

Evaluating the Determinants and Prevalence of HIV among Intravenous Drug Users in Benin

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Abstract HIV remains a serious global health problem. In Benin, intravenous drug users (IDUs) are at higher risk for HIV infection and are one of the groups the National AIDS Control Council (CNLS) has focused on in its strategic planning. The present study was conducted to estimate the rate of HIV prevalence among IDUs in Benin and identify potential risk factors. To this end, the 2013 and 2015 directives issued by the World Health Organization (WHO) and the Joint United Nations Program on HIV/AIDS (UNAIDS) regarding Second generation surveillance were followed. In total, 386 IDUs participated in the study from all departments of Benin, 3.1% of them were women. The average age of participants was 35 (± 10.7). The median length of time that participants had been using drugs was 10 years (range: 0 - 45) and cocaine was the most frequently consumed substance (56.0%). During their last injection, 90.9% of respondents used sterile injecting equipment. The HIV prevalence rate among IDUs was 4.7% (95% CI: 2.63% – 7.11%), compared to 1.2% within the general population. The results of this study highlight the need to implement continual HIV surveillance systems and develop prevention tools that specifically address the needs of IDUs.

Keywords Illicit Drugs, Injection Intravenous, HIV

1. Introduction

The slogan of UNAIDS to get to zero new infections,

zero AIDS-related deaths and zero discrimination in a world where HIV-infected people live long and healthy [1]. To achieve this goal by 2020, UNAIDS has developed an acceleration approach to achieve a set of time-bound targets. Targets include: 90% of all people living with HIV know their HIV status, 90% of people who know their HIV status have access to treatment, and 90% of people on treatment have a suppressed viral load. They also include reducing new HIV infections by 75% and achieving zero discrimination [1-3]. These key targets include injecting drug users (IDUs) [2, 4]. This behavioral pandemic particularly affects sub-Saharan Africa. In fact, in 2016, UNAIDS estimated that around 36.7 million people living with HIV (PLHIV) live in the world, more than two-thirds of them in sub-Saharan Africa [5, 6]. Speeding up the AIDS response in low- and middle-income countries could prevent 28 million new HIV infections and 21 million AIDS-related deaths between 2015 and 2030, saving US \$ 24 billion annually in additional treatment costs for HIV [1, 6].

Spectacular increases in injecting drug use and drug use (IDU) in sub-Saharan Africa explain more and more infections in an area already concerned by the HIV epidemic. There is no estimate of the number of inject drug users in the region, or the prevalence of HIV associated with injecting drug use [7, 8]. It has been reported that 10% of new HIV infections result from injection drug use. In European countries and in some parts of South and South-East Asia, it is estimated that the proportion of new HIV infections due to injecting drug use is around 75-80% [7-9]. Excluding countries in

sub-Saharan Africa, injecting drug users account for up to 30% of new HIV infections worldwide. Although several studies have linked IDU injecting drug use practices with HIV transmission, little research in sub-Saharan Africa has addressed this issue [10]. Although most HIV infections in Africa are the result of unprotected heterosexual intercourse and mother-to-child transmission, the current high-risk trends among injecting drug users and the lack of services targeting UDIs make this mode of transmission particularly worrisome. Despite the scarcity of IDU's data, evidence suggests that they are at high-risk of sexual exposures and injections and have high rates of HIV infection [11, 12].

Injection drug use is an important factor in new HIV infections in many parts of the world, particularly in Eastern Europe, South America, East, South-East Asia (Williams et al. 2007) and in sub-Saharan Africa in the last 10-15 years [4]. Trends in recent years in Africa suggest that in 2015, 0.08% of the population of East Africa, 0.19% of East Africa and 0.24% people in southern Africa inject heroin. This is close to, and can exceed, rates seen in the United States, where heroin use appears to have stabilized at about 0.2%. [4]. In view of this, WHO in its unified guidelines on HIV prevention, diagnosis, treatment, and care for key populations has recommended to several countries, such as Benin, to integrate injection drugs users as populations that contribute to the HIV epidemic [5].

