

## Background and Objectives

The influence of patients' characteristics on disparities in the HIV care continuum may vary following national organizations.

We investigated whether age, gender and place of birth have an impact in the HIV care continuum in France, a country with universal free healthcare system.

## Study Population

Information was collected from 18 centers in France participating in the Dat'AIDS cohort. The authors did not have access to any patient-identifying information as part of this work.

For the purpose of this study, we included adults (≥18 years old) with a first HIV diagnosis between 1 January 2013 and 31 December 2017 participating in the cohort since their first medical encounter.

The following data were extracted: age, gender, route of HIV acquisition, place of birth (France or abroad, abroad being South Saharan Africa in over 80% of the cases), CD4 cell count at the time of HIV diagnosis, date of AIDS diagnosis where appropriate, all dates and values of CD4 T cells and viral load assessments, all dates of starting or stopping ART and all dates of medical visits during the study period. Entry into HIV care was defined as the date of HIV diagnosis.

## Outcomes

We focused on care continuum outcomes subsequent to linkage to care. We were interested in seven care continuum stages in our analysis (see figure's legend). From these seven stages, we estimated the mean percentage of person-time spent for three main care stages (i) in care, (ii) on ART, and (iii) on ART and virally suppressed. The stage 'In care' was defined as having at least one HIV care visit, CD4 count, or viral load measures within 12 months. Consequently, loss to care (LTC) was defined as having no such visit or measures within 12 months. 'On ART' was defined as being in care and having been prescribed any combination of at least three antiretroviral agents whatever the regimen used. Viral suppression was defined as receiving an antiretroviral regimen and having a viral load below 50 copies/mL at the most recent measurement within the last 12 months. We stratified death and loss to care by whether they occurred before or after ART initiation.

## Statistical Analysis

We estimated the nonparametric cumulative incidence from enrollment to the nine following events: ART initiation; Death before ART initiation; Death after ART initiation; Engagement in HIV care before ART initiation; Engagement in HIV care after ART initiation; Lost-To-Care before ART initiation; Lost-To-Care after ART initiation; Viral suppression (ie, viral load ≤50 copies/mL); and Loss of viral suppression (ie, viral load >50 copies/mL after initial viral suppression [or disengagement from care while virally suppressed or death]).

Estimation of cumulative incidence functions in the presence of competing risks was estimated using the nonparametric version of the Fine and Gray model. Competing risks appear in dedicated table.

We estimated differences in the five-year restricted mean percentage of person-time spent in the three final HIV care continuum stages comparing men versus women, patients born in France versus born abroad, men who have sex with men (MSM) versus men who have sex with women (MSW), MSM versus women, and MSW versus women.

Stabilized inverse probability weighting (IPW) was used to balance distribution of the following potentially confounding factors among patients born in France or abroad: age, CD4 cell count at the time of diagnosis, interruption of the first ART during the first two weeks (yes/no) and AIDS defining event in the first six months after HIV diagnosis (yes/no).

