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Research Paper

# Drug use patterns and health problems among people who use drugs in Guinea-Bissau (2022): A cross-sectional survey using respondent-driven sampling

Andrew Scheibe [a,*], Andreia Teixeira [b], Mamadu Aliu Djaló [c], Miriam Nascimento Pereira [c], Kátia Ribeiro Barreto [c], Ibrahima Ba [c], Lucia Bird [b], Jason Eligh [b]

[a] Community Oriented Primary Care Research Unit, Department of Family Medicine, University of Pretoria, 31 Bophelo Road, Gezina, Pretoria 0084, South Africa
[b] Global Initiative against Transnational Organized Crime, Avenue de France 23, CH-1202 Geneva, Switzerland
[c] Enda Sante Guinea Bissau, Av. João Bernardo Vieira, Bairro Hafia, 2° andar esq. do Prédio s/n, CP1041 Bissau Códex, Guiné-Bissau

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ABSTRACT

*Background:* Little data exists on the use of cocaine, methamphetamine, tramadol and heroin or related health conditions in Guinea Bissau. We aimed to estimate drug use practices and the prevalence of selected blood-borne infections, depression and population size estimates of people who use injectable drugs in Guinea-Bissau.
*Methods:* We used respondent-driven sampling to recruit adults who use injectable drugs in this cross sectional survey in three cities (Bissau, Bafatá and Gabú) between July and September 2022. Participants completed an interviewer administered survey enquiring about sociodemographic characteristics, drug use practices and mental health. Rapid diagnostic testing was done for HIV, hepatitis B surface antigen (HBsAg) and hepatitis C antibody (anti-HCV). Data was weighted in RDS-Analyst using self-reported network size and Gile's Sequential Sampling Estimator. Population size estimates were generated using the two point capture-recapture method.
*Results:* Overall, 750 participants were recruited. People who use drugs were estimated to be mostly unemployed males aged between 25 and 49 years. Methamphetamine and crack cocaine were most commonly used. Prevalence of ever injecting ranged from 6 % to 44 %. Between 44 % and 52 % of people experience symptoms of depression. Prevalence ranges from 1.9 % to 5.2 % for HIV, and 5.7–8.3 % for HBsAg and 0.42–0.66 % for anti-HCV. The population estimates of people who use injectable drugs were 1637 in Bissau, 1314 in Bafatá and 424 in Gabú.
*Conclusion:* Methamphetamine and crack cocaine are the most commonly used injectable drugs in Guinea-Bissau. Symptoms of depression are common among people who use drugs in the country. Access to evidence-based drug use treatment and harm reduction interventions that integrate mental health care services are needed to improve the health and wellbeing of people who use drugs in Guinea-Bissau.

## Background

Effective public health and safety responses in relation to drugs are critical for social and economic development (International Peace Institute, 2018). Research in relation to drug markets, drug use practices and health and social harms related to drug use can contribute to evidence-based policy and practice (Buxton, 2020). This is of particular importance in low-income countries linked to the international drug trade and where governance structures and health and social services are weak (Buxton, 2020).

West Africa is a hub for illicit drug trafficking (UNODC, 2023). Significant amounts of cocaine are trafficked through this area towards Europe, while heroin and methamphetamine are also, to a lesser extent, trafficked to other regions of Africa, and to the United States (Bird, 2021). In 2018 and 2019, notable seizures were reported for pharmaceutical opioids (129 tonnes), cocaine (16.63 tonnes), methamphetamine (0.45 tonnes) and heroin (0.27 tonnes) in the region (ECOWAS Commission, 2021). Drug seizure data reflect increasing volumes of

* Corresponding author.
*E-mail addresses:* andrew.scheibe@gmail.com (A. Scheibe), andreia.teixeira@globalinitiative.net (A. Teixeira), aliu.djalo@enda-sante.org (M. Aliu Djaló), katia.barreto@enda-sante.org (K.R. Barreto), Ibrahima.ba@enda-sante.org (I. Ba), lucia.bird@globalinitiative.net (L. Bird), Jason.Eligh@globalinitiative.net (J. Eligh).

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these drugs between 2017 and 2021 (UNODC, 2023). Local drug markets have been established, however robust estimates to quantify the scope of use and related harms are limited (Nelson & Obot, 2020). Few harm reduction and drug dependence treatment services are available in the region (Nelson & Obot, 2020; WENDU, 2019). Data from the West African Community Epidemiology Network on Drug Use (WENDU) show that cannabis (68.5 %), opioids (26.04 %) and cocaine (8.5 %) were the primary drugs for which treatment was sought between 2018 and 2022 (WENDU, 2023). During this period people aged 15–24 years accounted for 65.0 % of admissions and 23.7 % of people were unemployed and one in two people had completed secondary education or less (WENDU, 2023).

