ART attrition across health facilities implementing Option B+ in Haiti

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Abstract

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Background: In 2015, the first study on retention that included pregnant women in Haiti showed that Option B+ clients had 1.5 fold excess risk of attrition at 12 months of ART initiation compared to other ART patients. Describing the variation of ART retention across Haiti and exploring health facility-level factors related to high attrition are important in order to improve implementation of the Option B+ strategy in Haiti.

Methods: This retrospective cohort study is based on information collected on iSanté, the largest electronic medical record in the country. I described the variability of ART retention across health facilities among pregnant and lactating women enrolled on ART from October 2012 to December 2013. I assessed for differences in ART retention between Option B+ clients and other ART patients and described the variability of this comparison across health facilities. Finally, I used generalized estimating equations to assess the association between health facility factors and risk of attrition, after controlling for individual-level risk factors.

Results: During the study period, 1,989 Option B+ clients were enrolled on ART in 45 health facilities. The percentage of attrition varied from 9% to 71% across the facilities. More than 40% of the health facilities had a statistically significant excess risk of attrition among Option B+ clients compared to other adults enrolled on treatment in those facilities. After adjusting for both individual-level and facility-level risk factors, the largest health facilities (those that enrolled more than 55 patients) had 38% higher risk of attrition (RR 1.38, 95% CI 1.08-1.77, p-value=0.009) compared with the smallest facilities. Compared to public health facilities, private institutions had 18% less risk of attrition (RR 0.82, 95% CI 0.70-0.96, p-value=0.020). Health facilities located in the West department and the south region had lower risk of attrition than those located in the north region.

Conclusion: The study demonstrated high facility-level variability and significant risk factors associated with high attrition among Option B+ clients. Moreover, as attrition was higher in Option B+ clients than other adults on ART across a majority of health facilities, retention on treatment is a major concern for PMTCT programs in Haiti. The implementation of the Option B+ strategy must be re-evaluated throughout the country in order to effectively eliminate mother-to-child HIV transmission and prevent the emergence of drug resistance.

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I also thank Orvalho Augusto and Jean Wysler Domerçant for their time and their wise advice.

DEDICATION

I dedicate my thesis

To my beloved husband, Rubens, a divine gift in my life

To my wonderful children, Ariel and Kevin, the source of my motivation

To my dear parents Molière and Solange Pamphile for their love and support

BACKGROUND

With an HIV prevalence of 2.2%, Haiti is one of the six countries in the Latin and Caribbean region with a generalized HIV epidemic [1]. In recent years, Haiti's national HIV program has achieved many improvements that contributed to a stabilization of the epidemic according to recent reports [2, 3]. ART service availability expanded from 41 sites in 2008 to 131 in 2013 [4]. Prevention of mother-to-child transmission of HIV (PMTCT) services expanded from 36 sites in 2004 to 137 in 2013 [5]. Increased coverage of ART and PMTCT services contributed to an improvement of patient survival and a reduction of new HIV infections from mother to child [6].

In June 2011, at the UN General Assembly High Level Meeting on AIDS, Haiti adopted the declaration on intensifying the efforts to eliminate HIV/AIDS [7]. This statement included a commitment to work towards the elimination of mother-to-child transmission (eMTCT) of HIV by 2015. During the same period, July 2011, Malawi implemented an innovative approach that increased the number of HIV-positive pregnant and breastfeeding women who started ART [8]. This strategy, called Option B+, removed the barrier of requiring a CD4 cell count to determine eligibility for treatment vs. prophylaxis among HIV-positive pregnant women. Following this experience in 2012, the national HIV program of Haiti updated guidelines for care for pregnant women to accelerate HIV testing among pregnant women and early treatment of all HIV-positive pregnant women. With the adoption of the Option B+ strategy, ART for HIV-positive pregnant and lactating women was no longer limited to prophylaxis during pregnancy and the breastfeeding period, but was offered as life-long treatment regardless of CD4 count.

Studies in countries implementing Option B+ show an increased coverage of ART treatment initiation among pregnant and lactating women [8, 9]. However, retention on treatment is an ongoing challenge [10, 11, 12]. Indeed, continuity of the treatment is critical

for reducing risk of HIV transmission to others, and retention in care is one of the early warning indicators (EWI) established by the World Health Organization (WHO) to monitor HIV drug resistance [13]. Monitoring EWIs informs national HIV programs of situations and practices that might favor the emergence of HIV drug resistance and provides an opportunity to take corrective actions.

