

# **Availability, Accessibility, and Coverage of Needle and Syringe Programs in Prisons in the European Union: A Multi-Stage Scoping Review**

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## Abstract

Needle and syringe programs (NSPs) are among the most effective interventions to control infection transmission among people who inject drugs in prisons. This review aimed to evaluate the availability, accessibility, and coverage of NSP in prisons in the European Union countries. In line with the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” criteria, four databases of peer-reviewed publications (PubMed/Medline, ISI Web of Science, EBSCO, and ScienceDirect), and 53 databases for grey literature were systematically searched to collect data published from January 2008 to August 2018. A total of 23,969 documents (17,297 papers and 6,672 grey documents) were identified, of them 26 were included into the study. In 2018, imprisonment rates in 28 EU countries ranged between 51 per 100,000 in Finland and 235 per 100,000 in Lithuania. Only four countries namely Germany (in one prison), Luxemburg (no coverage data were found), Romania (available in more than 50% of prisons), and Spain (in all prisons) have needle and syringe programs in prisons. Portugal stopped the program after a six-months pilot phase. Despite the protective impact of the prison-based NSP on infection transmission, only four EU countries distribute sterile syringes among people who inject drugs in prisons, and coverage of the program within these countries is very low. Since most prisoners will eventually return to the community, lack of NSP in EU prisons is not only a threat to the health of prisoners but also endangers public health.

## Keywords:

Needle and Syringe Programs, HIV, AIDS, Hepatitis, European Union, Prisons

Abbreviations: AIDS, Acquired Immune Deficiency Syndrome; EU, European Union; HBV, Hepatitis B Virus; HCV, Hepatitis C Virus; HIV, Human Immunodeficiency Virus; NSP, Needle and Syringe Program; PWIDs, People Who Inject Drugs; UNODC, United Nation’s Office on Drugs and Crime; WHO, World Health Organization.

## Introduction

On any given day, around 11 million people throughout the world are held in prisons and other closed settings.<sup>1</sup> In comparison with the general population, people behind bars are more likely to engage in high-risk behaviors such as unprotected sex, sharing needles/syringes for injecting drug use, and unsafe tattooing, piercing,<sup>2,4</sup> as well as the other forms of skin penetration.<sup>5,6</sup> A recent estimate was that the prevalence of injection drug use among prisoners varies across UN Regions between 0.5% and 20.2%; sexual risk behaviors between 1.5% and 13.6%; and tattooing between 14.7% and 45.4%.<sup>3</sup> These risk behaviors put prisoners at an elevated risk for acquiring the major infectious diseases including HIV/AIDS and viral hepatitis. A global study estimated that 3.8% of the global prison population (389,000 prisoners) are living with HIV, 15.1% (1,546,500) with hepatitis C virus (HCV), 4.8% (491,500) with chronic hepatitis B virus (HBV), and 2.8% (286,000) with active tuberculosis.<sup>7</sup> The aforementioned study suggested that high prevalence of the major infectious diseases in prisons is related to the criminalization of drug use and imprisonment of people who use drugs. Accordingly, a decrease in the incarceration rate of people who use or inject drugs, as well as applying a comprehensive package of interventions including in-prison drug treatment and needle and syringe programs (NSP) can considerably reduce infection transmission in prisons around the world.<sup>7</sup>

Prevalence of the major infectious diseases and risk behaviors, specifically drug injection, in prisons in Europe is a serious cause for concern. Evidence shows that 9.3% of prisoners in Western and Central Europe and North American region inject drugs in prison.<sup>3</sup> The prevalence of HIV and HCV in Western Europe has been estimated at 4.2% and 15.5% among people who inject drugs (PWIDs), respectively,

which are higher than the global prison average (HIV: 3.8% and HCV: 15.1%).<sup>7</sup> This evidence highlights the importance of attention to European prisons as a potential source of infection transmission, and a threat to public health.

