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Estimates of people who injected drugs within the last 12 months in Belgium based on a capture-recapture and multiplier method

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ABSTRACT

Background: For Belgium, available estimates of the number of people who inject drugs (PWID) are based on data from more than fifteen years ago and apply only to those who report ever injecting drugs. As a result, no reliable baseline data exist to determine the scale of services for PWID.

Methods: We obtained pseudo-anonymized identifier information from treatment and harm reduction service providers and a fieldwork study between February and April 2019 in Brussels. We estimated the number of PWID, defined as people who injected within the last 12 months, in Brussels using capture-recapture (CRC) methodology. To obtain national estimates, we scaled the proportion of PWID in Brussels to the total number of this population in Belgium based on two existing drug treatment registers, which were then multiplied with the result of the CRC.

Results: The total population of PWID is estimated to be 703 (95 %CI 538–935) for Brussels and between 6620 (95 %CI 4711 – 8576) and 7018 (95 %CI 4794 – 9527) for Belgium.

Conclusions: These estimates provide crucial information to ensure that services to PWID are adequately maintained. They clearly indicate the need to maximize efforts to achieve the targets set by WHO for 2030 on the provision of 300 sterile needles and syringes per PWID per year, a 90 % reduction of new HCV infections, and a 65 % reduction of liver-related mortality.

1. Introduction

Injecting drug use remains associated with a number of specific negative health outcomes such as increased risk of overdose and transmission of infectious diseases (Janjua et al., 2018; Larney et al., 2017; Leclerc et al., 2014; Levine et al., 2019; Sacamano et al., 2020; Sendi, 2003). As a result, people who inject drugs (PWID) have a considerably greater mortality risk compared to people who do not inject drugs (Larney et al., 2017; Stoové et al., 2008; Van Baelen et al., 2019). As such, accurate and timely estimates of the size of the PWID population in a given location are vital for understanding the burden of injecting-related harms and are essential to serve as a baseline for evidence-based services to PWID (Kwon et al., 2019; Larney et al., 2017; Leclerc et al., 2014; Ruiz et al., 2016). Indeed, harms related to injecting drug use can persist or increase because of a misallocation of services and resources (Des Jarlais et al., 2018). The availability of needle exchange services, drug consumption rooms, drug treatment, infectious disease screening and care are important interventions to reduce harms associated with injecting drug use (Leclerc et al., 2014). Accurate estimates of the number of PWID are necessary to scale the availability of these resources.

Several countries in and outside the EU have made efforts to obtain estimates of the number of PWID. These studies are characterized by the use of a variety of methods and definitions (Degenhardt et al., 2017; European Monitoring Centre for Drugs and Drug Addiction, 2019; Larney et al., 2017; Leclerc et al., 2014; Ruiz et al., 2016; Xu et al., 2014). First, some studies selected PWID within the last 12 months (Hickman et al., 2006; Jacka et al., 2020; Janjua et al., 2018; Kimber et al., 2008; Larney et al., 2017) while other studies used different criteria such as ever having injected drugs (Bollaerts et al., 2013), injecting drug use

Abbreviations: PWID, people who inject drugs; CRC, capture-recapture; MM, multiplier method; HCV, hepatitis C; EMCDDA, European Monitoring Centre for Drugs and Drugs Addiction; RDS, respondent driven sampling; AIC, Akaike Information Criteria; CI, confidence interval; TDI, treatment demand indicator; OST, opioid substitution treatment; DCR, drug consumption rooms.

