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Patients Enrolled in HIV Care in Mozambique: Baseline Characteristics and Follow-Up Outcomes

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Abstract

Objective—To utilize routinely collected service delivery data from HIV care and treatment clinics in Mozambique to describe the patient population and programmatic outcomes from 2003 to 2009.

Methods—Data from patient charts were entered into an electronic database at 28 clinics in 5 Mozambican provinces. Patients' characteristics at enrollment in HIV care and at antiretroviral therapy (ART) initiation were examined. We calculated a corrected 12-month mortality estimate using a recently developed nomogram for sub-Saharan African ART patients.

Results—A total of 154,188 HIV-infected individuals (10,164 children <15 years old) were enrolled in HIV care services between 2003 and 2009. Of the 51,269 (36%) adults who started ART, 35% initiated ART with CD4 count <100 cells per microliter and 14.4% with World Health Organization stage IV. Just more than 10% (10.5%) of women were documented to be pregnant at enrollment. One-third of the 3,745 (37%) children who initiated ART were <2 years old, and 53% of those <5 years initiated ART severely immunosuppressed (CD4% <15%). Thirty-five percent of all children and 30% of those initiating ART met the definition of severe malnourishment (weight-for-age Z score <−3). Among those who initiated ART, the median estimated 12-month mortality rate across sites was 13.1% (interquartile range: 11.5%–16.0%) and 13.5% (interquartile range: 11.4%–17.4%) for adults and children, respectively.

Conclusions—A substantial number of HIV-infected patients have been enrolled in HIV care and initiated on ART, with many patients having advanced HIV disease. With the release of new guidelines for ART use for adults, pregnant women, and children, extensive efforts are needed to ensure more timely initiation of ART.

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All investigators conceived of the content of the article. M.L. and D.N. coordinated the analyses and wrote all drafts of the article. M.L. conducted the statistical analyses. D.N. provided critical review of all article drafts. W.E.S. provided input and editing article drafts. All other authors revised it critically, contributed and approved the final text.

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Keywords

antiretroviral treatment; HIV/AIDS; HIV care; implementation science; Mozambique; operations research; PEPFAR; scale-up

INTRODUCTION

Many sub-Saharan countries have rapidly expanded HIV care and treatment services over the past years, increasing the ART coverage in this region to 33% in 2009.¹ To identify evidence-based interventions associated with better outcomes, several leading organizations, including the World Health Organization (WHO), the Global Fund, and the US Institute of Medicine have called for an increased emphasis on operations research in HIV care and treatment scale-up.²⁻⁴

Mozambique, with an estimated national HIV prevalence of 11.5% in 2009,⁵ has rapidly scaled-up HIV care and treatment in the past years. By the end of 2009, approximately 170,000 people, including an estimated 13,500 children, had initiated antiretroviral therapy (ART) at more than 200 clinics, for an estimated national coverage of 42% of those estimated to be in need of treatment.⁶ We embarked on an effort to utilize existing HIV care and treatment service delivery data from 28 clinics in Mozambique that were receiving support from ICAP-Columbia University through funding from the President's Emergency Plan for AIDS Relief to inform design and quality of the programs as part of the Identifying Optimal Models of HIV Care Collaboration. The aim of this collaboration is to evaluate the variation in program outcomes across sites and settings and to identify clinic and contextual-level factors associated with key outcomes. To set the stage for future analyses, the objective of this analysis is to describe characteristics of these clinics, baseline characteristics of the cohort at enrollment, and ART initiation along with the frequency of key outcomes such as loss to follow-up (LTFU) and death.

METHODS

Study Design and Study Population

We conducted a descriptive analysis of routinely collected service delivery data on HIV-infected patients enrolled at 28 HIV care and treatment clinics within the national HIV care and treatment program in Mozambique. These clinics were receiving support from ICAP-Columbia University through funding from the President's Emergency Plan for AIDS Relief and had an electronic patient-level database as of December 2009. These clinics, located in 5 Mozambican provinces, represented 13% of all clinics providing ART in the country at the end of December 2009 (Fig. 1). The study population includes all patients (adult and pediatric) who were ever enrolled in HIV care at these clinics by the end of December 2009.

Patient information routinely collected during each clinic visit was documented by clinicians on national patient forms and included in patient charts. This included sociodemographic information (ie, sex, marital status, point of entry) and clinical and laboratory parameters (ie, medications, opportunistic infections, WHO stage, CD4 cell count, etc.). Information from these forms was entered on a daily basis by trained data clerks into an electronic patient tracking system database that was deployed at all 28 sites. The electronic patient tracking system is a Microsoft Access electronic database developed by ICAP that is based on the Mozambique national forms, which are used for data entry into the system. Data quality assessments were done every 6 months to check the completeness and accuracy of the database compared with the paper forms.