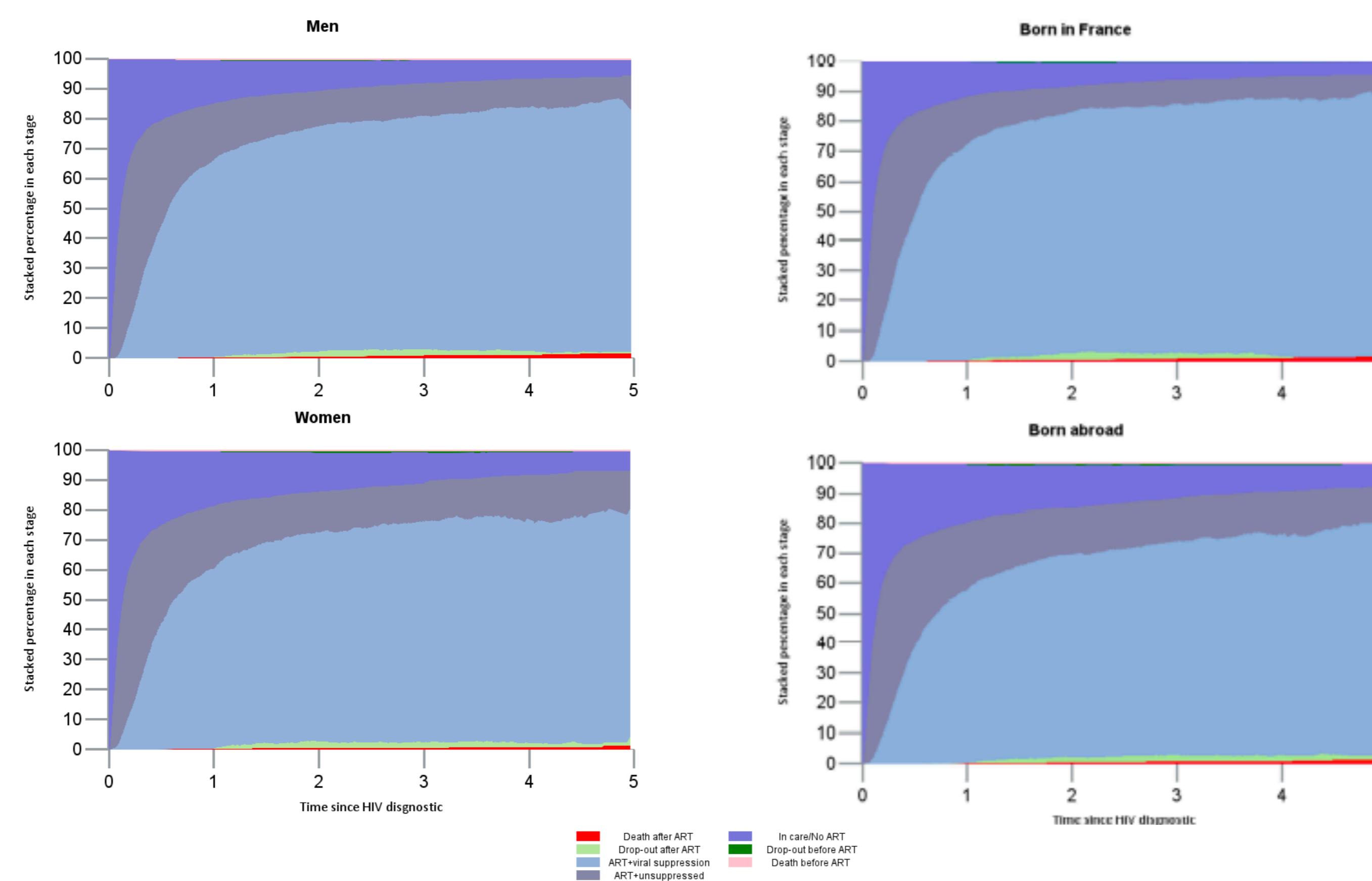
Analyses were either age-stratified or using a double stratification (stratified by sex and age, country of birth and age and sexual acquisition risk and age).

Competing events	Definition	Competing with:
ART Initiation	Date of ART initiation	Death before ART initiation
Death before ART initiation	date of death before ART initiation	ART initiation
Death after ART initiation	date of death after ART initiation	Death before ART initiation
Engagement in care before ART initiation	date of first HIV care visit, CD4 or VL before ART initiation and after a possible lost to care event	ART initiation and Death before ART initiation
Engagement in care after ART initiation	date of first HIV care visit, CD4 or VL after ART initiation and after a possible lost to care event	Death before and after ART initiation
Lost to care before ART initiation	More than 12 months after last date of HIV care visit, CD4 or VL assessment, before ART initiation	ART initiation and death before ART initiation
Lost to care after ART initiation	More than 12 months after last date of HIV care visit, CD4 or VL assessment, after ART initiation	Death before and after ART initiation
Viral suppression	Date of VL <50 copies/ml after ART initiation	Death before and after ART initiation
Loss of viral suppression	Date of VL >50 copies/mL or date of death or date of lost to care after ART initiation and viral suppression	Death before and after ART initiation

