

## **Barriers and facilitators to combined ART initiation in pregnant women with HIV: lessons learnt from a PMTCT B+ pilot program in Swaziland.**

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**Abstract:****Background:**

In January 2013, Swaziland launched a PMTCT B+ implementation study in rural Shiselweni. We aimed to identify patient and health service determinants of combined antiretroviral therapy (ART) initiation, to help guide national implementation of PMTCT B+.

**Methods:**

This prospective cohort study uses routine data from registers and patient files in the PMTCT B+ pilot zone and a neighbouring health zone where PMTCT A was standard of care. All HIV positive women not on combined ART at first ANC visit between 28/01/2013 and 31/12/2013 were included.

**Results:**

399 women from the PMTCT B+ zone and 183 from the PMTCT A zone are included. The overall proportion of women who had not started an anti-retroviral intervention before 32 weeks gestation was lower in the PMTCT A zone (13% v's 25%,  $p=0.003$ ), yet a higher proportion women with  $CD4 < 350$  initiated combined ART in the PMTCT B+ zone (86% v's 74%,  $p=0.032$ ). Within the PMTCT B+ pilot, initiation rates were highly variable between health facilities; while at patient level, ART initiation was significantly higher among women with  $CD4 < 350$  compared to  $CD4 > 350$  (80% v's 59%,  $p < 0.001$ ). Among women with  $CD4 < 350$ , those recorded as newly diagnosed were more likely to initiate combined ART. Although lower educational level and occupational barriers appeared to hinder combined ART initiation among women with  $CD4 > 350$ , high proportions of missing socio-demographic data made it impossible to make any firm conclusions to this respect.

**Conclusions:**

This study demonstrates challenges in initiating pregnant women on ART, but also identifies opportunities offered by PMTCT B+ for improving treatment initiation among women with lower CD4 counts.

## Introduction

The use of antiretroviral drugs for prevention of mother-to-child transmission of HIV (PMTCT) is a well-established element of HIV programming; several studies have shown that mono or combined therapy is effective in protecting the infant from HIV transmission from the mother; reported transmission rates at 6 months after delivery without PMTCT range from 25 to 40%, compared to rates of 1-8% in PMTCT programs<sup>1-3</sup>. Since 2010, most countries have implemented one of two approaches recommended by the World Health Organization (WHO). See Figure S1 (**Supplemental Digital Content**, <http://links.lww.com/QAI/A628> for a brief description of these approaches.

In April 2012, WHO released a programmatic update which defined a new approach to PMTCT (PMTCT B+), whereby lifelong combined Antiretroviral Therapy (ART) is offered to all pregnant and breastfeeding women with HIV, irrespective of CD4 count or WHO Clinical Stage<sup>4</sup>. This approach is thought to offer a number of advantages: it is operationally simpler (same treatment for everyone, no delay when CD4 testing absent); reduced risk of mortality and disease progression (HIV-related and Hepatitis B) associated with treatment interruptions; reduced risk of mother-to-foetus transmission in the next pregnancy from the moment of conception; and reduced risk of transmission to a sero-negative partner<sup>4-5</sup>. Furthermore it may be beneficial to the health of the mother in the light of emerging evidence on reduced mortality among mothers treated with lifelong ART at CD4 counts above 350<sup>6,7</sup>.