Clinic and Program Characteristics

Data on clinic and program characteristics were derived from routinely conducted structured site assessments completed annually since 2007 by ICAP field staff. These assessments capture information through observation and through interview of site staff regarding the characteristics and availability of services at the time of the survey: the setting (urban, rural), the type of facility (primary, secondary, tertiary), presence at the clinic or facility of programmatic services [eg, prevention of mother to child transmission program (PMTCT), voluntary counseling and testing (VCT), tuberculosis treatment], patient support services (eg, peer educators or outreach for patients who miss clinic visits), laboratory services (eg, availability of CD4 testing), and staffing characteristics (eg, number/type of providers).

Guidelines for HIV Care and ART

National guidelines for care of HIV patients in place during the study period recommended that all HIV patients at their first clinic visit should have a comprehensive history, receive a physical examination, and get CD4 count to assess ART eligibility. Patients >5 years old were considered eligible for ART initiation if they had the following: (1) WHO stage IV, (2) WHO stage III and CD4 count <350 cells per microliter, or (3) CD4 count <200 cells per microliter irrespective of WHO stage. Patients <5 years old were considered ART eligible if they had WHO stage III/IV, CD4 percentage <25% (<12 months), CD4 percentage <20% (12–35 months), or CD4 percentage <15% (36–59 months). For patients not eligible for ART, the guidelines recommended semiannual visits with clinical and CD4 assessment. Once ART eligibility is established, patients needed to attend 3 ART readiness pretreatment counseling sessions and disclose their HIV status to a treatment partner, upon which a physician reevaluated the patient to confirm ART eligibility and readiness and prescribed ART medication. Pediatric patients went through a similar process involving their main caregivers. At the time of ART initiation, guidelines recommended obtaining information on age, weight, and WHO clinical stage. First-line ART regimens were prescribed by a physician according to national protocols, and at the time of this study, this included lamivudine (3TC) plus nevirapine (NVP) plus either zidovudine (AZT) or stavudine (d4T). The initial follow-up schedule for those starting ART included 2 clinical visits in the first month to assess adherence and detect possible adverse effects and then monthly visits for clinical assessments and medication pick up. For patients with CD4 count <350 cells per microliter or clinical WHO stage III/IV, cotrimoxazole was indicated.

Statistical Methods

Patient characteristics at enrollment into care and at ART initiation were compared by sex using the χ^2 test for categorical variables and Wilcoxon test for medians. For patients' characteristics at enrollment into care (ie, weight, WHO stage, CD4 cell count), any value within 6 months of enrollment was used. For patients' characteristics at ART initiation, we considered the closest value using a window period of 6 months before and 1 month after ART initiation. Age distribution at ART initiation for adult and pediatric patients was examined using population age pyramids. For children <5 years old, HIV-associated immunodeficiency was defined based on the CD4 percentage according to the age-adjusted CDC classification [severe suppression (<15%), moderate suppression (15 to <25%) and no evidence of suppression (>25%)].⁷ Weight-for-age Z scores were calculated based on the CDC standards.⁸ A substantial proportion of patients had missing information on CD4 count and WHO stage at enrollment and ART initiation; they were included in our analyses with CD4 count and WHO stage assigned to "missing" categories. LTFU was defined as not having had a visit to the clinic or pharmacy for more than 12 months for patients in care and for 6 months in patients who had initiated ART. Only patients with enough follow-up time were included in the LTFU analysis (12 months for pre-ART and 6 months for ART patients). Kaplan–Meier product limit estimates are reported for known deaths and LTFU at

6 and 12 months. Data were analyzed using SAS 9.2 (SAS Institute, Cary, NC), and estimates of mortality corrected for LTFU were derived using a web calculator (<http://www.iedea-sa.org>) for a recently developed nomogram method by Egger et al.⁹ This method calculates a corrected 12-month mortality estimate based on the observed 12-month death rate, total number of patients initiating ART, and total number of patients LTFU using outcome data (mortality rates) from tracing studies among sub-Saharan African ART patients who were LTFU.

Ethical Approval

The study utilized data that are routinely collected by sites for service delivery, which was anonymized for analysis purposes. This study is part of the Identifying Optimal Models of HIV Care and Treatment in Mozambique Collaboration, which was approved by the Mozambican National Ethics Committee, the Columbia University Medical Center Institutional Review Board, the US Centers for Disease Control and Prevention, and the President's Emergency Plan for AIDS Relief's Office of the Global AIDS Coordinator.

