AN EVALUATION OF APPROACHES TO THE INITIATION OF ANTIRETROVIRAL THERAPY DURING PREGNANCY AMONG HIV-INFECTED WOMEN IN CAPE TOWN

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EXECUTIVE SUMMARY

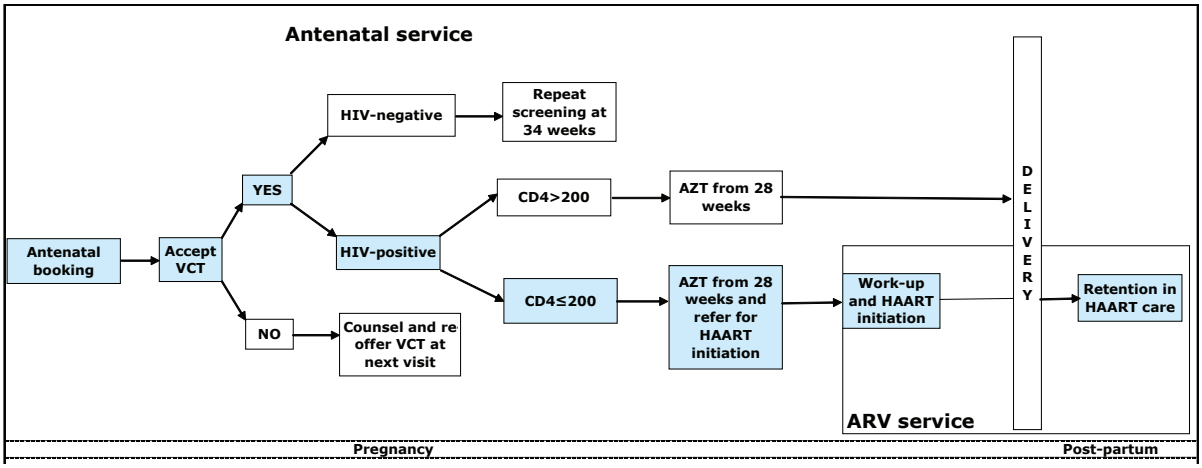
Background

Prevention of mother-to-child transmission (PMTCT) programmes recommend the use of highly active antiretroviral therapy (HAART) regimens during pregnancy to optimize maternal health and help prevent vertical transmission of HIV. However, little is known about the initiation of HAART in pregnancy in the Western Cape. The objective of this study was to evaluate existing models of care for HIV-infected women who are eligible for HAART initiation during pregnancy.

Methods

Three service models were identified and a programme review was undertaken at four antenatal services and their corresponding ARV services. Routine service data from 2005 were used to map the PMTCT cascade (Figure 1) in terms of HAART eligibility and successful antenatal treatment initiation. Service provider and patient interviews were conducted at the participating sites and their referral services.

Figure 1: The PMTCT Cascade



Results

Of 13 208 women tested for HIV during pregnancy during 2005 at these sites, 3 498 were HIV-infected; of these, 516 (15% of all known HIV-positives) were eligible for HAART. Among HAART-eligible pregnant women, 51% successfully initiated treatment before delivery. A further 27% of women did not initiate HAART but received some form of PMTCT prophylaxis in pregnancy and/or labour, but 22% of women who were HAART-eligible had no record of receiving any antenatal intervention. There was little variation in service coverage between the different models of care. Qualitative findings showed that there were substantial psychosocial barriers to accessing and initiating HAART in pregnancy related to the triple burdens of an HIV diagnosis, pregnancy and the need to initiate lifelong therapy.

Conclusion

There are significant challenges to successful HAART initiation during pregnancy in this setting, although there was little evidence that the model of care affected any of the outcomes measured here. Focused interventions are needed to optimize the initiation of HAART during pregnancy and ongoing management of these women.

1. INTRODUCTION

Over 90% of paediatric HIV infections worldwide are attributable to mother-to-child transmission (MTCT) (1). Clinical evidence has shown that the use of antiretroviral regimens offered in prevention of mother-to-child (PMTCT) programmes and the use of highly active antiretroviral treatment (HAART) during pregnancy in particular can help to reduce the risk of MTCT to less than 2% (2). The benefits of HAART are greatest for women with advanced stage disease who, with a high viral load, are most at risk of MTCT (3).

PMTCT programmes are recognized as an important strategy in HIV prevention. In addition to their role in preventing paediatric HIV infection, PMTCT programmes are also a crucial gateway to comprehensive HIV treatment and care for women and their families (4). In resource-rich contexts, the practical effectiveness of interventions emulates the efficacy demonstrated in clinical trials (5). Yet in low- and middle-income countries PMTCT programmes face greater challenges to effective implementation and scale up, including higher seroprevalence of HIV among pregnant women, high ratios of patients to health care providers, and limited health services infrastructure (6).

International findings indicate both service and patient-related barriers which impact on PMTCT effectiveness (7). The utilization of different models of counselling and testing across contexts has differential impact on coverage, while a shortage of trained health care providers, poorly resourced supportive laboratory service infrastructure and under-developed record keeping and functional health information systems impact on the quality of care (6, 7, 8, 9). Patient-driven factors that influence programme effectiveness include the lack of knowledge of serostatus prior to conception; reluctance around testing in pregnancy and the subsequent potential for post-diagnosis denial and fear of disclosure. The psychosocial sequelae of HIV infection necessitate supportive structures which range from effective patient-centred care to community outreach programmes in order to minimize the stigma of the condition. Adequate supportive care is frequently difficult to operationalize and low uptake of PMTCT interventions has been found in instances where treatment literacy and psychosocial support is weak (4, 6, 7). Loss-to-follow-up of pregnant women both pre-treatment and post-initiation highlights the need for interventions that focus on retention in antiretroviral (ARV) care for women of child-bearing age (10, 11, 12).

These challenges impact most on women who have advanced HIV infection in pregnancy. Women who have a high viral load, a low CD4 count and clinical AIDS are at greatest risk of transmitting HIV to their children without intervention, and need to initiate lifelong HAART before delivery, for their own health and that of their offspring (13).

The World Health Organization's (WHO) revised PMTCT guidelines have recommended the use of HAART during pregnancy in resource-constrained settings since 2004 (14, 15). A two-tiered approach to PMTCT interventions was adopted for such contexts, and HAART was recommended for women who needed treatment for their own health, while single dose or short course regimens were stipulated for women who required prophylactic treatment alone (16, 17). The effectiveness of the two-tiered strategy has been demonstrated in Abidjan, Côte d'Ivoire where, among women who initiated HAART from 24 weeks gestation, the majority of whom breastfed, the overall rate of transmission was 1.0% immediately postpartum, and 3.3% at 12 months. This study showed an overall peripartum transmission rate of 2.2% among women who received either HAART or a prophylactic regimen (18). These results are similar to those found in developed countries, and they underscore the effectiveness of the two-tiered approach to the treatment and care of HIV-infected pregnant women in resource-constrained settings. In 2006, further revisions were made

to the WHO guidelines to include updated clinical and programmatic evidence, which set out specific initiation criteria for HIV-infected women with indications for ARV treatment according to their disease stage or viral load. These criteria stipulated that all women in clinical stage 1 or 2 and with a CD4 count <200 cells/µl; clinical stage 3 and with a CD4 count <350 cells/µl; or clinical stage 4 should be recommended for HAART initiation (17).

Within South Africa, regional health system variations regarding models of care and the availability of treatment and services for HIV-infected pregnant women have always existed. The first PMTCT programme in South Africa was initiated in 1999. Short course zidovudine (SC-AZT) was piloted at a single site, followed by the introduction of single dose nevirapine (SD-NVP) in other high burden sites (19). By 2003, local PMTCT guidelines were revised and SD-NVP was replaced with AZT from 28 weeks gestation, in combination with SD-NVP at birth. Furthermore, an interface between antenatal and HAART services for women was formulated and HAART referral and initiation for eligible HIV-infected pregnant women was operationalized. This was aided by the implementation of routine CD4 count testing on all HIV-seropositive women at antenatal services (20, 21). In February 2008 the National Department of Health released the revised National PMTCT Policy Guidelines, which recommends the use of dual therapy regimens and HAART across all provinces (22).

While current PMTCT services target all HIV-positive pregnant women, programme effectiveness has the greatest potential to affect the lives of women who are living with advanced stage disease, and who are eligible for HAART. PMTCT services for HIV-infected pregnant women who require short course prophylactic regimens are integrated within routine maternal health services. Yet there are relatively few linkages between PMTCT and ARV services, to which women with advanced stage disease are referred for HAART. The separation of services raises concerns about the potential barriers a woman may have to overcome in order to initiate treatment timeously before delivery (4). Such fragmentation of health care services in South Africa is an artefact of previously vertical health systems structures, where separate programmes have been added on without overhauling existing infrastructure. The lack of re-orientation towards a continuum of chronic disease services is recognized as a major obstacle in service delivery, particularly in the era of ARV treatment and care (23).

The public sector health service has allocated significant resources towards the expansion of HIV/AIDS treatment and care programmes (24). However, among all HIV-infected children and adults estimated to be eligible for antiretroviral therapy in 2007, coverage was estimated to be only 28% (25). The National Department of Health has reported that approximately 85% of women attend antenatal services during pregnancy, which suggests the great potential for antenatal care to provide an entry point to HIV testing and ensuing PMTCT care (26). However, in 2006–07, NVP coverage at national level was recorded to be 61% of all known HIV-infected women, with 65.7% coverage reported in the Western Cape (27). Although HAART has been available for HIV-infected pregnant women who require it in limited service settings since 2004, not much is known about the effectiveness of HAART initiation and treatment programmes for pregnant women. Furthermore, little evaluation of the implementation of local PMTCT programmes with particular consideration of HAART treatment and care for HIV-infected pregnant women with advanced stage disease has been undertaken.

