

Reduction of Risk Behaviours in the Prevention of HIV/AIDS Transmission among Men Having Sex with Men in Benin: Trends from 2015-2017

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Abstract

Introduction: MSM are known to contribute to the spread of the HIV epidemic because they engage in high-risk behaviours during intercourse sex. Benin has a care service for people living with HIV which raised awareness of sexual behaviours at risk of HIV infection among MSM in 2015 and to assess the impact of actions in 2017. The study examines the evolution of risk practices from 2015 to 2017. **Materials & Methods:** Study was conducted among 359 MSM recruited by respondent-driven sampling from November 13 to 24, 2017 covering 19 cities of country. Eligibility criteria for MSM enrolment included being born as a biological male who reported having had at least one anal or oral sexual encounter with a male partner in the past 12 months, and being at least 18 years old and residing in Benin for the past six months prior to the survey, regardless of nationality, whether or not to belong to an association that is a member of one of the two MSM networks (BESYP and Coalition Sida Benin). **Results:** MSM age seeds ranged from 22 to 33 years and 359 were included in the study. They had a high school diploma or higher in 2015 and 2017. MSM were predominantly Beninese and their prevalence did not change from 2015 (97.4%) to 2017 (98.3%) ($p = 0.46$). The prevalence of MSM reporting con-

sistent use of a condom with lubricating gel every time they had anal sex with a male partner in the past 6 months increased compared to 2015 (21.1%) to 2017 (44.1%) ($p < 0.01$). No variation was observed among MSM accessing testing services ($p = 0.48$) and HIV-1 prevalence infection remained stable from 2015 to 2017. **Conclusion:** The results confirm the need to improve and strengthen current interventions in the prevention of HIV infection in the MSM population.

Keywords

HIV-1, MSM, Risk Behaviours, Prevention, Benin

1. Introduction

Heterosexual contacts are known to be the major mode of transmission of HIV infection in Sub-Saharan Africa [1] and West Africa particularly [2]. It is also known that MSM contribute to the spread of the HIV epidemic because they engage in high-risk behaviours that increase the rate of HIV infection in the sub-region [3]. These risks include the number of sexual partners, use of intoxicants and not using a condom during intercourse sex [4]. Baggaley described that in receptive anal sex, the rate of HIV transmission was 1.4% per act and 40.4% per partner roughly 18-fold higher than for vaginal intercourses [5]. In Senegal, 24% of MSM reported having had at least one unprotected insertive anal intercourse with a male partner, 20% at least one unprotected receptive anal intercourse and 18% at least one unprotected intercourse with a female partner [6]. Most of them respondents reported sex with women (94.1%) and 5% of participants had at least one clinical sign of sexually transmitted infections (STIs) [6]. 52.9% of MSM surveyed in Togo reported having had sexual relations with casual partners, demonstrating the risk behaviours to which they are exposed [7].

To reduce HIV risk infection and improve behaviour change, prevention services deliver messages about proper condom and lubricant use during intercourse [8]. In Senegal, MSM were invited to visit a health center specially equipped for STI management and from 2004-2007, the impact of the actions was observable [9]. In fact, condom use increased from 14% (2004) to 35% (2007) among men who reported regularly using a condom during anal and non-commercial sex in the month prior to the 2007 survey [9]. Gonorrhoea prevalence decreased from 5.5% in 2004 to 2.6% in 2007 [9].

Benin has a care service for people living with HIV (PLWHIV) responsible for raising awareness about risky sexual behaviour, prevention, HIV testing and management of opportunistic and sexually transmitted infections [10]. This service conducted an awareness campaign on risk behaviours for HIV infection among MSM in 2015 and to assess the impact of awareness actions in 2017.

This study examines changes in risk practices in the prevention of HIV infection among MSM and the evolution of trends in STI prevalence between 2015 and

2017 in Benin.

2. Materials and Methods

2.1. Type, Population and Period of Study

The surveillance survey among MSM in Benin is a cross-sectional study with an analytical orientation, conducted from November 13 to 24, 2017 for 2017 study and from November 19 to December 11 for 2015 study.

2.2. MSM Recruitment Sites in 2015

The MSM in the 2015 study were recruited from cities in Benin, including Cotonou, Abomey-Calavi, Ouidah, Bohicon, and Parakou (**Table 1(a)**). The arrangements put in place to ensure the safety of respondents described in 2017 were observed in 2015.