In Haiti, studies on retention [14, 15] are regularly conducted at the national level to provide the national HIV program and its non-governmental implementing partners adequate information to monitor the program and prevent the emergence of resistance to ART. In a national study, the Haitian Ministry of Health (MSPP) described the retention of the cohort of ART patients who started treatment in 2011. The retention rate was 73.3% of ART patient retention rate at 12 months. Among the 26.7% of patients who were inactive, 62% were lost to follow up and 23% had died [15]. Following the application of the Option B+ strategy in Haiti, another study on retention that included pregnant women was reported by Domerçant et al [16]. Comparing ART attrition among men, non-pregnant women and Option B+ clients, the study showed that Option B+ clients had 1.5 fold excess risk of attrition at 12 months compared to other adults (RR=1.47, 95% CI 1.37-1.58, p=<0.001) [16]. This Option B+ retention study highlighted several risk factors associated with high attrition, including younger age, rapid initiation in ART after HIV diagnosis, initiation of ART late in pregnancy, less advanced HIV disease state and no uptake of counseling services. A contemporaneous mixed-method study led by the MSPP, involving interviews with health care providers and women who were lost to follow up in the PMTCT cascade, grouped reasons that led to ART discontinuation in two categories [17]. Community factors included transportation fees, distance to health facility, beliefs, lack of food and moving. Institutional factors grouped side

effects, waiting time, concerns about lack of confidentiality and inhospitable clinic as barriers to retention on ART [17].

This analysis uses the same cohort as the study by Domerçant et al [16] to measure and explain the differences in retention across facilities. I will: 1) describe the variability of ART retention across health facilities among pregnant and lactating women enrolled on ART from October 2012 to December 2013 in 45 health facilities in Haiti; 2) assess for differences in ART retention between Option B+ clients and other ART patients and describe the variability in this comparison across health facilities; and 3) explore facility-level factors associated with ART retention among Option B+ clients.

METHODS

Study setting

Haitian health facilities offering ART services began implementing Option B+ in October 2012. Haiti adopted Option B+ in its national guidelines in the following ways:

- The initiation of life-long treatment immediately after the confirmation of a HIV-positive test of a pregnant or lactating woman;
- The availability of CD4 results no longer required to start lifelong ART among pregnant or lactating women; and
- The ART regimen TDF/3TC/EFV as the first choice for ART initiation.

In Haiti, health facilities that provide ART use one of the three available electronic medical records (EMR) to register patient visits. iSanté, the largest EMR, covers 71 out of the 131 national ART facilities which are located in 9 of the 10 health departments of the country [18]. The proportion of patients newly enrolled on ART in the iSanté EMR represents 70% of

the national ART enrollments. Among the 71 sites, I selected those that enrolled at least 10 pregnant women on ART between October 2012 and December 2013. Forty-five sites met this criterion. I conducted a retrospective cohort study using de-identified data extracted from the iSanté central server located at the Ministry of Health.

Study population

I collected information on all Option B+ clients and other patients enrolled on ART within the study period in the 45 heath facilities and the characteristics of these health facilities. Patients who did not have a registered age or sex were excluded from analysis. I used the date the patient picked up ART at the pharmacy for the first time to determine the date of enrolment on ART. I followed up the patients by registering all pharmacy visits for ART pick-ups during the year following the starting date of their antiretroviral treatment. Attrition, defined as a documented death or a patient lost to follow up (LTFU), was the outcome of the study. The patients LTFU were those who were not reported as deaths or transfers and who did not have evidence of having received ART within the time window from 270 to 365 days following the date of their ART initiation.

Data analysis

Many factors might determine health behavior by motivating a patient to seek care or by impeding this behavior to occur. In his model of health services utilization, Andersen grouped those factors into two large categories: The population and the environment characteristics [19]. According to the variables available on the EMR, I was able to collect population characteristics such as:

- Clients demographics: age, marital status

- Clients clinical information: WHO stage, number of days for ART initiation after HIV test, regimen, TMS and TB prophylaxis
- Clients laboratory results: CD4 count, hemoglobin
- Clients follow up: number of counseling sessions

The environment characteristics available on the EMR were:

- The size of the health facilities. The 45 study health facilities were divided into four groups by the number of Option B+ clients enrolled during the study period
- The network the health facility belongs to according to the NGO/MOH partner that supervises the health facility: In Haiti, all health facilities that provide ART services are supervised by a NGO or other institution partner of the Ministry of Health (MOH). In this study, there were nine MOH partners that were responsible of the ART program management of the 45 sites. The MOH partners that supervised at least six health facilities among the selected facilities were separately included in the analysis. The MOH partners that supervised five or fewer health facilities enrolled in the study were categorized as other.