Swaziland has a robust PMTCT programme based on the PMTCT option A approach. Although antenatal HIV prevalence is amongst the highest in the world (37% in 2012)<sup>8</sup>, over 80% of HIV+ pregnant women receive anti-retroviral prophylaxis (Zidovudine) or combined ART<sup>8</sup>. Mother-to-child transmission is low at 6 weeks post-partum (2-3%), although cumulative mother to child transmission rates at 18 months remain high at 12-15%<sup>9</sup>. Challenges of adherence to Nevirapine for the long breastfeeding period (17 months on average), has been suggested as a possible cause<sup>9</sup>. An additional challenge for HIV care for pregnant women in Swaziland was highlighted in the 2012 Annual PMTCT report from 2012, showing that approximately half of the HIV+ pregnant women eligible for lifelong combined ART according to National guidelines (CD4 <350 or WHO stages III/IV) were treated with prophylactic therapy only<sup>11</sup>. Failure to initiate lifelong ART puts these women at increased risk of HIV/AIDS related morbidity and mortality, so there is significant national interest in whether PMTCT B+ can help improve initiation rates among this population. Developing appropriate health messages around PMTCT B+ is particularly challenging, since previous messages declared that if one's CD4 count was greater than 350, one did not need antiretroviral treatment. In Swaziland, Zidovudine is often presented to the patient as not being an antiretroviral therapy<sup>12</sup>. Whether women who were not previously eligible for treatment will initiate combined ART, and what factors influences initiation of combined ART are important questions for health programmers.

In January 2013, Médecins sans Frontières (MSF), in collaboration with the Swaziland National AIDS Programme, implemented PMTCT B+ in one health zone in the Shiselweni region as a pilot program. In light of the pilot and the WHO guidance recommending PMTCT B+ in settings with

high prevalence and high birth rate, the Ministry of Health in Swaziland will roll out PMTCT B+ as national strategy in 2014<sup>10</sup>. This article reports on the early implementation experience of PMTCT B+ in Swaziland, drawing lessons learnt that can guide implementation of this approach nationally, and elsewhere.

## Methods

### Design

Prospective cohort study of women found to be HIV positive (newly diagnosed or known HIV+ status but not already on treatment) at first antenatal care (ANC), in a health zone implementing PMTCT B+, and a neighbouring health zone where PMTCT A is standard of care.

### Setting

Swaziland is a landlocked lower-middle income country in Southern Africa, with a population of 1.2 million and an HIV prevalence among 18-49 year-olds of 31%<sup>13</sup>. This study is carried out in Shiselweni region, which constitutes 25% of the geographical area of the country, and has a relatively poor and rurally located population of 210,000. Every year, approximately 2000 HIV+ pregnant women access ANC in the region<sup>8</sup>. Nearly all health care facilities offering ANC in the region are equipped with point-of-care CD4 (Alere Pima™ CD4) technology.

In January 2013, PMTCT B+ was introduced as a pilot program in Nhlangano, one of three health zones in Shiselweni. This study uses routine data from ANC records in all facilities providing PMTCT B+ in Nhlangano zone, as well as all facilities providing PMTCT A in the neighbouring health zone of Hlathikhulu (9 facilities per health zone). Prophylactic therapy (Zidovudine for mother, Nevirapine for baby) was offered to women refusing combined ART in the PMTCT B+ zone. At the start of the pilot study, same-day initiation of combined ART was not encouraged. However, after 3 months it was noted that median time to ART initiation was well over the one-week target, and a decision was made to adapt the SOPs in favour of same-day initiation for women who were ready. Details of the PMTCT B+ implementation process in Shiselweni and copies of the adapted SOPs are available online (see **Information S1 & S2, Supplemental Digital Content**, <http://links.lww.com/QAI/A628>).

### Participants & Data collection

Between 28 January 2013 (start of the pilot study) and 31 December 2013, all women presenting for their first ANC within the study zone who tested HIV+ for the first time, or who already knew their HIV+ status but were not yet on combined ART, were included in the study. Women who were diagnosed HIV+ at subsequent ANC visits by repeat testing were eligible for combined ART within the PMTCT B+ pilot zone, but were not included in this study. For the study participants, routine data were collected from the eighteen health structures. Baseline characteristics (first ANC visit date, maternal age, gestational age at first ANC, CD4 count, WHO Clinical Stage, and combined ART/Zidovudine initiation date) were obtained from ANC registers by MSF data clerks. For women who initiated combined ART, time to ART initiation was

calculated as the difference between combined ART initiation date and first ANC date. Women who initiated ART prior to 32 weeks gestation were considered to have successfully initiated (for the purposes of PMTCT); for women whose first ANC consultation was 32 weeks or later, initiation was considered successful if it took place within seven days (the national target for ART initiation in PMTCT programmes). Combined ART initiation was validated with the ART paper register, and patient files were retrieved to obtain data on marital status, occupation, educational level, and disclosure status.

