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# Awareness, Willingness and PrEP Eligibility Among Transgender Women in Rio de Janeiro, Brazil

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Running head: PrEP and transgender women

Abstract (word count: 250; max: 250)

**Background:** HIV epidemics disproportionately affect transwomen worldwide. Trans-specific guidance, outreach, and interventions to increase pre-exposure prophylaxis (PrEP) use among transwomen are scarce.
**Setting:** Rio de Janeiro, Brazil.
**Methods:** We measured awareness and willingness to use PrEP and examined factors associated with those outcomes among transwomen in Rio de Janeiro, and estimated how many transwomen would be eligible for PrEP. Data originate from *Transcender* study, a respondent-driven sampling survey conducted from August 2015 to January 2016. We performed regression models for PrEP awareness and willingness.
**Results:** 131 (38.0%) out of 345 participants had heard of PrEP. Among transwomen who self-reported as HIV-negative, 162 (76.4%) out of 212 (with available data) reported willingness to use it and 163 (66.8%) out of 244 met behavioral eligibility criteria for PrEP. Transwomen with health access in the prior six months, who reported HIV-infected sexual partner, and with 8+ years of schooling had increased odds of PrEP awareness. Lower PrEP awareness was associated with condomless anal intercourse and a newly diagnosed HIV-infection. Younger age and perceiving themselves at risk of HIV-infection increased the odds of PrEP willingness. Lower odds of PrEP willingness was associated with concerns about long-term effects of PrEP and with difficulties in getting access to health care due to transphobia.
**Conclusion:** Combination of low awareness, high willingness and substantial PrEP eligibility corroborates transwomen as a key-population for HIV prevention. PrEP is a promising and

empowering strategy for HIV prevention among transwomen, but trans-specific recommendations are needed to effectively implement PrEP in this population.

**Key-words:** transgender person, HIV, Pre-Exposure Prophylaxis, HIV Infections/prevention & control, Health Knowledge, Attitudes, Practice



## Introduction

HIV epidemics disproportionately affect transgender women, *travestis* and other gender identities of the feminine spectrum (transwomen) worldwide. A global HIV prevalence of 19% was estimated in a meta-analysis of studies of transwomen along with a 49-fold greater odds of HIV infection compared to the general population (1). Brazilian data indicate that transwomen have a higher HIV prevalence than any other key population (2). To date, there is no intervention designed specifically for transwomen with proven efficacy for promoting and facilitating HIV prevention tools in this population in Brazil or elsewhere.

The iPrEx trial was the first pre-exposure prophylaxis (PrEP) intervention that included transwomen. The study demonstrated a 44% reduction in HIV incidence and an estimated >90% efficacy among those with detectable drug levels; however, only 339 (14%) of the 2499 participants in the study were transwomen, and adherence was quite low among this population (3,4). Only 15% of transwomen in iPrEx had detectable drug levels at all visits, and none of the 10 transwomen who seroconverted had detectable drug levels at the time of first evidence of HIV infection (4). Despite the promise of PrEP, few transwomen have initiated use of PrEP and several studies demonstrate low PrEP awareness in trans communities (5–7).

High HIV vulnerability in Brazilian transwomen, comparable to those in other parts of the world, has been described, including multiple partners, sex work, and high sexually transmitted infections (STI) prevalence (2). Brazil is in the process of national PrEP implementation as a public health policy for HIV infection prevention through the Brazilian public health system. However, like elsewhere in the world, trans-specific guidance, outreach, and intervention for PrEP with transwomen are not available. The question remains as to the reach that PrEP will have among transwomen in Brazil. The present study was conducted to estimate PrEP awareness and willingness, and to examine factors associated with awareness and willingness to take PrEP. We also used recommendations recently released in Brazil (8) and previous CDC recommendations (9) to estimate how many transwomen in Rio de Janeiro, Brazil, would be considered eligible for PrEP based on these recommendations.

