiZulu in a private meeting room at the Africa Centre, and lasted 135 minutes. The traditional healers were reimbursed for travel costs and were provided with a cooked lunch at the Africa Centre canteen.

Ethics

Ethical approval. I moved to Mtubatuba (from Cape Town, South Africa), one of the three towns in the Hlabisa sub-district, in August 2012 to commence the data collection phase of my research. At the time of the move I had received ethical clearance for the research from the Stellenbosch Health Research Ethics Committee (HREC) (S12/05/135), as well as reciprocity with the University of KwaZulu-Natal (UKZN) (Appendix N).

Ethical considerations. *Gaining entry to the field.* In keeping with the qualitative methodology, I undertook a brief period of engaging with the context and becoming familiar with the recruitment site. I had met with the CAB of the Africa Centre in September 2012 to present the study and obtain their permission to enter the setting. The CAB granted permission for the study to proceed. Following permission from the CAB (CAB approval letter Appendix O), I attended a meeting at Hlabisa Hospital to meet with the Hospital Managers where I presented the aims and objectives of my research, and was granted

permission to approach staff and clients at the primary recruitment site for inclusion into the study.

Once all necessary approval was obtained to enter the field and to approach the relevant participants, I spent time becoming familiar with the primary recruitment site –the Family Clinic. As mentioned previously, Dr Bland, one of my doctoral supervisors, had established the Family Clinic. She held this clinic every Friday, until December 2012, after which one of the Hlabisa doctors took over. Over a period of a month I attended the family clinic with Dr Bland and observed how things operated at the clinic and how caregivers interacted with the doctors and counsellors. More importantly, I was introduced to staff and caregivers, whom I subsequently approached for inclusion in Phase 1. These insights proved useful, especially for Phase 2 in being able to decide how to approach caregivers and to understand the clinical route they followed when attending their monthly clinic appointments. I also accompanied Dr Bland to the paediatrics ward at Hlabisa Hospital and shadowed a clinical rotation. I was then also introduced to paediatricians with experience in treating children on ART.

Data analysis

Participant characteristics. Demographic information such as age, gender, marital status, level of education, and income were obtained from caregivers who took part in the caregiver focus group. Only partial demographic information (such as job description and gender) was available from the other respondents. Descriptive statistics (such as mean age etc.) were computed using the Statistical Package for the Social Sciences version 19 (Field, 2005).

Transcription. All the interviews and focus group interviews were audio-recorded and transcribed verbatim using ATLAS.ti version 7 (Scientific Development Software [ATLAS.ti], 2003). Data collected in isiZulu were outsourced to a transcribing company who

transcribed the transcripts in isiZulu and translated them into English. For each transcription the transcribing company signed a confidentiality agreement to ensure that the data remained secured and adhered to the ethics required for this study. Both versions of the transcripts were then given to the Zulu-speaking facilitators of the focus groups for quality checking against the audio recording. Both facilitators were reimbursed for their time. The transcripts and field notes were uploaded to ATLAS.ti version 7 for data analysis. The data analysis methods is discussed in the next section of this chapter.

Rigour. In an effort to ensure rigour and transparency of the data analysis within the thesis I had chosen to use ATLAS.ti qualitative data analysis computer software. The programme, currently in its seventh version, assists with qualitative data analysis by providing its user with functions to support a robust analysis.

The programme developers modelled the software on grounded theory methods, allowing users the option to create free codes and to visualize their coded work in a network space. Computer-aided qualitative data analysis (CAQDAS) has been available since the early 90's to assist researchers with the management and analysis of text-based data that later went on to support analysis of image-based, audio, and video data (Friese, 2014). Software programmes such as ATLAS.ti allow researchers to confidently analyse data according to the methodological strategy best suited to answer their research questions. Various methods of qualitative data analysis exist and inductive thematic analysis was chosen to analyse the data for Phase 1 as well as Phase 2.

Inductive thematic analysis. I conducted thematic analysis according to the guidelines set out by authors Virginia Braun and Victoria Clarke (2006). In their experience and during their review of the literature pertaining to thematic analysis, the authors found a large discrepancy between what thematic analysis is and how to go about conducting it. For

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the purposes of maintaining scientific rigour and transparency I chose to conduct my analysis in keeping with their recommendations (Braun & Clarke, 2006).

Braun and Clarke (2006) have provided a six-phase "theoretically-flexible approach" (p.2) that produces a comprehensive and holistic reflection of the data. An inductive thematic analysis differs from a theoretical thematic analysis in that themes identified are closely tied to the data themselves, as opposed to being fitted to a pre-existing coding frame.

Although I used Bronfenbrenner's EST (Bronfenbrenner, 1979) to organize themes that emerged from the data, the data were not coded or bound by the concepts related to the theory. The theory provided a suitable lens through which to interpret and make sense of the findings. Semantic themes, which merely described the data, evolved into latent themes, which allowed interpretation of the themes within a broader theoretical context. The six phases are shown in the Figure 4.1 below. The figure also shows how ATLAS.ti was used to facilitate each of the steps.
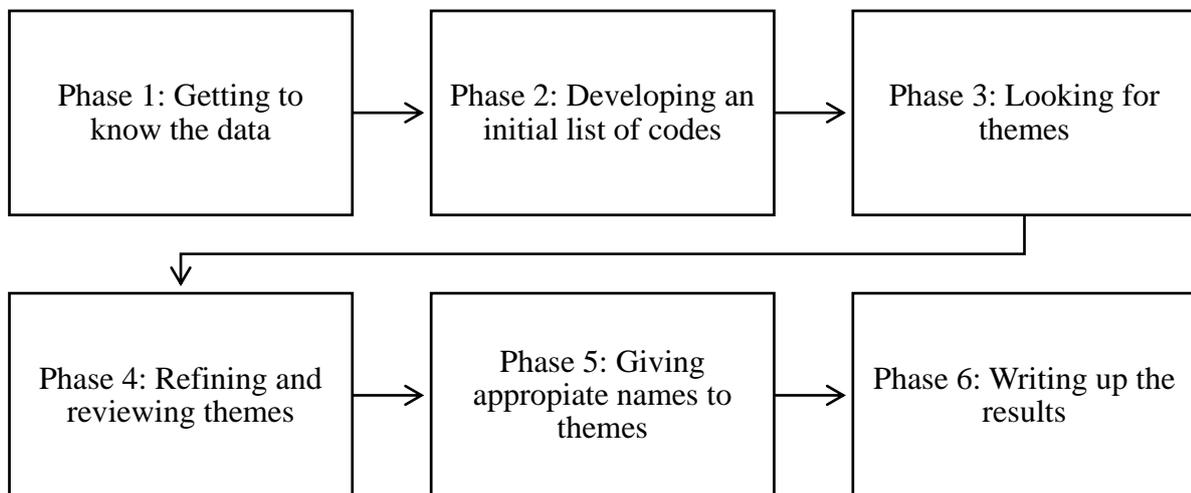
Figure 4.1. Six phases of thematic analysis, adapted from Braun and Clarke 2006 as used within ATLAS.ti v7

Phase 1. Once the data had been collected, I started to familiarize myself with the information that had been collected. Part of this entailed reading and re-reading through the transcripts to search for meanings and patterns throughout the data, and recognizing potential codes to use for the formal coding phase. I imported all the transcripts into ATLAS.ti (as primary documents) and began to collect ideas for initial codes using the memo function of the software as I read through the transcripts. Within ATLAS.ti the user can create free codes from a list using the memo function (Friese, 2014).

Phase 2. Once I had collected initial ideas for codes, I reviewed some of the codes for redundancy before importing them for use within ATLAS.ti. Friese (2014) recommends creating as much structure to the code list as possible early on to reflect transparency in the coding of the data. Semantic codes (descriptive codes) were used initially to describe the quotation of interest in a meaningful way. Saldana (2012) has offered ideas for other types of codes to include to facilitate coding, such as emotion codes (to code for feelings), attribute codes (to code for age, gender, occupation etc.), and versus codes (to highlight contrasts) (Saldana, 2012). Friese (2014) encourages the use of multiple layers of coding, as coding in such a way allows for the use of advanced functions of ATLAS.ti, for example, the code-occurrence table and the query tool. Coding in itself is an iterative process and requires constant back and forth until there is an overall satisfaction with the codes generated.

Phase 3. Once the data had been coded initially and a long list of codes had been produced, the analysis had to be refocused at the broader level of themes. During this phase, latent codes were developed and codes with inter-related meanings or ideas were sorted and grouped into potential themes. In ATLAS.ti this was done by grouping codes into families. Not all codes grouped into a family necessarily represented a separate theme. As Braun and Clarke (2006) explain, "A theme captures something important about the data in relation to

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the research question, and represents some level of *patterned* response or meaning within the data set" (Braun & Clarke, 2006, p. 10).

   Phase 4. This phase involved a refinement of the themes developed in phase 3. During this phase, I was able to decide which themes were actual themes and contained enough data to support them, and which themes were similar and could thus be merged into other suitable themes. In ATLAS.ti the network view function was used to facilitate the decisions made for themes. This phase also means going back to the level of the data and reading through all data segments that warrant inclusion in the theme. In the network view and through the use of appropriate filters, I was able to read all the data segments pertaining to a theme to decide whether there was an overall fit.

   Phase 5. Following the satisfactory establishment of themes that represent the data collected throughout, I went about giving each theme an appropriate name. At this stage I used another level of refinement and considered theme names based on theory and data. For example, one particular theme would be named Microsystem, and the extended name of the theme would be based on the data collected. This is clarified in the results that follow. During phase 4 and 5, memo writing was used to reflect on the content of the themes and used to synthesize the overall meaning pertaining to the theme. Memos developed in ATLAS.ti were attached to the relevant networks.

   Phase 6. Phase six involves the presentation of the results of the data. This is done in the results section below.

CHAPTER 5

Phase 1 - Results

Participant characteristics

A total of 40 respondents took part in the interviews and focus group discussions (Table 5.1).

Doctors. Five doctors took part in interviews. Three doctors received their medical training abroad, and two in South Africa. Four of the doctors were predominantly English-speaking, and one doctor spoke isiZulu. The English-speaking doctors used isiZulu-speaking interpreters (usually counsellors) during patient consultations. Three of the doctors were female, and two were male. The doctors were mainly clinic-based (and representative of all of the clinics in the DSA – see Figure 3.3), with two of the doctors being permanently based at the hospital (Table 5.1).

Nurses. Four nurses took part in interviews, all of whom were professional nurses with ART training. All were female, and based at the clinics (representative of three of the clinics in the DSA) (Table 5.1).

Counsellors. Ten counsellors took part in the counsellor focus group, all of whom had been trained as HIV counsellors, and were based at the clinics (representative of six of the clinics in the DSA) where they provided HIV counselling and testing, as well as routine adherence counselling to ART users. Nine of the counsellors were female, and one was male (Table 5.1).

Caregivers. All of the caregivers (n=11) who took part in the caregiver focus group were female. Seven of the caregivers were the biological mothers of the child on ART, three were grandmothers, and one was the child's aunt. Nine of the caregivers were single, one of the caregivers was widowed, and one was married. Seven of the caregivers had attended high school but did not complete it, two had achieved a Grade 12 level of education, one had no

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formal education and one had a tertiary level education and was, at the time of the interview, a retired teacher (Table 5.1). Nearly all (9 out of 11), had received the pre-ART education sessions before the child was initiated onto ART. All stated that they were unemployed and seven of the caregivers were receiving a child support grant (CSG), which at the time of the focus group was worth 280 ZAR (USD= 22.98) per month (Table 5.2).

Traditional healers. All the traditional healers (n=10) who took part had received training from Amref Health Africa (www.amref.org) (Table 5.1). Amref is an international African organization based in Nairobi, Kenya that trained 80 Traditional Health Practitioners (THP) between 2004 and 2007 in the Umkhanyakude district. Since 2007 the project was scaled up by the Department of Health and at the time of writing they continue to train THP's in the area. Seven of the traditional healers were male and three were female. All of the healers practised in the surrounding community and defined their roles as either a herbalist, faith healer/prophet, sangoma or a combination of two. According to Truter (2007), a herbalist has a broad knowledge of curative herbs and predominantly uses herbs for treating diseases. Herbalists normally choose the profession, unlike other healers who ostensibly receive a calling to the profession (Truter, 2007).

According to Truter (2007), a faith healer/prophet is normally a Christian belonging to mission churches. Faith healers predominantly heal through prayer, holy water and ash. A sangoma is generally considered the most senior of traditional healers. According to tradition sangomas are known to receive a calling to the profession. Sangomas, also known as diviners, are known to interact with the supernatural world to diagnose anomalies, especially with ancestors (Truter, 2007).

Table 5.1

Participant characteristics

Respondent	Respondent characteristics
Doctors	
Doctor 1	Medical officer and clinical researcher, trained abroad, male, clinic-based, English-speaking
Doctor 2	Medical officer and clinical researcher, trained abroad, female, clinic and hospital-based, English-speaking
Doctor 3	Medical officer, male, trained locally, hospital-based, English and isiZulu speaking
Doctor 4	Medical officer and clinical researcher, trained locally, female, clinic-based, English-speaking
Doctor 5	Medical officer, female, trained abroad, hospital-based, English-speaking
Nurses	
Nurse 1	Professional nurse with ART specialization, female, clinic-based, English and isiZulu speaking
Nurse 2	Professional nurse with ART specialization, female, clinic-based, English and isiZulu speaking
Nurse 3	Professional nurse employed as a research nurse, female, clinic-based, English and isiZulu speaking
Nurse 4	Professional nurse with ART specialization, female, clinic-based, English and isiZulu speaking
Counsellors	
Counsellor 1	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 2	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 3	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 4	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 5	HIV counsellor, male, clinic-based, English and isiZulu speaking
Counsellor 6	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 7	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 8	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 9	HIV counsellor, female, clinic-based, English and isiZulu speaking
Counsellor 10	HIV counsellor, female, clinic-based, English and isiZulu speaking

Table 5.1 *(continued)*

Respondent	Respondent characteristics
Caregivers	
Caregiver 1	Single, mother, 24 years old, Grade 12, no pre-ART sessions, child has suppressed VL
Caregiver 2	Single, mother, 23 years old, Grade 8, received pre-ART sessions, child newly initiated
Caregiver 3	Single, mother, 33 years old, Grade 12, received pre-ART, child has suppressed VL
Caregiver 4	Single, mother, 22 years old, Grade 8, received pre-ART, child has unsuppressed VL
Caregiver 5	Single, grandmother, 51 years old, Grade 10, received pre-ART, child has suppressed VL
Caregiver 6	Single, aunt, 27 years old, Grade 8, received pre-ART, child newly initiated
Caregiver 7	Married, grandmother, 55 years old, no education, received pre-ART, child has unsuppressed VL
Caregiver 8	Single, mother, 21 years old, Grade 8, no pre-ART, child has suppressed VL
Caregiver 9	Widowed, grandmother, 65 years old, retired teacher, received pre-ART, child has suppressed VL
Caregiver 10	Single, mother, 23 years old, Grade 8, received pre-ART sessions, child has suppressed VL
Caregiver 11	Single, mother, 18 years old, Grade 8, received pre-ART sessions, child newly initiated
Traditional healers	
Traditional healer 1	Herbalist, male
Traditional healer 2	Sangoma and prophet, male
Traditional healer 3	Sangoma and prophet, male
Traditional healer 4	Faith healer and herbalist, male
Traditional healer 5	Faith healer and herbalist, female
Traditional healer 6	Faith healer and herbalist, female
Traditional healer 7	Herbalist and sangoma, male
Traditional healer 8	Herbalist, male
Traditional healer 9	Faith healer and sangoma, male
Traditional healer 10	Herbalist, female

Table 5.2

Characteristics of the Caregivers

Characteristics	n=11
Age of Caregiver (Mean (Std. Dev) years)	32.9 (16.3)
Caregiver's relation to child	
Mother	7
Grandmother	3
Relative	1
Gender of child	
Male	3
Female	8
Caregiver marital status	
Single	8
Married or living in a permanent union	2
Widowed	1
Highest level of education of caregiver	
No formal education	1
Attended high school but did not complete Grade 12	7
Completed Grade 12	2
Graduated from university, college or technikon	1
Employment	
Unemployed	11
Income	
No income	1
Less than R12000 per month	3
More than R12000 per month	1
Grant R280 per month	4
Grant more than R280 per month	2
Received paediatric pre-ART HIV education	
Yes	9
No	2
VL status of child	
Suppressed [a]	6
Unsuppressed [b]	2
New enroller [c]	3

Note. a) VL < 400cps/ml after 12 months on ART; b) VL > 400 cps/ml less than 12 months on ART; c) On ART < 6 months - not yet received first VL

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Results from the thematic analysis

The themes that emerged from these data reflected a "patterned response" (Braun & Clarke, 2006, p. 10), not only due to the frequency with which the response emerged throughout each data set, but also according to investigator judgment as to whether it captured an idea important in answering the research question. The above process resulted in the identification of a composite list of semantic themes from each of the respondent groups. Table 5.3 shows the semantic themes derived from each respondent group, representing the themes derived at after Phase 3 and Phase 4 of the thematic analysis.

The above-mentioned themes were then interpreted through the lens of Bronfenbrenner's EST. Thus, latent themes were arrived at that represent doctors, nurses, counsellors, traditional healers and caregivers' reflections on barriers and facilitators to adherence amongst children receiving ART via a caregiver. These are presented in Table 5.4 below, and represent Phase 5 of the thematic analysis.

Table 5.3

Semantic Themes Derived at after Phase 3 and Phase 4 of Thematic Analysis

Traditional healers (n=10)	Doctors (n=5)	Nurses (n=4)	Counsellors (n=10)	Caregivers (n=11)
Grandmothers as caregivers	Caregiver definition Language barriers	Caregiver definition	Multiple caregivers	Older versus younger children
Trained versus untrained healers	Clinic experience	Frustration	Grandmothers as caregivers	Palatability
Clinic experience	Multiple caregivers	Positive affirmation towards caregivers	Palatability	Caregiver guilt
Disclosure	Grandmothers/mothers as caregivers	Social grants	Disclosure	Caregiver-child relationship
Multiple caregivers	Caregiver-child relationship	Financial insecurity	Adjustment to daily routine (morning versus evening)	Knowledge of importance of medications
Financial insecurity	Traditional medicines	Overburdened households	Religious beliefs	Caregiving experience
Pill swallowing	Overburdened households	Clinic experience	Fathers	Traditional medicines
Palatability	Food insecurity	Caregiver-child relationship	Clinic experience	pre-ART education sessions
Sweet taste distractor	Pill swallowing	Multiple caregivers	Older versus younger children	Use of reminder tools
Biological mothers	Large volumes of medicines	Palatability	Caregiver-child relationship	Disclosure
Social grants	Palatability	Side effects	Side effects	Visible outcomes of treatment adherence
	Doctor-caregiver relationship	Pill swallowing		Clinic experience
	Adherence counselling	Older caregivers		Financial insecurity

Table 5.3 *(continued)*

Traditional healers (n=10)	Doctors (n=5)	Nurses (n=4)	Counsellors (n=10)	Caregivers (n=11)
	pre-ART education sessions Caregiver ill health Disclosure Adjustment to daily routine (morning versus evening) Older caregivers Beliefs about medication Fathers Creativity in treatment administration Sweet taste distractor	Sweet taste distractor Adjustment to daily routine (morning versus evening) Food vouchers		

Table 5.4

Themes and Sub-themes Derived after Phase 5 Thematic Analytic Procedures

System	Description	Theme	Sub-theme
Micro-system	Characteristics of the members of the microsystem that acted as determinants of adherence to ART	Child characteristics	Pill burden
			Palatability
		Parent/caregiver characteristics	Caregiver-child interaction
			Disclosure of the child's HIV status to the caregiver
			Denial of HIV
		Household characteristics	Overcrowded households and food insecurity
			Stigma and disclosure
		Healthcare worker characteristics	Interaction with child
		Traditional healer characteristics	Interaction with child
Meso-system	Interactions between members of the micro-system that acted as determinants of adherence to ART	Caregiver-stakeholder interactions	Language barriers
			Multiple caregivers
Exo-system	Influence of the healthcare context on adherence to ART	Adherence counselling and training	
		Caregiver clinic experience	
		Child clinic experience	
Macro-system	Cultural and sub-cultural factors that act as determinants of adherence to ART	Traditional medicines	
		Religious beliefs	

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Microsystem

Ecological Systems Theory (EST), as explained in Chapter 2, places the child within the microsystem. Alongside the child and within the context of this study, are all the members that directly participate in and influence treatment and care of the child. Thus the child is situated alongside his or her parent (s), caregiver (s), and household members, as well as alongside healthcare workers and traditional practitioners that interact with the children during consultation.

Two over-arching themes were representative of the microsystem in this study, namely (1) characteristics specific to the child that influenced adherence to ART, and (2) characteristics specific to the key stakeholders (parents/caregivers, household members, healthcare workers, traditional healers) that influenced adherence to ART.

Child characteristics. The age group of children represented in this study was children younger than or five years old. Respondents reported that children in this age group seldom knew why they were taking medications, and as such I did not include children themselves as respondents. Instead, doctors, nurses, counsellors, traditional healers and caregivers reported on barriers and facilitators that children in this age group experience with ART.

Pill burden. The analysis indicated that respondents shared similar as well as differing views about what characteristics related to the child influenced adherence to ART. For example, doctors, nurses and counsellors had similar views on pill burden and reported that children struggled with taking large volumes of medication. They explained that children would sometimes be on ART and TB medication simultaneously, and that swallowing pills was problematic for children. One of the doctors (Doctor 5) stated that, "Exactly cause its liquids and especially if they are also affected by TB and possibly malnutrition, then you are looking at the ARV medication, your TB medication, your extra multivitamins and Bactrim

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(an antibiotic used to treat infections) [and] that is a lot" (P5). Similarly, one of the adherence counsellors (Counsellor 2) stated, "Then this medication from the babies is more than the adult. It's a lot of medication especially Efavirenz there is 200 and also 500 milligram and there is also the syrups, so maybe it is too much" (P8). One of the doctors (Doctor 3) stated that in his experience some caregivers of children on ART were uncomfortable with the number of medications the child received, and were often reluctant to administer the medications, especially when the child was ill. He stated that:

> . . . sometimes they [caregivers] look at the amount of medication that the child is getting. You find that, like on a prescription there'll be about five to six drugs on top of the ARVs. So the mother feels as if this is too much for the child and so even on their face you could actually see that they think it's a burden to the child to be given such medications, [it's] too much. And most especially if the child is very ill then they're a bit reluctant in giving medication because the child might vomit it and whatsoever. (P3)

Conversely, caregivers themselves did not report on pill burden. However, two caregivers reported that TB medications were easier to administer due to the shorter duration (only given for 6 months) and the better palatability of TB treatment versus life-long ART.

Doctors, nurses, counsellors and traditional healers stated that caregivers tried to mitigate issues of pill burden and facilitate treatment administration by opening medication capsules and dissolving tablets in water. For example, one of the traditional healers (Traditional healer 1) reported that a caregiver opened up the treatment capsules and dissolved it in water, making it much easier to administer to the child. The traditional healer stated, "One lady mentioned that the child was refusing to drink the medication so she just opened the capsules' and diluted them and the child now drinks without any problems" (P10).

Palatability. A more prominent concern expressed by all respondents was the taste of LPV/r. There was consensus amongst respondents that LPV/r, one of the protease-inhibitor drugs, and a first-line regimen for young children was strongly disliked by children. Respondents also explained that this drug is bitter and in many instances the only way to get a child to swallow the medicine was by masking the taste with something sweet.

Doctors reported that they normally advised caregivers to administer LPV/r together with something sweet such as the multivitamin usually prescribed to children or with a sweet alternative such as sugar, yoghurt, peanut butter or juice if they were able to afford it. As one of the doctors (Doctor 2) stated:

> I think particularly with LPV/r. It tastes very bitter, so one of the suggestions we make is if the child likes peanut butter to give them a spoon of peanut butter before giving the LPV/r…Obviously you could give a spoon of jam or something like that. Many families don't have that so what many families do is give a spoon of sugar water or sugar because many families do have sugar in the house. I know that's not particularly healthy, but that's often what's available to people. (P2)

Two caregivers reported adopting a specific strategy to administering the medication in an attempt to alleviate the unpleasant taste. For example, Ngengi (caregiver 7), the 55-year-old grandmother and caregiver of a child with an unsuppressed VL reported that she would start by administering the bitter-tasting medication to the child first, followed by the other, more palatable medications. Ngengi stated that:

> I used to start with the sweet medicine and let the child drink that first, [and] then I would finish with the bitter one. And then I changed and started with the bitter one first then finish with the sweet one. The child used to be very sick before I found out what was wrong at the clinic but now the child is better. (P9)

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The unpleasant taste associated with LPV/r was closely tied to side effects such as vomiting and spitting out of medications. As Maggie (Caregiver 9), the 65-year-old grandmother and caregiver to a child with a suppressed VL, explained:

> I had a problem with the bitter medicine because the child was vomiting it and then I came back here and told them that the child does not want the medicine because she is vomiting it and they said I must continue with it. (P9)

Nurses, doctors and counsellors were aware of the poor palatability and vomiting caused by LPV/r. They stated that caregivers were generally advised to re-administer treatment within an hour to ensure that the medicine was absorbed. In instances where caregivers were forced to re-administer medicine, some would run out of medications faster than others, resulting in caregivers having to travel to the clinic more than once a month to collect a refill.

In instances where sweet alternatives (flavouring agents) were not commonplace in the household during treatment administration, encouragement and positive reinforcement contributed to motivating children to take their medication. A nurse (Nurse 1) with some experience of the benefits of positive affirmation stated, "Yeah praises, the mother has to praise the child [and the] child just takes the medication" (P13).

Characteristics specific to the key stakeholders that influenced adherence to ART. ***Parent/ caregiver characteristics.*** *Caregiver-child interaction.* The relationship of the caregiver to the child, (grandmother, mother, father or relative) influenced the extent to which caregiver responsibilities were met. Doctors, nurses, counsellors and traditional healers stated that the caregiver responsible for bringing the child to the clinic/consultation was often their grandmother. This fact was not reflected in the caregiver focus group as seven (out of 11) caregivers were biological mothers who were unemployed, three were grandmothers and one was an aunt (mother's sister) (see Table 5.1). Respondents indicated that grandmothers were

mostly the caregivers of young children whose mothers had died or were working far away. One of the doctors (Doctor 2) who had several years of experience in seeing both children and their caregivers at the clinic and in the hospital setting stated that the interaction she observed between the caregiver and child was usually positive. She stated that she suspected that tension between the caregiver and child might arise when the child was struggling to take his/her medications. In such a situation the caregiver might feel an urgency to be strict with the child to ensure the medicine would be taken. She stated:

> …if there is any tension or any fear between the child and the caregiver, any kind of threats used, it can really make it quite difficult for little children to kind of swallow…but you can understand the caregivers point of view, if they're terrified, they want the child to do well and to live and it's really difficult for the caregiver if the child doesn't take medicine…And I can understand the caregiver really, really must just feel at the end of their tether when that happens. (P2)

Nurses and counsellors shared several concerns they had experienced in dealing with the grandmothers as caregiver. One concern was the inability to understand and follow dose and schedule adherence. For example, an HIV counsellor (Counsellor 3) stated:

> …and these days we know that most of the children - the caregivers are their grannies who do not understand, you know, the measurement [of the treatment doses] and especially with children another thing is that as the children gain weight, the dosage has to change. (P8)

Others counsellors agreed with this counsellor during the focus group, reporting that they experienced much difficulty in communicating effectively with older caregivers. Counsellors thus felt strongly that the pre-ART education sessions offered to caregivers of children should be attended by more than one member of the household. Doctors, nurses, counsellors and traditional healers reported that other characteristics associated with the

caregiver, such as caregiver ill health, guilt over vertical transmission, old age and the number of dependents in a particular household, were also thought to influence adherence to ART.

Disclosure of the child's HIV status to the caregiver. All of the grandmothers and one aunt who participated in the caregiver focus group stated that the biological mothers of the children in their care did not initially disclose the child's HIV status to them. These caregivers shared similar accounts of how the child came to be in their care and how they discovered the status of the child. The caregivers reported that the status of the child was only discovered once the child became ill, thus requiring a clinic visit. These caregivers expressed a deep sense of disappointment in their own children for failing to disclose the status of the child to them and subsequently compromising the health of the child. Maggie (Caregiver 9), a 65-year-old widowed grandmother to a child with a supressed VL, said the following with regard to her caregiving experience:

> In January 2011 [child's name] mother brought the child here and said she is going back to school so I took [child's name], but we could see that she was not in a healthy state of wellbeing…It was also difficult for me when I found (out) that the child has this problem, but at the clinic they helped me a lot and it was people that I was used to and also this lady I go to church with who is also taking ARV's and she also advised me and told me that everything is going to be okay and so I continued but my heart was still in pain but I continued to give her medicine and when I saw her starting to get better, I became happy and the other children didn't ask that much about why I am giving her medication and I think it was because they saw how she was before. (P9)

Maggie's account of her caregiving experience adequately reflects the sentiments shared by the other grandmothers in the focus group.

Denial of HIV. The failure of biological mothers to disclose the status of the child to the person in whose care she had left them suggests a form of denial of the status of the child on the part of the mother. However, biological mothers were not the only members of the microsystem considered unable to accept the status of the child. Doctors, nurses, counsellors and traditional healers indicated that they were aware of instances where the biological fathers of these children also acted as barriers to adherence in that they would deny the HIV status of their child, thus forcing female caregivers to be secretive with the treatment.