The prevalence of HIV infection has fluctuated in Benin around 2% since 2002 in sentinel sites. The estimate from the Demographic and Health Survey (DHS) carried out in 2006 and 2012-2013 shows that Benin has a prevalence of 1.2%. The DHS conducted in 2012-2013 shows the variations according to: sex (1.4% for women versus 1.0% for men), the place of residence (0.9% in rural areas, whereas in the urban areas it is 1.6%) [6-9]. This study will provide updated data on the prevalence of HIV infection among IDUs and associated behavioral risk factors.

The aim of this study is to estimate the prevalence of HIV among IDUs in Benin, to identify behavioral risk factors and to measure the pathway between data from 2013 and 2015 [10, 13, 14]. The survey conducted evaluated IDUs based on their knowledge, attitudes and practices regarding STDs and HIV/ AIDS. The findings could help policymakers to build appropriate services for IDUs and improve available data on HIV-related indicators in Benin.

2. Materials and Methods

2.1. Research Framework and Study Design

It was a cross sectional study conducted in 2015 and focused on eight cities in the departments of Atlantique,

Littoral, Plateau, Zou, Mono and Borgou. The cities had been previously identified in a map from a 2013 study of IDUs and men in same-sex relationships [14, 15]. As well, five additional urban areas were incorporated into the survey to obtain a more representative sample.

2.2. Study Population

Individuals who were 15 years of age and older and who verbally acknowledged having used intravenous drugs in the past 12 months were invited to participate in the study. To build trust with the research team, participants were located with the help of guides and IDU peer educators [10, 13, 16]. Participation in the study was open to anyone who met the criteria for enrollment.

2.3. Sampling

The sample size used to estimate the number of participants was [17, 18]

$$n_i = D \frac{\left[Z_{1-\alpha} \sqrt{2P_i(1-P_i)} + Z_{1-\beta} \sqrt{P_{1j}(1-P_{1j}) + P_{2j}(1-P_{2j})} \right]^2}{(P_{2j} - P_{1j})^2}$$

$P_{1,i}$ = estimated percentage for the indicator during the previous survey $i = 21,4\%$

$P_{2,i}$ = goal as $P_{2,i} - P_{1,i}$ shows expected difference for the indicator $i = 12\%$
 $P_i = (P_{1,i} + P_{2,i})/2$.

$Z_{1-\alpha}$ = Z score corresponding to the expected significance level with $\alpha = 0.005$ and bilateral test so $Z_{1-\alpha/2} = 1.96$

$Z_{1-\beta}$ = Z score corresponding to the test's power; $\beta = 0.20$ and $Z_{1-\beta} = 0.83$.

D = Sampling effect, $D = 2$.

n_i = expected minimal size of the sample for the indicator i .

$n_i = 387$

We used a random sampling based on a list available from peer educators' register. Following a presentation given by the peer educators, information was gathered from IDUs who were selected and accepted to participate. The presence of drug-related wounds was not a selection criteria, although it did reinforce the case for admitting individuals when they were found [18]. People unable to hold a conversation or who could not respond to questions coherently were not asked to participate. In total, 386 IDUs agreed to participate in the study.

2.4. Variables

The main variables were relatives to high risk behaviour (use of sterile injecting equipment or the decision to wear a condom during intercourse with an occasional partner) and HIV status.

Determining factors for high-risk behavior which have been considered can be grouped into three categories: i) access to services and materials, ii) HIV/STD awareness and iii) risk perception [11, 17-19]. The objective of this section is to determine if any of the variables within each

grouping is associated with the use of sterile injecting equipment or the decision to wear a condom during intercourse with an occasional partner.

2.5. Data Collection Methods

Only health centres in the cities of Cotonou, Ouidah and Grand-Popo were used as data collection sites. In other locations, data was collected in the slum areas, where IDUs tend to congregate, in the residences of drug dealers (or drug dealing sites) and in front of the homes of community resource people. At each location, the field researcher used the selection criteria to recruit candidates. To this end, information notes and consent forms were distributed to potential participants. Once the recruitment procedures were completed, interviews were carried out with the help of a structured questionnaire divided into several sections. Information was gathered about the socio-demographic profile of participants, various indicators specific to drug users, HIV and STD-related knowledge, sexual attitudes and behaviors, the use of condoms and sterile injection equipment, the treatment of STDs, exposure to messages about STDs and HIV/AIDS and participation in risk reduction programs [17].

