Characterizing the HIV risks and potential pathways to HIV infection among transgender women in Côte d’Ivoire, Togo and Burkina Faso

Shauna Stahlman§,1, Benjamin Liestman1, Sosthenes Ketende1, Seni Kouanda1,3, Odette Ky-Zerbo4, Marcel Lougue4, Daouda Diouf5, Simplice Anato6, Jules Tchalla7, Amara Bamba6, Fatou Maria Drame5, Rebecca Ezouatchi8, Abo Kouamé9 and Stefan D Baral1

§Corresponding author: Shauna Stahlman, E7133, 615 N Wolfe St, Baltimore, MD 21205, USA. Tel: +1 443 287 2370; Fax: +1 410 614 8371. (sstahlm1@jhu.edu)

Abstract

Introduction: Transgender women are at high risk for the acquisition and transmission of HIV. However, there are limited empiric data characterizing HIV-related risks among transgender women in sub-Saharan Africa. The objective of these analyses is to determine what factors, including sexual behaviour stigma, condom use and engagement in sex work, contribute to risk for HIV infection among transgender women across three West African nations.

Methods: Data were collected via respondent-driven sampling from men who have sex with men (MSM) and transgender women during three- to five-month intervals from December 2012 to October 2015 across a total of six study sites in Togo, Burkina Faso and Côte d'Ivoire. During the study visit, participants completed a questionnaire and were tested for HIV. Chi-square tests were used to compare the prevalence of variables of interest between transgender women and MSM. A multilevel generalized structural equation model (GSEM) was used to account for clustering of observations within study sites in the multivariable analysis, as well as to estimate mediated associations between sexual behaviour stigma and HIV infection among transgender women.

Results: In total, 2456 participants meeting eligibility criteria were recruited, of which 453 individuals identified as being female/transgender. Transgender women were more likely than MSM to report selling sex to a male partner within the past 12 months (p < 0.01), to be living with HIV (p < 0.01) and to report greater levels of sexual behaviour stigma as compared with MSM (p < 0.05). In the GSEM, sexual behaviour stigma from broader social groups was positively associated with condomless anal sex (adjusted odds ratio (AOR) = 1.33, 95% confidence interval (CI) = 1.09, 1.62) and with selling sex (AOR = 1.23, 95% CI = 1.02, 1.50). Stigma from family/friends was also associated with selling sex (AOR = 1.42, 95% CI = 1.13, 1.79), although no significant associations were identified with prevalent HIV infection.

Conclusions: These data suggest that transgender women have distinct behaviours from those of MSM and that stigma perpetuated against transgender women is impacting HIV-related behaviours. Furthermore, given these differences, interventions developed for MSM will likely be less effective among transgender women. This situation necessitates dedicated responses for this population, which has been underserved in the context of both HIV surveillance and existing responses.

Keywords: HIV; transgender women; stigma; sub-Saharan Africa; epidemiology; sexual risk behaviours; structural equation modelling.

Introduction

Transgender women, defined here as individuals who were assigned the male sex at birth but who identify as women, are at high risk for HIV acquisition and transmission [1,2]. Globally, the odds of being infected with HIV for transgender women are almost 50 times those of other adults of reproductive age, with a pooled HIV prevalence of around 19% [1]. Even compared to other key populations such as men who have sex with men (MSM), transgender women appear to be at increased risk for HIV transmission [1,3]. A primary driver of this burden, similar to MSM, is the high transmission probability of condomless anal sex [4]. Transgender women also experience high levels of multiple intersecting stigmas, such as stigma related to gender identity, sexual practices, sex work and HIV status [5–10]. Sexual behaviour stigma, which is defined here as stigma that is anticipated, perceived or experienced as a result of one’s sexual experience, is just one form of stigma that may be shared in common between MSM and transgender women [11]. However, because of the potential non-additive effects of these intersecting stigmas, the negative health outcomes due to sexual behaviour stigma may be even more severe for transgender women than for MSM [12,13].

A qualitative study of transgender women in the United States provided one example of the impact of stigma...
and discrimination on increasing the risk for HIV infection. The study noted that stigma can reduce self-esteem within the context of romantic relationships, which can lead to reduced condom use for the sake of these women pleasing their partner [14]. Sexual behaviour stigma and gender-related abuse have also been associated with risk factors for HIV infection, including condomless anal sex [8,15,16], as well as reduced access to/uptake of HIV prevention and care services [3,17,18]. Because transgender women are often among the most marginalized and economically discriminated against in societies, many engage in sex work to support themselves [19,20], which can further increase the risk for HIV transmission [19].

In Togo, Burkina Faso and Côte d’Ivoire, the HIV prevalence among adults aged 15 to 49 in 2014 ranged from 1 to 3.5% [21]. However, MSM communities in these countries experience a much greater burden of infection, with HIV prevalences ranging from 10 to 35% [22]. In addition, there are almost no empiric data on the risk factors for HIV infection among transgender women anywhere on the African continent, including West Africa [1,3,23]. Historically and also in the context of the HIV/AIDS epidemic, most have denied or downplayed the existence of gay, lesbian, bisexual and transgender individuals in Africa [24]. The lack of research on transgender populations in countries across sub-Saharan Africa has contributed to a lack of funding and clinical competency for transgender-specific HIV services [23]. Although visibility is increasing, the increased exposure to violence and victimization among transgender women has also contributed to the persistent lack of epidemiological research in this group [23]. As a result, we know little about sexual practices, HIV prevalence and risk factors among transgender women in the region.

The objective of these analyses is to determine what factors, such as sexual behaviour stigma, condom use and engagement in sex work, contribute to the risk for HIV infection among transgender women across three West African nations (Burkina Faso, Côte d’Ivoire and Togo). By studying the potential effects of sexual behaviour stigma across gender identities, we utilize intersectional research methods with the goal of unifying theoretical frameworks of stigma to reduce health disparities among transgender women, and to support data that examine multiple social identities (gay men and other MSM, as well as transgender women who have sex with men) [12,25,26]. During the period of data collection, same sex practices were illegal in Togo [27]. Although not criminalized in Côte d’Ivoire and Burkina Faso, same sex practices remained highly stigmatized and without any constitutional protections against discrimination [27,28]. Specifically, we explored the HIV risk factors that affect transgender women as compared with MSM and assessed which factors could potentially mediate the association between sexual behaviour stigma and risk of HIV infection.