## Results

Patients' characteristics at entry	Sex		Place of birth		Sexuality		
	Men N = 5634	Women N = 2432	France N = 3775	Abroad N = 4291	MSM N = 3925	Women N = 2432	MSW N = 1709
Age (median, IQR)	38 (30-48)	38 (31-47)	39 (30-50)	37 (31-46)	35 (28-46)	38 (31-47)	44 (35-54)
	18-31	1697 (30.1%)	639 (26.3%)	1124 (29.8%)	1212 (28.2%)	1429 (36.4%)	639 (26.3%)
	32-45	2022 (35.9%)	1053 (43.3%)	1222 (32.4%)	1853 (43.2%)	1416 (36.1%)	1053 (43.3%)
	≥45	1915 (34.0%)	740 (30.4%)	1429 (37.9%)	1226 (28.6%)	1080 (27.5%)	740 (30.4%)
CD4 Cells/mm <sup>3</sup> (median, IQR)	393 (231-569)	343 (180-518)	424 (263-602)	338 (183-509)	428 (280-598)	343 (180-518)	298 (144-482)
	<100	633 (11.2%)	364 (15.0%)	383 (10.1%)	614 (14.3%)	316 (8.1%)	364 (15.0%)
	100-200	538 (9.5%)	311 (12.8%)	299 (7.9%)	550 (12.8%)	293 (7.5%)	311 (12.8%)
	200-350	1236 (21.9%)	570 (23.4%)	747 (19.8%)	1059 (24.7%)	807 (20.6%)	570 (23.4%)
	350-500	1315 (23.3%)	537 (22.1%)	900 (23.8%)	952 (22.2%)	991 (25.2%)	537 (22.1%)
	>500	1912 (33.9%)	650 (26.7%)	1446 (38.3%)	1116 (26.0%)	1518 (38.7%)	650 (26.7%)
Viral load (log.copies/ml; median, IQR)	4.8 (4.1-5.4)	4.4 (3.5-5.1)	4.8 (4.1-5.4)	4.5 (3.7-5.2)	4.7 (4.1-5.4)	4.4 (3.5-5.1)	4.8 (4.0-5.4)

Cumulative incidence curves of the final stages in men and women (left) and in patients born in France or abroad (right)



Proportion of person-time in each stage of the continuum by HIV transmission risk, stratified by age and place of birth (adjusted analysis)