### *Guinea-Bissau*

Guinea-Bissau is a small West African nation with an estimated population of 2.1 million (2022) (The World Bank, 2022). It is one of the world's least developed countries with a multi-dimensional poverty index scale value of 0.341 (2018/2019) (OPHI & UNDP, 2023). Almost a fifth (21.7 %) of people live below the poverty line (OPHI & UNDP, 2023). The country has a track record of being an important transit and redistribution hub on international cocaine trafficking routes from Latin America, primarily towards Europe (Bird, 2021). Surveillance and research on drug use within Guinea-Bissau is limited (WENDU, 2019). The first biological behavioural survey and population size estimation among people who use drugs was conducted in 2019 (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020). This study provided insights into drug use practices and health issues related to drugs in three cities. The study focused on drugs that could potentially be injected, namely heroin, methamphetamine, cocaine and tramadol. The study identified an HIV prevalence among people who use injectable drugs of between 5 % and 6 % across the cities with estimated injectable drug user populations of 350 (95 % CI 294–429) in Bissau, 156 (95 % CI 143–177) in Bafatá and 126 (95 % CI 122–135) in Gabú using the multiplication method (single object distribution capture-recapture) (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020). Up-to-date data on the number of people who use drugs, drug use practices and risks and access to drug related services in the country are needed to inform policy and programming.

The use of the term 'injectable drugs' refers to heroin, methamphetamine, cocaine and tramadol, all of which can be injected and administered via other routes. This term was used to align with the earlier study outlined above (Enda Tiers Monde/ Enda Sante Guinea-Bissau, 2020).

This study aimed to describe selected social and demographic characteristics, estimate the prevalence of blood-borne infections and symptoms of depression and estimate the population size of people who use injectable drugs in three cities within Guinea-Bissau.

## Methods

This study included a cross-sectional survey and population size estimation of people who use injectable drugs in three cities of Guinea-Bissau using respondent-driven sampling and two source capture-recapture methodologies. Respondent-driven sampling was used as the data collection methodology due to its ability to estimate characteristics of populations that are hard to reach (White et al., 2015). The two-source capture recapture method was used for population size estimation to replicate the methods of a similar study done in Guinea-Bissau in 2019 (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020).

### *Setting*

The study was implemented in three cities in Guinea-Bissau; Bissau, Bafatá and Gabú. Bissau is the capital and largest city, with an estimated population of 573 533 (2009) (Open data for Africa, 2016). It is a port city near the entry of the Geba River into the Atlantic Ocean. Bafatá is a city in central Guinea-Bissau with a population of 68 956 (2009) (Open data for Africa, 2016) and is an industrial centre with connections to Senegal in the north, and other towns in other directions. Gabú is located in the eastern part of the country, and is a market city with a population of 41 612 (2009) (Open data for Africa, 2016) near the border of Guinea and Senegal. The study operated from health facilities. In Bissau the study initially operated from an outpatient medical treatment centre at a local hospital and for logistical reasons later moved to the facilities of a local civil society organisation. In Bafatá and Gabú the study was based at health centres that focused on services for women and children. Each site was visited before implementation and reviewed to identify and avoid potential barriers to recruitment and completing survey procedures. Opening hours were designed to facilitate study participation.

### *Population and sample*

The study population included adults living in the study cities who use cocaine, methamphetamine, heroin or tramadol. People who were 18 years and older, self-reported to have used cocaine, methamphetamine, heroin or tramadol in the 12 months prior to participation and who currently lived/ resided in the study location were eligible for participation.

### *Sample size*

The sample size was based on the formula for estimating a sample size using respondent driven sampling (Fig. 1). The sample size was based on estimated HIV prevalence, which was informed by a previous bio-behavioural survey (2019) (Enda Tiers Monde/ Enda Sante Guinea-Bissau, 2020). HIV prevalence among people who use injectable drugs was estimated at 5.4 % for Bissau, 5.1 % for Bafatá and 6.4 % for Gabú (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020). Using a design effect of 3 (Global HIV Strategic Information Working Group, WHO, CDC, UNAIDS & FHI 360, 2017) the estimated sample size for the study was 235 for Bissau, 223 for Bafatá and 276 for Gabú.

### *Recruitment*

The study employed respondent-driven sampling. This method is a chain-referral method that involves the recruitment of initial participants (seeds) who in turn recruit others from their social network. Seeds are known members of the sub-population who meet the study criteria and are connected within their networks (Global HIV Strategic Information Working Group et al., 2017). One seed was launched in each city to start and complete study recruitment. In Bafatá three additional seeds needed to be launched. The seeds were identified by ENDA Tiers Monde (a local civil society organisation) based on their insight into the community of people who use injectable drugs. Each seed was given three coupons (invitations to participate in the study) to provide to people they knew who also used injectable drugs. Participants received counselling on the use of the coupons for recruitment. In turn, eligible recruits who completed the study procedures were provided coupons to recruit their peers. Recruitment continued until the sample size in each city was reached.