The respondents explained that they were mostly made aware of these instances by the reports of caregivers who attended the clinic, as fathers (and males in general) were less likely to attend clinic visits compared to females. One of the male doctors (Doctor 3) explained that in the Zulu-speaking community the man usually has the final say, and stated:

> Yes because in the Zulu culture the man is the head of the house. Sometimes when the father is around when the mother takes the child home with the medication you'll find that the father will refuse the child taking medication. So it becomes a barrier between your child's health and mother giving the medication to the child because the father would totally refuse and say my child is not sick so they shouldn't be getting this ARV medication. So it becomes a stumbling block. (P3)

One of the traditional healers (Traditional healer 6) also stated:

> Like …one [caregiver] came to me saying that she does not know how to tell the father that the child is positive, I told her to try and tell him because the child is in trouble. He needs to know. (P10)

Most of the caregivers (9 out of 11) were single and living with other adults and children at their homesteads. The caregivers had reported that all the members of the household were aware of the status of the child, and none had specifically reported on the fathers of the children acting as barriers to ART. One of the caregivers reported that

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disclosing the child's HIV positive status to family members made treatment administration easier. The elderly caregiver (Caregiver 5) described how disclosure to household members facilitated adherence to the regimen:

I made sure that I don't forget the times so I put a reminder on my phone and asked the kids who I stay with to remind me and not forget and I made them read it so that if anything happens to me since I am a senior citizen they can help me. (P9)

Household characteristics. *Overcrowded households and food insecurity.* Caregiving responsibilities were not an easy task to manage, especially in the context of overcrowded households in which many of the children and their caregivers resided. For example, respondents indicated that one caregiver was often responsible for many children. One doctor (Doctor 2) stated:

That's another [thing], yes often these grannies… it's not just that they're caregivers to [one child], there's one granny whom I know who is caregiver to 12 grandchildren. I think three of them, I can't remember how many, are on HIV treatment, and one of the children is handicapped. So you know, it's a huge burden. (P2)

An HIV counsellor (Counsellor 1) shared a similar account:

We have a granny who's looking after five children who are HIV positive. There are two of them not taking the treatment and three of them they are taking the treatment. So it's hard for that granny to look after these children … (P8)

All the caregivers participating in the focus group were unemployed, and almost all of the caregivers received a CSG worth ZAR280 (equivalent to $26). Two received a grant worth more than ZAR280 from the government (see Table 5.2). This money seldom supported the family for an entire month. The availability of other income, and thus ability to buy food, often determined whether medication would be administered. A doctor (Doctor 2) stated:

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So last week I had a lady at the clinic and (the) child had a raised VL. (I) couldn't get to the bottom of it. (The child was) definitely taking the tablets but in the end I asked her to go see someone in particular. One of the good counsellors was at the clinic and it turns out they tend to run out of money from about the 20th of each month so basically for about a third of the month, the child, who is an older child, refuses to take medicine if there is no food. (P2)

One of the doctors (Doctor 3) also stated that a healthy child threatened the financial stability of many households, as an improvement in appetite meant that more food was necessary:

Sometimes when the child is on ARV treatment they start gaining appetite. They are growing up fast. They're quite active so in terms of food supply then it becomes a problem to their home. They don't have enough food to give the child because then suddenly the child has too much appetite so that also becomes a problem for them. (P3)

Food insecurity was thus identified as a major barrier to medication-giving with unanimity among respondents that caregivers were reluctant to administer treatment to a hungry child.

One counsellor (Counsellor 1) stated:

It's a problem when there is no food to give to the child. You would find most parents deciding rather not to give a child medication because there is no food and they fear that children might experience even more complications because they're taking medications with (out) that food. (P8)

Caregivers themselves indicated the importance of having food available and one suggested that food vouchers would relieve some of this burden. One of the caregivers (Caregiver 6) stated:

Why can't they like give us a voucher for the kids to get food because our kids want the healthiest of food and we can't afford to buy all of them. We are mothers who are not working so we could use some help because the grant money that we get doesn't help us that much and we don't work. (P9)

Stigma and disclosure. Doctors, nurses and counsellors stated that children in the study area often resided within a household where there are some children on treatment and others not. In such instances the issues of stigma and disclosure would affect adherence to ART. Tina (Caregiver 3) reported that children did not like to be called away from their friends for medication times and even ran away when treatment time approached. As Tina (Caregiver 3), a single mother and caregiver to a child with a suppressed VL stated, "I think so because our kids is not like they've got all the things to play with at home. They are usually out with friends and then now they have to be called to come and take the medication" (P9).

The other caregivers agreed with Tina's statement. One of the counsellors reported that she had once counselled a young child who was mocked by her friends who nicknamed her "Pills" because she was always being called to come and take her pills. As Lydia (Counsellor 1) stated:

Like when they call them for treatment, if the granny says come it's time for the pills, it can make the discomfort for the child. Like the other one … he said he don't like (to) take the treatment anymore because the friends are calling him 'Pills' now. (P8)

Caregivers reported that the children in their care did not know why they were taking treatment, and some of the children had begun asking questions. Counsellors reported that children, even those of five years and younger, knew the difference between being on TB treatment versus being on ART and that caregivers reported difficulties disclosing to children. In some instances caregivers provided children with inaccurate and conflicting messages

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about their treatment. One of the traditional healers (Traditional healer 4) reported on the conflicting messages that children received about their treatment and stated:

> You know kids are playful. A child asked what the pills were for and they [caregivers] told the child that is was to make him clever at school. The child said but at the clinic they told me these are pills for AIDS, and that is why I am always sick. (P10)

Child interaction with healthcare workers. In order to understand the extent to which the relationship between the child and the various other role players influenced adherence to ART, the analysis was directed at understanding the experience each stakeholder had when treating or working with children on ART. For example, doctors reported having far less interaction with the children compared to nurses, caregivers and counsellors. Doctors reported that the interaction they did have would often be when a child was ill, or needed to be switched to a different regimen. Nurses and counsellors also reported fairly limited interaction with children in this age group. One of the counsellors (Counsellor 2) stated that caregivers themselves often left the child outside of the consultation room. She stated:

> Sometimes we see the caregiver comes with the child and leaves the child outside playing and comes alone in the consulting room. Perhaps there is no need, it's like we feed the caregiver with the information and we don't talk to the child…(P8)

Communication between a child younger than five years and the healthcare workers was thus very limited, and most information was relayed via a caregiver.

Child interaction with traditional practitioners. Traditional healers reported that they did provide traditional healing services to children on ART, and much like healthcare workers, verbal communication with the child was infrequent and communication was mostly done via the caregiver.

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Mesosystem

In the context of this study, the mesosystem considers the interactions between the members of the microsystems and the resulting impact of these interactions on the child's adherence to ART. The over-arching theme representative of the mesosystem in this study was the interactions between the caregivers, healthcare staff and traditional healers.

Caregiver-healthcare worker interaction. *Language barriers.* Doctors, nurses, and counsellors stated that language barriers made it difficult to communicate with caregivers about difficulties regarding medication administration. Four of the five doctors interviewed were predominantly English-speaking. Doctors explained that during their consultations an isiZulu speaking translator would be present, and it would usually be one of the adherence counsellors. One doctor (Doctor 1) reported the difficulty he experienced with communicating with the help of a translator. He explained that communicating via a translator limited rapport-building with the patient and also limited the extent to which he was able to probe patients for difficulties experienced with adherence to the regimen. He stated:

> So there's a lot that's lost in the translation for sure, and a lot of the complexity and the nuances of trying to explore adherence and things is obviously…the language is important. So it's very difficult to explore in some of that complexity through a translator and ja, just building that confidence for somebody to truly tell you what the problems are is obviously very difficult without the language being the same. (P1)

Although nurses and counsellors were able to communicate with caregivers in isiZulu, they reported that caregivers struggled to understand important information about the treatment such as changes in dose amounts. As one of the counsellors (Counsellor 2) stated:

> It shows that yes she was listening but couldn't understand, which means at home she'll do another thing. And it's usually common because it's like those caregivers

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most time they are giving the syrups and then they come with an empty bottles at any time, [and say] oh it's finished now. It means that they don't understand. (P8)

Multiple caregivers. Although a grandmother was considered the primary caregiver by the majority of respondents, other household members would also bring the child to the clinic for their monthly consultation. Doctors stated that having different persons accompany the child to clinic appointments disrupted continuity of care. One of the doctors (Doctor 4) explained, "So they're coming in on their own, their caregivers have changed and the new caregiver doesn't know that this child is taking medication …" (P4).

One of the nurses (Nurse 4) explained how the irregularity of individuals attending clinic visits on behalf of the child on treatment disrupted her ability to monitor the child's progress on ART. She stated:

> You find that some children their mothers died long ago so they are brought by different people. This month you see this one, next month you see that one so that becomes a problem because what you have talked with this person next month the child is brought by another who doesn't know what have you talked [about] last time. Like, for instance, when I'm asking the caregiver to bring the child maybe for the bloods and telling them how to take the treatment, next time that one doesn't know how to give the child the treatment. Something like that so it becomes a problem when coming to children. The medication is not taken properly. (P12)

One of the doctors (Doctor 4) placed the irregularity of caregiver attendance at the clinics into perspective when she explained that when an older person such as the child's grandmother is the primary caregiver, attending the clinic every month is physically challenging for her. In such instances where the mobility of the caregiver was restricted, younger children were sent to attend clinic visits instead. She stated:

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… it's the same person that's usually giving the treatment [at home] but occasionally

you have, for example, a granny at home who did the first three classes, who is the

one who would be administering the medication, but bringing the toddler to clinic will

be maybe an auntie or an older sibling, because they're the one that is mobile and can

jump in and out of taxis with a toddler... that can cause a difficulty because you are

talking to someone who is not the person who is giving the medication at home

…(P4)

The problem of irregular caregiver attendance at the clinic is exacerbated when

treatment-specific information provided to the person attending the clinic is not

communicated to the person administering the medication. Further, doctors and counsellors

explained that in some instances they were unsure as to whether the person bringing the child

in was aware of the child's status, and thus to what extent they were able to communicate

with the person without disclosing the child's status. One of the doctors (Doctor 4) explained

that the uncertainty of whether disclosure had taken place delayed treatment initiation for the

child. The doctor stated:

…like I'm not always sure – should I disclose to this grandmother when the mother

hasn't done that herself or to call the mother back. So usually I say okay fine I'm

running these investigations [inaudible 25:24] and then please come back to see me

with the mother on another day. I haven't initiated anybody where it's not the person

who is supposed to come, who, it's not the primary caregiver coming to the clinic.

(P4)

Exosystem

In the context of this study the exosystem considers the interactions of the members of

the micro-, and mesosystems by placing the interactions in context, in this case, the

healthcare context. The over-arching themes representative of the exosystem in this study

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were adherence counselling and training and the experiences of the caregiver and child when attending their clinic visits.

Adherence counselling and training. Doctors stated that in their experience adherence counsellors were seldom able to demonstrate an ability to question patients with the aim of eliciting information about difficulties with treatment. The doctors explained that the poor level of counselling skills reflected the poor quality of the training that adherence counsellors received. One doctor (Doctor 1) recalled an instance of poorly conducted training:

> I mean I've heard very bad things about the training, that there's some place in [inaudible 0:27:41.2] that runs the training and it's supposed to be a tutor training, sort of 10 full days or something and I hear that usually on the 3rd day or something the tutor just says 'Oh, I think we've done enough. Just let them finish it. (P1)

Another doctor (Doctor 2) stated that counsellors were neglected in their role and received no debriefing, minimal supervision, and once-off training sessions that were in some instances poorly conducted. The doctor explained that in her experience counsellors often asked closed questions to patients and seldom possessed the skills required to elicit more in-depth information from patients. She also explained that counsellors were more likely to develop these skills if they were supervised by more skilled personnel. The doctor stated:

> Often when I've heard counsellors, you know, they ask a lot of closed questions which are not going to, in the five to ten minutes they've got with these patients, unearth these difficulties… Because if they have ten minutes per patient, there's an awful lot you can do in ten minutes, and I feel these problems could have been unearthed a lot, lot sooner than they have been. So I would say that one of the real ways to turn this round would be to really, really put effort into the counsellors. But

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that means you've got to have good counselling supervisors who are skilled and who are well-trained and who can debrief. (P2)

One of the doctors (Doctor 4) explained that adherence counsellors lacked clearly defined roles and that in essence the healthcare system demanded a certain role from them, but one which they were ill-equipped for. She stated:

Ja, I think the counsellors see their job as their session 1, 2, 3 and then additional adherence counselling they just try to figure out if the patient is taking their medication as they tell them to take the medication. But it's almost like we expect them to be psychologists you know what I mean but that's – there – I don't think they do their role as that [inaudible 17:33]. I think they have a different understanding of what they are supposed to be doing as ARV Counsellors and we'd have a different expectation of what we think they should be doing as ARV [inaudible 17:45] Counsellors.(P4)

Regarding the 'sessions 1,2,3' referred to by the doctor in the previous quote, doctors stated that the pre-ART HIV education sessions were conducted over two days at the primary healthcare clinics and on a single day at the hospital. The doctors agreed that it was emotionally and cognitively burdensome for a caregiver to receive counselling within two days, accept the child's HIV diagnosis, and be expected to commence treatment immediately. For an illiterate caregiver these challenges would be even greater.

A doctor (Doctor 1) explained:

… it is a lot of information to process, and in the clinic the disadvantage is, it [HIV education sessions] takes a lot more time…. While here [at the hospital] you know they test positive, we take their CD4, their results are back, the next day all classes are done and we might actually be starting them within one or two days. And it's a big

thing being diagnosed with HIV or your child being diagnosed with HIV and having to understand this whole thing and the treatments. (P1)

The intensity of information over a short period of time is likely to lead to poor caregiver knowledge of treatment administration practices. Doctors reported that some caregivers lacked basic knowledge about HIV and critical aspects of treatment administration, such as using a syringe for the measurement of liquid formulations. As one doctor (Doctor 4) described:

So the knowledge is what to give and when, but the skills are how to draw the medicine up in the syringe, how to measure 5 ml or 8 ml or 6 ml or whatever the child is getting, (and) how to break a tablet in half and crush it and dissolve it and give it to the child. Because if you've not been shown those things you could be doing what you think is the right thing and it's actually very different from what we think that caregiver is doing. (P4)

Counsellors too felt that caregivers required more training sessions, as one counsellor (Counsellor 1) stated, "So I don't know what we are going to do as counsellors. Maybe we need to… maybe the people need to come and do more sessions, maybe three or more… (P8).

Despite doctors, nurses and HIV counsellors agreeing that the HIV-education sessions were rushed, and that more effort was needed to improve the skills of the counsellors, caregivers who participated in the focus group that had received the HIV education sessions reported that they were more than sufficient.

One caregiver (Caregiver 3) explained:

Me for myself, I am also positive and I think 2 classes are enough because I already know about HIV. I didn't know how to drink the medication and that is what I wanted to know so 2 classes for me are enough. (P3)

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Two caregivers were ill and unable to attend the sessions, and they reported that another family member attended the sessions on their behalf. The two caregivers explained that the family members had then shown them how to administer the medications and they then took over from them.

The caregiver's experience at the clinic. Respondents shared differing views about what they thought the experiences of caregivers attending the clinics in the DSA were. For example, one of the doctors (Doctor 1) stated that the experience of attending clinics was fairly 'agricultural', suggesting that clinic attendees were still very much controlled by the healthcare system rather than being empowered to take responsibility for themselves. He stated:

I would imagine it's fairly agricultural. I would say, that you'd come in and you've kind of heard it around the clinic and told to queue for your file and then once you've got your file, told to queue to see the counsellor or whatever and here you queue at the pharmacy or whatnot. I mean it's very much still 'we're in control of you' rather than that the patient's caregivers or whatever are empowered to take responsibility themselves. It's still you are the clinic and you will do this and you will like it or not that you have to queue for six hours. (P1)

One of the other doctors (Doctor 2) explained that regular caregivers at the clinic actually found comfort in the routine that the clinic visit offered, and stated:

I find that with increasing time, the children and caregivers actually settle down quite a lot. They know exactly what is going to happen when they come to clinic. They know, they've got an idea of what I am like, so they kind of know how to deal with that and certainly from [name of the clinic]. (P2)

One of the traditional healers (Traditional healer 3) stated that perceived stigma prevented people from visiting certain clinics. He stated that some people in the surrounding

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community were reluctant to visit certain clinics as they feared that others would think they were living with HIV. He stated:

> I am from [name of area]. As far as I know people from there not many people like to go to the clinic there because like for example if you go test and you are tested positive for HIV then you will hear it somewhere else. So people are going to clinics in other places because of this. Even when you go to the clinics you will find that everyone knows the line for HIV positive people are in their own line as a result people end up just keeping quiet and not getting any treatment. (P10)

Caregivers in the focus groups reported positive experiences of attending the clinic. One caregiver (Caregiver 2) stated:

> Well I have never had a problem with the clinic, actually speaking, those people who work there motivate you and they advise you. Some people get offended but at the end they realize that they are getting good advice at the clinic. (P9)

The child's experience at the clinic. Respondents agreed that children were fearful of clinic visits in that they expected to get injections. However, they also agreed that clinics that fostered child-friendliness (often in the form of play leaders that facilitate various activities with children while awaiting their consultation) went a long way to improving their experiences at the clinic. One doctor (Doctor 2) explained:

> Parents or caregivers are often a bit nervous. The children are certainly nervous because they have often had blood tests done and the thought of coming to clinic is often quite worrying for them, because they don't know what is going to happen. They (are) not used to the routine. I think the children quite enjoy coming because they've got play therapy and the atmosphere of the clinic. (P2)

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Macrosystem

In the context of this study the macrosystem includes the influence of culture and religion and their impact on the treatment and care of a child on ART in this area. The over-arching themes representative of the macro-system in this study were the use of traditional medicines and religious beliefs.

Traditional healing and traditional medicines. The traditional healers who took part in the focus group had all been trained to identify symptoms of HIV and make appropriate referrals to health facilities. The healers explained that there were still many healers in the area who did not acknowledge the existence of the virus. One healer (Traditional healer 3) stated, "They do not have the knowledge and the training. We were also like that in the beginning before the training and they are just blank basically" (P10).

The healers went on to describe the impact of HIV training on their livelihoods. They stated that community members seeking help and advice from healers were unhappy with healers who had been trained and believed that their ancestral spirits were no longer communicating through them and that all they were doing was "referring them to the clinic". A healer (Traditional healer 4) stated:

> When this training started it was a huge thing where our patients were being told that we are no more healers. We just send people to fill clinics and draw blood. We think we are better and I would meet some and ask them and they would say they found out that we are no more healers. One healer actually took four children and tried to heal them. When they came to me I could see that they were very ill so I referred to the clinic because I could see that they were very ill. (P10)

Despite being trained to identify symptoms of HIV and make appropriate referrals, one of the traditional healers (Traditional healer 3) stated that he was confused about the extent to which their patients were able to use their herbal remedies. Other healers shared his

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concerns and stated that a better integration between traditional healers and healthcare providers was needed in their area. One healer (Traditional healer 3) stated:

> As we were trained we were told that the child who is infected had a high risk of infections while using the enema (herbal enema) so if it was explained in a good manner not just to say don't use the enema. I think if we were working together they would be able to explain it better to the mothers. (P10)

The healers reported that they would still prescribe herbal remedies and enemas to patients on ART, but that they would advise them to take the remedies after their ARVs. A healer (Traditional healer 6) stated:

> Yes we do give them medication but we ask the caregiver on the times when they give them the ARVs and allow 1 hour and 30 minutes for them to take the traditional medication so not to interrupt the process of the ARV's working on the child's system. (P10)

One of the doctors (Doctor 2) explained why traditional remedies were problematic for children and stated:

> No. It's not ok generally for child health. Some of the enemas that are given, particularly those that include traditional plants like Aloes, can actually kill the children. So in the hospital we have many children who are admitted because they had a herbal enema and some of them can cause kidney and liver failure and the child dies. (P2)

Only one caregiver in the focus group had consulted with a traditional healer about difficulties with treatment. Traditional healers, however, stated that they were frequented by caregivers, but that it was difficult to engage with them about medication adherence as caregivers were reluctant to disclose the child's HIV positive status to them.

Religious beliefs. The HIV counsellors shared their concern about the role of the church in the fight against HIV. Caregivers of children with HIV and other PLWH had told counsellors that they believed that if they were prayed for they would be cured. As one counsellor (Counsellor 1) stated:

> The other thing, although it's not so common, is the family belief disturbs sometimes on the adherence [family beliefs disturb adherence]. Like the family believes that if we take the child in a [in to] church and they will pray for the child she's cured... They say oh we believe in that pastor, he's doing a good job. (P8)

Counsellors were the only respondents that referred to the influence of religion on ART adherence amongst children. Caregivers made no mention of religious or other beliefs that influenced adherence to ART.

Summary of findings

During Phase 1 I conducted nine interviews and three focus groups with individuals considered key stakeholders in the treatment and care of children younger than five years on ART living in the study area. Following a six-phased thematic analysis, a comprehensive list of themes and sub-themes was produced that summarized important information regarding barriers to and facilitators of paediatric adherence to ART in rural KwaZulu-Natal. The analysis highlighted agreements and disagreements between participants, and provided relevant quotes to contextualize each theme and sub-theme.

The results reflected that the following barriers existing within the microsystem (i.e. the interactions between the child and all of his/her closest connections): Child characteristics, parent/caregiver characteristics, household characteristics, healthcare worker characteristics and traditional healer characteristics. Respondents were unanimous about the difficulty children had with taking large volumes of medications and swallowing medications that were unpleasant. Facilitators such as mixing the medications with a sweet alternative as

well as using positive affirmation were suggested to improve medication-taking by the child. In the mesosystem the results showed several interactions between the caregivers of children and healthcare staff that acted as a determinant of adherence to ART. Health workers emphasized that language barriers restricted rapport building and limited the extent to which information could be obtained from caregivers. The results indicated that barriers to paediatric adherence to ART were particularly salient when caregiving responsibility was shared and communication amongst those involved in the treatment and care of the child was lacking or poor.

The results showed that factors within the exosystem, such as adherence counselling and training, influenced the extent to which counsellors were able to engage with caregivers regarding medication difficulties. In other words, the results indicated that adequate training of adherence counsellors with regular supervision, training and debriefing was a necessity in ensuring timely identification of problems with caregivers. Several caregivers reported positive experiences at the clinic, while other respondents indicated that a fear of being identified as HIV positive was still a concern amongst residents of the area. Respondents reported that children generally did not enjoy coming to the clinic out of fear of having their bloods taken, but that child-friendly facilities helped to mitigate much of this barrier. Traditional healers reported that they still prescribed herbal enemas to children (whether on ART or not). Traditional healers explained that the effects of their remedies on ART were poorly understood by them and that this called for better engagement with healthcare staff in the area. The analysis thus provided a broad range of perspectives expressed by the key role players in the treatment and care of children on ART. The first phase of this study served as a descriptive phase and the knowledge obtained provided a context and understanding of the factors influencing adherence amongst CLWH and their caregivers within this community.

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The information obtained provided the necessary insight for the observational methods undertaken in Phase 2.

CHAPTER 6

Phase 1 – Discussion

Introduction

The findings of the interview and focus group data demonstrated how key stakeholders in the treatment and care of children younger than five years understood the factors influencing paediatric adherence to ART within this context. The findings revealed that adherence to ART is influenced and shaped by the interactions between the child-caregiver dyad and the family, in addition to the interactions between the child-caregiver dyad and healthcare system. In keeping with Bronfenbrenner's EST (1979), the present chapter is organized to discuss the findings at the level of the micro-, meso-, exo- and macrosystem (Bronfenbrenner, 1979).

Microsystem determinants of paediatric adherence to ART

As per Bronfenbrenner's EST (1979), the microsystem refers to the immediate environment in which the child lives and moves. In the context of this study, the system is dynamic and driven by the key interactions of the child with all those directly involved in their treatment and care. Two over-arching themes were representative of the microsystem in this part of the study, namely, characteristics specific to the child that influenced adherence to ART, and characteristics specific to each of the key stakeholders that influenced adherence to ART.

Child characteristics. Child characteristics influencing adherence to ART were mostly in accordance with the literature (Haberer & Mellins, 2009; Simoni et al., 2007; Vreeman, Wiehe, Pearce, et al., 2008). Thus, respondents were unanimous about the difficulty children had with taking large volumes of medication and swallowing medications that are unpleasant. In particular, respondents stated that children struggled with LPV/r as the bitter taste often caused vomiting, which disrupted dosing when the syrup was not re-

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administered after vomiting. Palatability difficulty for children with LPV/r poses several concerns. Firstly, at present first-line ART regimens that include LPV/r are more effective than other available first-line regimens at suppressing VL (Ciaranello et al., 2015). Secondly, third-line treatment options are not readily available in South Africa and require referral to a specialized team, which poses concerns about future treatment options in the face of emerging drug resistance, especially amongst children residing in this study area (Pillay et al., 2014). Lastly, in the absence of re-administration of the dose following an episode of vomiting, children are likely to experience periods of treatment interruption. A common reason for missed doses among infants and young children is vomiting without re-administration of the dose (Reddi et al., 2007). Fixed dose combinations are not yet the norm and there is still a pervasive shortage of paediatric formulations, including more palatable formulations, in resource-limited settings (Bagenda et al., 2011). Similar to the findings of other studies, facilitating actions such as mixing the medications with a flavouring agent, and positive affirmation from caregivers were suggested to improve medication-taking by the child (Fetzer et al., 2011; Wrubel et al., 2005). Some authors (e.g. Bunupuradah et al., 2006) have shown that masking the taste of ARVs facilitates treatment administration to children. However, it remains uncertain as to whether masking the taste of ARVs improves overall adherence to ART in children (Bain-Brickley et al., 2011).

Caregiver characteristics. With the devastating effects of HIV on the South African youth (15-35 years old) (Statistics South Africa, 2012), many children have been left orphaned (3.7 million) and care has increasingly shifted to grandparents or elderly caregivers (Mokgatle & Madiba, 2015). In this context, the Hlabisa HIV programme has dramatically improved the overall health and expected lifespans of HIV-infected women and children in the study area (Ndirangu, Newell, Tanser, Herbst, & Bland, 2010). Thus, more children are growing up with at least one biological parent present in the household

– usually the biological mother (Rochat, Arteche, Stein, Mitchell, & Bland, 2015). Despite these successes, there are still a number of children who live with an older caregiver, especially when biological mothers migrate to other areas for work (Hosegood et al., 2007; Makusha & Richter, 2014).

Findings from this study showed that biological mothers often did not disclose the HIV status of the child to the caregiver in whose care she left them. Therefore, as was also found in other findings from South Africa (e.g. Sikstrom, 2014), caregivers only became aware of the status of the child once the child had become ill and required medical attention. Children in the care of older caregivers have been shown to access treatment and care much later in their illness trajectory than those living with their biological mothers (Ahmed, Gugsa, Lemma, & Demissie, 2013; Mokgatle & Madiba, 2015). Further, children initiating ART at an advanced disease stage are at a heightened risk for morbidity and mortality (Davies et al., 2009; Davies, 2015; Fenner et al., 2010).

In the context of poverty, elderly caregivers who absorb young children into their care (especially children in need of chronic care and attention) are particularly challenged by their age, financial instability and level of education as they attempt to meet the caregiving needs of the child (Mokgatle & Madiba, 2015; Skovdal et al., 2011; Ssengonzi, 2007). Poverty also complicates and often diminishes the quality of caregiving a young child is likely to receive, as caregivers are likely to experience increased stress which makes it difficult to respond to the sensitive and stimulating care required by the child (Richter, 2004; Rochat et al., 2008). Caring responsibilities thus become shared among available household members. The results showed that irregular attendance of caregivers at the clinics was problematic for healthcare workers. There is evidence to suggest that children living with elderly caregivers usually have more than one person taking the child to clinic visits (Coetzee et al., 2015; Ferrand et al., 2010), and that the presence of multiple caregivers is associated

with poor adherence to ART (Fassinou et al., 2004). The problematic nature of caregiver irregularity at clinic visits in this study is discussed further on.

In the setting where the study was conducted, marriage rates are low and biological fathers seldom residing with their children (Hosegood et al., 2007; Makusha & Richter, 2014). The demographic profile of this study area shows that the majority of children live with their biological mothers, not with their fathers (Hill, Hosegood, & Newell, 2008). The absence of Black fathers in the lives of children in South Africa occurs largely as a consequence of apartheid. Yet, despite the abolition of the apartheid laws, the effects are still evident today with men separated from family life and from involvement in the care of their children (Makusha & Richter, 2014). Very few studies have explored the involvement of men in the care and treatment of CLWH, apart from studies that emphasise the financial contribution that men offer to support the child and the family's needs (Hosegood & Madhavan, 2010, 2012; Makusha & Richter, 2014).

Nevertheless, available evidence from this study and others (Wachira et al., 2012) seems to suggest that within the context of HIV, where male involvement in caregiving and interaction with health services is substantially less than that of females, a biological father may act as a barrier to adherence to ART. For example, in the study by Wachira et al. (2012), females were found to be reluctant to disclose the status of the child to their male partners out of fear of being stigmatized and losing their financial support. In this study the findings showed that some fathers were not convinced that their child was HIV positive, which meant that female caregivers had to be secretive about the treatment. As shown in the literature, concealing the status of the child is likely to cause stress on the part of the caregiver in having to hide medications and maintain secrecy of the illness while also needing to access social and financial support, which requires openness with and disclosure to others (Hejoaka, 2009).

Stigma and disclosure. Although the appropriate age at which to disclose a child's HIV status to them is not clear from the literature (Vreeman et al., 2013), respondents stated that children younger than five years were curious about their treatment and even aware that some treatment courses (like those for TB) come to an end, while theirs did not. The results show that even at this age, children experience discrimination from other children when called away from their friends to take medications. Studies from South Africa repeatedly report that many caregivers feel that children are too young to know about their status (Moodley et al., 2006; Kagee et al., 2006). Similar to other studies (Vreeman et al., 2010), caregivers then provide inaccurate information and often lie to children about their illness. In Brazil (Marques et al., 2006), HIV-infected adolescents emphasised the importance of receiving accurate and complete information about the nature of their illness.

Food insecurity and overcrowded households. A study from KwaZulu-Natal showed that rural households survive on less than ZAR12 (1.14USD) per day (D'Haese et al., 2013). Many caregivers reported that they receive the government funded CSG. The CSG, which is currently worth R300 (28.12 USD) (participants in our study referred to the amount allocated before this, i.e. R280 (26.25 USD)) per month, was an initiative of the government to support the nutritional and other health needs required for a growing child (South African Government Services, 2013). Caregivers in this study mostly relied on government support grants received on behalf of the child to support all family members. Doctors stated that as children regained their health because of ART adherence, their appetites improved. Some doctors explained that a child's improved appetite would threaten the financial stability of the household, as more food would have to be given to the child. In a study by Nagata et al. (2012) among adult ART users in Kenya almost all of the respondents (87%, n=67) reported that they experienced an improvement in their appetites following initiation on ART. Several participants reported that they would skip meals in the morning as

'hunger pangs' were worse at night. However, this did not necessarily stop them from taking their medication (Nagata et al., 2012).

Caregivers in this study stated that children have to take food with medications. The availability of food often determined whether medication would be administered to the child, as food is needed to mitigate the side effects of medication, such as nausea and vomiting. Similar findings have been reported elsewhere (Biadgilign et al., 2009; Fetzer et al., 2011). Caregivers in this study stated that food vouchers would help to alleviate some of the burden, as the vouchers would only be used to buy food and not other household amenities. The HIV epidemic has placed a large burden on families in SSA over the past three decades, many of which also face several other social, economic and political challenges. Thus, the HIV epidemic has compromized and threatened the ability of many families to care for and support children infected and affected by HIV. Despite the burden of absorbing an additional family member into a typical rural household, empirical studies consistently show that most affected families and households in SSA adapt and continue to provide for the needs of children (Hosegood & Madhavan, 2010).

Healthcare worker characteristics. De Civita et al. (2004) have argued that within the context of paediatric healthcare, successful adherence to medication regimens to a large extent requires a triadic partnership between the child, caregiver and medical team. These authors postulate that within the context of complex regimen requirements (such as ART), meaningful exchanges between each of the partners should occur within the context of developmental, contextual and disease characteristics.