Place of birth	Stage	Age	MSM	WOM	MSW	MSM vs WOM	95%CI	MSM vs MSW	95%CI	WOM vs MSW	95%CI
Abroad	In Care	Global	97.1	97.8	97.1	-0.7	-1.9 ; 0.4	0	-1.3 ; 1.5	0.7	-0.4 ; 2.0
Abroad	In Care	18-32 y	98.5	97.2	99.2	1.3	-0.5 ; 3.2	-0.7	-2.2 ; 1.5	-2	-3.8 ; 0.5
Abroad	In Care	32-45 y	97.2	98.4	97.5	-1.2	-2.9 ; 0.4	-0.3	-2.3 ; 1.7	0.9	-0.7 ; 2.6
Abroad	In Care	>45 y	95.5	96.8	95.8	-1.4	-4.1 ; 1.6	-0.3	-2.9 ; 3.0	1.1	-1.1 ; 3.5
Abroad	On ART	Global	81.5	82.9	80.4	-1.5	-3.9 ; 1.0	1.1	-1.7 ; 3.9	2.6	0.0 ; 5.2
Abroad	On ART	18-32 y	80.1	80.9	79.1	-0.8	-5.0 ; 3.3	1	-4.3 ; 7.4	1.8	-3.7 ; 8.2
Abroad	On ART	32-45 y	82.3	85.4	80.7	-3.1	-6.7 ; 0.2	1.7	-2.5 ; 6.1	4.8	1.3 ; 8.5
Abroad	On ART	>45 y	84.5	78.8	80.2	5.7	0.8 ; 10.6	4.3	-0.4 ; 9.2	-1.4	-5.8 ; 2.9
Abroad	Viral suppression	Global	64.4	64	59.2	0.4	-2.7 ; 3.4	5.3	1.8 ; 8.7	4.9	1.8 ; 8.3
Abroad	Viral suppression	18-32 y	58.1	60.4	53	-2.4	-7.7 ; 3.0	5.1	-2.8 ; 13.6	7.4	-0.4 ; 16.1
Abroad	Viral suppression	32-45 y	65.9	66.6	60.1	-0.7	-5.2 ; 3.4	5.8	0.3 ; 11.1	6.5	1.6 ; 10.9
Abroad	Viral suppression	>45 y	75.5	60.7	60	14.8	8.6 ; 19.9	15.5	9.6 ; 20.9	0.8	-4.2 ; 6.4
France	In Care	Global	98.7	96	95.3	2.7	1.4 ; 4.3	3.4	2.0 ; 5.1	0.7	-1.3 ; 2.8
France	In Care	18-32 y	98.8	95.3	98.6	3.5	0.8 ; 6.4	0.2	-0.8 ; 1.6	-3.3	-6.2 ; -0.2
France	In Care	32-45 y	98.6	98.4	96.2	0.2	-1.3 ; 2.1	2.3	0.3 ; 4.7	2.2	-0.4 ; 5.0
France	In Care	>45 y	98.6	94.9	94.1	3.7	1.4 ; 6.2	4.5	2.3 ; 6.8	0.8	-2.4 ; 4.2
France	On ART	Global	89.2	81.4	86.4	7.8	4.6 ; 11.6	2.8	0.6 ; 5.6	-5	-9.4 ; -1.1
France	On ART	18-32 y	87.9	84.2	85.6	3.7	-1.6 ; 9.9	2.3	-3.3 ; 9.2	-1.5	-8.9 ; 6.7
France	On ART	32-45 y	87.9	79.3	86.9	8.6	2.3 ; 16.4	0.9	-3.0 ; 5.6	-7.7	-15.7 ; 0.1
France	On ART	>45 y	91.4	80.1	85.9	11.3	6.0 ; 16.6	5.5	2.4 ; 9.0	-5.8	-11.9 ; 0.4
France	Viral suppression	Global	76	69.7	72	6.3	2.3 ; 10.4	4	0.7 ; 7.3	-2.3	-6.7 ; 2.2
France	Viral suppression	18-32 y	72.4	69.2	69.5	3.2	-4.2 ; 10.6	2.8	-4.5 ; 11.4	-0.3	-10.8 ; 10.7
France	Viral suppression	32-45 y	74.4	67.1	69.1	7.3	0.1 ; 15.9	5.3	-0.5 ; 11.6	-2	-11.8 ; 7.3
France	Viral suppression	>45 y	80.5	70.5	73.3	10	4.2 ; 15.4	7.2	3.1 ; 11.9	-2.8	-9.0 ; 3.8

Significant differences are colored in grey

## Discussion

The purpose of the study was to determine the influence of sex, age, place of birth and way of HIV acquisition on HIV care continuum indicators in France, a country with free access to care and to universal treatment. We identified specific groups of patients that are in need of targeted clinical and public health interventions. Young men born abroad were found to spend the smallest person-time virally suppressed. Among women born abroad of child bearing age, the proportion of time virally suppressed was higher than what we found in men of the same age group. Conversely, women over 45-year-old had the worst indicators, especially when born abroad. Among men, MSM born in France had better person-time in care, taking ART and virally suppressed than MSW.

One could have expected better results for patients recently diagnosed as long as care and ART are free of charge for all in France. The role of place of birth, as of sex and HIV risk behavior, may be related to differential access to information regarding both HIV infection and the health care facilities in populations found to have poor indicators.

Regarding patients born abroad, it has been shown in France that as much as half of the patients living with HIV coming from sub-Saharan Africa may have contracted their infection after migration, and that even if the health insurance system aims at protecting all, including undocumented migrants, access may be impaired by administrative and social inclusions.