**Methods**

**Study population and sampling methods**

Data were collected as part of larger cross-sectional studies including quantitative questionnaires, HIV testing and population size estimates of MSM in several West African countries. The studies took place from December 2012 to June 2013 (Kara and Lome) in Togo; January to August 2013 (Bobo-Dioulasso and Ouagadougou) in Burkina Faso; and in Côte d’Ivoire in March to May 2015 (Abidjan), July to September 2015 (Bouaké), May to June 2015 (Gagnoa) and September to October 2015 (Yamoussoukro). The study cities were chosen based on the following criteria: large enough to enable recruitment of the proposed sample size (all urban cities), far enough away from other cities so that the same population was not resampled, representative of different areas and cultures within the country, and existing relationships of trust with activities and programmes that work with MSM. Eligible participants had to be at least 18 years old, to have been assigned male sex at birth, to be capable of providing informed oral consent, and to report having had insertive or receptive anal sex with a man in the past 12 months. During the questionnaire, participants were asked, “What do you consider your gender to be?” Those responding “female” or “transgender” were considered as transgender women for these analyses. The response options were “man,” “woman” or “Intersex” in Togo and Burkina Faso and “man,” “woman,” “transgender” or “other (specify)” in Côte d’Ivoire. Intersex was explained to participants as meaning that they did not identify as either male or female, and key informants indicated that participants interpreted “transgender” as meaning the same thing as “female.”

Participants were recruited using respondent-driven sampling (RDS) [29,30]. To begin recruitment, three to six seeds, or initial recruits, were selected based on the recommendation of local community-based organizations, representing a range of characteristics including age, education, socioeconomic status and participation in LGBT associations. In Bobo-Dioulasso, 24 waves of accrual were reached, with all other sites reaching between 7 and 14 waves. Equilibrium was reached for the outcome variable of interest (HIV status) and for sociodemographics (e.g., age, education) in all study sites. Equilibrium was defined as the point at which the cumulative sample proportions came within 2% of the final sample proportion and did not fluctuate more than 2% during the sampling of additional waves [31].

Participants were reimbursed for the cost of travel to the study site. In Togo, participants were additionally reimbursed for the cost of one meal. RDS recruiters were compensated the equivalent of US$3 (Burkina), US$6 (Togo) and US$2 (Côte d’Ivoire) for each eligible participant they recruited into the study (up to three recruits). Studies were approved by the Ethical Committee of Togo, the Health Research Ethics Committee of Burkina Faso, the Health Research Ethics Committee of Côte d’Ivoire and the institutional review board at the Johns Hopkins Bloomberg School of Public Health.

**Data collection and key measures**

During the study visit, trained interviewers administered a structured questionnaire including modules on demographics, sexual risk practices and sexual behaviour stigma. Interviews were conducted in French or in the local languages of Ewe or Kabiye (Togo) or Mooré or Dioula (Burkina Faso), by interviewers who were fluent and trained in conducting the interviews in the local language of the city.
Sexual risk practices included the number of receptive anal sex partners within the past 12 months (Togo and Burkina) and number of regular receptive anal sex partners within the past 30 days (Côte d’Ivoire; number of casual receptive anal sex partners was not measured). Participants were also asked whether they used a condom during the last time they had anal sex with a male partner. Sexual positioning variables were generated for those who only engaged in receptive anal sex (“bottoms”), those who only engaged in insertive anal sex (“tops”) and those who engaged in both receptive and insertive anal sex (“versatiles”). In order to measure engagement in sex work, participants were asked whether they had anal or oral sex with any men in the last 12 months in exchange for things they wanted or needed such as money, drugs, food, shelter or transportation.

Sexual behaviour stigma measures consisted of a series of yes/no questions that assessed four domains [32–35]. Domains were identified via exploratory factor analysis using tetrachoric correlations. They included the following: 1) stigma from family and friends (e.g., “Have you ever felt excluded from family gatherings because you have sex with men?”), 2) perceived healthcare stigma (e.g., “Have you ever felt afraid to go to healthcare services because you worry someone may learn you have sex with men?”), 3) experienced healthcare stigma (e.g., “Have you ever heard healthcare providers gossiping about you because you have sex with men?”) and 4) social stigma (e.g., “Have you ever been verbally harassed and felt that it was because you have sex with men?”). Social stigma also included whether the participant had ever been physically attacked or forced to have sex and felt that it was because they have sex with men. Of the 13 initial items, two were removed due to cross loading on two or more factors. Four stigma domain variables were created for use in the multivariable model, which consisted of the sum of the total number of yes responses for each domain.

At the end of the survey, participants were tested for HIV using the Alere Determine HIV 1/2 Ag/Ab Combo Rapid Test (Waltham, MA, USA). If there was a positive result, either the HIV Bispot ImmunoComb II (Organics, Yavne, Israel), First Response HIV 1-2.0 Card Test (Premier Medical Corporation, Nani Daman, India) or Clearview HIV 1/2 STAT-PAK™ (Chembio Diagnostic Systems, Medford, NY, USA) were used to confirm the result in Burkina Faso, Togo, or Côte d’Ivoire, respectively. The specificity for the HIV confirmatory test was 100% in all settings. Participants who tested positive for HIV at any of the study sites were provided referrals for treatment.

### Table 1. Prevalence of sociodemographic characteristics of transgender women as compared with MSM participants in three West African nations (N = 2246)

| Characteristic                  | Total          | MSM           | Transgender women | \(\chi^2\) \(p^a\) |
|--------------------------------|----------------|---------------|-------------------|---------------------|
| Median age (IQR)\(^b\)         | 23 (21 to 26)  | 23 (21 to 26) | 22.5 (20 to 26)   | 0.02*               |
| Education completed            |                |               |                   |                     |
| Primary school or lower        | 211            | 139           | 72                | <0.001***           |
| Secondary/high school          | 1437           | 1174          | 263               | 58.7                |
| More than high school          | 579            | 466           | 113               | 25.2                |
| Employment status              |                |               |                   |                     |
| Unemployed                     | 238            | 187           | 51                | 0.07                |
| Student                        | 1102           | 902           | 200               | 44.3                |
| Employed                       | 905            | 704           | 201               | 44.5                |
| Study site location            |                |               |                   |                     |
| Bobo-Dioulasso, Burkina Faso   | 276            | 201           | 75                | <0.001***           |
| Ouagadougou, Burkina Faso      | 265            | 242           | 23                | 5.1                 |
| Abidjan, Côte d’Ivoire         | 350            | 211           | 139               | 30.7                |
| Bouake, Côte d’Ivoire          | 350            | 287           | 63                | 13.9                |
| Gagnoa, Côte d’Ivoire          | 150            | 113           | 37                | 8.2                 |
| Yamoussoukro, Côte d’Ivoire    | 250            | 183           | 67                | 14.8                |
| Kara, Togo                     | 307            | 301           | 6                 | 1.3                 |
| Lome, Togo                     | 298            | 255           | 43                | 9.5                 |

\(p < 0.05; \quad **p < 0.01; \quad ***p < 0.001; \quad ^a p\)-value derived using Pearson’s chi-square test; \(^b p\)-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.
estimate mediated associations between sexual behaviour stigma and HIV infection among transgender women in the combined data set. The model adjusted for age and education level as potential confounders based on previous knowledge \[16,37,38\] and on results from bivariate analyses. Participants with missing data for variables of interest were excluded from the analyses.