**Methods**

Data originate from the *Transcender* study, a respondent-driven sampling (RDS) survey conducted from August 2015 to January 2016. Details of the methods have been previously described (2). Briefly, inclusion criteria were: self-identification as a transwomen, living in Rio de Janeiro or the metropolitan area, and being 18 years or older. After a formative assessment phase, we selected twelve seeds with diverse characteristics (e.g. age, race/skin color, trans identities, education, geography, HIV status, history of sex work, and risk behaviors). Each participant received up to 5 coupons to recruit peers until the target sample size was reached, and equilibrium was achieved on the same characteristics listed above. Equilibrium was reached when the sample composition from one wave to the next differed by less than 2% (10).

Incentives for study participation included snacks, sexual health materials, make up, and a medical visit scheduled after enrollment.

Ethical approval was obtained from the Evandro Chagas National Institute of Infectious Diseases-FIOCRUZ Institutional Review Board. Participants provided written informed consent. This study was sponsored by the Brazilian Research Council (CNPq) and the National Institute of Allergy and Infectious Diseases (NIAID-NIH).

Measures

Measures for the current study were obtained through a face-to-face administered questionnaire by trained interviewers. The instrument included socio-demographics, sexual behavior, drug and hormone use, awareness and attitudes towards PrEP, and access to care. PrEP awareness was assessed with a yes/no response to the question: "Before today, have you ever heard of people who do not have HIV regularly taking antiretroviral medicines to keep from getting HIV?". After a brief explanation, we assessed willingness to take PrEP with the question: "What would be your level of interest in using PrEP if it were available in *SUS* [Brazilian public health system]?". Possible responses were 'not interested', 'slightly interested', 'somewhat interested', 'very interested'. For PrEP-specific analyses, we considered willingness as 'very interested' in order to estimate a more conservative measure, as previously described (11–13). We also asked about preferences on route of PrEP administration (possible answers: a daily pill, 3-monthly intramuscular injection, 2-monthly intravenous injection, any of them). Concerns about PrEP were assessed using three separate items ("I am worried about medication side effects", "I am worried about medication long-term effects", and "I am worried about interactions with my

hormone therapy"). A Likert-type response to each item included the following five options: "Not concerned with this", "Slightly concerned about this", "Somewhat concerned about this", "Very concerned about this", and "I will not take PrEP for this reason". Those defined as concerned about PrEP included those who answered "Very concerned with this" and "I will not take PrEP for this reason" so as to provide a more conservative measure.

Factors we considered potentially associated with awareness and willingness to take PrEP included sociodemographic information (age, race/color, income and education), current use of hormones (yes/no), reported access to health care in the past 6 months (yes/no), reported access to trans-specific health care (yes/no), and engagement in sex work (current/past/never). Questions to assess sexual risk for HIV acquisition were the number of sexual partners in the last 6 months (more or less than or equal to 4), whether or not any of their last three partners were living with HIV and whether or not they had condomless anal intercourse with their last three sexual partners. We assessed perceived likelihood of becoming HIV infected through the question "What is your chance of getting HIV in the next year?", with possible options grouped as 'None' and 'Any chance' (Low, Some, High, Certainly). The question "Have you ever heard of people who do not have HIV taking antiretroviral medicines after sex to keep from getting HIV?" evaluated post-exposure prophylaxis (PEP) awareness. We also assessed whether or not they had trouble accessing health care due to anti-trans stigma. Substance use measures assessed were use of any illicit drugs in the past 12 months, including sniffed cocaine, and binge drinking. We screened for depression with the 10-item CES-D (Center for Epidemiologic Studies Depression Scale).

HIV testing was performed after the completion of the survey and followed the Brazilian Ministry of Health algorithm and approved assays (14). Syphilis screening was performed with VDRL, and positive results were confirmed using a microhemagglutination assay for *Treponema pallidum* (MHA-TP). Rectal *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoea* (NG) infection were screened using the Abbott Real Time platform and the NG/CT Amplification Reagent Kit (Abbott Molecular, Des Plains, IL). All indeterminate results for rectal CT/NG were repeated using the same tests on the same sample. We provided treatment for any diagnosed STI and offered linkage to care, specialised HIV care, and combination antiretroviral therapy to all participants who tested positive for HIV.