RESULTS

Clinic and Program Characteristics

Of the 28 HIV care and treatment clinics included in the analysis, 24 clinics (85.7%) were located in a city/town and 4 (14.3%) in rural settings. There were 12 (42.9%) at primary facilities, 11 (39.3%) at secondary facilities, and 5 (17.9%) at tertiary facilities (Table 1). All facilities offered free HIV care and treatment services and adherence support services, and 24 (85.7%) had PMTCT services at the same facility. Fifteen (53.6%) had CD4 cell count testing available at the facility. Twenty (71.4%) clinics indicated that they had an active outreach program to track patients who missed clinic visits (defaulters). Three-fourths (75%) of the clinics had peer educator services, and approximately half (53.6%) offered nutritional support services.

Adult Patient Characteristics at Enrollment into Care and ART Initiation

Overall, 154,188 patients were enrolled in HIV care at the 28 clinics between 2003 and 2009 (Fig. 1A). Among the 144,024 adults, 94,261 (65.4%) were women, and they were significantly younger than men (median age; 30.0 years vs. 36.0 years, respectively, P value <0.001) (Table 2). Eleven percent of women were documented as being pregnant at enrollment, increasing from 2.4% in 2005 to 6.4% in 2006 and remaining constant at around 13% in subsequent years. It also varied greatly by site, with a median proportion of 12.4% [interquartile range (IQR): 3.4%–18.6%]. Approximately, one-third (32.4%) were referred to HIV care from VCT services and 8.2% entered through PMTCT, with 37.3% having unknown point of entry. The proportion of patients referred from VCT was stable over time, whereas the proportion referred PMTCT increased from 1.3% in 2005 to 5.3% in 2006 and then remained constant at around 11% in subsequent years. Only 0.2% of adults had a documented history of having received prior ART at other clinics. Forty-eight percent of the adult patients reported being married and 31.2% being single, and this information was missing for 14.1% of patients, with the proportion who reported being single significantly higher among women compared with men (33.6% vs. 26.7%, P value <0.001). Almost half of adult patients had primary education, and 17.5% of women and 25.7% of men had 8 or more years of education (P value <0.001), however, data were missing on years of education for 24.2% of patients. Among patients for whom HIV disease stage data were available (WHO stage or CD4 cell count), women entered care with less advanced disease stage than men, with a lower proportion with WHO stage III or IV (31.3% vs. 39.4%, P value <0.001), CD4 count <200 cells per microliter (20.0% vs. 25.9%, P value <0.001) or tuberculosis (TB) treatment at enrollment (2.8% vs. 5.5%, P value <0.001). However, both WHO stage and

CD4 cell count measurements were missing at enrollment into care for a high proportion of adult patients (32.7% and 43.9%, respectively), and overall 22.2% were missing both WHO staging and CD4 cell count. The proportion missing both declined considerably over time (from 52.9% in 2004 to 33.4% in 2005), stabilizing after 2006 to 15%–17%. The median proportion missing both WHO stage and CD4 cell count by site was 15.8% (IQR: 12.5%–20.5%). Among those who had a CD4 count, the median CD4 count at enrollment in care was 262 (IQR: 123–452) cells per microliter.

Of those enrolled in care, 51,269 (35.6%) of adults started ART by December 2009, of which 62.8% were women (Table 3). The number of patients who started ART over time is represented in Figure 2B. There was a rapid increase in the number of patients starting ART in 2005, and then the number stabilized by 2007. At ART initiation, women were significantly younger than men (median age; 32.5 vs. 38.0, P value <0.001), and 6.9% of the women were documented as pregnant at ART initiation. The age distributions are shown in Figure 3A for the overall population (including the percentage of females that were pregnant at ART initiation). WHO stage and CD4 cell count measurements at ART initiation were missing for 33.7% and 35.1% of adults, respectively, and 21.2% were missing both in the database. Of those whose ART eligibility could be determined at the time of enrollment in care [74,756 (51.9%) of all patients], 43,695 (58.5%) were eligible to start ART according to national guidelines. Among them, the proportion initiating ART within 3 months of ART eligibility was 73.6% [95% confidence interval (CI): 73.1% to 74.1%] [median time: 34 days (IQR: 15–67) between ART eligibility and ART initiation]. Among those who had a CD4 count, the median CD4 count at ART initiation was 144 (IQR: 69–221) cells per microliter, and 35.1% had a CD4 count <100 cells per microliter. Fourteen percent had WHO stage IV at ART initiation. The proportion documented to be receiving TB treatment at ART initiation was lower in women (4.5% vs. 8.0%, P value <0.001). The initial ART regimens for adult patients were D4T + 3TC + NVP (80.8%), D4T + 3TC + EFV (10.6%), AZT + 3TC + NVP (6.9%) among others (1.7%). Of those who started ART, 2.9% were known to have died within 6 months, and 23.4% were LTFU (Table 4).