Children are often excluded from the decisions made during medical consultations (Schwartz & Axelrad, 2015; Tates & Meeuwesen, 2000). Doctors, nurses and traditional healers reported that they often had very little communication with children during consultations and counsellors reported that children were occasionally excluded from their

counselling sessions. For caregivers of CLWH, exclusion of children from the medical consultation may occur as a result of fear of disclosure of the child's HIV status to the child (Vreeman et al., 2013). However, studies have shown that children who are given responsibility and are made part of the treatment process respond better to their treatment and are better able to integrate treatment into their daily lives (Fetzer et al., 2011; Hammami et al., 2004).

Mesosystem determinants of paediatric adherence to ART

In the context of this study, the mesosystem considers the interactions between the members of the microsystems and the resulting impact of these interactions on the child's adherence to ART. The over-arching theme representative of the mesosystem in this study was the interactions between the caregivers with healthcare staff and traditional healers.

In the South African paediatric HIV healthcare context, and especially in the context specific to this study, the ART programme is typically led by doctors, nurses, and counsellors (Bland et al., 2013). Given the influence of culture and the use of herbal remedies in rural South Africa (Appelbaum Belisle et al., 2015), traditional healers may also be considered part of the medical team. The information that caregivers of children on ART receive from their healthcare providers contributes a large proportion of the skills and knowledge available to them to ensure the child's optimal adherence to ART (DiMatteo, 2004).

Findings from this study demonstrates several factors that disrupt the potential to form healthcare partnerships between caregivers and healthcare workers necessary to overcome barriers to adherence to ART in children's mesosystems. Among these factors were limited interaction and communication between doctors, caregivers and children, predominantly as a result of language barriers. Doctors in the study were largely English-speaking and consulted with patients via translators. Consequently, language barriers took away the opportunity for the doctors to establish meaningful relationships and build sufficient rapport with the

caregivers. Penn et al. (2011) have found language barriers to complicate patients' knowledge and understanding of ART among ART users in South African public healthcare facilities (Penn, Watermeyer, & Evans, 2011). Poor knowledge of ART among caregivers has repeatedly been associated with poor adherence to ART (Arage et al., 2014; Olds, Kiwanuka, Ware, et al., 2015; Wachira et al., 2012).

The opportunity for rapport-building was similarly disrupted with the irregularity of a single consistent caregiver attending clinic visits on the child's behalf. In this study, the unavailability of a single caregiver in some cases disrupted the continuity of care as doctors were unsure whether appropriate communication amongst the individuals who were responsible for the child took place after the clinic visit. As mentioned earlier, the evidence of the impact of multiple caregivers on paediatric adherence rates is unclear (Haberer & Mellins, 2009). Yet, some evidence from South Africa shows that confusion between multiple caregivers responsible for administering ART to the child was among the most salient reasons for missed doses among children (median age of 5.7 years) on ART (Reddi et al., 2007).

The findings from this study suggest that irregularity of clinic attendance among caregivers is a consequence of orphanhood and maternal migration for work purposes. Elderly caregivers who are more likely to be immobile and suffer age-related illnesses rely on other household members to attend clinic visits on their behalf. Although it did not emerge from this data, the irregularity of doctors in primary healthcare settings also limits rapport-building. Doctors in the primary healthcare settings are known to rotate between clinics and patients may not consistently see the same doctor for consultation (Biadgilign et al., 2009; Bland et al., 2013). Inconsistency in doctors and caregivers, coupled with limited interaction with children during consultations, highlighted the difficulty of developing and sustaining meaningful healthcare partnerships in this setting.

Exosystem determinants of paediatric adherence to ART

In the context of an expanding ART programme in South Africa and the shortage of healthcare workers, task-shifting has become one way to manage the sheer volume of patients accessing primary healthcare facilities. Task-shifting was originally put forward by the WHO (2008) to allocate specific tasks to health workers with lower level qualifications in order to increase HIV services at decentralized healthcare facilities. The new cadre of health workers engaged to facilitate this process are known as adherence counsellors or lay/peer counsellors or community health workers (CHWs) (McPake & Mensah, 2008).

Lay counsellors typically do not hold professional or paraprofessional qualifications, and are known to receive short periods of unstandardized training (Dewing et al., 2015; Petersen et al., 2014). Some training programmes last only one week, while others may last up to one year (Remien et al., 2013). For example, at the time of writing this research report, in the Western Cape, lay counsellors trained by the Western Cape AIDS Training and Information Counselling Centre (ATICC) received a month of training, after which they are left to respond to problems with patient adherence on their own (Remien et al., 2013). Following training, counsellors are required to provide a number of services, including psychosocial support services to ART users in the form of adherence counselling. The limited training that counsellors receive places them at a relative disadvantage to engage with patients in a supportive manner (Dewing et al., 2015; Kagee, 2013).

Doctors in this study stated that adherence counsellors were largely neglected in their role, and received little support in the form of regular supervision and debriefing. In many ways, doctors felt that the healthcare system demanded a certain role from adherence counsellors, but one that they are ill-equipped for. Given the varying periods of unstandardized training provided to adherence counsellors in the South African public healthcare system, some studies have specifically focused on providing lay counsellors with

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counselling skills with the aim of improving psychosocial services to ART users (Kagee et al., 2013; Dewing et al., 2015). However, a recent systematic review showed mixed results regarding lay counsellors' ability to provide behaviour change counselling with the aim of improving adherence to ART (Petersen et al., 2014). Findings from the review showed that adherence counsellors adapted behaviour change interventions according to their own needs, and often chose to advise patients on adherence issues in their own manner and not according to client-centred models (such as Egans's client-centred model) (Dewing et al., 2012). Further, the review showed that counsellors felt excluded from the medical hierarchy largely due to the unclear nature of their roles within the healthcare system (Petersen et al., 2014). In the context of the exosystem, the unstructured training sessions and lack of follow–up with and debriefing of counsellors are factors beyond the control of the counsellors themselves, but they nonetheless influence the level of psychosocial support and behaviour change counselling that counsellors are able to offer patients during routine counselling sessions.

As the ART initiation criteria continue to change, more people access public healthcare facilities and have to be initiated onto ART. Given the urgency to provide health-seeking individuals with treatment in an already overburdened healthcare system, pre-ART education sessions often occur over very short periods of time (Bland et al., 2013). Doctors in this study stated that pre-ART education sessions received by patients at the clinic and at hospital were usually conducted either over two days at the clinics, or a single day at the local hospital. Doctors stated that this was too much information to receive over such a short period of time, and that for an illiterate caregiver this was especially cognitively and emotionally burdensome. Counsellors, in particular, stated that they had difficulty in communicating with elderly caregivers regarding treatment changes. The rushed nature of these education sessions and irregular clinic attendance may explain why communicating with elderly caregivers is problematic. Given the absence of effective communication

amongst key role players in the treatment and care of children on ART in this study, rushed information-giving coupled with an illiterate caregiver and a poorly skilled adherence counsellor is likely to affect the relationship the child has with his or her treatment and the healthcare facility.

Despite the obvious concerns that healthcare workers had regarding adherence counselling and pre-ART education sessions, caregivers reported that the pre-ART counselling sessions they received were sufficient for their needs. This discrepancy may reiterate the problematic nature of the state of adherence counselling services provided to caregivers of children on ART. Caregivers may not be aware that they lack important knowledge regarding the treatment as this information was not communicated to them by a family member or healthcare provider.

Several caregivers reported positive experiences at the clinic, while traditional healers indicated that a fear of being identified as HIV positive was still a concern amongst residents of the area. Stigma still persists as one of the most important factors influencing linkage to care. It contributes to delayed treatment initiation among HIV infected infants and young children (Boender et al., 2012). Respondents reported that children generally did not enjoy coming to the clinic out of fear of injections, but that child-friendly facilities helped to mitigate many of these barriers. Other studies have also demonstrated the importance of child-friendly services at healthcare facilities (Fairlie, Sipambo, Fick, & Moultrie, 2014; Mkwanazi, Rochat, Coetzee, & Bland, 2013).

Macrosystem determinants of paediatric adherence to ART

The influence of traditional medicines on adherence to ART. African communities are still largely influenced by traditional healers and traditional medicines (Appelbaum Belisle et al., 2015; Bland, Rollins, Broeck, & Coovadia, 2004; Schenk, Kiragu, Murugi, & Sarna, 2014). Studies from KwaZulu-Natal have shown that traditional healers are

often patients' first contact with healthcare (Appelbaum Belisle et al., 2015; Carton, Laband, & Sithole, 2008). Similarly, in Kenya traditional healers are often patients' first access to healthcare as it is affordable, accessible and less stigmatising than clinic or hospital visits (Schenk et al., 2014).

Despite the influence of traditional healers in this community, caregivers in this study stated that they did not typically consult with healers regarding ART difficulties with children in their care. Only one caregiver in the FGD had consulted with a traditional healer about difficulties with treatment. Traditional healers, however, stated that they were consulted by caregivers, but that it was difficult to engage with them about medication adherence as caregivers were reluctant to disclose the child's HIV positive status to them. In the study by Appelbaum Belisle et al. (2015) traditional healers reported that patients sought their care as they were considered trustworthy. However, stigma associated with being HIV positive limited the extent to which traditional healers were able to engage with caregivers and children on ART.

Despite having received training on identifying the symptoms associated with HIV, traditional healers in this study remained largely unaware of the contra-indications of their herbal remedies when used in conjunction with ART. Traditional medicines remain largely uncontrolled (poorly regulated and unregistered) and in the case of children, the uses of traditional medicines such as herbal enemas have resulted in child deaths (Bland et al., 2004). Similar to the findings of other studies (Appelbaum Belisle et al., 2015) traditional healers reported that they prescribed herbal enemas to children whether they are on ART or not. Traditional healers explained that the effects of their remedies on ART were poorly understood by them and stated that better engagement with healthcare staff in the area was needed. The use of traditional medicines within the context of HIV treatment and care remains contentious (Appelbaum Belisle et al., 2015). Recent evidence on the use of

traditional medicines among Zulu ART users in KwaZulu-Natal demonstrated that traditional healers supported concurrent use of traditional remedies and ART and believed they played a very important role in the treatment and care of PLWH. Healthcare providers were not open to engaging traditional healers in the care of PLWH (Appelbaum Belisle et al., 2015).

      The influence of religious beliefs on adherence to ART. Only adherence counsellors in this study mentioned the potential influence that religion had on adherence to ART. The counsellors stated that they were aware of instances where ART users had reported to them that HIV could be cured through prayer. Another study in South Africa has also implicated some charismatic religious leaders as barriers to adherence to ART (Coetzee et al., 2011). However, these findings contradict other research studies investigating the influence of religion on adherence (Park & Nachman, 2010). For example, in an earlier study by Park et al. (2010), the authors investigated the relationship between religious beliefs and adherence to ART. The authors sampled 18 HIV-infected youth members aged between 14 and 22 years. The authors found that youths who reported elevated rates of involvement in religious practices more often had excellent adherence (defined as no missed doses in the past three days for more than one medication) compared to those with lower rates. The authors attributed religious beliefs to a form of social support. Social support has been shown to increase adherence amongst ART users (DiMatteo, 2004; Katz et al., 2013; Olds, Kiwanuka, Ware, et al., 2015).

Limitations and strengths

      The findings represent the perspectives of healthcare providers, traditional healers and caregivers of children younger than five years on ART in rural KwaZulu-Natal. The study therefore provides a broad range of perspectives expressed by the key role players in the treatment and care of children on ART. However, due to the small sample size and geographic

location of the participants, the findings cannot be generalized beyond the study. However, the findings may be transferable to other caregiver-child dyads living in the study area.

The study included parental as well as non-parental caregivers of children on ART, local as well as non-local doctors, and considered the perspectives of traditional healers. Very few studies have incorporated traditional healers' perspectives regarding barriers and facilitators of paediatric ART. By limiting the research specifically to children younger than five years on ART the research provides specific age-related knowledge that may contribute to intervention development. The perspectives of female caregivers were largely solicited in this research. Given the dearth of studies including male perspectives on paediatric HIV, future research might benefit from purposively recruiting biological or social fathers' perspectives on factors influencing paediatric ART. By including children with varying virological outcomes, this research allowed for comparisons that highlighted factors that may contribute to disease progression among infants and young children on ART. The findings demonstrate that attempts to improve paediatric adherence to ART in this setting should consider the complexity of the socioecological environment in which adherence among children and their caregivers in this area occurs.

CHAPTER 7

Phase 2 - Methods

Objectives

In order to determine what information caregivers received during their adherence counselling session at the clinic, I observed and documented the adherence counselling session caregivers received during a routine monthly visit to the clinic.

To determine the barriers and facilitators of treatment administration practices by caregivers to children younger than five years with different virological outcomes on ART, I video-recorded and documented the administration of medication to children younger than five years by their caregivers during one morning and one evening visit at their homesteads.

Sample design and sampling methods

Employment of a field assistant. Phase 2 of the research commenced in March 2013. Prior to this, I employed a full-time, isiZulu-speaking, research assistant (RA; Ms Mgenge). The RA had previous experience in the field, as she had been appointed as a data collector at the Africa Centre prior to becoming involved in my study. She had also previously worked as a data capturer and had experience in interviewing women and adolescents living with HIV. Ms. Mgenge has been a resident in the Hlabisa sub-district all her life and had valuable knowledge of the rural area. Her knowledge aided navigation of the field in areas where street names and proper roads are non-existent.

The RA assisted with recruitment of caregiver-child dyads, served as an interpreter in the field during home visits and counselling sessions, and assisted with rapport building with families. The RA kept a field journal in which she recorded her reflections on home visits. I included the field notes of the RA in the analysis.

Sampling design and criteria. Purposive sampling was used to select and recruit children younger than five years into the study. Viral load status at the time of recruitment

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was used to differentiate three groups of children invited to take part in the study (Table 7.1).

Children on ART for more than a year with a VL ≤400 copies per millilitre (cps/ml) were

considered virally suppressed. A suppressed VL was considered an indicator of good

adherence. Children on ART for more than a year with two consecutive VLs of ≥400 cps/ml

were considered virally unsuppressed. An unsuppressed VL was considered to be an indicator

of poor adherence. Children on ART for less than a year with no VL data were new enrollers.

New enrollers were included in order to understand how caregivers incorporated treatment

administration and clinic adherence into their daily routine. I aimed to recruit 10 caregiver-

child dyads based on each criteria group.

Table 7.1

Sampling Criteria of Children on ART

	Time on ART (years)	VL (copies per millilitre)
Unsuppressed VL	≥1	≥400 cps/ml (X2)*
Suppressed VL	≥1	≤400cps/ml
Newly initiated	≤ 1	No VL**

Note. * = Unsuppressed following two consecutive raised VLs ≥400 cps/ml. ** = Newly initiated children had not yet had a VL taken since enrolment on ART.

Recruitment. Recruitment took place at two primary healthcare clinics (one peri-

urban clinic [clinic A], and one rural clinic [clinic B]) in the Africa Centre's DSA. Clinic A

was the same clinic we had used during Phase 1 of the study. Recruitment began at clinic A

and clinic B was added to complete the sample size/ensure enough caregiver-child dyads

were recruited for each criteria group.

Dr Ruth Bland, paediatrician to all the children on ART attending clinic A and B,

approached the Africa Centre database scientist with the criteria for the study sample as

outlined earlier. A password-protected output based on these criteria generated a list of

caregiver-child dyads and expected date of clinic attendance. At the clinic, the list was

provided to one of the adherence counsellors (who had agreed to assist with recruitment)

based in the filing room at the clinic. The filing room was the patients' first point of entry when they came to the clinic, and was therefore a suitable point at which to engage with and invite caregivers. I asked the adherence counsellor to invite caregivers attending the clinic on the child's behalf to meet with me and my RA in a private room after their clinic visit. At clinic B I used the same recruitment strategy. The RA, in the presence of the principal investigator (BC), explained each objective of the overall study to participants in their first language, isiZulu. All participants gave written informed consent.

Figure 7.1 shows the number of caregiver-child dyads recruited from clinic A and clinic B and the numbers that withdrew from the study. The final sample consisted of 10 children newly initiated on ART and their caregivers, 12 children with suppressed VL's and their caregivers, and 11 children with unsuppressed VL's and their caregivers. Thus, 33 caregiver-child dyads took part in this study. Detailed participant characteristics are presented in the next section.

Newly initiated (n=10)	

13 recruited from clinic A and B (n=13)	

2 withdrew (Both moved out of the DSA)

1 child passed away 1 month after recruitment

Final sample clinic A (n=8)	Final sample clinic B (n=2)

Suppressed VLs (n=12)	

22 recruited from clinic A and B	

8 lost to follow-up after home visit 1

2 withdrew as father refused home visits

Final sample clinic A (n=12)	Final sample clinic B (n=0)

Unsuppressed VLs (n=11)	

17 recruited from clinic A and B	

3 withdrew
2 relatives did not want home visits
1 Caregiver-child dyad moved out of DSA

Final sample clinic A (n=10)	Final sample clinic B (n=1)

Figure 7.1. Recruitment numbers at clinic A and clinic B

Procedure. I observed caregivers during their counselling session, as well as during two to three visits at their homes. I asked each caregiver for permission to use a video camera during the household visit. However, those who declined were not excluded from the study. Only caregivers who had previously stated that members of the household were aware that the child was receiving medications were recruited for the study. All caregivers provided written informed consent.

Counselling session. Once a caregiver and child had been recruited, my RA and I accompanied them to a counselling session approximately one month after recruitment. We were present at the clinic on the date of each caregiver's next clinic visit. However, we did not call caregivers beforehand to remind them of their visits. Caregivers who were not present at their next clinic date were then telephoned the following day to determine the reason.

A semi-structured observation schedule (see Appendix M) was used during each adherence counselling session. When caregivers arrived at the clinic on their next clinic date, we met with them at the filing room and waited with them in line for their counselling session. The observation schedule elicited the following information: the length of the counselling session, caregiver and counsellor mood, presence of the child in the session, and content of the counselling session. The counselling sessions were mostly conducted in isiZulu, and captured via my RA's field notes. These field notes were translated by my RA into English and used by me for analysis. Once the counselling visit was concluded, we scheduled the first home visit (home visit 1) within a week following the counselling visit.

Household visits. Following the counselling session, participants were observed at their households three times.

Home visit 1. Home visit one (which typically lasted between 45 and 60 minutes) was the first time that we met with the caregiver and child at home. The purpose of this first visit

was to establish initial rapport with the family, to map out exactly where participants lived (so that we could arrive on time for the medication event on home visit 2), and to observe and document the type of dwelling, occupants and resources (see Observation schedule for Home visit 1 - Appendix J).

Home visit 2 and 3. Following home visit 1, my RA and I were present at the caregiver and child's home during one morning and one evening field visit (which typically lasted between 20 and 60 minutes each) in order to document and observe ART administration and management as it occurred naturally in the household. The morning home visit occurred no later than a month after home visit one. We conducted all the morning home visits during the period May 2013 to October 2013. No home visits occurred during November and December 2013 due to heavy rainfalls and families migrating or receiving family members during the festive season. Evening home visits were conducted during the period January 2014 to March 2014.

On the day of either the morning or evening home visit we arrived at the household some time before the treatment event (administering of ART to the child) took place. Caregivers had indicated to the RA the time that ART was "normally" administered to the child and we arrived before this time to document the moment-to-moment occurrences before, during and after the administration of the ART (See observation schedule for Home visit 2 and 3 – Appendix K).

My RA and I identified obvious obstacles that caregivers faced and the methods or structures that were in place to facilitate the administration of medication. We identified the individuals involved in the administration of the medication, observed the interaction between the child and the caregiver and used a video-recording device to facilitate these observations. During home visit 2 literate caregivers were given a book and pen and asked to

document their daily routine. Illiterate caregivers nominated a literate household member to write in the journal on their behalf.

Participant food parcels. Following each home visit participants were handed a food parcel to the value of R150.00 as a token of my appreciation for their willingness to participate in this research.

Natural observation as a data collection method

Unlike our natural observations of the world around us and our ability to make sense and offer judgements about things, observation for research purposes is systematic and focused on formal processes that characterize daily life (Angrosino, 2007). Observation may thus be defined as, "…the act of noting a phenomenon, often with instruments, and recording it for scientific purposes" (p. 72). Naturalistic observation differs from participant observation to the extent to which the researcher engages in the action. Angrosino (2007) has summarized four kinds of roles that a researcher conducting ethnographic work may adopt during the data collection process as established by Gold (1958).

The first role is that of the "complete observer" (p72). In this role the observer remains entirely covert and is never seen or noticed by the participants. The "complete observer" role lends itself to ethical concerns in the form of deception of participants. The second role is that of the "observer-as-participant" (p72). In this role the researcher conducts short periods of observation and is known to and often interacts with the study participants, but only in his/her capacity as a researcher. The third role is that of the "participant-as-observer" role (p73). In this role the researcher becomes as much a friend to participants in the study as an objective and neutral researcher. Thus, participants remain aware of the intentions of the role of the researcher during the data collection period. Finally, the fourth role is that of "complete participant" (p73). In this role the researcher becomes completely

immersed in the lifestyle of the participants to the extent that the research agenda remains largely unknown to participants.

Based on these distinctions of the various observer roles, I considered my role in this research to be that of "observer-as-participant". Observing participants through naturalistic observation provided me with the unique opportunity to collect data from individuals embedded in their natural context (Paterson, Bottorff, & Hewat, 2008). As far as possible I tried to remain unobtrusive, but this was difficult given the predominantly rural and Black inhabited surrounding community and my presence as a young white female. Initially I had used a marked Africa Centre vehicle for home visits, but experienced field workers suggested that an unmarked vehicle would make the neighbours of my participants less curious. I thus decided to change the field car to an unmarked rented vehicle for the remainder of the data collection period. Despite my concerns, my presence at the households received little attention from the neighbours of the participants, possibly due to the timing of our visits. The first visit to each participant was usually conducted during early afternoon (between 11am and 4pm), followed by a very early morning home visit 2 (between 5am and 9am), and late afternoon/evening home visit 3 (between 4pm and 8.30pm).

Video-recording as a data collection method. Video-recording has emerged as a valuable tool for qualitative studies (Knoblauch & Schnettler, 2012; Knoblauch, 2012). It has been used extensively in social anthropological studies and is a useful tool for research in the sociological, psychological and health sciences (Heath, Hindmarsh, & Luff, 2010). The use of video, augmented by field work, allows for access to the fine details of participant behaviour and interaction (Heath, Luff, & Sanchez Svensson, 2007). I used Heath, Hindmarsh and Luff (2010) as my main source and guide for collecting, organizing, transcribing, and analysing the video data. For the purposes of this research, video was used to capture a very specific process as it occurred naturally within the households of my participants that may otherwise

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not have been documented as accurately by observation schedules alone. There are both advantages and disadvantages to using video as a data collection tool, and these have important implications for the kind of data generated from this work. For example, video allows for the observed event to be viewed more than once and be subjected to a fine-grained frame-by-frame analysis of the phenomenon being investigated. However, using a video-recording device in the presence of participants invites bias as participants may react in a way that is contrary to their normal behaviour (Heath et al., 2010). Reactivity bias and its implications in this study are discussed later on.

Participant journals as a data collection method. Journals as a method of data collection are not frequently utilized as they require a level of commitment and adherence (the very phenomenon being investigated in this study) amongst the participants. However, participant journals are useful in circumstances where long periods of observation are not practical (Jacelon & Imperio, 2005). Therefore, without imposing too much constraint on participants' daily routines, it was suggested that they try to keep the diary for at least a week. Participants were encouraged to merely document their day as it proceeded, with relevant times if possible. None of the diaries had any content that appeared to be psychologically distressing to participants.

Methodological considerations

Position of camera in the household. Although my overall methodology remained the same during this process, considerations such as where to place the camera, whether it should be handheld or placed on a tripod changed as the research progressed. When the camera was handheld, following the actions of participants, especially in the context of limited space to move within a household, it became obvious that the actions were intrusive. Thus, I decided a tripod was a far less intrusive method. Since most of the morning visit data had been recorded using the handheld method, I struggled with the idea of not following the

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action and not being up close to the action. Furthermore, using a handheld camera meant that I was able to zoom in during measurements and administration, whereas using the tripod meant that I recorded from a small distance away from the action.

Reactivity bias. The presence of the researcher in a household undoubtedly invokes questions as to what extent researcher presence affects natural behaviour. Furthermore, concerns exist regarding whether the behaviour that is observed in a seemingly natural environment is representative of everyday behaviour (Gardner, 2000). There was initial concern about how reactivity bias would influence the research as my presence within the household undoubtedly created bias amongst respondents. In some instances the bias was clear, while in others it was less clear. For example, in some instances during the video-recording participants are seen looking directly at the camera during the observed event. There are also instances where the camera is moved around several times and forced to follow participants' actions very closely due to the sheer restriction of space in the household.

I tried to ascertain whether the behaviour I observed during my visits to the household was representative of normal behaviour. I did so by conducting an initial, unobtrusive (no video) home visit followed by the morning visit and evening visit to the household, both of which were video-recorded. Visiting the site more than once may reduce reactivity bias amongst participants (Heath et al., 2010; Knoblauch & Schnettler, 2012).

Another way to ascertain whether the behaviour I observed during my visits to the household was representative of normal behaviour was the inclusion of the participant journals. In the journals participants documented their daily activities, which included (amongst other things) who administered treatment on a particular day and whether or not the child demonstrated any problematic behaviour during the medication-giving activity.

Reflexivity

As mentioned previously, the study is located within the interpretivist paradigm, which acknowledges the subjectivity of the researcher and potential bias introduced by the individual life experiences and background of the researcher (Blanche et al., 2006; Creswell, 2013). It is thus integral to the reader of this thesis to understand the extent to which my background has shaped the interpretation of the data. I am a 27-year-old, white South African female living in a middle-class residential area in Cape Town. For this thesis I relocated to KwaZulu-Natal. Prior to the start of this thesis I completed both an honours and masters thesis in structural barriers to adherence to ART amongst adults living with HIV. Following the completion of both these theses, I developed a modest baseline knowledge of the factors that influence adherence amongst ART users living in circumstances much poorer than the context in which I grew up in.

However, the notion of adherence to medication and its importance is not unknown to my personal context. Both my brother and father live with chronic health conditions that require twice daily dosing with medications. My mother is the primary caregiver to both my brother and father as she is responsible for the monthly collection of their medications and the administration of their medications twice daily. In our context adherence is not limited by structural barriers to such an extent that it influenced adherence as is the case in the context of my participants.

During my home visits to the participants in my study, I was sensitized to the challenges they faced due to the lack of the financial security necessary to buy food. For both the caregivers and children who took part in this study, food security by far determined daily adherence to medication taking. I recall one particular instance of a caregiver who began to cry during my visit due to the sheer helplessness she experienced from being unable to consistently provide her child with food. The direct confrontation with poverty as

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experienced by my presence in these households, allowed for a deeper understanding and appreciation of the circumstances people living within a rural context face.

Rigour

Creswell (2014) has suggested eight ways of ensuring and maintaining scientific rigour in qualitative research and maintains that researchers should use a combination of at least two of these strategies (Creswell, 2014 p. 232-234). These are:

1. Prolonged engagement. Prolonged engagement involves spending long periods in the field to obtain an in-depth understanding of the details of the study site and the participants. In this study I used prolonged engagement in the form of multiple field visits to increase the rigour and validity of the observations made.

2. Persistent observation. Persistent observation involves focusing on key characteristics that may be relevant to the phenomenon being investigated, and exploring these in as much detail as possible. Observation of caregivers' treatment administration practices was key to the research design and facilitated triangulation.

3. Triangulation. Triangulation uses a combination of different data sources to justify the overarching themes arrived at after analysis. In this study I used interviews, focus groups, observation, field notes and participants journals to derive and justify key themes emanating from the data.

4. Peer debriefing and support. Peer debriefing is used to enhance the accuracy of the information obtained by allowing someone (usually an expert), to review and question the study design and findings. Due to the sensitive nature of the data collected, the analysis of the data was done in consultation with both of my supervisors, Prof Ashraf Kagee (an expert on barriers to adherence) and Dr Ruth Bland (an expert on paediatric HIV, especially in rural settings). Both Prof Kagee

and Dr Bland reviewed a subset of the transcripts (without seeing the coded work) and their independent impressions were matched against the coded transcripts. They also provided conceptual input at the level of theme identification.

5. Member checking. Member checking involves presenting the findings of the study to the participants and determining whether the findings are an accurate depiction of participants' insights.

6. Negative case analysis. Negative case analysis involves presenting discrepant or contrary information about a particular theme and adds to the credibility of the theme.

7. Auditing. An external auditor, preferably someone not familiar with the research, may be used to provide an objective perspective throughout the research process and assess accuracy and interpretation of findings. External auditing in the form of conference presentations (Appendix P) of some of the findings pertaining to this research provided objective perspectives of the research.

8. Reflexivity. Reflexivity allows for the researcher to clarify bias in the research process that may be as a result of present or past experiences.

Trustworthiness

According to Miles and Huberman (1994), trustworthiness in qualitative research can be established using four criteria, namely:

1. Confirmability

2. Dependability

3. Credibility, and

4. Transferability

1. Confirmability refers to the accuracy of the information collected by the researcher, void of bias on the part of the researcher. One way to control for this is

to have multiple observers. I thus asked Ms. Mgenge, my RA, to participate in the observations of the counselling sessions and home visits, also using the semi-structured observation schedules and writing her account of each visit in the form of field notes. After a particular home or counselling visit, Ms. Mgenge and I would compare field notes and eliminate any inaccuracies that may have been encountered by either one of us. The use of participant journals invited the participants' voice into the analysis of data based on daily routine, which subsequently also added to the confirmability of the observations.

2. Dependability refers to the extent to which the research process remained consistent over the course of the study period. I used semi-structured observation schedules to guide my observations during the counselling and home visits, which allowed for observations in a systematic fashion (Angrosino, 2007). I also used field notes to contextualize the observations and to document any deviation from the research process, if encountered.

3. Credibility refers to the extent to which the conclusions of the study are a fair reflection of the data collected and of the participants. The data presented in this thesis were constantly checked with participants as they were collected. At each home visit the field notes and observations of the previous visit would be shared with participants in order to obtain their approval of the version of the accounts as captured by myself and my RA. All the data were analysed by me and checked with my supervisors for meaningful interpretation and clarity in the presentation of the results. Lastly, Phase 1 of the data has been published in a peer-reviewed journal, and thus reported to a wider audience. Phase 2 of the data has been presented at one feedback session to the Africa Centre, and also at a conference.

The data from Phase 2 will also be prepared for publication in a peer-reviewed journal.

4. Transferability refers to the extent to which conclusions of the study are relevant to matters beyond the study. Transferability will be addressed in the concluding chapter of this thesis.

Ethics

Ethical approval. The study received ethical approval from Stellenbosch University (S12/05/135) and reciprocity with the University of KwaZulu-Natal.