Table 1. (a) Seed characteristics (n = 8) of ESDG 2015 among MSM in Benin; (b) Seed characteristics (n = 9) of ESDG 2017 among MSM in Benin.

(a)								
Seed & collect site	Social network size	Age	Sexual orientation	Sexual role	Educational level	Number of recruits	Number of waves	% of sample
1Cn	18	24	Pansexual	Insertive	Sec	46	4	12.6%
2Cn	60	23	Same-sex	Versatile	Sec	49	4	13.4%
3Cn	25	25	Pansexual	Insertive	Sup	54	4	14.8%
4Cn	25	29	Pansexual	Versatile	Sup	37	4	10.1%
5Ac	2	19	Pansexual	Receptive	Sup	45	4	12.3%
6Ou	20	23	Same-sex	Receptive	Sup	50	4	13.7%
7Bh	15	32	Pansexual	Receptive	Sec	40	4	10.9%
8Pk	5	27	Pansexual	Receptive	Sec	45	4	12.3%
(b)								
Seed & collect site	Social network size	Age	Sexual orientation	Sexual role	Educational level	Number of recruits	Number of waves	% of sample
1Cn	12	27	Pansexual	Insertive	Sup	59	4	16.6%
2Cn	35	29	Pansexual	Versatile	Sup	59	4	16.6%
3Pn	17	31	Same-sex	Insertive	Sec	35	4	9.4%
4Pn	42	28	Same-sex	Versatile	Sec	25	4	7.1%
5Ac	17	22	Pansexual	Receptive	Sup	46	4	12.9%
6Ou	7	26	Same-sex	Receptive	Sec	48	4	13.4%
7Bh	19	25	Pansexual	Receptive	Sec	45	4	12.6%
8Pk	9	33	Same-sex	Receptive	Sup	26	4	7.4%
9Pk	12	NG	Pansexual	Insertive	Sup	16	3	4.0%

Cn = Cotonou; Ac = Abomey-Calavi; Ou = Ouidah; Bh = Bohicon; Pk = Parakou; Pn = Porto-Novo; Sec: Secondary; Sup: Superior, NG= Not given.

2.3. MSM Recruitment Sites in 2017

The localities covered by the study in 2017 were the 19 cities which were covered by the situation analysis of MSM and injectable drug users (IDU) in the fight against STI, HIV and AIDS in Benin carried out in 2012 and the first Second Generation Surveillance Survey (ESDG) carried out in 2013.

With the help of the head of the two MSM networks (Benin Synergie Plus and Coalition AIDS Benin) and identity associations, collection sites were identified in the selected localities. In order to guarantee the safety of the respondents as well as the discretion of the operation, it was decided to install the collection sites in health centers and headquarters of certain identity associations, according to the constraints of each locality. This is the Cotonou 1 health center, the Coalition AIDS Benin (CAB) headquarters in Abomey-Calavi, the headquarters of the Adorable Club Association in Porto-Novo, the Ouidah zone hospital, the headquarters of the MSM Love Story association in Bohicon and the Zongo health center for the city of Parakou (**Table 1(b)**). The sites where the blood samples were stored were all part of the PSLS network of STI, HIV and AIDS care sites. They also had the advantage of having facilities to collect and store blood samples.

2.4. Inclusion Criteria in MSM Recruitment in 2015 and 2017

Eligibility criteria for MSM enrolment included being born as a biological male who reported having had at least one anal (receptive or insertive) or oral (fellatio and/or rimming) sexual encounter with a male partner in the past 12 months and being at least 18 years old of age and voluntarily consent to participate in the survey and residing in Benin during the last six months preceding the survey regardless of nationality, whether or not to belong to an association that is a member of one of the two MSM networks (BESYP and Coalition Sida Benin and have a valid reference coupon).

2.5. Exclusion Criteria in MSM Recruitment in 2015 and 2017

Excluded of the study were MSM who did not meet one of the inclusion criteria at the time of the survey and who were in a state that did not allow them to give informed consent (under the influence of drugs or alcohol, mental illness or any other cause).

2.6. MSM Recruitment in 2015 and 2017

Second Generation Surveillance Survey (ESDG) among men who have sex with men in Benin used Respondent Driven Sampling (RDS) [7] method to recruit MSM both in 2015 and 2017.