### *Study procedures*

The study was implemented by ENDA Tiers Monde between July and September 2022, with support from The Global Initiative Against Transnational Organized Crime. Formative assessment activities were limited to engagements with stakeholders from government and civil society organisations providing services to key populations in the study cities. These engagements took the form of in-person meetings that discussed the planned approach, which followed that of the 2019 study.

$$n = D\frac{Z^2_{1-\alpha}\,P(1-P)}{d^2}$$

$n$ = Sample size required per survey round

$D$ = Design effect

$Z_{1-\alpha}$ = The $z$ score for the desired confidence level, usually 1.96 for 95% confidence

$P$ = Expected proportion

$d$ = precision (usually set at 5%)

**Fig. 1.** Formula to estimate sample size for respondent driven sampling.
Source: WHO, UNAIDS. Introduction to respondent driven sampling. In: Introduction to HIV/AIDS and STI surveillance. Geneva: WHO; 2015

Stakeholders were supportive of repeating the methodology without the need for additional interviews, focus group discussions or mapping as part of the formative assessment. The study involved unique object distribution, initial survey visits and second survey visits.

*Unique object distribution*

As part of the population size estimation process unique objects (coloured bracelets) were distributed at hotspots across each city two to three weeks before the survey was launched in each site (279 in Bissau, 270 in Bafatá and 335 in Gabú). Unique objects should be inexpensive, memorable, sought after items that are not readily for sale. The number of objects distributed is recorded and used as part of the population size estimation calculation (described later) (Global HIV Strategic Information Working Group et al., 2017).

*First survey visit*

Participants who presented to the study sites with a valid coupon were assessed for eligibility. Eligible participants completed an interviewer administered questionnaire. The questionnaire elicited information around demographic and social characteristics (age, sex, education, housing), substance use (age at first use, drug most commonly used, ever injected a drug, ever shared a needle/ syringe) and HIV testing history (ever tested). Symptoms of depression were assessed by enquiring about feeling low, depressed or hopeless in the past two weeks (not at all; several days; more than half of days; almost every day). Symptoms of suicidality or self-harm were assessed by enquiring about having "Thoughts that it would be better to die or self-maim in the past two weeks" (not at all; several days; more than half of days; almost every day). Participants who participated in the survey (described below) were asked if they had received a unique object (bracelet) prior to participation. Participants were asked about their personal network size ("How many different drug users do you personally know? That is, you know them and they know you, you have seen them in the last two years and you could contact them if needed"). Recruiter-recruit relationships were not tracked. Participants were allocated a unique identification number, without the use of biometrics. Trained interviewers administered the questionnaires on tablets using ArcGIS Survey123 (ESRI, Redlands, California). The questionnaire was in Portuguese, with questions posed in Creole by a research team member fluent in both languages.[1]

Participants were provided with pre-test counselling on HIV, hepatitis B virus and hepatitis C virus by certified personnel. Trained laboratory technicians drew blood and completed rapid testing for HIV (screening with Determine HIV, Abbott, Chiba, Japan and confirmatory testing with First Response HIV, Premier Medical Corporation, Gujarat, India), hepatitis B surface antigen (HBsAg Card, Cypress Diagnostics) and hepatitis C antibody (HCV First Response, Premier Medical Corporation, Gujarat, India). Counsellors provided post-test counselling and people with reactive results were given referral letters to local health facilities for further management. HIV tests that were positive on screening and confirmatory rapid tests were tested at a central laboratory using an HIV enzyme-linked immunosorbent assay (ELISA).

*Second survey visit*

One to three weeks following their initial visit participants returned to the survey site to receive remuneration for each eligible peer that presented to the study site and completed survey procedures.

*Study team and training*

At site level facilitators welcomed and accompanied participants throughout study procedures. Coupon managers checked the eligibility criteria and registered the coupons into the coupon management system. A social worker obtained informed consent and provided pre- and post-test counselling. A laboratory technician carried out the rapid diagnostic testing and arranged for blood samples to be sent to the laboratory for confirmatory HIV testing. Interviewers administer the questionnaire. Technical support was provided by staff based at ENDA Tiers Monde's head office and researchers based in Guinea-Bissau, Canada and South Africa. Members of the technical support team were experienced in carrying out studies with hard-to-reach populations using the respondent-driven sampling methodology. All team members were trained in the key concepts of the study and issues relating to drug use and injecting, the protocol and study tools. The training involved practical exercises for each person's function. During the training, the interpretation of the questions was practised among the team members under the supervision of the trainers. Discussions took place to ensure consistent interpretation of questions in the survey across study sites.