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within the past 6 months (Xu et al., 2014), injecting drug use within the past 30 days or current injecting drug use (Des Jarlais et al., 2018; Leclerc et al., 2014; Raag et al., 2019; Ruiz et al., 2016). Second, not all estimates covered the same geographical area. Only a few studies were conducted on a national scale (Bollaerts et al., 2013; Jacka et al., 2020; Larney et al., 2017; Raag et al., 2019), while most estimated the number of PWID at regional, district or city level (Des Jarlais et al., 2018; Hickman et al., 2006; Janjua et al., 2018; Kimber et al., 2008; Leclerc et al., 2014; Ruiz et al., 2016; Xu et al., 2014). Third, different age ranges such as 15–54 (Kimber et al., 2008), 11–65 (Janjua et al., 2018), 14–65 (Leclerc et al., 2014), 15–64 (Degenhardt et al., 2017; Jacka et al., 2020; Larney et al., 2017), 18–64 (Bollaerts et al., 2013), ≥15 (Raag et al., 2019; Xu et al., 2014), ≥16 (Hickman et al., 2006) or ≥18 years old (Ruiz et al., 2016) have been used. Fourth, recent estimates are rarely available, with few exceptions (Des Jarlais et al., 2018; Jacka et al., 2020; Janjua et al., 2018; Larney et al., 2017). It is clear that these different methods and definitions are always chosen in relation to a specific context. Some studies have the objective to meet specific requirements and needs at certain locations because of for example the concentration of specific services or vulnerable groups (Des Jarlais et al., 2018; Kimber et al., 2008; Leclerc et al., 2014; Xu et al., 2014). The availability of services for PWID requires information in order to verify the progress and further evolutions (Degenhardt et al., 2017; Jacka et al., 2020; Larney et al., 2017). In addition, the global shift in patterns of drug use, new targets or enhanced efforts in infectious disease reductions and drug treatment coverage could also be a motivation to choose a specific approach and/or case definition (Bollaerts et al., 2013; Degenhardt et al., 2017; Des Jarlais et al., 2018; Jacka et al., 2020; Larney et al., 2017; Ruiz et al., 2016). More pragmatic considerations such as the availability of (administrative) source data are also decisive factors (Janjua et al., 2018; Raag et al., 2019). This variety, however, hinders comparability between estimates.

In Belgium, one of the first efforts to estimate the number of people who had ever injected drugs was made by Sartor et al. (2001) using the national HIV register. The methods used were further improved and corrected for statistical biases in 2013 (Bollaerts et al., 2013). These improvements and corrections were based on a national sero-prevalence study conducted during the years 2004–2005 (Plasschaert et al., 2005). Over the last decade, this adapted method was used to calculate a yearly estimate of PWID during lifetime in Belgium. However, as these estimates are based on data from more than fifteen years ago and apply only on those who have ever injected drugs, they no longer correspond to today's reality. Therefore, the objective of the current study was to estimate the number of PWID within the last 12 months in Brussels and Belgium in order to have a baseline for evidence-based provision and assessing the coverage of harm reduction and treatment services.

2. Materials and methods

PWID are often socially stigmatized, have limited contacts with official services and are hard to reach (Kwon et al., 2019; Leclerc et al., 2014). As a result, the number of PWID cannot be estimated using standard sampling and estimation techniques (Bollaerts et al., 2013; Salganik and Heckathorn, 2004). In standard household surveys for example, drug users and especially PWID are underrepresented and enumeration of PWID through such surveys will fail because the size of the unsampled PWID population is not taken into account (Jones et al., 2016; Kraus et al., 2003; Leclerc et al., 2014; Rehm et al., 2005; Vaissade and Legleye, 2009). Moreover, within the Belgian household survey for instance, questions on drug use are limited and questions on the route of administration are not included (Gisle and Drieskens, 2019). It is thus recommended to use indirect estimation techniques such as capture-recapture (CRC) and the multiplier method (MM) (Hay and Richardson, 2016; Leclerc et al., 2014; Vaissade and Legleye, 2009).