2. AIMS & OBJECTIVES

The overall aim of this study was to gain insight into the provision of HAART treatment services for eligible HIV-infected pregnant women in Cape Town. Within this, two specific research objectives were identified:

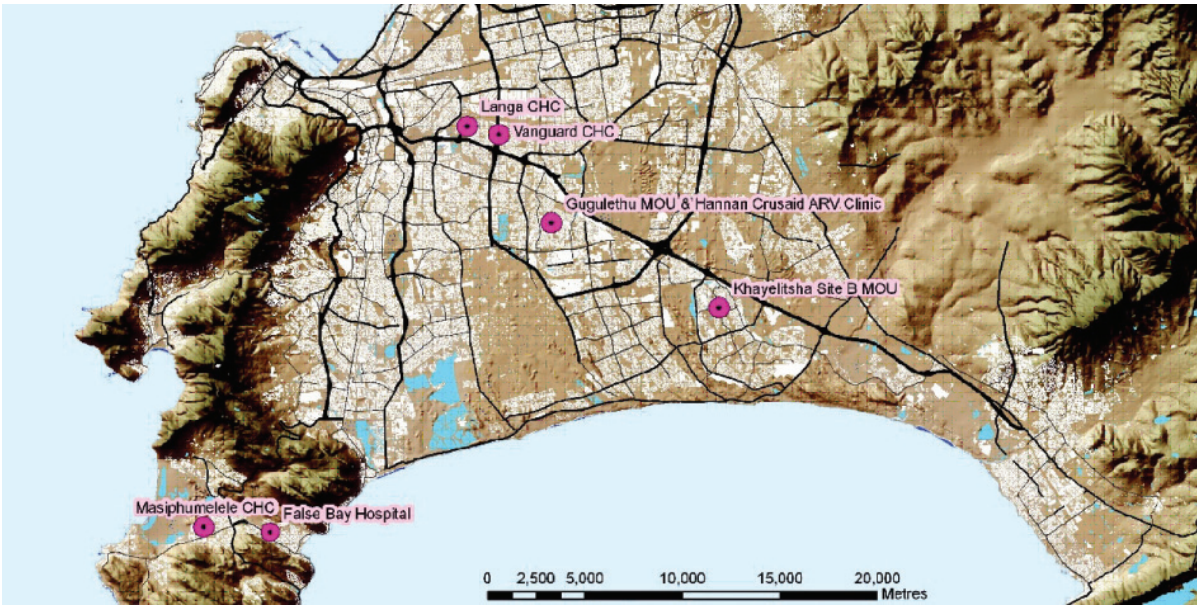
- To evaluate different models of care for initiating HAART in pregnant women, which have evolved out of existing local antenatal and HAART treatment service partnerships since around 2004. This evaluation was to incorporate an examination of the coverage of HAART services for HIV-infected pregnant women, and the processes in place to fast-track eligible women for HAART initiation before delivery.
- To examine the constraints and barriers to HAART initiation in pregnancy, as experienced by a representative sample of patients and health care providers within the services respectively.

3. METHODS

3.1 Study setting

The study focused on four antenatal care services and their secondary and tertiary referral facilities situated within the Cape Metropolitan area. The antenatal sites comprised two midwife obstetric units (MOUs) and two midwife-driven services situated within a community health centre and an outpatients department of a secondary level hospital respectively. During 2004, the Provincial Government of the Western Cape (PGWC) Department of Health revised and implemented PMTCT guidelines, which incorporate a two-tiered approach to ARV treatment for HIV-infected women. Pregnant women with CD4 counts >200 cells/µl receive AZT from 28 weeks gestation and SD-NVP in labour, and those with CD4 counts ≤200 cells/µl are referred to separate ARV treatment services for HAART initiation. These facilities offer a 'fast-track' approach to evaluation, work-up and HAART initiation for such women. Services are geographically based and operate under the directive that women are referred to facilities closest to their area of residence.

Figure 2: Location map of study sites



It was hypothesized that the separation of antenatal services from HAART services could lead to substantial delays and loss to follow-up in referral and treatment initiation in the subset of HIV-infected women who were eligible for HAART. Four sites were selected to highlight the differences in the proximity of the ARV service to the antenatal site (Figure 2). Factors such as physical distance between a woman's home, the antenatal service and the ARV service; transport systems and their associated costs, as well as the requirement to attend separate follow-up visits at two facilities were noted as potential barriers to rapid treatment initiation. Three models of care were identified based on these assumptions. Each displayed varying degrees of service integration.

Table 1: Distance between antenatal and HAART services

Participating sites	Distance to travel from antenatal care to HAART service
Vanguard CHC – Langa CHC	1.8 km
False Bay Hospital – Masiphumelele CHC	4.2 km
Gugulethu MOU – Hannan Crusaid ARV Clinic	130 m
Khayelitsha Site B MOU	Across corridor in facility

3.2 Service models

3.2.1 Distal service model: Antenatal service and ARV service >1 km apart

This model comprises 2 antenatal services and participating HAART services.

MODEL 1A: VANGUARD COMMUNITY HEALTH CENTRE (CHC) AND LANGA CHC

The antenatal service provided at Vanguard CHC, Bonteheuwel, is one of a broad range of health services offered by this community health clinic. The antenatal service runs five days per week, and has a 24-hour labour ward. Patients requiring secondary level obstetric care are referred to New Somerset Hospital, Green Point. The catchment area for Vanguard CHC includes Bonteheuwel, Crossroads, Langa, Milnerton, Dunoon, Table View, Maitland and Kensington. Antenatal admission policy, however, is not restricted to women who reside in the catchment area, and pregnant women from further afield are booked but encouraged to transfer out to antenatal facilities in their own area. At the time of writing, the antenatal service at Vanguard CHC admits over 100 bookings per week. At the time of the study, this facility did not provide an ARV service. This antenatal service was evaluated in terms of its proximity to Langa CHC which is a City of Cape Town and Department of Health clinic 1.8 km away by foot, which has offered an ARV service since 2004.

MODEL 1B: FALSE BAY HOSPITAL AND MASIPHUMELELE ARV CLINIC

The antenatal service at False Bay Hospital operates from the Outpatients Department, where 20 to 30 new bookings are made per week. The antenatal service is utilized by women residing in Fish Hoek, Masiphumelele, Ocean View, Red Hill, Simon's Town, Sun Valley, Grassy Park and Retreat. This model represents a shift from separate to integrated antenatal and ARV care. Before November 2005, False Bay Hospital referred all HAART-eligible pregnant women to Masiphumelele Clinic (4.2 km apart by road), a joint initiative between the South Peninsula Municipality and the Desmond Tutu HIV Foundation. From the end of 2005, False Bay Hospital became a designated ARV treatment site, and began to provide an integrated HAART service for pregnant women. While women have the option to access HAART services at False Bay Hospital postpartum, residents of Masiphumelele are encouraged to transfer out to Masiphumelele Clinic for their own financial and logistical benefit.

3.2.2 Proximal service model: Antenatal and ARV services on the same premises, but in separate buildings

MODEL 2: GUGULETHU MOU AND HANNAN CRUSAID ARV CLINIC

Gugulethu MOU offers an antenatal service five days per week, and a 24-hour labour ward. Patients who require secondary obstetric care are referred to Mowbray Maternity Hospital. The catchment area for Gugulethu MOU is Philippi, Nyanga, Lower Crossroads, Heideveld and Gugulethu. However, the MOU has a non-restrictive booking policy, and women from Mitchell's Plain, Samora Machel, Khayelitsha and the Eastern Cape are known to utilize services here. Gugulethu MOU books approximately 200 pregnant women per week. The antenatal service was evaluated in terms of its proximity to Hannan Crusaid ARV Clinic, which has operated exclusively as a vertical ARV site since 2004. The two facilities are situated on the same premises, yet they operate as independent services from separate buildings.

3.2.3 Integrated service model: Combined antenatal and ARV service

MODEL 3: SITE B MOU AND AN OUTREACH ARV SERVICE WITHIN THE MOU

Site B MOU in Khayelitsha represents the largest antenatal service under evaluation. The MOU provides antenatal services five days per week with a 24-hour labour ward. The facility books more than 200 new antenatal clients every week. The catchment area for the MOU is Site B, however, since the MOU is well-served by public transport, it tends to attract clients from the greater Khayelitsha area. Pregnant women who have relocated to Delft, Macassar, and women who have relocated either temporarily or permanently from the Eastern Cape are known to use Site B MOU. The Site B model illustrates an integrated antenatal and ARV treatment service, with two doctors on site to deliver HAART initiation and care to eligible pregnant women on one morning per week. The integrated ARV service is available to women up to one month postpartum, at which point they are expected to transfer out either to Site B ARV Clinic (which situated in a separate building but in the same complex), or an ARV site of choice, closer to their home.

Variation in staffing and internal service structure was observed between the models. Table 2 below describes the key features of each PMTCT service by model and site.

3.3 Ethical approval

Ethical approval for the study was received from the Research Ethics Committee of the University of Cape Town in February 2007. Approval for research at the respective clinics was obtained from the City of Cape Town in March 2007 and the Provincial Government of the Western Cape in May 2007. Special permission was given for the use of personal names as unique identifiers during data collection, in light of foreseen difficulties in linking women from antenatal sites to separate HAART services. Access to the data during extraction and capture was restricted to the principal investigator and two field workers. Data were anonymized once duplicate checks had been run.

