FACTORS ASSOCIATED WITH LOSS TO FOLLOW-UP AMONG PLWH-1: Analysis through linkage of the ANRS PRIMO, CODEX, and COPANA to the ANRS CO4-FHDH: the PDVCOH study

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PURPOSE

Retention in care of people living with HIV (PLWH) is essential to lower the risks of viral replication and death[1]. Identifying PLWH at increased risk of loss to follow-up (LTFU) is crucial.
In order to retrieve subsequent follow-up data from other healthcare facilities, and identify people disengaged from hospital care, we performed a linkage of three different ANRS cohorts (PCC cohorts) with the ANRS CO4-FHDH (French Hospital Database on HIV), a large nationwide hospital cohort.
This linkage enabled us to **assess the roles of the region of birth and the HIV risk group in LTFU in France, taking account of socioeconomic and lifestyle factors**, factors not routinely available in the FHDH.

METHODS

Study population:

PLWH-1 enrolled between **1996-2019** in PCC cohorts **(ANRS PRIMO, CODEX, and COPANA)**

Record linkage of the PCC cohorts with ANRS CO4-FHDH:

- First, **direct linkage** on the common pseudonymized participants number[2] and then **indirect linkage**[3] applied on the remaining unlinked participants by using 4 algorithms with different sets of 10 to 13 variables. A weight was given to each pair of individuals, according to the agreement between variables belonging to the algorithm. A decision threshold was used, through the probabilistic **Fellegi-Sunter method**[4], below which the paired record was considered to correspond to distinct participants. Results from these 4 algorithms were compared, with manual verification when necessary.
- Follow-up data was updated with data available in the FHDH.

Statistical analyses :

- Baseline was the date of inclusion in the PCC cohorts.
- **LTFU was defined as no clinical visit since ⩾ 24 months at the study end (December 31, 2021).**
- Risk factors were assessed using **Fine & Gray[5] model**, taking into account **death as a competing event.**
- Adjustment variables that were considered: At enrolment in the PCC cohorts: HIV risk groups and region of birth, age, primary infection, CD4 cell count, HIV plasma viral load, AIDS status, inclusion in Paris region, viral hepatitis, tobacco and alcohol use, antidepressant medication, educational level, employment status; During follow-up: antiretroviral therapy (ART) initiation.
- **Multiple Imputation by Chained Equations (MICE)** was performed for missing data.

RESULTS

- **2935 participants**:

1879 MSM (men having sex with men) (64.0%), 480 MSW (men having sex with women) (16.4%) and 576 women (19.6%).
2189 French-born participants (74.6%), mainly MSM (74.2%).
436 migrants from SSA, mainly women (56.6%).

- **At baseline :**

Median age: 36 years (IQR:29–45); median CD4 cell count: 490/mm3 (348-666).
Post secondary education: 1371 (46.7%); unemployment: 644 (21.9%).

- **Linkage with FHDH: 2334/2935 (79.5%):**

1927 by direct linkage and 407 through indirect linkage method.

Follow-up

- 1005/2935 (34%) participants were LTFU in the PCC cohorts. Of these, 456 were found with subsequent follow-up in FHDH after data linkage and were not LTFU in FHDH => **Overall, 549/2935 participants were considered to be LTFU from hospital care.**
- Overall, 111 participants died before LTFU.
- **Cumulative incidence of LTFU at 10 years was 16% (15-18)** overall, and was the **highest for MSM not born in France (p<.0001)** (Figure).