I collected other environment factors from the Service Provision Assessment (SPA) data set and the national master health facility list (MHFL) [20, 21]:

- The type of health facility: There were three types of health facility (public, faith-based and private)
- The department where facilities were located: The nine departments included in the study were categorized in three regions (Figure 1)

a-Grand Nord grouped the sites located in North, North West, North East and Artibonite.

b-Ouest included only the sites of the West department

c-Grand Sud grouped the sites located in Grand Anse, South, South East and Nippes

Figure 1: Map of Haiti's 10 departments

▪Other specific geographical location: Urban or rural

▪ The level of organization of the institution: The structure of the Haitian health system has three levels of organization (Figure 2) [22]. The primary level includes first-level health facilities with or without bed and referral community hospitals. The second level includes the 10 department hospitals. The third level includes the university hospitals of the country. In this analysis, because of the small number of Level 3 health facilities in the dataset, I grouped Level 2 and 3 facilities together and compared them with Level 1 facilities.

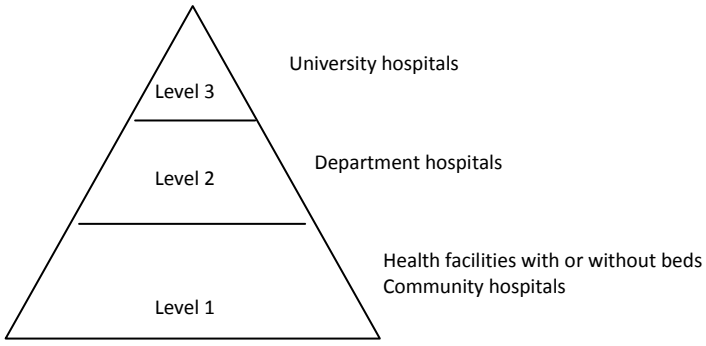

Figure 2: Haiti's pyramid of health care

To describe the study population, I determined the medians and interquartile ranges (IQRs) for the continuous variables (age, CD4, number of days for ART initiation after HIV test). I provided the percentage of pregnant women for each categorical variable (WHO stage, marital status, number of counseling sessions, regimen, TB and TMS prophylaxis).

To illustrate the pattern of attrition of Option B+ clients across health facilities, I plotted the attrition level by health facility with confidence intervals. Then, I compared the percentage of attrition among Option B+ clients with that of other adults, and calculated the relative risk of attrition by patient group with 95% confidence intervals.

Finally, to assess the relationship of facility variables with the risk of attrition, after adjusting for individual-level patient risk factors, I used a multivariable generalized estimating equations model with a Poisson family distribution, a log link, and robust standard errors. This type of model provides sound estimates of the population-averaged effect of each covariate, and accounts for the correlated nature of the individual patient records at the level of each health facility. In the multivariable analysis I included all health facility characteristics and all patient characteristics previously described. I calculated the relative risk and 95% confidence intervals to determine an association between a variable with the outcome. The level of significance was set at a p-value of < 0.05. I used Stata 12[1] to conduct the data analysis.

Ethical review

The study involved secondary analysis of de-identified patient data and was granted a non-human subjects research exemption by the University of Washington Human Subjects

[1] Stata Corp, College Station, TX

Division. The study took place with approval of the US Centers for Disease Control and Prevention and the National Bioethics Committee of the Haiti Ministry of Health.

RESULTS

Table 1 shows the characteristics of pregnant women in the study cohort. The study population included 1,989 Option B+ clients with a median age of 28 years old (IQR: 23 - 33).

Clinically, among the 68% of Option B+ clients with a registered WHO stage, 92% were at stage I/II. In regards to the timeliness of initiating Option B+ clients on ART, among the 76% of clients with a registered date of HIV test, about 34% started ART the same day as the result of their HIV test. Cumulatively, 54% of them initiated the treatment within one week after the result of their HIV test. Following the guidelines of the national HIV program, 98.8% of the cohort were placed on treatment using one of the first-line regimens. Tenofovir + lamivudine + efavirenz (TDF/3TC/EFV) was the first choice regimen for initial ART used (80.8%). 66% of the Option B+ clients received trimethoprim/sulfamethoxazole (TMS) prophylaxis.