Results

Study sample
In all, 2456 eligible participants were recruited across the six study sites, including 453 (18.4%) individuals who identified as being female or transgender. Those who reported being intersex \(n = 208\) or both male and female \(n = 1\) or “don’t know” \(n = 1\) were not considered to be transgender women nor MSM and were excluded from these analyses post hoc. The median age of the participants was 23 years, most had completed secondary/high school education (65%) and a large proportion were students (49%). Transgender women were similar to MSM in terms of employment status \(p = 0.07\) (Table 1). However, transgender women were more likely to only have completed primary school or a lower level of education \(p < 0.01\) and were slightly younger \(p < 0.05\). In addition, transgender women were disproportionately sampled across certain study sites, with the largest percentages of transgender women attending study locations in Abidjan (31%) and Bobo-Dioulasso (17%). These sociodemographic trends were similar when we examined associations TABLE 2. Prevalence of sociodemographic characteristics of transgender women as compared with MSM participants in Togo \((N = 605)\)

| Characteristic                  | Total                          | MSM                          | Transgender women                  | \(\chi^2\) | \(p^a\) |
|--------------------------------|-------------------------------|------------------------------|------------------------------------|-----------|--------|
| Median age (IQR)b              | 23 (21 to 26)                 | 23 (21 to 26)                | 21 (20 to 25)                      | 0.004**   |        |
| Education completed            |                               |                              |                                    |           |        |
| Primary school or lower        | 32 5.3                        | 26 4.7                       | 6 12.2                             | 0.04*     |        |
| Secondary/high school          | 410 68.0                      | 376 67.9                     | 34 69.4                            |           |        |
| More than high school          | 161 26.7                      | 152 27.4                     | 9 18.4                             |           |        |
| Employment status              |                               |                              |                                    |           |        |
| Unemployed                     | 62 10.3                       | 59 10.6                      | 3 6.1                              | 0.08      |        |
| Student                        | 215 35.5                      | 203 36.5                     | 12 24.5                            |           |        |
| Employed                       | 328 54.2                      | 294 52.9                     | 34 69.4                            |           |        |
| Study site location            |                               |                              |                                    |           |        |
| Kara                           | 307 50.7                      | 301 54.1                     | 6 12.2                             | <0.001*** |        |
| Lome                           | 298 49.3                      | 255 45.9                     | 43 87.8                            |           |        |

*\(p < 0.05\); **\(p < 0.01\); ***\(p < 0.001\); \(p\)-value derived using Pearson’s chi-square test; \(p\)-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.

TABLE 3. Prevalence of sociodemographic characteristics of transgender women as compared with MSM participants in Burkina Faso \((N = 541)\)

| Characteristic                  | Total                          | MSM                          | Transgender women                  | \(\chi^2\) | \(p^a\) |
|--------------------------------|-------------------------------|------------------------------|------------------------------------|-----------|--------|
| Median age (IQR)b              | 22 (20 to 24)                 | 22 (20 to 24)                | 21 (20 to 24)                      | 0.70      |        |
| Education completed            |                               |                              |                                    |           |        |
| Primary school or lower        | 51 9.6                        | 38 8.7                       | 13 13.8                            | 0.13      |        |
| Secondary/high school          | 384 72.2                      | 315 71.9                     | 69 73.4                            |           |        |
| More than high school          | 97 18.2                       | 85 19.4                      | 12 12.8                            |           |        |
| Employment status              |                               |                              |                                    |           |        |
| Unemployed                     | 27 5.0                        | 18 4.1                       | 9 9.2                              | 0.002**   |        |
| Student                        | 344 63.6                      | 296 66.8                     | 48 49.0                            |           |        |
| Employed                       | 170 31.4                      | 129 29.1                     | 41 41.8                            |           |        |
| Study site location            |                               |                              |                                    |           |        |
| Bobo-Dioulasso                 | 276 51.0                      | 201 45.4                     | 75 76.5                            | <0.001*** |        |
| Ouagadougou                    | 265 49.0                      | 242 54.6                     | 23 23.5                            |           |        |

*\(p < 0.05\); **\(p < 0.01\); ***\(p < 0.001\); \(p\)-value derived using Pearson’s chi-square test; \(p\)-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.
stratified by country, although transgender women were less likely than MSM to be students as compared with employed or unemployed in Burkina Faso (\( p < 0.01 \)) (Tables 2–4).

### Prevalence of HIV risk-related characteristics

Transgender women were more likely than MSM to report recently engaging in exclusively receptive anal sex (\( p < 0.01 \)) and less likely to report recently engaging in exclusively insertive anal sex (\( p < 0.01 \)) (Table 5). However, overall transgender women were not found to be more or less likely to report sexual position versatility (i.e., practicing both receptive and insertive anal sex). Transgender women were, however, more likely to report condomless anal sex (\( p < 0.01 \)), selling sex to a male partner (\( p < 0.01 \)) and were more likely to be living with HIV (\( p < 0.01 \)) as compared with MSM.

There was some variation when results were stratified by country (Tables 6–8). Namely, transgender women were less likely than MSM to report sexual position versatility in Togo (\( p < 0.05 \)) and were more likely to report sexual position versatility in Côte d’Ivoire (\( p < 0.01 \)). Transgender women were not more likely to be living with HIV in Burkina Faso (\( p = 0.96 \)), though the overall HIV prevalence was lower there. Transgender women were more likely to report a higher number of receptive anal sex partners in all settings and were more likely to report condomless anal sex in all countries except for Burkina Faso.