In this study, people were defined as PWID when they had injected in the last 12 months. Between February and April 2019 we collected data from three sources: (i) two low-threshold outpatient drug treatment centers (Projet Lama and MASS de Bruxelles), (ii) a low-threshold residential center (Transit asbl) and (iii) a fieldwork study. The low threshold outpatient centers MASS de Bruxelles and Projet Lama offer similar specialized drug treatment services and Opioid Substitution Treatment (OST). An internal registration system guarantees that users can only approach one of these centers, which means data is mutually exclusive. We therefore grouped data from both centers. The low-threshold residential center Transit asbl offers psycho-social support during the day and a shelter for the night. As not every PWID is in contact with a treatment or harm reduction service, estimations only based on the number of unique individuals currently in contact with these services would underestimate the total number of PWID (Des Jarlais et al., 2018). Therefore, we integrated a fieldwork study in the CRC. The fieldwork (Van Baelen et al., 2020), followed the respondent-driven sampling (RDS) method and started with a small number of seeds, selected by low-threshold treatment centers or needle exchange services (e.g. Platt et al., 2006). Low-threshold services for drug users can be defined as those which offer services to drug users, do not impose abstinence from drug use as a condition of service access, and endeavor to reduce other documented barriers to service access (Mofizul Islam et al., 2013). We engaged these providers in Brussels because their expertise and trust within this population allowed us to access this population which is almost completely hidden (Kraus et al., 2003) and which is often suspicious of outsiders, particularly researchers (Ruiz et al., 2016). The study protocol of the fieldwork has been described elsewhere (Van Baelen et al., 2020).

Selection criteria for the whole CRC-study were: (i) having injected any substance within the last 12 months, (ii) aged 18 or older and (iii) having lived or used drugs in Brussels principally during the last year. In addition, for the part of the fieldwork, respondents (iv) had to be selected by one of the participating organizations as a seed or having received an invitation by means of a recruitment coupon from someone who participated already and (v) could not be selected when having participated already in the fieldwork before (Van Baelen et al., 2020). It was decided to include in the fieldwork study also high-risk opiate users, defined following the directives of the EMCDDA as people who used opiates at least once a week for six months in the last year without medical prescription (Thanki and Vicente, 2013), as they were seen as a bridge between different PWID sub-populations or individual PWID. We assumed that all individuals of the target group were equally likely to be captured in any of the three sources (Braeye et al., 2016; Jones et al., 2016). Moreover, a research period of three months is relatively short in the career of drug users. Therefore, we assumed that within this period, the target population did not start or stop using drugs and that they did not move into or out of Brussels (Hay and Richardson, 2016; Vaissade and Legleye, 2009).

All three data sources applied the same unique identifier code which was based on two initials of the first name, two initials of the last name, gender and birthdate (dd/mm/yyyy). This code has previously been used by the Belgian HIV-register (Sasse and Defraye, 2008). Based on this unique identifier code, we applied probabilistic matching on the three data sources. Three researchers (EP, JA and LVB) independently checked all codes for which at least 10 out of 13 characters were the same and decided by majority if two different codes referred to the same person or not. In case two codes were identical or when it was decided two slightly different codes referred to the same person and a key characteristic for this person was different for one of the three sources, the existence of the key characteristic was preferred over the absence of the characteristic. In other words, if a source reported for instance a person who was known to them as someone who injected within the last 12 months and another source did not report this, the person was registered in the final database as someone who injected.

We used log-linear modelling to analyze the overlap in the number of PWID in the three data sources. Subsequently, on this model we applied interaction terms which were compared to the independence model. For

every fitted model, we estimated the total population size, i.e. the total number of PWID in Brussels, including those who were not sampled by any of the three data sources. The Akaike Information Criteria (AIC) was used to decide whether an interaction model better fitted the data. We selected the final model based on the goodness of fit and the simplest model with the lowest AIC (Table 1).

The estimated total number of PWID in Brussels was then used to estimate the total number of PWID in Belgium through a MM. The MM is a two-source method which is relatively easy to apply (Bollaerts et al., 2013; Hickman and Taylor, 2005). This method combines (an estimate of) the size of the known subset of the target population, the benchmark, with (an estimate of) the proportion of the overall target population, the multiplier (Bollaerts et al., 2013; UNDCP, 2002). Key assumptions of the MM are that the number of the target population in the benchmark sample is known and the multiplier is representative and unbiased (Kimber et al., 2008; UNDCP, 2002). The current study used the results of the CRC as benchmark, which represents the PWID population in Brussels, and two existing drug treatment registers as multiplier.