Ethical considerations. *Gaining entry to the field.* As mentioned previously, gaining entry into the field required approval from the CAB. In contrast to their willingness to approve Phase 1 of the study, CAB members stated that they were hesitant to approve Phase 2. The board expressed concern as to who would have access to the data, and that this would be a crucial factor when informing participants of the study. The sensitive nature of the data meant that I had to conduct the review of the video-recordings and the analysis in consultation with my supervisors. As mentioned in Phase 1, the necessary approval was sought from the Hlabisa Hospital management to conduct this research at their clinics. However, before recruitment at the clinic commenced for Phase 2, the RA and I arranged to meet the head nurse of the clinic, as well as the Africa Centre ART nurse. We received verbal approval from both the head nurse and ART nurse to commence recruitment of participants.

Anonymity and confidentiality. The sample included in this study consisted of children considered vulnerable persons, and measures were subsequently taken to firstly allow for such video-recording to be done in the households, and secondly to analyse the data securely in such a manner that the actions would be ethically acceptable. Pseudonyms were used to anonymize participants' information and are used throughout the thesis, and image stills captured from the video data were censored to remove any identifying facial features.

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Participants were informed that only members directly involved in the research (myself and my supervisors) would have access to the data. The video data were kept secure on a password-protected external hard drive in a locked drawer.

Data analysis

      Counselling data. The source of the counselling sessions' data was the written notes of my own as well as my RA observations of these sessions. The observations were structured using a semi-structured observation schedule (Appendix M). Thus, the average length of the counselling observations and whether the child attended the counselling session or not were calculated using statistical functions in Excel 2013. Textual data regarding the content addressed in the counselling sessions were coded using ATLAS.ti v7. Field notes were used to place the counselling sessions in context, to note whether the observations were done in the morning or later in the day when a counsellor may be expected to be more tired, and to document space in the counselling room, privacy and the occurrence of interruption.

      Household data. The sources of the household data were the video-recordings and data from the semi-structured observation schedules used during home visits one, two and three. Other sources of data included handwritten observational field notes taken by my RA and I during home visit one, two and three, as well as participants' journals. Demographic data (such as age, marital status, level of education etc.) were entered and analysed using the SPSS v 22. Field notes and video data were imported into ATLAS.ti v 7.

      Video data. Video material, like other forms of qualitative data, is analysed and interpreted based on the researcher's methodological needs and theoretical assumptions (Heath et al., 2010). I was guided by the methods provided by Heath, Hindmarsh and Luff (2011) in collecting, organizing, transcribing, and analysing the video data. These authors discuss three key steps when analysing video data from a sociological perspective, drawing on ethnomethodology and conversation analysis (CA) (pp. 61 – 85). Firstly, the video data

undergoes a preliminary review that entails cataloguing of the data corpus, with consistent labelling of the video file names and marking instances that may be important for further analysis. At the end of each home visit the video data were uploaded onto a password-protected personal computer and reviewed before being imported into ATLAS.ti. Friese (2014) also encourage the use of "good data file names" (p.38) when working in ATLAS.ti. I subsequently labelled each video clip based on the following convention (Friese, 2014):

HDV_0014_SUPP_1; HDV (High definition video_participant ID number_virological status of the child_age of the child). Following the preliminary review, Health et al. (2011) have suggested a substantive review of the data corpus that entails selecting and analysing the video instances marked during the preliminary review. They then discuss the ways in which 'talk' can be transcribed alongside sequence of events. Given that most of my video data lacked any verbal communication amongst participants (which subsequently became a sub-theme in the analysis), my review and transcription of the video data were mainly sequence-orientated. The video data were transcribed in ATLAS.ti and coded using principles of grounded theory as video data were analysed alongside observational notes and participant journals.

The analysis approach is one of inductive thematic analysis that adopts similar strategies to grounded theory for analysing data (Braun & Clarke, 2006). It is important to state that this thesis is not embedded within grounded theory as a methodology as outlined in Charmaz (2006). Rather, the principles of the theory are used as an analytic guide for the analysis of the video data, observations, and field notes collected for this thesis. The analytic outline was continually revised based on each additional piece of data entered, with the process of open coding, axial coding, and selective coding (Charmaz, 2006). Open coding consists of identifying codes or themes in the original transcripts. Axial coding involves arranging the basic codes into inclusive categories or families. Selective coding is the process

of identifying overarching core categories at greater levels of abstraction to form a conceptual model that is the grounded theory. Thus based on the principles of grounded theory and data analytic steps suggested by Health et al., (2010), I analysed the data following the nine steps below to arrive at the themes and sub-themes presented in the next chapter.

Step 1: Frame-by-frame transcription of video data in ATLAS.ti

Step 2: Re-reading of transcripts and marking important processes

Step 3: Generation of empirical codes and initial memo-writing

Step 4: Re-reading of transcripts for conceptual clarity and refinement of code list

Step 5: Import of field notes and participant journals

Step 6: Reading of transcripts alongside field notes and participants journal

Step 7: Using hyperlink functions in ATLAS.ti and additional empirical codes to compare and contrast the sequence of events across the three criteria groups

Step 8: Re-examination of all the data to refine codes at a broader conceptual level

Step 9: Organizing codes into themes and sub-themes

Step 1. Transcription of the video was a necessary first step as it allowed frame-by-frame documentation of the steps taken during treatment administration and ensured that coding was conducted as close to the action as possible. Thus, transcription allowed for a meaningful engagement with the video, over and above the initial cataloguing review discussed previously. It also allowed for the clear identification of process and sequence of events followed during the retrieval, preparation and administration of medications.

Step2. Once transcription was completed, all the video transcripts were re-read. During the reading of the transcripts I marked (highlighted) instances across the transcripts that were similar (e.g. same geographical area in the house where medication was administered), and also instances that were different (e.g. change in person responsible for administering

medication to the child in the morning versus in the evening). The analysis was guided by the research objectives for Phase 2. Therefore, I marked instances that related to:

- Where medications were stored

- Whereabouts of the child during medication preparation

- How medications were measured

- How medications were administered

- The person responsible for measuring and administering medication

- The support of another household member during treatment measurement and administration

- Difficulties during measurement and administration

- Food availability before, during or after treatment administration

- Interaction between caregiver and child

Step 3. Following Step 2, I went back to all the marked instances and coded these with suitable descriptive level codes. As the names of the codes were likely to change as the analysis developed further, I kept a daily analytic memo in which I reflected on the appropriateness of various code names.

Step 4. Once I had assigned code names to all the marked instances I re-read the transcripts for conceptual clarity and refinement of the code list.

Step 5. Following Step 4, I imported the field notes and participant journals into the analysis and labelled them according to the same convention as the video data.

Step 6. The multiview functionality (two or more windows containing different analytic material can be opened simultaneously) of ATLAS.ti allowed for coding video alongside field notes and participant journals to bring context into the conceptualization of codes. Furthermore, the multiview functionality of ATLAS.ti allowed for the comparison of treatment administration across the three groups.

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Step 7. I used hyperlink functions in ATLAS.ti to combine segments of the field notes and participant journals to explain observed events in the video data. I added new codes where necessary.

Step 8. Following step 7 I re-examined all the data and refined the code list.

Step 9. In the final step I organized codes into suitable themes and sub-themes using the 'create family' function in ATLAS.ti, and used the 'query tool' in ATLAS.ti to locate similarities and differences in treatment administration across the three criteria groups.

Observational notes and participants' journals. Textual data obtained from handwritten field notes and participant journals were re-written in a Word document and imported into ATLAS.ti for thematic analysis. I followed the same six-step thematic analytic procedure as outlined in Phase 1 to code and categorize the information obtained from these data. Furthermore, as part of the process of triangulation, these data were coded alongside video data to provide a basis for the constant comparison between what had been observed during household visits and what had actually happened. The results of the data analysis procedure are addressed in the next chapter.

CHAPTER 8

Phase 2 - Results

Participant characteristics

Child characteristics

Children with suppressed viral loads. Of the 12 children on ART with suppressed VLs, one child was aged one year, three children were aged two years, two were aged three years, three were aged four years and three were aged five years. The median age of these children was 3.5 years (IQR [2-4.75]) (Table 8.1).

The majority of the children were female (8 out of 12) and more than half (9 out of 12) had at least two caregivers. The biological mother was the primary caregiver of eight children and the grandmother of four children as the children's biological mothers were living away from home. Most of the children's biological fathers (8 out of 12), were also living away from home. None of the children's biological parents were reported to be deceased.

Nine children were receiving a first-line PI-based regimen consisting of ABC + 3TC + LPV/r, and one received a first-line PI-based regimen consisting of d4T + 3TC + LPV/r. Two children were on a first-line NNRTI-based regimen consisting of ABC + 3TC + EFV, and d4T + 3TC + EFV, respectively. The average time on ART among children in this group was 27.9 months (2.3 years).

Half of the children received their medications at 7am and 7pm daily. Andile's caregiver, however, had changed his dose time from 7am/pm to 6am/pm to accommodate her crèche times (Table 8.1).

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Table 8.1

Sample Characteristics of Children with Suppressed VL's

Pseudonym	Age (years)	Gender	Number of caregivers	Primary caregiver	Whereabouts of biological mother	Whereabouts of biological father	ART regimen	Time on ART (months)	Dose time at recruitment	Dose time changed
Thabisa	4	Female	2	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	14	7am/pm	No
Sizwe	2	Male	1	Grandmother	Living away from family	Living away from family	ABC + 3TC + LPV/r	27	8am/pm	No
Thenjiwe	3	Female	2	Mother	Living with child	Living with child	ABC + 3TC + LPV/r	35	7am/pm	No
Lwazi	3	Male	2	Mother	Living with child	Living with child	ABC + 3TC + LPV/r	35	7am/pm	No
Richard	4	Male	2	Mother	Living with child	Living with child	ABC + 3TC + LPV/r	25	7am/pm	No
Mbali	1	Female	2	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	21	8am/pm	No
Ayanda	5	Female	2	Mother	Living with child	Living away from family	d4T + 3TC + EFV	42	7am/pm	No
Andile	2	Female	2	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	25	7am/pm	Yes(6am/6pm)

Table 8.1 *(continued)*

Pseudonym	Age (years)	Gender	Number of caregivers	Primary caregiver	Whereabouts of biological mother	Whereabouts of biological father	ART regimen	Time on ART (months)	Dose time at recruitment	Dose time changed
Tholakele	5	Female	1	Grandmother	Living away from family	Living away from family	d4T + 3TC + LPV/r	50	6am/pm	No
Nandi	4	Female	2	Grandmother	Living away from family	Living away from family	ABC + 3TC + LPV/r	20	6h30am/pm	No
Sizani	2	Female	1	Grandmother	Living away from family	Living away from family	ABC + 3TC + LPV/r	22	6h30am/pm	No
Sibusiso	5	Male	2	Mother	Living with child	Living with child	ABC + 3TC + EFV	19	6am/pm	No

Note. Liquid ARVs - ABC (Abacavir), 3TC (lamuvidine), LPV/r (Lopinavir/ritonavir). Tablet ARVs - d4T (Stavudine), EFV (Efavirenz), AZT (Zidovudine), CPV (Capravirine)

Children with unsuppressed viral loads. Of the 11 children on ART with unsuppressed VLs, one child was aged one year, one was aged two years, three children were aged three years, one child was aged four years and five children were aged five years. The median age of these children was four years (IQR [3-5]) (Table 8.2).

The majority of the children were male (6 out of 11). At least eight children had more than one caregiver with five having two caregivers, and three having as many as three caregivers. Caregivers were identified as persons responsible for both treatment administration daily as prescribed and/or monthly clinic attendance. Five children had their biological mother as their primary caregiver, while two had their grandmothers as their primary caregiver, and the remaining four had an aunt as their primary caregiver (Table 8.2).

The biological mothers of three children were deceased. Two biological mothers lived away from home and the remaining six biological mothers lived with their children. However, of the six biological mothers who lived with their children, only one (Dingane) was not identified as the primary caregiver of the child. One of the children's biological fathers was deceased, seven were living away from home, and three were living at the same homestead. Six children were receiving a first-line PI-based regimen consisting of ABC + 3TC + LPV/r, and three a first-line PI-based regimen consisting of d4T + 3TC + LPV/r. Two children were on second-line regimens consisting of AZT + 3TC +LPV/r, and AZT + ABC + 3TC + CPV respectively. The average time on ART among children in this group was 33.7 months (2.8 years). More than half of the children (7 out of 11) received their medications at 7am and 7pm daily. Dingane's aunt, however, changed her medication from 9am/9pm to 6am/6pm as Dingane was due to start school soon (Table 8.2).

Table 8.2

Sample Characteristics of Children with Unsuppressed VL's

Pseudonym	Age (years)	Gender	Number of caregivers	Primary caregiver	Where-abouts of biological mother	Where-abouts of biological father	ART regimen at last home visit	Time on ART (months)	Dose time at recruitment	Dose time changed
Samu	3	Male	3	Aunt	Living away from family	Living with child	ABC + 3TC + LPV/r	28	7am/pm	No
Phila	5	Female	3	Grand-mother	Deceased	Living away from family	AZT + ABC + EFV+ CPV/r	54	6am/pm	No
Nathi	2	Male	2	Mother	Living with child	Living with child	ABC + 3TC + LPV/r	17	7am/pm	No
Muzi	5	Male	2	Aunt	Deceased	Living away from family	d4T + 3TC + LPV/r	51	7am/pm	No
Kwanele	5	Female	3	Mother	Living with child	Living away from family	d4T + 3TC + LPV/r	23	7am/pm	No
Dingane	5	Female	2	Aunt	Living with child	Deceased	3TC + AZT + LPV/r	46	9h00am/pm	Yes (6am/6pm)
Busisiwe	5	Male	2	Aunt	Deceased	Living away from family	d4T + 3TC + LPV/r	57	7am/pm	No

Table 8.2 *(continued)*

Pseudonym	Age (years)	Gender	Number of caregivers	Primary caregiver	Where-abouts of biological mother	Where-abouts of biological father	ART regimen at last home visit	Time on ART (months)	Dose time at recruitment	Dose time changed
Duduzile	1	Female	1	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	18	6am/pm	No
Jabulile	3	Male	2	Grand-mother	Living away from family	Living with child	ABC + 3TC + LPV/r	32	6am/pm	No
Khethiwe	4	Female	1	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	29	7am/pm	No
Siyabonga	3	Male	1	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	16	7am/pm	No

Note. Liquid ARVs - ABC (Abacavir), 3TC (lamuvidine), LPV/r (Lopinavir/ritonavir). Tablet ARVs - d4T (Stavudine), EFV (Efavirenz), AZT (Zidovudine), CPV (Capravirine)

Children newly initiated on ART. Of the 10 children newly initiated on ART, one was aged below one year (four months), and one was aged one year. Four children were aged two years, and four children were aged five years. The median age of these children was two years (IQR [2-5]) (Table 8.3).

The majority of the children were female (6 out of 10). Six children had more than one caregiver with half of the primary caregivers being a biological mother. Three caregivers were grandmothers, one caregiver was an aunt and one caregiver was a biological father. The biological mothers of two children (Tina and Thandiso) were deceased. Two biological mothers lived away from home. Almost all (9 out of 10) biological fathers were living away from the family. Seven children were receiving a first-line PI-based regimen consisting of ABC + 3TC + LPV/r, and one child was on a first-line PI-based regimen consisting of d4T + 3TC + LPV/r. Two children were receiving a first-line NNRTI-based regimen consisting of ABC + 3TC +EFV. The average time on ART among children in this group was 4.4 months (0.4 years). Half of the children received their medications at 6am and 6pm daily and none had changed their dose times during the course of the study (Table 8.3).

Table 8.3

Sample Characteristics of Children Newly Initiated on ART

Pseudonym	Age (years)	Gender	Number of caregivers	Primary caregiver	Where-abouts of biological mother	Where-abouts of biological father	ART regimen at last home visit	Time on ART (months)	Dose time at recruitment	Dose time changed
Thembe	5	Female	1	Aunt	Living away from family	Living away from family	ABC + 3TC + EFV	4	6am/pm	No
Lungile	5	Female	2	Grand-mother	Living away from family	Living away from family	ABC + 3TC + EFV	7	7am/pm	No
Luyando	1	Male	2	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	9	6am/pm	No
Zoliswa	5	Female	2	Grand-mother	Living with child	Living away from family	ABC + 3TC + LPV/r	1	6am/pm	No
Tina	5	Female	2	Father	Deceased	Living with child	d4T + 3TC + LPV/r	6	7am/pm	No
Hlengiwe	2	Female	1	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	6	9h00am/pm	No
Amanda	<1(4 months)	Male	2	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	1	7am/pm	No
Thandiso	2	Male	2	Grand-mother	Deceased	Living away from family	ABC + 3TC + LPV/r	6	6am/pm	

Table 8.3 *(continued)*

Pseudonym	Age (years)	Gender	Number of caregivers	Primary caregiver	Where-abouts of biological mother	Where-abouts of biological father	ART regimen at last home visit	Time on ART (months)	Dose time at recruitment	Dose time changed
Siyasizwe	2	Male	1	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	2	6am/pm	No
Thondeka	2	Female	1	Mother	Living with child	Living away from family	ABC + 3TC + LPV/r	2	8am/pm	No

Note. Liquid ARVs - ABC (Abacavir), 3TC (lamuvidine), LPV/r (Lopinavir/ritonavir). Tablet ARVs - d4T (Stavudine), EFV (Efavirenz), AZT (Zidovudine), CPV (Capravirine)

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Caregiver characteristics

The age of the caregivers ranged from 22 to 67 years. A greater proportion of caregivers to children with suppressed VLs (7 out of 12) were married and/or living with a significant other in a permanent union compared to the other two groups (2 out of 11 – unsuppressed, and 2 out of 10 – new enrollers). Furthermore, a greater proportion of caregivers to children with suppressed VL's had completed high school (5 out of 12), compared to the other two groups (2 out of 11 – unsuppressed, and 1 out of 10 – new enrollers). Most of the caregivers (27 out of 33, 82%) were unemployed and were receiving either a CSG or disability grant from the South African government. More than half of the caregivers (19 out of 33, 58%) were also ART users. Only 24 (73%) had received the pre-ART HIV education sessions before the child was enrolled on treatment (Table 8.4).

Several caregivers (25 out of 33, 76%) indicated that they were not solely responsible for treatment giving or for attending clinic visits (11 out of 33, 33%), but shared this responsibility with another member of the household, usually an older sibling. Caregivers reported that all members of the household were aware that the child was on treatment. However, it was not fully ascertained whether the household members knew this treatment was for HIV, especially in the case of other siblings in the household (Table 8.4).

Table 8.4

Caregiver Characteristics

Variable	Suppressed (n =12)	Unsuppressed (n=11)	Newly initiated (n=10)	Total
Age, years, median (IQR) [Range: 22-67]	35 (27.5 - 48)	29 (24 - 40)	28.5 (25.5 - 51)	
Marital Status				
Single	5	9	7	21
Widowed	0	0	1	1
Married or living with a significant other in a permanent union	7	2	2	11
Living arrangement				
Live with children only	3	1	3	7
Live with other adults and children	9	10	7	26
Education				
No formal education	0	2	1	3
Attended primary school but did not complete	0	1	1	2
Completed primary school	2	3	2	7
Attended high school but did not complete Grade 12	5	3	4	12
Completed Grade 12	5	2	1	8
Graduated from university, college or technikon.	0	0	1	1

Table 8.4 *(continued)*

Variable	Suppressed (n =12)	Unsuppressed (n=11)	Newly initiated (n=10)	Total
Employment				
Unemployed	10	11	6	27
Employed full-time	0	0	2	2
Student	1	0	1	2
Retired	1	0	1	2
Income				
Less than R12, 000	5	6	0	11
Do not know	2	0	1	3
CSG*	3	2	2	7
>1 grant	2	2	4	8
Disability grant	0	1	0	1
R10, 0001-R40, 000	0	0	1	1
Pension	0	0	2	2
Language				
Zulu	11	11	10	32
Portuguese	1	0	0	1
Caregiver on ART, yes, no	8	6	5	19
Caregiver attend HIV education session, yes	8	7	9	24
Number of children looked after, mean, (range)	3.5 (2-7)	2.9 (1-7)	2.7 (1-4)	

Table 8.4 *(continued)*

Variable	Suppressed (n =12)	Unsuppressed (n=11)	Newly initiated (n=10)	Total
Only person bringing child to clinic, yes	9	5	8	22
Other clinic goer				
Aunt	2	1	2	5
Sibling	1	1	0	2
Father	0	2	0	2
Mother	0	1	0	1
Grandmother	0	1	0	1
Only person who administers treatment, Yes	4	1	3	8
Other treatment giver				
Aunt	1	1	2	4
Sibling	5	2	5	12
Father	3	2	0	5
Mother	0	3	0	3
Grandmother	0	2	1	3
Grandfather	1	0	0	1
Disclosed to family members, yes	12	11	10	33

Counselling observations

The caregiver-child dyads recruited for the study were accompanied to one routine adherence counselling session at their first clinic visit after recruitment, and prior to home visit one. The purpose of conducting the counselling visit prior to the home visit was to document the information caregivers received during these sessions. Reasons for non-attendance at the clinic visit were determined telephonically.

ART clinic and counselling room setup

Figure 8.1 below shows the typical setup of the ART section at clinic A. The setup at clinic B was similar. In the ART section, rooms were numbered one through ten, with patients' exit point being the pharmacy where they collected their medications. During informal conversations with the head ART nurse at the time, she explained that the following activities took place in each room:

Room 1: Prior to initiation patients are weighed in room one. Children are then weighed every month to determine whether dose changes have to be made.

Room 2: Prior to initiation HIV infected adults and caregivers of HIV-infected children undergo three pre-ART group HIV education sessions. These sessions take place on two separate days over a two-week period.

Room 3: Patients' files are stored here.

Room 4: Patients' files are kept here before they are stored in room three.

Room 5, 6 and 7: Routine patients usually started at room four where they receive their patient files. Once they have received their files they wait to see the adherence counsellors in either rooms five, six or seven.

Room 8, 9 and 10: Patients then visit the ART nurse in either rooms eight, nine or ten.

Room 11: Patients collect their monthly medication from the pharmacy at room 11, where they then exited the ART clinic.
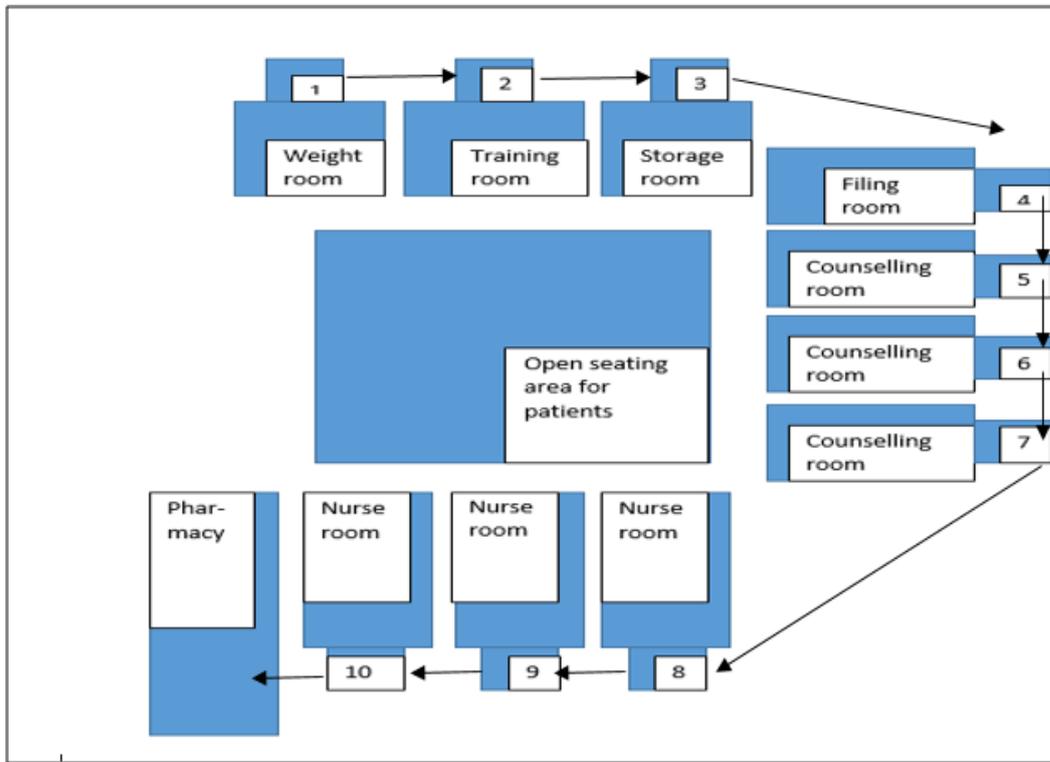
Figure 8.1. The ART clinic setup at clinic A.

Counselling observations

During my observations events usually occurred in the following sequence. Once caregivers had collected their files at room 4, they queued outside the counselling rooms (room 5, 6, or 7), which were occupied on a 'first-come-first-served' basis. Figure 8.2 below shows the typical setup inside a counselling room, including the position of the adherence counsellor in relation to the caregiver and child, as well as where my RA (RA) and I (PI) stood and observed the sessions. The setup was similar in all counselling rooms at both clinic A and clinic B.
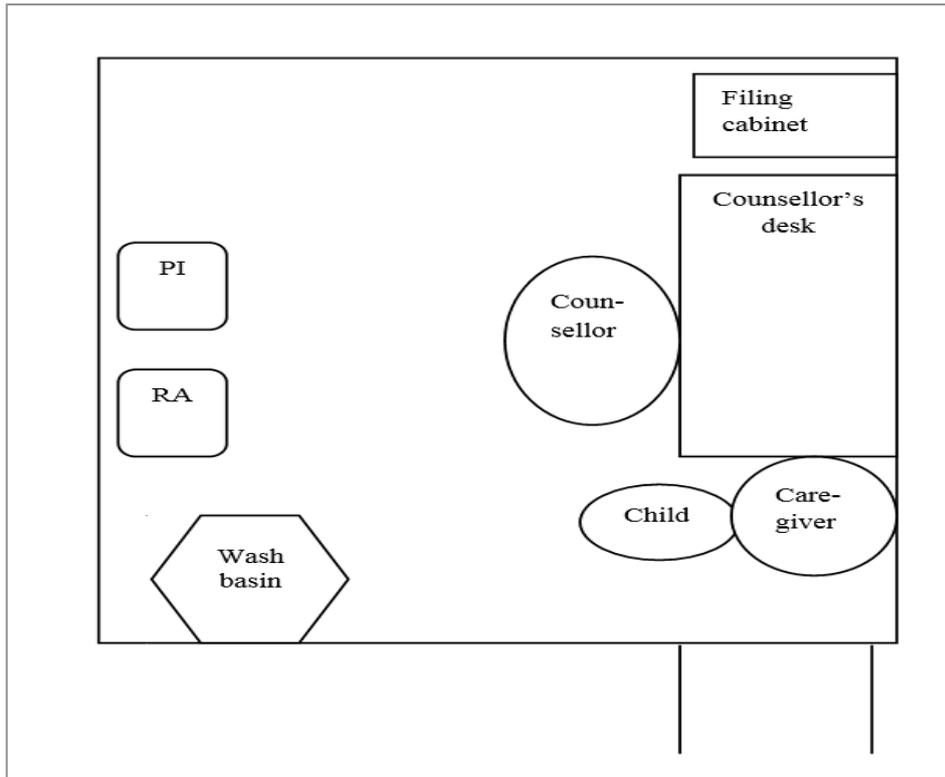
Figure 8.2. Typical counselling room setup

Once caregivers had entered the room for counselling they were seated in the chair closest to the door, or opposite the counsellor. Counselling observations were recorded from the moment caregivers entered the counselling room to the moment they exited the rooms.

Reasons for non-attendance

My RA and I observed 25 adherence counselling sessions. Thus we observed 6of 10 of the newly initiated children, 11 out of 12 of the suppressed children, and 8 out of 11 of the unsuppressed children (Table 8.5). Of the eight sessions that my RA and I were unable to observe, four caregivers stated that they were unwilling to wait in the long queues outside the counselling rooms, three caregivers stated that they were unable to get time away from work, and one stated that she was in school and unable to attend.

Length of counselling session

The length of the counselling sessions varied across observations, with the average counselling visit across all observations lasting 8.1 minutes. The average length of counselling received by caregivers of children with unsuppressed VLs was 6.86 minutes. On average the time in counselling received by caregivers of children newly started on ART and those with suppressed VLs was 8.2 and 8.8 minutes respectively. Among the children with unsuppressed VLs, two counselling sessions lasted less than 10 minutes and the remaining were less than seven minutes. Among the children with suppressed VLs, six sessions lasted less than 10 minutes, and the remaining were less than seven minutes. Among children newly initiated on ART, three sessions lasted longer than 10 minutes, with the remaining sessions lasting less than five minutes. The variations in length resulted from the varied nature of the content addressed in the counselling sessions and is discussed further on.

Presence of child in session

Children accompanied their caregiver to the counselling session in 18 out of 25 observations. Among the newly initiated children, one child (Siyasizwe) was unable to attend. The caregiver stated that the child was at home with his aunt. Among the suppressed children, five children (Thenjiwe, Lwazi, Sibusiso, Ayanda, Richard) were unable to attend the counselling session. One caregiver, a mother to twins on ART (Thenjiwe and Lwazi) reported that the children were at school. Reasons for non-attendance of the remaining three children were not elicited by the counsellors from the caregivers during the counselling sessions. One child with an unsuppressed VL (Dingane) was reported by the caregiver to be at school.

Presence of primary caregiver

Almost all (24 out of 25) caregivers who attended the counselling sessions were the primary caregiver of the child. One counselling session of a child newly initiated on ART (Thandiso) was attended by the child's older sibling instead of his grandmother. In three

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instances both the caregiver and child were counselled in the same session (Table 8.5). These instances contributed to longer counselling times.

Privacy in counselling sessions

In eight of the observations the counselling sessions lacked privacy. In three instances, two counsellors occupied one counselling room and saw patients simultaneously. In three instances counselling sessions were interrupted by other members of staff and in two instances the counselling sessions were interrupted by other patients (Table 8.5).

The extract below from my field notes of the counselling session observed with Sizwe (suppressed two-year-old male) and his grandmother demonstrates the difficulty associated with an overcrowded counselling room.

Field note extract:

Two counsellors occupied one of the counselling rooms at the clinic. One of the counsellors did not work from a desk and balanced the patient's file on her knees or pressed on a stack of files on a chair. The other counsellor in the room was seated at the desk [P197].