### **Data Analysis**

We compared the proportion of eligible patients initiating combined ART in the two health zones, as well as the proportion initiating amongst patients with CD4<350 or WHO Stage III/IV disease. Within the PMTCT B+ zone, we compared characteristics of those who initiated combined ART and those who did not, including a variable indicating whether the patient attended the first ANC before or after the SOPs were switched in favour of same-day initiation. Pearson's Chi squared test was used to test for association between categorical variables, and a non-parametric K-sample median test was used for continuous variables with asymmetrical distributions. In the comparison of ART initiation prior to and after the implementation of same-day initiation, data from a facility where staff problems led to significant changes in combined ART use during the latter period were excluded to reduce the chance of bias. Socio-demographic characteristics were not available for all patients due to incomplete and inconsistent data recording at facility level. Statistical tests in tables 1 and 2 are reported excluding missing values.

We also explored the barriers and facilitators to ART initiation in the PMTCT B+ zone using unconditional logistic regression. Adjusted odds ratios and 95% confidence intervals (95%CI) were calculated using an unconditional multivariable regression model developed in a step-wise backward manner. Variables that were associated with uptake in univariable analysis with a p-value of <0.10 were considered for inclusion in the model. Educational level, occupation, marital status and disclosure status were excluded from multivariable analysis because of the high proportion missing socio-demographic information. Due to effect modification, separate models were evaluated for women with CD4<350 and women with CD4>350. Models were controlled for clustering by health facility. Data entry was carried out using Epidata 3.1 and data analysis used Stata/SE 12(StataCorp, Texas, U.S.A.)

### **Ethics**

Ethical approval for this study was granted by the Scientific and Ethics Committee of the Ministry of Health of Swaziland, and the International Ethics Review Board instituted by MSF. Informed consent for study participation was not solicited from participants and only routinely collected data was used.

## Results:

### *Comparison PMTCT B+ and PMTCT A health zones:*

Five hundred and eighty-two women were included in the analysis; 399 (69%) from the PMTCT B+ health zone, and 183 (31%) from the PMTCT A health zone. Baseline characteristics of the women are shown in table 1. Their median age was 25 years (IQR 22 - 29 years), the median CD4 was 411 (IQR 288 - 558) and the median gestational age at first ANC was 21 weeks (IQR 17 - 25). More than half of the women were recorded as newly diagnosed HIV positive at first ANC consultation. The proportion of newly diagnosed individuals and the proportion of women with CD4<350 cells/ml was higher in PMTCT B+ zone compared to the A zone (64% v 54%, p=0.020; and 37% v 29%, p=0.033, respectively). In terms of PMTCT, the proportion of women who had not started any form of anti-retroviral intervention (either Zidovudine or combined ART) before 32 weeks gestation was higher in the PMTCT B+ zone, where 98 (25%) women had not initiated combined ART or Zidovudine, compared to 23(13%) in the PMTCT A zone (p=0.003). Amongst the subgroup of women with CD4 counts below 350 cells/ml, combined ART initiation was higher in the PMTCT B+ zone (128 (86%), compared to 39 (74%) in the PMTCT A zone (p = 0.032)). The median time to combined ART initiation was seven days (IQR 0 - 28 days) in both zones.