The first register is the Treatment Demand Indicator (TDI) register, which collects data for Belgium in a standardized way on episodes of people in treatment for alcohol or street drugs. An episode is defined as the period between the first face-to-face contact between a professional and the patient and the end of the activities in the context of the program foreseen. Different variables are registered, including the injection status and last injection occurrence (Antoine et al., 2016). The second register is the OST register, which collects socio-demographic information on OST clients as well as their use of OST (amount, type of medication, provider, etc.) (Vander Laenen et al., 2013). As information about injection behavior is lacking in this register, we assume that the people in the OST register are all ever or last year injectors. Both registers collect information about the geographical area and have a good coverage of PWID in Brussels. Consequently, the definition of PWID used for the multipliers matches the definition of the benchmark (Hickman and Taylor, 2005). This is crucial to know the correct ratio of PWID in Brussels and Belgium. For both registers, data for 2018 were the most recent data available at the time of writing.

Furthermore, to obtain 95 % confidence intervals (CI), we used a Monte Carlo simulation with 100000 reiterations on a non-truncated beta-distribution. The mean and variance were estimated using the sample mean and variance of the normal distribution. We report the empirical quantiles of the resampled estimates.

We have used SAS software version 9.3 (SAS Institute Inc., 2011) and R version 3.6.0 (R Core Team, 2019) to perform the statistical analyses for the CRC and MM. The reporting of this study conforms to the STROBE guidelines (von Elm et al., 2014). The study protocol was approved by the commission of medical ethics of University hospital Ghent (Nr B670201837344).

Table 1
Log-linear models of the estimated population size of people who inject drugs (PWID) in Brussels described by Deviance, DF, AIC and BIC.

Log-linear Model	Deviance	DF	Estimated population size *(95% CI)*	AIC	BIC
No interactions	46.5030	3	443 *(396–496)*	91.9853	91.7689
OC*RC	44.0780	2	463 *(406–531)*	91.5602	91.2898
OC*FW	31.9762	2	376 *(334–427)*	79.4585	79.1880
RC*FW	13.3801	2	536 *(458–632)*	60.8624	60.5919
OC*RC + OC*FW	31.9615	1	377 *(329–436)*	81.4438	81.1193
OC*FW + RC*FW	12.5511	1	487 *(383–653)*	62.0334	61.7089
RC*FW + OC*RC[1]	0.8582	1	703 *(538–935)*	50.3404	50.0159
RC*FW + OC*RC + OC*FW	0.0	0	963 *(518–1865)*	51.4823	51.1036

OC = low-threshold outpatient drug treatment centers Projet Lama and MASS de Bruxelles, RC = low-threshold residential center Transit asbl, FW = Fieldwork study RDS, DF = Degrees of Freedom, CI = Confidence Interval, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion.
[1] selected model.

3. Results

Within a period of three months, 269 unique adult PWID were identified in Brussels after matching the three data sources. As shown in the figure, 90 PWID met the eligibility criteria at the low-threshold residential center, 167 PWID met the eligibility criteria at the two low-threshold outpatient drug treatment centers and 169 PWID have been interviewed during the fieldwork (Fig. 1).

The mean age of the 269 PWID was 39.8 years (s.d. 9.4, range 19–63), and 85.7 % of them were male. 79.6 % injected opiates and 78.1 % injected other substances than opiates within the last 12 months, such as amphetamines, cocaine, crack, etc. In total, 57.6 % injected both opiates and other substances within the last 12 months. Only 13.0 % did not use opiates within the last 12 months. Based on the selected model, we estimate the total population of adult PWID in Brussels at 703 (95 % CI 538–935). As shown in Table 2, given a total population size aged 18 or older in Brussels of 923837 inhabitants (Statbel, 2019), this estimate corresponds to a population prevalence of 0.8 PWID per 1000 adult inhabitants (95 %CI 0.6–1.0).