Needle and syringe programs are among the most effective interventions in preventing infection transmission both inside and outside prison.<sup>2</sup> Findings from a global systematic review and meta analysis showed an association between higher coverage of NSP and a reduction in HCV acquisition among people who inject drugs in the community.<sup>8</sup> The evaluation of prison-based NSPs in three European countries showed a set of positive outcomes including: a decline in needle sharing, no new cases of HIV or viral hepatitis transmission, and no reports of serious unintended negative events such as using needles as weapons to threaten prison staff or other prisoners.<sup>9</sup> Although the NSP, as an effective intervention against infection transmission, has been recommended by international organizations including WHO, Joint United Nations Programme on HIV/AIDS (UNAIDS), and the United Nations Office on Drugs and Crime (UNODC), it has been implemented in prisons in just a few countries in the world.<sup>2</sup>

In 2013, the UNODC developed a comprehensive package of interventions to control HIV/AIDS, Hepatitis B, Hepatitis C, and Tuberculosis in prisons.<sup>10</sup> The Package contained 15 interventions including NSP as a necessary intervention to mitigate the burden of infectious diseases in prisons. This study reviews and reports the availability, accessibility, and coverage of NSP in prisons in 28 EU countries, and identifies the key obstacles to implementation of NSP in these countries.

## **Materials and Methods**

The present study is drawn from the comprehensive systematic scoping review of availability, accessibility and coverage of key interventions to control HIV and relevant infections within the EU prisons. It was conducted in line with the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)” criteria.<sup>11</sup>

### **Geographical coverage of the study**

Our review covers 28 European countries (namely Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom) listed as the member states of the European Union at the end of 2018.<sup>12</sup> In this review, publications and reports from all penal institutions including prisons, jails, police cells, and detention centers were assessed.

### **Systematic Literature Search**

Peer-reviewed and grey literature were searched to find data on availability and coverage of NSP in prisons in the EU countries. The UNODC global dataset on epidemiology and risk factors of the major infectious diseases in prison was used as a complementary dataset.

The initial search took place in August 2018. Four databases including the Institute of Scientific Information (ISI) Web of Science, Medline via PubMed, EBSCO and ScienceDirect as the main databases of peer-reviewed publications were searched to identify papers published between January 2008 and August 2018. Over 300 search terms were used in the aforementioned databases. A complete list of search terms is available in Web Appendix 1. To search the grey literature, we followed the guidelines “Searching the grey literature to access information on drugs, alcohol and HIV/AIDS research: An update”, developed by the National Drug and Alcohol Research Center; University of New South Wales.<sup>13</sup> In addition to Google and Google Scholar, 53 global, European, and country-specific databases recommended by the guidelines were searched to identify unpublished data. The grey literature search took place between April and June 2019.

As the complementary source of data used in this study, the UNODC global dataset contains information about epidemiology and risk factors of HIV, TB and viral hepatitis in prisons. Data summarized in the UNODC global dataset were gathered through a global systematic review of the literature published from 2013 to 2017, as well as surveying key informants in each region and/or country. Permission was granted from the HIV/AIDS section of the UNODC to use their dataset.

#### Inclusion/exclusion criteria

In order to minimize the risk of missing important data, first we conducted the review at a global level, then we excluded the documents from the countries outside the EU. We used a set of broad inclusion criteria to ensure an exhaustive review of NSP in the EU prisons. All documents containing information about availability, accessibility and coverage of NSP in any EU country were included. The documents reporting data from outside the EU, data collection before 2008, and those without relevant information, listed authors, or valid references were excluded. Peer-reviewed references were managed by EndNote (Clarivate Analytics, Philadelphia, PA) version X8.2 for Windows.

In case of unavailability of the full texts or any question regarding the methodology or results of the obtained documents, corresponding authors were contacted through email or ResearchGate message to provide the full text or more information regarding their projects. Besides, controversial results were cross-checked by the European harm-reduction experts, and updated based on their knowledge and experience.

#### Definition of the outcomes

‘Availability’ refers to whether or not sterile syringes were distributed among PWIDs in prisons through an official program aimed to decrease the burden of infectious diseases in prison. ‘Accessibility’ means the method of syringe distribution (e.g. through healthcare workers on demand, or syringe vending machines) by which PWIDs can have access to sterile syringes. ‘Coverage’ refers to the proportion of prisons (number of prisons providing NSP divided by number of all prisons in a certain country) or the proportion of PWIDs (number of PWIDs who are under coverage of NSP divided by number of all PWIDs in prisons in a certain country).