Of those patients who were eligible for ART at enrollment in care but who were not initiated on ART, 7.3% (95% CI: 6.5 to 8.1%) were documented to have died [median most recent CD4 = 66 cells/μL (IQR, 22–144.5)] and 81.1% (95% CI: 80.4% to 82.0%) were LTFU at 12 months [median most recent CD4 = 113 cells/μL (IQR: 42–192.5)]. Of those with unknown eligibility at enrollment due to missing information, 81.3% did not start ART by December 2009, of which 1.3% (95% CI: 1.2% to 1.5%) were documented to have died, and 53.9% (95% CI: 53.4% to 54.4%) were LTFU at 12 months.

Pediatric Patients at Enrollment into Care and ART Initiation

Of the total population enrolled in care, 10,164 (6.6%) were children <15 years with a median age of 2 years (IQR: 0.9–5.0) and a similar distribution of females and males (52.3% and 47.7%, respectively) (Table 5). A total of 5,398 children (53.1%) had WHO stage at enrollment; of those, 38.7% were WHO stage III and 8.0% were WHO stage IV. In children 5 years old with a CD4 count at enrollment (61.2%), 24.4% had a CD4 count <200 cells per microliter. The results of CD4 percentage were missing for 61.1% of pediatric patients <5 years old. Of children <5 years old with CD4 percentage at enrollment, 35.0% had severe immunosuppression (CD4% <15%). Among those who had a weight measurement at enrollment (50.4%), 35.3% were severely malnourished (weight-for-age Z score <−3). Finally, 1.9% of children were documented as being on TB treatment at enrollment into care.

Among those enrolled in care during 2003–2009, 3745 (36.8%) started ART, with an equal distribution of females and males (50.7% and 49.3%, respectively) (Table 2). The median

age at ART initiation was 2.7 (IQR: 1.3–6.1) years, and the age distributions of pediatric patients (Fig. 3B) show that approximately one-third were <2 years old. Of those with a WHO stage at ART initiation (55.8%), 1071 (51.2%) children were WHO stage III and 273 (13%) were WHO stage IV. In children younger than 5 years, who had a CD4 percentage result (53.7%), more than half were severely immunosuppressed. The initial ART regimens for pediatric patients were D4T + 3TC + NVP (54.7%), AZT + 3TC + NVP (28.1%), and D4T + 3TC + EFV (6.9%) among others. Among those who had a weight measurement at ART initiation (71.6%), 30.0% were severely malnourished (weight-for-age *Z* score <−3). Among the children who initiated ART, 6.5% (95% CI: 5.6% to 7.5%) were known to have died, and 20.5% (95% CI: 19.1% to 22.0%) were LTFU at 12 months (Table 4). Among those enrolled in HIV care who did not initiate ART, 6.3% (95% CI: 5.5% to 7.1%) were known to have died at 12 months [14.1% (95% CI: 11.3% to 17.4%) among those known to be eligible for ART] and 54.1% (95% CI: 55.6% to 52.6%) were LTFU at 12 months [71.3% (95% CI: 68.1% to 74.3%) among those known to be eligible for ART].

Corrected Mortality Estimates

The estimates of mortality at 12 months after ART initiation, corrected for unascertained mortality among those lost to follow-up,⁹ were 13.1% (IQR: 11.5%–16.0%) for adults and 13.5% (IQR: 11.4%–17.4%) for children.

DISCUSSION

Analysis of routinely collected data from a subset of HIV care and treatment clinics in Mozambique documents the rapid scale-up HIV care and treatment services in the country during the 2003–2009 period. The majority of adult patients enrolled in care and those who initiated ART were women (65.4% and 62.8%, respectively), a slightly higher proportion than in the larger HIV epidemic in Mozambique (57%).¹⁰ This may reflect higher testing and referral rates for women in Mozambique. For example, at least 10.5% of women included in this analysis were pregnant at enrollment, likely reflecting availability of PMTCT programs and linkages between PMTCT programs and HIV care. Children were also enrolled and initiated on ART, however, only a small proportion of children initiating ART (15.5%) were <1 year old. This is likely due to very high death rates, only recent availability of early infant diagnostic tests, and enrollment before new guidelines which recommend that all HIV-infected infants younger than 1 year be initiated on ART irrespective of HIV disease stage.¹¹ Additionally, a high proportion of children were severely malnourished at enrollment and ART initiation.