For the serological component of the study, the following tools were used to gather data.

- Both pre-and post-test counselling was offered to IDUs who chose to undergo a screening.
- A form was filled out when blood was collected. For privacy reasons, blood samples were not labelled with any information that could potentially identify the participant. Label codes were used to trace the samples to the blood collection forms and the questionnaire data. The form contained information about i) the collection site and participant ii) the blood collection procedure and iii) how the sample was handled.
- Laboratory notes were used to record the results.

2.6. Treatment of Blood Samples

Blood samples were obtained using new, sterile needles intended for single-use. Samples were then directly applied to reactive strips. To assure quality control, two drops of blood from each sample were placed on filter paper. In total, 10% of samples passed the quality control test. After blood drops were applied, the filter paper was dried for 15 minutes and placed in a sealable plastic bag. A label was then attached to the bag, which displayed the same number code as the label placed on the participant's questionnaire, blood data form and the filter paper itself. After being dried and placed in a bag, the samples were conserved either at room temperature or at + 4°C in refrigerators accessible to the blood collection personnel. Samples were then transferred to a testing laboratory where they were kept at -20°C prior to handling [2, 20, 21].

Sample analysis complied with Benin's blood testing norms and procedures (type II algorithm of the WHO) [7]. To this end, a sensitive test was initially carried out, followed by a discriminant validity test on positive samples. Blood specimens that tested positive or inconclusive as well as 10% of negative samples were subjected to a quality control test. ELISA and Vironostika tests were initially applied, followed by a second discriminant test procedure involving Immunocomb. In order to give participants their results, a fast acting test using Determine and Bioline was carried out at blood collection sites.

2.7. Data Analysis

The data was tabulated using SPSS 21.0 and the results were organized into tables and graphs with Excel. We used the Pearson Chi-square test and a Fisher test (variance analysis) to evaluate the relationships among variables, using a 5% significance level.

2.8. Regulatory Approvals

Participation in the study was voluntary and potential recruits were given clear explanations as to the study's objectives and procedures. Those who wished to be recruited signed a written consent form, in which they agreed to be interviewed and to undergo an anonymous screening for HIV. Participants were interviewed in a safe environment that protected their privacy. In addition, blood samples were collected anonymously and each participant was assigned a code number, which was written on a series of labels. The labels themselves did not include any socio-demographic indicators that could be used to identify the participant. The study protocol was submitted with favorable opinion to the National Committee on Ethics and Health Research (NCEHR).

3. Results

3.1. Study Coverage and HIV Screening Acceptance

The present study sought to enrol 387 participants. In the end, 386 were recruited, which represents 99.7% of the expected sample size. Recruitment targets were determined by the population size in each department. The number of participants in Atacora/Donga was considerably lower than expected because many of the individuals who were approached during recruitment only used drugs orally. However, this underrepresentation was compensated by higher enrollment rates in Borgou/Alibori and Atlantique/Littoral. Otherwise, out of the 386 IDUs who agreed to participate in the study, 381 (98.7%) agreed to undergo a screening for HIV. The acceptance rate varies slightly by department (Table 1).

Table 1. Distribution of participants by department

Department	Expected sample size	Number of IDUs surveyed	% of expected sample size	Number of blood samples taken for HIV test	Acceptance rate
Atacora/Donga	27	2	7.4	2	100.0
Atlantique/Littoral	150	165	110.0	164	99.4
Borgou/Alibori	70	78	111.4	76	97.4
Mono/Couffo	40	40	100.0	39	97.5
Ouémé/Plateau	60	61	101.7	60	98.4
Zou/Collines	40	40	100.0	40	100.0
Total	387	386	99.7		