### **Findings**

A total of 23,969 documents including 17,297 peer-reviewed and 6,672 grey literature publications were identified through the systematic search. From all publications 22,710 were excluded after reviewing the titles, 755 by abstract, and 478 by full text. Finally, 26 publications on NSP in the EU prisons were included in qualitative synthesis (Figure 1). Our search included publications in German, French, Spanish, Portuguese, Finnish, Lithuanian, Polish, and Greek as well as English.

#### Imprisonment rates in the EU

Understanding the rates of imprisonment in the EU countries allows for assessment of harm reduction interventions in prisons. According to the latest World Prison Population report from the International Centre for Prison Studies in 2018, imprisonment rates in the EU countries ranged from 51 per 100,000 population in Finland to 235 per 100,000 population in Lithuania.<sup>1</sup> Poland with 73,524 and Malta with 588 prisoners had the highest and lowest number of prisoners within the EU countries.<sup>1</sup>

#### NSP in the EU prison

Only four countries including Germany, Luxemburg, Romania, and Spain have needle and syringe programs in prisons. One country (Portugal) stopped the program after a pilot phase (Table 1). Of all 26 included publications on NSP in the EU prisons, 9 national and 2 sub-national reports were from

Spain, 6 national reports from Germany, 5 national reports from Romania, 2 national reports from Portugal, and 2 national reports from Luxemburg.

### Germany

Prevalence of prisoners who have ever injected drugs in Germany was 22.2%.<sup>14</sup> Germany has NSP in prisons.<sup>15-17</sup> The program was started in 1996 with a pilot phase in two (one men's and one women's) prisons. The pilot program was found to be successful by an independent evaluation, as needle sharing and overdose decreased drastically, and no attack with needles by clients of the program was recorded.<sup>9</sup> Syringes were distributed through drug and alcohol counsellors in the men's prison, and an automatic dispenser in the women's prison.<sup>9</sup>

Data on coverage of the program in this country is controversial. A survey of 25 countries in 2018 reported that the program is currently implemented in at least one prison in Germany.<sup>18</sup> Another report, however, stated that only women in 'some' German prisons have access to sterile needle and syringes.<sup>19</sup> The absolute numbers regarding the coverage of NSP in German prisons were obtained from an article published by Stark and colleagues, who estimated that in the first 4 months after starting the pilot phase in two German prisons, coverage of the program dropped from 71% (of PWIDs in prisons) to 11%.<sup>20</sup> Consulting with the European experts revealed that only one prison (Berlin-Lichtenberg women's prison) in Germany has NSP. No information was found regarding the possible reasons for the reduction in coverage of the program in German prisons.

### Luxemburg

In Luxemburg, the prevalence of prisoners who had ever injected drugs was estimated at 31%.<sup>14</sup> Availability of NSP in prisons in Luxemburg has been documented by a report from the WHO in 2008 and an article published by Michels and Stöver published in 2012.<sup>16, 17</sup> However, none of these documents reported data on coverage of the prison NSP in this country. No information was found regarding the initiation date of the program, number of PWIDs in prisons under NSP, or funding source of the program in prisons in Luxemburg.

### Romania

We found no data regarding the rate of injection drug use in prisons in Romania; however, this country is another EU country with NSP in prison.<sup>16, 21</sup> Similar to the previous countries, data on the coverage of the program in prisons of Romania is controversial. A cross-sectional survey of harm reduction in 25 countries authored by Bielen and colleagues in 2018 reported that NSP is officially available in all prisons in Romania, but has no clients since prisoners need to fill in enrolment forms and disclose their personal information and are reluctant to do so.<sup>18</sup> Another study, however, reported that NSP is available in 8 out of 44 national penal institutions (18%) in Romania.<sup>15</sup> On the other hand, the WHO Regional Office for Europe claimed that NSP is implemented in more than half of prisons in Romania.<sup>22</sup> Consulting with the European experts confirmed findings of Bielen and colleagues that needle and syringe program in Romania has no client. We found no other information regarding the details of the program in Romanian prisons.