Among 60% of women who had a baseline CD4 available, the median CD4 count was 496 cells/µl (IQR: 331- 678). Among the 49% of women who had a hemoglobin concentration available, 27% had a moderate or severe anemia.

I found that 87% of the women were enrolled without a registered counseling session.

Table 1: Characteristics of Option B+ clients

Total pregnant women	1,989
	Number (%)
I-Client demographics:	
1-Age group	
Median age (IQR)	28 (23 - 33)
<= 25 years	617 (31.0)
26 – 35 years	1,016 (51.1)
> 35 years	356 (17.9)
2-Marital status	
In union	1,310 (65.9)
Single/Widow/divorce	297 (14.9)
Missing/Unknown	382 (19.2)
II-Client clinical information	
1-WHO stage	
Stage I/II	1,242 (62.5)
Stage III/IV	104 (5.2)
Missing	643 (32.3)
2-Number of days for ART initiation after HIV test	
Median (IQR)	5 (0 – 116)
Same day	516 (26.0)
1-7 days	306 (15.4)
>7 days	697 (35.0)
Missing	470 (23.6)
3-Regimen	
TDF-3TC-EFV	1,608 (80.8)
All Others	381 (19.2)
4-TMS prophylaxis	
No	674 (33.9)
Yes	1,315 (66.1)
5-TB prophylaxis	
No	1,501 (75.5)
Yes	488 (24.5)
III-Laboratory results	
1-cd4	
Median CD4 (IQR)	496 (331 – 678)
<=350	341 (17.1)
> 350	871 (43.8)
Missing	777 (39.1)
2-Hemoglobin (Hb)	
Normal Hb/mild anemia	707 (35.6)
Moderate/severe anemia	265 (13.3)
Missing	1,017 (51.1)
IV-Client follow up	
Number of counseling sessions	
No session	1,740 (87.5)
>1 session	249 (12.5)

Half of the 45 health facilities enrolled fewer than 35 patients during the period (IQR 24 – 55). Table 2 presents health facility characteristics. 40% of the facilities were public institutions. More than a third of health facilities were located in the West department (36%). The facilities were more likely to be located in an urban area (82%), and to be of Level 1 category (58%).

Table 2: Site characteristics

	Number of sites (%)	Number of patients (%)	Percentage of attrition (%)
1-Size of health facility			
10-25	13 (28.9)	235(11.8)	40
26-35	12 (26.7)	362 (18.2)	38
36-55	9 (20.0)	408 (20.5)	43
>55	11 (24.4)	984 (49.5)	51
2-Type of health facility			
Public	18 (40.0)	948(47.7)	48
Faith-based	14 (31.1)	435 (21.9)	41
Private	13 (28.9)	606 (30.5)	46
3-Department			
Grand Nord	20 (44.4)	743 (37.4)	48
Ouest	16 (35.6)	964 (48.5)	46
Grand sud	9 (20.0)	282 (14.2)	40
4-Geographic location			
Rural	8 (17.8)	239 (12.0)	33
Urban	37 (82.2)	1750 (88.0)	48
5-NGO network			
A	12 (26.6)	695 (34.9)	45
B	7 (15.6)	174 (8.7)	32
C	7 (15.6)	265 (13.3)	45
D	6 (13.3)	228 (11.5)	54
Other	13 (28.9)	627 (31.5)	48
6-Level of organization			
Level 1	26 (57.8)	1003 (50.4)	44
Levels 2 and 3	19 (42.2)	986 (49.6)	48

There was a large difference in the level of attrition after 12 months among Option B+ clients, which varied from 9% to 71% across the 45 health facilities. 14 sites (31.1%) had 50% or more cases of attrition among their Option B+ clients. Only three sites (6.6%) were

able to reach WHO's target of maintaining more than 75% of their cohort on treatment for one year (Figure 3).

