Prevalence and circumstances of forced sex and post-migration HIV acquisition in sub-Saharan African migrant women in France: an analysis of the ANRS-PARCOURS retrospective population-based study

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Summary

Background Sub-Saharan African migrant women are a key population at risk of HIV infection in Europe. Using data from the ANRS-PARCOURS study, we aimed to assess the prevalence of forced sex after migration and its association with post-migration acquisition of HIV as well as the circumstances of forced sex after migration, including housing and administrative insecurity, among sub-Saharan African migrant women living in the Paris Region, France.

Methods The ANRS-PARCOURS study was a retrospective life-event survey done between February, 2012, and May, 2013, in health-care facilities in the Paris region of France. Women were eligible if they were born in sub-Saharan Africa, aged between 18 and 59 years, and had been diagnosed with HIV infection at least 3 months earlier for women receiving HIV care or not diagnosed with HIV. In this analysis, we used ANRS-PARCOURS study data to compare the incidence of forced sex after migration in three groups of sub-Saharan African migrant women: those who acquired HIV after migrating, those who acquired HIV before migrating, and those without HIV. We assessed the associations between forced sex, sexual partnerships, and living conditions after migration with mixed-effects logistic regression and generalised structural equation models. The study is registered with ClinicalTrials.gov, number NCT02566148.

Findings We obtained data from 980 eligible individuals who participated in the ANRS-PARCOURS study (407 without HIV and 573 HIV-positive) from 54 randomly selected health-care facilities. We excluded 20 women whose HIV infection could not be dated and eight women with missing data from the analyses, for a total of 405 women in the reference group (without HIV) and 547 women in the HIV group (156 with post-migration HIV acquisition, 391 with pre-migration HIV). Women who acquired HIV after migration experienced forced sex after migration more frequently than women without HIV (24 [15%] *vs* 18 [4%]; p=0·001). Forced sex after migration was associated with being hosted by family or friends (β=0·95, 95% CI 0·19–1·72) and lack of stable housing (β=1·10, 0·17–2·03). Lack of a residence permit was also associated with forced sex after migration.

Interpretation The social hardships faced by sub-Saharan African migrant women after migration, especially a lack of housing or lack of a residence permit, increases their exposure to sexual violence and to HIV infection.

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Introduction

Sexual violence against women and girls and the associated health consequences have increasingly been recognised as challenges for global public health. Data from global reports[1,2] suggest that 30% of women worldwide have experienced sexual and physical violence by an intimate partner (regional estimates range from 36·6% in Africa to 24·6% in Europe) and that 7·2% have been subjected to sexual violence by someone other than a partner (regional estimates ranging from 11·9% in Africa to 5·2% in Europe).

In Europe, national surveys have estimated a prevalence of non-volitional or forced sex in women (defined as an experience of sex against their will[3]) of 9·8% in Britain in 2012[3] and 6·8% in France in 2006.[4] Negative health outcomes of forced sex have been documented in the general population and include self-reported sexually transmitted infections (STIs)[3]. However, French national surveys have not investigated migrant-specific health problems.

Studies of sexual violence among migrants and refugees worldwide and in Europe are scarce or have been done with small sample sizes and non-random sampling methods (eg, convenience samples). Based on data from existing studies in Europe, 8–22% of female migrants have been subjected to sexual violence in their lifetimes.[5–9] Female refugees, asylum seekers, and undocumented migrants are at high risk of sexual violence after migration (between 10% and 70% of female refugees are affected[10–13]). In Europe, data are scare about the prevalence, determinants

Research in context

Evidence before this study

In January, 2017, we searched the Science Direct and PubMed databases for articles about sexual violence and HIV risks in sub-Saharan African migrant women in Europe using the terms "sexual violence", "rape", "forced sex", "gender based violence", "intimate partner (sexual) violence", "violence", "migration", "(im)migrants", "refugees", "HIV"; and the Cairns website for articles and books in French using the terms "violence sexuelle", "viol", "rapports sexuels forcés", "violences de genre", "violences conjugales", "violences", "migration", "(im)migrantes", "réfugiées", "VIH". Although there is strong evidence of an association between sexual violence and HIV among sub-Saharan African women in Africa, we found no quantitative studies investigating the association between sexual violence after migration and post-migration acquisition of HIV among sub-Saharan African migrant women in Europe.