At the national level, we identified 1099 adult PWID in the last year in TDI in 2018. Of them 111 were registered in Brussels and 988 were registered in the rest of Belgium. This gives a ratio of 9.9 PWID in treatment in Belgium to every PWID in treatment in Brussels. When applying this multiplier to the results of the CRC, we arrive at an estimated total number of 7018 adult PWID in Belgium (95 %CI 4794 – 9527) on the basis of the TDI register. Given a total population size aged 18 or older of 9074575 for Belgium (Statbel, 2019), this corresponds to 0.8 PWID per 1000 adult inhabitants (95 %CI 0.5–1.0). The OST register recorded 16165 adults of which 2234 adults in Brussels in 2018. We assume all persons in this register are ever or last year injectors. To deduce the number of injectors in the last year, we again used the TDI register: in Brussels there were 111 last year injectors and 181 ever injectors, i.e. last year injectors in treatment were 38.0 % of all injectors, whereas in Belgium there were 1099 last year injectors compared to 1121 ever injectors, i.e. last year injectors were 49.5 % of all injectors. Applying these figures to the data of the OST register, we estimate a ratio of 9.4 PWID in treatment in Belgium to every PWID in treatment in Brussels. When applying this multiplier to the results of the CRC, we obtain a total number of 6620 adult PWID in Belgium (95 %CI 4711 – 8576) on the basis of the OST register. Given the abovementioned population size for Belgium, this corresponds to a prevalence of 0.7 PWID per 1000 adult inhabitants (95 %CI 0.5 – 0.9).

We can apply these results in a broader context of infectious disease prevention. Firstly, the outcomes of this study allow us to know the coverage of sterile needle and syringe distribution in Belgium. Indeed, a total number of 1249501 needles and syringes was distributed in Belgium in 2018 (European Monitoring Centre for Drugs and Drug Addiction, 2020). Applying the estimates from this study to this number, a mean number between respectively 178 (95 %CI 131–261) and 189 (95 %CI 146–265) of sterile needles and syringes was distributed to each individual adult PWID in 2018. Secondly, Van Baelen et al. (2020) showed that approximately 43.4 % (95 %CI 28.9%–58.0%) of the adult PWID in Brussels tested positive for HCV antibodies. Translating this prevalence to the results of the current study, it corresponds to 305 (95 %CI 97–545) adult PWID in Brussels and respectively between 2875 (95 %CI 897 – 5159) and 3198 (95 %CI 709 – 6656) adult PWID in Belgium with HCV antibodies.

4. Discussion

For the first time, the number of PWID within the last 12 months in

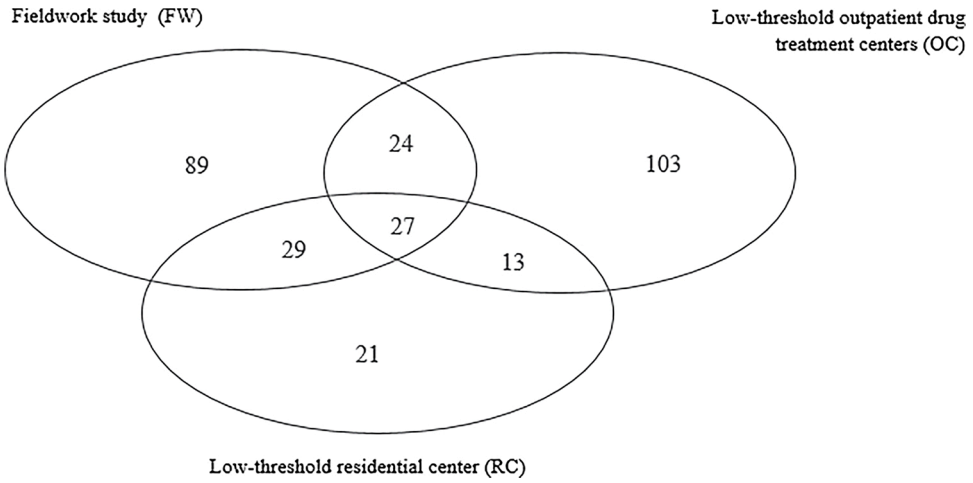

Fig. 1. Overview of PWID data after matching.