3.4 Study design

Both quantitative longitudinal data and qualitative data were collected in this study and two approaches to field work were applied:

1. A programme review of the year 2005 for each antenatal service
2. Interviews with pregnant or postpartum clients at each of the participating services, as well as interviews with health care providers from each of the participating services and the Peninsula Maternity and Neonatal Services.

Table 2: Model-specific features of the PMTCT service, for HAART-eligible women

Model 1a (Distal) Vanguard MOU	Model 1b (Distal) False Bay Hospital	Model 2 (Proximal) Gugulethu MOU	Model 3 (Integrated) Khayelitsha Site B MOU
PMTCT programme staff			
4 VCT counsellors; 2 midwives	2 VCT counsellors; 3 midwives; 1 patient advocate; 1 obstetrician	4 VCT counsellors, including 2 patient advocates; 2 midwives	2–3 VCT counsellors; 3 midwives
Counselling and testing			
Group counselling followed by the opportunity for individual counselling away from main waiting area of clinic. Same day HIV rapid test result and post-test counselling.	More emphasis on individual counselling than on group counselling observed. Women move along a corridor from room to room for each component of the antenatal booking, and HIV testing is integrated into this system, creating an opt-out model. Same day HIV rapid test result, and post test counselling.	Group counselling followed by the opportunity for individual counselling. Same day HIV rapid test result and post-test counselling in rooms which open on to the main waiting area.	Group counselling followed by the opportunity for individual counselling. Same day HIV rapid test result and post-test counselling in rooms which are removed from the main antenatal service waiting area.
Laboratory monitoring and follow-up			
CD4 count sent to NHLS. Results given to client up to one or two weeks later at follow-up visit (dependent on gestational age at booking).	CD4 count sent to NHLS. Results given to client at two week follow-up appointment, but women who book late are asked to return within the same week for the CD4 result.	CD4 count sent to NHLS. Results given to client up to one or two weeks later at follow-up visit (dependent on gestational age at booking).	CD4 count sent to NHLS. Results given to client up to one or two weeks later at follow-up visit (dependent on gestational age at booking). For late bookers, the CD4 results are phoned for, and the woman is asked to return in 3 days.
Referral process			
HAART-eligible women referred to Langa CHC, Dunoon or clinic of their choice. Antenatal card or written note from midwife serves as referral documentation.	From 2004 to end 2005, HAART-eligible women referred to Masiphumelele CHC. From end 2005: HAART-eligible women referred internally to FBH Infectious Disease Clinic. Patient advocates assist in chaperoning women to the HAART service.	HAART-eligible women referred to Hannan Crusaid. Patient advocates facilitate referral by providing logistical and psycho-social support. Referral letter used as documentation of eligibility for HAART.	HAART-eligible women are referred to the in-situ ARV service across the corridor. The service operates every Thursday morning. Midwives refer women to counsellors who assist with introductions to the ARV service.
ARV facility admission criteria			
Enrols clients from Langa, Valhalla Park, Bonteheuwel, Delft and Philippi, but operates an open door policy.	Both sites enrol patients from same catchment area, which includes Masiphumelele, Ocean View, Red Hill, Simonstown, Sun Valley and Fish Hoek.	This clinic is an exclusive ARV site. Admissions policy extends to members of Nyanga subdistrict only, due to home-based adherence counselling model.	The integrated ARV service operates for all women who attend the Site B MOU antenatal service. Most of the women come from Khayelitsha and surrounds.
Treatment work-up and fast-tracking procedure			
2–4 week HAART work-up, depending on availability of patient. Treatment supporter mandatory for third work-up session. Fast-tracking of pregnant women can be achieved in 1 week, subject to treatment readiness and identification of a treatment supporter.	Work-up at Masiphumelele is approximately a month, but it can be achieved in 2 weeks for pregnant women. Few women arrive late in pregnancy. Women are encouraged to disclose, but non-disclosure will not impede treatment initiation. FBH Infectious Diseases Clinic fast-tracks eligible women within one week.	Work-up at Hannan Crusaid is 1 month for women around 24 weeks gestation. Late bookings presenting at the Gugulethu antenatal service are referred to the weekly specialist obstetric clinic, and referred to Hannan Crusaid. At Hannan Crusaid, women over 24 weeks are fast-tracked and initiate treatment within 2 weeks.	The referral and work-up can take up to three weeks. Clients present to the ARV doctors on Thursdays, once they have had sufficient counselling. Fast-tracking is available for late bookers but is limited by the fact that the doctors are only available on a weekly basis.

3.4.1 Programme review

The programme review of service data was conducted to create a retrospective cohort study, which mapped the critical steps of the PMTCT cascade at each service site. Individual site assessments were carried out to test the feasibility of data collection, and a data extraction instrument was developed and piloted prior to the commencement of fieldwork at each facility.

The programme review was conducted over 8 months (May 2007–January 2008) by the principal investigator (PI) and two field workers. First, antenatal booking data were extracted from site-specific HIV VCT registers on all women booking for pregnancy care in 2005. At each MOU, the folder number, name, age and HIV status with CD4 count where applicable, was extracted for every woman who booked during pregnancy in 2005. Missing information on demographic variables, HIV status and CD4 count for each observation, was followed up using a data extract supplied by the National Health Laboratory Services (NHLS).

Following this, a subset of HIV-positive observations with a CD4 count ≤ 200 cells/µl was identified as the proportion of HAART-eligible women in the sample, to be followed up in the cascade. Delivery dates and perinatal child outcomes were extracted for this subset from a variety of sources, which included, where possible, the electronic obstetric patient information system (CRADLE) for information on deliveries and births, in conjunction with other patient registration systems, to link mothers to children. Folder numbers which had been obtained from the VCT registers were used to recover antenatal patient folders of those who were not found on CRADLE. An extensive search for folders was undertaken at the four antenatal sites and their adjoining storage facilities. Folders of antenatal and peripartum referrals to secondary and tertiary care were followed up at Mowbray Maternity Hospital, New Somerset Hospital and Groote Schuur Hospital. While conducting this review, field workers and the PI also traced the folders of observations where information from the VCT registers had been incomplete. Over 80% of folders of HAART-eligible women were recovered.

Western Cape PMTCT guidelines stipulate that all HIV-infected women should be given AZT from 28 weeks gestation and, where possible, such information on AZT dispensing was extracted from patient folders. Information on ARV prophylaxis during labour was obtained from PMTCT Labour Ward registers.

Completion of a referral for HAART was defined for each observation as evidence of at least one visit to a HAART service in pregnancy. Successful HAART initiation was defined as evidence from a patient folder or other source, such as a data base, of initiating HAART in pregnancy, or evidence of being on HAART at delivery, as stipulated in the PMTCT labour ward register. Information on HAART referral and initiation was traced at the four referral ARV sites using existing patient data bases, which were made available by clinic management. While the folder review was underway, the PMTCT Labour Ward register was consulted at each site to ascertain whether women were on ART during delivery. The birth register was used to trace residual missing delivery information where possible.

Through the folder review, it became clear that some women accessed a broader range of Cape Town ARV services than the four ARV sites assumed at the outset of the study. Between January and February 2008, field work was extended to encompass further ARV sites in order to minimize loss to follow-up, but was put on hold pending PGWC approval. Approval was granted in early April 2008. The extension of the study was also supported by Absolute Return for Kids (ARK), who assisted with follow-up of missing HAART referral and initiation data from 23 clinics with their data base. In total, 31 ARV facilities in the greater Cape Town area were surveyed.

3.4.2 Patient interviews

In-depth semi-structured interviews were undertaken with HIV-positive HAART-eligible or HAART-initiated pregnant or postpartum women who were attending health care services at the time of the study. A sample of 29 patients who were attending the four designated antenatal sites or their adjoining ARV services was recruited. Interviews were undertaken between August and October 2007.

The PI worked with clinic staff to identify and recruit eligible participants. Patients were considered to be suitable for inclusion if they were pregnant or <6 months postpartum, and if they had either initiated HAART in their current or most recent pregnancy; or if they were deemed HAART-eligible in pregnancy, but had not initiated treatment. Convenience sampling was used, and participants were selected through purposive and snowball methods. The sample represented a 60/40 distribution of pregnant and postpartum women from all four antenatal services and their ARV referral sites (Table 3 and Table 4). Interviews were digitally recorded and transcribed verbatim. Transcripts were translated into English by a translator and a linguist to ensure congruence in thematic interpretation.

Table 3: Women interviewed at the study sites

Distribution by antenatal or ARV service	Pregnant	Postpartum
Gugulethu MOU/Hannan Crusaid	7	2
Vanguard CHC/Langa CHC	4	4
Khayelitsha Site B MOU	4	1
False Bay Hospital/Masiphumelele	4	3

Table 4: Profile of participants interviewed

Number of participants included (N)	29
Number pregnant	18
Number postpartum	11
Number initiated HAART in pregnancy	26
Number not on HAART in pregnancy	3
Mean age in years	26 (SD 4.96)
Median CD4 count at interview	146 cells/µl (range 46–318 cells/µl)

3.4.3 Service provider interviews

In order to ascertain service provider perspectives on approaches to antenatal and ARV treatment for pregnant women, 21 in-depth, semi-structured interviews were conducted among health care providers. Participants were recruited using purposive methods from all levels of service provision at the designated antenatal facilities, their secondary and tertiary obstetric referral hospitals and ARV treatment services (Table 5 overleaf). Of all health care providers who were approached, two declined to be interviewed. All interviews were digitally recorded in English, and transcribed verbatim for analysis.