The first MSM surveyed called “seeds” were identified in a reasoned way. In order to promote better representativeness of the sample, arrangements have been made to ensure a good diversity of seeds.

This diversity of basic characteristics made it possible to avoid an over-representation of certain groups of participants with more extensive networks, thus im-

proving the representativeness of the final sample. It was only after that and after accepting to play the role of “seed” that MSM was chosen. A total of eight and nine MSM were selected as starting points (seeds) for recruiting other MSM in 2015 and 2017 respectively. These men were chosen so as to obtain a better representativeness of the MSM population in the country.

Each seed received three recruitment coupons which it then distributed to three other MSM called “recruited” that it knows and who know him. Each coupon distributed bears a unique number making it possible to know at all times who has been recruited and by whom and to follow the characteristics of the recruitment. These coupons were validated for a specific week in order to modulate the influx of people presenting with a coupon and wishing to participate in the study. Each recruit received in turn three recruiting coupons which they also distributed to three other MSM, thereby becoming a “recruiter”. The recruitment chain started from each seed continued until the expected sample was reached.

2.7. Calculation of the Sample Size

The sample size calculation took into account the prevalence of HIV, the level of knowledge about HIV and the level of use of condoms and lubricant gels during anal intercourse. Thus, the formula [11] used to calculate the sample size and was 364 in 2015 and 359 in 2017.

2.8. Data Collection

A structured questionnaire was used to collect the data both in 2015 and 2017. It included the following components:

Sociodemographic characteristics, knowledge, sexual behaviour/practices, opinions and attitudes towards STIs and HIV/AIDS, types and number of sexual partners, use of condoms and lubricating gels, sexually transmitted infections, HIV, voluntary HIV testing, social network, socio-cultural, health and legal contexts of MSM and Access to prevention services and tools, especially condoms, lubricants, and HIV information services.

2.9. Laboratory Procedures

Serum samples were first tested for HIV by enzyme linked immunosorbent assay (Vironostika® HIV Uni-Form II Ag/Ab (bioMérieux bv)). Confirmation was obtained with (Génie III HIV 1&2®, Bio-RAD). Samples that produced discordant results were further analyzed with western blot (INNO-LIA® HIV I/II Score).

2.10. Data Management and Analysis

All the data collected in 2015 and 2017 were checked through a written procedure manual and then double-entered using the EPI-DATA software. Further data cleaning and data analysis were done using SPSS 22.1. Data tabulation was done with RDSAT software version 7.1.38 5 [12].

For each calculated indicator, the RDSAT software uses the so-called “boot-

strapping” technique, a robust non-parametric method, to calculate the 95% confidence interval. Thus, all the indicators calculated and presented in this report have been weighted according to the RDSAT procedures with their 95% confidence intervals. In combination with the NETDRAW software, the RDSAT also provides a graphical representation of the recruitment structure.

Results were presented as proportions with a 95% confidence interval. Qualitative variables were compared using the chi-2 or Fisher’s exact tests.

The dependent and explanatory variables were analyzed by univariate and/or multivariate logistic regression to study the relationships between the determinants of HIV infection.

2.11. Ethical Approval

The national ethics committee for health research (CNERS) of Benin gave its approval of the study. The consent of each participant was requested after explaining the benefits, potential risks and other conditions for participating in the survey.

Informed consent covered both the behavioural component of the study and the biological component (anonymous HIV screening test). All those recruited to participate in this study were free to accept or refuse.

3. Results

3.1. Seed Characteristics

In 2015, the sizes of the social networks of MSM seeds ranged from 2 (Abomey-Calavi site) to 60 (second site of Cotonou). The age of MSM seeds ranged from 19 years to 32 years. The total number of participants in the 2015 study per seed ranged from 37 to 50 (**Table 1(a)**).

Table 1(b) shows some general characteristics for each MSM seed in the survey of 2017. The sizes of the social networks of MSM seeds ranged from 7 (Abomey-Calavi site) to 42 (Porto-Novo site). The age of MSM seeds ranged from 22 years to 33 years. One seed has not given its age

3.2. Sociodemographic Characteristics of the Respondents

366 MSM were recruited in 2015 survey. Of these, two were eliminated to avoid bias in recruitment. Thus, a total of 364 MSM were retained, including (186/364, 50.5%) in Cotonou, (45/364, 12.4%) in Abomey-Calavi, (50/364, 13.7%) in Ouidah, (40/364, 11%) in Bohicon and (45/364, 12.4%) in Parakou.