### Spain

In Spain, prevalence of ever injection drug use in prison was found to be 3.1%.<sup>14</sup> Availability of NSP in Spanish prisons has been documented by 11 publications.<sup>15, 17-19, 22-27</sup> According to the findings, Spain is the only EU country providing NSP in all prisons.<sup>18, 22</sup> Assessment of the need and coverage of syringe exchange program in Spanish prisons conducted by de la Fuente and colleagues in 2012 showed that NSP was started in 1997, its maximum coverage reached 36% in 2005, and it was halved during the next four years, to 17.4% in 2009.<sup>24</sup> Another article reported that maximum coverage of NSP reached 20.7% in 2006, but halved in the next two years.<sup>25</sup> Although NSP exists in all prisons in Spain, a small

proportion of Spanish PWIDs in prisons use this service. No evidence was found regarding the reasons for the reduction in the coverage of NSP over time in the Spanish prisons.

## Portugal

Prevalence of injection drug use in prisons in Portugal was estimated at 1.9%.<sup>14</sup> In December 2007 a pilot prison NSP was mandated by the Parliament of Portugal; however, six months after starting the pilot phase the prison healthcare system decided to terminate the program.<sup>15, 27</sup> Despite guarantee of the confidentiality of personal data, no prisoners participated in the pilot study, which led to termination of the program.<sup>27</sup> Lack of participation of PWIDs in prisons in the pilot NSP was in fact because of the fear of being discriminated by the prison authorities, and suffering from its consequences.<sup>27</sup>

## Discussion

Our review reveals that no EU country has a fully implemented and/or systematic NSP program in prison. Evidence from our review indicate that at least five of 28 members of the European Union including Germany, Luxemburg, Portugal, Romania and Spain have implemented needle and syringe program in prisons, while Portugal's program did not start due to the lack of willing participants. In most EU countries with NSP in prisons, coverage of the program dropped over time. Coverage of NSP is found to be low in prisons in Germany, Romania, and Spain, and unknown in Luxemburg.

Detailed information is required to perform an accurate multi-dimensional assessment of needle and syringe programs in prisons. Such information should include number of PWIDs in each facility, and the proportion covered by NSP; number of syringes distributed in a defined period of time; which organization is in charge; what is financial cost of the program; the method of syringe distribution (e.g. through vending machines, healthcare providers on demand); whether the sterile syringes are free of charge; disposal methods and information about satisfaction of custodial staff and clients of the program; as well as effectiveness of the program to control infection transmission in prisons. Information regarding the above-mentioned topics in four EU countries implementing NSP in prisons is scarce and now dated. Obviously more research is required to bridge the gaps in data and to enhance the effectiveness of NSP in prisons in the EU countries.

The availability of prison-based NSP in only four European Union countries, and low coverage of the programs in these countries is a serious cause for public health concern. Prison authorities may have three main concerns about implementation of NSP in prisons: 1. Syringes will be used as weapons against prison guards or other prisoners; 2. Provision of syringes may increase the number of people injecting drugs in prisons; 3. Implementation of NSP would admit security failure and presence of drugs in prison. In response to these concerns, it should be noted that there are no reports from EU countries with prison-based NSP where syringes were used as weapons, or that provision of syringes increased the frequency of drug use in prisons.<sup>28</sup> Furthermore, availability and use of the other harm-reduction services such as opioid substitution treatment, bleach for syringe cleaning or drug-free units already confirm that drugs are available in prisons.<sup>28</sup>

The resistance to prison-based NSP also relates to the wider political difficulties of mainstreaming harm reduction approaches in prison settings. In the UK for example, the dominant policy focus has been on promoting abstinence and eradicating drugs in prisons by increasing security, testing and punishment, rather than harm reduction measures which were viewed as politically untenable as implementing them would appear to be encouraging and condoning illegal drug use.<sup>29,30</sup> In relation to NSP, the Prison Service concluded that 'the conflict between encouraging prisoners to use an exchange scheme and detecting illicit drug use would have no easy resolution'.<sup>31</sup> As mentioned above, there was also opposition from prison officers due to fears of needles being used as weapons. As a compromise, after an outbreak of HIV infection in Scotland in 1993 due to in-prison injecting, sterilizing tablets were eventually made available to clean injecting equipment.<sup>32</sup>

Sterile syringes can be distributed among prisoners through various methods including syringe dispensing machines, peer workers, non-governmental organizations and external personnel, and prison healthcare providers. As discussed previously, because of the lack of confidentiality no prisoner participated in NSP in Portugal, and consequently the prison health policymakers terminated the program, due to the lack of participants.<sup>27</sup> Similarly, there was reluctance of male PWIDs in prisons in Germany to engage in the program due to the lack of anonymity.<sup>9</sup> Considering the experiences of Portugal and Germany, distribution of syringes via requests to healthcare staff members is not advisable for implementing NSP in prisons. Using syringe dispensing machines in a private place (e.g. prison toilets) can increase the participation and enhance the effectiveness of the program.