### *ART initiation in the PMTCT B+ zone:*

The level of combined ART initiation varied significantly between facilities, ranging from 38% to 89% (p=0.003, Table 2). Median time to combined ART initiation in the PMTCT B+ zone was eight days (IQR 5 - 31) prior to implementation of same-day initiation and zero days (IQR 1-14days) (p<0.001) afterwards. Although the proportion of pregnant women initiating combined ART did improve slightly with each quarter (table 2), the overall initiation rates remained below the programme target of 80%. The proportion of women initiating combined ART was higher after implementation of same-day initiation and revision of clinical SOPs (60% before, versus 70% after the intervention, p=0.045). Initiation rates were significantly lower among women with higher CD4 counts (59% of women with CD4>350 initiated combined ART before 32 weeks compared to 80% of women with CD4<350, p<0.001, OR adjusted for clustering by health facility 0.37, 95% CI 0.26 - 0.52). Age did not appear to be associated with initiating combined ART; the median age of the women who started combined ART was 25 (IQR 22 - 30) compared to 24 (IQR 23 - 29) in those that did not start combined ART (p=0.494). The impact of other patient-level barriers and facilitators of combined ART initiation appeared to be different among the two CD4 groups and are described separately in table 2.

### *Barriers and facilitators of ART initiation among women with CD4>350 in the PMTCT B+ zone:*

A large proportion of the women with CD4>350 had missing information for educational level, occupation, marital status and disclosure status (119, 59%; 108, 54%; 93, 46%; and 120, 60% respectively) preventing analysis of the impact of these factors on combined ART initiation with a high degree of validity. However, we observed that among women with available socio-demographic information and CD4>350, uptake was significantly higher among women with at

least secondary education completed, compared to women with less than secondary education (86% versus 58%,  $p=0.018$ , table 2). Furthermore, women in paid employment had lower initiation rates than those who were unemployed (53% versus 83% respectively,  $p<0.001$ ).

*Barriers and facilitators of ART initiation among women with CD4<350 in the PMTCT B+ zone:*

There were also high levels of missing socio-demographic information for women with lower CD4 counts (education 69, 46%; occupation 67, 45%; marital status 53, 36%; and disclosure status 77, 52%). However, in contrast to women with high CD4 counts, among the women with available socio-demographic data, the impact of education, employment or marital status appeared to be minimal (table 2). In this group a higher proportion of women who had disclosed their status to their family initiated ART compared to those who had not disclosed (93% versus 70%,  $p=0.011$ ). Furthermore, women who knew their HIV+ status before attending their first ANC appeared more likely to start ART for PMTCT compared to women who were newly diagnosed at the ANC appointment, but this did observation did not reach statistical significance (87% versus 75%,  $p=0.074$ ).

*Missing data:*

Socio-demographic information (education, employment and marital status) and disclosure status were obtained from patient files. Two hundred and sixty two (66%) of the women in the study had missing socio-demographic information, and these women were less likely to have started combined ART compared to those with socio-demographic information available (OR 0.4, 95% CI 0.2 - 0.6). Furthermore, the disclosure status was not noted for 232 (37%) of the women; similarly, these women were less likely to have started ART compared to those with a disclosure status recorded (OR 0.3, 95% CI 0.2 - 0.5).

**Discussion:**

We observed higher rates of initiation of combined ART among pregnant women with CD4<350 cells/ml in the PMTCT B+ setting, relative to a comparable setting where PMTCT A was standard of care. Since the majority of HIV/AIDS related morbidity and mortality in pregnancy and the post-natal period occurs in the CD4<350 group, these findings demonstrate the potential of PMTCT B+ to reduce HIV related mortality and morbidity<sup>14</sup>. However, it was also noted that fewer women in the PMTCT B+ zone received an anti-retroviral treatment before 32 weeks gestation than those in the PMTCT A zone, which could result in an increased risk of vertical transmission during pregnancy and delivery. Although initiating antiretroviral treatment is no guarantee of adherence, effectiveness of PMTCT B+ must start with high levels of combined ART uptake. Attention must be paid to reinforcing counselling around benefits of combined ART for PMTCT, and on-going training and support of health workers is needed to ensure high rates of initiation are maintained during the transition from PMTCT A to PMTCT B+.