Findings of studies in the UK and France have shown that HIV infection among migrant women is due not only to its high prevalence in their countries of origin but also to infection after arriving in Europe. Using 2012-13 ANRS-PARCOURS data, Desgrées du Loû et al found that the social hardships faced by African women during their settlement shaped their sexual partnerships and increased their HIV risk. Research from Keygnaert et al also reported a high prevalence of sexual violence after migration among vulnerable migrant women.

Added value of the study

Our findings show for the first time an association between forced sex after migration and post-migration acquisition of HIV among sub-Saharan African migrant women in a European county. Based on a life-event approach, this study also shows the association between a lack of housing and stable residence permits after migration and forced sex after migration.

Implications of all of the available evidence

Prevention of sexual violence as an HIV risk factor among migrant women in Europe is a public health issue. The difficulties faced by sub-Saharan African migrant women increase their exposure to sexual violence and HIV infection. This finding has important implications in view of the current political context in Europe, which is increasingly tightening its immigration policies and thus possibly increasing social hardships among sub-Saharan African migrant women.

and negative health outcomes of sexual violence experienced by migrant women in destination countries.

Migrant women in Europe, especially refugees and undocumented female migrants, face many forms of social hardships (eg, lack of stable housing, lack of resources and an undocumented status) after arriving in their destination countries; however, studies of the effect of social hardships on sexual health and on HIV infection in particular are scarce.[14] Sub-Saharan African women around the world and in Europe are highly affected by the HIV epidemic; they represented 60% of women diagnosed with HIV in 2014 in France.[15] This rate is due not only to the high prevalence of HIV in their countries of origin but also to the occurrence of infection after migration; at least 30% of sub-Saharan African women living with HIV in France have been estimated to have acquired HIV after migration.[16] After migrating, sub-Saharan African women might experience sexual violence, and this exposure can be an important determinant of post-migration acquisition of HIV.

In this analysis of ANRS-PARCOURS study data, we aimed to assess the prevalence of forced sex after migration and its association with post-migration acquisition of HIV, as well as the circumstances of forced sex after migration, including housing and administrative insecurity, among sub-Saharan African women living in the Paris region, France.

Methods

Study design and participants

The ANRS-PARCOURS study was a retrospective life-event survey done between February, 2012, and May, 2013, in health-care facilities in the Paris region. The study included two random samples of sub-Saharan African migrant women receiving consultations at these health-care facilities (573 receiving HIV care and 407 not diagnosed with HIV). Women were eligible if they were born in sub-Saharan Africa, aged between 18 and 59 years, diagnosed with HIV infection at least 3 months earlier for women receiving HIV care and not diagnosed with HIV for the primary care group. Doctors asked all eligible patients, except those with major health impairments to participate and collected their written consent.

Time-location sampling was done to obtain the study sample. Health-care facilities; outpatient hospital HIV clinics (n=24) and general practice medical centres (n=30), were selected using a stratified random sampling procedure based on the estimated number of migrants in the caseloads of the exhaustive lists of the facilities. General practice medical centres are primary health-care facilities of the National Federation of Health Centres (FNCS) of the Paris region, which brings together most health-care facilities irrespective of their status (public, private, or voluntary; 118 facilities) as well as the primary health-care facilities for vulnerable populations (nine facilities). The sampling frame consisted of 127 facilities and was stratified by type of facility and by the number of African migrants in the facility's municipality.

Sampling frames were constructed for each half-day that the health-care facilities were open. All eligible patients were included for each health-care facility half-day visit. The data were weighted according to each individual's probability of inclusion in the survey (ie, considering the probability of inclusion in the sample

for each health-care facility, the number of half-days of weekly consultations in each facility included, and the individual study participation per half-day of the included consultations).

The life-event questionnaire was adapted from the questionnaires developed by French demographers to analyse how residential, professional and family trajectories and health trajectories[17] were interlaced. The information collected included administrative, residential, professional and sexual partnerships. Every dimension of interest was documented for each year from birth until the time of data collection. Age at first sexual intercourse was also collected. All information was collected anonymously.

