HIV acquisition after arrival in France among sub-Saharan African migrants living with HIV in Paris area. Estimations from the ANRS PARCOURS study

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Introduction

In France, as in most countries in Western Europe, sub-Saharan immigrants are disproportionally affected by the HIV epidemic [1]. People born in Sub-Saharan Africa account for 31% of new HIV diagnoses and for 24% of the whole population of persons living with HIV in France [2].

Among migrants, HIV acquisition has long been considered to predominantly occur before migration because of generalized HIV epidemics in sub-Saharan African countries. However recent evidence from various European countries suggests that a substantial proportion of migrants from sub-Saharan Africa have acquired HIV while they were living in Europe [3]. In the UK, this proportion was recently estimated at 31% using a CD4-based modelling approach [4]. Such an estimate is not currently available for most European countries.

Objective: to estimate the proportion of sub-Saharan migrants who acquired HIV infection after their arrival in France using life-event and clinical data collected in the ANRS-PARCOURS study.

Materials and methods

In 2012-2013, a cross-sectional study in Paris area among migrants from sub-saharan Africa (aged 18-59 years)

Study design

- A random sample of HIV-infected outpatients followed in 24 health care centers.
- A retrospective life-event questionnaire covering migration and health history, sexual activity, in face to face interview (one hour), with trained professional interviewers.
- Clinical and laboratory information were documented from medical records.

Combined method mixing life-event and CD4 data

Life-event questionnaire based-method

We assumed that HIV infection had probably been acquired in France if at least one of the following life-event criterion was fulfilled:

- HIV diagnosis ≥ 11 years after arrival in France [5],
- ≥1 negative HIV test in France,
- first sex after arrival in France.

If none of these criteria was fulfilled, we estimated the duration from HIV infection to first CD4 count measurement using statistical modelling of CD4 cell count decline.

CD4-cell count method

We used data from a cohort of ART-naïve HIV-infected individuals with well-estimated dates of HIV seroconversion in Côte d'Ivoire, West Africa [6] to derive an equation with which to calculate the duration from seroconversion to any given CD4 cell count, using a linear mixed model [7]. CD4 cell count (square root transformed) decline over time was estimated using a linear mixed model with random intercept and slope, adjusted for individual CD4 cell count at first CD4 cell count measure (x_1) , duration from estimated date of HIV seroconversion to first CD4 cell count measure (x_2) and age at HIV seroconversion (x_3). With the fixed effects obtained from the fitted linear mixed model in this seroconverters population, we derived a formula to estimate the duration (Δt) from HIV seroconversion to any given CD4 cell count (CD4t).

The formula :

$$\Delta t = \frac{\left(\sqrt{CD4_t} - (12{,}108 + 0{,}02x_1 + 0{,}974x_2 - 0{,}002x_3)\right)}{-0{,}675 - 0{,}001x_1}$$

For each PARCOURS respondent, we simulated 500 values of Δt from a multivariate normal distribution in order to yield 500 simulated durations from seroconversion to first CD4 cell count measurement. Then, we added 3 months to obtained durations from HIV seroconversion to first CD4 cell count measurement to account for the duration between HIV infection and seroconversion.

The proportion of individuals having acquired HIV infection while living in France was estimated according to two scenarios:

– **Median scenario**, for each individual the infection was assumed to have occurred in France if >50% of the simulated durations fell within the staying period in France.

– **Conservative scenario**, for each individual the infection was assumed to have occurred in France if >95% of the simulated durations fell within the staying period in France.