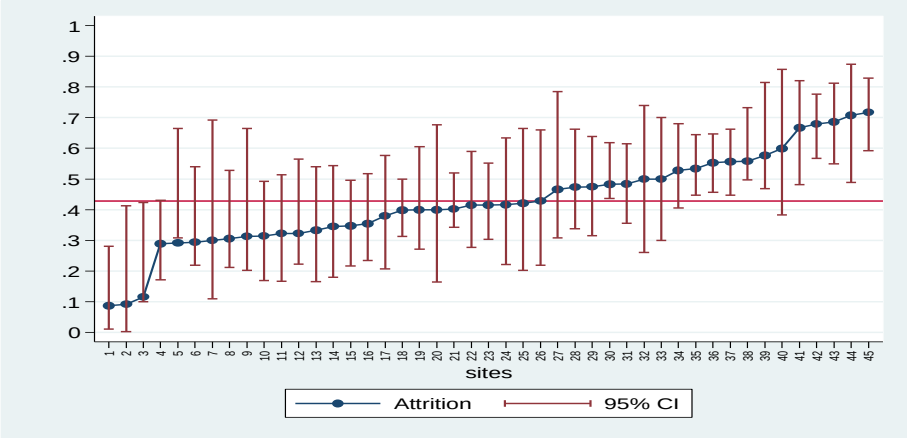

Figure 3: Attrition rate across health facilities[2]

Forty health facilities (89%) had a higher risk of attrition among Option B+ clients compared to other adults on treatment (Figure 4). In the five health facilities where the percentage of attrition was higher in other adults compared to Option B+ clients, the difference of attrition between both groups was not statistically significant. In contrast, among the 40 health facilities with higher attrition among Option B+ clients, in 19 of the 40 facilities (nearly 50%), the difference was statistically significant.

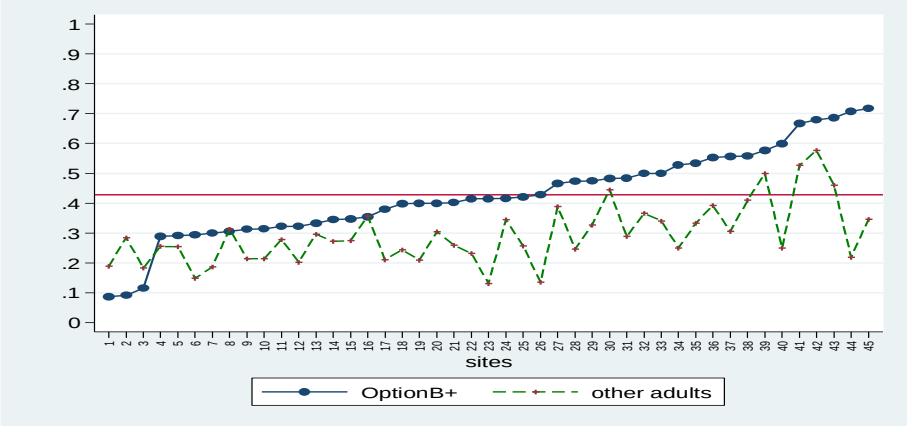

Figure 4: Comparison of attrition rate between Option B+ clients and other adults across health facilities[2]

[2] Red line: mean attrition

Figure 5 shows the relative risk of attrition for Option B+ clients compared with all other adults enrolled on ART, which varied from 0.27 to 5.51. Among the 14 health facilities that had 50% or more of their cohort no longer on ART after 12 months, eight (57%) had a significant difference of the risk of attrition for Option B+ clients compared to other adults enrolled on treatment at the same health facilities.