Trained interviewers administered a face-to-face, standardised, life-event questionnaire with each woman (average duration 55 min). The interviewers followed a 5-day training course on how to conduct these specific life-event interviews. The participants received a voucher worth €15. The Advisory Committee on Data Collection in Health Research (CCTIRS) and the French Data Protection Authority (CNIL) both approved this project. The ANRS-PARCOURS study design is described fully elsewhere.[14]

Outcomes and variables of interest

The analysis considered three groups: two groups with HIV infection (one with HIV acquisition before migration and one with HIV acquisition after migration) and the reference group without HIV. Based on earlier work,[16] we defined the subgroup of HIV-positive women who were estimated to have acquired HIV after migration using life-event and CD4-positive T cell-count data. This subgroup comprised women who met at least one of the following life-event criterion: HIV diagnosis 11 years or later after migration (because the probability of being diagnosed 10 years after HIV-aquisition is extremely low in sub-Saharan migrant women in France[18,19]), negative HIV test after migration, and first sexual intercourse after migration or women with estimated dates of seroconversion occurring at a greater than 95% probability after migration using statistical modelling of the decline in CD4-positive T-cell counts.

Sexual violence, particularly rape, is still stigmatising and therefore might not be acknowledged as such. To avoid under-reporting, behaviour-specific terms are generally preferred.[3,4] Hence, women were retrospectively asked whether they had ever been forced to have sex against their will, which we reported as forced sex, and, if yes, during which calendar year(s). Based on this information, we used the following measures: lifetime forced sex, forced sex since 15 years of age, and forced sex since 15 years of age after migration. We also considered forced sex since 15 years of age after migration yearly from the first year in France onwards.

The covariates included fixed and time-varying variables. The fixed covariates were the generation (born from 1953–68, 1969–78, or 1979–95) and the reason for migration (threatened in the country of origin, family reunion, employment, or education). Sexual partnerships after migration were included as time-varying variables and were documented yearly from the first year in France onwards. Sexual partnerships were classified as follows: no partnership, partnership that lasted at least 1 year (stable), partnership that lasted less than 1 year (short or casual), both stable and casual partnerships within one year, two or more stable partnerships within 1 year (concurrent) and at least one transactional partnership (in exchange for housing, food, administrative papers, or money) in a given year. Living conditions after migration were included as time-varying variables and were documented yearly from the first year in France onwards. The housing situation was classified as follows: insecure housing (no stable housing), hosted by family or friends, hosted by associations or collective structures and in own housing. Administrative insecurity referred to having no resident permit in a given year as opposed to having a temporary or long-term residence permit or being a French national. We also included time: each calendar year since the age of 15 after migration as a time-varying covariate (time).

Statistical analysis

First, we measured the frequency of forced sex over the lifetime, since 15 years of age and since 15 years of age after migration and compared these frequencies between women who acquired HIV before migration, women who acquired HIV after migration and women in the reference group (HIV-negative) using multivariable design-based Poisson regression models adjusted for age, education level, and age at migration.

Second, we examined the associations between forced sex since 15 years of age after migration and sexual partnerships each year after migration using mixed-effects logistic regression models adjusted for the study group and time; random effects were used to account for individual heterogeneity. This analysis included years without sexual partnerships to account for non-partner forced sex.[1]

Third, to establish the pathways to forced sex after migration during the years that women were in relationships, we used a mixed-effects generalized structural equation model taking into account the association between sexual partnerships, the housing situation, administrative insecurity, and the reason for migration. This analysis excluded years without sexual partnerships because the purpose was to understand the circumstances of intimate-partner forced sex, which occurred much more frequently than non-partner forced sex after 15 years of age.[4] Years with only transactional partnerships (36 person-years) were considered as casual partnerships due to statistical power issue. In this analysis, indirect effects were estimated using a product of coefficients approach.[20–22] Confidence intervals,

See Online for appendix

For the **ANRS-PARCOURS survey protocol** see http://ceped.org/parcours/protocol-en.pdf

p-values, and standard errors were computed using a bootstrap procedure[23] (appendix p 1).

The data were weighted to account for the differences in individuals' probabilities of inclusion in the survey. All statistical analyses were done with STATA (version 14.1).