Table 8.5

Counselling Observations across the Three Criteria Groups

	Newly-initiated	Supp-ressed VLs	Unsupp-ressed VLs	Total
Number of observations	6	11	8	25
Length of counselling session in minutes (mean, [range])	8.2 [5,10]	8.8 [4, 18]	6.86 [2, 14]	8.1
Presence of child in session	5	6	7	18
Presence of primary caregiver	5	11	8	24
Caregiver and child counselled in same session, yes	1	1	1	3
Number of interruptions during counselling sessions	1	2	2	5
> 1 counselling session taking place, yes	1	0	2	3

Content addressed in the sessions

Table 8.6 shows the content of the counselling sessions with the caregivers across all three groups. Table 8.6 shows the number of times each of the activities was observed in the sessions across each criterion group.

As mentioned previously, 10 of the counselling sessions lasted longer than 10 minutes. Six of the sessions were longer as a result of administrative tasks that took place during the sessions. For example, five counselling sessions among children with suppressed VLs lasted longer than 10 minutes. In one session (Richard) this was because both caregiver and child were counselled in the same session. Time was spent doing a pill count of the caregivers' medication. In two sessions (Ayanda, Mbali), time was spent replacing old file covers with new ones. In one session, counselling for two children (Lwazi, Thenjiwe) took place. In the session that lasted 18 minutes, 12 minutes was spent searching for the laboratory results of the child in the filing room next door to the counsellor's room.

In one session with a child newly started on ART (Amanda), the counsellor spent time searching for lab results. Thus, although it appeared as though children with suppressed VL's

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received longer counselling sessions, the difference in time was predominantly due to administrative tasks that took place during the session.

As can be seen in Table 8.6, there were only two observed instances where caregivers had reported issues related to the child to the counsellor. One was an instance where the child's eyes were hurting and the other was an instance where the caregiver reported bodily sores on the child. In both instances the counsellors had recommended that the caregiver take the child to see a doctor.

During the counselling sessions, counsellors typically asked about the dose amounts of medication administered to the child (10 out of 25 observations), reported the child's weight to the caregiver (4 out of 25 observations), reported the child's CD4 count (4 out of 25 observations) and VL results to the caregiver (7 out of 25 observations), and in one instance, a counsellor asked about the use of a reminder tool.

In four observations counsellors had reported the VL status of an unsuppressed child to the caregiver. In two of these observations the counsellors had stated that the child was due to have their VLs tested again at the next clinic visit. In both of the other two sessions (Phila, Jabulile) the counselling lasted less than 10 minutes. During these sessions counsellors asked caregivers to name the medications that the child was receiving and to name the dose amounts. Both counsellors asked what times the caregivers were administering the medications to the child and emphasized that the timing was important.

In both instances the caregiver of the child was their grandmother. Both caregivers were able to name the dose amounts. However, only Jabulile's grandmother was able to name all of the medications he received. Although Phila's grandmother was present in this counselling session, she reported previously that she was not solely responsible for clinic attendance and treatment administrations to Phila. She shared this responsibility with two of

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Phila's older siblings. Irregular clinic attendance by Phila's grandmother may have contributed to her inability to name all of the medications Phila received.

There were two instances (Siyasizwe, Thandiso - both children newly initiated on ART), where the counsellors had asked the caregivers to demonstrate how they measured the medications. In both instances the counsellor had presented the caregiver with a syringe and cup of water and asked the caregiver to demonstrate how much of a certain formulation (in both cases LPV/r) the caregiver administered to the child. Both caregivers had made accurate measurements.

There were two counselling sessions (Nathi, Dingane- both unsuppressed children on ART) in which the counsellor attending to the caregivers had only signed the patients file for attendance. The extracts from my field notes of both instances below show how this was documented. Below is the field note extract from counselling session with Nathi (three-year-old unsuppressed male) and his mother.

Field note extract:

Nathi's mother walked into the counselling room and sat down on the chair nearest to the counsellor and handed the counsellor two files (one file was her own). The counsellor greeted both caregiver and child (as well as myself and RA) and began to page through the file. She repeated the file entry that was made last month, and dated and signed her entry. She handed the file back to the caregiver and said to Nathi, "I like your shoes boy", but he did not respond. The counsellor then asked whether the child talks (child was standing behind his mother) and the caregiver nodded and replied, "yes", and got up and exited the room. (Time in session: 9h47am – 9h55am) [P202].

Below is the field note extract from the counselling session of Dingane (five-year-old unsuppressed female) and her aunt.

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Field note extract:

> Dingane's aunt stepped into the counselling room. The caregiver (Dingane's aunt) sat down on the chair nearest to the counsellor. The caregiver had three files with her today (one of which was her own, and the other Dingane's). The counsellor asked the caregiver, "Where is the child?" to which the caregiver replied, "at school". The counsellor signed and dated all three files, and handed them to the caregiver. The caregiver then got up and exited the counselling room. (Time in session: 10h22am – 10h24am) [P206].

As seen from the extracts above, in one of the sessions the child had been present and in the other the child had not been present. Regardless of child's presence, the counsellors did not engage in conversation with the caregivers. The content of the counselling sessions observed amongst caregivers in this study thus varied from caregiver to caregiver. There appeared to be no formalised approach to any of the sessions I observed, and as mentioned, in some sessions very little interaction took place between caregiver and counsellor. The majority of the counselling sessions took place in confidence, although it must be mentioned that the presence of my RA and I may have contributed to a lack of engagement between caregiver and counsellor.

Table 8.6

Counselling Observations and Activities across the Three Criteria Groups

Content covered in session	Newly initiated Number of times occurred (out of 6 observations)	Suppressed Number of times occurred (out of 11 observations)	Unsuppressed Number of times occurred (out of 8 observations)	Total Out of 25 observations
Caregiver reported child's eyes are hurting			1	1
Caregiver reported sores on child's body to counsellor	1			1
Counsellor asked caregiver about dose amounts	5	3	2	10
Counsellor asked caregiver about dose times	1		2	3
Counsellor asked caregiver about medication names		1	2	3
Counsellor asked caregiver about number of treatment givers	1	1	1	3
Counsellor asked caregiver about reminder tools		1		1
Counsellor asked caregiver to bring child for blood tests	1	1	2	4
Counsellor asked caregiver to bring child to counselling	1	3		4
Counsellor asked caregiver to bring medication to clinic		1		1
Counsellor asked caregiver to demonstrate measurements	2			2
Counsellor **only** signed and dated child's file			2	2

Table 8.6 *(continued)*

Content covered in session	Newly initiated Number of times occurred (out of 6 observations)	Suppressed Number of times occurred (out of 11 observations)	Unsuppressed Number of times occurred (out of 8 observations)	Total Out of 25 observations
Counsellor reported CD4 count to caregiver		2	2	4
Counsellor reported child's weight	2	1	1	4
Counsellor reported VL to caregiver		3	4	7
Counsellor searched for lab results	1	1		2
Counsellors asked caregiver how child was doing		2		2
Counsellors asked the age of the child			1	1
Counsellors did caregiver's pill count	1	1		2

Household observations

Household characteristics

Following the counselling observations, my RA and I conducted home visit one. Home visit one was used to locate participant households, as well as to document the type of dwelling participants lived in, the number of occupants and resources.

Household area. Most (13 out of 33) participants lived in an area known as Msane reserve (Area 1 – Figure 8.3) (Table 8.7). Msane reserve is part of the greater KwaMsane area, and is approximately 4km from clinic A. The roads leading from the national road to clinic A, Africa Centre, and clinic B are all tarred. Five participants lived in an area with a tarred road leading up to their homestead (those living in KwaMsane –Area 2). The remainder of participants had dirt roads leading to their homesteads. In areas such as Msane reserve (Area 1), Ndlovu village (Area 4), Bhoboza (Area 5) and KwaMshaya (Area 7), my RA and I often had to park our vehicle somewhere close to the homestead and walk the remainder of the way as there were no direct roads leading to these homesteads, only footpaths. Except for the two participants living in KwaMshaya (Area 7), most participants lived within a 5km radius of their clinic.

Type of dwelling, occupants and resources. Twenty-two caregiver-child dyads resided in a RDP type house. Two caregiver-child dyads resided in wooden structures, two in rondawel's (circular, single-roomed structures made of mud and mortar with thatched roofs), and seven resided in house structures made of brick and cement (Table 8.7).

The median numbers of adults and children per household were three and three respectively. Given that the modal number of rooms per household was two, the households were mostly overcrowded with an average of six members per household. All of the households had electricity, and almost all had access to a refrigerator (30 out of 33, 91%). Water was mostly available via a communal water point (17 out of 33, 52%). All of the

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caregivers indicated that if available, children were usually given food prior to being administered their ART (Table 8.7).
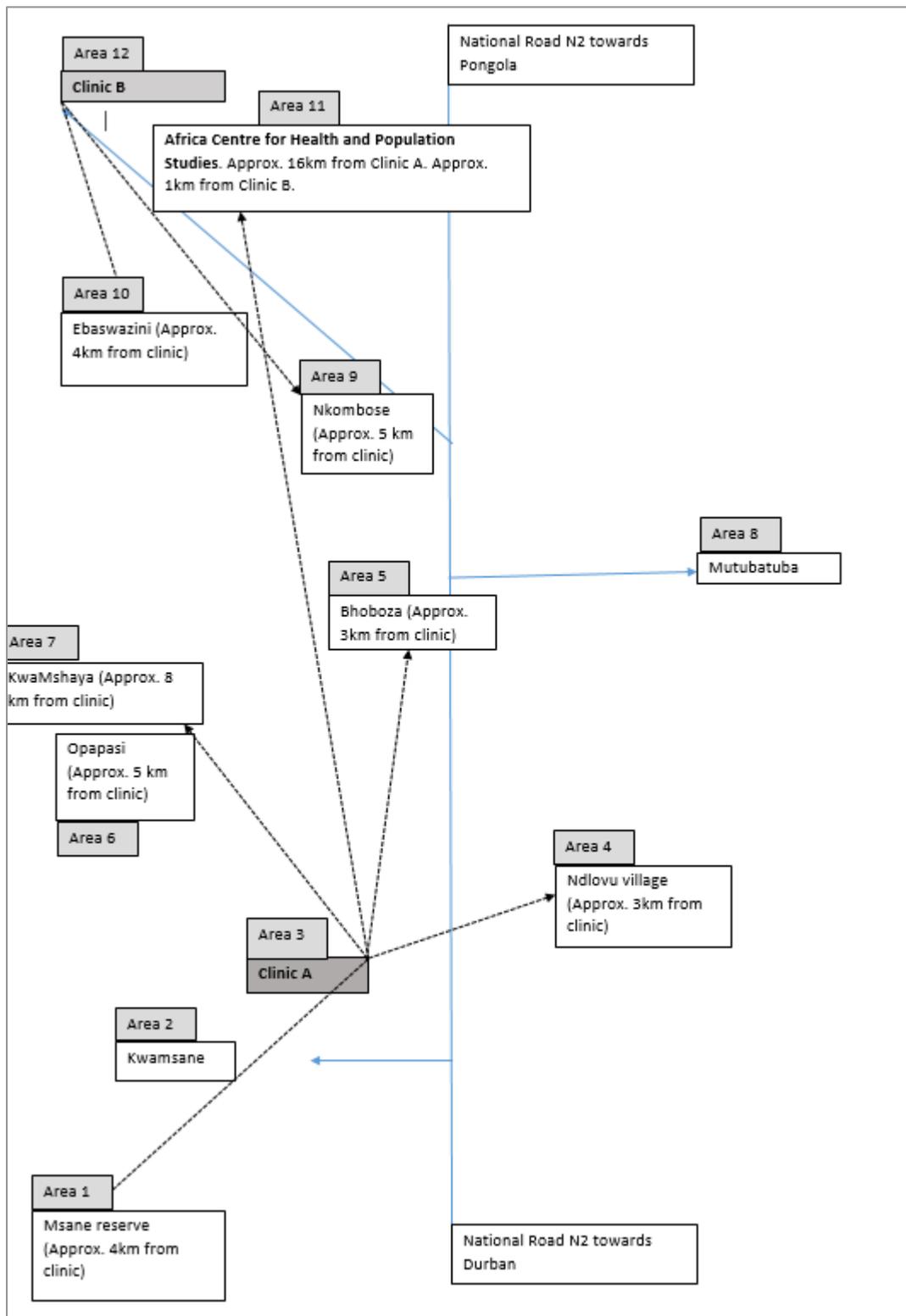
Figure 8.3. Map of location of study participants in relation to both clinic recruitment sites (not to scale).

Table 8.7

Household Characteristics

Variable	Suppressed (n=12)	Unsuppressed (n=11)	Newly initiated (n=10)	Total (n=33)
Household area				
Bhoboza	0	0	2	2
Msane reserve	6	5	2	13
Ndlovu village	0	3	1	4
KwaMsane	4	1	0	5
Opapasi	1	0	0	1
KwaMshaya	0	0	2	2
Ebaswazini	1	1	2	4
Somkhele	0	1	1	2
Type of dwelling				
RDP* house	7	8	7	22
Wooden house	1	1	0	2
Rondawel**	1	1	0	2
Brick house	3	1	3	7
Number of rooms per household(mode)	2	2	2	2
Number of adults per household (median)	2.5	3	2.5	3
Number of children per household (median)	4	3	3.5	3
Water in household				
Inside tap	5	1	2	8
Tap on property	4	3	1	8
Communal water point	3	7	7	17

Table 8.7 *(continued)*

Variable	Suppressed (n=12)	Unsuppressed (n=11)	Newly initiated (n=10)	Total (n=33)
Electricity (yes)	12	11	10	33
Refrigerator (yes)	11	10	9	30
Food given before ART (yes)	12	11	10	33

Note. * = RDP - Reconstruction and Development Programme house, typical size of two-roomed RDP structure - 30 m^2 (Hunter & Posel, 2012)
** = Rondawel - circular house made of brick and mortar with a thatched roof.

Treatment administration observations

Following home visit one, participants were visited at their homesteads during one morning (home visit two) and one evening visit (home visit three). As stated previously, 33 caregiver-child dyads took part in Phase 2 of this study. My RA and I conducted a total of 86 home visits over a period of 13 months [February 2013 – March 2014], visiting each caregiver-child dyad at their homes at least twice (i.e. at home visit 1 - initial visit to household, and home visit two - morning visit to household). However, only 20 caregiver-child dyads were visited a third time (i.e. at an evening visit [home visit 3]). The reasons for not completing all evening visits are described below.

Children newly initiated on ART. I was unable to observe treatment administration in the evenings of four of the children newly initiated on ART. Two of the children, Hlengiwe and Thondeka received their doses in the evening at 8pm and 9pm respectively. For safety reasons, my RA assistant and I did not conduct any field work later than 8pm in the township (Table 8.3).

Although my RA and I had arranged and been to Tina and her father's homestead before 7pm one particular evening to observe medication administration, we did not video record the treatment event. Tina's father had arrived home late from work that evening and refused to administer medication to his child until supper had been prepared and eaten. By 8pm that evening supper was still not ready, and treatment had still not been administered. My RA and I had left the homestead without recording treatment administration. Tina's father, however, called my RA in the morning to state that he did administer treatment to his daughter, and that he had done so at 9h30pm. The importance that the caregivers in this study attach to administering food before medication is addressed again later in this thesis.

Lastly, I was unable to conduct an evening home visit to Luyando and his mother's homestead. The RA had called Luyando's mother to arrange an evening visit. She stated that

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they had moved households since our last visit and was not comfortable with us coming to their new home as the other members of the household were not aware of the child's status.

Children with suppressed VL's on ART. I was also unable to observe treatment administration in the evening at four of the homes of children with suppressed VLs. Two of the children, Sizwe and Mbali, both received their second dose of medication at 8pm (Table 8.1). As mentioned, no evening visits occurred after 8pm. Andile and her mother lived in very close proximity to their neighbours. At recruitment, Andile's mother said that we were welcome to visit them in the morning, but that the evenings at their homestead were always busy and they did not wish to draw the attention of their neighbours. Lastly, Sizani's grandmother informed my RA that Sizani no longer lived with her and was living with her mother in an area outside of the DSA.

Children with unsuppressed VL's on ART. Finally, I was unable to observe treatment administration in the homes of two children with unsuppressed VLs (Table 8.2). I was unable to observe treatment administration in the evening at Muzi's home. Muzi's aunt had informed us that he had gone with his aunt to a funeral in Mpumalanga and that she was unsure as to when they would return. We were also unable to observe treatment administration at Duduzile's home in the evening as my RA was unable to schedule an evening that suited her caregiver. Dudu's mother had begun working since our last visit and she struggled to give an exact time that she would be at home.

In the next section I present the themes and sub-themes related to the observations of the treatment administration practices undertaken by caregivers at medication-giving times during the morning and evening home visits. The section incorporates the video data, observation schedules, field notes and participant journals to contextualize the treatment event and household circumstances. The themes and sub-themes are summarized in Table 8.9.

Length of morning and evening visits. The average time spent at the households in the morning was approximately half an hour across all three groups, and in the evening approximately an hour long across all three groups. The actual time it took to measure and administer the medication to the child during these visits was far shorter (Table 8.8).

Table 8.8

Length of Morning and Evening Visits

	Newly initiated		Suppressed VL		Unsuppressed VL	
	Morn-ing visit (n=10)	Even-ing visit (n=6)	Morn-ing visit (n=12)	Even-ing visit (n=8)	Morn-ing visit (n=11)	Even-ing visit (n=9)
Length of morning and evening visit in minutes[mean, min, max]	32.7 (19, 54)	58.63 (26,14)	37.25 (19, 55)	55.00 (37, 79)	36.00 (17, 65)	55.81 (20, 90)
Length of treatment administration in minutes [mean, min, max]	3.85 (1.45, 9.11)	3.03 (1.00, 7.53)	4.12 (0.56, 5.54)	6.83 (1.59, 12.25)	4.99 (1.02, 14.55)	5.99 (2.43, 9.32)

Length of treatment administration. The average length of time it took to measure and administer medication in the mornings across all the groups was less than five minutes, and in the evening less than seven minutes (Table 8.8). Caregivers to children newly initiated on ART took an average of three minutes to measure and administer the medication, whereas caregivers of children with suppressed and unsuppressed VL's took longer.

The difference in the length of treatment administration time was largely attributable to the age/weight of the child as this determined the type of medication the child received. For example, six of the newly initiated children were younger than two years of age (Table 8.3), compared to the majority of children in the suppressed (Table 8.1) and unsuppressed group, who were older than three years (Table 8.2). As per the Department of Health dosing chart for children (2013), children weighing more than 10kg typically receive tablets instead of liquid formulations. Thus, a larger proportion of children with suppressed and unsuppressed VLs received tablets/capsules as part of their regimen. Some of the tablets were

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dissolved before being administered to the child, thus adding to the length of the treatment event. Issues specific to the way in which medications were administered and measured are discussed in detail in the section with the heading 'Medication-related observations'.

Table 8.9

Themes and Sub-themes across Observations

		Barriers	Facilitators
Microsystem		Drug palatability	Self-administration/ ownership of the medication
	Child-related observations	Side effects (refusal, cough, spit and vomit)	
		Pill burden (dissolving pills and opening capsules)	
Mesosystem			
	Context-related observations	Medication workspace (house structure, number of occupants) Medication storage	
		Caregiver beliefs about ART (Food given before treatment administration)	
	Medication-related observations	Caregiver knowledge of ART (medication measurement tools, measurement issues, dose checking, medication administration to child, missed doses)	
	Caregiver-related observations		Caregiver strategies for remembering (Reminder tool) Caregiver strategies for disguising medication taste (flavouring agents) Adjustment to daily routine (organization, mornings vs evenings) Caregiver consistency and treatment supporter
			Strategies for managing pill burden (mixing medications) Caregiver-child interaction (communication during treatment administration)

Context-related observations

  Medication workspace. As mentioned previously, households on average had up to six occupants in a dwelling consisting of one bedroom and one living area. Thus, overcrowded households were common amongst the participants in this study. In addition, the majority of household members were unemployed (Table 8.10). Overcrowded households coupled with unemployment fuelled various difficulties associated with treatment-giving that are discussed again further on. These difficulties include the inability to provide food before medication is given. In the context of this sub-theme, overcrowded households meant that some of the caregivers were limited in terms of space within the household to facilitate a smooth transition of medication-related activities in the morning and evening.

  Below is an extract from my field notes on the morning that we visited Khethiwe, a four-year-old girl with an unsuppressed VL. Khethiwe received her medication from her mother at 7am and 7pm daily. She received a combination of three liquid ARVs (ABC + 3TC + LPV/r). Khethiwe's mother prepared her medications for her by measuring the dose of each liquid using a syringe and injecting the contents of the syringe into three separate cups. In the mornings, Khethiwe's mother also prepared packets of peanuts that she sold in town in order to provide an income for herself and her four children who reside with her in their one-bedroomed house. On this particular morning, I observed how Khethiwe's mother stepped over children asleep on the floor as she went about her morning routine. The extract demonstrates some of the discomfort associated with managing everyday activities in an overcrowded household:

  Field note extract:

  Walking into the household this morning I noticed family members (all children) asleep on the floor, and also on the bed in the lounge area and in the small bedroom

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[…]. The caregiver stepped over one of her children asleep on the floor to get to the fridge. She opened the fridge and took out the small bottle of LPV/r. She stepped back over the child, and returned to the small table in kitchen area of the room. The caregiver checked her cell phone (presumably for the time) and then began to prepare the medication. [P188].

Table 8.10

Context-related Observations

	Newly initiated		Suppressed VL		Unsuppressed VL	
	Morning visit (n=10)	Evening visit (n=6)	Morning visit (n=12)	Evening visit (n=8)	Morning visit (n=11)	Evening visit (n=9)
Medication workspace						
Lounge	5	4	9	6	2	4
Bedroom	3	2	2	1	7	3
Kitchen	2	0	1	1	2	2
Medication storage						
In bedroom (hidden)	5	3	5	3	3	5
In bedroom (not hidden)	2	1	6	5	7	4
In lounge (hidden)	3	2	0	0	1	0
In lounge (not hidden)	0	0	1		0	0
LPV/r refrigerated*	4	2	9	7	5	4
Food given **	3	2	1	0	0	0

Note. * = 27 children were receiving LPV/r as part of their regimen. ** = food given before treatment administration

As previously mentioned, the modal number of rooms in the households was two (Table 8.7). The rooms were typically organized into an area for cooking (usually close to the refrigerator), a lounge area and a sleeping area (usually the second room). Based on these distinctions within the households, I coded the area in which the medication was measured and administered to the child.

Throughout both morning and evening visits a larger proportion of children newly initiated on ART and those with suppressed VLs were observed to receive their medications

in the 'lounge' area, compared to those with unsuppressed VLs. Among children with unsuppressed VLs, 10 observations took place in a bedroom. The preferred area to administer medication was presumably where the caregiver and child had enough space to be seated next to one another (Table 8.10). The area in the house where the medication was administered was usually the same for morning and evening visits.

In one particular instance the caregiver of a newly initiated child on treatment (Thembe) chose to administer medication to the child in the bedroom during the evening visit. I had observed Thembe's aunt preparing and administering medication to Thembe during the morning visit in the kitchen area of their home. Thembe's aunt reported that the kitchen area was convenient for her as she had a table where she could do her measurements and had access to any additional tools or materials that she needed in order to proceed with the activity. Thembe's aunt stated that her brother, who lived and worked in an area several hours away from the family, was home for a short period due to illness. She stated that Thembe's uncle refused to allow Thembe to be in the same room as his own children when he was at home. The field note extract below from my RA's journal captures the sentiments shared by Thembe's aunt about her brother on that day:

Field note extract:

The caregiver said that he even says that this child is sick and she must not be present where we are as a family. She must stay outside the room. He doesn't even want the child to touch any utensils, when she wants to drink water he doesn't want the child to take it herself from the bucket because that water will be drunk by everyone in the house [P187].

Thembe's aunt stated that Thembe was aware of her uncle's dislike of her and often stayed outside of the house when he was home. This was the only instance where we had encountered obvious discrimination against an HIV-infected child on ART.

Medication storage. Despite the lounge area of most households being the preferred area for treatment measurement and administration, nearly all of the caregivers stored the medications in the bedroom (Table 8.10). Abacavir and 3TC (both liquid ARV formulations) and tablets (such as EFV, AZT and d4T) do not require refrigeration and it was therefore appropriate to store these medications at room temperature. The directions for one of the medications, LPV/r, state that it should be kept refrigerated (Department of Health South Africa, 2013b). Although most caregivers (30 out of 33) had access to a refrigerator (Table 8.7), not all caregivers stored LPV/r in the refrigerator. Of the 27 children (10/12 suppressed; 9/11 unsuppressed; 8/10 newly initiated) receiving LPV/r, the medication was only seen removed from the fridge on 18 morning occasions and 13 evening occasions (Table 8.10). LPV/r was stored together with other medications, usually in the caregivers' bedroom. Compared to children with suppressed VL's, fewer caregivers of children newly initiated and with unsuppressed VLs kept LPV/r refrigerated.

Medications stored in the bedroom were either hidden (when kept in plastic bags and stored in a cupboard in the bedroom) (see Figure 8.4), or not hidden (when kept on a table in the bedroom) (see Figure 8.5) (Table 8.10). At 16 observations (morning and evening) of children newly initiated on ART, medication was kept in the bedroom in 11 of the observations, of which eight were observed to be hidden and three not hidden (Table 8.10). Across 20 observations of children with suppressed VLs, medication was kept in the bedroom in 19 cases, of which eight were observed to be hidden, and 11 not hidden. At 20 observations of children with unsuppressed VLs, medication was kept in the bedroom in 19 cases, of which eight were observed to be hidden and 11 not hidden. Compared to children with supressed and unsuppressed VLs, more of the caregivers to children newly initiated on ART did not keep LPV/r in the fridge and preferred to store medications out of sight. Based on this observation it is possible that they were hiding the medications from small children, other

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household members or visitors. Figures 8.4 and 8.5 provide examples of medication that was presumably hidden and medication that was not hidden respectively.

Figure 8.4. Medication hidden - illustrates caregiver holding a plastic bag containing medications.

Figure 8.5. Medication not hidden – illustrates medications kept on a table in the bedroom

Food given before treatment administration. During home visit 1, all of the caregivers reported that they usually give food to the child before treatment administration in the mornings and evenings (Table 8.7). During both morning and evening visits to the household, we seldom saw children eating food before their treatment was administered (Table 8.10). When asked whether the child had eaten yet, caregivers responded by saying that they had already given food to the child before we arrived.

There were only four morning (three newly initiated, and one suppressed VL) and two evening visits (both newly initiated) where we had seen a child eating before treatment was administered or had seen visible signs that food had been prepared and given (Table 8.10). We had not seen any indications of food given during our visits to the households of children with unsuppressed VLs. There was therefore a mismatch between what caregivers had stated during the initial home visit (home visit one) and what had been observed during the morning and evening home visits.

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However, although visible signs of food preparation and consumption were missing from most morning and evening household visits, entries from caregiver journals show that eating food was an important activity before medication was given, and that the lack of food presented a barrier to treatment administration for both the caregiver and child. In the sequence of extracts below I present individual entries from the journals of two caregivers of children with unsuppressed VL's. In the journals of each of these caregivers, giving food to the child always preceded giving medication to the child. The extracts thus show the importance of food administration before medication administration in the daily routines of these caregivers and children.

Extract from the journal of Phila's (unsuppressed five-year-old female) grandmother:

30 September 2013

At 05h48am I wake up I prepare something so that Phila can eat it before she can take medicines then at 6am I gave her meds. At 10h40 I started cooking food for us to eat after lunch. At 1pm I take my lunch then I also take cold drink. When it was about the time for Phila to take treatment at 6pm I prepare meds for her after that I gave it to her but I started by giving her food because she can't take meds on an empty stomach. I watched TV until 21h30pm then I went to sleep [P261].

Extract from the journal of Jabulile's (unsuppressed three-year-old male) grandmother (written by an older sibling member):

We wake up in the morning we take a bath eat our food and we went to school. Jabulile went to his car that takes him to school. When he came back from school he went to sleep then when granny came back she wake him up. We gave him food because we see that time for him to take treatment is closer after that he takes his treatment then take a bath [P263].

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In the extract below from the journal of Thondeka's (newly initiated two-year-old female) mother, she illustrates the barrier that a lack of food in the household imposed on treatment administration. Thondeka's mother sought support from her neighbours when she was unable to provide her child with food.

Journal extract:

18 February 2014

I wake up in the morning. I washed dummies for my child. I made milk because there was no food that she will get when she wake up. Then I went to my neighbour to ask if they can help me with maize meal so that I can make porridge for her. […][P211].

Medication-related observations

Liquid formulations. Apart from one child with a suppressed VL (Ayanda five-year-old female), all of the children received liquid ARV formulations as part of their regimen. These formulations included ABC, 3TC and LPV/r. Of children newly initiated on ART, nine received ABC, 10 received 3TC and eight received LPV/r as part of their regimen. Of children with suppressed VLs, 10 received ABC, nine received 3TC and 10 received LPV/r as part of their regimen. Of children with unsuppressed VLs, seven received ABC, seven received 3TC and nine received LPV/r as part of their regimen.

Table 8.11

Medication-related Observations

	Newly initiated		Suppressed VL		Unsuppressed VL	
	Morning visit (n=10)	Evening visit (n=6)	Morning visit (n=12)	Evening visit (n=8)	Morning visit (n=11)	Evening visit (n=9)
Medication measurement tools						
Syringe	6	3	7	5	7	5
Syringe + nozzle	4	2	4	3	1	1
Measuring cup	0	1	1	0	3	3
Measurement issues						
Bubble in syringe	1	0	2	1	1	1
Dose checking						
ABC	2	3	2	0	4	3
3TC	2	3	1	1	4	3
LPV/r	3	3	8	6	6	7
Medication administration (directly or indirectly)**						
Syringe (directly)	6	3	9	7	4	4
Measuring cup (indirectly)	4	3	2	1	7	5
Missed doses	1	1	0	0	0	0

Note. ** = Medication administration: Directly – medication injected directed into child's mouth using syringe. Indirectly – medication transferred into a cup

The majority of caregivers (observed 20 times during morning administration, and 13 times during evening administration) used a separate syringe to measure and administer each dose (Table 8.11). One way to aid accurate measurements of liquid formulations using syringes is through the use of a syringe nozzle. Syringe nozzles are small plastic attachments that fit into the opening of medication bottles and are made especially for syringes. These devices are typically packaged with the medications ABC and 3TC. The medication LPV/r does not come with such a device. Syringe nozzles were underutilized amongst the caregivers (only used 15 times across 56 observations) (Table 8.11). Observation revealed that syringe nozzles were used more frequently by caregivers of children newly initiated (observed six

times) and suppressed on ART (observed seven times) compared to unsuppressed children on ART (observed two times). Fewer instances were observed among those with unsuppressed VLs as a large proportion was receiving LPV/r via syringe only.

However, even with a syringe nozzle intact, caregivers who chose to use them used an angle to make measurements that sometimes compromised accurate measurements of the dose. In two instances where measurements were taken at a horizontal angle these measurements led to bubble formations in the syringe.