*Data management*

No personal identifiers were collected. Electronic data were stored in a centralised database. The field team managers and coordinators met with data collectors regularly to monitor progress and ensure quality. The site coordinator at each study location uploaded electronic interview files to a data warehouse located on a password-protected computer at the office, and files were emailed (de-identified) to the data manager. An excel database was used to monitor recruitment and coupons using the coupon number and unique participant number. All databases were encrypted and password protected.

*Data analysis*

Data was analysed using RDS-Analyst v0.11 (UCLA Statistics, Los Angeles) and StataSata v14 (Statacorp, College Station). Coupon details were included in a separate coupon manager excel spreadsheet. Each

[1] Creole from Guinea-Bissau is not an official language. There are no established grammatical rules, which makes translation difficult and can give rise to different interpretations, especially in relation to injected drugs and drugs that can be injected.

survey site's data was weighted in RDS-Analyst using self-reported network size and Gile's Sequential Sampling Estimator. Descriptive statistics were used to analyse socio-demographic characteristics, drug use practices, health variables and estimates of blood borne virus infection. Data was analysed by city. No sensitivity analysis was done. Population size estimation was done based on two source capture (i.e. unique object distribution and participation in the survey) using the multiplier method on the Multiple Source Capture Recapture application (Fellows, n.d.), using the log-linear model approach. This method applies the number of unique objects distributed and the proportion of survey participants who report receipt of a unique object to estimate the population size. This method requires: (1) a closed population (no significant movement into or out of the population); (2) matching of individuals who are captured on both occasions (receipt of an object and participation in the survey); (3) individuals have the same chance of being sampled in both capture rounds, and (4) the second and first capture rounds are independent (Global HIV Strategic Information Working Group et al., 2017). The formula for the capture-recapture method is provided in Fig. 2.

### *Ethical considerations*

An advisory committee was set up to oversee the study. It included representatives from the National HIV Council (Secretariado Nacional da Luta contra a Sida), the National Council to Combat Drugs (Conselho Nacional de Combate a Droga) and the Jean Piaget Guiné-Bissau University. Approval was obtained from the National Research Ethics Committee of Health Research of Guinea Bissau (Comité Nacional de Etica para Pesquisas de Saúde). Participants provided written informed consent prior to the collection of any data or blood test. Participants received a compensation of 3000 XOF (US$ 5) for participation and 2000 XOF (US$ 3) for each peer that they referred who was eligible for participation (up to a maximum of three referrals).

## Results

### *Participants and recruitment*

The study sample size was reached in each city. All people presenting at study sites were eligible for participation.

In Bissau recruitment was completed after 12 waves of recruitment, with most subjects ($n = 65$) recruiting three participants each. In Gabú recruitment was completed after 8 waves, with most subjects ($n = 60$) recruiting three participants each. In Bafatá four seeds were launched, with one seed responsible for recruiting almost all participants ($n = 220$), with sample size reached after 7 waves. No other recruitment challenges were experienced.

The seeds were known, and had previously or were currently accessing HIV prevention programmes. Heterogeneity was sought between them in terms of age, level of education and their networks. Across the cities homophily was assessed for participant independence from seeds in relation to selected variables (age, sex, education, HIV status and primary drug use) – with a range of 0.9–1.3, with more homophily in relation to age in Bissau and Gabú and sex in Bafatá.

### *Demographic characteristics*

Across the cities in 2022 over two thirds of people who use injectable drugs were male (ranging from 55.2 % in Bafatá to 91.5 % in Bissau). Most people who used injectable drugs were in the age group 25–49 years (ranging from 39.5 % in Bafatá to 65.6 % in Bissau). The majority had incomplete secondary school (ranging from 50.9 % in Gabú to 69.7 % in Bissau) and unemployment ranged from 33.8 % in Bafatá to 62.9 % in Gabú (Table 1). People who use injectable drugs from Bissau were mostly males (91.5 %), and in the age group 25–49 years (65.6 %) and around half of people who used injectable drugs were unemployed (48.1 %). In Bafatá 44.8 % of people who used injectable drugs were females, with most people in the 25–49 years category (39.5 %). A higher proportion of participants from Gabú had not completed primary school (35.6 %) compared to participants from other cities, and it also had the greatest proportion of participants reporting unemployment (62.9 %).

### *Drug use practices*

Most people who used injectable drugs start using drugs between the ages of 15–24 years. Reasons for starting drug use include 'own decision' (74.5 % in Bissau and 88.9 % in Gabú), and 'introduction by a friend' (52.0 % in Bafatá). At the time of the study methamphetamine was the most frequently used injectable drug in Bafatá (66.5 %) and Gabú (76.7 %). Cocaine was the most commonly used injectable drug in Bissau (53.1 %). Tramadol was the most commonly used injectable drug among 21.5 % of people in Gabú. Very little heroin was used; ranging from 0 in Gabú to 1.4 % in Bissau. History of ever injecting a drug ranged from 4.6 % in Bissau to 11.8 % in Bafatá. People who inject drugs had shared injecting equipment in all cities, with sharing in the past six months ranging from 0.5 % in Bissau to 44.7 % in Bafatá (Table 2).