### Prevalence of sexual behaviour stigma

Transgender women in the combined sample were more likely than MSM to report feeling excluded by family members

### Table 4. Prevalence of sociodemographic characteristics of transgender women as compared with MSM participants in Côte d’Ivoire (\( N = 1100 \))

| Characteristic                  | Total | MSM | Transgender women |
|--------------------------------|-------|-----|-------------------|
|                                | \( n \) | \%  | \( n \) | \%  | \( n \) | \%  |
| Median age (IQR)\(^b\)         | 24 (21 to 27) | 24 (22 to 27) | 23 (21 to 27) | 0.02* |
| Education completed            |       |     |                   |      |
| Primary school or lower        | 128  | 11.7| 75        | 9.5  | 53  | 17.4| <0.001*** |
| Secondary/high school          | 643  | 58.9| 483       | 61.4 | 160 | 52.5|
| More than high school          | 321  | 29.5| 229       | 29.1 | 92  | 30.2|
| Employment status              |       |     |                   |      |
| Unemployed                     | 149  | 13.6| 110       | 13.9 | 39  | 12.8| 0.19 |
| Student                        | 543  | 49.4| 403       | 50.8 | 140 | 45.9|
| Employed                       | 407  | 37.0| 281       | 35.4 | 126 | 41.3|
| Study site location            |       |     |                   |      |
| Abidjan                        | 350  | 31.8| 211       | 26.6 | 139 | 45.4| <0.001*** |
| Bouake                         | 350  | 31.8| 287       | 36.2 | 63  | 20.6|
| Gagnoa                         | 150  | 13.6| 113       | 14.2 | 37  | 12.1|
| Yamoussoukro                   | 250  | 22.7| 183       | 23.1 | 67  | 21.9|

\* \( p < 0.05 \); \** \( p < 0.01 \); \*** \( p < 0.001 \); \^\( p\)-value derived using Pearson’s chi-square test; \^\^\( p\)-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.

### Table 5. Prevalence of HIV risk-related characteristics of transgender women as compared with MSM participants in three West African nations (\( N = 2246 \))

| HIV risk-related characteristic          | Total | MSM | Transgender women |
|------------------------------------------|-------|-----|-------------------|
|                                          | \( n \) | \%  | \( n \) | \%  | \( n \) | \%  |
| Sexual position\(^b\)                    |       |     |                   |      |
| Insertive only                           | 801   | 47.9| 770       | 59.4 | 31  | 8.2  | <0.001*** |
| Receptive only                           | 290   | 17.3| 84        | 6.5  | 206 | 54.6 | <0.001*** |
| Versatile                                | 583   | 34.8| 443       | 34.2 | 140 | 37.1 | 0.29  |
| Condomless anal sex, last anal sex episode| 583   | 26.6| 438       | 24.9 | 145 | 33.3 | <0.001*** |
| Sold sex to male partner, past 12 months | 874   | 39.2| 658       | 37.0 | 216 | 48.1 | <0.001*** |
| Living with HIV                          | 201   | 9.2 | 119       | 6.8  | 82  | 18.9 | <0.001*** |

\* \( p < 0.05 \); \** \( p < 0.01 \); \*** \( p < 0.001 \); \^\( p\)-value derived using Pearson’s chi-square test; \^\^\( p\)-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.
In the analysis stratified by country, transgender women consistently reported higher levels of verbal harassment (Tables 10–12). Transgender women also reported significantly higher levels of physical assault in Côte d’Ivoire (p < 0.01) and Burkina Faso (p < 0.01), as well as higher levels of rape in Côte d’Ivoire (p < 0.01). Perceived and experienced healthcare stigma was not significantly higher among transgender women in Togo or Burkina Faso, and family/friend stigma was not significantly higher among transgender women in Togo. However, in Togo several cell counts for family- and healthcare-related stigma were below 5.

**Independent associations with HIV infection among transgender women**

The GSEM was used to analyze mediated associations of sexual behaviour stigma and HIV infection among transgender women. Country-specific models could not be used due to the limited number of transgender women and HIV cases by country. Those who were aware that they were currently living with HIV were removed (n = 36) in order to eliminate potential bi-directionality of the association between knowledge of living with HIV and sexual behaviour stigma, resulting in a final sample of 417 transgender women. Each sexual behaviour stigma domain variable was conceptualized as an explanatory cause of HIV infection, and potential mediators included sexual positioning, number of recent receptive anal sex partners, condomless anal sex and engagement

| HIV risk-related characteristic | Total | MSM | Transgender women | $\chi^2$ p* |
|--------------------------------|-------|-----|-------------------|-------------|
| Median number of receptive anal sex partners, past 12 months (IQR)b | 0 (0 to 1) | 0 (0 to 0) | 1 (0 to 2) | <0.001*** |
| Sexual position, past 12 months | | | | |
| Insertive only | 101 | 38.7 | 95 | 41.7 | 6 | 18.2 | 0.01* |
| Receptive only | 36 | 13.8 | 18 | 7.9 | 18 | 54.6 | <0.001*** |
| Versatile | 124 | 47.5 | 115 | 50.4 | 9 | 27.3 | 0.01* |
| Condomless anal sex, last anal sex episode | 146 | 24.3 | 127 | 23.0 | 19 | 39.6 | 0.01* |
| Sold sex to male partner, past 12 months | 172 | 28.5 | 152 | 27.4 | 20 | 40.8 | 0.046* |
| Living with HIV | 51 | 8.5 | 42 | 7.6 | 9 | 18.8 | 0.008** |

*p < 0.05; **p < 0.01; ***p < 0.001; b p-value derived using Pearson’s chi-square test; b p-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.
Variables that were not statistically significant (p > 0.05) were dropped from the model, however, HIV laboratory diagnosis was kept in order to describe associations of interest, and age and education were kept to control for potential confounding. In the final model, social stigma was positively associated with condomless anal sex at the last anal sex episode (p < 0.01). In addition, social stigma and family/friend stigma were associated with selling sex to a male partner within the past 12 months (p < 0.01) (Table 13; Figure 1). However, condomless anal sex and engagement in sex work were not found to be significantly associated with HIV infection.