A total of 359 MSM were included in 2017 study with (118/359, 32.9%) in Cotonou, (60/359, 16.7%) at Porto-Novo, (48/359, 13.4%) at Ouidah, (46/359, 12.8%) at Abomey-Calavi, (45/359, 12.5%) at Bohicon and (42/359, 11.7%) at Parakou.

About half of the respondents (46.8%) were between 18 and 24 years old and younger than those recruited in the 2015 (80.6%) survey ($p < 0.01$). On the other hand, those aged 25 and over were more numerous in 2017 (19.4%) than in 2015 (53.2%) ($p < 0.01$). Less than 10% of MSM were married in 2017 and more numerous (8.6%) than those of 2015 (1.9%) ($p < 0.01$) while single MSM were nu-

merous in 2015 (94.7%) than in 2017 (73.5%) ($p < 0.01\%$) (**Table 2**). Almost all MSM were in school, and over 90% had a high school diploma or above in 2015 as well as in 2017. No difference was observed up to the secondary education level of the MSM recruited in 2015 and 2017 apart from the higher education level where there were more MSM recruited in 2017 (49.3%) than in 2015 (38.1%) ($p < 0.01\%$).

Table 2. Sociodemographic characteristics and sexual behaviours among MSM surveyed.

Sociodemographic characteristics	2015 % (n/N)	2017 % (n/N)	p
Age group			
18 - 24	80.6 (293/364)	46.8 (168/359)	< 0.01
25 et plus	19.4 (71/364)	53.2 (191/359)	< 0.01
Marital status			
Married	1.9 (7/364)	8.6 (31/359)	< 0.01
Single	94.7 (345/364)	73.5 (264/359)	< 0.01
Others	3.4 (12/364)	17.9 (64/359)	
Educational level			
Not in school	0.3 (1/364)	2.3 (8/359)	0.99
Primary	5.4 (20/364)	2.9 (11/359)	0.15
Secondary	56.2 (204/364)	45.5 (163/359)	0.10
Higher	38.1 (139/364)	49.3 (177/359)	< 0.01
Socio-professional situation			
Pupils/Students	74.2 (270/364)	3.1 (11/359)	< 0.01
Salaried employees	5.0 (18/364)	21.4 (77/359)	< 0.01
Craftsmen	20.8 (76/364)	75.5 (271/359)	< 0.01
Religion			
Traditional	9.9 (36/364)	8.9 (32/359)	0.74
Christian	55.3 (201/364)	65.2 (234/359)	<0.01
Muslim	21.4 (78/364)	21.2 (76/359)	0.99
Others	13.4 (49/364)	4.7 (17/359)	<0.01
Nationality			
Benin	97.4 (354/364)	98.3 (353/359)	0.46
Others	2.6 (10/364)	1.7 (6/359)	0.73
Sexual orientation			
Same-sex	29.6 (108/364)	29.5 (106/359)	0.97
Pansexual	70.4 (256/364)	70.5 (253/359)	0.97
Sexual role			
Active or insertive	48.4 (176/364)	46.2 (166/359)	0.62
Passive or receptive	26.7 (97/364)	30.1 (108/359)	0.35
Versatile	24.9 (91/364)	23.7 (85/359)	0.74

Craftsmen represent the majority of people questioned (75.5%) in 2017 and

more numerous than in 2015 (20.8%) ($p < 0.01$) while the pupils/students questioned in 2015 were higher (74.2%) than those of 2017 (3.1%) ($p < 0.01$). On the other hand, more salaried employees were recruited in 2017 (21.4%) than in 2015 (5%) ($p < 0.01$).

The prevalence of traditional and Muslim MSM remained stable from 2015 to 2017 (9.9% vs 8.9%) ($p = 0.74$) and Muslim (21.4% vs 21.2%) ($p = 0.99$). The prevalence of Christian MSM increased from 55.3% in 2015 to 65.2% in 2017 ($p < 0.01$). MSM were predominantly Beninese and their prevalence did not change from 2015 (97.4%) to 2017 (98.3%) ($p = 0.46$). Only 2% were of foreign origin (Togo, Ghana) and the prevalence remained stable in 2017 ($p = 0.73$).