According to the WHO, an effective health intervention has four main components; availability, accessibility, acceptability, and quality.<sup>33</sup> In terms of availability, sterile syringes should be available to all PWIDs in prisons (regardless of their age, gender, type of crime, sentence length, etc.) at any given time. Lack of HIV knowledge and lack of confidentiality could be among the barriers to accessibility to sterile injection equipment and acceptability of NSP programs. Implementation of NSP in prisons is not only away to control infections, but also is a prisoners' right to access high-quality healthcare, equivalent to that available in the community. According to the UN's International Bill of Human Rights, all prisoners have right to the highest standards of physical and mental healthcare.<sup>34</sup> United Nations Standard Minimum Rules for the Treatment of Prisoners (the Nelson Mandela Rules) rule 24 states that: "Prisoners should enjoy the same standards of health care that are available in the community, and should have access to necessary health-care services free of charge without discrimination on the grounds of their legal status".<sup>35</sup>

Since implementation of needle and syringe programs to control bloodborne infections in prisons is a part of the highest standards of healthcare, it is argued that all governments are obliged to provide them to prisoners.<sup>28</sup> Effectiveness of needle and syringe programs to decrease the burden of infectious diseases is well established. However, evidence shows that a combination of health intervention is more effective than a single intervention.<sup>36-38</sup> For example, results of a network population simulation experiment in the United States suggest that combined syringe access and medically assisted treatment are much more effective than each single intervention to reduce HCV transmission among injecting drug users.<sup>39</sup> Findings of another study evaluating the effectiveness of opiate substitution therapy, high-coverage needle and syringe programs, and antiviral treatment of HCV confirmed that combined interventions are more effective to reduce the burden of HCV among those who inject drugs.<sup>40</sup> According to the abovementioned evidence, NSP should be combined with the other effective interventions such as information, education and risk communication, and opioid substitution treatment.

In the past 20 years, the effectiveness of prison-based NSP has been evaluated in various countries in which it has been implemented. The experience of eight countries with needle and syringe programs in prisons showed that these programs: 1) have additional positive health impacts on prisoners through referring them to drug treatment and the other healthcare services; 2) are effective in different prison systems; and 3) can be modified based on the needs of institutions and prisoners.<sup>41</sup> Drawing the attention of prison health policy makers to the positive health impacts of NSP might encourage them to implement programs or increase the accessibility and quality of the programs in the EU countries with low coverage and quality.

The UN comprehensive package of interventions is one of the most quoted references about infection control in prisons and closed settings. In addition to NSP, the other services such as Information, education and risk communication; prevention, diagnosis and treatment of HIV/AIDS, viral hepatitis and tuberculosis; drug dependence treatment, including opioid substitution therapy; are among the interventions in the comprehensive package.<sup>10</sup> Although the guidelines cover a broad list of issues, some major elements such as alcohol use, psychiatric disorders, sexual partners of prisoners, and after-release period are missing in the package of interventions.<sup>42</sup> Considering NSP as one of the main interventions to control infection transmission in prisons, policy makers are recommended to consider the shortcomings of the existing guidelines in order to maximize efficacy of combined interventions to mitigate the burden of infectious diseases in prisons.

## Conclusions

Of all 28 European Union countries, only four have implemented NSP in prisons, which is a cause for public health concern in this region. Lack of availability and coverage of NSP in the EU prisons can be the result of misconceptions of policy makers about prisoners using syringes as weapons or the programs encouraging prisoners to start using drugs. Providing sterile syringes in prisons is not only an intervention to control infection transmission, but also a prisoner's right to access high-quality healthcare. It is recommended that prison authorities in the EU countries implement or expand the coverage of NSP as an evidence-based intervention to control infectious diseases in prisons. Prisoners should be involved in the design and implementation of prison-based NSP, as well as having easy and confidential access to syringes. Since most prisoners will eventually return to the community, implementation of accessible, acceptable and high-quality NSP with maximum coverage in prisons in the EU countries should be considered as a public health intervention.

Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram of studies published 2008-2018 and included in this review

Table 1. Characteristics of the countries with past or current NSP in prisons

## References

1. Walmsley R. World prison population list. 12th ed. London, United Kingdom: International Centre for Prison Studies; 2018. [https://www.prisonstudies.org/sites/default/files/resources/downloads/wppl\\_12.pdf](https://www.prisonstudies.org/sites/default/files/resources/downloads/wppl_12.pdf). Accessed November 13, 2019.
2. Kamarulzaman A, Reid SE, Schwitters A, et al. Prevention of transmission of HIV, hepatitis B virus, hepatitis C virus, and tuberculosis in prisoners. *Lancet*. 2016;388(10049):1115-26.
3. Moazen B, Saeedi Moghaddam S, Silbernagl MA, et al. Prevalence of Drug Injection, Sexual Activity, Tattooing, and Piercing Among Prison Inmates. *Epidemiol Rev*. 2018;40(1):58-69.
4. United Nations Office on Drugs and Crime. Prison and HIV. United Nations Office on Drugs and Crime. Available from: [https://www.unodc.org/unodc/en/hiv-aids/new/prison\\_settings\\_HIV.html](https://www.unodc.org/unodc/en/hiv-aids/new/prison_settings_HIV.html) (Access date: 13.11.2019).
5. Yap L, Butler T, Richters J, Malacova E, et al. Penile implants among prisoners-a cause for concern? *PLoS One*. 2013;8(1):e53065.
6. Bajory Z, Mohos G, Rosecker A, et al. Surgical solutions for the complications of the Vaseline selfinjection of the penis. *J Sex Med*. 2013;10(4):1170-7.
7. Dolan K, Wirtz AL, Moazen B, et al. Global burden of HIV, viral hepatitis, and tuberculosis in prisoners and detainees. *Lancet*. 2016;388(10049):1089-102.
8. Platt L, Minozzi S, Reed J, et al. Needle syringe programmes and opioid substitution therapy for preventing hepatitis C transmission in people who inject drugs. *Cochrane Database Syst Rev*. 2017;9:CD012021.
9. Dolan K, Rutter S, Wodak AD. Prison-based syringe exchange programmes: a review of international research and development. *Addiction*. 2003;98(2):153-8.
10. United Nations Office on Drugs and Crime. Prevention, Treatment and Care in Prisons and Other Closed Settings: a Comprehensive Package of Interventions. Vienna, Austria: United Nations Office of Drugs and Crime; 2013. [https://www.unodc.org/documents/hiv-aids/HIV\\_comprehensive\\_package\\_prison\\_2013\\_eBook.pdf](https://www.unodc.org/documents/hiv-aids/HIV_comprehensive_package_prison_2013_eBook.pdf). Accessed November 13, 2019.
11. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ*. 2009;339:b2700.
12. European Union. European Union countries. 2018. Available from: [https://europa.eu/europeanunion/about-eu/countries\\_en](https://europa.eu/europeanunion/about-eu/countries_en). Accessed November 13, 2019.
13. Degenhardt L, Gibson G, Leung J, et al. Searching the grey literature to access research on illicit drug use, HIV and viral hepatitis. Sydney, New South Wales, Australia: National Drug and Alcohol