Discussion

In these analyses of transgender women in three West African nations, we found a high burden of HIV, nearly three times that of MSM, who are known as a key population at risk for HIV infection. Previous studies among transgender women in the United States have pointed to higher levels of condomless anal sex and engagement in sex work as key risk factors for HIV transmission, driven potentially by underlying experiences or perceptions of stigma and economic marginalization [3,15,17]. In this sample, we found that sexual behaviour stigma from family/friends and broader social groups was positively and significantly associated with recent

### Table 8. Prevalence of HIV risk-related characteristics of transgender women as compared with MSM participants in Côte d'Ivoire (N = 1100)

| HIV risk-related characteristic                                           | Total | MSM | Transgender women |
|-------------------------------------------------------------------------|-------|-----|-------------------|
| Median number of regular receptive anal sex partners, past 30 days (IQR) | 0 (0 to 1) | 0 (0 to 0) | 1 (0 to 2) |
| Sexual position, past 30 days                                           |       |     |                   |
| Insertive only                                                           | 490   | 470 | 20                |
| Receptive only                                                           | 176   | 41  | 135               |
| Versatile                                                                | 206   | 115 | 91                |
| Condomless anal sex, last anal sex episode                              | 303   | 205 | 98                |
| Sold sex to male partner, past 12 months                                | 495   | 342 | 153               |
| Living with HIV                                                          | 123   | 55  | 68                |

* p < 0.05; **p < 0.01; ***p < 0.001; *p-value derived using Pearson's chi-square test; p-value derived using the Wilcoxon rank-sum test; MSM, men who have sex with men.

### Table 9. Prevalence of sexual behaviour stigma among transgender women as compared with MSM participants in three West African nations (N = 2246)

| Stigma from family/friends       | Total | MSM | Transgender women |
|----------------------------------|-------|-----|-------------------|
| Excluded by family               | 223   | 156 | 67                |
| Gossiped about by family         | 641   | 448 | 193               |
| Rejected by friends              | 501   | 358 | 143               |
| Perceived healthcare stigma      |       |     |                   |
| Afraid to seek healthcare        | 473   | 364 | 109               |
| Avoided seeking healthcare       | 363   | 276 | 87                |
| Experienced healthcare stigma    |       |     |                   |
| Treated poorly at a healthcare centre | 60   | 41  | 19                |
| Gossiped about by healthcare worker | 167  | 124 | 43                |
| Social stigma                    |       |     |                   |
| Verbally harassed                | 727   | 475 | 252               |
| Blackmailed                      | 420   | 320 | 100               |
| Physically hurt                  | 253   | 139 | 114               |
| Raped                            | 230   | 131 | 99                |

* p < 0.05; **p < 0.01; ***p < 0.001; *p-value derived using Pearson's chi-square test; MSM, men who have sex with men.
condomless anal sex as well as engagement in sex work, which could help to partially explain the disproportionate burden of HIV among this population.

Another important finding is the relatively large proportion of participants who identified as a woman or transgender as part of these RDS-generated samples of individuals born male who have sex with men. Our findings highlight that transgender women comprise a distinct population from that of MSM, with increased levels of stigma and risk of HIV infection. Of further note is the relationship between sexual positioning and gender identity, which suggests that transgender women are more likely to engage exclusively in receptive anal sex. One possibility is that some participants may have confused questions about gender identity with questions about sexual positioning (e.g., those who bottom being more likely to indicate female gender). However,

### Table 10. Prevalence of sexual behaviour stigma among transgender women as compared with MSM participants in Togo (N = 605)

|                           | Total                      | MSM | Transgender women | $\chi^2$ | p*  |
|---------------------------|----------------------------|-----|-------------------|----------|-----|
| **Stigma from family/friends** |                            |     |                   |          |     |
| Excluded by family        | 51 (8.4)                   | 46  (8.3) | 5  (10.2) | 0.64    |
| Gossiped about by family  | 94 (15.5)                  | 83  (14.9) | 11 (22.5) | 0.16    |
| Rejected by friends       | 70 (11.6)                  | 66  (11.9) | 4  (8.2)  | 0.64    |
| **Perceived healthcare stigma** |                        |     |                   |          |     |
| Afraid to seek healthcare  | 53 (8.8)                   | 47  (8.5) | 6  (12.2) | 0.37    |
| Avoided seeking healthcare | 42 (6.9)                   | 40  (7.2) | 2  (4.1)  | 0.56    |
| **Experienced healthcare stigma** |                    |     |                   |          |     |
| Treated poorly at a healthcare centre | 7 (1.2)       | 6  (1.1) | 1  (2.0)  | 0.45    |
| Gossiped about by healthcare worker | 24 (4.0)      | 20  (3.6) | 4  (8.2)  | 0.12    |
| **Social stigma**         |                            |     |                   |          |     |
| Verbally harassed         | 97 (16.0)                  | 82  (14.8) | 15 (30.6) | 0.004** |
| Blackmailed               | 106 (17.5)                 | 93  (16.7) | 13 (26.5) | 0.08    |
| Physically hurt           | 21 (3.5)                   | 17  (3.1) | 4  (8.2)  | 0.08    |
| Raped                     | 20 (3.3)                   | 17  (3.1) | 3  (6.1)  | 0.22    |

*p < 0.05; **p < 0.01; ***p < 0.001; *p-value derived using Pearson’s chi-square test; Fisher’s exact test was used for cell counts less than 5; MSM, men who have sex with men.

### Table 11. Prevalence of sexual behaviour stigma among transgender women as compared with MSM participants in Burkina Faso (N = 541)

|                           | Total                      | MSM | Transgender women | $\chi^2$ | p*  |
|---------------------------|----------------------------|-----|-------------------|----------|-----|
| **Stigma from family/friends** |                            |     |                   |          |     |
| Excluded by family        | 53 (9.8)                   | 36  (8.1) | 17 (17.4) | 0.006** |
| Gossiped about by family  | 161 (29.8)                 | 125 (28.2) | 36 (37.1) | 0.08    |
| Rejected by friends       | 166 (30.7)                 | 127 (28.7) | 39 (39.8) | 0.03*   |
| **Perceived healthcare stigma** |                        |     |                   |          |     |
| Afraid to seek healthcare  | 154 (28.5)                 | 133 (30.0) | 21 (21.4) | 0.09    |
| Avoided seeking healthcare | 136 (25.1)                 | 114 (25.7) | 22 (22.5) | 0.50    |
| **Experienced healthcare stigma** |                    |     |                   |          |     |
| Treated poorly at a healthcare centre | 18 (3.3)       | 13  (2.9) | 5  (5.1)  | 0.28    |
| Gossiped about by healthcare worker | 39 (7.2)      | 32  (7.2) | 7  (7.1)  | 0.98    |
| **Social stigma**         |                            |     |                   |          |     |
| Verbally harassed         | 209 (38.7)                 | 152 (34.4) | 57 (58.2) | <0.001***|
| Blackmailed               | 99 (18.3)                  | 86  (19.5) | 13 (13.3) | 0.15    |
| Physically hurt           | 67 (12.5)                  | 40  (9.1) | 27 (27.8) | <0.001***|
| Raped                     | 52 (9.7)                   | 38  (8.6) | 14 (14.3) | 0.09    |

*p < 0.05; **p < 0.01; ***p < 0.001; *p-value derived using Pearson’s chi-square test; MSM, men who have sex with men.
we used a two-step process for gender assessment, which is the method recommended by the UCSF Center of Excellence for Transgender Health [39]. In addition, our analyses further indicate that, overall, transgender women are equally likely as MSM to engage in sexual position versatility (i.e., to practice both receptive and insertive anal sex). This sexual position versatility has implications for increasing network-level HIV transmission risks, in that it enables partners who are newly infected through receptive anal sex to transmit HIV efficiently to new partners when they are the insertive partner [4,40].