The complete survey protocol is registered with Clinicaltrials.gov, number NCT02566148, and is available online.

Role of the funding source

The funder of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the paper. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

The ANRS-PARCOURS study was a retrospective life-event survey done between February, 2012, and May, 2013, in health-care facilities in the Paris region. The study included two random samples of sub-Saharan African migrant women receiving consultations at these health-care facilities (573 receiving HIV care and 407 not diagnosed with HIV). In the participating services, 637 (reference group) and 1158 (HIV-positive) women met the eligibility criteria. Of these women, 64 and 95, respectively, were not offered participation by their physicians. We interviewed 407 women in the reference group (69% participation rate) and 573 women with HIV (51% participation rate). The respondents and non-respondents did not differ in age, employment situation or CD4-positive T-cell counts (appendix p 4). We excluded 20 women whose HIV infection could not be dated and eight women with missing data from the analyses (five with missing information on forced sex and three missing other information), for a total of 405 women in the reference group and 547 women in the HIV group (156 with post-migration HIV acquisition).

Table 1 shows the characteristics of the participants at the time of the interview. The median age of the reference group was 41 years (IQR 35–48). Regarding the education level, 324 (80%) women in the reference group had attended at least some secondary school; the other groups did not differ in their education levels. Most of the migrants (>95%) came from western and central Africa. Cote d'Ivoire, Cameroon, Mali, the Democratic Republic of the Congo, and Senegal were the most common home countries.[14] The median duration of residence in France

	HIV acquired after migration (N=156)	p value	HIV acquired before migration (N=391)	p value	Reference group without HIV (N=405)	p value overall
Age (years)	41 (35–48)	0·999	40 (35–46)	0·546	41 (31–50)	0·641
Age at migration (years)	23 (17–27)	0·032	30 (26–36)	<0·0001	26 (20–31)	<0·0001
Years spent in France	21 (13–25)	<0·0001	10 (5–14)	0·004	13 (6–24)	<0·0001
Education level, secondary and higher	125 (82%)	0·789	319 (82%)	0·661	324 (80%)	0·896
Sexual debut						
Before migration	108 (69%)	0·100	389 (100%)	<0·0001	315 (76%)	<0·0001
The year of migration	11 (6·1%)	..	0	..	26 (8%)	..
After migration	36 (25%)	..	1 (<1%)	..	54 (16%)	..
Age at first sex (years)	17 (16–19)	0·005	17 (16–19)	<0·0001	18 (16–20)	<0·0001
Main reason for migration						
Family reunion	78 (54%)	0·013	126 (33%)	<0·0001	164 (46%)	0·001
Study or work	63 (41%)	..	222 (56%)	..	161 (36%)	..
Threats in country of origin	15 (5%)	..	43 (12%)	..	79 (18%)	..
Social hardships after migration						
Ever experienced administrative insecurity (no resident permits)	80 (49%)	0·384	221 (52%)	0·384	190 (43%)	0·153
Ever hosted by family or friends	105 (69%)	0·045	227 (59%)	0·045	214 (54%)	0·110
Ever experienced housing insecurity (no stable housing)	47 (26%)	0·413	157 (35%)	0·413	112 (21%)	0·024
Sexual partnerships after migration						
Ever in a stable partnership	147 (95%)	0·010	309 (77%)	0·044	337 (86%)	0·002
Ever in a casual partnership	89 (55%)	0·003	177 (46%)	0·026	131 (32%)	0·005
Ever in a concurrent partnership (both stable and casual)	40 (21%)	0·163	65 (14%)	0·688	62 (15%)	0·220
Ever in a transactional partnership	14 (9%)	0·008	29 (6%)	0·008	14 (2%)	0·021

Data are median (IQR), n (%), or p value unless otherwise stated.