We observed high rates of nonretention among ART adult patients at 12 months (27%), although they were similar to those described in a systematic review of 39 cohorts from sub-Saharan Africa [median attrition at 12 months was 23% (range 7%–45%)].¹² Among children on ART, 21% were LTFU at 12 months, which was higher than those reported in other cohorts.^{13,14} High rates of LTFU were observed among patients enrolled in care who had not initiated ART, especially among a substantial proportion of patients who despite being ART eligible at enrollment were not initiated on ART. The high proportion of 1-year LTFU in this group (81% in adults and 71% in children) may have hindered initiation of ART and could also represent a substantial number of unascertained deaths.^{15–17} For example, a recent study conducted in South Africa with 44,844 patients enrolled in HIV care observed that 23% of eligible patients died before starting ART with a median time to death of 92 (IQR: 33–216) days.¹⁸ Some of the LTFU could also be due to overburdened clinics (due to waiting times and prioritization of ART patients to receive adherence support and outreach services), undocumented transfer of patients to other facilities,¹⁹ or due to patients not completing the nonclinical national requirements to start ART (ie, failing to attend 3 ART readiness pretreatment counseling sessions and disclosing HIV status to a treatment

partner). Our findings around LTFU underscore the importance of conducting active tracing of all patients enrolled in HIV care to engage pre-ART patients in HIV care to help ensure timely ART initiation²⁰ and reduce the risk of mortality and morbidity.^{21,22} The recent changes in ART initiation guidelines in Mozambique [CD4 count <250 cells/ μ L (vs. the previous <200 cells/ μ L), WHO stage IV and WHO stage III, and CD4 count <350 cells/ μ L] will likely result in a 10% increase in the number of eligible patients at enrollment into care. Nevertheless, additional efforts at the community and clinic levels will be needed to ensure that this larger population of ART eligible patients do in fact start ART earlier.

Among those who initiated ART, we also observed a relatively high proportion of patients initiating ART at advanced stages of HIV disease (CD4 count <100 cells/ μ L or WHO stage IV), although 21% had missing WHO stage and CD4 count at ART initiation. Late ART initiation has been associated with high early mortality rates in sub-Saharan Africa.^{22,23} A cross-sectional study from a clinic in rural Uganda observed that 40% of the 2,311 patients initiating ART were late presenters and found that male sex, lower education level, and unemployment, among other factors, were associated with a higher likelihood of late ART initiation.²⁴ A recent analysis of 268 HIV care clinics in sub-Saharan Africa found both program level factors (provider to patient ratio, adherence support services, linkages with PMTCT programs, and outreach services) and AIDS knowledge and testing coverage in the general population to be important determinants of low median CD4 counts in populations of persons initiating ART.²⁰ In addition to diminishing the successes of scale-up and its future potential to save lives, the problem of late ART initiation also adds significant burden and costs to care,²⁵ and missed opportunities for secondary HIV prevention due to late diagnosis.^{26–29} It is therefore critical to understand more about the upstream determinants of late ART initiation (eg, determinants of HIV testing and late diagnosis among HIV-positive persons).

The 12-month reported mortality rate of 5% of adults and 7% of children who initiated ART in this study are very high, and almost certainly underestimated due to high numbers of persons LTFU, among whom death rates have been shown to be quite high in sub-Saharan African scale-up programs.^{19,21} Application of a recently described method which attempts to correct mortality estimates for LTFU suggest that the true 12-month mortality rate among patients initiating ART in our study population is probably closer to 13% and 14%, for adults and children, respectively. Taken together, these data underscore that efforts are urgently needed in Mozambique to identify and enroll patients at earlier stages of HIV infection.

The strengths of our study include the fact that the data were derived from routine clinical care from multiple HIV care and treatment clinics from a variety of facility types and from various regions in the country. It also includes information on adult and pediatric patients on ART and those in HIV care. This analysis included 55,014 patients from 28 sites in 5 Mozambican provinces, which represent one-fourth of the approximately 229,000 patients who ever initiated ART in Mozambique across more than 200 sites.^{6,30}