The rate of combined ART initiation in the context of the PMTCT B+ pilot program was below 80%, mainly due to lower initiation rates among women with high CD4 counts. However the levels of ART uptake varied remarkably between different facilities regardless of the CD4 group. Given that this was a new pilot program, it is likely that the level of understanding and acceptance of this new approach varied between facilities, which could explain the varying results observed. This would be expected to improve with time. While health-system barriers have been perceived as barriers for ART initiation for PMTCT in other studies<sup>15</sup>, it should be noted that these findings differ significantly from implementation experiences in Malawi, where much higher rates of ART initiation were described during PMTCT B+ roll-out<sup>16</sup>. This difference in itself suggests key determinants of combined ART initiation are health system related. In Malawi PMTCT B+ was implemented on a nationwide basis; sensitisation and mobilisation process was led by the Ministry of Health, using all available communication media. By contrast in Swaziland, mass media could not be used to communicate about PMTCT B+, since PMTCT A is still nation strategy. Furthermore, the on-going availability of prophylactic treatment with Zidovudine in Swaziland enables health workers and patients who are sceptical of combined ART to use this 'lighter option', often perceived in Swaziland as not being an antiretroviral therapy at all<sup>12</sup>.

It is also important to note that, unlike Malawi, ANC facilities in Shiselweni have point-of-care CD4 testing, such that CD4 results are available within 20 minutes of testing. Although not required for combined ART initiation for PMTCT B+, availability of CD4 results may impact both the nurses' and the patients' behaviour, given that CD4 level has previously been presented as the principal criterion for ART initiation. Low levels of ART initiation among women with high CD4 counts could reflect the focus of health workers on initiating ART in patients with low CD4 counts, known to be most in need of treatment, in accordance with previous training they have received. Moreover it could reflect the patients' sense that they are still well, and thus can wait to start combined ART, in line with messages previously transmitted by health workers<sup>12</sup>.

Same-day ART initiation appeared to be an important contributor to the successful introduction of PMTCT B+ in the study zone. Discussions with individual patients (who did and did not initiate combined ART) revealed that many were open to initiate combined ART the same-day, but were told by the health worker to go back home and think about it<sup>12</sup>. However, attention must be paid to treatment education and support when introducing same-day initiation to ensure that attrition rates remain acceptable. Recent findings from Malawi suggest pregnant women testing HIV positive and starting ART on the same-day are particularly at risk of attrition<sup>17</sup>.

The implementation approach and health facility related factors were the principal, but not be the sole determinants of ART initiation. Although high levels of missing data made the analysis of the influence of some patient-level factors extremely challenging, it did appear that they varied according to whether the patient's CD4 level was below or above the threshold for combined ART eligibility (350cells/ml) used nationally in Swaziland. In those with CD4 counts below 350, non-disclosure of HIV status to family could be a potential barrier to initiation, which has been described in other studies in general HIV+ populations<sup>18,19</sup>. We also observed higher rates of ART initiation among women with lower CD4 counts who knew they were HIV positive before coming to ANC. It is possible that the message from previous visits about the need to start ART when the CD4 count was below 350 facilitated combined ART initiation among these women, while newly diagnosed women may have needed more time to come to terms with their diagnosis, and thus may not have been ready to initiate ART promptly. Interpreting the differences in combined ART uptake according to education, occupation and marital is difficult because a large proportion of missing data may have introduced bias into the study. However, among women with available socio-demographic data and higher CD4 counts, initiation rates were lowest amongst women of a lower education level, which could suggest a barrier in the understanding of the information given during counselling. Similarly, among those with high CD4s and available socio-economic information, initiation rates were lower for women in paid employment (mostly factory workers) compared to unemployed people. This could reflect strict working conditions and a low level of workplace autonomy making it difficult for these women to attend appointments. In light of difficulties interpreting data with a high proportion of missing data, it is worth noting that the observations made here are in line with other studies describing status knowledge, non-disclosure, educational and occupational barriers to ART initiation and adherence<sup>20-21</sup>.