We adapted criteria from the CDC (9) and Brazilian recommendations (8) to determine how many transwomen would be considered eligible. Transwomen were considered eligible for PrEP if they self-reported as HIV-negative, had any male sex partners in the past 12 months, were not in a monogamous partnership, and had one of the following: (1) any anal sex without condoms (receptive or insertive) in the past 12 months; (2) STI diagnosis (e.g. any reported STI in the past 12 months or a current diagnosed STI (syphilis, rectal CT or NG); or (3) had a known HIV-infected sexual partner among the last three partners.

Data analysis

We used RDS-unadjusted data. The first step in the analysis was to characterize transwomen who were aware of PrEP at the time of the survey and identify significant differences from those not previously aware of PrEP. The second and third analysis were, respectively, to assess factors associated with willingness to take PrEP and to identify eligible transwomen among those who

self-reported as HIV negative at the time of the interview. Chi squared tests were first conducted and variables with p-values <0.20 in univariable analysis were included in multivariable analyses, removing terms of greatest non-significance until a final model was reached. Bivariable and multivariable analysis was performed using R Software version 3.0.2.

**Results**

Of 345 participants offered HIV testing, 204 (59.1%) were HIV-negative, 101 (29.3%) had previously been diagnosed with HIV, and 40 (11.6%) were newly diagnosed as HIV-infected. Overall, 131 (38.0%) had heard of PrEP at the time of the survey and 168 (48.7%) had heard of PEP . Of the 244 transwomen who were not known to be HIV infected at the time of the interview, 15 (6.1%) had taken PEP at least once. The final adjusted logistic regression model found that transwomen who accessed health service in the last six months (adjusted Odds Ratio [aOR] 2.1 [95% CI 1.3-3.4], p=0.004), those who reported at least one known HIV-infected sexual partner among the last three partners (aOR 2.0 [95% CI 1.0-3.9], p=0.04) and those with more than 8 years of schooling (aOR 1.5 [95% CI 1.0-2.5], p=0.079) had higher odds of PrEP awareness (Table 1). Lower PrEP awareness was associated with condomless anal intercourse (aOR 0.6 [95%CI 0.3-1.0], p=0.04) and a newly diagnosed HIV-infection [aOR 0.4 [95%CI 0.2-0.9], p=0.035).

Data from the participants who self-reported to be HIV-negative were assessed for PrEP willingness (N=212 with available data) and eligibility (N=244). The majority of transwomen who self-reported to be HIV-negative reported concerns with interactions between hormones and PrEP (76.5%), PrEP long-term (75.8%) and side effects (78.3%). After a brief explanation about

PrEP, 162 (76.4%) reported willingness to use it. In multivariable analysis, being younger (aOR 3.7 [1.4-10.4], p=0.011 among those aged 18-24 years, and aOR 3.3 [1.4-7.7], p=0.006 among those aged 25-35 years), and identifying themselves at risk of becoming HIV-infected increased the odds of PrEP willingness (aOR 2.9 [95%CI 1.4-6.1], p=0.006). Lower odds of PrEP willingness was associated with concerns about the long-term effects of PrEP (aOR 0.4 [95%CI 0.1-1.0], p=0.07) and with difficulties in getting health care access due to transphobia (aOR 0.5 [95%CI 0.2-1.0], p=0.05).

Overall, 163 of the 244 transwomen who self-report as HIV-infected (66.8%) met the criteria for PrEP eligibility. Among those HIV-infected who were not aware of their HIV status (N=40), 31 met the behavioral criteria for PrEP (77.5%). Transwomen were eligible for PrEP most commonly due to condomless anal sex (147, 90.2%), current or past STI (88, 54.6%), or having a known HIV-infected sexual partner (4, 2.4%). The majority preferred intramuscular (63, 38.7%) or oral (57, 35.0%) PrEP (Figure 1). Among transwomen who would be eligible for PrEP, the majority reported fillers in the buttock region (97, 59.5%).