3.5 Data capture and quality control

Quality control checks were performed during data collection on 50% of all data extraction forms. In addition, 100% of information on all HIV-seropositive bookings was checked against

VCT register information while field workers were still on site, to ensure data integrity, accuracy and completeness. Data were captured and stored in a data base using Microsoft Access software (2003). To ensure confidentiality of the data, the same two assistants who had extracted the data in the field were utilized for data entry.

Single data entry methods were used and quality control checks were run on 25% of the data from each site early in the data entry process, to identify systematic errors or omissions related to capture. Final quality control checks were carried out on a random 10% of the data set once data entry was complete. Data capture on the subset of HAART-eligible observations was subjected to 100% quality control measures.

The data were screened for errors and data anomalies were detected through the generation of filters and queries. First, outliers were isolated by generating predefined exceptions lists. Further exceptions lists of mismatching and implausible observations were created and individually checked by revisiting data sources.

Table 5: Profile of service providers interviewed

Number of participants (N)	**21**
Category of service provider	
Midwife/CPN	5
Obstetrician	3
Paediatrician	1
PMTCT counsellor	1
HIV/MTCT nurse	3
HIV doctor	5
Unit manager (MOU/ARV)	3
Mean time worked as a service provider in years	18.2 (SD 8.3)
Mean time in current position in years	6.1 (SD 4.9)

3.6 Data analysis

Quantitative data were analysed using STATA Release 9 statistical software (STATACorp, College Station, USA). The data were programmed and coded into a series of proportions which reflected the stages of the PMTCT cascade. Qualitative data collected in the participant and health care provider interviews were coded with ATLAS.ti V5.0 software (Scientific Software Development, Berlin, Germany), and then codes and salient themes were analysed using grounded theory methodology.

4. RESULTS

4.1 Programme review

4.1.1 Antenatal booking

A total of 14 987 women booked at the four antenatal sites in 2005. This total is very close to estimates from the City of Cape Town aggregated antenatal booking data (28) from the same year (Table 6).

Table 6: Total number of antenatal bookings at each study site, 2005

Site	Study bookings	%	City bookings	%
Vanguard	4 468	29.8	4 455	29.8
False Bay Hospital	913	6.1	748*	5.0
Gugulethu MOU	4 783	31.9	4 911	32.9
Khayelitsha (Site B) MOU	4 823	32.2	4 811	32.2
Total	14 987	100.0	14 925	100

*(data from January & February 2005 missing)

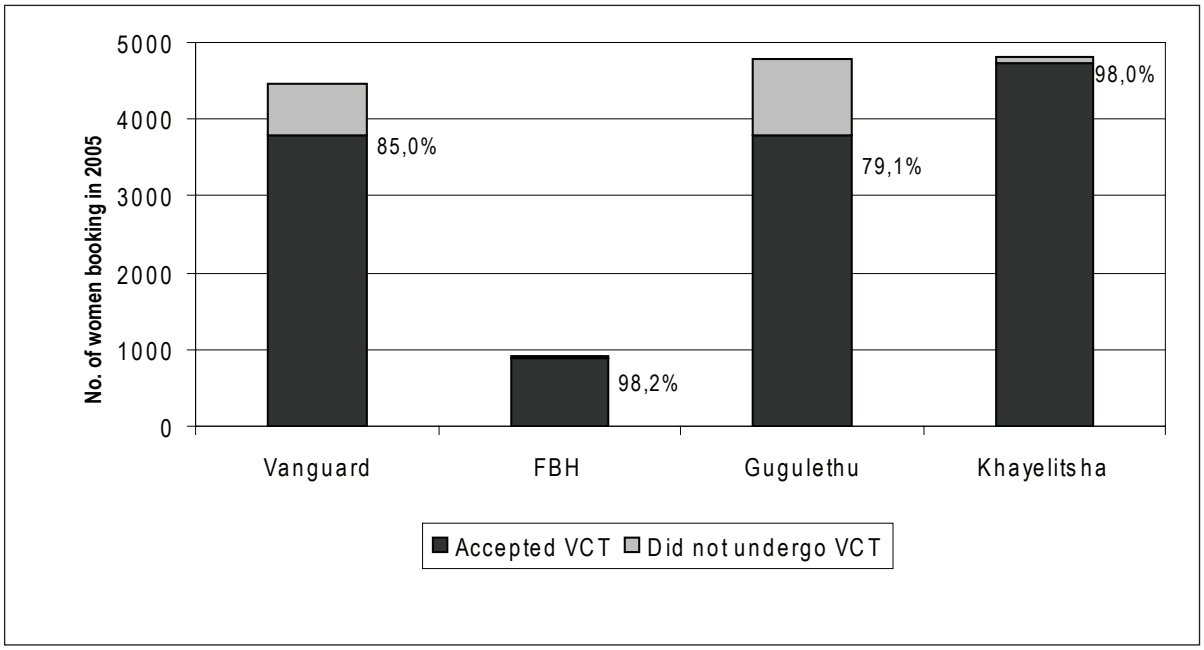
4.1.2 Proportion of women accepting VCT

In 2005, 88% of women accepted VCT at the four antenatal sites (Table 7 and Figure 3 below). VCT coverage was highest at Khayelitsha Site B MOU and False Bay, where uptake was 98% at both sites, while at Vanguard CHC, coverage was 85%. At Gugulethu MOU, 79% of women accepted VCT in 2005 (Figure 3).

Table 7: Overall VCT coverage

VCT Coverage	N	%
N	14 987	100
Not tested	1 751	12
Not offered a test	28	0
Tested	13 208	88

Figure 3: Site-specific VCT uptake from all bookings



Note: % figures adjacent to each bar indicate VCT coverage

4.1.3 Proportion of women testing HIV-positive

HIV prevalence among women who accepted VCT at the four antenatal services was 26% in 2005 (Figure 4). Khayelitsha Site B had the highest HIV prevalence of 30%. Gugulethu MOU data showed HIV prevalence of 28% among those who accepted VCT. At Vanguard CHC, 23% of pregnant women who tested for HIV were seropositive (Figure 5).

Figure 4: HIV prevalence and CD4 thresholds among women who accepted VCT

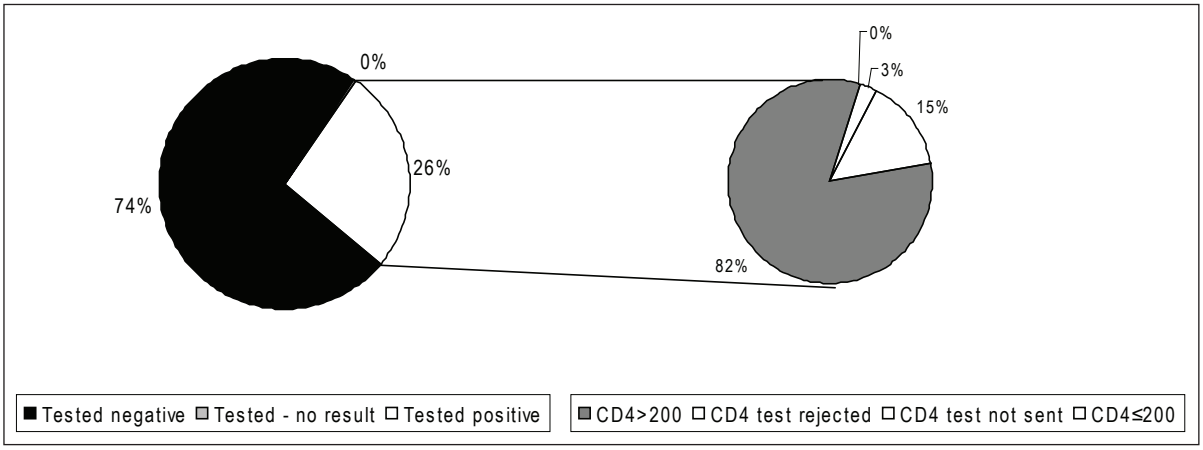
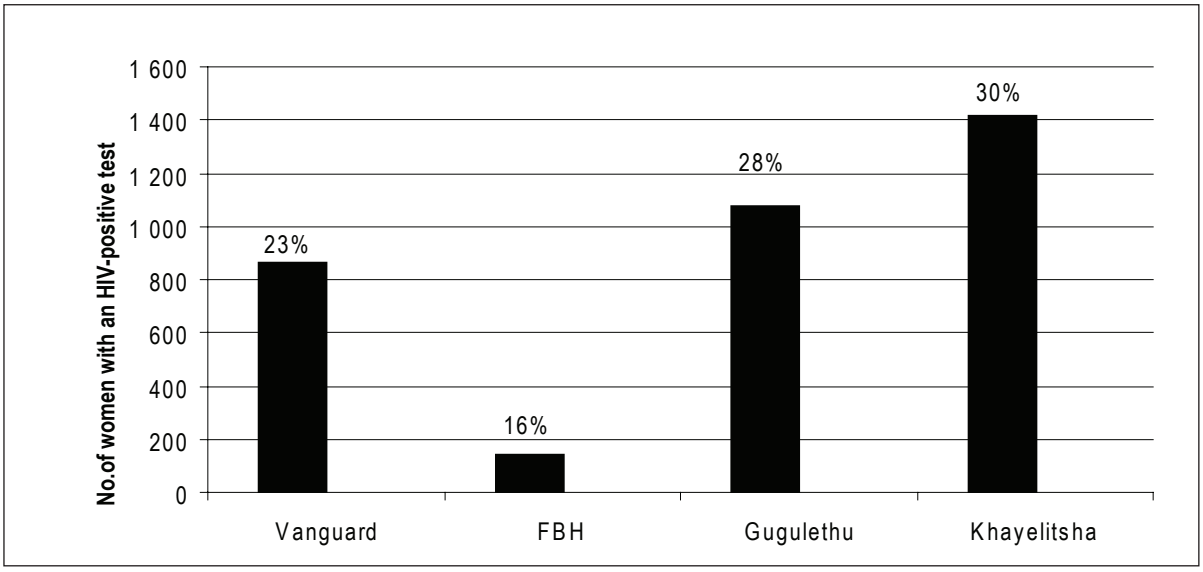


Figure 5: Site-specific HIV prevalence among women who accepted VCT



Note: % figures above each bar indicate site HIV prevalence

4.1.4 Proportion of pregnant women eligible for HAART

Data from facility registers, patient folders and the NHLS show that 97% of HIV-infected women were successfully screened for a CD4 count (Figure 6 below). Data extracted from the PMTCT VCT register showed that 15% of all CD4 count results were not recorded. While these 15% were traced from NHLS data and found to be in most cases recorded in patient folders, lost CD4 data in the registers could point to a lack of systematic record keeping.