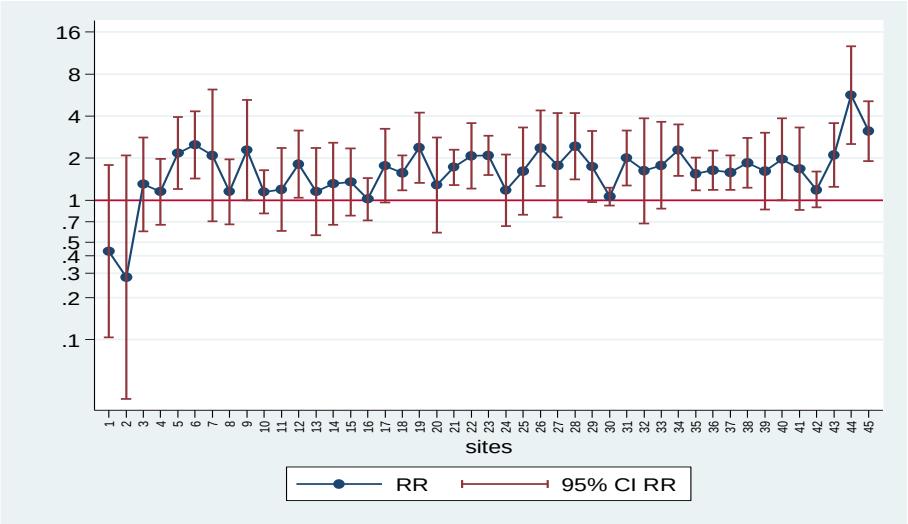

Figure 5: Relative risk of attrition for Option B+ clients compared to other adults[3]

In the multivariable analysis, the largest health facilities (those that enrolled more than 55 Option B+ clients) had 38% more risk of attrition (RR 1.38, 95% CI 1.08-1.77, p-value=0.009) compared with the smallest health facilities (10 to 25 Option B+ clients). Compared to public health facilities, faith-based and private institutions had respectively 18% (RR 0.82, 95% CI 0.70- 0.96, p-value=0.020) and 23% (RR 0.77, 95% CI 0.65- 0.93, p-value=0.006) less risk of attrition.

Health facilities located in the West department and the south region had significantly lower risk of attrition than those located in the north region, respectively (RR 0.74, 95% CI 0.64-0.85, p-value=<0.001); (RR 0.69, 95% CI 0.52-0.90, p-value=0.007). There was a

[3] Red line: null value

substantial significant difference between attrition among three MOH partner networks. Compared to network A, network C had 51% higher risk of attrition (RR 1.51, 95% CI 1.19-1.91, p-value=0.001) and network D had more than 100% higher risk of attrition (RR 2.14, 95% CI 1.59-2.87, p-value<=0.001). Location in urban vs. rural areas and Level of facility within the Haitian health system pyramid were not significantly associated with attrition in this study.

Table 3a: Facility characteristics and risk factors associated with attrition

	Number of sites (%)	Number of patients (%)	Relative Risk	p-value	95% Confidence interval
1-Size of health facility					
10-25	13 (28.9)	235 (11.8)	reference		
26-35	12 (26.7)	362 (18.2)	1.04	0.745	(0.81, 1.32)
36-55	9 (20.0)	408 (20.5)	1.12	0.353	(0.87, 1.43)
>55	11 (24.4)	984 (49.5)	1.38	0.009	(1.08, 1.77)
2-Type of health facility					
Public	18 (40.0)	948 (47.7)	reference		
Faith-based	14 (31.1)	435 (21.9)	0.82	0.020	(0.70, 0.96)
Private	13 (28.9)	606 (30.5)	0.77	0.006	(0.65, 0.93)
3-Department					
Grand Nord	20 (44.4)	743 (37.4)	reference		
Ouest	16 (35.6)	964 (48.5)	.74	<0.001	(0.64, 0.85)
Grand sud	9 (20.0)	282 (14.2)	.69	0.007	(0.52, 0.90)
4-Geographic location					
Rural	8 (17.8)	239 (12.0)	reference		
Urban	37 (82.2)	1750 (88.0)	1.06	0.647	(0.82, 1.37)
5-NGO Network					
A	12 (26.6)	695 (34.9)	reference		
B	7 (15.6)	174 (8.7)	1.18	0.318	(0.84, 1.67)
C	7 (15.6)	265 (13.3)	1.51	0.001	(1.19, 1.91)
D	6 (13.3)	228 (11.5)	2.14	<0.001	(1.59, 2.87)
Other	13 (28.9)	627 (31.5)	1.35	<0.001	(1.18, 1.55)
6-Level of organization					
Level 1	26 (57.8)	1003 (50.4)	reference		
Levels 2 and 3	19 (42.2)	986 (49.6)	1.14	0.049	(1.00, 1.31)

Several individual-level factors showed significant associations with attrition. Protective effects included: older age (RR 0.97, 95% CI 0.96-0.98, p-value=<0.001);

enrolment on ART at least one day after the date of the HIV test (RR 0.82, 95% CI 0.71-0.94, p-value=0.006); realization of counseling sessions before enrolment on ART (RR 0.81, 95% CI 0.74-0.89, p-value= <0.001); prescription of TMS prophylaxis (RR 0.88, 95% CI 0.78-0.99, p-value=0.043). Having a moderate/severe anemia was a risk factor (RR 1.23, 95% CI 1.04-1.44, p-value=0.011).

