

## Pilot Study to Assess Risk Behaviors Among Injection Drug Users in Kigali-Rwanda

**Authors:** K. Workman<sup>1</sup>; J. Factor<sup>1</sup>; W. Asimwe<sup>1</sup>; D. Subuhoro<sup>2</sup>; H. Gashema<sup>3</sup>; M. Irakoze<sup>3</sup>; S. Nsanziimana<sup>2</sup>; D. J. Riedel<sup>1,\*</sup>

**Affiliations:** <sup>1</sup>University of Maryland, MD, USA; <sup>2</sup>Rwanda Biomedical Centre, Kigali, Rwanda; <sup>3</sup>University of Rwanda, Kigali, Rwanda.

### ABSTRACT

**INTRODUCTION:** Injection drug use (IDU) is a high-risk practice for acquiring and transmitting HIV and other blood-borne infections. While many studies have been conducted in the U.S.A, Europe, and Southeast Asia, IDU is less well-recognized in sub-Saharan Africa. No studies of IDU have ever been conducted in Rwanda.

This pilot study assessed the injection behaviors and risk factors among people who inject drugs (PWID) in Kigali, Rwanda.

**METHODS:** A cross-sectional survey and voluntary HIV testing were administered to PWID at a single health center in Kigali. Convenience sampling was utilized for recruitment.

**RESULTS:** Sixteen PWID completed the survey. Most participants (94%) were male; the median age was 34.5 years (range, 18-50 years). The most frequently used drugs were heroin (100%), marijuana (87%), benzodiazepines (81%), and cocaine (38%). Half of the participants used multiple times daily; 44% reported sharing equipment. Nearly all (88%) reported actively seeking drug treatment. Fifteen participants were tested for HIV, and all tested negative.

**CONCLUSIONS:** This is the first study to assess PWID in Rwanda. Although all participants tested negative for HIV, this study highlights that PWID in Rwanda are at high risk for HIV and other blood-borne infections. Prevention and drug treatment strategies are needed for this vulnerable population.

**Keywords:** HIV Infections, Substance Abuse, Intravenous, Substance-Related Disorders, Drug Users

### INTRODUCTION

Injection drug use (IDU) is a high-risk practice for acquiring and transmitting HIV and other blood-borne infections. While many studies have been conducted in the U.S., Europe, and Southeast Asia, IDU is less well-recognized in sub-Saharan Africa.

One review of IDU in 6 African countries found 0.2% of adults were using heroin, similar to the global average [1]. Heroin and cocaine are both frequently used by people who inject drugs (PWID) in Africa [2]. In one study in Nairobi, Kenya, PWID reported injecting 2-3 times per day, almost every day; many reported sharing syringes [3]. Another

**\*Corresponding author:** David J. Riedel, MD, MPH, Associate Professor of Medicine, Institute of Human Virology, University of Maryland School of Medicine, 725 W. Lombard Street, Baltimore, MD 21201, Tel: +1-410-706-5665 (office), driedel@ihv.umaryland.edu; **Potential Conflicts of Interest (Col):** All authors: no potential conflicts of interest disclosed; **Funding:** All authors: Partial funding was provided by the University of Maryland Center for Global Engagement, but the funder had no role in the study's design; **Academic Integrity.** All authors confirm that they have made substantial academic contributions to this manuscript as defined by the ICMJE; **Ethics of human subject participation:** The study was approved by the local Institutional Review Board. Informed consent was sought and gained where applicable; **Originality:** All authors: this manuscript is original has not been published elsewhere; **Review:** This manuscript was peer-reviewed by three reviewers in a double-blind review process; **Type-editor:** Cardillo (USA).

**Received:** 31<sup>st</sup> August 2020; **Initial decision given:** 08<sup>th</sup> February 2021; **Revised manuscript received:** 09<sup>th</sup> February 2021; **Accepted:** 15<sup>th</sup> April 2021.