Table 8 below shows that 82% of women who accepted VCT and had a seropositive result, had a CD4 >200 cells/µl, and were eligible for short-course prophylaxis. Table 9 below shows the

breakdown of CD4 count thresholds. Out of all those who tested positive, a total of 15% of all seropositive women had CD4 counts of ≤200 cells/µl, and were eligible for referral to HAART care (Figure 6 below). Just under 30% of all women who had a positive test, had a CD4 count within the range of 201–350 cells/µl, and just over half of all women who tested positive had a CD4 count >351 cells/µl (Table 9).

Figure 6: The PMTCT cascade combined for all sites

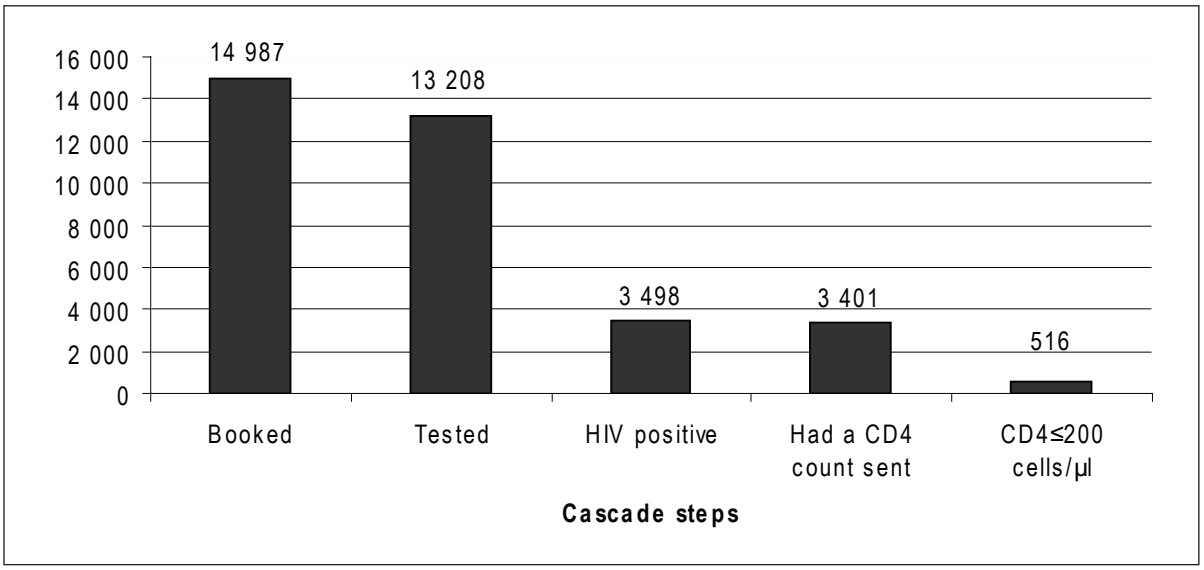


Table 8: Site-specific HIV prevalence and status of CD4 count

	Tested positive	CD4>200	CD4 test rejected	CD4 test not sent	CD4 ≤200
All sites	3 498	2 885	4	93	516
%		82	0	3	15
Vanguard	862	735	0	18	109
%	23	85	0	2	13
FBH	145	123	0	1	21
%	16	85	0	1	14
Gugulethu	1 076	4	2	42	159
%	26	81	0	4	15
Khayelitsha	1 415	1 154	2	32	227
%	30	82	0	2	16

Table 9: All sites: distribution of CD4 count thresholds

CD4 count (cells/µl)	% of all positive tests	Cumulative frequency
0–200	15.15	15.15
201–350	28.96	44.11
351 or more	55.89	100
Total	100.00	

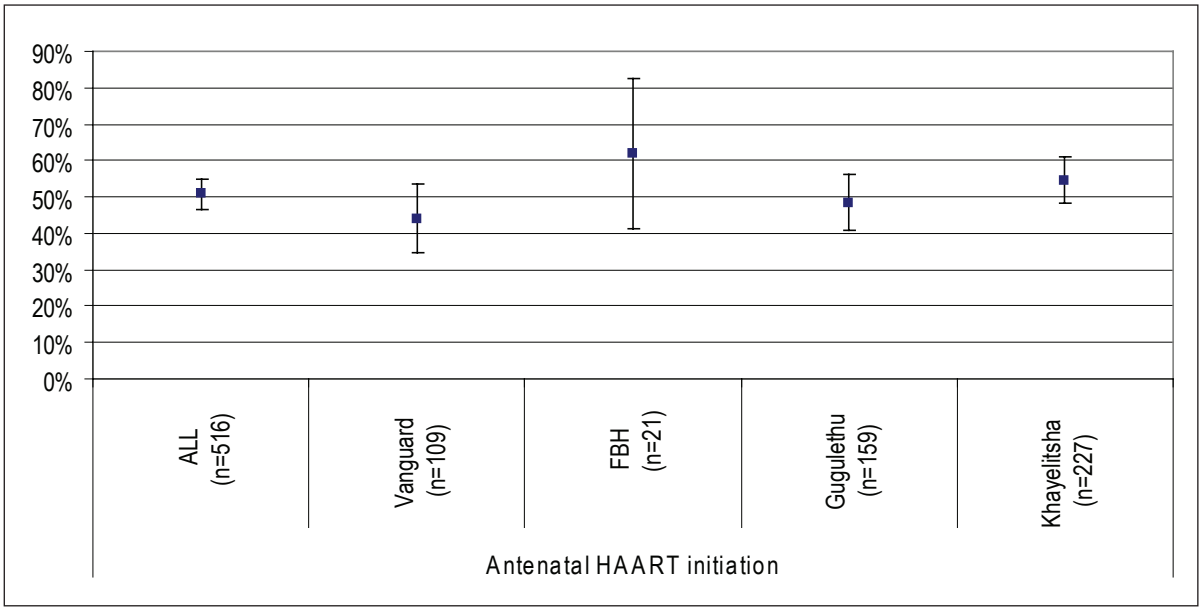
4.1.5 Proportion of women completing HAART referral

Of the 516 women eligible for HAART, 60% (n=309) were noted to have completed a referral for HAART, defined as being referred to and attending a HAART clinic at least once, in the distal and proximal models, or attending the weekly outreach visit in the integrated model. Yet approximately 24% (n= 76) of these women who registered with an ARV service did not go on to initiate HAART pre-delivery.

4.1.6 Proportion of women successfully initiating antenatal HAART

Evidence of HAART initiation before delivery, or being on HAART at the time of delivery, was found for 51% of all women who were eligible in pregnancy. Site-specific initiation percentages in Figure 7 and Table 10 reveal little difference between the models, with the integrated service model at Khayelitsha Site B faring best at 55%. Results from False Bay Hospital indicated that 62% of women were on HAART by delivery (Table 10). This site exemplified the distal model in 2005, and when in combination with Vanguard CHC results, overall successful initiation was 47% for this model (Figure 8). The proximal model, exemplified by Gugulethu MOU and Hannan Crusaid ARV Clinic, showed that 48% of women eligible for HAART initiated before delivery (Table 10 and Figure 8).

Figure 7: Percentage uptake of antenatal HAART in eligible women

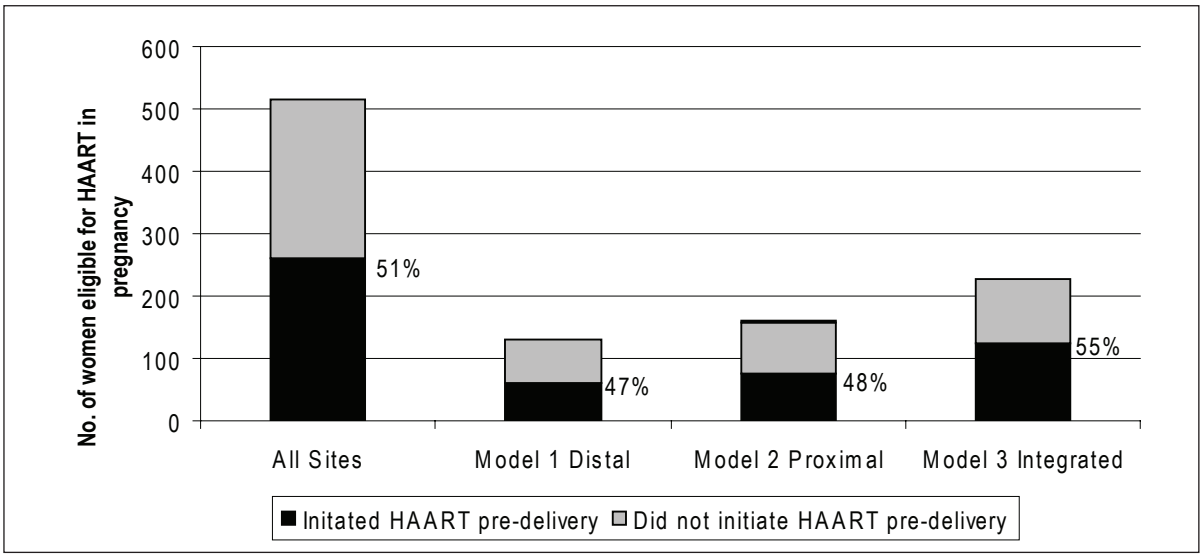


Note: The width of the error bars corresponds to sample size and hence the variance of the estimate.