**Discussions**

Our results point to low awareness, but high willingness to take PrEP among transwomen in Brazil. Thirty-eight percent of all transwomen heard of PrEP before our study, while almost 80% of transwomen who self-reported as HIV-uninfected were willing to use it after a brief explanation. Moreover, almost 70% of transwomen who self-reported as HIV-negative were candidates for PrEP based on CDC and Brazilian Ministry of Health criteria. Very few studies have evaluated PrEP awareness, willingness and eligibility specifically in transwomen. To our

knowledge, this is the first study to assess these three outcomes simultaneously in Latin-American transwomen.

Our finding of low awareness of PrEP among transwomen is consistent with other studies of marginalized populations from low and high-income settings (15–17). Other studies enrolling only transwomen in the US have previously described similarly low PrEP awareness rates (6,18), which points to the need for focusing on transwomen as a stand-alone group in PrEP awareness campaigns and social marketing. PrEP Brasil, a demonstration study for men who have sex with men (MSM) and transwomen conducted in Brazil, identified higher rate of PrEP awareness, which may be due to differences in the study sample (transwomen comprised only 5% of the total study population) (19). Strategies should be directed to the increase of PrEP awareness among transwomen. Peer delivered information could be an effective strategy given the high level of transwomen disbelief in the health care system. For example, campaigns that show transwomen champions in advertisements are important for shifting the perceived indications that this is only a medication for MSM or other groups, and messaging that addresses concerns transwomen may have about taking PrEP are needed. Targeted interventions to increase PrEP awareness in the trans community will be critical so that the full benefit of this intervention can be achieved.

PrEP awareness is an essential step in the path to accessing this important HIV prevention tool. Our findings demonstrate that transwomen reporting a known HIV-infected sexual partner had higher PrEP awareness. Wilson et al (6) also observed higher knowledge on PrEP associated with a sexual partner's HIV-positive status. Transwomen with a known HIV-infected sexual partner may identify themselves as being at a higher risk of HIV acquisition. PrEP is an

important strategy for preventing transmission within HIV serodiscordant partnerships (20). Transwomen who reported recent condomless anal intercourse and who were newly diagnosed as HIV-infected had lower PrEP awareness. This reinforces the need to develop communication strategies tailored specifically to highly vulnerable transwomen in order for PrEP implementation to succeed.

We identified higher willingness to use PrEP than in other studies of transwomen (6,11,12,18). However, we still found that one quarter of participants were unwilling to use PrEP. Many transwomen who were unwilling to use PrEP also reported difficulties in getting access to health services due to transphobia. This is consistent with other studies involving transwomen (7,21,22). Discrimination in healthcare settings is a common reason transgender people give for avoiding health services (7,23–25). Such barriers may ultimately impact PrEP implementation. In the US, where PrEP is already available, inequities in PrEP access and education have been described, with disproportionately low uptake among those most at need (26).

As found in another study (16), many who were unwilling to use PrEP were concerned with long-term effects of PrEP. Drug interactions between hormones and PrEP was a major concern among transwomen currently using hormones, although concerns with those potential interactions did not appear as a reason not to will PrEP. An iPREX sub-analysis found lower levels of PrEP drugs concentrations in transwomen using hormone therapy, compared to those not using hormones and MSM, possibly due to adherence issues (4). Authors hypothesized that low PrEP adherence might be related to concerns about negative effects of PrEP drugs on feminizing therapy. In another analysis using this dataset, we found that hormone use was

reported by more than half of transwomen (56.8%) in Rio de Janeiro (2). Although there is some information about the concomitant use of hormonal contraception and PrEP by cisgender women, there are no specific data for transwomen (27–29). Studies evaluating the interaction of PrEP and feminizing hormones are underway (NCT03220152).

We found that younger transwomen and those who perceived themselves at risk were more likely to be willing to use PrEP. Wang et al (11) identified a moderate perceived HIV risk among Chinese transfemale sex workers and a strong association between those who perceived themselves at risk and PrEP acceptability. It may be the case that transwomen who would most benefit from PrEP are those most likely to be willing to take it. Based on our results, almost 70% of transwomen who self-reported as HIV-negative were candidates for PrEP, most of them due to condomless anal sex. High frequencies of PrEP indication among transwomen were also described by other authors (6,18,30), and speaks to the high vulnerability transwomen have to HIV because of social inequities they face due to their gender identity, which restrict their education opportunities, their access to the formal labor market, their ability in condom use negotiation, and HIV risk management (31).