Results

Figure 1 Assignment of HIV acquisition

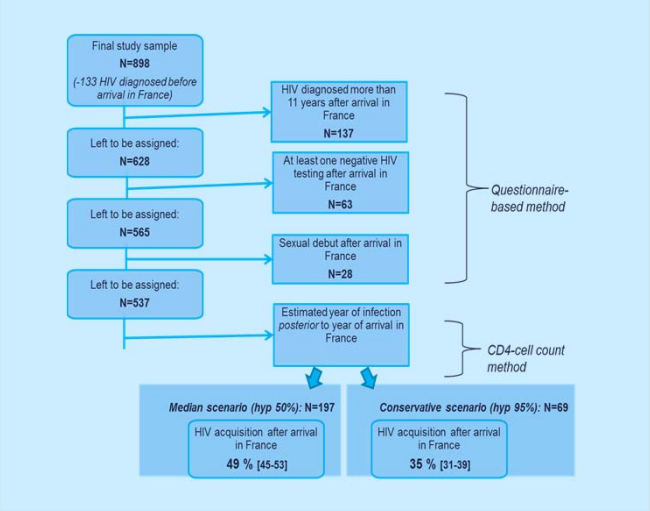

Table 1 Estimated proportion of HIV acquisition after arrival in France (Conservative scenario)

	Men		Women	
	Weighted%	p-value	Weighted%	p-value
Overall	44		30	
Age at arrival in France				
<25 years	78	<0.001	54	<0.001
25-34 years	44		25	
35 years or older	20		8	
Number of years in France prior to diagnosis				
0 to 2	10	<0.001	5	<0.001
3 to 5	19		23	
6 to 9	54		53	
10 or more	94		86	
Country of birth				
Cameroon	31	0.14	24	0.04
Mali	55		55	
Côte d'Ivoire	29		24	
Congo RDC	44		20	
Congo Brazzaville	46		28	
Others	49		30	

The proportion of HIV acquisition in France was higher in men than in women (30% [25-35] versus 44% [37-51] in the conservative scenario), among those arrived in their youth and it increased with duration after migration. No difference was found according to educational level, region of birth or period of diagnosis.

Conclusion

Our findings highlight the need for a better understanding of the determinants of HIV infection in sub-Saharan migrants living in France, in order to improve focused HIV prevention in this population.

Literature cited

[1] Hamers FF, Downs AM. The changing face of the HIV epidemic in western Europe: what are the implications for public health policies? The Lancet. 2004;364(9428):83-94

[2] Cazein F, Lot F, Pillonel J, Le Strat Y, Sommen C, Pinget R, et al. Découvertes de séropositivité VIH et de sida – France, 2003-2012. Bull Épidémiol Hebd, avril 2014

[3] ECDC. Report of the ECDC Workshop: Improving the monitoring of HIV among migrant populations in Europe. ECDC, Madrid; 2013.

[4] Rice BD, Elford J, Yin Z, Delpech VC. A new method to assign country of HIV infection among heterosexuals born abroad and diagnosed with HIV: AIDS. 2012;26(15):1961-6.

[5] Ndawinz JDA, Costagliola D, Supervie V. New method for estimating HIV incidence and time from infection to diagnosis using HIV surveillance data: results for France. AIDS. 2011;25(15):1905-1913

[6] Minga AK, Lewden C, Gabillard D, Bomisso GI, Toni T, Emième AA, et al. CD4 cell eligibility thresholds: an analysis of the time to antiretroviral treatment in HIV-1 seroconverters: AIDS. 2011;25(6):819- 23.

[7] Ndawinz JDA, Anglaret X, Delaporte E, Kulla-Shiro S, Gabillard D, Costagliola D, et al. New indicators for delay in initiation of antiretroviral treatment: estimates for Cameroon. Bull World Health Organ. in Press

Acknowledgements

We thank the ANRS 1220 PRIMOCI group (PI Albert Minga and Xavier Anglaret) who accepted to share with us the data on natural decline in CD4 among the PRIMO CI Ivoirian cohort of seroconverters.

The PARCOURS Study Group included A. Desgrées du Loû, F. Lert, R. Dray Spira, N. Bajos, N. Lydié (scientific coordinators) ; J. Pannetier, A. Ravalihasy, A. Gosselin, E. Rodary, D. Pourette, J. Situ, P. Revault, P. Sogni, J. Gelly, Y. le Strat, N. Razafindrasitma.