Figure 8.6 and 8.7 show two different caregivers taking a measurement of 3TC with a syringe nozzle intact. Both caregivers were biological mothers, one was a biological mother to a suppressed child, and the other to a child newly initiated on ART. In both instances the caregiver is seen holding the bottle horizontally while the measurement is taken. In both these instances the angle at which doses were measured resulted in bubbles forming within the syringe, suggesting possible dose inaccuracy. The doses were not checked by the caregivers after measurements. Thus, it is likely that children were under-dosed in these examples.

Figure 8.6. Dose measurement of 3TC – suppressed child on ART

Figure 8.7. Dose measurement of 3TC – newly-initiated child on ART

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In four other instances it was clear from the video data that a large bubble had formed in the syringe (Table 8.11). In neither of these instances was the bubble removed, indicating a possible under-dosing of that medication.

To illustrate this, Figure 8.8 features a series of consecutive video frames (P226 – P228) taken from the recording of a typical morning medication measurement by Siyasizwe's (newly initiated two-year-old male) mother, depicting the formation of an air bubble in syringe. In the first frame, the caregiver draws up an amount of medication from an orange cup using a syringe. In the second frame, the caregiver lifts the syringe upward and checks the dose amount from a downward/horizontal angle. In the last frame, the caregiver removes the syringe from the orange cup (with an air bubble in the syringe pointed out by the yellow arrow).

Figure 8.8. Air bubble formation in syringe

Similarly, Figure 8.9 shows a consecutive series of video frames (P230 – P232) taken from a recording of a typical medication measurement in the morning by Nandi's (suppressed four-year-old female) grandmother, depicting the formation of a bubble in the syringe during the measurement of 3TC. The caregiver poured some of the liquid from the medication bottle into the lid before the measurement began. As seen in frame P230, the caregiver placed the syringe into the lid (at a slight horizontal angle) and began to draw up an amount of liquid. In frame P231, an arrow points to the air bubble in the syringe. In P232 the caregiver has placed

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the syringe down (the air bubble was not removed). Thus, due to the large bubbles in the syringes in these examples, it is likely that the dose administered was insufficient.

Figure 8.9: Air bubble formation in syringe

Dose checking. As mentioned earlier, the majority of caregivers used a syringe to measure liquid formulations. Once a dose had been measured, I was able to code for whether the caregiver checked the amount that she had drawn up, and whether she made any adjustments to this amount. Across all three groups, caregivers made several adjustments to the measurements of LPV/r compared to the other liquid formulations (Table 8.11). Caregivers appeared to be more cautious and concerned with the accuracy of LPV/r and less so with the measurements of liquid ABC and 3TC. Furthermore, caregivers of children suppressed (observed 14 times) and unsuppressed on ART (observed 13 times) were observed to check the dosage of LPV/r more frequently than the caregivers of children newly initiated (observed six times) on ART (Table 8.11).

To illustrate dose checking, Figure 8.10 features a sequence of images from a recording of a typical morning measurement of ABC by Khethiwe's mother. In video frame P241 the caregiver draws up a dose amount (from a downward angle), followed by a minor dose adjustment in video frame P242. In video frame P243 the caregiver checks the dose briefly (at a horizontal angle). In video frame P244 the caregiver is seen transferring the dose to an alternative administering tool [medication cup]. This example illustrates the brief nature

of dose checking that occurred when doses of ABC (and 3TC) were measured. It is likely that these brief instances of dose checking resulted in inaccurate measurements.

Figure 8.10. Dose checking

Medication administration (directly or indirectly). Caregivers administered liquid ARV's (like ABC, 3TC and LPV/r) to the child either directly (by injecting the liquid directly from the syringe into the child's mouth), or indirectly (by injecting the liquid into a cup first and then letting the child drink from the cup) (Table 8.11). Caregivers to children newly initiated (observed nine times) and with suppressed VLs (observed 16 times) preferred injecting the liquid ARVs directly from the syringe into the child's mouth (Table 8.11). On the other hand, caregivers to children with unsuppressed VLs (observed 12 times) preferred injecting the liquid into a medication cup first and then administering it to the child (Table 8.11). Caregivers administered liquid medications directly to younger (younger than three years old) children.

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Tablet formulations. All of the five-year-olds (three with suppressed VL's, five with unsuppressed VL's, and three newly initiated) in the study were on a regimen containing either pills or capsules in combination with a liquid ARV (usually LPV/r). Most children received their medication via direct administration (Table 8.11). The ARV's in tablet and capsule form were prepared and administered differently from the liquid. As seen from Table 8.12, tablets and capsules were either swallowed whole or dissolved in water or mixed with a taste distractor (drinking yoghurt). All the children with suppressed VL's received their tablets/capsules directly and they were subsequently either swallowed whole or, as in the one instance with Tholakele, the contents of the capsule were poured out into her mouth.

Table 8.12

Handling of Tablets and Capsules during Treatment Administration

	Person administering dose	ART regimen	Tablet swallowed whole/ dissolved in water	Capsule swallowed whole/ capsule opened	Residue
Newly initiated					
Thembe	Aunt	ABC + 3TC + EFV (300mg)	EFV swallowed whole	NA	
Lungile	Grandmother	ABC + 3TC + EFV (200mg)	NA	EFV capsule opened and mixed with drinking yoghurt	None
Tina	Father	d4T (20mg) + 3TC + LPV/r	d4T mixed with other ARVs	NA	
Suppressed					
Ayanda	Mother	d4T (20mg) + 3TC (75mg) + EFV (300mg)	d4T + 3TC + EFV swallowed whole	NA	
Tholakele	Grandmother	d4T (20mg)+ 3TC (75mg) + LPV/r	d4T swallowed whole	3TC capsule opened, powder administered directly into mouth	None
Sibusiso	Mother	ABC (300mg) + 3TC (150mg) + EFV (300mg)	ABC + 3TC _EFV swallowed whole	NA	

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Table 8.12 *(continued)*

	Person administering dose	ART regimen	Tablet swallowed whole/ dissolved in water	Capsule swallowed whole/ capsule opened	Residue
Unsuppressed					
Phila	Grandmother	AZT (100mg) + ABC + EFV (200mg)+ CPV/r	AZT dissolved in water	Capsule opened and dissolved in water	Yes
Muzi	Aunt	d4T (20mg) + 3TC (150mg) + LPV/r	d4T + 3TC swallowed whole	NA	
Kwanele	Mother	d4T (20mg) + 3TC (75mg) + LPV/r	d4T dissolved in water	3TC capsule opened and dissolved in water	Yes
Dingane	Aunt	3TC + AZT (150mg) + LPV/r	AZT dissolved in water	NA	Yes
Busisiwe	Aunt	d4t (20mg) + 3TC (75mg) + LPV/r	d4T dissolved in water	3TC capsule opened and dissolved in water	Yes

The tablets of 4 out of 5 children in the unsuppressed group were dissolved in water before being administered (Table 8.12). Dissolving tablets into solutions was problematic in cases where the residue of the tablets remained behind in the container (usually a cup) and was discarded by the caregiver when she rinsed out the medication cup. In all four instances where either a tablet or capsule had been dissolved in water, residue of the medications remained behind in glass/cup it was administered from. Once administered, the caregiver rinsed the administration tool and discarded the residue that remained left over.

To illustrate the above phenomenon, the sequence of images from the recording of treatment administration to Phila (unsuppressed five-year-old female) is shown below (Figure 8.11). Phila was on a second-line regimen and had never had a suppressed VL. Each of Phila's tablet/capsule medications was dissolved in water and administered to her in a tall glass. In video frame P228, Phila's caregiver measures 5ml of water and injects it into the tall glass. She then reaches for the bottle of pills [P289] and takes out a single capsule. She then opens the capsule and pours the powder contents into the water in the tall glass [P290]. She then proceeds to mix the contents together [P291]. After this, she administers the dose to the child.
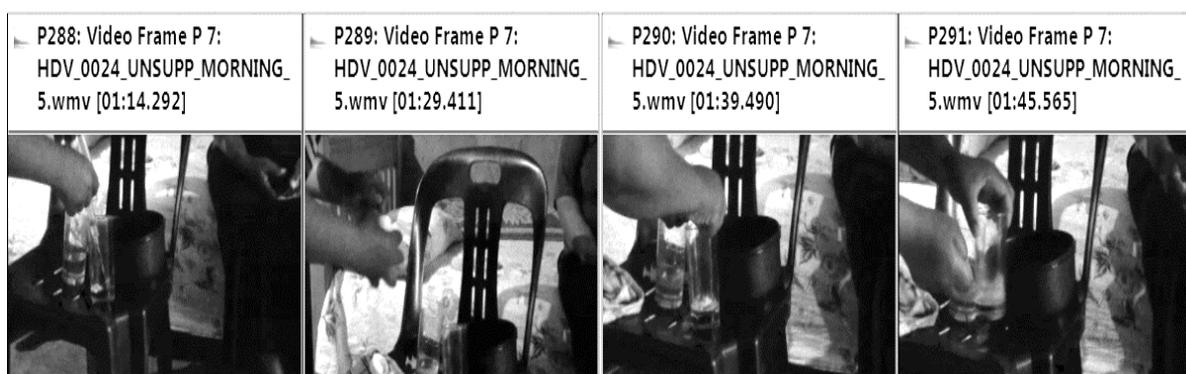
Figure 8.11. Dissolving tablets

Following administration of the medication to Phila, her caregiver discards the residue remaining in the glass. The actions of the discarding the residue are described in the extract of the video transcript below.

Video transcript:

Video transcript 7: video segment 6635 – 7084. The camera follows the caregiver to where she has poured water into the tall glass [white residue visible in the glass]. The caregiver swirls the mixture of residue and water around in the glass and walks towards the door. The caregiver disposes of the contents of the glass outside. The caregiver walks back into the room and picks up one of the syringes. She rinses it using the water in the blue plastic container. She then dries off the syringe and proceeds to rinse the next syringe [P7].

Missed doses. Only one caregiver had missed a dose of a particular medication (Table 8.11). Siyasiwe's (newly initiated two-year-old) mother stated she had been using ABC and 3TC interchangeably as she thought they were the same medication.

Caregiver-related observations

Use of a reminder tool. All of the caregivers reported using a cell phone as a reminder device at home visit one. However, during my observations not all caregivers checked their cell phones for the time before preparing to administer the medication to the child (Table 8.13). In 15 (out of 33) morning and 14 (out of 20) evening observations, caregivers were seen checking their cell phones before dose administration (Table 8.13). Nearly all (8 out of 12 in the morning and 8 out of 8 in the evening) of the caregivers of children with supressed VLs had their cell phones with them and checked them for the time beforehand. However, there were only two instances (Table 8.13) across all video recordings where the sound of an alarm going off as a reminder was heard. Both instances were from the same caregiver during the morning and evening visit (Thenjiwe's mother, see Table 8.1). So,

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although caregivers reported using cell phones as a reminder device, only one had actually set an alarm on her cell phone.

Table 8.13

Caregiver-related Observations

	Newly initiated		Suppressed VL		Unsuppressed VL	
	Morning visit (n=10)	Evening visit (n=6)	Morning visit (n=12)	Evening visit (n=8)	Morning visit (n=11)	Evening visit (n=9)
Reminder tool (device seen/heard)						
Device seen and checked	4	3	8	8	3	3
Device seen and heard	0	0	1	1	0	0
Organization*	2	1	6	4	4	6
Caregiver consistency and treatment supporter						
Dose administration by primary caregiver	9	8	11	7	9	6
Dose administration by other household member	1	2	1	1	2	3

Note. * = methodical treatment preparation and administration.

Amongst caregivers who visibly checked their cell phones for time, there were two instances (during Richard's (suppressed) morning visit, and during Dingane's (unsuppressed) morning and evening visit) of waiting periods between dose measurements and dose administrations. The waiting periods indicated the importance that these caregivers attached to administering the dose at the appropriate time.

In the video transcript below, Dingane's (unsuppressed female, five years old) aunt had already collected all the medications from her bedroom and the LPV/r from the fridge in the kitchen and had brought them into the lounge area where she prepared and administered the doses. Once she had placed all the medications down, she had sat down and checked her cell phone (presumably for time) several times before she began measuring and preparing the

dose amounts. The transcript extract demonstrates an instance where the caregiver waits for an exact time before proceeding with dose measurements.

Video transcript extract:

Video transcript 69: video segment 4801 – 5082: The caregiver sits with her elbows resting on her knees. The caregiver and child sit in silence [waiting period: 5.30s to 8.00s]. The caregiver reaches for her cell phone. The caregiver picks up her cell phone, and looks at it [presumably checking the time]. She then places the cell phone down again [P69].

Organization. I coded for instances where organized and systematic dose preparation and administration took place. In each of the video recordings of treatment administration by these caregivers (12 mornings and 11 evenings), syringes and or medication cups were placed in a specific order before the medication was administered to the child. The order of medications involved administering LPV/r first, followed by the administration of the other liquids. Caregivers of children with suppressed (observed 10 times) and unsuppressed (observed 10 times) VLs were observed to organize treatment administration in this way more times compared to caregivers of children newly initiated on ART (observed three times) (Table 8.13).

Treatment organization was most notable with the two mothers that each had two children on treatment. Thus, Thenjiwe and Lwazi's (suppressed three–year-old unidentical twins) and Khetiwe's (older sibling also on ART) mothers were both clearly systematic in their approach to treatment administration. The organization demonstrated by both of these caregivers is best illustrated in the two images below. In the first image (Figure 8.12), Thenjiwe's and Lwazi's caregivers had separated the syringes of medication for each child. Medications were then administered to the child in a specific order. In the second image

(Figure 8.13), Khetiwe's caregiver had measured the dose amounts and organized them for each child prior to administration.

Figure 8.12. Medication organization 1

Figure 8.13. Medication organization 2

Caregiver consistency and treatment supporter. As mentioned previously, most of the caregivers recruited into the study were the biological mothers of the children for whom they were caring. Caregivers reported that in some instances another member of the household, usually an older child (sibling of the child on treatment) was also responsible for administering medication to the child (see Table 8.14).

Table 8.14 shows the caregiver consistency coded from the video data. Among the children newly initiated on ART, caregivers responsible for treatment administration in the morning and in the evening were fairly consistent. However, caregiver inconsistency was observed twice. Thus, in two instances (Zoliswa and Thandiso), a different person administered the medication to the child at the evening visit. In both instances, the grandmother administered medication to the children in the morning while an aunt in one instance and a sibling in the other instance administered medication in the evening. During three morning instances (Zoliswa, Thandiso and Siyasizwe) and two evening instances (Zoliswa and Siyasizwe) the person administering the medication had support from another member of the household (a treatment supporter) to facilitate the activity. The caregiver to

both Zoliswa and Thandiso was their grandmother. During morning observations both grandmothers had assistance from a household member during the treatment event. In the case of Zoliswa, the aunt assisted the grandmother by bringing LPV/r from the fridge to the bedroom where medication was administered. In the case of Thandiso, the sibling had measured the dose amounts, while the grandmother administered the doses to Thandiso. During the morning observation of Siyasizwe, his mother received help from his aunt during the treatment event. Siyasizwe refused to take his medication at first, after which his aunt promised him an apple if he took his medications.

Among the children with suppressed VLs, similar observations were made. The same person administered the dose in the morning as well as in the evening in 10 out of 12 instances. During two evening instances (Andile and Nandi) the person administering medication to the child received assistance during the treatment event. In the case of Andile, her mother had assistance from Andile's grandmother. Andile's grandmother encouraged her to drink her medications. In the case of Nandi, her sibling had assistance from Nandi's grandmother. Nandi's grandmother helped to administer the medication to her.

Among the children with unsuppressed VLs, caregiver inconsistency was observed three times (Samu, Phila and Kwanele). During one morning instance (Busisizwe) and five evening instances (Samu, Nathi, Kwanele, Dingane and Busisizwe) the person administering the medication received assistance from another family member. In the case of Samu, his mother had assistance from his aunt during treatment administration. Samu's mother did not live with him at home as she works in an area several kilometres away and was home temporarily. Samu's aunt thus measured the doses while his mother administered the doses to him. In the case of Nathi, his mother had assistance from his father during the evening visit. Nathi's father assisted by fetching the medications from the bedroom where they were kept. In the case of Kwanele, his sibling had assistance from his grandmother. Kwanele's

grandmother gave the medications to the sibling (Kwanele's brother), who then measured and administered the medication to him. In the case of Dingane, her aunt had assistance from Dingane's mother during the evening visit. Dingane's mother worked full-time and thus her aunt administered medication to her and was responsible for attending clinic visits. In the case of Busisizwe, both his aunts were involved in treatment-related activities. While one aunt measured and administered the doses (Aunt_1), the other was responsible for fetching the medications and medication tools.

Table 8.14

Caregiver Consistency and Treatment Supporter during Medication-giving Times

		Morning		Evening	
		Treatment giver	Treatment supporter [a]	Treatment giver	Treatment supporter
Newly initiated	Thembe	Aunt	None	Aunt	None
	Lungile	Grandmother	None	Grandmother	None
	Luyando	Mother	None	Visit not done	Visit not done
	Zoliswa	Grandmother	Aunt	Aunt	Aunt
	Tina	Father	None	Visit not done	Visit not done
	Hlengiwe	Mother	None	Mother	None
	Amanda	Mother	None	Visit not done	Visit not done
	Thandiso	Grandmother	Sibling	Sibling	None
	Siyasizwe	Mother	Aunt	Mother	Aunt
	Thondeka	Mother	None	Mother	None

Table 8.14 *(continued)*

		Morning		Evening	
		Treatment giver	Treatment supporter [a]	Treatment giver	Treatment supporter
Suppressed	Thabisa	Mother	None	Mother	None
	Sizwe	Grandmother	None	Grandmother	None
	Thenjiwe	Mother	None	Mother	None
	Lwazi	Mother	None	Mother	None
	Richard	Mother	None	Mother	None
	Mbali	Mother	None	Visit not done	Visit not done
	Ayanda	Mother	None	Visit not done	Visit not done
	Andile	Aunt	None	Mother	Grandmother
	Tholakele	Grandmother	None	Grandmother	None
	Sizani	Grandmother	None	Grandmother	None
	Nandi	Grandmother	None	Sibling	Grandmother
	Sibusiso	Visit not done	Visit not done	Mother	None
Unsuppressed	Samu	Aunt	None	Mother	Aunt
	Phila	Sibling	None	Grandmother	None
	Nathi	Mother	None	Mother	Father
	Muzi	Aunt	None	Visit not done	Visit not done
	Kwanele	Mother	None	Sibling	Grandmother
	Dingane	Aunt	None	Aunt	Mother
	Busisiwe	Aunt_1	Aunt_2	Aunt_1	Aunt_2
	Duduzile	Mother	None	Visit not done	Visit not done
	Jabulile	Grandmother	None	Visit not done	Visit not done
	Khethiwe	Mother	None	Visit not done	Visit not done
	Siyabonga	Mother	None	Visit not done	Visit not done

Child-related observations

Palatability. Most (no palatability issues in 38 out of 56 observations) of the children took their medications without much resistance (Table 8.15). However, I observed four instances (one newly initiated, one suppressed, two unsuppressed) of children spitting medications out; two instances of vomiting (one newly initiated, one unsuppressed); seven instances of coughing (two newly initiated, four suppressed, one unsuppressed) during medication-administration or moaning by the child; five instances of child refusal (one instance in which the child ran away (newly initiated); and four instances (two newly initiated and two suppressed) where the child pushed the caregiver's hand away) (Table 8.15). In all instances of palatability difficulty, the caregiver completed dose administration. In both instances of vomiting in particular, the caregivers completed the dose that was measured within a few minutes of the occurrence.

Table 8.15

Child-related Observations

	Newly initiated		Suppressed VL		Unsuppressed VL	
	Morning visit (n=10)	Evening visit (n=6)	Morning visit (n=12)	Evening visit (n=8)	Morning visit (n=11)	Evening visit (n=9)
Palatability						
No palatability issues	5	4	10	3	8	8
Spitting	1	0	1	0	2	0
Vomiting	1	0	0	0	0	1
Cough/moans	2	0	0	4	1	0
Refusal	1	2	1	1	0	0
Taste distracter	0	1	2	2	1	1
Self admini-stration	4	2	1	2	5	

Caregiver-child interaction observations

These observations are supplemented by Tables 8.16 through 8.18.

Communication during treatment event. Table's 8.16 through 8.18 below show the frequency of verbal communication between caregiver and child during treatment administration in the mornings. Most (29 out of 33) of the children were present in the medication area and thus did not need to be called or brought into the medication giving area. In instances where the child was called to the medication area, he/she responded positively and reacted towards the caregiver's instruction to drink his/her medications.

Only one child (Siyasizwe, two-year-old male – newly initiated) tried to run away from his mother when treatment was about to be administered. In this instance Siyasizwe's aunt (treatment supporter) persuaded Siyasizwe to drink his medication by offering him an apple afterwards (Table 8.16). As most of the children were present in the medication area, there was little communication between child and caregiver before or after the treatment administration. Younger children (below two years old) were often picked up and seated across their caregivers lap during treatment administration. This made treatment administration faster and easier as treatment was administered directly to them – i.e. from the syringe into their mouth (Table 8.11). Younger children therefore did not need to be called to the medication area as was the case with older children. Thus, treatment administration to younger children was predominantly a silent and fast-paced activity.

There were two morning instances where the children had difficulty with swallowing the medication and the caregiver reacted towards the difficulty with little to no verbal communication. For example, Lungile, a newly initiated child on ART, was coughing during treatment administration in the morning. Even in this instance communication was poor and no words of encouragement were used to motivate the child to drink her medication (Table 8.16). In the second instance with Siyasizwe, the caregiver continued to administer the

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medication to the child by holding his head firmly in place while she administered the rest of the medication to him (Table 8.16).

There were two instances (Sizwe (suppressed) and Thenjiwe (suppressed)) where encouragement/praise was used (Table 8.17) to motivate the child to take his/her treatment. Extracts from the video transcription of each of these illustrate both instances.

Video transcript – Sizwe (two-year-old suppressed male):

Video transcript 80: Caregiver picks up final syringe [3TC] and injects it directly into the child's mouth. She waits for the child to swallow and then says 'Ngiyabonga - thank you' and hands the syringe to the child who then drops it into the tupperware. Gogo then asks her to put her syringes away. Child picks up the syringes and leaves the video frame. [P80]

Video transcript – Thenjiwe (three-year-old suppressed female)

Video transcript 180: Caregiver [biological mother] slowly and carefully injects the liquid [3TC] directly into the child's mouth. When she is done, her grandmother claps her hands and praises the child, and kisses her on the head. [P180]

Self-administration/ ownership of the medication. Across 16 (out of 56) observations children self-administered their medication after it had been measured by a caregiver (Table 8.15). These observations demonstrated that some of children showed interest and wanted to take part in the medication process.

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Table 8.16

Caregiver-child Communication during Morning Visits to Children Newly Initiated on ART

Observation	Newly initiated (n=10)									
	Thembe	Luyando	Tina	Hlengiwe	Amanda	Thandiso	Lungile	Siyasizwe	Zoliswa	Thondeka
Medication area	Kitchen area	Lounge area	Lounge area	Bedroom area	Lounge area	Bedroom area	Lounge area	Lounge area	Bedroom area	Kitchen area
Child present in medication area? (yes/no)	Yes (Seated in medi-cation area)	Yes (Seated in medi-cation area)	Yes (Seated on mother's lap)	Yes (Stands next to grand-mother)	Yes (Seated in medi-cation area)	Yes (Seated on mother's lap)	No (Fetched and seated on mother's lap)	No (Fetched and seated on grand-mother's lap)	Yes (Seated in medi-cation area)	Yes (Seated in medicatio n area)
Communi-cation between caregiver and child? (yes/no)	No	Yes (calls child to drink medi-cation. Child does not respond verbally)	No	Yes (calls child to drink medi-cation. Child does not respond verbally)	No	No	No (despite obvious struggle: coughing - no encourage ment no communic ation)	Yes (grandmot her encour-ages child to drink, but child has vomited. Holds child's head in position to administer dose)	Yes (calls child for doses. Child attempts to run away. Aunt uses apple as incentive)	

Table 8.17

Caregiver-child Communication during Morning Visits to Children with Suppressed VL's on ART

Observation	Richard	Ayanda	Andile	Mbali	Nandi	Sibusiso	Thabisa	Sizwe	Thola	Thenji-	Lwazi	Sizani
Suppressed (n=12)												
Medication area	Kitchen	Lounge floor	Lounge	Lounge (dining room table)	Floor (Single roomed house)	Lounge	Bedroom	Lounge	Kitchen	Kitchen	Kitchen	Lounge
Child present in medication area? (yes/no)	Yes (Seated in medication area)	Yes (Seated in medication area)	No (Child called to medication area)	Yes (Seated in medication area)	Yes (Seated in medication area)	Yes (Seated on mother's lap)	Yes (Seated in medication area)	No (Child called to medication area)	Yes (Seated in medication area)	Yes (Seated in medication area)	Yes (Seated in medication area)	Yes (Seated in medication area)
Communication between caregiver and child? (yes/no)	No	Yes (told to take medication)	No	Yes (told to take medication)	No	No	No	Yes (encouragement during treatment event to swallow medication)	Yes (told to take medication)	Yes (encouragement during treatment event to swallow medication)	Yes (told to take medication)	Yes (told to take medication)

Table 8.18

Caregiver-child Communication during Morning Visits to Children with Unsuppressed VL's on ART

Observation	Unsuppressed (n=11)									
	Samu	Phila	Nathi	Muzi	Kwanele	Dingane	Busisiwe	Duduzile	Jabulile	Khethiwe
Medication area	Bedroom	Bedroom	Lounge	Bedroom	Kitchen	Lounge	Kitchen	Bedroom	Lounge	Bedroom
Child present in medication area? (yes/no)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Communi-cation between caregiver and child? (yes/no)	Yes (told to take medi-cation)	No	No	No	No	No	No	No	No	No

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Summary of findings

In the second phase of this research I sought to observe and document the treatment administration practices of caregivers to children younger than five years on ART living in a predominantly rural area. Following recruitment of 33 caregiver-child dyads at two ART clinics in the Hlabisa sub-district, I attended one adherence counselling session with each dyad, as well as two home visits (a morning visit and an evening visit). I also provided each of the caregivers with a journal to document their daily routine to provide additional insight into behaviours that were observed.

My RA and I were able to observe 25 out of 33 caregivers at a routine adherence counselling visit. The purpose of the observation was to document the information that caregivers received during these sessions. The sessions lasted on average 8.1 minutes, and were mostly conducted in private. Overall, very little information exchange took place during these sessions. The questions asked and information provided to caregivers during the sessions varied, but were largely concerned with reporting VLs and CD4 counts, asking caregivers to recall dose names and dose amounts, and indicating when the child needed to have their bloods taken again.

Following the adherence counselling sessions, my RA and I attended a maximum of three visits to participants' homes. The first visit was aimed at locating their homes and documenting the occupants and resources, while the second (a morning visit) and third (an evening visit) home visit was centred on video recording and observing morning and evening treatment administration practices.

I analysed the video recordings, field notes, participant journal notes and observation schedules and obtained four clear areas/themes to describe the observations that took place, namely context-related observations, medication-related observations, caregiver-related observations and child-related observations. Context-related observations showed that

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treatment administration times across the three criteria groups were fairly consistent, with treatment administration to children newly-initiated on treatment proceeding slightly faster compared to those children with suppressed and unsuppressed VLs. The majority of the households were RDP houses, usually containing two distinct living areas. For the participants in this study, one area was used for sleeping, while the other area was used as a kitchen and/or lounge. Out of 56 observations, 30 observations took place in the lounge area of participants' homes. Despite the open display of treatment preparation and administration in the lounge area, medication was usually kept in caregivers' bedrooms.

Although most of the caregivers had access to a refrigerator, some still chose to keep LPV/r in their bedroom in either a plastic bag or on a table along with the other ARVs. Although caregivers reported that food was usually administered before treatment administration, this was not regularly observed. Caregivers used measurement tools such as syringes and medication cups to administer medications. However, dose-checking of the measured amounts was less frequently observed and, in some instances, led to noticeable under-dosing of the medication.

Some caregivers demonstrated a methodological approach to treatment administration which may be suggestive of adequate integration of the medication into their daily routine. Very few palatability issues were observed among the children. However, in instances where children had difficulty with their medications (e.g. vomiting), caregivers rushed to complete the dose, rather than waiting and re-administering the full dose. Older children received tablets or capsules as part of their regimen. These medications were usually dissolved in water before administration. Although dissolving tablets made it easier to administer the dose to the child, I observed several instances where a noticeable amount of residue remained in the glass/cup. Caregiver-child interaction and communication were limited during treatment administration and the event often took place in complete silence.

CHAPTER 9

Phase 2 - Discussion

Introduction

In Phase 2 I recruited children aged younger than five years with different virological outcomes to determine the barriers and facilitators of treatment administration practices by caregivers to young children on ART. Ecological models, like EST, favour behaviour-specific approaches to interventions, such as improving adherence to ART amongst children younger than five years. By focusing on specific behaviours, EST allows for the identification of the most relevant factors influencing a particular health behaviour at each level (Glanz et al., 2008). Thus, by using EST in this thesis I was able to identify factors at the micro-, meso, exo- and macrolevel influencing adherence to ART among children younger than five years in a rural area of South Africa. According to Bronfenbrenner (1979), the social ecology of human development requires an understanding of the mutual transactions that take place between the individual and the environmental systems they interact with across their lifespan (Bronfenbrenner, 1979). This discussion is situated predominantly within the micro- and mesosystem of Bronfenbrenner's model. The discussion begins at the level of the mesosystem.

While Bronfenbrenner's EST provides a useful framework to structure the levels at which interventions may be targeted, individual level theories provide useful insights into the ways in which the targeted interventions may be delivered. As argued by Glanz et al. (2008), "Ecological models can incorporate constructs from models that focus on psychological, social, and organizational levels of influence to provide a comprehensive framework for integrating multiple theories, along with consideration of environments and policy in the broader community" (p 466-467). For example, the IMB model of adherence offered by Fisher et al. (2006) may be used to understand and reflect on several of the factors

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influencing adherence within the child's micro- and mesosystems as identified in Phase 2 of this research. The IMB model of adherence as proposed by Fisher et al. (2006) emphasizes the importance of accurate information and motivation in the form of perceived self-efficacy to perform the behaviours necessary to achieve optimal levels of adherence. Furthermore, the model focuses on how information, motivation and behavioural skills factors are "conceptually and empirically linked to adherence and specifies situational and personal factors" (p.463). In this discussion the IMB model by Fisher et al. (2006) serves to provide an understanding and explanation of some of the findings from Phase 2 of this research.

Mesosystem determinants of paediatric adherence to ART

The results demonstrated that at the mesolevel, barriers to and facilitators of adherence to ART were best understood as a result of factors related to caregiver-child dyad interactions with adherence counsellors, caregiver knowledge of ART, household context, and adjustment to daily routine.