Taken together, these results suggest that participants in this study defined their gender identity separately from their sexual practices and that sexual practices alone cannot explain the disproportionately high burden of HIV among transgender women.

In a sensitivity analysis, we included the 210 individuals in Togo and Burkina Faso who reported their gender as intersex (n/C30 208) or other (n/C30 2) as a separate category in the bivariate analyses. We found that these individuals had a relatively similar distribution of sociodemographic characteristics and experience of stigma as that of transgender women; however, they were much more likely to report versatile sexual positioning (73% in Togo and 76% in Burkina Faso). The HIV prevalence of these individuals was 21% in Togo and 4% in Burkina Faso, which was similar to the prevalences of 19% and 5% observed among transgender women in each country, respectively. Based on these findings, it appears that those who identify as intersex may have similar HIV risks to transgender women, reinforcing the need to better understand gender diversity across these settings.

Stigma likely plays an important role in facilitating risk for HIV transmission in this population. After adjusting for sociodemographic factors and clustering within study sites, we found that social and family/friend stigma was associated with engagement in sex work, and social stigma was associated with increased report of condomless anal sex at the last anal sex episode. Although condomless anal sex and engagement in sex work were not found to be empirically associated with prevalent HIV infection in this sample, they nonetheless serve as important risk factors for HIV transmission [41,42].

Table 12. Prevalence of sexual behaviour stigma among transgender women as compared with MSM participants in Côte d’Ivoire (N = 1100)

| Stigma from family/friends | Total n % | MSM n % | Transgender women n % | χ2 p* |
|----------------------------|-----------|---------|-----------------------|-------|
| Excluded by family         | 119 10.8  | 74 9.3  | 45 14.7               | 0.01* |
| Gossiped about by family   | 386 35.1  | 240 30.2 | 146 47.7             | <0.001*** |
| Rejected by friends        | 265 24.1  | 165 20.8 | 100 32.7             | <0.001*** |
| Perceived healthcare stigma|           |         |                       |       |
| Afraid to seek healthcare   | 266 24.2  | 184 23.2 | 82 26.8               | 0.21  |
| Avoided seeking healthcare | 185 16.8  | 122 15.4 | 63 20.6               | 0.04* |
| Experienced healthcare stigma|         |         |                       |       |
| Treated poorly at a healthcare centre | 35 3.2 | 22 2.8 | 13 4.3 | 0.21 |
| Gossiped about by healthcare worker | 104 9.5 | 72 9.1 | 32 10.5 | 0.48 |
| Social stigma              |           |         |                       |       |
| Verbally harassed          | 421 38.3  | 241 30.4 | 180 58.8             | <0.001*** |
| Blackmailed                | 215 19.6  | 141 17.8 | 74 24.2              | 0.02* |
| Physically hurt            | 165 15.1  | 82 10.4  | 83 27.3              | <0.001*** |
| Raped                      | 158 14.4  | 76 9.6   | 82 26.8              | <0.001*** |

*p < 0.05; **p < 0.01; ***p < 0.001; *p-value derived using Pearson’s chi-square test; MSM, men who have sex with men.

Table 13. GSEM-adjusted associations with testing positive for HIV and potential mediators among transgender women in three West African nations (N = 417)

| Outcome variable | Explanatory variable | Adjusted odds ratio | 95% confidence interval | p |
|------------------|----------------------|---------------------|-------------------------|---|
| Condomless anal sex, last anal sex episode | Social stigma | 1.33 | 1.09, 1.62 | 0.004** |
| Sold sex to male partner, past 12 months | Social stigma | 1.23 | 1.02, 1.50 | 0.03* |
|                   | Family/friend stigma | 1.42 | 1.13, 1.79 | 0.003** |
| Positive for HIV | Condomless anal sex, last anal sex episode | 1.21 | 0.63, 2.33 | 0.56 |
|                   | Sold sex to male partner, past 12 months | 0.82 | 0.44, 1.53 | 0.54 |

*p < 0.05; **p < 0.01; GSEM, generalized structural equation model; MSM, men who have sex with men. Note: Model adjusts for age and education. Clustering is taken into account at the site level.
Sample size limitations and underreporting of sexual risk practices due to social desirability bias in face-to-face interviews, as well as the timing of HIV infection as measured in relation to risk practices (i.e., condom use at last anal sex episode), could explain the lack of finding of an association here.

There are additional limitations of this study to consider. First, temporality could not be established with the use of cross-sectional data. However, we removed those who self-reported living with HIV from our final multivariable model, reducing the likelihood that knowledge of HIV status affected sexual behaviour stigma or sexual risk practices. In addition, transgender women face multiple levels of intersecting stigma, including gender identity stigma and HIV stigma. We measured only sexual behaviour stigma; however, these measures had good validity in this sample and were found to be significant in predicting risk factors for HIV infection among those unaware of living with HIV. This intercategorical approach to assessing intersectionality of sexual behaviour stigma, by focusing analyses on categories of gender identity, is an approach that has been recommended in previous work [26]. Another limitation is that a large proportion of participants in Togo had missing data for sexual positioning (55%), and these results should be interpreted with caution. Because transgender women were recruited via predominantly MSM social networks, we may have failed to reach transgender women not linked to the MSM community via social or sexual networks. Due to sample size limitations, it was not possible to run separate GSEMs for each country. Because Côte d’Ivoire accounted for roughly half of the study sample and the majority of prevalent HIV cases, we note that the findings from the GSEM were driven primarily by data from Côte d’Ivoire. Finally, there may have been differences in culture, time period and access to healthcare settings that were not explored. For example, Abidjan, Bobo-Dioulasso and Lomé have areas that are more culturally open to and accepting of MSM than other regions within the same country and, although we adjusted for study site in the GSEM, we did not assess the impact of these site-specific factors on stigma or risk for HIV.