Table 3b: Patient factors included in the multivariable analysis and association with attrition

	Relative Risk	p-value	95% Confidence interval
Age at enrollment	0.97	<0.001	(0.96, 0.98)
Marital status: in union vs not	0.89	0.129	(0.77, 1.03)
HIV treatment regimen TDF/3TC/EFV vs others	0.97	0.743	(0.84, 1.12)
Anemia: No anemia/mild vs moderate/severe	1.23	0.011	(1.04, 1.44)
Time between HIV test and ART initiation			
Same day	reference		
Within 1 week	0.82	0.006	(0.71, 0.94)
>1 week	0.82	0.011	(0.71, 0.95)
WHO stage I/II vs III/IV	1.01	0.838	(0.84, 1.22)
Pre ART counseling	0.81	<0.001	(0.74, 0.89)
TB prophylaxis	0.94	0.385	(0.83, 1.07)
TMS prophylaxis	0.88	0.043	(0.78, 0.99)

DISCUSSION

This study showed that, like several other countries [9, 10, 11], Haiti is experiencing challenges related to retention on HIV treatment among Option B+ clients. Overall, 46% of Option B+ clients were no longer on treatment one year after the initiation of ART. This result is far above the national rate of 27% of 12-month attrition among all newly-enrolling adult ART patients. The analysis by Domerçant et al demonstrated many risk factors associated with high attrition including younger age, rapid initiation in ART after HIV diagnosis, initiation of ART late in pregnancy, less advanced HIV disease state and no uptake of counseling services [16]. The contemporaneous mixed-methods study by the MOH identified community and institutional factors that influenced Option B+ clients to

discontinue their treatment [17]. This analysis provided additional information by describing variability in the attrition phenomenon across health facilities and by analyzing associated health facility factors. I observed an extremely high variability between health facilities in attrition among Option B+ clients. The size of the site, the category, the region and the MOH partner network were important factors affecting retention. Indeed, the largest health facilities, the public facilities and the facilities located in the north region were more likely to have higher attrition among their cohort compared with small, faith-based or private institutions located in the south or west regions.

Another particularity of this study was the comparison of retention among Option B+ clients and other adults enrolled on treatment at the same period to determine if higher or lower attrition levels were consistent across all groups of patients. The finding, that a large number of health facilities (19/45, or 42%) had significantly higher levels of attrition among Option B+ clients compared to other adults, indicates that there are unique challenges to successfully treating pregnant and lactating women on ART.

Analyzing retention of other adults enrolled on treatment at the same period, I observed a contrast in patients' retention within the same health facilities. Many health facilities were not able to reach the same level of performance in regard to both other adults and pregnant/lactating women enrolled on treatment. After the diffusion of the new PMTCT norms, health facilities had the responsibility to determine the best way to implement the strategy. Few of them succeeded. A lot might be learned from the health facilities which were "positively deviant"- those that had a very low attrition and those where there were no disparities between B+ and other adults. Studying these sites could reveal best practices which could be taken up by other sites.

This study also provided information about the extension of the application of the new PMTCT norms. Compliance with PMTCT norms was modest, with room for improvement.

Use of recommended first line regimens was high, but only a little more than half of clients with known HIV testing dates were started on ART within one week of their test. In regard to the timeliness of the treatment initiation, I observed that almost a quarter of the Option B+ clients did not have a registered date for their HIV test (23.6%). The missing values might be related to the lack of connection between VCT and ART services. Indeed, in Haiti, iSanté EMR is used for longitudinal medical records after the patient enrolls in the HIV care and treatment program and is not the main data system for VCT services. The date of a positive HIV test may not be routinely available from VCT service sites so that it can be entered within the EMR.

As in this study, other countries that have analyzed attrition among their Option B+ cohorts have also described the variability of ART retention across health facilities. In Malawi, the difference of ART attrition varied from 4% to 29% across 141 health facilities after a period of six months [23]. In Mozambique, the difference of ART attrition between 6 health facilities ranged from 5% to 32% after 90 days [24]. In this analysis, I observed a difference that varied from 9% to 71% across health facilities after one year. I did not assess PMTCT coverage following the implementation of the Option B+ strategy. However, this study showed that most of the facilities had difficulties to maintain Option B+ clients on treatment which might impact the goals of eliminating new pediatric HIV infections, ensuring maternal health and preventing sexual transmission of HIV.