3.2. General Characteristics of IDUs

Table 2. Socio-demographic characteristics of IDUs

	IDUs surveyed	
	Number	Percentage
Sexe (n=386)		
Female	12	3.1
Age in years (n=386)		
Under 19	6	1.6
19 – 24	66	17.1
25 and older	314	81.3
Education level (n=378)		
None	44	11.6
Primary	142	37.6
Secondary	161	42.6
Post-secondary	29	7.7
Koranic school	2	0.5
Marital status (n=382)		
Married	72	18.8
Common-law	175	45.8
Single	117	30.6
Widowed	6	1.6
Divorced	12	3.1
Occupation (n=382)		
Craftsmen	175	45.8
Vendor	31	8.1
Driver	66	17.3
Artist	8	2.1
Official	48	12.6
Student	30	7.9
Department (n=386)		
Atacora/Donga	2	0.5
Atlantique/Littoral	165	42.7
Borgou/Alibori	78	20.2
Mono/Couffo	40	10.4
Ouémé/Plateau	61	15.8
Zou/Collines	40	10.4

As Table 2 shows, 3.1% (n=386) of IDUs surveyed

were women. The average age of participants was 35 (± 10.7) and the median was 34. The ages of respondents ranged from 15 to 65. Furthermore, almost one fifth of participants (18.7%) were under the age of 25. The percentage of participants within this age group was higher in Mono/Couffo (40.0%), Borgou/Alibori (38.5%) and Zou/Collines (25.0%), compared to Ouémé/Plateau (8.2%) and Atlantique/Littoral (6.7%) ($p < 0.001$). Almost nine out of ten IDUs surveyed (87.8%) had been at school. For the occupations, 45.8% of respondents were craftsmen. Drivers were the second largest group (17.3%). Students were a small but not insignificant percentage of total participants (7.9%). Most of the IDUs surveyed were from Benin (95.8%). The remainder was from others nationalities whom half had been living in Benin for at least five years. Some were in Benin since 36 years.

3.3. Drugs Related Indicators

3.3.1. Type of Drugs and Drugs Use History

According to the results, there are three main drugs that IDUs consume: cocaine (35%), heroin (29%) and cannabis (28%). IDUs obtained their drugs from dealers (51.3%), through friends (33.2%) or by stealing from dispensaries (38.1%). Moreover, drugs were paid for with cash (94.3%), gifts (14.2%), by pawning personal belongings (13.0%) or with borrowed money (10.1%). As well, respondents generally administered the drugs in private residences (62.7%) or in the homes of suppliers (33.7%). IDUs were increasingly less likely to inject themselves with drugs in slum areas (3.6%). During the previous month, most users (72%) inject themselves with drugs at least once a week.

On average, respondents were 22.3 (± 7.2) years old when they began using intravenous drugs and the median age was 20. The age of first use ranged from 12 to 58 and two thirds of respondents (64.9%; n=345) had started before 25. On average, participants had been using intravenous drugs for 12.9 years (± 9.1) and the median duration of use was 10 years. Only four respondents had begun taking drugs in the previous year.

3.3.2. Access, Use and Maintenance of Sterile Equipment among IDUs

Nearly all participants (97.9%; n=381) know a location where they can acquire injecting equipment. The main sources for material were pharmacies (63.3%), drugstores/shops (30.0%) health centers (23.9%), friends (22.3%) and resellers (41.3%). The injection kits of participants consisted of the following materials: tourniquet: 69.1%, alcohol pad: 47.0%, needle: 94.0%, syringe: 94.3%, adhesive bandage: 16.4%, container: 10.4%, kit: 6.8%.

During their most recent injection, 90.9% of respondents (n=383) used sterile equipment. While the use of clean material was widespread in all departments, it should be noted that in Atacora/Donga, where only two IDUs were involved, neither participant reported having used sterile equipment. During the previous month, 50.6% of respondents had used new equipment. The use of sterile equipment was highest among IDUs aged 25 years and over (92.6%), followed by those in the 19- 24 age group (84.8%). Respondents under 19 years of age were the least likely (66.7%) to use clean injecting equipment ($p<0.04$). IDUs are sometimes faced with a situation in which they need drugs, but lack the means to acquire injecting equipment. In such cases, IDUs tend to pursue one of three options: use another type of drug (41.7%), resist the urge until another syringe is acquired (35.5%) or borrow a syringe from a friend (8.3%). During the 30 days prior to the survey, 2.9% of participants said they had shared injecting equipment. Some respondents had shared their material with ten people. Equipment is generally shared with a friend (53.8%) or given out randomly to the first comer (3.8%).