There were no significant differences in the orientation and sexual role of MSM from 2015 to 2017 (**Table 2**).

3.3. Biological and Behavioural Indicators: Comparison between 2015 and 2017

Table 3. Biological and behavioural indicators: Comparison between 2015 and 2017.

	2015 N = 364			2017 N = 359			Comparison 2015/2017
	Percentage (%)	(n/N)	95% CI	Percentage (%)	(n/N)	95% CI	p*
MSM who have both accurate knowledge how to prevent sexual transmission of HIV and who reject major misconceptions about HIV transmission	66.6	242/364	57.9 - 73.8	66.0	237/359	59.2 - 72.1	0.95
MSM who known how to prevent HIV	97.1	353/364	93.7 - 99.6	97.2	349/359	95.5 - 98.9	0.97
MSM who known how HIV is transmitted	98.3	358/364	96.7 - 99.6	99.2	356/359	98.3 - 99.9	0.81
MSM living with HIV (Prevalence)	7.7	28/364	2.6 - 12.6	7.0	25/359	2.1 - 11.9	0.81
Prevalence of STI in the MSM population in the past six months	26.1	95/364	19.6 - 34.2	27.0	97/359	19.9 - 35.1	0.84
Average number of male sexual partners in the past 6 months	1.86	7/364	1.71 - 2.03	1.82	6/359	1.71 - 2.03	0.98
Average number of female sexual partners in the past 6 months	0.79	3/364	0.62 - 9.96	0.81	3/359	0.62 - 9.96	0.69
MSM who reported having consistently used a condom with lubricating gel each time they have anal sex with a male partner in the past 6 months.	21.1	77/364	15.1 - 28.7	44.1	158/359	40.1 - 50.3	< 0.01
MSM who reported having consistently used a condom each time they have vaginal sex with a female partner in the past 6 months.	49.8	181/364	38.9 - 60.0	52.4	188/359	47.2 - 57.6	0.52
MSM with access to testing services	86.4	314/364	79.8 - 92.3	84.1	302/359	78.7 - 89.5	0.48
MSM who used a condom the last time they had anal sex	66.6	242/364	57.9 - 73.8	66.0	237/359	59.2 - 72.1	0.95

STI: Sexually transmitted infections, *p-Value. Fisher's exact test.

MSM prevalence who have both precise knowledge about preventing sexual transmission of HIV and who reject major misconceptions about HIV transmission had remained stable from 2015 (66.6%) to 2017 (66.0%) ($p = 0.95$). Similarly, the prevalence of MSM living with HIV ($p = 0.81$) and sexually transmitted infections ($p = 0.84$) remained unchanged. The prevalence's of the average number of male ($p = 0.98$) and female ($p = 0.69$) sexual partners remained unchanged during the last 6 months of the survey in 2015 and 2017 (**Table 3**). In contrast, the prevalence of MSM who reported consistently using a condom with lubricating gel every time they had anal sex with a male partner in the past 6 months increased from 2015 (21.1%) to 2017 (44.1%) ($p < 0.01$). Prevalence did not change among MSM who reported consistently using a condom every time they had vaginal intercourse with a female partner in the past 6 months from 2015 (49.8%) to 2017 (52.4%) ($p = 0.52$). Regarding the prevalence of MSM having access to screening services, no variation was observed ($p = 0.48$) (**Table 3**). This non-variation in prevalence was also observed among MSM who reported using a condom the last time they had anal sex ($p = 0.95$).

4. Discussion

The 2017 survey was conducted after two years of the 2015 survey and aimed to assess the impact of prevention actions provided to MSM in 2015 in Benin.