Several findings from the multivariable analysis are consistent with a study done in Malawi. The Malawi study of facility and individual level factors related to being lost to follow up (LTFU) after 6 months of ART found higher attrition in large health facilities and those managed by the Ministry of Health than small, faith-based, private facilities. Contrarily

to Malawi, this study did not find any association between attrition and the category of health facility (Level 1 or Levels 2 and 3) or site's location in urban or rural region, after controlling for other covariates [6].

This study has a few limitations. Though iSanté is the largest EMR in Haiti, the findings cannot be generalized to the national level. Moreover, data quality in terms of low completeness of data or under-reported transfers might have led more patients to be classified as LTFU in some sites more than others. Also, the factors I analyzed are not exhaustive. Based on Andersen model, other factors might have influenced the implementation of the strategy. Among the population characteristics, some unmeasured factors are the income/occupation, education, family, geographic access, health and cultural beliefs and social support. Among environment characteristics, other unmeasured factors are the Human resources available to provide the service, the tracking of patients and the integration of services (ANC/ART).

Although I was able to analyze many individual and facility-level factors, I did not have the ability to analyze the organization of the services in health facilities, a potentially important factor which might explain better performance in some facilities compared to others. In Haiti, PMTCT services are organized differently depending on the health facility. 56% of antenatal clinics (ANC) with the capacity to offer HIV testing do not provide ART services [20]. Therefore, those clinics refer HIV+ women to other sites for ART initiation. In other health facilities, there is a lack of integration of PMTCT services in ANCs [25]. A study in Malawi took into consideration the model of care when assessing the performance of health facilities [23]. The study showed that highest retention rates among HIV-positive

pregnant and lactating women occurred when the women initiated their ART in dedicated ART programs (in facilities both with and without ANC services), rather than when women initiated ART within the ANC setting and were later expected to transfer care to an ART clinic for follow up. Further study of the role of organization of services in Option B+ client retention is needed in Haiti.

Lastly, this analysis showed that nearly 90% of clients lacked record of an ART counseling session before ART initiation. According to the norms, an ART adherence counseling session must be done before the initiation of the treatment. The electronic version of the counseling form is available in the EMR to be filled out for each patient. Unfortunately, I cannot determine the percentage of counseling sessions done and not registered and the percentage of clients who did not receive a counseling session.

Using results and recommendations available from previous studies, Haiti's national HIV program should discuss with the MOH partner networks a re-organization of the services in terms of tracking of missed visits, adequacy of human resources, quality and realization of counseling and education sessions. According to the results of this study, even though the program should prioritize large, public sites located in the North region, appropriate interventions should be planned in all health facilities to increase patient treatment adherence and improve health outcomes.

The national HIV program recently updated norms of HIV care to offer long-life antiretroviral treatment to all HIV+ adults and adolescents regardless of their CD4 count [26]. As learned from the implementation of the Option B+ strategy, the diffusion of new norms must be supported by adequate evaluations of resources available and constraints in the organization of the services in order to strengthen the health system to ensure the continuity of

a quality service to the population. In Haiti, the methodology HIVQUAL/ HEALTHQUAL [27] had helped achieve a great improvement in quality of care in the HIV program. With the availability of EMR in all health facilities, a quarterly follow up of cohort of patients is feasible. Therefore, in addition to feedback from yearly evaluations, health facilities must be encouraged to consider retention on treatment as an indicator for quality improvement projects.

CONCLUSION

Analyzing attrition among 45 health facilities implementing Option B+, this study revealed that retention on HIV treatment was a general concern among the Option B+ clients in Haiti. Only three of the sites (7%) had less than 25% attrition at 12 months among Option B+ clients. 19 sites (42%) had a significantly greater relative risk of attrition among Option B+ clients compared with other adults. In the most extreme case of disparity, the excess risk of attrition among Option B+ clients reached 5 times the risk of attrition of other adults on treatment. In the adjusted analysis, public, largest health facilities and those located in the northern region of Haiti were more likely to have higher attrition. The organization of care services in PMTCT health facilities might be associated with attrition among Option B+ clients, but further research is needed in order to identify adequate models of care and guide the elaboration of new policy recommendations.

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