Caregiver-child dyad interactions with adherence counsellors

The previous discussion chapter identified and contextualized the influence of adherence counsellors on adherence to ART at the level of the exosystem. Adherence counsellors proved to be key in influencing adherence behaviours, but are not adequately trained and supported to provide adherence counselling that could influence behaviour to improve adherence. The unstructured training sessions and lack of follow-up and debriefing of counsellors were considered factors beyond the control of the counsellors, but nonetheless something that influences the level of psychosocial support and adherence counselling that they are able to offer patients during routine counselling sessions. The adherence counselling observations in Phase 2 provide support for these arguments.

As mentioned previously, adherence counsellors themselves are known to receive short periods of unstandardized training with little to no follow-up in the form of supervision,

monitoring and debriefing (Petersen et al., 2014). The limited training that counsellors receive place them at a relative disadvantage to engage with patients in a supportive manner that may improve patients' adherence to ART. For example, findings from Phase 2 show that although adherence counsellors were able to report children's CD4 counts and VLs to the caregiver, they failed to interpret and follow up on instances where an unsuppressed VL was reported. The absence of probing skills suggests that adherence counsellors were unable to facilitate counselling sessions in a way that identified difficulties in medication administration and supported adherence to ART.

These data concur with other evidence highlighting the relative inadequacy of adherence counsellors to recognize and follow up on issues during adherence counselling sessions that require further investigation (Kagee, 2013). For example, Kagee (2013) has trained eight female patient advocates (PAs) with counselling skills in the process of working with an NGO that provides psychosocial services to ART users. None of the women had completed high school and neither had more than two years of counselling experience. The women were self-selected from the NGO and received nine 2-hour-long training workshop that aimed to teach them basic counselling skills and allowed them to practice these skills. PAs' skills were then assessed via the Counsellor Evaluation Form (CEF) and the Counsellor Rating Form – Short (CRF-S). Scores on the evaluation forms indicated that PAs had some, but not sufficient skills to perform several of the counselling activities they were assessed on, such as reflecting on patients' feelings and confronting incongruities as they happened. Kagee (2013), however, did not conduct a baseline assessment of PAs' skills level, so it is not clear to what extent the training improved PAs' counselling skills and improved adherence to ART.

On the basis of these findings, and in keeping with the EST that emphasizes the cross-cutting effects of multilevel influences on behaviour, one may assume that the poor

skills level associated with adherence counsellors in this setting is likely to explain the poor skills level associated with some of the caregivers' treatment administration practices observed in Phase 2. This point is further discussed under the heading 'Caregiver knowledge of ART'.

In addition to the absence of adequate counselling skills with which to facilitate counselling sessions, adherence counsellors' lack of communication during consultation may be the result of burnout amongst counsellors. As argued by Gibson et al. (2005), burnout amongst counsellors may manifest in an emotional disconnect from the patients they see (Gibson et al., 2005). In this context, burnout may be due to the sheer volume of patients adherence counsellors are expected to counsel on a daily basis. Also, as shown in this study and others (Dewing et al., 2015), structural barriers such as inadequate space and privacy to perform adherence counselling may influence adherence counsellors' engagement with their patients. In Phase 1, adherence counsellors stated that they had limited interaction with children as they were often left outside the consultation room and excluded from medication consultations. Yet, in Phase 2 the majority of children had been present in the consultation rooms. My accompaniment of caregiver-child dyads to the adherence counselling sessions may have resulted in caregivers choosing to bring the child into the consultation where they otherwise might not have. However, even with children present in the room, little attempt was made to include them in the counselling session. The presence of children in the consultation provides an opportunity to include them in the consultations about their treatment. By doing so, children can receive age-appropriate information regarding their treatment that may be beneficial to support disclosure as they get older. Early and age-appropriate disclosure has been shown to be beneficial for adherence to ART (Vreeman et al., 2013).

During observation, caregivers seemed to be reserved in their engagement with counsellors and rarely volunteered information about difficulties they might have been

experiencing with the treatment or problems they had with the child on their own. The lack of caregivers' reporting of difficulties associated with treatment measurement and administration may be as a consequence of a perceived sense of self-efficacy in the face of little monitoring of their knowledge and skills by adherence counsellors. A perceived sense of self-efficacy may also explain why some caregivers in Phase 1 reported that the pre-ART education sessions they received were enough for them, while doctors, nurses and counsellors stated that caregivers required more education and training. Apart from literature reporting on the feasibility of counsellors to provide behavioural interventions to ART users (Dewing et al., 2012; Kagee, 2013; Petersen et al., 2014), very limited evidence of routine patient-lay counsellor interactions exist within the context of HIV with which to compare these findings. However, evidence of patients' experiences with healthcare staff at public healthcare facilities may provide explanations for limited engagement of caregivers during consultations. Studies of patients' experiences at public healthcare facilities show that patients often have antagonistic relationships with healthcare staff and experience them as being rude and unsympathetic (Coetzee et al., 2011; Kagee et al., 2012).

Caregiver knowledge of ART

According to the IMB model of adherence offered by Fisher et al. (2006), "…information that is relevant to adherence to HAART is a prerequisite of consistent and correct use of therapy" (p.463). Thus, adherence to ART may be facilitated when an individual is provided with the correct and accurate information necessary to adhere to the regimen optimally. In the case of caregivers to children on ART, this information may be related to accurate knowledge regarding the exact amount of a medication to measure, what type of medication tool facilitates this type of measurement and what best the way is to administer this to an infant and/or a child. Alternatively, missing or inaccurate knowledge about treatment may inadvertently be a barrier to adherence (Fisher et al., 2006). The lack or

absence of knowledge or information necessary for optimal adherence may cause caregivers to appear careless during treatment administration, especially in instances where they use medication tools inappropriately or the correct responses to medication side effects had not been properly explained to them.

Although the caregivers observed in this study were not receiving the adequate level of adherence counselling to facilitate adherence, low levels of health literacy among adults and caregivers of children on ART has also been associated with medication dosing errors among patients and caregivers in LMIC (Ciampa et al., 2012; Howard et al., 2014). Of the respondents engaged with in Phase 2, a large proportion (22 out of 33) of caregivers did not complete high school. As alluded to in Phase 1, the largest proportion of information transfer to caregivers regarding ART treatment occurred during the pre-ART education sessions. The sessions themselves are knowledge-intensive and occurred over a short period of time, often within a day, and were usually conducted by adherence counsellors.

Findings from Phase 2 demonstrate that caregivers of children on ART were knowledgeable about some aspects of the medication, but lacked the necessary skills with which to perform accurate measurements of the doses. According to IMB (Fisher et al., 2006) information is a necessary condition for behavioural change, but it is not sufficient to bring about that change in itself. Motivation to adhere and behavioural skills are necessary as well. Behavioural skills, as Fisher et al. (2006) have argued, "… determines whether even well-informed and motivated individuals will be capable of adhering to HAART" (p.464). Behavioural skills therefore include the caregivers' abilities to perform accurate measurements and their perceived level of self-efficacy to adhere to the regimen.

While caregivers used medication tools such as syringes and medication cups to measure doses of the medications, they lacked the necessary skills required for performing accurate measurements, such as dose checking (especially checking that all of the content of

dissolved tablets and capsules were administered) and removing bubbles in syringes. These findings concur with other studies assessing dosing accuracy among patients on ART (Howard et al., 2014; Yin et al., 2010). Howard et al. (2014) have assessed paediatric dosing accuracy among adult ART users (aged 18 - 49 years) from Mozambique. Participants were given clearly marked syringes and measuring cups together with a prescription card and verbal instructions. Participants were instructed to measure a hypothetical dose of AZT suspension [2.5 mL (25 mg)] using both measurement tools. Doses were electronically weighed for accuracy, and defined as no error if the dose was within 20% of the reference weight; some error if the dose deviated by more than 20% from the reference weight, and major error if the dose deviated by more than 40% from the reference weight (reference weight in Yin et al., 2010). Using the measuring cup, 49% (157/316) made some error, of which 28.4% made a major dosing error. Using syringes, 47.8% made some error, of which 27.9% made a major dosing error. The majority of dosing errors using the medication cup was due to over-dosing, while the major dosing errors with the syringes were due to under-dosing. Given the absence of dose checking when using syringes among caregivers in this study, and the number of bubbles observed in syringes, it is likely that several of the measured doses were below the required measurement. Only two of the caregivers (of children newly initiated on ART) were asked to demonstrate measurements of formulations using syringes in the adherence counselling sessions. Although tablets and capsules may be dissolved in water, halved and crushed (Department of Health South Africa, 2013b), failure to administer the entire contents of the dissolved dose may contribute to unsuppressed VL's among children who received their medications in this way. Children with suppressed VLs, however, were observed swallowing their tablets whole. The inability to accurately administer a dissolved tablet and capsule medications to children with unsuppressed VLs supports the IMB theory in that "…adherence to therapy is directly linked with individual

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health outcomes (e.g., viral load, CD4 count, drug resistance, physical health, and subjective health and quality of life…" (p.464).

Caregiver consistency

The presence of a caregiver, especially a stable caregiver, who is able to respond to the physical and emotional needs of a child has been shown to influence health and cognitive outcomes in children (Richter, 2004). As seen in this study and similar contexts in South Africa (Sikstrom, 2014), as well as other African societies (Vreeman et al., 2009; Skovdal et al., 2011), caregiving as a definition is best described as a dynamic concept as children often have various biological or non-biological individuals responsible for their care. In Phase 1 respondents shared concerns about multiple caregivers and knowledge transfer regarding dose changes and other treatment-related information. In Phase 2 there were two instances of children who had moved away to live with other family members. Evidence shows that disruptions in household structure, which may come about from the unavailability of a single consistent caregiver and disorganized family structures, are likely to contribute to poor adherence (Cupsa et al., 2000).

Social support during treatment administration

In Phase 2, children predominantly received their medications from the individual who attended clinic visits. However, medication responsibilities appeared to be shared among household members as some caregivers had support (referred to as treatment supporters) from other household members during treatment administration. Unlike other studies that suggest that shared responsibility may act as a barrier to adherence to ART (Fetzer et al., 2011), the findings of this study suggest that shared responsibility was facilitative of adherence to ART and may represent a form of social support. The IMB model posits (Fisher et al., 2006) that motivation to adhere requires personal as well as social motivation. Social motivation in the context of these findings was demonstrated by the facilitative role that household members

played during the treatment event. Social support has been linked to improved adherence to ART (DiMatteo et al., 2002).

Poverty and food insecurity

The findings in Phase 1 demonstrated a reluctance on the part of caregivers to administer ART in the absence of food as this exacerbates side effects such as vomiting. The findings from Phase 1 thus suggested that caregivers were likely to forgo treatment administration if food was not available. However, in Phase 2, I seldom saw caregivers administer food to the child before medication was given. Furthermore, there was little evidence that food had been prepared or given to the child prior to our arrival at the household.

The lack of food and the subsequent administration of medication suggest the caregiver's willingness to administer treatment without food. Caregivers' willingness to adhere to ART in the absence of available resources has often been associated with what Olds et al. (2015) have referred to as the 'Lazarus effect' (p.586). Based on the observable improvements in children's health due to ART use, caregivers may be less inclined to miss treatment out of fear that the child may become progressively ill. However, given the journal entries made by some of the caregivers reflecting the importance of providing food to the child before treatment administration, it is likely that my presence in the household played a part in caregiver's willingness to administer the medication. Thus, under normal circumstances caregivers may likely forgo treatment administration if there is no food available in the home. The latter statement is reflective of findings in the literature (Weiser et al., 2010; Young et al., 2014).

Stigma and disclosure

Disclosure in the context of paediatric HIV is complex and challenging in many ways. Disclosure not only involves disclosure of a child's HIV status to them, but also to other

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members of the household and the family. Furthermore, disclosure also often involves a discussion of the caregiver's HIV status with the child and others (Vreeman et al., 2013). Although caregivers in Phase 2 reported that the other members of the household were aware that the child was taking treatment, I never fully ascertained whether the household members had been fully disclosed to. The impact of the lack of disclosure to members outside the house was evident when I was unable to visit certain households in the evening, or when caregiver-child dyads had moved into new homes. In a study by Marhefka et al. (2008), it was uncommon for families to disclose the child's status to people outside of the immediate family (Marhefka et al., 2008). Several studies suggest that caregivers of CLWH prefer to keep the status of the child concealed from family members, other close relations, as well as from the children themselves (Wachira et al., 2012; Bikaako-Kajura et al., 2006). As mentioned previously, in instances where children reside with their biological fathers, caregivers were reluctant to disclose the HIV status of the child to the fathers and often go to great lengths to maintain the health of the child in order to allay suspicion from their partners. In Phase 2, I observed one instance of discrimination towards a child on ART. During the evening visit the caregiver had opted to administer the medication to the child in the child's bedroom as opposed to the kitchen area where it had been done previously as the caregiver's brother was home and did not want an HIV infected child around his own children. As seen in other studies, failure to disclose the child's HIV status to husbands or family members deprives caregivers of a valuable source of social support. For example, others in the household could remind them to administer medicines and could also administer medicines in their absence (Wachira et al., 2012; Kimani-Murage et al., 2013).

Factors influencing integration into daily routine

Failure to maintain a structured routine has been shown to impact on treatment administration (Fetzer et al., 2011; Hamammi et al., 2004). Hammami et al. (2004) have

described three factors necessary for caregivers to successfully integrate ART into their daily routines based on information they gathered from adherent versus non-adherent caregivers to children on ART. In order to be adherent, caregivers need sufficient knowledge of the benefits of adherence and should be successfully convinced of the reasons why medication-taking was essential. Secondly, caregivers had to believe that they were capable of administering the medication (capacity) and lastly, they had to demonstrate a willingness to administer the medication (motivation). These elements were necessary in order for medication-giving to be a priority in their lives (Hammami et al. 2004). In their study, adherent caregivers internalized knowledge about the medication, making the information their own and stating their understanding of the treatment in their own words, as opposed to reporting what they were told by health personnel as less adherent caregivers would do (Hamammi et al., 2004).

Findings by Hammami et al. (2004) have also shown that for successful integration of ART into their daily routines, caregivers had to be 1) proactive in recognising and implementing creative strategies to provide ongoing reminders to administer the medication, and 2) able to foresee possible situations where treatment was likely to be disrupted. The findings from the study by Hammami et al. (2004) support the component of the IMB model (Fisher et al., 2006). Accurate knowledge, motivation and behavioural skills were therefore necessary for caregivers to adapt medication to their daily routines.

Caregivers in Phase 2 of this study showed a preference for storing the child's medication in the bedroom. The medication was either hidden, when it was kept in a plastic bag within a cupboard, or not hidden when visibly displayed on a bedside table or table in the room. The preference for keeping the medications out of sight was also noted when caregivers did not refrigerate LPV/r, which requires refrigeration. Although caregivers were not explicitly asked why they chose to store medications in this way, one might presume that caregivers were hiding the medications from small children or from visitors. Keeping

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medications hidden may prevent caregivers from accessing cue-based strategies, such as visibility of the medications for reminder purposes (Marhefka et al., 2008). Although many of the caregivers actively checked their cell phones before measurements and administration, only two had programmed their cell phone alarms to go off at specific times. Marhefka et al. (2008) have argued that in addition to memory or cue-based strategies, caregivers had to better integrate treatment-related activities into their daily routine. Thus, in keeping with IMB theory without visible or audible reminders, caregivers are likely to forget to administer medications should their routine be disrupted in anyway (Fisher et al., 2006).

The literature shows that children in resource-limited settings, in South Africa in particular (Moodley et al., 2006), are not informed of their HIV status until adolescence (Vreeman et al., 2013). Despite available guidelines on disclosure, caregivers have frequently reported that children under 10 years are too young to be told of their status and show very little understanding of medication and illness (Vreeman et al., 2013).

However, children in this study demonstrated both an understanding and observable comfort with their medications. Despite one instance of a child attempting to run away during the treatment event, none of the children in this study cried when presented with their medication, not even those children newly-initiated on ART and presumably still adjusting to taking medications every day. Furthermore, several children were able to self-administer their medication (after it had been measured out by a caregiver) or take part in treatment-related activities such as packing medications away. Thus, on a microlevel, some of the children (specifically those aged five years) in this study showed medication competence in that they were able to take ownership of their medications and successfully inject syringes filled with medication into their mouths.

These observations coincide with the observations made by Rochat et al. (2008) in their sample of children aged five years and under. In this study 48 child-caregiver dyads

from South Africa were enrolled in a qualitative study aimed at better understanding children's (younger than five years) experiences of HIV and their treatment. In an attempt to include children within this age group in the research, the authors used a series of visual aids to facilitate children's' involvement and responses. Thus, children used toy dolls and medication tools (e.g. syringes, spoons, cups) to demonstrate not only their comfort with the medication and the medication tools, but also their knowledge of treatment administration practices. Children showed very little discomfort with the treatment and took a keen interest in activities related to medication adherence (Rochat et al., 2008). There is evidence to suggest that children with increased shared responsibility in their own treatment are better able to integrate the medication routine into their daily routine (Hamammi et al., 2004; Marhefka et al., 2008; Fetzer et al., 2011). In their study, Marhefka et al. (2008) have examined the relationship between adherence to ART and family factors associated with medication taking, one of which was regimen responsibility. Caregivers of 127 children aged 2 to 15 years (mean = 7.8 years old) were interviewed about treatment responsibility and whether administration of medication was done solely by themselves, or whether the children assisted with this responsibility. Caregivers stated that older children often had more control of taking their own medication and shared regimen-related tasks with them. Marhefka et al. (2008) have argued that allowing children to assume increasing responsibility for medication-taking as they became older presented them with the opportunity to prepare for self-care in adolescence and adulthood, as increased responsibility was likely to leave children feeling a greater sense of self-efficacy in taking their treatment (Marhefka, 2008). Amongst older children (children aged 9 years and above), complete disclosure has been shown to be appropriate, beneficial to parent-child relationships, and associated with better adherence to ART (Vreeman et al., 2013).

As children grow older they tend to become more active in their roles as members of a household and to participate in daily routines. Children subsequently become able to regulate their own behaviour and establish confidence from being able to master these routines (Richter et al, 2004). Children's ability to easily, successfully and independently take medication at a young age is likely to facilitate the transition from partial responsibility for their treatment as young children, to full responsibility of their treatment as adolescents and adults.

Microsystem determinants of paediatric adherence to ART

The results demonstrated that at a microlevel, caregiver-child interactions during treatment administration practices were best understood as a result of factors related to the characteristics of the child, caregiver knowledge of ART, communication during medication administration, household context, and adjustment to daily routine.

Child characteristics

Despite palatability concerns among respondents in Phase 1, most children in Phase 2 took their medications without resistance. While access to flavouring agents for unpalatable formulations, such as LPV/r, was not always readily available, some caregivers were observed to adopt specific strategies such as administering the bitter tasting medication to the child first, followed by the sweeter medicines to facilitate dose administration. However, inconsistent knowledge of dose administration was evident amongst those caregivers who failed to re-administer doses when a child vomited the medication. In keeping with earlier discussions, poor knowledge of dose re-administration by caregivers is likely the result of the poor quality of adherence counselling provided to caregivers, as well as poor communication between caregivers and healthcare staff. In keeping with IMB, the absence of accurate information is likely to contribute to poor adherence to ART (Fisher et al., 2006).

Communication during medication administration

In this study the treatment event (i.e. the time during which medication was being measured and administered to the child) was observed to be a silent process between the caregiver and child. Very few instances of verbal communication took place during the treatment event even when a child was observed to have difficulty swallowing the medication. Further, the treatment event took place very quickly, especially amongst the infants and children ≤ 3 years of age. Drawing on theories of child development, such as attachment theory as described by Bowlby (1969), the importance of caregiver sensitivity and responsiveness during periods of caregiver-child interaction is extremely important.

Typical examples of intense interactions between caregivers and infants occur during daily care routines such as feeding, bathing and dressing the infant. Evidence from observational studies on these interactions suggest that "… even brief interactions are nonetheless regarded as highly emblematic of the quality of the early relationship between caregiver and child" (Richter, 2004, p. 14). Considering the importance of even brief intense interactions, one cannot underscore enough the importance of the interactions between the caregiver and the child during medication administration enough. For children on chronic medications this process may then be considered as important as feeding and cleaning, as it occurs multiple times a day every single day. Furthermore, medication administration has the potential to create a stressful situation for a child where they need to overcome challenges such as swallowing distasteful medications like LPV/r.

Caregivers of CLWH are continuously confronted by the challenges associated with poverty, such as limited resources and food, which contributes substantially to the psychosocial stressors they experience, often as sole providers for themselves and other family members (Rochat et al., 2008). These stressors may lead to emotional disengagement and disrupt the caregiver's alertness and responsiveness to important cues. An emotionally

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distant caregiver may be unresponsive to the stress and discomfort exhibited by a child during a process such as this. It may consequently limit their potential to bond with the child (Richter, 2004). Insecure attachments have been coupled with problem behaviour in children, difficulty socialising with peers, and an inability to solve problems. CLWH who show problem behaviours may worsen as they face increased exposure to emotionally and psychologically compromising situations such as learning about their HIV status and being exposed to stigma and discrimination.

Conclusion

The findings of Phase 2 emphasise key elements within children's micro- and mesosystems that act as either barriers to or facilitators of adherence to ART. Ecological theories of health are often criticized for lacking specific mechanisms through which to address the factors identified at each level. In this discussion I have argued that the findings here that pertain to the barriers and facilitators to adherence among children younger than five years as identified within the micro- and mesosystems may be understood and explained by the IMB theory (Fisher et al., 2006).

Based on the IMB model proposed by Fisher et al. (2006), if caregivers to children on ART are well-informed about ART, are motivated to act and have the necessary behavioural skills to achieve optimal adherence, they will be more likely to maintain these adherence behaviours over time. However, the findings highlighted several ways in which each of these necessary components are disrupted. In keeping with Bronfenbrenner's EST disruptions in any one of the systems is likely to have cascading effects throughout each of the other systems. Thus, caregiver knowledge about ART as demonstrated in this thesis is partially a consequence of the information provided to them from adherence counsellors. The findings show that adherence counsellors were ill-equipped to provide adequate adherence counselling, which was a consequence of the lack of structured training and support

programmes for adherence counsellors. Caregivers in this study, however, demonstrated motivation to provide ART, and had support from household members when doing so. However, given the fact that some medications were hidden, one can deduct that integration of ART into daily life is problematic. This causes a lack of access to reminder cues, which influences behavioural skills. As mentioned previously, merely satisfying one dimension of the IMB is not sufficient for behavioural change.

Limitations and strengths

The findings of Phase 2 have to be interpreted against the strengths and limitations inherent to the research. Although necessary given the methods used in Phase 2, the sample was limited as only caregivers whose co-household residents knew about the child's status were recruited. The findings provide data on routine adherence counselling sessions that caregivers and children on ART receive. However, the observations were only based on a small number of adherence counselling sessions conducted at one peri-urban and one rural decentralized public healthcare facility in rural KwaZulu-Natal. My presence in the counselling sessions and participant homes undoubtedly biased some of the observations. However, I tried to limit the potential bias through multiple visits to participant homes. Furthermore, evidence from Phase 1 suggests that the observations during the counselling sessions match the perspectives on adherence counselling as held by doctors. Thus, caregivers may, in fact, experience more challenges to treatment administration than what I observed. The caregiver-child cohort represented children at varying levels of disease progression. Knowledge of children's VLs allowed for an advanced qualitative understanding of adherence behaviour and provided age-specific information that may contribute to intervention development and are described in the concluding chapter.

CHAPTER 10

Conclusion

Introduction

The findings from Phase 1 and Phase 2 have significant relevance in the context of paediatric HIV and emerging drug resistance among infants and young children on ART in South Africa. The study triangulated interview and focus group data that probed the perspectives of doctors, nurses, adherence counsellors, caregivers and traditional healers with observational data from adherence counselling sessions and treatment administration practices by caregivers to children on ART at their homes.

Findings from this study emphasize the importance of qualitative studies and explanatory factors that might not be captured through conventional quantitative means. The study differs from the other qualitative research conducted on barriers and facilitators to paediatric adherence as it included a naturalistic observation phase which took me into the homes of children presumed to be doing well on treatment (suppressed VLs), children presumed to be doing poorly on treatment (unsuppressed VLs), and children who were newly adjusting to life-long therapy (newly initiated on ART). The documentation of moment-to-moment occurrences as they unfolded within the household context provided important insights into the way ART was being integrated into children's lives, the relative involvement (or lack of involvement) of household members, caregiver knowledge and comfort with the routine and the availability of resources.

The findings provide new knowledge in the following areas: 1) the combined perspectives from key stakeholders in the treatment and care of children on ART on the barriers and facilitators to adherence to ART among children younger than five years; 2) empirical observations of barriers and facilitators of 'routine' treatment administration practices by caregivers to children younger than five years on ART in their homes; and 3)

empirical observations of 'routine' adherence counselling sessions with caregivers of children younger than five years on ART.

Microsystem

Through the lens of EST, the findings highlight the complexity of factors influencing paediatric adherence within children's ecological environments. At the microlevel, children younger than five years have difficulty with the palatability of liquid LPV/r, which is a concern in the face of limited treatment options available to children in South Africa. More research is needed to develop palatable ARV formulations for infants and young children on ART. Taste-masking and pill-swallowing interventions have contributed suggestions for strategies with which caregivers may deal with these issues (Bain-Brickley et al., 2011). However, these interventions have not been shown to improve adherence to medication in children. In keeping with IMB theory (Fisher et al., 2006), knowledge is a necessary but insufficient condition for behavioural change. Thus, findings from this study show that caregivers need additional knowledge on skills associated with measuring and administering the medications to improve dosing accuracy. Furthermore, re-iterating knowledge of dose re-administration after vomiting or spitting may improve adherence to ART. Counselling interventions thus have to be structured into sessions where adherence counsellors are educated on the barriers and facilitators that influence paediatric adherence to ART at the level of the child, caregiver, and medication.

In addition, at the microlevel, a lack of disclosure of the child's HIV status among relevant family members has negative health implications for the child. At present several disclosure interventions are aimed at caregivers and children. These interventions are targeted at facilitating disclosure of children's HIV status to them, and of caregivers' HIV status to their infected and/or uninfected children (Vreeman et al., 2013). Future research should be aimed at finding ways to facilitate disclosure of the child's HIV status between those

responsible for both clinic attendance and treatment administration. Healthcare workers have to assist caregivers with identifying all those who may share responsibility in the treatment and care of children on ART and provide ways to facilitate communication between them. Given the major influence of mobile technologies on improving adherence to ART among adults (Nieuwlaat et al., 2014), healthcare workers could mobilize this technology to facilitate communication amongst those involved in the child's treatment and care.

Despite increased parental survival rates, elderly caregivers still provide care to children in this area and they are uniquely challenged by their own age to meet the caring needs of infants and young children. Counselling interventions may help to support elderly caregivers by strengthening the caregiver-child, as well as the caregiver-caregiver relationships though communication strengthening and social support amongst caregivers.

Fathers are still largely absent from the lives of young children in this area. However, in this research, paternal presence in the context of ART seemed to negatively influence adherence to ART. Future research exploring fathers' understandings of child care in the context of HIV is needed. Such research should be aimed at exploring paternal knowledge and beliefs about ART and what could be done to improve their understanding of the benefits associated with optimal adherence.

Children continue to be excluded from medical consultations, which limits their ability to become active agents of their own treatment. Children's comfort level and their ability to demonstrate ownership of their treatment indicates the potential to involve children as soon as possible in activities surrounding their treatment.

These findings suggest that, unlike caregiver and healthcare provider beliefs, children younger than five years are able to and should be encouraged to take part in activities surrounding their illness. Although children under five years may be too young to process full disclosure, these findings as well as those of Rochat et al. (2008),) show that young children

know about their medications and want to be involved in the treatment administration practices. Thus, partial disclosure to children at this age is possible and should be encouraged amongst caregivers. Although full disclosure may not be age-appropriate to children younger than five years, gradual involvement in treatment-related activities may facilitate partial disclosure and eventually full disclosure at an appropriate age.

Healthcare workers such as nurses and counsellors that regularly interact with caregivers need to prioritize child involvement and encourage this involvement amongst caregivers as well. Regular attendance of the child can foster ongoing communication with healthcare staff and children can easily take ownership and some responsibility early on. Structural barriers, such as money for transport for a child to attend monthly clinic visits with the caregiver and school attendance may challenge this in future. However, if there is good integration with the system from an early age this may buffer adherence challenges when the child is older.

Food insecurity presents an overwhelming challenge to adherence and caregivers are likely to forgo treatment in the absence of food. More research is needed to evaluate and determine the extent to which improving food security may lead to improvements in adherence to ART (Young et al., 2014).

Mesosystem

At the mesolevel, language barriers and caregiver irregularity at the clinics limit opportunities for rapport building. Caregiver consistency is important and may take the form of regular monitoring of the person attending clinic, monitoring regular communication between caregivers, and ensuring that treatment-related recommendations are effectively passed on to the person responsible. Caregivers then have to ensure that treatment knowledge is transferred to all those involved so that the response is family orientated.

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Exosystem

At the exolevel, unstandardized training of adherence counsellors and rushed pre-ART education sessions challenge opportunities to provide caregivers with knowledge and skills necessary to adhere optimally. Thus, more efforts are needed to standardize and improve the training counsellors receive and provide support and debriefing to them in the form of regular supervision. Furthermore, given the various roles of lay health personnel in the South African healthcare system, it is necessary to allocate specific roles to each of the health workers. Thus some may purely do administrative work, while others provide adherence counselling. The organization of roles will provide counsellors with a renewed purpose in their role. Evidence shows that counsellors can be trained to provide psychosocial support and adherence counselling to ART users (Petersen et al., 2014). However, in the absence of regular follow-up training and supervision the intervention sessions provide little sustainable use. Providing adherence counsellors with regular support and debriefing is likely to improve morale, which has shown to facilitate HIV care provision to patients (Kagee, 2013). Furthermore, to facilitate counsellors' consultations with patients the healthcare system should be an environment structured with suitable support to help alleviate the challenges patients may face.

Macrosystem

At the macrolevel, traditional medicines presented some barriers to adherence to ART. A better integration and understanding of the role of traditional healers in HIV treatment and care is needed. Available evidence (Appelbaum Belisle et al., 2015) has suggested that traditional healers in South Africa are cognisant of the role and importance of ARVs. However, given their limited understanding of the contra-indications of their herbal remedies on health outcomes, healthcare staff and researchers have to prioritize knowledge transfer in high prevalence areas, like KwaZulu-Natal.