Table 10: Site-specific HAART eligibility and antenatal initiation

	No. Eligible	Antenatal HAART	%	95% CI
ALL	516	262	51	46–55
Vanguard	109	48	44	35–54
FBH	21	13	62	38–82
Gugulethu	159	77	48	40–56
Khayelitsha	227	124	55	48–61

Figure 8: Model-specific antenatal HAART initiation

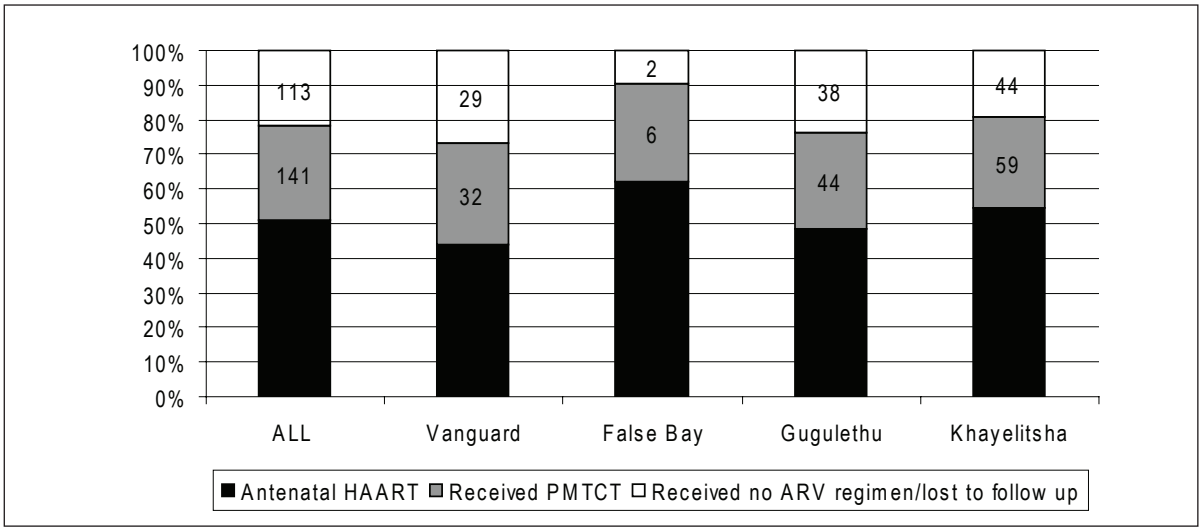


Note: % figures adjacent to each bar indicate HAART initiation

4.1.7 PMTCT uptake in HAART-eligible women

Of those who did not initiate treatment, evidence of PMTCT prophylaxis in the form of records of AZT dispensed or antiretroviral prophylaxis given in labour was found for a further 27% of pregnant women who were eligible for HAART, as shown in Figure 9 below. A further 4% of women were confirmed as receiving no form of antiretroviral treatment, and 18% had no record of receiving any intervention.

Figure 9: Treatment status by site



Note: Numbers in the stacked bars represent number of women classified by treatment status

4.1.8 Postpartum referral for HAART

31% of women who were eligible for HAART, but only received a short-course PMTCT intervention, went on to initiate treatment postpartum. Of all women with CD4<200 cells/µl who had not received any form of treatment in pregnancy, 38% initiated HAART postpartum.

4.1.9 Gestational age at booking among women with CD4<200

Information on gestational age was available for 80% (n=414) of the HAART-eligible cohort. Median gestational age at booking among HAART-eligible women was 26 weeks. Within this group, the median gestational age at booking for all eligible women who did not initiate HAART was 29 weeks, and the median gestational age at booking for women who successfully initiated HAART before delivery was 24 weeks. The median gestational age at treatment initiation was 32 weeks (Table 11).

Table 11: Median gestation age at booking and HAART initiation in eligible women

Median Gestational Age	ALL	IQR	On HAART	IQR	Not on HAART	IQR
At booking	26 weeks	(21–31 weeks)	24 weeks	(19–28 weeks)	29 weeks	(24.5–35 weeks)
At treatment initiation			32 weeks	(28–36 weeks)		

Less than 2% of HAART-eligible women had booked for antenatal care by the end of their first trimester and less than 25% had booked by 20 weeks. Furthermore, 79% of the HAART-eligible cohort had booked by 32 weeks. 88% of these women had booked by 35 weeks, which would allow for approximately three weeks therapy, given that median gestational age at delivery was 39 weeks (Table 12).

Table 12: Gestational age at booking among HAART-eligible women

Gestational age (weeks)	Cumulative frequency (%)
12 weeks	1.9
20 weeks	23.2
28 weeks	62.6
32 weeks	79.5
35 weeks	88.6
38 weeks	96.4

4.2 Service and patient-related factors influencing antenatal HAART initiation

Two major themes from the qualitative analysis arose among clients and service providers as contributory factors to failed HAART initiation in pregnancy. First, women struggle to deal with a positive test result in pregnancy, and second, women fear treatment initiation.

4.2.1 Motivation for testing and dealing with a seropositive result

Respondents contended that prior to pregnancy, they had felt no need to test for HIV, because they either had no reason to believe that they had been exposed or were at risk, or if they had felt they were at risk, they believed that an HIV test would be too stressful or frightening to undergo. For the few who had tested prior to pregnancy, the motivation to test stemmed from a suspicion of infection, brought about by signs and symptoms of disease. One woman who had not tested before pregnancy noted:

I knew there is AIDS, but I never thought deeply about it … I never thought that I might be infected … There was no need to test. I was not sick – there were no symptoms. I never thought that I could march into the clinic saying I'm here for testing.

Few women had prior knowledge of their positive serostatus. They suggested that becoming pregnant had changed their attitude from one of denial of a previously HIV-positive test result to acceptance of infection.

I realized I have to accept it, and follow it up, because they explained to me – when they tested me when I was pregnant – that, 'We can protect you and your child here inside you so that it comes out healthy' … I will say that it finally dawned on me, or became a reality. Then I realized that I had to follow it up.

Women reflected that the primary motive for testing in pregnancy was to know their serostatus in order to protect their unborn children. Providers agreed that women sensed a large burden of responsibility towards their children, which took precedence over the desire to know their status for the benefit of their own health. One provider noted:

Most women do test in pregnancy … Most women will test for their baby, it's an automatic thing. On some level, it's a responsibility for most women. In the last 6 months I don't think I've had any refusals. Obviously, when they get counselled, they have then the choice to refuse. But most take up the VCT. Even if they're positive – they might not take up whatever we offer, but most of them actually test.

Test results were met with reactions of shock, disbelief and confusion by most women. The majority of women said that they did not expect the result to be positive. One woman suggested that she thought of going to test elsewhere, another mentioned that she blacked out. Others felt that they had been betrayed by a partner. A woman noted:

I was shocked and all sorts of things entered my mind – 'Why? Which? Who?' … Maybe it was because I was angry, and I had never thought this could happen to me. Because I had only been careless once, and that one time had cost me my whole lifetime.

The majority of women who were interviewed had worked through their initial responses to a seropositive status, and they had come to terms with being HIV-positive. They mentioned the importance of acceptance of their status – it made treatment initiation easier and resulted in a less 'stressful' life. Women who found it difficult to accept their status attributed their feelings to the absence of visible signs and symptoms, and believed that if they could see evidence of illness such as a rash or diarrhoea, it would be easier for them to believe that they were ill.

Denial of illness was an important recurrent theme for providers. They suggested that women who could not accept their status seemed less likely to refer themselves and initiate HAART in pregnancy. They felt that the impact of a positive test result in pregnancy, combined with the news of advanced stage disease, which required swift work-up to life-long therapy, was too much for some women to manage. Providers empathized with their patients, saying that there were too many issues a woman had to deal with at once:

It's denial, because if they are in denial, they don't accept that they are sick or that they must take this kind of test while pregnant. Secondly, when the counsellors counsel them – they tell them, 'If your CD4

count is less than 200, then you'll have to start the ARVs' – and that it is for life, and then they say, 'For life?' They cannot take treatment for life. So they would rather not start the ARVs, if they have to take them for life, so they don't come back.

Many women reflected that it had not been problematic to disclose their status. However, their thoughts about disclosure varied according to whom they disclosed, and at what point after testing they decided to disclose. Most respondents preferred to wait between a week and a month to tell someone. Some mentioned that they waited until they had no option but to disclose in order to start treatment. Some would return for an antenatal follow-up and say that they had not found some one to disclose to, or that they were not ready to disclose. Women suggested that it was difficult to speak about their status as they could not anticipate the reaction they would receive. Some were frightened that they would be 'cursed' by their partner or their family, or that the person they chose to tell would be 'disgusted' and unsupportive, or spread information about their status.