The study also has limitations that motivate caution in interpretation of the findings. First, the clinics included in this analysis were selected for establishment of electronic database and are therefore not representative of all clinics providing HIV care and treatment in Mozambique. Second, some children <18 months who had not yet initiated ART may have been entered into the database with unknown HIV infection status, overestimating the number of HIV-infected children who were receiving care at these sites. Finally, an important limitation is the quality of the data that were derived from service programs including a large proportion of missing data and inability to validate the information. Despite periodic data quality assessments, there was a high proportion of patients with

missing data on WHO stage (32.7% and 33.7%) and CD4 cell count (43.9% and 35.1%) at enrollment in HIV care and ART initiation, respectively. This precluded us from assessing their ART eligibility status, among other things. The reasons for these missing data may include the following: lack of clinical staging, poor documentation of information in the medical chart, poor data entry, lack of CD4 cell count testing (including reagent shortages or machine downtime), or some combination of these factors. Although missing data are a common challenge in large scale service delivery programs, it nonetheless limits the ability to accurately determine a variety of estimates and examine determinants of key outcomes,³¹ requiring the use of missing data methods such as multiple imputation³² (for an example of this technique for baseline CD4 cell count in HIV scale-up). Focused efforts to improve data quality are ongoing and will be critical to provide further insights into HIV care and treatment scale-up in the future. The importance of obtaining complete information during clinical assessments and documentation of all findings in medical records must be emphasized during the training of health care workers.

In conclusion, our analysis documents the success in the enrollment of large numbers of patient in HIV care and on ART. However, several challenges remain. These include high rates of loss to follow-up and death and initiation of ART in the advanced stages of HIV disease among both adults and children. Further efforts are also needed to ensure that accurate and complete data are obtained on all individuals enrolled in the HIV programs. When possible, future analyses of HIV scale-up programs should include an analysis of patients from the pre-ART phase of care, even if key clinical data may be missing on a large proportion of patients.

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FIGURE 1.
 Geographic distribution of the 28 HIV Care and Treatment sites included in the analysis.

FIGURE 2.

A, Overview of enrollment into care for adults and pediatric patients over time. B, Overview of ART initiation for adults and pediatric patients over time.

FIGURE 3.

A, Age pyramid and pregnancy of all patients at ART initiation. B, Age pyramid of pediatric patients at ART initiation.

TABLE 1

Characteristics of the 28 Antiretroviral Treatment Programs in Mozambique Included in the Analysis as of December 2009

	Number of Sites (n = 28)	%
Setting		
Urban	24	85.7
Rural	4	14.3
Type of facility		
Primary	12	42.9
Secondary	11	39.3
Tertiary	5	17.9
Year ART started		
2003	1	3.6
2004	5	17.9
2005	6	21.4
2006	11	39.3
2007	4	14.3
2008	1	3.6
PMTCT services on-site		
Yes	24	85.7
No	4	14.3
CD4 testing		
On-site	15	53.6
Off-site	13	46.4
Active outreach program		
Yes	20	71.4
No	8	28.6
Peer educator services		
Yes	21	75.0
No	7	25.0
Food security support services		
Yes	15	53.6
No	13	46.4

TABLE 2
Demographic and Clinical Characteristics of Adult Patients at Enrollment into Care by Sex

Characteristics	At Enrollment into Care					
	Total		Women		Men	
	n	%	n	%	n	%
Adult patients	144,024	—	94,261	65.4	49,763	34.6
Age (yrs), median (IQR)	32.0	26.0–40.0	30.0	24.0–38.0	36.0	29.0–44.0
Documented pregnancy						<0.001
Yes	—	—	9921	10.5	—	—
Point of entry into care						
VCT	46,608	32.4	29,359	31.1	17,249	34.7
PMTCT	11,741	8.2	11,356	12.0	385	0.8
TB/HIV	1296	0.9	660	0.7	636	1.3
Inpatient	7,012	4.9	4,318	4.6	2,694	5.4
Outpatients	13,224	9.2	7749	8.2	5475	11.0
Other*	10,412	7.2	6,596	7.0	3816	7.7
Missing	53,731	37.3	34,223	36.3	19,508	39.2
Documented prior ARV						
Yes	247	0.2	156	0.2	91	0.2
Marital status						0.449
Single	44,987	31.2	31,696	33.6	13,291	26.7
Married/in union	69,092	48.0	41,224	43.7	27,868	56.0
Widowed	9214	6.4	7,630	8.1	1584	3.2
Other	471	0.3	314	0.3	157	0.3
Missing	20,260	14.1	13,397	14.2	6863	13.8
Years of schooling						
None/very low (< 3 years)	9828	6.8	8016	8.5	1812	3.6
Primary school (4–8 years)	70,088	48.7	45,864	48.7	24,224	48.7
Secondary school or higher (>8 years)	29,297	20.3	16,517	17.5	12,780	25.7
Missing	34,811	24.2	23,864	25.3	10,947	22.0