In 36.3% of cases (n=369), respondents held onto their material for later use. Injecting equipment was kept in various places, including cigarette packages, eyeglass cases, cartons, bottles, bowls, syringe wrappings and tissues. Before re-use, respondents who kept their equipment cleaned it by rinsing (54.9%), dusting (13.5%) or wiping (10.5%) their material. However, 5.3% said they re-used their equipment without cleaning it.

3.4. Sexual History, Condom Access and Use among IDUs

All respondents were sexually active and the average age of first sexual intercourse was 17 (± 4.2). Moreover, 56.5% (n=377) of IDUs were under the age of 18 when they first had sex and 19.1% were less than 15 years old. During their first sexual intercourse, 43.6% of study participants used protection. The percentage of respondents who were sexually active during the previous year was 90.5% (n=383). During the previous month this percentage was 80.2% corresponding to 310 IDUs. However, 31.4% (n=310) of respondents used protection when they had intercourse under the influence of drugs.

In total, 27% (n=281) of those who had sex with a regular partner during the three months prior to the survey wore condoms. Among the respondents, 20.7% had

intercourse with a commercial sex worker, out of whom 72.5% (n=80) used protection. Many participants (13.3%) explained that they did not use protection because neither they nor the commercial sex worker had a condom available. More than one quarter of participants (28.0%, n=108) had sex with an occasional, non-commercial partner in the three months prior to the survey. Moreover, during the most recent sexual intercourse, 60.2% of them wore a condom and 63.7% (n=107) had done so in the previous 30 days. Participants also said they chose not to use protection because they trusted their partner, did not like to wear condoms or questioned their effectiveness.

The results show that 30.8% (n=383) of participants used a condom during their last sexual encounter. The level of education and the department were associated with the use of condom during the last sexual encounter; IDUs with a post-secondary education were twice as likely to use condoms ($p<0.01$). Furthermore, participants from Mono-Couffo and Borgou/Alibori wore protection more often than IDUs from other departments ($p=0.02$). However, the decision to wear a condom was not influenced by age or gender.

The two main reasons that participants gave for wearing condoms were to protect against STDs/HIV (69.1%, n=375) and to avoid contraception (42.1%, n=375). Only 7% (n=353) of IDUs surveyed applied a lubricant, usually when they used a condom. Most IDUs said they knew of a location where they could acquire condoms. The places the more often cited, were kiosk (78%), pharmacy (75%), Supermarket (46%), market/street vendor (45%). The health center was cited by 27% of respondents. Roughly three quarters of respondents (76.7% n=374) are able to reach the location from their home in less than five minutes.

3.5. Knowledge and Attitudes among IDUs Regarding STDs and HIV

3.5.1. Knowledge and Attitudes Regarding STDs

The IDUs involved in the survey generally had difficulty identifying symptoms of STDs. Depending on the symptom, between 10% and 35% of respondents could identify physical signs of STDs in women and, for men, the rate varied between 3% and 65%. The most commonly cited examples were, for women, vaginal and purulent discharge and, for men, dysuria and urinal discharge. During the previous 12 months, 10.4% (n=385) of participants said they had experienced urinal discharge and 5.2% (n=384) suffered from ulcerations. In total, 13.8% (n=383) of IDUs surveyed experienced at least one STD episode. However, only 5% of those with urinal discharge or ulcerations used protection during intercourse.

Only three of the 20 IDUs surveyed in this sub-group who had exhibited symptoms of STDs in the previous 12 months sought treatment, usually by going to a public health center. However, none of those affected visited an STD clinic. Those who did not go to a health center, turned

to traditional medicine or friends for treatment.