Table 2
Estimated population size of adult people who inject drugs (PWID) within the last 12 months in Brussels and Belgium.

Population	Method	Multiplier method			Estimated population size (95 % CI)	Prevalence/1000 adult inhabitants (95 % CI)[1]
		N PWID in register in Belgium (a)	N PWID in register in Brussels (b)	Multiplier (a/b)		
PWID in Brussels	CRC (Benchmark for MM)	–	–	–	703 *(538–935)*	0.8 *(0.6–1.0)*
PWID in Belgium	MM (using TDI)	1099	111	9.9	7018 *(4794–9527)*	0.8 *(0.5–1.0)*
PWID in Belgium	MM (using OST)	7988	849	9.4	6620 *(4711–8576)*	0.7 *(0.5–0.9)*

N = Number, CI = Confidence Interval, CRC = Capture-recapture, MM = Multiplier Method, TDI = Treatment Demand Indicator, OST = Opioid Substitution Treatment.
[1] Total adult population size was 923837 for Brussels and 9074575 for Belgium in 2018 (Statbel, 2019).

Belgium was estimated based on the prevalence of PWID in Brussels and their proportion in treatment registers compared to the total number of PWID in treatment at the national level. Both treatment registers give comparable estimates strengthening our findings. The results of this study are important for the implementation of drug consumption rooms (DCR), the provision of sterile needles and syringes and the number of PWID who are HCV-antibody positive in Belgium.

Firstly, they are crucial for the further planning of drug consumption rooms (DCR) in Belgium. A DCR is a low-threshold health service where PWID can inject under the supervision of a health and education team. The purpose is to welcome PWID who would otherwise inject in harmful or dangerous circumstances such as in public places or squats and to prevent risks related to overdoses and infectious diseases (Kimber et al., 2008). In addition, a DCR aims also to facilitate the access to other health and social services for its target group. The first DCR opened in Belgium in Liège in September 2018. Since then, Brussels, Charleroi and Namur have developed or approved plans to implement a DCR as well. Nevertheless, the DCR in Liège is the only DCR which is operational in Belgium at the moment of writing. The average number of daily visitors of this DCR is 35 of which 42 % inject their drugs (Smith et al., 2019). This study shows the need for additional DCR and recommend specifically for the future Brussels DCR to intend to reach potentially up to 935 unique adult PWID.

Secondly, the results allow us to update estimates of coverage for distributed sterile needles and syringes on the basis of the number of PWID in this study. Knowledge about the coverage of sterile needles and syringes distributed to PWID is needed because the shared use of needles and syringes and other injecting equipment is the primary mode of infectious disease transmission (Levine et al., 2019; White et al., 2006). Especially for hepatitis C virus (HCV), there is evidence that a high coverage of sterile syringe distribution can reduce the risk of HCV infection among PWID (Kwon et al., 2019). The mean number between respectively 178 (95 %CI 131–261) and 189 (95 %CI 146–265) of sterile needles and syringes distributed to each individual adult PWID in 2018 can be categorized in the medium (between 100 and 200 needles and syringes distributed per PWID per year) to high (over 200 needles and syringes distributed per PWID per year) coverage level as defined by EMCDDA and UNAIDS (European Centre for Disease Prevention and Control, European Monitoring Centre for Drugs and Drug Addiction, 2015; UNAIDS, 2017). This update of the coverage estimates of distributed needles and syringes per PWID per year shows that Belgium has almost reached the target number for 2020 of 200 sterile needles and syringes provided per PWID per year. The target number by 2030 is set at 300 sterile needles and syringes (WHO, 2016). Monitoring trends in coverage level of sterile needles and syringes remains important to ensure that the services are adequately maintained and efforts are maximized to achieve the targets (Kwon et al., 2019; O'Keefe et al., 2017; Ruiz et al., 2016). Nevertheless, this coverage level does not inform us about the specific risk elements of individual PWID or subgroups such as frequency of injecting. It does not provide any indication whether the demand for sterile needles and syringes is met (Kwon et al., 2019; O'Keefe et al., 2017; White et al., 2006).