**Copyright:** © The Author(s). This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY-NC-ND) ([click here](#)) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. **Publisher:** Rwanda Biomedical Centre (RBC)/Rwanda Health Communication Center, P. O. Box 4586, Kigali. ISSN: 2079-097X (print); 2410-8626 (online)

**Citation for this article:** K. Workman; J. Factor; W. Asimwe et al. Pilot Study to Assess Risk Behaviors Among Injection Drug Users in Kigali, Rwanda. Rwanda Medical Journal, Vol. 78, no. 2, pp. 35-39, 2021.

study in Mwanza, Tanzania, found that half were sharing needles and syringes; more than one-third were unaware of the associated risks [4].

IDU is increasingly common among young adults in East Africa and is associated with high-risk sexual behaviors, thus connecting these two behaviors with the generalized HIV epidemic in the region [5]. In the Tanzania study, 13% of PWID reported having  $\geq 5$  sexual partners in the past month, while only 6% reported consistent condom use [4]. In Nairobi, 18% of PWID reported no condom use with the main partner, and only 5% used condoms with a casual partner during their last sexual encounter [3]. These behaviors place PWID and their partners at high risk for HIV and other sexually transmitted infections (STIs).

In Rwanda, the overall prevalence of HIV is approximately 3% [6], while it is 4.3% in Kigali [7]. HIV prevalence is higher in “key populations” like female sex workers and men-who-have-sex-with-men, ranging from 5 to 51%, respectively [8,9]. PWID are the third major “key population;” however, there are no current data on IDU prevalence, its associated risk factors, or the seroprevalence of HIV among PWID in Rwanda. This pilot study aimed to assess high-risk behaviors and HIV infection among a small sample of PWID in Kigali, Rwanda.

## METHODS

A cross-sectional behavioral survey of PWID was conducted at a single health center (Biryogo) in the Nyamirambo sector in the Nyarugenge District of Kigali, Rwanda using convenience sampling in August 2018. Patients visiting the center were asked to participate. Participants helped recruit others in the surrounding neighborhood to take part in the study by word of mouth referrals.

A brief eligibility screening questionnaire confirmed self-reported IDU and age  $\geq 18$  years. Survey questions were adapted from the HIV Risk-Taking Behavior Scale (HRBS) [10] and the Behavioral Risk Assessment for Infectious Diseases (BRAID) [11]. Data was collected on socio-demographic characteristics, IDU and practices; sexual behaviors; and HIV knowledge.

The survey was translated and administered in Kinyarwanda (the primary Rwandan language) by native speakers using Qualtrics software. A

laboratory technician performed venipuncture and rapid diagnostic testing for HIV if consent was provided.

Descriptive statistics were computed for major variables. Ethical approval was granted by the University of Rwanda (Reference No: 268/CMHS IRB/2018) and the University of Maryland Institutional Review Boards (Reference No: HP-00079241).

## RESULTS

**Demographics:** Sixteen participants participated in the study (Table 1). Most (94%) were male; the median age was 34.5 years (range, 18-50 years). Most (88%) participants were born in Rwanda. No participants received education further than secondary school.

**Drug Use:** Half of the participants reported injecting on a weekly basis, and half of these injected  $\geq 3$  times per day. The following drugs were reportedly used by participants: heroin (100%), marijuana (87%), benzodiazepine (81%), and cocaine (38%). Of the drugs used most frequently, 75% reported marijuana, followed by heroin (19%) and cocaine (6%). In the preceding month, 5 (31%) reported snorting heroin and 6 (38%) also reported smoking heroin.

Four participants (25%) reported having an overdose in the past, and two reported an overdose last month. Fourteen (88%) reported seeking drug treatment; all were interested in receiving drug treatment and/or rehabilitation.

**Needle Practices:** Five participants (31%) reported injecting a drug with a used, given, lent, rented, or sold syringe. Nearly half (44%) reported giving, lending, or selling a syringe to someone else after they had used it to inject. Nearly half (44%) also reported reusing their last syringe. Most (94%) participants had obtained sterile syringes from a local pharmacy (there were no needle exchange programs at that time in Rwanda). Participants reported disposing of needles in the trash and/or toilets.