3.5.2. Knowledge, Awareness and Attitudes among IDUs Regarding HIV/AIDS

Most of the respondents, 92.7% (n=382) knew that condoms reduce the risk of HIV and 94.5% (n=385) mentioned the importance of not using sharp, contaminated objects. In addition, most respondents said that HIV can be prevented by not sharing needles (96.4%, n=384) and by using oral rather than intravenous drugs (83.0%). Other prevention measures cited by participants were sexual fidelity (94.5%, n=385) and abstinence (81.3%). As well, 81.0% (n=373) of IDUs involved in the survey said that mothers can pass on HIV to their children and that transmission can occur during pregnancy (61.3%, n=300), labor (31.3%) and breastfeeding (34.7%). Furthermore, 70.0% agreed that mother-to-child transmission of HIV can be prevented with anti-retroviral drugs and only 3.0% believed that traditional medicine would be effective.

Most IDUs reject certain misconceptions about HIV. Specifically, 86.9% (n=381) stated that a person who appears to be in good health can transmit the virus if they are infected and 53.9% (n=380) said HIV cannot spread through mosquito bites. Moreover, most respondents agreed that a person cannot become infected through witchcraft (56.2%, n=370) or by sharing a meal with someone who has HIV (72.4%, n=366). In total, 34.4% of IDUs (n=346) rejected all major misconceptions about how HIV is transmitted.

In sum, 31.1% (n=341) of participants had a good understanding of HIV.

3.6. Access to the Interventions

Prior to the survey, 52.1% participants (n=386) had undergone a screening in the previous 12 months and obtained their results. Gender (p=0.03), department of residence (p<0.01) and educational level (p<0.01) were factors that determined whether respondents knew their serological status. Specifically, female IDUs, participants who pursued post-secondary studies, women and IDUs from the departments of Borgou/Alibori and Mono/Couffo were more likely to be aware of their status.

Radio is the main source of information for IDUs, followed by television. Moreover, 81.3% (n=386) of respondents said they regularly listen to the radio and 68.1% watch television often. In total, 43% (n=383) said they heard messages about STDs several times a day and 74.7% (n=162) of those with peer educators learned from them about how to prevent STDs and HIV.

Monitoring agencies in Benin have designed services tailored to the needs of IDUs that offer a series of prevention activities to follow. However, only 13.8% (n=385) of participants had heard of these services, out of whom slightly more than a quarter inquired about them in the previous 12 months. In total, 8.1% of respondents accessed health services for problems related to drug use. Participants said they went to health centers because they wanted treatment for dependency issues in most of the cases (addictions 50%, withdrawal and issues 47%), or were suffering from an illness unrelated to drug use (10%).

In sum, less than a third (31.8%, n=377) of IDUs had been reached by HIV interventions and exposure was not influenced by any socio-demographic factor.

3.7. High Risk Behaviors, Related Factors and HIV Prevalence among IDUs

The HIV prevalence rate among the IDUs surveyed (n=380) was 4.7% (95% CI: 2.63% – 7.11%) and no explanatory variable was associated with a respondent's serological status.

Participants who knew where to purchase injecting equipment were almost three times more likely to use sterile material. Knowing one's serological status is an important component of HIV awareness. However, participants who had obtained their results were not statistically more likely to use sterile equipment. The decision was also not influenced by whether the participant had a good understanding of HIV. Most of the indicators related to risk perception also had no noticeable effect. However, IDUs who understood the risks associated with intravenous drug use were more likely to use clean material (p<0.001) (Table 3).

Respondents who received free condoms and knew the location of an anonymous screening center were not more likely to use protection. In addition, condom use was higher among participants who knew their serological status (35.8%), compared to those who had not been tested (25.3%). However, the likelihood of using a condom was not influenced by whether a participant had a good understanding of HIV or could identify two symptoms of STDs in either sex. In addition, no indicator related to risk perception was determined to be significant (Table 4).