Conclusion

As the only effective treatment for HIV, adherence to ART remains the most important intervention to date to manage the sheer volume of individuals that are HIV infected globally. Infants and young CLWH are uniquely challenged as they face various developmental and age-related factors through the course of their illness that affect adherence to ART. In the context of prolonged lifespans due to ART, it has become increasingly important to manage the transition to non-communicable disease and co-morbid illness. Subsequently, ensuring age-appropriate and targeted interventions from a young age is crucial to mitigating this transition. For children younger than five years, adherence is largely dependent on a caregiver who faces several additional factors that influence their ability to provide treatment and care to children on ART. The findings from this research demonstrate the importance of understanding context-specific and age-specific factors that influence adherence to ART among infants and young children. By stratifying these factors according to the micro-, meso-, exo- and macrolevels at which they occur, targeted interventions may be developed.

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APPENDICES

Appendix A – Interview flyer

Dear_____

I would like to invite you to take part in an interview that will be about the role of primary caregivers in administering ART to children under 5 years old. I would like to know what difficulties they experience and also what things make it easy for them to administer medication to such a young child.

You have indicated that _____ are usually quiet days at the clinic. I would like to contact you again in order to visit you on one of these days for an interview.

Please contact me if you need any more information at 072 241 5028.

Best wishes

Bronwyne Coetzee

Appendix B – Informed consent (doctor/nurse)

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

Doctor/Nurse

TITLE OF THE RESEARCH PROJECT:

Barriers to and facilitators of paediatric adherence to antiretroviral therapy (ART) amongst children ≤ 5 years in rural South Africa

REFERENCE NUMBER: S12/05/135

PRINCIPAL INVESTIGATOR: Bronwyne Coetzee

CONTACT NUMBER: 072 241 5028

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

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

What is this research study all about?

This project aims to identify both problems faced (barriers) when administering antiretroviral medication to young children (by caregivers), as well as useful information (facilitators) that may be passed on to other families under similar circumstances. Health professionals (like you)

will be invited to take part in-depth interviews. The interviews will be semi-structured- which means that questions may be added or removed depending on how the interview flows, and guided by the interviewer (Bronwyne) in order to obtain as much information as possible. I will ask mostly open-ended questions to learn your understanding of the factors that children who receive antiretrovirals (ARVs) from caregivers face.

Why have you been invited to participate?

You have been invited to participate because you have been identified as a doctor/nurse that provides treatment (medical or psychological) to young children receiving ART through the assistance of a primary caregiver.

What will your responsibilities be?

You will have no direct responsibilities. However, I would like to encourage you to actively participate in this interview and answer all the questions that you feel comfortable with answering as truthfully as possible.

Will you benefit from taking part in this research?

There are no direct benefits; however future patients are likely to benefit from the outcomes of this research.

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

There are no physical risks involved in participating in this research.

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

No foreseeable injury will occur from taking part in this study.

Will you be paid to take part in this study and are there any costs involved?

No, you will not be paid to take part in the study. There will be no costs involved for you, if you do not take part.

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Is there anything else that you should know or do?

You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

You can also contact me (the principal investigator) if you have any questions: 072 241 5028

You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I ……………………………..…………. agree to take part in a research study entitled (insert title of study).

I declare that:

I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is voluntary and I have not been pressurised to take part.

I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) ....…........…………….. on (date) …………....………. 2013.

Signature of participant   Signature of witness

Declaration by investigator

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

I explained the information in this document to …………………………………..

I encouraged him/her to ask questions and took adequate time to answer them.

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I am satisfied that he/she adequately understands all aspects of the research, as discussed above I did/did not use a interpreter. (If a interpreter is used then the interpreter must sign the declaration below.

Signed at (place) ....…........……………….. on (date) …………...……….. 2013.

Signature of investigator   Signature of witness

Declaration by interpreter

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

I assisted the investigator (name) ………………………………………. to explain the information   in   this   document   to   (name   of   participant) ……………..………………………….. using the language medium of Afrikaans/Xhosa.

We encouraged him/her to ask questions and took adequate time to answer them.

I conveyed a factually correct version of what was related to me.

I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Signed at (place) ....…........……………….. on (date) …………...………………..

Signature of interpreter   Signature of witness

Appendix C - Doctor-nurse interview schedule

INTERVIEW GUIDE
Doctor/nurse Interview Guide

                                       Moderator:

Site:_____   Note-taker:

Number of participants: Transcriber:

Date:

Start time: End time:

Thank you for agreeing to take part in this study. In this interview I am going to ask you some questions about your experience in treating children with HIV and also what you think of the roles of caregivers in pediatric adherence to ART are. I am specifically interested in what you think the barriers and facilitators to adherence to ART amongst children (specifically children younger than 5 years) are, and the influence of the role of caregivers on this.

Can you please state your position here:

Please tell me about your experience/relationship with children who receive ART (What is your role)?

Please tell me about your experience/relationship with the caregivers of children who receive ART (What is your role)?

What do you think are the experiences of caregivers and children (under 5) when they come to the clinic? What in your opinion are some of the relationship dynamics between child and caregiver that you can observe from your time with them?

What do you think is the hardest part for children (<5) in taking their medication? [Do they take their medication? If they don't, what do they do with it?]

What other things make it difficult for them to take their medication? Is it harder to give the meds in the morning or the evening? Why?

What things make it easy for children to take their medication?

What other things make it easy for them to take their medication?

What in your opinion is the role of a caregiver?

Who do you find is normally the caregiver of children receiving ART?

What things make it difficult for a caregiver to fulfill this role? (Do you think they understand the regimen- do they know how to read the prescriptions/understand what the doctors/nurses are saying? Do they know how to administer the drugs/who shows them how?)

What things make it easy for a caregiver to fulfill this role? Are there caregivers that you have seen that have come up with methods that you think other caregivers should know about?

Is there anything someone would like to add to the discussion, or share their thoughts about?

-Some drugs need to be kept in fridges- if they don't have fridges what do you advise?
- Do caregivers come to you with problems about administrating drugs? How do you advise them?
-In the counseling session what methods do you use to train caregivers in measuring/ making up doses for children?

Appendix D – Focus group flyer

Dear _____

I would like to invite you to take part in a focus group on _____

at _____ time.

The focus group will be an hour long (at the most) and will be about the role of caregivers in

administering antiretroviral therapy to children under 5 years old.

I will reimburse your travel costs, and supply you with a light lunch on the day.

Please contact me if you need any more information at 072 241 5028.

Best wishes

Bronwyne Coetzee

0722415028

Sawubona_____

Ngithanda ukukumema uba ubeyingxenye yeqoqo

ngomhlaka_____indawo

_____isikhathi.

Lengxoxo izothatha isikhathi esingangehora, imayelana nendima edlalwa abanakekeli

bezingane ekunikezeni ngemishanguzo kubantwana abaneminyaka engaphansa kwemihlanu

(5).

Ngiyonibuyisela imali yenu yokugibela, ngiphinde ngilethe nokuncane okuya ngasethunjini.

Uma ufuna emininingwane nokunye, ngicela uxhumane nami ku 072 241 5028.

Izilokotho ezinhle

u-Bronwyne Coetzee

0722415028

Appendix E - Informed consent - caregiver focus group

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

Focus Groups

TITLE OF THE RESEARCH PROJECT:

Barriers to and facilitators of paediatric adherence to antiretroviral therapy (ART) amongst children ≤ 5 years in rural South Africa

REFERENCE NUMBER: S12/05/135

PRINCIPAL INVESTIGATOR: Bronwyne Coetzee

CONTACT NUMBER: 072 241 5028

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

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

What is this research study all about?

This study will look at problems faced (barriers) when giving antiretroviral medication to young children, as well as useful information (facilitators) that may be passed on to other families who experience the same problems. People that play an important role in the lives of

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young children receiving antiretroviral medications (like you) will be invited to take part in a focus group discussion. The interviews will be semi-structured and guided by the interviewer (Bronwyne) so that we can understand as much as possible about this. I will ask mostly questions that will allow you to answer with as much information as you can to learn your understanding of the problems faced amongst children who receive medication from a caregiver.

Why have you been invited to participate?

You have been invited to participate because you have been identified as playing an important role in the lives of young children receiving ART.

What will your responsibilities be?

You will have no direct responsibilities; however I will encourage you to actively participate by answering the questions that I ask, express your opinions honestly, and also respond to questions or discussions that are raised by other members of the group.

Will you benefit from taking part in this research?

There are no direct benefits; however future patients are likely to benefit from the outcomes of this research.

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

There are no physical risks involved in participating in this research. However, if you experience any discomfort from taking part in this research I will report this to Dr Bland who will then make a suitable referral to a clinician that will address your concerns.

Who will have access to your medical records?

We will not need access to your medical records.

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

No foreseeable injury will occur from taking part in this study.

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Will you be paid to take part in this study and are there any costs involved?

No, you will not be paid to take part in the study, but relevant out-of-pocket expenses will be covered for each study visit. There will be no costs involved for you, if you do not take part.

Is there anything else that you should know or do?

You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

You can also contact me (the principal investigator) if you have any questions: 072 241 5028

You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I …………………………………..…………. agree to take part in a research study entitled (insert title of study).

I declare that:

I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is voluntary and I have not been pressurised to take part.

I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) ....….......……………... on (date) …………...……….. 2013.

Signature of participant   Signature of witness

Declaration by investigator

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

I explained the information in this document to …………………………………..

I encouraged him/her to ask questions and took adequate time to answer them.

I am satisfied that he/she adequately understands all aspects of the research, as discussed above

I did/did not use a interpreter. (If a interpreter is used then the interpreter must sign the declaration below.

Signed at (place) ....…….......……………….. on (date) …………...………. 2013.

Signature of investigator   Signature of witness

Declaration by interpreter

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

I assisted the investigator (name) ……………………………………. to explain the information in this document to (name of participant)

……………..…………………………….. using the language medium of Afrikaans/Xhosa.

We encouraged him/her to ask questions and took adequate time to answer them.

I conveyed a factually correct version of what was related to me.

I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Signed at (place) ....…….......……………….. on (date) …………...……………….

Signature of interpreter   Signature of witness

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Appendix F - Caregiver focus group guide

Moderator:

Site:_____   Note-taker:

Number of participants: Transcriber:

Date:

Start time: End time:

Thank you for agreeing to take part in this study. In this interview

We are interested in the kinds of things that make it difficult for you to provide the child with his/her ARV medication around medication times.

1. Please tell me about your experience with giving medicine to a child as their caregiver.

2. How would you describe your relationship with the child?

3. What difficulties do you think the child has?

4. What would make it easier for them?

5. What are the main problems that you have when you have to give the child their medication?

6. Is there anything you can think of that would make it easier for you to give the child their medicine?

7. If these changes were made (mention the suggestions the participant gave in above), can you tell me how it would be different or better for you in terms of giving the child their medication?

8. Is there anything that we haven't talked about that you want to say about any of these issues?

Appendix G - Counsellors focus group guide

Moderator:

Site:_____   Note-taker:

Number of participants: Transcriber:

Date:

Start time: End time:

Thank you for agreeing to take part in this study. In this interview

We are interested in the kinds of things that make it difficult for caregiver's to provide the child with ARVs around medication times.

Please tell me about your experience/relationship with the caregivers of children who receive ART (What is your role)?

What do you think are the experiences of caregivers and children (under 5) when they come to the clinic? What in your opinion are some of the relationship dynamics between child and caregiver that you can observe from your time with them?

What do you think is the hardest part for children (<5) in taking their medication? [Do they take their medication? If they don't, what do they do with it?]

What other things make it difficult for them to take their medication? Is it harder to give the meds in the morning or the evening? Why?

What things make it easy for children to take their medication?

What other things make it easy for them to take their medication?

What in your opinion is the role of a caregiver?

Who do you find is normally the caregiver of children receiving ART?

What things make it difficult for a caregiver to fulfil this role? (Do you think they understand the regimen- do they know how to read the prescriptions/understand what the doctors/nurses are saying? Do they know how to administer the drugs/who shows them how?)

What things make it easy for a caregiver to fulfil this role? Are there caregivers that you have seen that have come up with methods that you think other caregivers should know about?

Is there anything someone would like to add to the discussion, or share their thoughts about?

Appendix H - Traditional healer focus group guide

Moderator:

Site:_____   Note-taker:

Number of participants: Transcriber:

Date:

Start time: End time:

Good morning/good afternoon and thank you very much for taking the time to meet with me today. I have learnt from other researchers that you are a valued allied health provider and that many members of the community seek your advice and guidance when it comes to various things. I think that many of them may tell you things that they may not tell a doctor or a nurse and that is why I would like to speak to you today. I am specifically interested whether you give advice to mothers and caregivers of children with HIV when it comes to taking the medication every day.

So, I am interested in learning more about the influence that you have on the adherence behaviours of very young children (under 5 years old) receiving ART in the community. I am also interested in learning more about the barriers (the things that make it difficult to take the medication) and the facilitators (the things that help with taking medication) to adherence to ART.

How often do you come into contact with caregivers of children who receive ART?

Can you tell me about your experience in consulting with caregivers of children who receive ART?

What role do you play in his/her life?

What problems do caregivers usually come to you with?

How do you generally advise these caregivers on solving these problems?

What do you see as the most important factors that act as barriers to caregivers when they provide children with their medications? (spend time here probing)

What do you see as the most important factors that act as facilitators to caregivers when they provide children with their medications?

Potential probes:

Do you generally think that caregivers provide medications in the way that they are supposed to?

Why do you think they might not be providing the medication in the correct ways?

What do you think would help them to make medication time easier?

Appendix I - Caregiver consent form

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

Caregivers

TITLE OF THE RESEARCH PROJECT:

Barriers to and facilitators of paediatric adherence to antiretroviral therapy (ART) amongst children ≤ 5 years in rural South Africa

REFERENCE NUMBER: S12/05/135

PRINCIPAL INVESTIGATOR: Bronwyne Coetzee

CONTACT NUMBER: 072 241 5028

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

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

What is this research study all about?

This study will look at how children and the person giving their medication to them (you) interact. By studying this we will hopefully see what problems there are (if any) when the medicine is given to the child. We will also hopefully see what useful information can be

gathered by the way medication is given to the child. We hope to pass the useful information on to other families under similar circumstances. This is an observational study, which means that I will be present in your home for three mornings (when it best suits you) and for three evenings (when it best suits you) for 2hours at a time to observe you and your child during the times that you give medications to the child. I will also go with you (should this suit you) to one clinic visit and to one counselling visit for observation as well. I would like to invite 60 children and caregivers to participate in this study. This study will be conducted in Mtubatuba, in the homes of participants who consent. Should you agree, I would like to video record these observations in addition to the field notes that I will be taking. Identifying characteristics (e.g face) will be removed from the footage.

Why have you been invited to participate?

You have been invited to participate because you have been identified as a caregiver to a child that receives antiretroviral therapy.

What will your responsibilities be?

You will have no direct responsibilities. However, it will be important that you continue with your daily routines (as close to reality as possible) in my presence.

Will you benefit from taking part in this research?

There are no direct benefits; however future patients are likely to benefit from the outcomes of this research.

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

There are no physical risks involved in participating in this research. If however you realise that you do not feel comfortable with the amount of time that I am spending in your home you can report this to me, and I will adjust to your needs.

Who will have access to your medical records?

We will not need access to your medical records. However, Dr Ruth Bland (primary clinician at your clinic) may need to refer to your file. No other person involved in this research will have access to any personal/ identifying information in your medical records.

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

No foreseeable injury will occur from taking part in this study. However, if you experience any discomfort from taking part in this research I will report this to Dr Bland who will then make a suitable referral to a clinician that will address your concerns.

Will you be paid to take part in this study and are there any costs involved?

No, you will not be paid to take part in the study, but out-of-pocket expenses will be covered for each study visit. There will be no costs involved for you, if you do not take part.

Is there anything else that you should know or do?

You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

You can also contact me (the principal investigator) if you have any questions: 072 241 5028

You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I …………………………………..…………. agree to take part in a research study entitled (insert title of study).

I declare that:

I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is voluntary and I have not been pressurised to take part.

I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

I may be asked to leave the study before it has finished, if the study doctor or researcher feels

it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) ....…........……………….. on (date) …………...……….. 2013.

Signature of participant   Signature of witness

Declaration by investigator

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

I explained the information in this document to ……………………………………..

I encouraged him/her to ask questions and took adequate time to answer them.

I am satisfied that he/she adequately understands all aspects of the research, as discussed above

I did/did not use a interpreter. (If a interpreter is used then the interpreter must sign the

declaration below.

Signed at (place) ....…........……………….. on (date) …………...……….. 2013.

Signature of investigator   Signature of witness

Declaration by interpreter

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

I assisted the investigator (name) ……………………………………… to explain the

information   in   this   document   to   (name   of   participant)

……………..…………………………….. using the language medium of Afrikaans/Zulu.

We encouraged him/her to ask questions and took adequate time to answer them.

I conveyed a factually correct version of what was related to me.

I am satisfied that the participant fully understands the content of this informed consent

document and has had all his/her question satisfactorily answered.

Signed at (place) ....…........……………….. on (date) …………...………………..

Signature of interpreter   Signature of witness

Appendix J - Home visit 1 observation schedule

Home Visit #1

Baseline observation of house and occupants

What does the structure of the house look like?

_____

_____

_____

_____

_____

_____

How many people live in this house?

_____

_____

How many bedrooms are there?

_____

_____

Is there running water/ a bath/toilet etc…?

_____

Where is the child's medication kept?

_____

_____

_____

_____

_____

_____

Where is the child's medications usually administered?

_____

_____

At what time has the medication been administered?

_____

_____

_____

Appendix K - Home visit 2 and 3 observation schedule and video recorder

Home Visit # 2 and 3

Details:_____

_____

How is the child called to the medication area?

_____

_____

How is it administered (liquid-form/pill form)?

_____

_____

How does the caregiver go about measuring volumes of medication if liquid formulations are

made?

_____

_____

How does the caregiver interact with the child during administration of the medication?

_____

_____

How does the child interact with caregiver during administration of the medication?

_____

_____

_____

What are the main concerns expressed by the child during administration of the medication?

_____

_____

How does the caregiver respond to this?

_____

_____

How long does it take to administer the medication?

_____

_____

Does the child have something to eat before or after taking medication?

_____

_____

_____

Is there only one person involved in the activities surrounding the administration of the medication to the child?

_____

_____

Summarise step-by-step the steps involved in administering the treatment to the child based on footage and observation:

_____

_____

_____

_____

_____

_____

_____

_____

Medication specific observations:

What measurement tool is being used?

Syringe

Spoon

Cup

None

How many mills of liquid formulation are being given?

_____

_____

How many of each tablet is being given?

_____

_____

How clearly is the measuring tool marked?

_____

_____

After 3rd visit assess caregiver knowledge

Ask caregiver to recall medication names

_____

_____

_____

Ask   caregiver   to   recall   dose

amount_____

_____

Ask caregiver whether she thinks she administered the treatment correctly or not?

_____

_____

Ask caregiver what difficulties she had in giving treatment in the past?

_____

_____

Ask caregiver how Dr/counsellor prescribed medication?

_____

_____

Ask caregiver whether she had adjusted this in any way to make it easier for herself?

_____

_____

_____

Demographic data:

Age:_____

Date of Birth:_____

Gender: M/F

Marital status;

Single

Separated

Widowed

Divorced

Married or living with a significant other in a marriage-like relationship

Current living situation:

Live alone

Live with other adult(s), no children

Live with other adults and children

Live with children only

Live in an institution or retirement home

Level of education:

No formal education

Completed primary school

Attended high school but did not complete matric

Completed matric

Attended university, or college or technicon but did not graduate

Graduated from uni, college or tech

Current work situation:

Employed full time

Unemployed

Homemaker

Disabled

Employed part-time

Student

Retired

Annual income:

Less than R12000 a month

R10, 001-R40, 000

R40, 001- R80, 000

R80, 001-R110, 000

R110, 001-R170, 000

R170, 001-R240, 000

R240, 001 and above

Don't know

Grant (R_____)First language? _____

Additional questions:

Did you receive the three pre-initiation counselling sessions from the ARV counsellor?

YES/NO

Are you the only one who brings the child to the clinic? YES/NO

Who else?_____

Are you the only person who gives the child his/her medication? YES/NO

Who else gives the medication?_____

When do you administer the ARVS? MORNING/EVENING/MORNING & EVENING

Does the child receive other treatment as well? YES/NO

How many children do you look after?

Additional Notes:

_____

_____

_____

Appendix L - Counsellor consent form

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

COUNSELLORS

TITLE OF THE RESEARCH PROJECT:

Barriers to and facilitators of paediatric adherence to antiretroviral therapy (ART) amongst children ≤ 5 years in rural South Africa

REFERENCE NUMBER: S12/05/135

PRINCIPAL INVESTIGATOR: Bronwyne Coetzee

CONTACT NUMBER: 072 241 5028

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

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

What is this research study all about?

This study will look at how children and the person giving their medication to them interact. By studying this we will hopefully see what problems there are (if any) when the medicine is given to the child. We will also hopefully see what useful information can be gathered by the

way medication is given to the child. We hope to pass the useful information on to other families under similar circumstances. This is an observational study, which means that I will be present in the home of children and their caregivers for three mornings and for three evenings to observe how the child receives his/her treatment. I have also received written permission from each of the caregivers of the children enrolled in the study whether I can attend one routine adherence counselling session with them. During these counselling sessions I will observe and document what information caregivers receive from adherence counsellors during a typical counselling session and how long the counselling session takes.

Why have you been invited to participate?

You have been invited to participate because you have been identified as an adherence counsellor that provides routine adherence counselling to children and caregivers attending this clinic.

What will your responsibilities be?

You will have no direct responsibilities. However, it will be important that you continue with your counselling session as you would do normally.

Will you benefit from taking part in this research?

There are no direct benefits; however future patients are likely to benefit from the outcomes of this research.

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

There are no physical risks involved in participating in this research.

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

No foreseeable injury will occur from taking part in this study. However, if you experience any discomfort from taking part in this research I will report this to the Hospital Manager who will then make a suitable referral to a clinician that will address your concerns.

Will you be paid to take part in this study and are there any costs involved?

No, you will not be paid to take part in the study. There will be no costs involved for you, if you do not take part.

Is there anything else that you should know or do?

You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.

You can also contact me (the principal investigator) if you have any questions: 072 241 5028

You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I ……………………………..…………. agree to take part in a research study entitled (insert title of study).

I declare that:

I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is voluntary and I have not been pressurised to take part.

I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (place) ....……........…………….. on (date) …………...………. 2013.

Signature of participant   Signature of witness

Declaration by investigator

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

I explained the information in this document to ………………………………..

I encouraged him/her to ask questions and took adequate time to answer them.

I am satisfied that he/she adequately understands all aspects of the research, as discussed above

I did/did not use a interpreter. (If a interpreter is used then the interpreter must sign the declaration below.

Signed at (place) ....…….......……………. on (date) …………...………. 2013.

Signature of investigator   Signature of witness

Declaration by interpreter

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

I assisted the investigator (name) ……………………………………. to explain the information   in   this   document   to   (name   of   participant) ……………..…………………………….. using the language medium of Afrikaans/Xhosa.

We encouraged him/her to ask questions and took adequate time to answer them.

I conveyed a factually correct version of what was related to me.

I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Signed at (place) ....…….......……………. on (date) …………...………………..

Signature of interpreter   Signature of witness

Appendix M - Counselling observation schedule

NAME OF CV-CHILD

COMBO:_____

MONTH:_____

_____

TIME START:_____

TIME END:_____

DRAW SET UP COUNSELLING ROOM
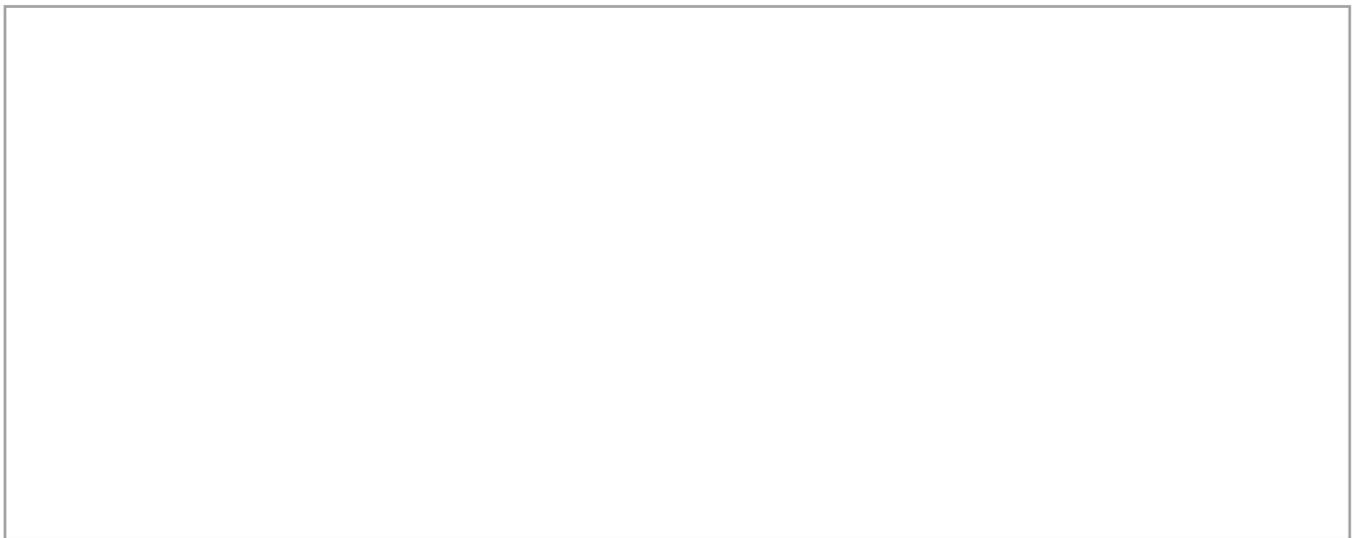
1. IS CHILD PRESENT? YES/NO
2. WHAT IS YOUR IMPRESSION OF THE COUNSELLORS MOOD?

_____

_____

_____

_____

3. WHAT IS YOUR IMPRESSION OF THE CAREGIVERS MOOD?

_____

_____

_____

_____

4. WHAT IS ASSESSED IN THIS COUNSELLING SESSION?

Appendix N - Ethics

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot • your knowledge partner

Approval Notice
New Application

12-Jun-2012
Coetzee, B

Ethics Reference #: S12/05/135

Title: The identification and influence of barriers and facilitators to adherence to antiretroviral therapy (ART) amongst young children who rely on caregiver administration of antiretrovirals, in rural Kwazulu Natal

Dear Ms B Coetzee,

The New Application received on **16-May-2012**, was reviewed by members of **Health Research Ethics Committee 1** via Expedited review procedures on **10-Jun-2012** and was approved.
Please note the following information about your approved research protocol:

Protocol Approval Period: **10-Jun-2012 -10-Jun-2013**

Please remember to use your **protocol number** (S12/05/135) on any documents or correspondence with the REC concerning your research protocol.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:
Please note a template of the progress report is obtainable on www.sun.ac.za/rds and should be submitted to the Committee before the year has expired.
The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number projects may be selected randomly for an external audit.
Translation of the consent document in the language applicable to the study participants should be submitted.

Federal Wide Assurance Number: 00001372
Institutional Review Board (IRB) Number: IRB0005239

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are Ms Claudette Abrahams at Western Cape Department of Health (healthres@pgwc.gov.za Tel: +27 21 483 9907) and Dr Helene Visser at City Health (Helene.Visser@capetown.gov.za Tel: +27 21 400 3981). Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.
For standard REC forms and documents please visit: www.sun.ac.za/rds

If you have any questions or need further help, please contact the REC office at 0219389657.

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Email: BREC@ukzn.ac.za
Website: http://research.ukzn.ac.za/ResearchEthics/BiomedicalResearchEthics.aspx

10 September 2012

Ms Bronwyne Coetzee
Africa Centre for Health and Population studies
Department of Psychology
University of Stellenbosch
e-mail bcoetzee@iafricacentre.ac.za

Dear Ms Coetzee

Re: Request for Reciprocity (HREC-1)

Your letter dated 23 August 2012 to the Chair of the Biomedical Research Ethics Committee (BREC) requesting reciprocity for a PhD study refers.

Please note that your request for reciprocity has been granted by the Chair of BREC.

Yours sincerely
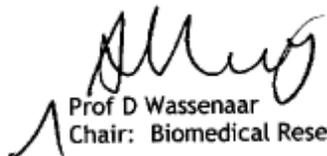
Prof D Wassenaar
Chair: Biomedical Research Ethics Committee

Appendix O - CAB approval letter

23 August 2012

Biomedical Research Ethics Committee
University of KwaZulu-Natal
Private Bag x7
Congella 4013

Dear Sir/Madam

Protocol: Paediatric resistance to antiretroviral therapy: the role of caregivers in administrating antiretrovirals

This serves to advise that the above-mentioned study was presented in detail to the Africa Centre Community Advisory Board on 23rd of August 2012.

The CAB members asked questions about a wide range of aspects relating to the study. The questions and comments were adequately addressed by the Study Investigator, Bronwyne Coetzee. The CAB members carefully considered the benefits of the study to individual participants and the community as whole.

It is from this premise that the CAB hereby unconditionally grants permission to the Africa Centre for Health & Population to conduct the proposed study.

Yours sincerely
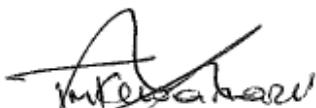
CAB Chairperson
Thokozani Mkhwanazi

CAB Secretary
Thabani Mgenge

Management Committee Chairperson: T. K. Mkhwanazi
Members: S. Mchunu, S. Mkhwanazi, T. Mgenge, N. Simelane, G. Mnyango, T. Mbuyisa

Postal: PO Box 198, Mtubatuba 3935, South Africa   Physical: Africa Centre, R618 en route to Hlabisa, Somkhele
Tel: +27 (0)35 550 7500   Fax +27 (0)35 550 7565   E-mail: info@africacentre.ac.za
Website: www.africacentre.ac.za

Appendix P – External auditing

Publication:

Coetzee, B., Kagee, A., & Bland, R. (2015). Barriers and facilitators to paediatric adherence to antiretroviral therapy in rural South Africa: a multi-stakeholder perspective. *AIDS Care*, *27*(3), 315–21. doi:10.1080/09540121.2014.967658

Conferences:

2015: Oral presentation: Short coming of adherence counselling provided to caregivers of children receiving antiretroviral therapy (ART), 7TH SA AIDS CONFERENCE, 09 - 12 JUNE 2015, ICC DURBAN, SOUTH AFRICA

2014: Oral presentation: Using video and observation to understand ART administration practices amongst children ≤ 5 years in rural KwaZulu-Natal , RuDASA Conference Worcester, 21-24 September

2013: Poster presentation: The Role of The Caregiver (Poster); 8th International Conference on HIV Treatment and Prevention Adherence; June 2nd – June 4th 2013; Miami, Florida, United States of America;

2013: Poster presentation: Paediatric Resistance to Antiretroviral Therapy: The Role of The Caregiver (Poster); 6th SA AIDS Conference; June 18th – June 21st 2013; Durban; South Africa