Table 1: **Sociodemographic characteristics, social hardships, and sexual partnerships after migration by study group among sub-Saharan migrant women in the ANRS-PARCOURS study**

	HIV acquired after migration (N=156)	Prevalence rate ratio (*vs* reference group)	Adjusted prevalence rate ratio (*vs* reference group)	HIV acquired before migration (N=391)	Prevalence rate ratio (*vs* reference group)	Adjusted prevalence rate ratio (*vs* reference group)	Reference group without HIV (N=405)	p value overall	Adjusted p value overall
Lifetime forced sex	42 (23·9%) [17·6–31·5]	1·30 [0·78–2·15; 0·307]	1·34 [0·81–2·22; 0·249]	91 (19·0%) [15·2–23·6]	1·03 [0·65–1·65; 0·885]	0·92 [0·59–1·42; 0·695]	88 (18·4%) [12·0–27·2]	0·501	0·289
Forced sex since 15 years of age	36 (20·1%) [13·8–28·3]	1·36 [0·76–2·44; 0·299]	1·41 [0·78–2·53; 0·244]	78 (16·0%) [11·8–21·3]	1·08 [0·62–1·87; 0·779]	0·93 [0·55–1·58; 0·779]	72 (14·8%) [9·2–23·0]	0·546	0·355
Forced sex since 15 years of age after migration	24 (15·1%) [10·1–21·9]	4·30 [1·95–9·44; <0·0001]	3·83 [1·75–8·41; 0·001)	20 (4·2%) [2·5 – 7·1]	1·21 [0·51–2·86; 0·665]	2·03 [0·66–6·24; 0·211]	18 (3·5%) [1·8–6·9]	<0·0001	0·003

Data are n, (%) [95% CI], [95% CI; p value], unless otherwise stated. Weighted percentages; CI, confidence interval; prevalence rate ratio and p value compared with the reference group without HIV using a design-based Poisson regression model, unless otherwise stated.

Table 2: **Prevalence of forced sex by study group among sub-Saharan migrant women in the ANRS-PARCOURS study**

was 13 years (IQR 6–25), and the median age at migration was 26 years in the reference group. The women who acquired HIV after migration had been in France longer (21 years, IQR 13–25) and had arrived at a younger age (23 years) than the women in the other groups (table 1). Most women's sexual debuts occurred before migration (76% in the reference group). Fewer women in the HIV acquired after migration group (69%) had their sexual debuts after migration (p<0·0001). The median year at first sex was 18 years in the reference group and 1 year younger in the HIV groups (all p<0·0001). Many women experienced administrative insecurity (43% in the reference group and 52% in the HIV acquired before migration group) and housing insecurity (21% in the reference group, whereas the other groups did not differ). Additionally, most of the women had been hosted by family or friends (54% in the reference group and 69% in the HIV acquired after migration group).

18·4% (95% CI 12·0–27·2) of HIV-negative women in the reference group and 23·9% (17·6–31·5) of the women who acquired HIV after migration reported being subjected to forced sex over their lifetimes (p=0·249; table 2). After excluding forced sex during childhood, these proportions were 14·8% (95% CI 9·2–23·0) in the reference group and 20·1% (13·8–28·3) in the group of women who acquired HIV after migration (p=0·244). When considering only forced sex that occurred since 15 years of age after migration, there was a large difference between the women in the reference group and the women who acquired HIV after migration. Women who acquired HIV post-migration reported forced sex after migration more frequently than women in the reference group without HIV (15·1%, 95% CI 10·1–21·9 *vs* 3·5%, 1·8–6·9; p=0·001; table 2).

Forced sex since 15 years of age after migration was more likely to occur during the years when women's sexual partnerships were casual (OR 5·53, 95% CI 2·83–10·82), concurrent (8·59, 3·62–20·40), or transactional (31·73, 10·48–96·04) and was less likely to occur during years when women had no sexual partnership (0·24, 0·10–0·63) compared with years when women were in stable sexual partnerships (table 3).

	‰ person-year at risk* (N=12 185)	Odds ratio	95%CI; p value
None	2	0·24	0·10–0·63; 0·003
Stable	7	Ref·	··
Casual	28	5·53	2·83–10·82; <0·0001
Concurrent	41	8·59	3·62–20·40; <0·0001
Transactional	91	31·73	10·48–96·04; <0·0001

Mixed-effects logistic regression models adjusted for study group and time.*The number of years of forced sex divided by the number of years lived in a given sexual partnership: for every 1000 women with casual partnerships for 1 year, 28 were subjected to forced sex.