Table 3. Factors associated with the use of sterile equipment by IDUs during the last injection

Indicators	% of IDUs who used sterile equipment during their last injection		
	No(n=35)	Yes(n=348)	P value
Access to services and materials			
Knows where to purchase injecting equipment	40.0	91.4	< 0.006**
Received free syringes in the past 6 months	8.6	16.1	0.18
HIV and STD awareness			
Previously underwent voluntary screening for HIV and received the results	89.1	92.5	0.26
Has a good understanding of HIV/AIDS	90.9	90.6	0.91
Was exposed to HIV-specific interventions	90.9	90.0	0.77
Risk perception			
Knows someone currently living with AIDS or who died from it	89.7	92.6	0.34
Uses oral or nasal drugs instead of intravenous drugs	93.7	90.7	0.32
Understands the risks from intravenous drug use	68.2	93.8	< 0.001**
Is aware of treatment options that replace intravenous drugs with substitutes	91.4	88.2	0.41
Is willing to use oral rather than intravenous drugs	90.0	90.9	0.82

Table 4. Factors associated with condom use during the last sexual encounter with occasional partner

Indicators	% of IDUs who used a condom during their most recent sexual encounter with occasional partner		
	No(n=265)	Yes(n=118)	P value
Access to services and materials			
Knows the location of a screening clinic	34.1	30.6	0.31
Received free condoms in the past three months.	27.0	31.6	0.47
HIV and STD awareness			
Previously underwent voluntary screening for HIV and received the results	25.3	35.8	0.03**
Has a good understanding of HIV/AIDS	32.8	27.9	0.37
Knows at least two STD symptoms in women	32.1	28.6	0.47
Knows at least two STD symptoms in men	31.5	30.1	0.76
Was exposed to HIV-specific interventions	32.2	30.0	0.68
Knows that condoms protect against HIV/AIDS	28.6	31.3	0.47
Risk perception			
Knows someone currently living with AIDS or who died from it	30.2	31.8	0.74

4. Discussion and Recommendations

The results of this study confirm that the use of intravenous drugs is a pressing issue in Benin and that IDUs continue to be at higher risk for HIV infection [22, 23]. Nevertheless, our findings also indicate that, between 2013 and 2015 the infection rate among IDUs dropped by 30%, falling from 6.7% to 4.7%. Behavioral changes that lower the risk of infection were also observed over the same period [13, 16, 24].

It was also shown that women make up a small percentage of IDUs. The previous study from 2013 as well as other reports has noted similar findings. In addition, most of the IDUs surveyed were less than 34 years old and some participants were 15, which corroborate what other studies have also shown, namely that young people are the largest consumers of drugs [25, 26].

The median length of time that participants had been using intravenous drugs was 10 years, indicating that many IDUs have been vulnerable for extended periods. Apart from HIV exposure, the use of injectable drugs can increase the risk of developing other conditions such as cancer and chronic illnesses [27, 28].

In Benin, cocaine was the most frequently used intravenous drug, likely because it is easily injected and because it is widely available, despite its relatively higher cost compared to other substances [7, 8, 29]. Moreover, almost half of respondents used non-intravenous drugs when they lacked the financial means to acquire injectable drugs or equipment. During their last injection, most study participants (90.9%) used sterile equipment, a practice that increased significantly with age. Nevertheless, one out of ten respondents did not use sterile material, which

potentially exposes them to contracting HIV. The fact that users are mostly young is also a cause for concern since many of them are sexually active and could transmit HIV to members of the general population [30-32]. Many IDUs also keep their equipment for later use. However, storage conditions are often poor with many users placing their equipment in cigarette boxes, eyeglass cases, bottles, bowls, syringe wrappings or tissues [33, 34]. These practices expose IDUs to the risk of HIV infection. If a program was implemented that distributed injecting equipment, it is likely that fewer needles would be shared and the risk of transmission would decline. As marginalized members of society, IDUs face unique challenges that put them at higher risk for contracting HIV [15, 16].

The results show that only 30.8% of respondents used a condom during their last sexual intercourse, and this choice was influenced by a user's level of education and department of residence, which confirms what other studies have found [15, 17]. Another notable finding is the fact that, during the 12 months prior to the survey, 13.8% of IDUs experienced at least one episode of STD, 15% of whom sought treatment. However, many participants had a good understanding of HIV, with knowledge varying by level of education and department of residence. Most respondents could cite at least two prevention measures, including ways to reduce the risk from using intravenous drugs. A majority of respondent also rejected certain common misconceptions about how HIV is transmitted. As previous studies have suggested [5, 35], further educating IDUs about STDs and HIV, regardless of their educational background and geographical area could help reduce the risk of infection.