This study included consecutively recruited women attending ANC facilities in two health zones in rural Swaziland. There was an imbalance in the study population such that the intervention zone had more than double the sample size of the comparison zone. Although we recognise the reduced sample size in the PMTCT A zone reduces the statistical power of the comparisons shown in table 1, we believe the impact on our results was minimal. This study was carried out using data available from routine clinical registers and patient files. Approximately 10% of the participants had missing information on CD4 count. This was in part caused by unreliable access to a functioning PIMA machine in two of the facilities (one in each zone), but may also have been due to poor record keeping in some facilities. We had a higher volume of missing socio-economic

information and due to differences in recording and filing for pre-ART patients in some facilities, this data was less likely to be available for women that did not initiate ART. Hence, missing data was not equally distributed among those initiating and those not initiating ART. This could introduce bias to the study and limit the internal validity of the findings. We might expect those who have complete records to be different from those with incomplete records (e.g. women with complete records may have better access to health care, may be more educated or may face less work-related barriers). Given these limitations, we urge readers to interpret any of the associations regarding disclosure, educational status, occupation and marital status with the utmost caution. The issue of missing data highlights the challenge of evaluating programmes using routine data sources, especially in low-resource settings, where a high level of decentralization and task shifting makes detailed comprehensive monitoring and evaluation challenging. Comprehensive recording and data quality should be an important operational concern for national programmes that wish to roll out PMTCT B+.

In conclusion, implementing PMTCT B+ where PMTCT A remains national strategy is challenging but feasible. This study demonstrates barriers to initiating pregnant women on combined ART, but also identifies opportunities offered by PMTCT B+ for improving initiation rates among women with lower CD4 counts. Overall, uptake of combined ART during the first year of Swaziland's PMTCT B+ pilot was sub-optimal, mainly due to poorer initiation rates among women with higher CD4s. The predominant barriers to ART initiation appear to be health service related, but efforts may still be needed to overcome occupational barriers faced by some women, and to ensure messages about benefits of early ART initiation are reaching women with lower educational level. Offering same-day initiation for pregnant women who are ready to do so appears to be vital to ensure optimal rates (and timeliness) of ART initiation. These findings will help guide nationwide implementation of PMTCT B+ in Swaziland in 2014, and can be useful for similar high prevalence, low-resource settings making the switch to PMTCT B+.

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**Table 1:** Baseline characteristics and ART uptake among HIV women at first ANC in Nhlango and Hlathikhulu Zones, Shiselweni, Jan-Dec 2013

	<b>Nhlango Health Zone (PMTCT B+) (N=399)</b>	<b>Hlathikhulu Health Zone (PMTCT A) (N=183)</b>	<b>P<sup>1</sup></b>
HIV status knowledge, N (%) <sup>2</sup>			
Known status	143 (36)	84 (46)	0.020
Newly diagnosed	254 (64)	98 (54)	
Median Age, Years (IQR)	25 (22 - 30)	25 (22 - 29)	0.809
Median Gestational age, Weeks (IQR)	21 (17 - 26)	22 (17 - 26)	0.314
CD4 count, N (%):			
<350	148 (37)	53 (29)	0.033
≥350	201 (50)	110 (60)	
Missing CD4 information	50 (13)	20 (11)	
MTCT prophylaxis, N (%)			
On combined ART at 32 weeks gestation	252 (63)	43 (23)	<0.001
On Zidovudine at 32 weeks gestation	49 (12%)	117 (64)	
Not on combined ART or Zidovudine at 32 weeks gestation	98 (25)	23 (13)	
ART uptake <sup>3</sup> among women CD4<350, N (%)			
Initiated combined ART	128 (86)	39 (74)	0.032

<sup>1</sup> P values shown are from Pearson's Chi squared test, except for age, which was from a non-parametric K-sample median test.