Characteristics	At Enrollment into Care						P
	Total		Women		Men		
	n	%	n	%	n	%	
Weight for adults, Kg							
Median (IQR)	54.0	48.0–61.0	53.0	46.9–60.0	56.1	50.4–63.0	<0.001
Missing	53,462	37.1	30,665	32.5	17,985	36.1	
Clinical WHO stage							
Stage I	26,498	18.4	20,145	21.4	6353	12.8	<0.001
Stage II	21,243	14.7	14,274	15.1	6969	14.0	
Stage III	40,654	28.2	24,905	26.4	15,749	31.6	
Stage IV	8502	5.9	4619	4.9	3883	7.8	
Missing	47,127	32.7	30,318	32.2	16,809	33.8	
CD4 count (cells/ μ L)							
<100	16,634	11.5	9388	10.0	7246	14.6	<0.001
100–199	15,038	10.4	9411	10.0	5627	11.3	
200–350	19,240	13.4	12,883	13.7	6357	12.8	
350	29,830	20.7	21,580	22.9	8250	16.6	
Missing	63,282	43.9	40,999	43.5	22,283	44.8	
ART eligibility							
Eligible	43,695	30.3	25,943	27.5	17,752	35.7	<0.001
Ineligible	31,061	21.6	22,440	23.8	8621	17.3	
Indeterminate	69,268	48.1	45,878	48.7	23,390	47.0	
Documented TB treatment at enrollment							
Yes	5343	3.7	2607	2.8	2736	5.5	<0.001
Calendar year of enrollment into care							
Before 2005	11,055	7.7	6551	6.9	4504	9.1	<0.001
2005	15,472	10.7	9507	10.1	5965	12.0	
2006	24,084	16.7	15,578	16.5	8506	17.1	
2007	31,497	21.9	21,175	22.5	10,322	20.7	
2008	31,653	22.0	21,167	22.5	10,486	21.1	
2009	30,263	21.0	20,283	21.5	9980	20.1	

Measurements closest to enrollment into care using a window period of 6 months after enrollment.

* Includes youth centers, private clinics, laboratory, and emergency room.
IQR, interquartile range.

TABLE 3

Demographic and Clinical Characteristics of Adult Patients at ART Initiation, by Sex

Characteristics	At ART Initiation					
	Total		Women		Men	
	n	%	n	%	n	%
Adult patients	51,269	—	32,200	62.8	19,069	37.2
Age (yrs), median (IQR)	34.5	28.2–42.7	32.5	27.1–40.2	38.0	31.1–45.5
Documented pregnancy						
Yes	—	—	2235	6.9	—	—
Weight for adults, Kg						
Median (IQR)	53.5	47.0–60.2	52.0	45.5–59.0	56.0	50.0–62.0
Missing	18,066	35.2	11,531	35.8	6535	34.3
Clinical WHO stage						
Stage I	5126	10.0	3741	11.6	1385	7.3
Stage II	6387	12.5	4164	12.9	2,223	11.7
Stage III	17,563	34.3	10,405	32.3	7158	37.5
Stage IV	4915	9.6	2664	8.3	2251	11.8
Missing	17,278	33.7	11,226	34.9	6052	31.7
CD4 count (cells/ μ L)						
<100	11,701	22.8	6,671	20.7	5,030	26.4
100–199	11,365	22.2	7148	22.2	4,217	22.1
200–350	7818	15.2	5135	15.9	2683	14.1
350	2411	4.7	1510	4.7	901	4.7
Missing	17,974	35.1	11,736	36.4	6,238	32.7
ART eligibility						
Eligible	29,175	56.9	17,419	54.1	11,756	61.6
Ineligible	3468	6.8	2442	7.6	1026	5.4
Indeterminate	18,626	36.3	12,339	38.3	6287	33.0
Documented TB treatment at ART initiation						
Yes	2984	5.8	1453	4.5	1531	8.0
Calendar year of enrollment into care						

Characteristics	At ART Initiation						P
	Total		Women		Men		
	n	%	n	%	n	%	
Before 2005	749	1.5	418	1.3	331	1.7	<0.001
2005	3867	7.5	2243	7.0	1624	8.5	
2006	8270	16.1	5081	15.8	3189	16.7	
2007	12,590	24.6	8,007	24.9	4583	24.0	
2008	12,187	23.8	7754	24.1	4433	23.2	
2009	13,606	26.5	8697	27.0	4909	25.7	
Initial ART regimen							
D4T + 3TC + NVP	41,403	80.8	25,740	79.9	15,663	82.1	<0.001
D4T + 3TC + EFV	5457	10.6	3037	9.4	2420	12.7	
AZT + 3TC + NVP	3555	6.9	2,878	8.9	677	3.6	
Others	854	1.7	545	1.7	309	1.6	

Measurements closest to ART initiation using a window period of 6 months before and 1 month after.