Our study has several limitations. This was cross-sectional study, so we cannot infer causality. The RDS methods used for sampling in this study also present biases to the sample composition that require caution for generalizing to the transwomen population as a whole. For example, research with transwomen has found that RDS-based studies may represent data from lower income transwomen and miss those in high income networks (32). Also, our data collection occurred between 2015 and 2016, and the current Brazilian scenario might have changed since

that period. Finally, PrEP willingness may not be related to PrEP actual use. Further studies are needed to identify PrEP use among transwomen as PrEP moves into routine practice.

Despite limitations, our study collected important information on the awareness and willingness to take PrEP in a highly stigmatized population, and our results could significantly inform PrEP implementation programs. Concerns for PrEP drugs being a barrier for PrEP implementation are tapered by our finding that those most at risk were willing to take PrEP. Transwomen may have fewer PrEP options as buttock fillers preclude injectable PrEP so far and industrial silicone injections are a common practice among Brazilian transwomen (2,33). The combination of low awareness, high willingness and substantial PrEP eligibility corroborates transwomen as a key-population for HIV prevention, especially in Brazil. PrEP is a promising and empowering strategy for HIV prevention among transwomen, but trans-specific recommendations might be necessary to implement PrEP successfully in this highly vulnerable population.

**Authors' contributions**

BG, EMJ, WMcF, ECW, SB, and VGV conceived the study and interpreted the findings. BG, EMJ, ECW, and VGV drafted the manuscript. LV performed the statistical analyses with aid from RIM, EMJ, ECW, and PML. LV, RIM, ACGF, and PML helped with data acquisition, interpretation of the results, and drafting the manuscript. AR, SW, and BH helped with interpretation of the results and drafting the manuscript. WMcF, AYL and SB were involved in revising the manuscript for important intellectual content. All authors read and approved the final manuscript.

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**Legend – Figure 1:**
The majority of transwomen preferred intramuscular (63, 38.7%) or oral (57, 35.0%) PrEP.

**Table 1. Correlates of PrEP knowledge among transwomen in the *Transcender* study, Rio de Janeiro, Brazil, 2015-2016[1]**

| Characteristic | Aware of PrEP (n=131), % | Univariable | | Multivariable | |
|---|---|---|---|---|---|
| | | Odds Ratio | p-value | Adjusted Odds Ratio | p-value |
| Age[2] | | | | | |
| 18-24 | 26 (27.4) | 0.5 (0.3-0.9) | 0.023 | | |
| 25-35 | 60 (41.4) | 0.9 (0.6-1.6) | 0.82 | | |
| 36-45 | 45 (42.9) | 1 | | | |
| Self-declared race/color | | | | | |
| White | 36 (45.6) | 1 | | | |
| Mixed/other | 67 (36.8) | 0.6 (0.3-1.1) | 0.19 | | |
| Black | 28 (33.3) | 0.7 (0.4-1.2) | 0.11 | | |
| Monthly income (in US$)[2,3] | | | | | |
| ≤130.00 | 47 (33.6) | 0.6 (0.4-1.2) | 0.14 | | |
| 131.00 – 260.00 | 41 (37.6) | 0.8 (0.4-1.4) | 0.40 | | |
| >260.00 | 32 (43.8) | 1 | | | |
| Years of education[2] | | | | | |
| 8 or less | 91 (43.3) | 1 | | 1 | |
| 8+ | 40 (29.6) | 1.8 (1.2-2.9) | 0.01 | 1.5 (1.0-2.5) | 0.079 |
| Currently taking hormones | | | | | |
| Yes | 58 (34.1) | 0.8 (0.5-1.2) | 0.22 | | |
| No | 63 (40.6) | 1 | | | |
| Health care access in last 6 mo | | | | | |
| Yes | 91 (45.7) | 2.2 (1.4-3.6) | 0.0006 | 2.1 (1.3-3.4) | 0.004 |
| No | 40 (27.4) | 1 | | 1 | |
| Access to trans-related health care | | | | | |
| Yes | 28 (54.9) | 2.3 (1.2-4.1) | 0.008 | | |
| No | 103 (35.0) | 1 | | | |
| Engagement in sex work | | | | | |
| Current | 68 (40.7) | 1.3 (0.7-2.3) | 0.41 | | |
| Ever (not currently) | 37 (35.6) | 1.0 (0.5-1.9) | 0.95 | | |
| Never | 26 (35.1) | 1 | | | |
| Illicit drug use in the last 12 mo | | | | | |
| Yes | 67 (35.3) | 0.8 (0.5-1.2) | 0.25 | | |
| No | 64 (41.3) | 1 | | | |
| Sniffed cocaine in the last 12 mo | | | | | |
| Yes | 30 (34.5) | 0.8 (0.5-1.4) | 0.44 | | |
| No | 101 (39.1) | 1 | | | |
| Binge drinking[4] | | | | | |
| Yes | 85 (37.4) | 0.9 (0.6-1.5) | 0.78 | | |
| No | 46 (39.0) | 1 | | | |
| Depression | | | | | |
| Yes | 88 (37.0) | 0.9 (0.6-1.5) | 0.67 | | |