Conclusion

The World Health Organization and UNAIDS recently called for a reduction of stigma towards MSM and transgender women to reduce HIV transmission in these key populations [43,44]. Overall, these data suggest that sexual behaviour stigma perpetuated against transgender women is widespread in Togo, Burkina Faso and Côte d’Ivoire and is even more extreme than stigma directed towards MSM. This stigma also has a significant impact on HIV risk-related behaviours and will need to be addressed as part of a comprehensive HIV prevention strategy. Empirical data among transgender women across sub-Saharan Africa are historically limited. However, these findings indicate that transgender women are present in substantial numbers in West Africa. They are a distinct population from MSM, and this distinction is not defined exclusively by sexual positioning. Continued efforts are needed to improve our understanding of gender identity and to better meet the HIV treatment, care and prevention needs of transgender women across the continent.

Authors’ affiliations

1Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health Baltimore, MD, USA; 2Institut de Recherche en Sciences de la Santé, Ouagadougou, Burkina Faso; 3Institut Africain de Santé Publique, Ouagadougou, Burkina Faso; 4Programme d’Appui au Monde Associatif et Communaute, Ouagadougou, Burkina Faso; 5Enda Santé Senegal, Dakar, Senegal; 6Arc-en-ciel, Lomé, Togo; 7Espoir Vie, Lomé, Togo; 8Enda Santé, Abidjan, Côte d’Ivoire; 9Programme National de Lutte contre le Sida, Ministère de la Santé et de la Lutte contre le Sida, Abidjan, Côte d’Ivoire

Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

This study combines work conducted across six study sites in three different West African nations, which resulted in multiple collaborators. SS led the analysis and writing of the manuscript. SK1 created data entry and data management systems for each of the sites, contributed to the questionnaire development and provided input for the analysis. SK2 served as principal investigator from the Institut de Recherche en Sciences de la Santé for the Burkina Faso site. OK was the principal investigator from the Programme d’Appui au Monde Associatif et Communautaire (PAMAC) for the Burkina Faso study. ML was a co-investigator from PAMAC in Burkina Faso and supported the manuscript development by providing important guidance. DD was the West Africa regional advisor/investigator for all three studies (Togo, Burkina Faso and Côte d’Ivoire). SA was the local principal investigator and study coordinator in Togo. JT was responsible for the supervision of data entry and management in Togo. AB and RE were responsible for programme support in Côte d’Ivoire. FMD, AK and BL supported the implementation of the studies, as well as supporting data cleaning processes and interpretation of the data. S8 conceptualized the study designs and monitored study stages in all countries, as well as giving guidance on the analysis and being involved throughout the manuscript development. All authors contributed substantially to either the...
study design, data collection or analysis or interpretation of data; participated in drafting the article or revising it for intellectual content; and approved the final version to be published, as outlined by the ICMJE authorship criteria.

Acknowledgements
We would like to thank the participants for their engagement and for making these analyses possible. We also acknowledge the study team members for their continued dedication and important role in the success of these studies.

Funding
Work in Togo and Burkina Faso was supported by Project SEARCH, which was funded by the US Agency for International Development under contract GHU-00-07-00032-00 and by the President’s Emergency Plan for AIDS Relief. Work in Côte d’Ivoire was funded by the Global Fund to Fight AIDS, Tuberculosis and Malaria through the government of Côte d’Ivoire National AIDS Control Program (PNPPEC) contract to Enda Santé, an organization based in Senegal and subcontracted for technical assistance to Johns Hopkins University.