Thirdly, on the basis of the results of this study it is possible to estimate the total number of adult PWID who are HCV-antibody positive in Belgium. This is essential to assess the efforts to improve the cascade of care of PWID who are infected with hepatitis C. Van Baelen et al. (2020) showed that 35.1 % of the adult PWID indicated to have never been tested for HCV before. Indeed, it is important to know what the current prevalence of HCV among PWID is in order to reach the objectives put by the WHO of a 90 % reduction of new HCV infections and a 65 %

reduction of liver-related mortality by 2030 (WHO, 2016). The results in this study shows that still a substantial number of adult PWID are HCV-antibody positive. Consequently, it remains extremely useful to continue the efforts to prevent HCV transmission among PWID through achieving a higher coverage of sterile needles and syringes, but also to reach and convince more PWID to have a first HCV screening and to be treated when needed (Fraser et al., 2018).

At the same time, it is important to be careful with the interpretation of the results. Firstly, some statistical assumptions for CRC may not be met. The high turn-over of PWID in prison suggests that the assumption of a closed population may not hold (Des Jarlais et al., 2018; Raag et al., 2019). Nevertheless, we assume that within a period of three months the change of the target population due to detention or release from prison could be kept to a minimum. Secondly, an over- or underestimation of the number of PWID within 12 months is possible (Kwon et al., 2019). The decision to give preference to the existence of a key characteristic in one database over the absence of the characteristic in another database and the assumption that all persons in the OST register are last year or ever injectors can lead to an overestimation. Nevertheless, an over- or underestimation of the estimates is also possible if dependence in selection into the three data sources exists. Finally, we assume that a similar distribution of PWID within 12 months exist in the three Belgian regions. This is not necessarily the case, given the different socio-economic and geographical realities in the three regions. Based on the OST register we can assume that Brussels has a higher number of PWID compared to the Flemish region, but a lower number of PWID compared to the Walloon region (Antoine, 2020). The TDI register shows different proportions of injecting behavior by region depending of the substance used. The proportion of PWID registered in TDI for cocaine, stimulant or alcohol treatment is higher for Brussels compared to the Flemish and Walloon region, but lower for PWID registered in TDI for opiates (Antoine, 2019).

The results can be used as a basis for further work in this area (Larney et al., 2017). Only cross-validation studies at national level will be able to confirm, disprove or improve the current estimates (Kimber et al., 2008; Kraus et al., 2003; Kwon et al., 2019).

5. Conclusion

This study provides estimates of the number of adult PWID who injected within the last 12 months in Brussels and the number of adult PWID who injected within the last 12 months in Belgium as a whole. Our results confirm the usefulness of the CRC approach to estimate the number of PWID in a specific location and to monitor closely the size of the PWID population to ensure an evidence-based provision of services.

By estimating the number of adult PWID in Brussels and Belgium, we highlight the need to improve access to treatment and harm reduction services to reach the HCV targets for 2030 set by the WHO, more specifically regarding the provision of 300 sterile needles and syringes distributed per PWID per year, a 90 % reduction of new HCV infections, and a 65 % reduction of liver-related mortality (WHO, 2016).

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Contributors

EP contributed to the conception and design of the study. She did the fieldwork and was also involved in the matching procedure, the analysis and interpretation of the data. She wrote the first draft of the manuscript and was involved in the revision. LVB designed the study, did the fieldwork, was involved in the matching procedure, analyzed the data and was a major contributor in writing and revising the manuscript. FWC contributed to the analysis and interpretation of the data. JA was the major link with the local partners, supported the fieldwork and was involved in the matching procedure. LG supervised the study. All authors read and approved the final manuscript.

Declaration of Competing Interest

The authors report no declarations of competing interest.

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