| | | | | | |
|---|---|---|---|---|---|
| No | 41 (39.0) | 1 | | | |
| Number of sex partners last 6 mos[2] | | | | | |
| 4 or less | 33 (34.4) | 1 | | | |
| More than 4 | 88 (38.4) | 1.2 (0.7-2.0) | 0.49 | | |
| HIV-positive status among last 3 partners | | | | | |
| Yes | 18 (29.0) | 1.6 (0.9-3.0) | 0.11 | 2.0 (1.0-3.9) | 0.042 |
| No | 113 (39.9) | 1 | | 1 | |
| Condomless anal intercourse with last 3 partners | | | | | |
| Yes | 55 (30.9) | 0.5 (0.3-0.8) | 0.005 | 0.6 (0.3-1.0) | 0.04 |
| No | 76 (45.5) | 1 | | 1 | |
| HIV status | | | | | |
| HIV-negative | 81 (39.7) | 1 | | 1 | |
| Known HIV-infected | 42 (41.6) | 1.1 (0.7-1.8) | 0.75 | 0.8 (0.4-1.5) | 0.48 |
| Newly diagnosed HIV-infected | 8 (20.0) | 0.4 (0.2-0.8) | 0.02 | 0.4 (0.2-0.9) | 0.035 |

[1]Proportions calculated for valid data; missing excluded; [2]Continuous variables were reclassified as categorical; [3]US$1.00=R$3.85; [4]Defined as six or more alcohol drinks on any occasion.

**Table 2. Correlates of PrEP willingness among HIV-negative transwomen in *Transcender*, Rio de Janeiro, Brazil, 2015-2016[1]**