### *Mental health*

In Bissau, 23.0 % (95 % CI 14.5–31.9 %) of people who used injectable drugs experienced feelings of depression and 12.7 % (7.2–18.2 %) had thoughts of self-harm or suicide various days in the two weeks prior to study implementation. In Bafatá 39.8 % (95 CI 31.6–48.4 %) of people who used drugs experienced feelings of depression and 11.8 (95 % CI 6.1–17.5 %) had thoughts of self-harm or

$$N = (C1 \times C2)/R$$

*Where*
*N = estimate of total population size*
*C1 = total number of persons captured on the first visit*
*C 2= total number of persons captured on the second visit*
*R = total number of persons captured on both the visits*

*The various can be computed as:*

$$Var(N) = [C1*C2*(C1-R)*(C2-R)]/R^3$$

The 95% confidence interval can be computed as:

$$95\%\ CI = N \pm 1.96 * \sqrt{Var(N)}$$

**Fig. 2.** Formula to estimate population size using the capture-recapture method.
Source: Global HIV Strategic Information Working Group, WHO, CDC, UNAIDS, & FHI360. Biobehavioural survey guidelines for populations at risk for HIV. Geneva: WHO; 2017.

**Table 1**
Socio-demographic characteristics of people who use injectable drugs by city, Guinea-Bissau (2022) (adjusted).

| | | Bissau ($n$ = 238) | | Bafatá ($n$ = 226) | | Gabú ($n$ = 279) | |
|---|---|---|---|---|---|---|---|
| | | % | 95 % CI | % | 95 % CI | % | 95 % CI |
| **Sex** | **Female** | 8.5 | 3.5–13.5 | 44.8 | 31.5–57.8 | 9.8 | 6.8–12.8 |
| | **Male** | 91.5 | 86.5–96.5 | 55.2 | 42.2–68.8 | 90.2 | 87.2–93.2 |
| **Age** | **Median (years)** | 28 | | 24 | | 25 | |
| | **IQR (years)** | 23–37 | | 20–32 | | 21–32 | |
| | **18 - 19 years** | 4.4 | 0.9–7.9 | 19.4 | 11.8–26.9 | 11.8 | 9.5–14.1 |
| | **20 - 24 years** | 29.2 | 19.3–39.0 | 32.8 | 24.6–41.1 | 37.8 | 33.3–42.3 |
| | **25 - 49 years** | 65.6 | 54.6–76.9 | 39.5 | 31.1–47.9 | 46.5 | 42.1–50.9 |
| | **≥ 50 years** | 0.7 | 0–2.1 | 8.3 | 3.2–13.4 | 1.6 | 0.7–2.4 |
| **Education** | **< completed primary** | 5.1 | 1.8 | 13.9 | 6,9–21.3 | 35.6 | 31.0–40.1 |
| | **Completed primary / some secondary** | 69.7 | 60.1–79.4 | 53.9 | 45.5–62.0 | 50.9 | 46.5–55.3 |
| | **Completed secondary & above** | 25.1 | 16.8–33.4 | 32.2 | 24.6–39.7 | 13.6 | 10.8–16.4 |
| **Occupation** | **Unemployed** | 48.1 | 34.2–61.7 | 33.8 | 26.4–41.3 | 62.9 | 58.4–67.1 |
| | **Currently employed** | 43.0 | 28.5–57.7 | 23.3 | 15.6–31.0 | 19.7 | 17.0–21.8 |
| | **Student** | 8.9 | 3.3–14.6 | 42.9 | 33.9–51.9 | 17.5 | 13.2–21.8 |