**Sexual Behavior:** In the last month, 6 participants (38%) reported sexual activity with a regular partner, but 3 participants (17%) reported sexual activity with 3-5 people. Half of the participants reported sexual activity with a casual partner in the last month, and 67% of them reported never using condoms. One participant reported a prior STI diagnosis.

**Table 1: Patients' demographic characteristics**

Characteristic	n (%)
Male sex	15 (94)
Median age (IQR), years	34.5 (9)
Age group	
18-30	4 (25)
31-40	9 (56)
41-50	3 (19)
Country of birth	
Rwanda	14 (88)
Burundi	1 (6)
Kenya	1 (6)
Current marital status	
Single	5 (31)
Married	7 (44)
Divorced	4 (25)
Highest level of education	
Primary	5 (31)
Secondary	11 (69)
Drugs used*	
Heroin	16 (100)
Cocaine	1 (6)
Marijuana	12 (75)
Benzodiazepines	13 (81)
Injected drugs in the past week	8 (50)
Injected drugs in the past 6 months	11 (69)
Shared a syringe/needle in the past 6 months	4 (25)
Ever injected with a used syringe	5 (31)
Ever given a used syringe to someone else	7 (44)
Ever cleaned syringes before reusing	11 (69)
Ever overdosed	4 (25)
Ever received any drug treatment	3 (19)
Currently seeking drug treatment	14 (88)

\* Categories are not mutually exclusive, IQR: interquartile range

**HIV and Hepatitis C:** Fourteen participants (88%) reported the previous testing for HIV. Fifteen participants agreed to HIV testing, and all 15 tested negative. Most participants (92%) reported never having been tested for hepatitis C (HCV), while one was unsure of prior testing.

**Knowledge of Participants:** Prior to this survey, all were familiar with HIV, but fewer were aware of hepatitis B (25%) or hepatitis C (19%). Most participants knew that HIV could be transmitted through sharing syringes (69%) and unprotected sex (75%). Participants reported the following acts could protect against HIV: condoms (69%), sex with one, uninfected, faithful partner (19%), avoiding casual sex (44%), abstinence (38%), avoiding blood transfusions (13%), avoiding IDU (31%), not sharing needles (6%), and praying (6%).

## DISCUSSION

In this pilot study of PWID in Rwanda, there were several important findings. First, injection drug use with heroin and cocaine in this small sample were common and ongoing. Second, needle sharing was a common activity. Finally, all participants tested negative for HIV infection.

This result was unexpected in an HIV-endemic country, with most participants engaging in numerous high-risk behaviors (including and beyond IDU). With a high frequency of sharing used needles and unprotected sexual activities, the participants are at high risk of an HIV or other blood-borne infection outbreaks. If a single person in this closed network were to acquire HIV, an outbreak could rapidly develop. In the U.S., one such outbreak was clearly described in a small IDU population in Scott County, Indiana [12]. Considering that most participants had never been tested for HCV, it is possible that there are other blood-borne or sexually transmitted infections present already within this closed network, any or all of which could also rapidly spread through the network.

While IDU practices and HIV incidence among PWID have been well described in the US, Europe, and Southeast Asia, IDU remains poorly characterized in sub-Saharan Africa. Prior work from nearby countries of East Africa (Kenya and Tanzania) have reported similarly high rates of high-risk sexual

and injection practices [3,4]. With their geographic proximity to Rwanda and the generalized HIV epidemic present in the East African region, PWID will remain at high risk for HIV and other blood-borne and sexually transmitted infections. Further investigation of the size and magnitude of IDU in Rwanda is important for policymakers at the national level.

This study had several limitations, including the small sample size and limited timeframe to conduct the survey. These factors, along with the negative HIV test results, limited our ability to investigate associations of risk factors with HIV infection. Additionally, due to budget constraints, we were not able to test for other STIs or blood-borne infections (e.g. HBV or HCV), which would have allowed further characterization of this cohort. Finally, the survey data was self-reported and could have been subject to recall or social desirability bias.