| Characteristic | Willing to use PrEP (n=162), % | Univariable | | Multivariable | |
|---|---|---|---|---|---|
| | | Odds Ratio | p-value | Adjusted Odds Ratio | p-value |
| Age[2] | | | | | |
| 18-24 | 57 (81.4) | 3.1 (1.4-7.3) | 0.007 | 3.7 (1.4-10.4) | 0.011 |
| 25-35 | 77 (81.9) | 3.2 (1.5-7.1) | 0.003 | 3.3 (1.4-7.7) | 0.006 |
| 36-45 | 28 (58.3) | 1 | | 1 | |
| Self-identified race/color | | | | | |
| White | 38 (77.6) | 1 | | | |
| Mixed/other | 80 (74.1) | 0.8 (0.4-1.8) | 0.76 | | |
| Black | 44 (80.0) | 1.2 (0.4-3.0) | 0.64 | | |
| Monthly income (in US$)[2,3] | | | | | |
| ≤130.00 | 70 (80.5) | 1.5 (0.6-3.4) | 0.35 | | |
| 131.00 – 260.00 | 46 (78.0) | 1.3 (0.5-3.1) | 0.59 | | |
| >260.00 | 36 (73.5) | 1 | | | |
| Years of education[2] | | | | | |
| <8 | 105 (78.9) | 1 | | | |
| 8+ | 57 (72.2) | 1.4 (0.8-2.8) | 0.26 | | |
| Currently taking hormones | | | | | |
| Yes | 89 (74.8) | 0.8 (0.4-1.5) | 0.42 | | |
| No | 63 (79.7) | 1 | | | |
| Health access in the last 6 mo | | | | | |
| Yes | 84 (77.1) | 1.1 (0.6-2.0) | 0.82 | | |
| No | 78 (75.7) | 1 | | | |
| Access to trans-related health care | | | | | |
| Yes | 17 (53.1) | 0.3 (0.1-0.6) | 0.001 | | |
| No | 145 (80.6) | 1 | | | |
| Trouble getting health access for being trans | | | | | |
| Yes | 46 (69.7) | 0.6 (0.3-1.2) | 0.137 | 0.5 (0.2-1.0) | 0.05 |
| No | 114 (79.2) | 1 | | 1 | |
| Engagement in sex work | | | | | |
| Current | 83 (81.4) | 2.3 (1.0-5.0) | 0.045 | | |
| Ever (not currently) | 50 (75.8) | 1.6 (0.7-3.8) | 0.26 | | |
| Never | 29 (65.9) | 1 | | | |
| Illicit drug use in the last 12 mo | | | | | |
| Yes | 65 (67.0) | 2.7 (1.4-5.2) | 0.0036 | | |
| No | 97 (84.3) | 1 | | | |
| Sniffed cocaine in the last 12 mo | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Yes | 35 (85.4) | 2.0 (0.8-5.6) | 0.14 | | |
| No | 127 (74.3) | 1 | | | |
| Binge drinking[4] | | | | | |
| Yes | 116 (78.4) | 1.4 (0.7-2.8) | 0.31 | | |
| No | 46 (71.9) | 1 | | | |
| Depression | | | | | |
| Yes | 111 (78.2) | 1.4 (0.7-2.7) | 0.33 | | |
| No | 49 (72.1) | 1 | | | |
| Number of sex partners last 6 mos[2] | | | | | |
| 4 or fewer | 35 (66.0) | 1 | | | |
| More than 4 | 123 (83.7) | 2.6 (1.3-5.4) | 0.008 | | |
| HIV-positive status among last 3 partners | | | | | |
| Yes | 16 (80.0) | 0.8 (0.2-2.3) | 0.69 | | |
| No | 146 (76.0) | 1 | | | |
| Condomless anal intercourse in the last 12 mo | 116 (79.5) | 1.7 (0.9-3.2) | 0.123 | | |
| HIV-positive test | 31 (91.2) | 3.7 (1.2-15.7) | 0.039 | | |
| Any perceived likelihood of becoming HIV infected | 96 (84.2) | 2.5 (1.3-5.0) | 0.008 | 2.9 (1.4-6.1) | 0.006 |
| PrEP aware | | | | | |
| Yes | 61 (74.4) | 0.8 (0.4-1.6) | 0.58 | | |
| No | 101 (77.7) | 1 | | | |
| Concerned about side effects of PrEP | 123 (75.9) | 0.8 (0.3-1.7) | 0.522 | | |
| Concerned about long-term effects of PrEP | 118 (74.2) | 0.5 (0.2-1.1) | 0.1 | 0.4 (0.1-1.0) | 0.07 |
| Concerned about interactions between hormones and PrEP | 121 (76.1) | 0.7 (0.3-1.5) | 0.32 | | |

[1]Proportions calculated for valid data; missing excluded; [2]Continuous variables were reclassified as categorical; [3]US$1.00=R$3.85; [4]Defined as six or more alcohol drinks on any occasion.

Figure 1. Preferences on route of PrEP administration among transwomen in Rio de Janeiro, 2015-2016.