**Table 2**
Drug use practices of people who use injectable drugs by city, Guinea-Bissau (2022) (adjusted).

| | | Bissau ($n$ = 238) | | Bafatá ($n$ = 226) | | Gabu ($n$ = 279) | |
|---|---|---|---|---|---|---|---|
| | | % | 95 %CI | % | 95 %CI | % | 95 %CI |
| **Age of first use** | <15 | 29.5 | 12.2–46.8 | 4.8 | 0–9.9 | 9.8 | 7.7–11.8 |
| | 15–24 | 67.2 | 50.8–83.5 | 80.4 | 72.7–88.0 | 85.4 | 80.3–90.5 |
| | ≥25 | 3.3 | 0–7.0 | 14.8 | 8.0–21.7 | 4.9 | 0–11.1 |
| **Reasons for starting to use drugs** | Own decision | 74.5 | 66.1–82.9 | 44.9 | 36.2–53.7 | 88.9 | 86.4–91.3 |
| | A friend | 22.0 | 14.5–29.6 | 52.0 | 43.3–60.6 | 5.6 | 3.9–7.3 |
| | Sexual partner | 1.1 | 0–2.5 | 2.3 | 0.3–4.4 | 3.4 | 2.2–4.5 |
| | Other | 2.2 | 0–5.4 | 0.7 | 0–4.4 | 1.9 | 0.1–0.4 |
| **Most frequently used drug** | Methamphetamine | 34.3 | 23.7–45.0 | 66.5 | 56.5–76.4 | 76.7 | 73.5–79.9 |
| | Crack/powder cocaine | 53.1 | 30.1–73.4 | 11.3 | 7.1–15.4 | 1.3 | 0.8–1.8 |
| | Tramadol | 1.6 | 0–3.3 | 21.5 | 12.0–31.1 | 15.9 | 13.1–18.7 |
| | Heroin | 1.4 | 0–3.1 | 0.3 | 0–0.7 | 0 | 0 |
| | Other | 9.3 | 4.2–14.4 | 0 | 0 | 5.1 | 3.4–6.5 |
| **History of injecting** | Over 6 months ago | 4.6 | 1.6–7.7 | 11.8 | 7.2–16.4 | 4.8 | 0.4–9.5 |
| | Past 6 months | 1.4 | 0–3.0 | 55.6 | 47.5–63.6 | 4.7 | 3.4–5.9 |
| **Shared needles** | Over 6 months ago | 2.3 | 0.4–4.6 | 2.6 | 0.5–4.7 | 4.7 | 3.3–6.2 |
| | Past 6 months | 0.5 | 0–1.1 | 44.7 | 36.7–52.7 | 5.7 | 4.3–7.1 |

suicide in the two weeks prior to study implementation. In Gabú 30.2 % (95 % CI 26.9–33.4 %) of people who used drugs experienced feelings of depression and 5.5 % (95 % CI 4.6–6.3 %) had thoughts of self-harm or suicide in the two weeks prior to study implementation.

*HIV testing history and HIV, HBsAg and anti-HCV prevalence*

History of ever having an HIV test was 58.5 % (95 % CI 50.6–66.1 %) in Bissau, 43.2 % (95 % CI 43.2–60.4 %) in Bafatá and 46.3 % (95 % CI 41.6–51.1 %) in Gabú. The HIV prevalence based on laboratory confirmation (ELISA) of testing among people who use injectable drugs ranged from 0.3 % in Gabú to 7.0 % in Bafatá. Hepatitis B surface antigen prevalence ranged from 8.4 % in Gabú to 9.1 % in Bissau. Anti-hepatitis C prevalence ranged between 0 in Bissau to 2.7 % in Gabú (Table 3).

**Table 3**
HIV, HBsAg and anti-HCV prevalence among people who use injectable drugs by city, Guinea-Bissau (2022) (adjusted).

| | Bissau ($n$ = 238) | | Bafatá ($n$ = 226) | | Gabú ($n$ = 279) | |
|---|---|---|---|---|---|---|
| | % | 95 %CI | % | 95 %CI | % | 95 %CI |
| HIV rapid test confirmed | 1.7 | 0.5–2.9 | 8.3 | 3.6–13.0 | 3.3 | 2.4–4.1 |
| HIV ELISA confirmed | 1.7 | 0.5–2.8 | 7.0 | 2.5–11.5 | 0.3 | 0.1–0.6 |
| HBsAg reactive | 9.1 | 4.5–13.8 | 8.5 | 4.1–12.9 | 8.4 | 4.2–12.8 |
| Anti-HCV reactive | 0 | 0 | 0.5 | 0–1.1 | 2.7 | 0–6.0 |

*Population size estimation of people who use injectable drugs (2022)*

In Bissau, the population of people who use injectable drugs in 2022 based on capture-recapture was estimated at 1637 (95 % CI 1289–2162) in Bissau; in Bafatá at 1314 (95 % CI 1061–1688) and Gabú at 424 (95 % CI 411 - 441).

## Discussion

The findings suggest that the population of people who use injectable drugs in Guinea-Bissau is larger than previously described. The study highlights the use of stimulant-type drugs and high risk injecting practices. People who use injectable drugs in Guinea-Bissau have a high burden of hepatitis B infection and depression.

The study successfully recruited people who use injectable drugs in the three cities within a short period of time. The current survey used the same recruitment methodology and eligibility criteria as the bio-behavioural survey done in 2019. The estimated median age of people who use injectable drugs was similar to the earlier survey (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020), and is similar to that of people entering drug treatment services in the West African region (ECOWAS Commission, 2021). Compared to the 2019 survey the current survey had a larger sample size ($n$ = 750 and 420 people, respectively) and included more women ($n$ = 118 and 47, respectively) and included more people with some tertiary education ($n$ = 187 and 12, respectively) (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020).