Almost one half of IDUs did not know whether they were HIV positive and previous studies have also shown that many Beninese are unaware of their serological status [36, 37]. During the six months prior to the survey, most IDUs were exposed to awareness messages about STDs and HIV/AIDS.

According to our results, the HIV prevalence level among IDUs was 4.7%. While the incidence of HIV did not appear to be determined by any specific factors, it was higher than the national rate [13, 38]. Nevertheless, the level of HIV prevalence among users did fall by two percentage points compared to 2013, although the drop was not statistically significant.

The results of the present study suggest that positive changes have occurred since 2013, when the previous survey was undertaken [13-15]. For instance, IDUs are more likely to wear condoms during sexual intercourse with commercial sex workers. However, during sex with other types of partners, there has been a decline in usage. Nevertheless, the use of sterile equipment increased and IDUs were less likely than before to share their material with other users. Despite this promising trend, the number of IDUs who have access to places that offer sterile

injection equipment has fallen compared to 2013 [13, 39].

More IDUs than previously understand that not sharing equipment and switching to drugs that are not administered intravenously reduces the risk of HIV infection. However, knowledge about other aspects of the disease has not improved and exposure to awareness campaigns among IDUs has declined since 2013.

The present study identified certain challenges and needs specific to IDUs. Almost all respondents expressed an interest in quitting and asked for assistance. Many would like to stop taking drugs but are unable, with each attempt ending in failure. Other studies have reported similar issues with quitting. One possible explanation is that, since most IDUs live in slum areas, they are unable or unwilling to visit drug rehabilitation centers. Relapse is therefore common, which only further aggravates the problem and renders IDUs even more vulnerable to contracting HIV and STDs [9, 28, 31, 40].

It is therefore important to continue distributing free condoms and gels to IDUs and provide them with services that are accessible and adapted to their needs. Such efforts could help reduce the infection rate among IDUs and lower the risk of HIV spreading from IDUs to commercial sex workers and eventually to the general population.

The results also highlight the importance of raising awareness about HIV and STDs through better communication with IDUs. Moreover, the risk of exposure could decline if services were adapted to address the specific needs of IDUs as they related to drug use and HIV [2, 41]. Currently, however, access to treatment remains a serious issue and only a small number of respondents (13.3%) said they had heard about available services. It is important therefore to extend the coverage of services offered and improve the quality of treatment. Finally, the implementation of a risk reduction program to help prevent further infection among IDUs is necessary [9, 42].

Our study presents interesting findings regarding the prevalence level of HIV infection and the behavioral factors associated with the level of IDUs, but it is not without limits. The sampling method used to recruit study participants may be subject to social desirability bias. With respect to selection bias, the selected cities were selected for convenience and only those aged 15 years and older who self-identified intravenous medications in the last 12 months were invited to participate in the study. Those belonging to other non-selected cities and localities were not included in the study. This situation may underestimate the prevalence. Another limitation to participation in the study was the fact that the acceptance of being IDUs was underlined by a verbal statement, some IDUs due to sociological and cultural weight may not show up for study to participate. This is a bias of social desirability that may underestimate the results of the study. But with the very active role of peer counselors and their support and support to IDUs this bias has been reduced. It

would be somewhat difficult with the cross-sectional nature of the study to establish a direct causal link between the occurrence of HIV infection among IDUs and injection drug use. A follow-up cohort study to estimate the incidence of HIV infection will further support our findings.

5. Conclusions

Intravenous drug users are a key group that is at higher risk for contracting HIV in Benin. For many years, very little country-specific information was available about them. The present study highlights the fact that IDUs contribute to the HIV epidemic. However, the results also showed that, between 2013 and 2015, the rate of infection fell by 30%, declining from 6.7% to 4.7% due to interventions by various stakeholders. Finally, the percentage of IDUs who followed practices that reduce the likelihood of contracting HIV increased during the same period.

Conflicts of Interest

Authors declare no conflict of interest.

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