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 estimation 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 count at first CD4 cell count measure \( x_i(0) \), duration from estimated date of HIV seroconversion to first CD4 cell count measure \( x_i(0) \) and age at HIV seroconversion \( x_i(0) \). With the fixed effects obtained from the fitted linear mixed model in this seroconverters population, we derived a formula to estimate the duration \( \Delta t \) from HIV seroconversion to any given CD4 cell count (CD4t).

The formula:

\[
\Delta t = \left( \frac{\sqrt{CD4t} - (12,108 + 0,02x_i + 0,974x_i - 0,002x_i)}{0,675} \right) - 0,001x_i
\]

For each PARCOURS respondent, we simulated 500 values of \( \Delta t \) 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

<table>
<thead>
<tr>
<th>Country of Birth</th>
<th>Cameroon</th>
<th>Mali</th>
<th>Côte d’Ivoire</th>
<th>Congo-KIN</th>
<th>Congo-Zaïre</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at arrival in France (&lt;25 years)</td>
<td>78</td>
<td>&lt;0.001</td>
<td>54</td>
<td>&lt;0.001</td>
<td>44</td>
<td>25</td>
</tr>
<tr>
<td>(25-34 years)</td>
<td>44</td>
<td>25</td>
<td>19</td>
<td>23</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>(35 years or older)</td>
<td>20</td>
<td>8</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

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


Acknowledgements

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