The study shows that drug use varies across cities. Cocaine was the

most commonly used injectable drug in Bissau. In Bafatá and Gabú methamphetamine was the most commonly used injectable drug. Across the cities tramadol use was less than cocaine and methamphetamine. Heroin use was very uncommon. The data points to increased methamphetamine use in Bafatá and Gabu in relation to the survey done in 2019 (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020). While heroin use in the current study was limited it is higher than the previous study (Enda Tiers Monde/ Enda Sante Guinea- Bissau, 2020). No drug treatment data was available for comparison from Guinea Bissau. For the West Africa region, drug treatment data differs from the prevalence estimates, with cocaine making up 11.1 % of drug treatment admissions and amphetamine type stimulants only 0.7 % in 2018–2019 (ECOWAS Commission, 2021).

The blood borne viruses under focus were detected. For HIV, the prevalence in Bafatá and Gabú was higher than the estimated general population prevalence (aged 15–49 years) which was 2.4 % (2022) (UNAIDS, 2022). The viral hepatitis prevalence was mostly lower than a cross sectional household survey among adults in the Bandim region of Bissau (2014–2016) which identified an HBsAg prevalence of 18.7 % and anti-HCV prevalence of 0.5 % (Hønge et al., 2020). Estimates in this biobehavioural survey were lower than in 2019 (Enda Tiers Monde/ Enda Sante Guinea Bissau, 2020). Seroprevalence among people who inject drugs in Senegal is estimated at 9.3 % for HIV and 39.3 % for anti-HCV (Harm Reduction International, 2022).

The high HBsAg prevalence is likely to reflect substantial vertical transmission in the population. Hepatitis B vaccination has been part of childhood vaccinations since 2008 (Hønge et al., 2020). However, the country is yet to start hepatitis B birth dose vaccination. The high burden of hepatitis B infection poses a risk for morbidity and mortality related to chronic hepatitis B infection in the future.

Drug injecting was reported in all three cities. Injecting was highest in Bafatá, with one in two people who use drugs having injected drugs in the past six months. In Bissau and Gabú the people who had injected a drug had done so more than six months ago. Injecting practices were more common in this survey compared to 2019. The sale of needles in pharmacies is legal and common for medical use and has not changed. The study findings and lack of needle and syringe programmes (Colledge-Frisby et al., 2023) suggests notable risks for the transmission of blood borne infections among people who inject drugs in Guinea-Bissau. Data of increased injecting has been seen in other parts of sub-Saharan Africa over the past two decades (Colledge-Frisby et al., 2023; Degenhardt et al., 2017).

The study identified high levels of depression and thoughts of self-harm and suicide among people who use injectable drugs in Guinea Bissau. Historical drug policies in the region have focused on prohibition and are likely to negatively affect the mental health of people who use injectable drugs in the country (Nelson & Obot, 2020; UNODC, 2022).

The size estimates from this study suggest that the population of people who use injectable drugs is larger than suggested by the earlier study. Both studies used the same method for population size estimation (single object distribution capture-recapture method). The change in the point estimates are 4.6 fold greater for Bissau, 8.4 fold greater for Bafatá and 3.4 fold greater for Gabú. The 95 % confidence intervals for the population sizes in each city between the two rounds do not overlap. There has also been another grey literature report proposing larger population size estimates of people who use drugs for the country. The Global State of Harm Reduction 2022 reports a national population size of 3 500 people who inject drugs, citing a survey response submitted by civil society organisations (Harm Reduction International, 2022). The population size estimation methodology in our study was based on city-level estimates. Extrapolation of these findings to obtain a national population size estimate could be done through the use of predictive modelling, inverse probability weighting and triangulation with other data sources (Loeb et al., 2024).

The increase in the population of people using cocaine and methamphetamine could be due to the increase in trafficking of these drugs through Guinea-Bissau, which corresponds to the global increase in production of these drugs in recent years (Bird, 2021; UNODC, 2023). Nigeria has been identified as a significant manufacturer and exporter of methamphetamine in the region (Eligh, 2021). Increased domestic use is also likely due to some people engaged in cocaine trafficking receiving payment in the form of cocaine.[2]

Despite documentation of the country's involvement in cocaine trafficking routes and drug related service need, to date there has not been a comprehensive national drug policy or implementation of harm reduction services. Harm reduction services have been implemented in the West and Central Africa region, with 9 out of 25 countries having needle and syringe programmes and five offer opioid agonist therapy (Harm Reduction International, 2022). Drug policy reform, towards the provision of harm reduction services and away from incarceration of people who use drugs, has been implemented in Ghana and is being considered elsewhere in West Africa (Cedeao et al., 2023).