## CONCLUSION

Despite the limitations noted, this study provides a preliminary picture of IDU practices among PWID in Kigali, Rwanda. It sheds light on this vulnerable population at high risk for acquiring HIV and other blood-borne infections. Given the participants' interest in seeking drug treatment, programming for PWID and demand reduction programs are needed in Rwanda.

**Author contributions:** Study conception and design: KW, JF, WA, SN, DJR. Data acquisition: KW, JF, WA, HG, IM, DJR. Data analysis and interpretation: KW, SD, DJR. Drafting the manuscript: KW, DJR. Critical revisions: all. Approval of the final manuscript: all.

**Acknowledgements:** These data were accepted for presentation at the 2020 Annual CUGH Global Health Conference in Washington, DC, in April 2020 (cancelled due to the COVID-19 pandemic). The authors are grateful to the participants in this study, the health care providers who invited the participants and arranged the interview, and the Rwanda Biomedical Center for facilitating the administrative procedures.

## REFERENCES

- [1] S. Dewing, Pluddemann, A., Myers, B., Parry, C, "Review of injection drug use in six African countries: Egypt, Kenya, Mauritius, Nigeria, South Africa and Tanzania," *Drugs: Education, Prevention and Policy*, vol. 13, no. 2, pp. 121-137, 2006.
- [2] M. Adelekan, Lawal, R, "Drug use and HIV infection in Nigeria: A review of recent findings.," *African Journal of Drug and Alcohol Studies*, vol. 5, pp. 118-129, 2006.
- [3] A. E. Kurth et al., "HIV Prevalence, Estimated Incidence, and Risk Behaviors Among People Who Inject Drugs in Kenya," *J Acquir Immune Defic Syndr*, vol. 70, no. 4, pp. 420-7, Dec 1 2015.
- [4] A. X. Tan, S. Kapiga, K. Khoshnood, and R. D. Bruce, "Epidemiology of Drug Use and HIV-Related Risk Behaviors among People Who Inject Drugs in Mwanza, Tanzania," *PLoS One*, vol. 10, no. 12, p. e0145578, 2015.
- [5] S. R. Reid, "Injection drug use, unsafe medical injections, and HIV in Africa: a systematic review," *Harm Reduct J*, vol. 6, p. 24, Aug 28 2009.
- [6] S. Nsanzimana et al., "Household survey of HIV incidence in Rwanda: a national observational cohort study," *Lancet HIV*, vol. 4, no. 10, pp. e457-e464, Oct 2017.
- [7] Rwanda Biomedical Center (RBC). (2020, RBC). Rwanda Population-based HIV Impact Assessment. Available: [https://phia.icap.columbia.edu/wp-content/uploads/2020/11/RPHIA-Final-Report\\_Web.pdf](https://phia.icap.columbia.edu/wp-content/uploads/2020/11/RPHIA-Final-Report_Web.pdf)
- [8] R. S. Ntale et al., "HIV seroprevalence, self-reported STIs and associated risk factors among men who have sex with men: a cross-sectional study in Rwanda, 2015," *Sex Transm Infect*, vol. 95, no. 1, pp. 71-74, Feb 2019.
- [9] M. Mutagoma et al., "High HIV prevalence and associated risk factors among female sex workers in Rwanda," *Int J STD AIDS*, vol. 28, no. 11, pp. 1082-1089, Oct 2017.
- [10] J. Ward, S. Darke, and W. Hall, *The HIV Risk-Taking Behaviour Scale (HRBS) Manual*. National Drug and Alcohol Research Centre, 1990.
- [11] K. E. Dunn, F. S. Barrett, E. S. Herrmann, J. G. Plebani, S. C. Sigmon, and M. W. Johnson, "Behavioral risk assessment for infectious diseases (BRAID): Self-report instrument to assess injection and noninjection risk behaviors in substance users," *Drug Alcohol Depend*, vol. 168, pp. 69-75, Nov 1 2016.
- [12] P. J. Peters et al., "HIV Infection Linked to Injection Use of Oxymorphone in Indiana, 2014-2015," *N Engl J Med*, vol. 375, no. 3, pp. 229-39, Jul 21 2016.