Table 3: **Associations between forced sex since 15 years of age after migration and sexual partnerships among sub-Saharan migrant women in the ANRS-PARCOURS study**

Figure 1 shows the results of the mixed-effects generalised structural equation model. The pathway analysis suggested that direct and indirect associations between social hardships and forced sex after migration were mediated by casual and concurrent sexual partnerships. Migrating because of threats in the country of origin was directly associated with forced sex after migration (β=1·71, 95% CI 0·37–3·04). Being hosted by family or friends and not having stable housing were associated with forced sex after migration (β=0·95, 0·19–1·72 and β=1·10, 0·17–2·03, respectively). Being hosted by family or friends was associated with casual relationships (β=1·10, 0·74–1·47), which increased the likelihood of forced sex (β=1·54, 0·81–2·27). The indirect effect of being hosted by family or friends through casual and transactional sexual partnerships was significant (β=0·001, 0·000–0·002). Administrative insecurity (not having a resident permit) was significantly associated with concurrent sexual partnerships (β=0·90, 0·53–1·27), which increased the likelihood of being subjected to forced sex (β=2·17, 1·31–3·03). The indirect effect of administrative insecurity through

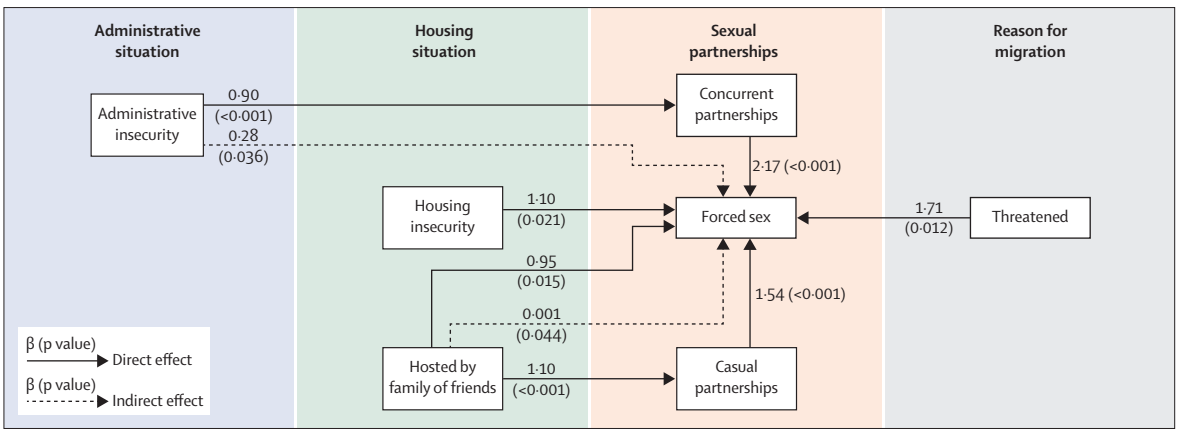

Figure: **Mixed-effects generalised structural equation model of pathways to forced since 15 years of age after migration among sub-Saharan migrant women in the ANRS-PARCOURS study**

concurrent sexual partnerships was significant (β=0·028, 0·002–0·055).

Discussion

Our findings showed that sub-Saharan African women living in the Paris region were regularly exposed to forced sex in their lifetimes. Our study provides evidence of an association between forced sex after migration and post-migration acquisition of HIV among sub-Saharan African migrant women in a European county. Forced sex that occurred after migration was related to social hardships, particularly a lack of housing or lack of a residence permit.

Forced sex after migration was more frequent in casual, concurrent, and transactional relationships than in stable relationships with only one partner. This finding was consistent with studies showing that women who experience intimate partner violence (including sexual violence) were more likely to have concurrent and transactional sexual partnerships.[24–27] Some women also reported forced sex during the years in which they were not in any intimate relationships or had no sexual partners. In this case, they could have been forced to have sex against their will by family members, friends, compatriots, police officers, or strangers.[10,13]

Our study showed that women who lacked stable housing and were hosted by relatives or acquaintances in a given year more often reported being forced to have sex against their will during this year independent of the type of relationship in which they were engaged. When hosted by relatives or acquaintances, women might be forced to have sexual intercourse by men in these social networks. Findings of a qualitative study among migrant women has shown that adverse living conditions can lead to sexual harassment and transactional sex in exchange for basic goods or accommodations.[28] These results highlight the need to strengthen women's access to personal housing as soon as possible after arrival in the host country.