### *Limitations*

The study relied on self-reporting of practices using an interviewer administer questionnaire. Potential bias were minimised by the study taking place in safe locations, with engagement of community members and the use of trained staff.

The survey tool did not assess sharing of other injecting equipment, nor the frequency of drug injecting or age at first injecting. Without this information the insights into the risks for blood borne-infection transmission is limited.

The amount of drug injecting reported in Bafatá is notably higher than the other cities. It is possible that a larger proportion of the participants may have been recruited through networks among people who inject drugs in that city thereby over estimating the prevalence of drug injecting. However the assessment of homophily between recruits and seed in relation to history of injecting in that city showed little homophily (homophily = 1.06). Further, the translation of the questions around use of an injectable drug and personal history of drug injecting into Creole may have led to an over-reporting of injecting. However, training included agreement on translation and meanings of terms to minimise this risk.

There was notable discrepancy in the rapid HIV testing and ELISA confirmation in Gabú, raising concerns about the quality of the HIV testing at that site. There were 11 people with reported reactive HIV rapid tests, while the laboratory results reflected that only one infection was confirmed on ELISA and nine results were missing. This discrepancy was identified during the data analysis stage and quality improvement initiatives for rapid testing could not be implemented and sample reports could not be identified. HIV prevalence was reported on ELISA results, potentially under estimating HIV prevalence in Gabú.

There is no gold standard for population size estimation, and it is possible that the population of people who use injectable drugs may be under or over-estimated. However global data does not suggest any significant reductions in drug trafficking in the region. Attempts to compare the heterogeneity of population size estimates from the multiplier method and the successive sampling population size estimation done through RDS-Analyst software was not possible. Errors resulting from prior population estimates being smaller than the number of people recruited in the study resulted in computational errors. As the population size estimates were not validated and rely on one method, they should be interpreted with caution. However, available data points to likely increased trafficking, particularly of cocaine and tramadol, which supports the finding of an increase in population size of people who use injectable drugs in relation to the study completed in 2019.

[2] Personal experience of research team through drug surveillance monitoring done by the Global Initiative against Transnational Organized Crime in Guinea-Bissau.

## Recommendations

In light of the demonstrated use of injectable drugs, high levels of mental health issues and injecting drug practices, Guinea Bissau could consider the development of a national drug policy to guide the national response. Following global practice, this should provide support for provision of evidence-based prevention, harm reduction and treatment interventions and mental health services (UNODC, 2018; WHO & UNODC, 2020; WHO, 2022). Drug policy reform should also align to global recommendations in relation to public health approaches that do not criminalise drug use or possession of drugs for personal use (UNAIDS, 2021). The ministry of health and government should aim to mobilise donor and domestic funding to finance health service delivery. Due to the high risks associated with injecting drugs, initiation of needle and syringe programmes are important. Due to the high levels of stimulant use, other methods of structured interventions and training on reducing stimulant-related harms could be considered (UNODC, WHO & UNAIDS, 2019). The inclusion of women who use drugs and the reports of initiation of drug use at an early age highlights the potential value of providing interventions that are effective for these sub-populations. The country should consider intensifying hepatitis B prevention interventions and enhance case finding, testing, treatment and follow-up of people with chronic hepatitis B infection. Capacity building of service providers to deliver evidence-based interventions along the substance use continuum may be considered as well. Ongoing surveillance of drug use trends and repeated population size estimations would provide insights into trends and guide future policy and programming.

## Conclusion

This study provides additional evidence of the use of injectable drugs in Guinea Bissau, and on drug injecting. On-going surveillance of drug use patterns and public health and drug policy responses will need to be monitored to reflect changes over time and the outcomes of interventions.

## Ethics approval

The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

Approval was obtained from the National Research Ethics Committee of Health Research of Guinea Bissau (Comité Nacional de Etica para Pesquisas de Saúde) Refª 044/CNES/INASA/2022

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## CRediT authorship contribution statement

**Andrew Scheibe:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Andreia Teixeira:** Writing – review & editing, Writing – original draft, Project administration, Conceptualization. **Mamadu Aliu Djaló:** Validation, Project administration, Investigation, Data curation. **Miriam Nascimento Pereira:** Writing – review & editing, Project administration, Investigation. **Kátia Ribeiro Barreto:** Writing – original draft, Project administration, Investigation. **Ibrahima Ba:** Writing – review & editing, Formal analysis. **Lucia Bird:** Writing – review & editing, Writing – original draft, Validation. **Jason Eligh:** Writing – review & editing, Writing – original draft, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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AS led the development of the protocol and data analysis. MAD, MNP, KRB were responsible for coordination of in-country implementation. IB provided technical assistance to the in-country team. AT, JE and LB were involved in oversight and provision of technical assistance. All authors reviewed the final manuscript.

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