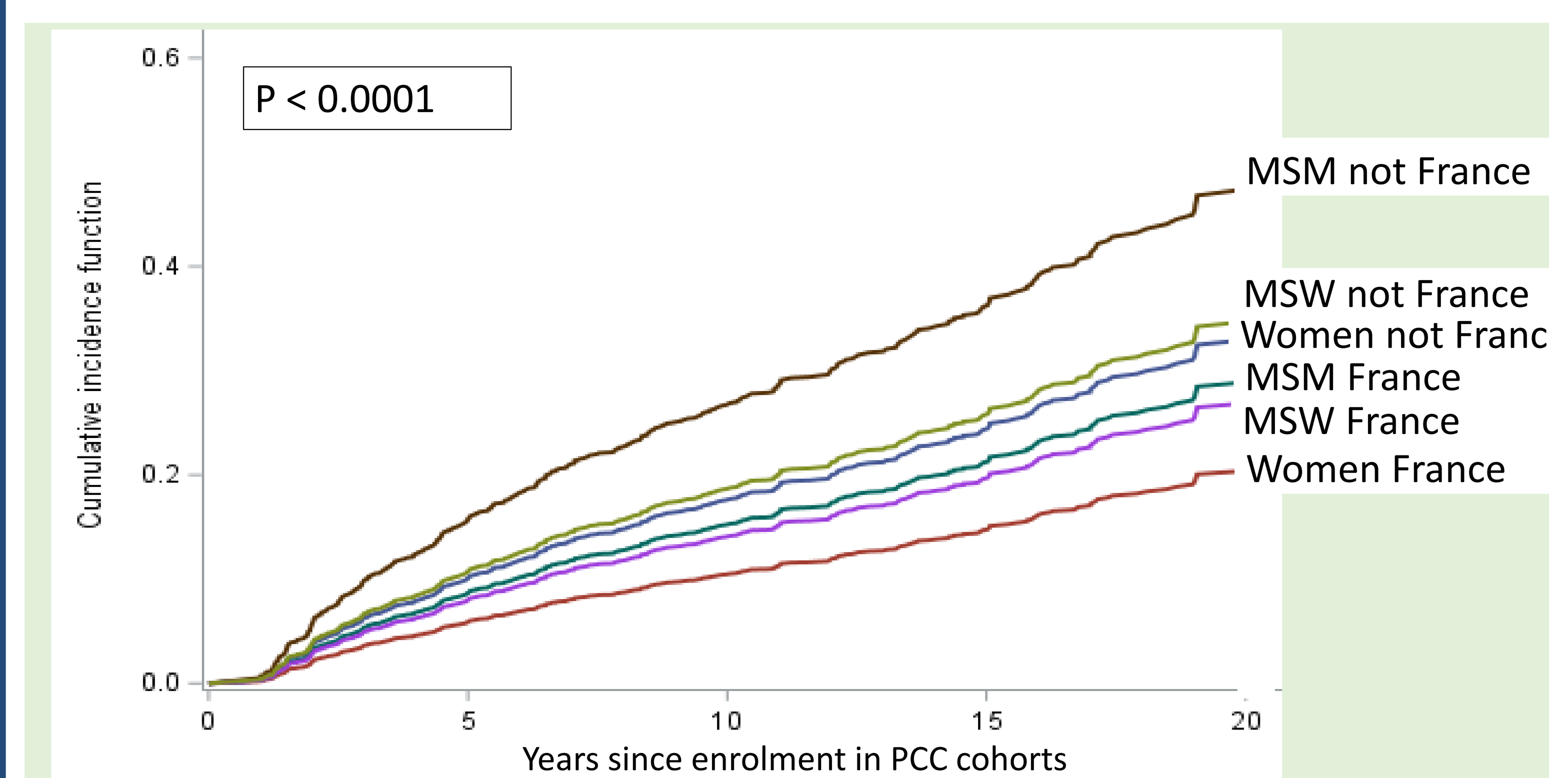

FIGURE *Cumulative incidence function (CIF) curves of LTFU after inclusion according to the risk groups*

Factors associated with LTFU

In **multivariable analysis** (Table), **MSM and MSW not born in France** had a higher risk of LTFU and women born in France had a lower risk, compared to MSM born in France.

TABLE*. Risk of loss to follow-up. Subdistribution hazard ratios (SHRs) of LTFU in Fine and Gray's multivariable model: 549 LTFU and 111 deaths, 2 935 participants.*

Variables		N total	n LTFU	Multivariable model* adj sHR [95%CI]
HIV risk group and region of birth	MSM born in France	1625	285	1
	MSM not born in France	**254**	**71**	**1.83 [1.39-2.41]**
	MSW born in France	297	50	1.04 [0.76-1.43]
	MSW not born in France	**183**	**43**	**1.44 [1.00-2.09]**
	Women born in France	**267**	**35**	**0.70 [0.49-1.00]**
	Women not born in France	309	65	1.22 [0.89-1.68]
Age at inclusion (years)	≤ 30	872	212	1
	]30 – 40]	**1005**	**191**	**0.75 [0.61-0.92]**
	> 40	**1058**	**146**	**0.60 [0.48-0.76]**
HIV stage at inclusion	CD4 < 350 or AIDS and no Primary infection	261	52	1. 31 [0.87-1.98]
	350 ≤ CD4 < 500 and no Primary infection	171	28	0.94 [0.59-1.52]
	CD4 ≥ 500 and no Primary infection	410	61	1
	Primary infection	**2093**	**408**	**1.67 [1.21-2.30]**
Paris region	Yes	1593	340	1.17 [0.97-1.40]
Tobacco[1]	Yes	1215	254	1.17 [0.98-1.41]
Alcohol[1]	Yes	188	45	1.31 [0.91-1.90]
Antidepressant	**Yes**	**105**	**26**	**1.67 [1.11-2.52]**
Employment [1]	**Yes**	**646**	**155**	**1.25 [1.01-1.54]**
ART initiation[2]	**Yes**	**2642**	**436**	**0.56 [0.43-0.71]**

Abbreviations: MSM: men who have sex with men; MSW: men who have sex with women;
*Adjusted subdistribution hazard ratios obtained from Fine-Gray model; [1]: Multiple imputation for tobacco (missing 3.3%), alcohol (missing 23.1%), and employment status (missing 0.8%); [2]: time-dependent variable

Younger age, antidepressant treatment at inclusion, unemployment (vs. employed/retired), absence of ART initiation during follow-up were associated with a higher risk for LTFU, independently from sex and origin.

CONCLUSIONS

Although our analysis was adjusted for ART initiation, age, depression, some economic and lifestyles factors, **the risk of being LTFU from hospital care was higher in men (MSM or MSW)** not born in France compared to MSM born in France. **Employment status and mental health**, reflected by antidepressant treatment, **were associated with LTFU**, while educational level was not.

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