TABLE 4

Documented Deaths and LTFU Among Adult and Pediatric Patients by ART Status

	Known To Have Died				LTFU			
	6 Months		12 Months		6 Months		12 Months	
	Estimates	95% CI	Estimates	95% CI	Estimates	95% CI	Estimates	95% CI
Adults								
Never initiated ART	1.4%	1.3% to 1.5%	1.9%	1.8% to 2.0%	46.4%	46.0% to 46.8%	55.4%	55.0% to 60.0%
Eligible	5.5%	5.0% to 6.0%	7.3%	6.5% to 8.1%	69.4%	68.1% to 70.4%	81.1%	80.4% to 82.0%
Ineligible	0.5%	0.4% to 0.6%	0.9%	0.8% to 1.1%	31.9%	31.2% to 32.6%	45.5%	44.8% to 46.3%
Undetermined *	1.0%	0.9% to 1.1%	1.3%	1.2% to 1.5%	47.1%	46.7% to 47.6%	53.9%	53.4% to 54.4%
Initiated ART	3.5%	3.4% to 3.7%	4.9%	4.7% to 5.1%	17.1%	16.7% to 17.4%	22.1%	21.7% to 22.5%
Children								
Never initiated ART	4.7%	4.1% to 5.4%	6.3%	5.5% to 7.1%	44.7%	43.2% to 46.1%	54.1%	55.6% to 52.6%
Eligible	10.7%	8.6% to 13.3%	14.1%	11.3% to 17.4%	60.8%	57.5% to 64.2%	71.3%	68.1% to 74.3%
Ineligible	0.8%	0.3% to 2.3%	1.5%	0.7% to 3.2%	19.6%	16.3% to 23.5%	29.1%	25.2% to 33.4%
Undetermined *	3.8%	3.2% to 4.6%	5.3%	4.4% to 6.2%	44.1%	42.4% to 45.9%	53.3%	51.6% to 55.1%
Initiated ART	4.4%	3.8% to 5.2%	6.5%	5.6% to 7.5%	17.1%	15.8% to 18.5%	20.5%	19.1% to 22.0%

* Patients with not enough information to be classified as ART eligible due to missing data (ie, WHO stage and/or CD4 cell count).

TABLE 5

Demographic and Clinical Characteristics of Pediatric Patients at Enrollment into Care and at ART Initiation

Characteristics	At Enrollment into Care		At ART Initiation	
	(n = 10,164)		(n = 3,745)	
	n	%	n	%
Age (yrs), median (IQR)	2.0	0.9–5.0	2.7	1.3–6.1
Sex				
Female	5,315	52.3	1,899	50.7
Male	4,849	47.7	1,846	49.3
Clinical WHO stage				
Stage I	1,443	14.2	267	7.1
Stage II	1,434	14.1	479	12.8
Stage III	2,090	20.6	1,071	28.6
Stage IV	431	4.2	273	7.3
Missing	4,766	46.9	1,655	44.2
CD4 count (cells/ μ L) *				
<100	237	9.1	66	2.7
100–199	152	5.8	92	3.7
200–350	267	10.3	200	8.1
350	937	36.0	1,200	48.6
Missing	1,009	38.8	909	36.8
HIV-associated immunodeficiency †				
No evidence of suppression (< 25%)	710	9.4	124	5.0
Moderate suppression (15% to <25%)	1,198	15.8	498	20.2
Severe suppression (<15%)	1,030	13.6	702	28.5
Missing	4,624	61.1	1,143	46.3
Malnutrition				
Not malnourished (Z score > -2)	2,522	24.8	1,444	38.6
Moderately malnourished (-3 < Z score < -2)	792	7.8	428	11.4
Severely malnourished (Z score < -3)	1,805	17.8	810	21.6
Missing	5,045	49.6	1,063	28.4
Documented TB treatment at enrollment				
Yes	191	1.9	121	3.2
Calendar year of enrollment into care				
Before 2005	287	2.8	6	0.2
2005	721	7.1	151	4.0
2006	1,602	15.9	476	12.7
2007	2,607	25.9	905	24.2
2008	2,160	21.4	914	24.4
2009	2,707	26.8	1,293	34.5

Characteristics	At Enrollment into Care		At ART Initiation	
	(n = 10,164)		(n = 3,745)	
	n	%	n	%
Initial ART regimen				
D4T + 3TC + NVP	—	—	2,051	54.7
AZT + 3TC + NVP	—	—	1,053	28.1
D4T + 3TC + EFV	—	—	259	6.9
Others	—	—	381	10.2

Measurements closest to enrollment into care using a window period of 6 months after enrollment

* For pediatric patients >5 years old.

[†] For pediatric patients <5 years old.