Administrative insecurity (ie, lack of a residence permit) also seemed to be indirectly related to forced sex through engagement in concurrent partnerships. This finding is consistent with previous results and shows that concurrent partnerships are more frequent among women without a resident permit.[14] In this study, we modelled the role of administrative insecurity on the risk of forced sex using a structural equation model. When lacking a residence permit, women can be obliged to engage in several sexual partnerships to ensure their survival, and in this situation of dependency, they can be forced to have sex by their partners against their will.

Women who migrate to France because of threats in their own country are also more exposed to forced sex after migration. This finding suggests that women whose migration is motivated by violence in their host country (eg, interpersonal violence, rape as a weapon of war or torture) face violence again (including sexual violence) after migration. The proportion of women who migrated to France under these circumstances (fleeing under a threat and knowing no one in the destination country) increased from 13% among those who arrived before 2005 to 23% among those who arrived after 2005.[29] Thus, special attention should be devoted to migrant women who arrive under these circumstances because they can experience considerable difficulties in the host country. Research on sexual violence among refugees has identified a frequent co-occurrence of sexual violence with physical, emotional, and socioeconomic forms of violence in European countries.[13,30]

Results of a previous study has shown an association between social hardships after migration and post-migration acquisition of HIV as a result of social vulnerability, which increases sexual risk behaviours.[14] This study found that social hardships after migration exposed women not only to sexual risk behaviours but also to forced sex and this was also related to post-migration acquisition of HIV.

Several limitations of this study should be discussed. Our data were collected every calendar year and they were not precise enough to assess the ordering of events between forced sex and HIV acquisition after migration. Forced sex can occur first as unprotected forced sexual intercourse can cause HIV acquisition, HIV acquisition can occur first as HIV disclosure may entail intimate partner violence,[31] HIV acquisition can occur in a context of sexual violence, as intimate partner violence is associated with sexual risk behaviours.[24–27]

The study population was representative only of migrant women consulting HIV services and primary care services in the greater Paris metropolitan region, and thus, the results could not be extrapolated to other regions of France. Nevertheless, 60% of the sub-Saharan migrants living in France are concentrated in this region, which accounts for 18% of the French population. Additionally, these results might be generalisable to other European metropolitan areas where migrant women are facing similar social hardships.

Recruitment in the reference group occurred among patients attending primary health-care facilities; migrant women with a more comfortable situation might be underrepresented because women followed in private general practice were not recruited. Accordingly, the prevalence of hardships and forced sex after migration in the reference group may have been overestimated. This potential bias did not occur in the HIV-infected group, which was representative of HIV-infected women in care for their infection because all of them in France are followed in hospital services. Therefore, if forced sex in the reference group is overestimated, the association between forced sex after migration and post-migration acquisition of HIV may be even stronger than the association observed in our study.

Finally, in view of the retrospective cross-sectional design, the findings are subject to desirability bias and recall bias. Rates of forced sex might have been underestimated through interviewer administered data collection since such events are known to be difficult to report. However, this bias is likely to apply to all women irrespective of their HIV statuses and should not affect our results. The recall bias was minimised because the life-event questionnaire improved the recall effort and consistency of the collected information. Moreover, because these biases were likely to be the same for all women irrespective of recruitment group, they should not have affected our results regarding the association between forced sex after migration and post-migration acquisition of HIV in this population.

In conclusion, many sub-Saharan African migrant women have been subjected to forced sex after migration. Despite the growing evidence of people's exposure to sexual violence, efforts to prevent sexual violence among vulnerable immigrants and refugees are scarce.[32] Exposure to sexual violence should be addressed through combined political, social, and health responses, which can reduce the risk of HIV infection related to sexual violence.

Contributors
JP, AR, and ADL designed the study. JP and AR analysed the data. JP did the literature search and drafted the report. JP, ADL, FL, and NL critically revised the report for important intellectual content.

Declaration of interests
We declare no competing interests.

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