References
1. Baral SD, Poteat T, Stromdahl S, Wirtz AL, Guadamuz TE, Beyer C. Worldwide burden of HIV in transgender women: a systematic review and meta-analysis. Lancet Infect Dis. 2013;13(3):214–22.
2. Baral S, Holland CE, Shannon K, Logie C, Semugoma P, Sithole B, et al. Enhancing benefits or increasing harms: community responses for HIV among men who have sex with men, transgender women, female sex workers, and people who inject drugs. J Acquir Immune Defic Syndr. 2014;66(Suppl 3):S319–28.
3. Poteat T, Reisner SL, Radix A. HIV epidemics among transgender women. Curr Opin HIV AIDS. 2014;9(2):168–73.
4. Beyer C, Baral SD, van Griensven F, Goodreau SM, Chariyalertsak S, Wirtz AL, et al. Global epidemiology of HIV infection in men who have sex with men. Lancet. 2012;380(9839):367–77.
5. Grant JM, Mottet LA, Tanis J. Injustice at every turn: a report of the national transgender survey. Washington, DC: National Center for Transgender Equality; 2011.
6. Lombardi EL, Wilchins RA, Priesing D, Malouf D. Gender violence: transgender experiences with violence and discrimination. J Homossex. 2001;42(1):89–101.
7. Logie CH, James L, Tharao W, Loutfy MR. “We don’t exist”: a qualitative study of marginalization experienced by HIV-positive lesbian, bisexual, queer and transgender women in Toronto. Canada J Int AIDS Soc. 2012;15(2):17392.
8. Operario D, Yang M. Stigma and the syndemic of HIV-related health risk behaviors in a diverse sample of transgender women. J Community Psychol. 2014;42(3):544–57.
9. Gibson BA, Brown SE, Rutledge R, Wickersham JA, Kamuruziama A, Abice FL. Gender identity, healthcare access, and risk reduction among Malaysia’s mak nyah community. Global Publ Health. 2016;1:16–16. doi: http://dx.doi.org/10.1080/17446192.2015.1134614
10. Logie CH, Newman PA, Weaver J, Roungkraphon S, Tejan J. HIV-related stigma and HIV prevention uptake among young men who have sex with men and transgender women in Thailand. AIDS Patient Care STDS. 2016;30(3):92–100.
11. Brown L, Maxitnyre K, Trujillo L. Interventions to reduce HIV/AIDS stigma: what have we learned? AIDS Educ Prev. 2003;15(1):49–69.
12. Bowling L. The problem with the phrase women and minorities: intersectionality – an important theoretical framework for public health. Am J Public Health. 2012;102(7):1267–73.
13. Committee on Lesbian, Gay, Bisexual, and Transgender Health Issues and Prevention. The health of lesbian, gay, bisexual, and transgender people: building a foundation for better understanding. Washington, DC: The Institute of Medicine. 2011.
14. Melendez RM, Pinto R. It's really a hard life: love, gender and HIV risk among male-to-female transgender persons. Cult Health Sex. 2007;9(3):233–45.
15. Ntubrock L, Bocking W, Rosenblum A, Hwang S, Mason M, Macri M, et al. Gender abuse, depressive symptoms, and substance use among transgender women: a 3-year prospective study. Am J Public Health. 2014;104(11):2199–206.
16. Ntubrock L, Bocking W, Rosenblum A, Hwang S, Mason M, Macri M, et al. Gender abuse and incident HIV/STI among transgender women in New York City: buffering effect of involvement in a transgender community. AIDS Behav. 2015;19(8):1446–53.
17. De Santis JP. HIV infection risk factors among male-to-female transgender persons: a review of the literature. J Assoc Nurses AIDS Care. 2009;20(5):362–72.
18. Kosenko K, Rintamaki L, Raney S, Maness K. Transgender patient perceptions of stigma in health care contexts. Med Care. 2013;51(9):819–22.
19. Operario D, Soma T, Underhill K. Sex work and HIV status among transgender women: systematic review and meta-analysis. J Acquir Immune Defic Syndr. 2008;48(1):97–103.
20. Sausa LA, Keatley J, Operario D. Perceived risks and benefits of sex work among transgender women of color in San Francisco. Arch Sex Behav. 2007;36(6):784–77.
21. UNAIDS. HIV prevalence among adults (15–49) [Internet]. 2014 [cited 2015 Sep 11]. Available from: http://aidsinfo.unaids.org/###
22. Dijomard G, Quaye S, Sullivan PS. HIV epidemic among key populations in west Africa. Curr Opin HIV AIDS. 2014;9(5):506–13.
23. Jobson GA, Theron LB, Kaggwa JR, Kim JH. Transgender in Africa: invisible, inaccessible, or ignored? SAHARA J. 2012;9(2):160–3.
24. Epprecht M. Heterosexual Africa?: the history of an idea from the age of exploration to the age of AIDS. Athens, OH: Ohio University Press; 2008.
25. Bauer GR. Incorporating intersectionality theory into population health research methodology: challenges and the potential to advance health equity. Soc Sci Med. 2014;10:10–7.
26. Leslie McCall The complexity of intersectionality. Signs (Chic). 2005; 30(3):1771–800.
27. Itaborahy LP, Zhu J. State-sponsored homophobia. A world survey of laws: criminalisation, protection and recognition of same-sex love [Internet]. 2013 [cited 2016 May 11]. Available from: http://od4.ila.gov/Statehomophobia/ILG_Sate_Sponsored_Homophobia_2013.pdf
28. International Lesbian Gay Bisexual Trans and Intersex Association. State sponsored homophobia report [Internet]. 2015 [cited 2016 May 11]. Available from: http://ila.org/what-we-do/state-sponsored-homophobia-report/
29. Heckathorn DD. Respondent-driven sampling: a new approach to the study of hidden populations. Soc Probl. 1997;44(2):174–99.
30. Heckathorn DD. Respondent-driven sampling II: deriving valid population estimates from chain-referral samples of hidden populations. Soc Probl. 2002;49(1):11–34.
31. Gill K, Johnston LG, Salganik MJ. Diagnostics for respondent-driven sampling. J Roy Stat Soc Stat Soc. 2015;178(1):241–69.
32. Baral S, Adams D, Lebona J, Kaibe B, Lettie P, Tsheliro R, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in Lesotho. J Int AIDS Soc. 2011;14:36.
33. Wirtz AL, Jumbe V, Trapanz G, Kamba D, Umar E, Ketende S, et al. HIV among men who have sex with men in Malawi: elucidating HIV prevalence and correlates of infection to inform HIV prevention. J Int AIDS Soc. 2013;16(Suppl 3):18742.
34. Fay H, Baral SD, Trapenz G, Motimedi F, Umar E, Lipinge S, et al. Stigma, healthcare access, and HIV knowledge among men who have sex with men in Malawi, Namibia, and Botswana. AIDS Behav. 2011;15(6):1088–97.
35. Baral S, Trapanz G, Motimedi F, Umar E, Lipinge S, Dausab F, et al. HIV prevalence, risks for HIV infection, and human rights among men who have sex with men (MSM) in Malawi, Namibia, and Botswana. PLoS One. 2009; 4(3):4977.
36. Johnston LG, Malekinjad M, Kendall C, Luppa IM, Rutherford GW. Implementation challenges to using respondent-driven sampling methodology for HIV biological and behavioral surveillance: field experiences in international settings. AIDS Behav. 2008;12(4 Suppl):S313–41.
37. Santos GM, Rapues J, Wilson EC, Macias O, Packer T, Colfax G, et al. Alcohol and substance use among transgender women in San Francisco: prevalence and association with human immunodeficiency virus infection. Drug Alcohol Depend. 2014;133(3):287–95.
38. Hotton AL, Galarofalo R, Kuhns LM, Johnson AK. Substance use as a mediator of the relationship between life stress and sexual risk among young transgender women. AIDS Educ Prev. 2013;25(3):62–71.
39. Sausa L, Sevelius J, Keatley J, Iriuguz J, Reyes M. Policy recommendations for inclusive data collection of trans people in HIV prevention, care & services [Internet]. Center of excellence for transgender HIV prevention: University of California, San Francisco. 2009 [cited 2015 Mar 20]. Available from: http://transhealth.ucsf.edu/trans?page=lib-data-collection
40. Goodreau SM, Peinado J, Goicochea P, Vergara J, Ojeda N, Casapia M, et al. Role versatility among men who have sex with men in urban Peru. J Sex Res. 2007;44(3):233–9.

41. Baral SD, Friedman MR, Geibel S, Rebe K, Bozhinov B, Diouf D, et al. Male sex workers: practices, contexts, and vulnerabilities for HIV acquisition and transmission. Lancet. 2015;385(9964):260–73.

42. Koblin BA, Husnik MJ, Colfax G, Huang Y, Madison M, Mayer K, et al. Risk factors for HIV infection among men who have sex with men. AIDS. 2006; 20(5):731–9.

43. World Health Organization. Guidelines: prevention and treatment of HIV and other sexually transmitted infections among men who have sex with men and transgender people: recommendations for a public health approach [Internet]. [cited 2016 May 11]. Available from: http://www.who.int/hiv/pub/guidelines/msm_guidelines2011/en/

44. UNAIDS Guidance Note. Reduction of HIV-related stigma and discrimination [Internet]. 2014 [cited 2016 May 11]. Available from: http://www.unaids.org/en/resources/documents/2014/ReductionofHIV-relatedstigmaanddiscrimination