On the whole, women seemed to feel more comfortable telling a female friend or relative. Married women or women in a long-term relationship were more likely to tell their husbands or partners, although fear of abandonment was a recurrent theme for most women. Providers, too, mentioned that the fear of being left by the father of the child was a challenge to disclosure. Often this impeded a woman in finding a treatment supporter, which posed as a barrier to swift initiation at services where treatment supporters were a requirement. One provider noted:

Disclosure is a huge problem, it's a huge problem – the only problem usually that keeps them from not accessing ARVs. Because when they come, the counsellors tell them, 'Please bring a treatment partner.' Usually the treatment buddy is a partner and then we lose them … they don't come back … They don't start because of a treatment buddy problem.

4.2.2 Fear of initiating HAART

The fear associated with HAART regimen side effects was raised as a crucial factor which delayed or prevented treatment initiation. Negative media coverage, such as radio chat shows which canvassed public opinion concerning HIV treatment, had the potential to cast doubt on the safety of HAART. Women reflected that before initiating treatment, they had feared that it would affect their unborn children. Providers mentioned that often patients refused treatment and preferred to seek alternatives from religious sources. Based on these fears, service providers suggested that women would keep their referral letters for several weeks before approaching the ARV service.

Providers also felt that some women found it difficult to start treatment, because they were still dealing with the fact that they were HIV-positive, and that they had a low CD4 count. To have to go onto treatment for life could be too much to contemplate for some. One woman mentioned:

It was difficult. I got home to the house with them and I had to start them. I had never taken any [pills] before that day, it had been my way. I am not a person who takes things hard, but that I realized … yhuu!! I have been very scared to take pills for my whole life – yhu!!! What would I be doing to myself if I didn't take them? I had to take them because I am thinking about that person I am [carrying] – so then I just started them. No, now I just take them.

5. DISCUSSION

5.1 ART initiation in pregnancy

This study shows that of all women known by the services to be eligible for HAART in pregnancy during 2005, 51% successfully initiated treatment. Taking into account missed opportunities to identify eligible women through the initial steps of the PMTCT cascade – particularly with less than 100% VCT coverage in 2005 – we estimate that 44% of women eligible for HAART in pregnancy started HAART in the same year. Successful referral and HAART initiation during pregnancy appears sub-optimal in these data, compromising PMTCT outcomes for both mothers and children. Interestingly, the proportion of women starting HAART antenatally did not differ by the model of care. Conceptually, integrated service delivery may be the preferred service model as a 'one-stop shop', but this study suggests integrated antenatal care and HAART services may still encounter service-related barriers that impede rapid HAART initiation.

Factors that limited access to HAART were observed in each model. First, in the integrated model, the availability of ARV clinicians only once per week was reported by service providers to result in women losing up to three weeks of missed appointments during pregnancy, before being able to access an ARV doctor. Second, a weakness of the proximal model is that while the home-based peer counselling has been shown to be highly effective in treatment adherence (29), the stringent clinic inclusion criteria based on area of residence, leads to some women who are referred from the antenatal service 130m away, being turned down because they reside outside of the area. This can lead to further delays in treatment initiation, or failure to initiate treatment before delivery. Finally, while an open-door policy was exercised in the distal model, HAART initiation was impeded by the imperative for women to bring a treatment supporter to the clinic by the third work-up session. Women who may already find it difficult to come to terms with the diagnosis in pregnancy, may be at increased risk of loss to follow-up in cases where disclosure and sourcing a treatment supporter is challenging.

While just over half of eligible women initiated HAART in pregnancy, only a small additional proportion of these women with the highest risk of transmitting HIV received a standard two-drug ARV regimen during the antenatal period. It was evident that some women were resistant to starting medication during pregnancy, for fear of adverse effects to themselves or their unborn children.

Other patient-related challenges to service uptake included acceptance of an HIV-positive test result. In general pregnant women who are offered VCT at an antenatal facility often have not previously considered themselves to be at risk of HIV infection. Having not experienced any signs and symptoms of disease, these women underwent HIV testing, motivated by its potential benefit to their unborn children rather than to themselves. Hence a seropositive result in the context of antenatal care could be more traumatic than the same result rendered in the context of an HIV service, where clients refer themselves for a test, based on a suspicion of infection.

Furthermore completing a referral to an ARV service can be hindered by delayed psychological responses to VCT and failure to get across to the ARV site timeously. As has been described by service providers interviewed in this study, the 'fast-tracking' of pregnant women for HAART can take up to one week at some services, however, patient-related barriers such as denial and finding a treatment partner; coming to terms with the notion of lifelong treatment, and fear of regimen side effects in combination with pregnancy itself, may impede such interventions. Such psychosocial issues proved to have more bearing than the hypothesized logistical challenges associated with the different models and access to health services in this study.

5.2 Booking for antenatal care

Results from the data show that women book late into the second trimester of pregnancy (median gestational age at booking was 26 weeks and was later among women who failed to initiate HAART antenatally). Reasons for late booking from the qualitative results included intrinsic attitudes towards pregnancy: that a woman would only consider booking for antenatal care once she was showing the physical attributes of pregnancy. Migration from the Eastern Cape late in the second trimester to give birth in Cape Town was also a common theme. Late booking has important implications for successful HAART initiation, because it limits the time allowed for a woman to accept the diagnosis; to refer for HAART; and to begin treatment work-up. In that a CD4 result can take a further two weeks to be returned, a pregnant woman may only discover that she is eligible for HAART by 28 or 30 weeks gestation.

The results of this study show that women who did not start HAART booked later in pregnancy than those who did start HAART. The median gestational age at booking of a pregnant woman who did not start HAART before delivery was 29 weeks. Evidence from resource rich settings has shown that at least 4.4 weeks of NVP-based HAART was required in ART-naïve, eligible pregnant women of West African origin to achieve an undetectable viral load by delivery (30). These latter results underscore the importance of early booking in pregnancy to optimize HAART effectiveness.

5.3 Voluntary counselling and testing

Voluntary counselling and testing at the antenatal study sites was being implemented successfully in 2005. Provincial level data on VCT for all antenatal facilities, including urban and rural sites, show an increase from 86% in 2003 to 96% in 2004 (20). This study noted an 88% uptake rate of VCT across the clinics for 2005, which falls within the expected range. Supporting evidence from patient interviews suggests that women had a satisfactory experience of VCT services in the MOUs, and they were content with the nature and quality of the counselling they received. Most women suggested that counsellors played an important role in preparing them for the test, and that counsellors were compassionate and containing when they delivered the test results.

From this study, three key factors separately or in combination, seemed to influence VCT uptake in the sites under observation. First, the position of the VCT room in relation to the general waiting area of the facility impacted on client privacy and could influence a woman's comfort in accepting VCT. At sites where counsellors' rooms opened on to the waiting area, service providers and respondents alike felt that fellow clients were searching for giveaway emotional responses when they emerged from testing. Second, the attitude of staff potentially influenced VCT uptake. At sites where testing was promoted as an opt-out activity, uptake rates were observed to be higher. Third, high patient volume was reported to impact on the quality of counselling offered, where service providers felt that the inadequate time spent with women post-test was correlated with subsequent loss to follow-up in pregnancy.

5.4 HIV screening and follow-up

The use of rapid point of care HIV tests and routine CD4 count testing was working optimally in 2005, with only 3% of seropositive pregnant women missing CD4 testing. An error of this type, however, can lead to women not being correctly identified as HAART eligible, resulting in programme failure.

Furthermore, while the turnaround time on CD4 results is within one week, antenatal services were more likely wait until the next follow-up appointment to act upon them. For women in

late stages of pregnancy, who were more likely to return for follow-up sooner than those who booked earlier in pregnancy, this was advantageous as they would receive their results sooner than those of earlier gestational age. Hence advanced gestational age and closely spaced follow-up visits benefited the fast-tracking system in place for late booking. However, the antenatal appointment system fails to take cognizance of the fact that all HIV-infected pregnant women who are eligible for HAART may benefit from an increased time frame for HAART work-up.

6. LIMITATIONS

These data should be interpreted in light of several limitations. One major challenge was the follow-up of patients based on medical records kept across different health care services. For instance an HIV-positive woman who initiated ART could access up to a combination of three distinct primary, secondary or tertiary obstetric care facilities alone, as well as separate ARV services.

While great effort was expended in attempting to trace women to the most likely services, information on antenatal HAART initiation was not found on 18% of eligible women, due to lost folders and incomplete clinical records. Another limitation of this research is that the results are based on 2005 data, which – by reflecting the initial roll out of HAART in services – may embody more of the early 'teething' problems than the recent improvements in service delivery. Thus, while these results cannot be taken to reflect the current state of services, they do highlight the significant hurdles facing health care services and HIV-infected women starting HAART antenatally.

This research focused on three models of care, each of which demonstrated unique and contrasting elements of service provision. Hence the results of this study may not be generalizable to all South African ARV services. Further research is needed to ascertain how models of care impact on HAART initiation and retention in care.

In addition, for the qualitative study selection bias could potentially skew the supporting qualitative results of this study due to the characteristics of the patients interviewed. While the PI succeeded in interviewing women who had started HAART in pregnancy, or those who had not started HAART in pregnancy but were eligible for treatment, only women who were part of the health system were found. These women could be seen to have been self-selected into the study, and HAART-eligible women who may have left the antenatal service and who did not make it to an ARV site due to denial or other reasons already discussed, could not be traced.