<sup>2</sup> 3 individuals had missing information on HIV status knowledge, 2 in the PMTCT B+ zone and 1 in the PMTCT A zone.

<sup>3</sup> Uptake of combined ART at any gestational age

**Table 2:** Clinical and socio-demographic characteristics influencing ART initiation for PMTCT B+ according to CD4 count at first ANC consultation.

	Total (N=399)		CD4 <350 (N=148)		CD4 ≥350 (N=201)		CD4 missing (N=50)	
	ART uptake, N (%) <sup>1</sup>	P <sup>2</sup>	ART uptake, N (%) <sup>1</sup>	P <sup>2</sup>	ART uptake, N (%) <sup>1</sup>	P <sup>2</sup>	ART uptake, N (%) <sup>1</sup>	P <sup>2</sup>
Overall	252 (63)		118 (80)		119 (59)		15 (33)	
HIV status knowledge <sup>3</sup>								
Known status	96 (67)	0.226	48 (87)	0.074	39 (58)	0.792	9 (43)	0.091
Newly diagnosed	155 (61)		69 (75)		80 (60)		6 (21)	
Date of first ANC								
Q1 2013	53 (59)	0.452	23 (77)	0.912	28 (58)	0.425	2 (17)	0.423
Q2 2013	79 (60)		34 (79)		38 (52)		7 (44)	
Q3 2013	78 (67)		44 (80)		31 (63)		3 (23)	
Q4 2013	42 (69)		17 (85)		22 (69)		3 (33)	
Facility								
1	10 (66)	0.003	5 (71)	0.020	4 (57)	0.350	1 (100)	0.559
2	16 (89)		9 (100)		7 (88)		-	
3	8 (38)		2 (40)		6 (40)		0 (0)	
4	22 (73)		10 (91)		12 (67)		0 (0)	
5	16 (67)		7 (88)		8 (62)		1 (33)	
6	122 (69)		61 (85)		58 (62)		3 (25)	
7	23 (59)		7 (88)		11 (69)		5 (33)	
8	23 (44)		14 (67)		6 (35)		3 (21)	
9	12 (55)		3 (43)		7 (58)		2 (67)	
Educational status <sup>4</sup>								
Less than Secondary	90 (70)	0.061	49 (83)	0.454	35 (58)	0.018	6 (67)	0.858
Secondary completed	42 (84)		18 (90)		19 (86)		5 (62)	
Occupation <sup>4</sup>								
Unemployed	86 (83)	0.019	37 (90)	0.319	46 (84)	<0.001	3 (38)	0.027
In paid employment	47 (68)		24 (77)		17 (53)		6 (100)	
Self-employed	8 (89)		5 (100)		3 (100)		0 (0)	
Housewife	3 (42)		3 (75)		0 (0)		0 (0)	
Marital status <sup>4</sup>								
Married	50 (83)	0.115	23 (85)	0.989	23 (82)	0.083	4 (80)	0.457
Single	117 (73)		58 (85)		51 (65)		8 (62)	
Disclosure Status <sup>4</sup>								
Disclosed to family	89 (82)	0.037	40 (93)	0.011	44 (77)	0.111	5 (63)	0.248
Undisclosed to family	41 (68)		19 (70)		15 (60)		7 (88)	

<sup>1</sup> The percentages shown here are the proportion of women that initiated ART in each subgroup (row percentage). Although the denominator is not shown in this table, it can be deduced, e.g. Number of women with a known status  $0.63 * 96 = 143$  (for total column the information is also available in table 1).

<sup>2</sup> P values shown are from Pearson's Chi squared except for age, which was from a non-parametric K-sample median test.

<sup>3</sup> 2 individuals had missing information on HIV status knowledge, one had CD4<350 and initiated ART, the other had CD4>350 and did not initiate ART.

<sup>4</sup> Socio-demographic details were missing for a high proportion of patients: education (n= 221, 55%), employment (n=226, 57%) marital status (n=179, 45%) and disclosure status (n= 232, 58%).