The majority of MSM were over 25 years old (53.2%) in 2017 compared to 2015 where they were mostly younger (80.6%). Mostly single in 2015 as in 2017, they had a high level of education in 2017 than in 2015 when they were much more at a secondary level of education. More than one study conducted among MSM had revealed that they were mostly young, aged under 24 years [7] [13]. However, in our study, the majority of MSM were over 25 years old. Indeed, HIV testing was on the rise among those over 25. This is the case in China [14]. A predominance of age over 25 years was also reported in study conducted in Kampala [15]. In the same study, Hladik and colleagues reported that the MSM had a secondary or high level education as in our study. In Benin, MSM declared they were mostly single in 2015 as 2017. This declaration could explain their difficulty in displaying their sexual orientation in a country where same-sex is not yet accepted. In fact, they were mainly pansexual in 2015 (70.4%) as 2017 (70.5%) in our study, which supposes that few of them were in a relationship with female partners. This situation has been observed in Togo where 14.7% of MSM declared living as couples and 12.7% declared to be with a man [7]. The same observation was reported in Malawi where 31% of MSM reported having female partners in the past 12 months [16]. This would reinforce the ideas that MSM could serve as a gateway for mixing HIV-1 strains from high-risk men to low-risk women especially in countries with a dual epidemic such as Senegal [1]. It is in the face of these conditions that some studies have reported double or multiple infections by HIV-1 strains in the MSM group as in East Africa, India, and

South America [17]-[19].

The increase in systematic condom use with lubricating gel during sex with a male partner (44.1% in 2017 compared to 21.1% in 2015) (**Table 3**) may reflect the positive impact of MSM awareness on risk behaviours in the transmission of HIV infection as reported in those studies [20] [21] and if two years after the administration of good practice advice, a positive result on behaviours was observed, the increase in age does not seem to have an impact on the increase in the use of lubricant during sexual intercourse. This suggests that despite the strong stigma against MSM, their situation seems to have improved in terms of HIV infections [22], since the prevalence had remained stable between 2015 (7.7%) and 2017 (7.0%).

In another hand, these findings could explain the HIV seronegativity of some people belonging to the group at high risk of HIV transmission. Indeed, in a study conducted in Los Angeles, 89% and 69% of MSM negative and having receptive anal intercourse reported having used lubricants a month and last intercourse respectively before the study [23]. The use of different types of pre-exposure prophylaxis (PrEP) could be offered to this population after awareness sessions [24]. This would thus constitute a solution to discrimination and stigma based on sexual orientation since appointments with the doctor for consultations will be prolonged due to the choice of a long-acting PrEP [24]. The latter, while reducing the proportion of sexually transmitted infections, could be a contributor to reducing the rate of HIV infection [25]. At this point, it will be necessary to identify the PrEP barriers during consultation in HIV prevention services [26] among MSM for good acceptance [27].

Today, with the suspension of USAID grants for HIV prevention and awareness activities for key populations, the major risk is to see a return to reinfection cases and an increase in HIV prevalence in this group.

5. Limitations

Given the research team's experience with the target and this type of study, practical arrangements were made to avoid the emergence of difficulties.

The study's limitations may lie in the choice of RDS as the sampling strategy, which emerged as the best alternative given the various options available. However, RDS is not without risk, especially if the seeds are not well chosen.

6. Conclusion

These results demonstrate that interventions targeting MSM are producing positive results. They confirm the need to continue and improve current interventions to prevent HIV infection among MSM. These programs must be integrated into existing programs and include important actions aimed at reducing risks associated with MSM's sexual behaviours, including: HIV knowledge, behaviours, use of integrated and tailored services, and PrEP.

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Authors' Contributions

Edmond Tchiakpe: Design the study, drafted and wrote the manuscript. Septime Pepin Hector Hessou: Patient enrollment, collection of information and read the manuscript. Odile Sodoloufo: Patient enrollment and registration of information in the database. Rene Kpemahouton Keke, Eric Gbaguidi, Moussa Bachabi, Design the study and Review the manuscript. Akadiri Yessoufou: Review the manuscript. All authors read and approved the final manuscript.

Data Availability

All the raw data generated are available upon reasonable request to corresponding author

Ethics Approval and Consent to Participate

Ethical clearance was obtained from National Ethics Committee for Health Research (CNEERS): number 012 of April 30, 2015. Written informed consent was obtained from each study participants. Confidentiality and anonymity of the information was also maintained.

Conflicts of Interest

The authors declare that they have no competing interests.

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List of Abbreviations

CNERS: National ethics committee for health research

ESDG: Second generation surveillance survey

HIV: Human immunodeficiency virus

IDU: Injection drug users

MSM: Men having sex with men

STI: Sexually transmitted infection

PLWHIV: People living with HIV

PrEP: Pre-exposure prophylaxis

RDS: Respondent driven sampling

RDSAT: Respondent driven sampling analysis tool

SIDA: Acquired immunodeficiency syndrome