7. RECOMMENDATIONS

Based on these results, a number of interventions are possible to (1) optimize the identification of HIV-infected women early in pregnancy, (2) identify those women in need of ART, and (3) start ART rapidly and effectively to promote maternal and child health.

7.1 Antenatal booking and VCT

- Promote pre-pregnancy VCT with interventions that aid pre-pregnancy diagnosis of HIV in all women of reproductive age, so that women enter antenatal services aware of their serostatus, and where applicable, already on ARV treatment.
- Promote awareness of PMTCT outside of the antenatal setting to ensure that HIV-infected women are aware of the benefits of early pregnancy booking before becoming pregnant.

- Introduce point of care CD4 count testing to aid fast-tracking of HAART-eligible clients, the potential disadvantage being that a woman eligible for HAART may experience increased emotional stress when it is indicated to her that she requires lifelong treatment, before she has had sufficient time to come to terms with the diagnosis. Alternatively, make provision for all HIV-infected women to return for follow-up within a week of booking to get their CD4 results.
- Make pregnancy tests free at all services to encourage earlier diagnosis, and promote earlier booking.

7.2 Psychosocial support

- Increase awareness of pregnancy and HIV as a 'dual condition' for a woman that requires special attention from the health care services. Provide adequate resources such as increased post-test counselling; access to patient advocates as well as support groups and social networks for women who test in pregnancy, to counter potential loss to follow-up in pregnant HIV-infected women.
- Enhance partner support and ease of disclosure through family-based care approaches in the antenatal and HAART services.

7.3 Testing and follow-up

- Decrease the follow-up time for return of results in all HIV-positive women, regardless of gestational age.
- Invest in clinical record keeping training to ensure the systematic, standardized recording of patient serostatus, CD4 counts and treatment regimens.
- Place measures that ensure the follow-up of all blood test results for HIV-infected pregnant women, including CD4 counts and Hb levels.

7.4 Model specific changes

- Integration of HAART services should be prioritized in antenatal services; however, where this is not feasible specific models should work towards intensifying follow-up of patients. This could be achieved through a series of steps, including:
  1. Regular antenatal service providers ensuring same day services for all women receiving CD4 counts that make them eligible for HAART
  2. Active tracing of pregnant women who are eligible for HAART to ensure that they complete referrals for HIV treatment
- The feasibility of the integrated model has been demonstrated in this setting, with the use of outreach doctors, and the potential for expanding the roles of PMTCT service providers to incorporate the dispensing of HAART in the antenatal service should be explored.
- The choice of a safe, low side effect regimen may allay the associated fears of treatment initiation among women.

7.5 Improved surveillance for HAART initiation and continued ARV care

- Strengthen district monitoring systems to enable the surveillance of HAART-eligible women, based on clinic and laboratory information systems.
- There is a need for continuous systematic audits of services for HAART initiation proportions based on representative samples of patients with low CD4 counts who have been identified through the laboratory information system.

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APPENDIX 1: The PMTCT cascade – all sites

VCT UPTAKE AND HIV PREVALENCE	Subtotal		
N	14 987	100%	
Not tested	1 751		12%
Not offered a test	28		0%
Tested	13 208	88%	
Tested negative	9 694		73%
Tested, but had no result	16		0%
Tested positive	3 498	26%	
CD4 > 200	2 885		82%
CD4 test rejected	4		0%
CD4 test not sent	93		3%
CD4 ≤ 200	516		15%
HAART UPTAKE			
HAART-eligible women	516	15%	
Antenatal HAART initiation & PMTCT interventions			
Received PMTCT, or were recorded as receiving ARVs in labour	141		27%
Received no intervention either before or during delivery	21		4%
True loss to follow-up (missing data from booking onwards)	92		18%
Initiated prenatal HAART or were on HAART at delivery	262		51%
Postpartum HAART initiation			
Received PMTCT and initiated HAART postpartum	44	31%	
Received no intervention pre-delivery, but initiated HAART postpartum	8	38%	
Loss to follow-up ito antenatal care and delivery, but initiated HAART postpartum	9	10%	
Summary – All Sites			
88% of women accepted VCT 73% of women who accepted VCT, tested negative 26% of women who accepted VCT, tested positive 82% of women who accepted VCT and tested positive, had a CD4 count> 200 cells/μL 15% of all women who accepted VCT and tested positive had a CD4 count < 200 cells/μL 27% of all women who were eligible for HAART did not initiate, but received some PMTCT (antenatal/intrapartum) 4% of all women eligible for HAART did not receive any form of intervention 18% of HAART-eligible women had no data on antenatal initiation or delivery **51% of all women who were eligible for HAART initiated before delivery, or were recorded to be on HAART at delivery** 31% of women who got PMTCT in pregnancy and/or during delivery went on to initiate HAART postpartum 38% of women who did not receive any intervention in pregnancy or during delivery went on to initiate HAART postpartum 10% of women who were lost to follow-up ito any information on PMTCT or HAART, went on to initiate HAART postpartum			

APPENDIX 2: The PMTCT cascade: Model 1a Vanguard CHC – Langa CHC

VCT UPTAKE AND HIV PREVALENCE	Subtotal		
N	4 468	100%	
Not tested		649	15%
Not offered a test		19	0%
Tested	3 800	85%	
Tested negative		2 934	77%
Tested, but had no result		4	0%
Tested positive	862	23%	
CD4 > 200		735	85%
CD4 test rejected		0	0%
CD4 test not sent		18	2%
CD4 ≤ 200		109	13%
HAART UPTAKE			
HAART-eligible women	109	13%	
Antenatal HAART initiation & PMTCT interventions			
Received PMTCT, or were recorded as receiving ARVs in labour		32	29%
Received no intervention either before or during delivery		5	5%
True loss to follow-up (missing data from booking onwards)		24	22%
Initiated prenatal HAART or were on HAART at delivery		48	44%
Postpartum HAART initiation			
Received PMTCT and initiated HAART postpartum	6	19%	
Received no intervention pre-delivery, but initiated HAART postpartum	0	0%	
Loss to follow-up ito antenatal care and delivery, but initiated HAART postpartum	2	8%	

APPENDIX 3: The PMTCT cascade: Model 1b False Bay Hospital – Masiphumelele Clinic

VCT UPTAKE AND HIV PREVALENCE	Subtotal		
N	913	100%	
Not tested	16		2%
Not offered a test	0		0%
Tested	897	98%	
Tested negative	752		84%
Tested, but had no result	0		0%
Tested positive	145	16%	
CD4 > 200	123		85%
CD4 test rejected	0		0%
CD4 test not sent	1		1%
CD4 ≤ 200	21		14%
HAART UPTAKE			
HAART-eligible women	21	14%	
Antenatal HAART initiation & PMTCT interventions			
Received PMTCT, or were recorded as receiving ARVs in labour	6		29%
Received no intervention either before or during delivery	0		0%
True loss to follow-up (missing data from booking onwards)	2		10%
Initiated prenatal HAART or were on HAART at delivery	13		62%
Postpartum HAART initiation			
Received PMTCT and initiated HAART postpartum	2	33%	
Received no intervention pre-delivery, but initiated HAART postpartum	0	0%	
Loss to follow-up ito antenatal care and delivery, but initiated HAART postpartum	0	0%	

APPENDIX 4: The PMTCT cascade: Model 2 Gugulethu MOU – Hannan Crusaid

VCT UPTAKE AND HIV PREVALENCE	Subtotal		
N	4 783	100%	
Not tested	994		21%
Not offered a test	5		0%
Tested	3 784	79%	
Tested negative	2 701		71%
Tested, but had no result	7		0%
Tested positive	1 076	28%	
CD4 > 200	873		81%
CD4 test rejected	2		0%
CD4 test not sent	42		4%
CD4 ≤ 200	159		15%
HAART UPTAKE			
HAART-eligible women	159	15%	
Antenatal HAART initiation & PMTCT interventions			
Received PMTCT, or were recorded as receiving ARVs in labour	44		28%
Received no intervention either before or during delivery	10		6%
True loss to follow-up (missing data from booking onwards)	28		18%
Initiated prenatal HAART or were on HAART at delivery	77		48%
Postpartum HAART initiation			
Received PMTCT and initiated HAART postpartum	19	43%	
Received no intervention pre-delivery, but initiated HAART postpartum	6	60%	
Loss to follow-up ito antenatal care and delivery, but initiated HAART postpartum	4	14%	

APPENDIX 5: The PMTCT cascade: Model 3 – Khayelitsha Site B MOU

VCT UPTAKE AND HIV PREVALENCE	Subtotal		
N	4 823	100%	
Not tested		92	2%
Not offered a test		4	0%
Tested	4 727	98%	
Tested negative		3 307	70%
Tested, but had no result		5	0%
Tested positive	1 415	30%	
CD4 > 200		1 154	82%
CD4 test rejected		2	0%
CD4 test not sent		32	2%
CD4 ≤ 200		227	16%
HAART UPTAKE			
HAART-eligible women	227	16%	
Antenatal HAART initiation & PMTCT interventions			
Received PMTCT, or were recorded as receiving ARVs in labour		59	26%
Received no intervention either before or during delivery		6	3%
True loss to follow up (missing data from booking onwards)		38	17%
Initiated prenatal HAART or were on HAART at delivery		124	55%
Postpartum HAART initiation			
Received PMTCT and initiated HAART postpartum	17	29%	
Received no intervention pre-delivery, but initiated HAART postpartum	2	33%	
Loss to follow up ito antenatal care and delivery, but initiated HAART postpartum	3	8%	