- Research Centre, University of New South Wales; 2016. Available from: <https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/Technical%20report%20number%20334.pdf>. Accessed November 13, 2019.
14. European Monitoring Centre for Drugs and Drug Addiction. Prisons and Drugs in Europe: the Problem and Responses. Lisbon, Portugal: European Monitoring Centre for Drugs and Drug Addiction; 2012. [http://www.emcdda.europa.eu/attachements.cfm/att\\_191812\\_EN\\_TDSI12002ENC.pdf](http://www.emcdda.europa.eu/attachements.cfm/att_191812_EN_TDSI12002ENC.pdf). Accessed December 30, 2019.
  15. Zurhold H, Stöver H. Provision of harm reduction and drug treatment services in custodial settings: Findings from the European ACCESS study. *Drugs (Abingdon Engl)*. 23(2):127-34.
  16. Michels II, Stöver H. Harm reduction from a conceptual framework to practical experience: the example of Germany. *Subst Use Misuse*. 2012;47(8-9):910-22.
  17. Matic S, Lazarus J, Nielsen S, et al. Progress on Implementing the Dublin Declaration on Partnership to Fight HIV/AIDS in Europe and Central Asia. Copenhagen, Denmark: World Health Organization Regional Office for Europe; 2008. <https://apps.who.int/iris/bitstream/handle/10665/107907/E91677.pdf?sequence=1&isAllowed=y>. Accessed November 13, 2019.
  18. Bielen R, Stumo SR, Halford R, et al. Harm reduction and viral hepatitis C in European prisons: a cross-sectional survey of 25 countries. *Harm Reduct J*. 2018;15(1):25.
  19. Klingemann J, Zourhold H, Haasen C, et al. Pre- and post-release care programmes for drug addicted women in European prisons. *Alkoholizm i Narkomania*. 2014;27(2):107-25.
  20. Stark K, Herrmann U, Ehrhardt S, et al. A syringe exchange programme in prison as prevention strategy against HIV infection and hepatitis B and C in Berlin, Germany. *Epidemiol Infect*. 2006;134(4):814-9.
  21. Iliuta C. UNODC and the National Administration of Penitentiaries launched harm reduction programme in Romanian prisons. *Int J Prison Health*. 2009;5(1):52-3.
  22. World Health Organization. Health in prisons: fact sheets for 38 European countries. Copenhagen, Denmark: World Health Organization Regional Office for Europe; 2019. Available from: [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0007/397915/Health\\_in\\_prisons\\_report\\_online.pdf?ua=1](http://www.euro.who.int/__data/assets/pdf_file/0007/397915/Health_in_prisons_report_online.pdf?ua=1). Accessed January 20, 2020.
  23. Arroyo-Cobo JM. Public health gains from health in prisons in Spain. *Public Health*. 2010;124(11):629-31.
  24. de la Fuente L, Bravo MJ, Jimenez-Mejias E, et al. [Evolution of the need and coverage of syringe exchange programs in Spanish prisons, 1992-2009: A revised estimation]. *Rev Esp Sanid Penit*. 2012;14(3):86-90.
  25. de la Fuente L, Bravo MJ, Jimenez-Mejias E, et al. [Evolution of the need and coverage of opioid substitution treatments and needle exchange programmes in Spanish prisons, 1992-2009]. *Rev Esp Sanid Penit*. 2012;14(2):67-77.
  26. Ferrer-Castro V, Crespo-Leiro MR, Garcia-Marcos LS, et al. [Evaluation of needle exchange program at Pereiro de Aguiar prison (Ourense, Spain): ten years of experience]. *Rev Esp Sanid Penit*. 2012;14(1):3-11.
  27. Sander G, Scandurra A, Kamenska A, et al. Overview of harm reduction in prisons in seven European countries. *Harm Reduct J*. 2016;13(1):28.
  28. Danroth R. On pins and needles: More support for prison needle exchanges. *BC Medical Journal*. 2018;60(2):121-3.
  29. Duke K. *Drugs, Prisons and Policy-making*. London: Palgrave MacMillan; 2003.
  30. Moazen B, Assari S, Stöver H, et al. Victorian systems will not solve modern prison health problems. *Lancet*. 2019 Sep 21;394(10203):1008-1009.
  31. AIDS Advisory Committee. Review of HIV and AIDS in Prison. London: HMPS; 1995.
  32. Weston J, Berridge V. HIV/AIDS and the Prison Service of England & Wales, 1980s-1990s. Source London (UK): London School of Hygiene & Tropical Medicine; 2017 May.
  33. World Health Organization. Availability, Accessibility, Acceptability, Quality. Online article. Available from: <https://www.who.int/gender-equity-rights/knowledge/AAAQ.pdf?ua=1>. Accessed November 13, 2019.
  34. United Nations General Assembly. The International Bill of Human Rights. Paris, France: United Nations General Assembly; 1948.

<https://www.ohchr.org/Documents/Publications/FactSheet2Rev.1en.pdf>. Accessed November 13, 2019.

35. United Nations Office on Drugs and Crime. United Nations Standard Minimum Rules for the Treatment of Prisoners (the Nelson Mandela Rules). Vienna, Austria: United Nations Office on Drugs and Crime; 2016.

[https://www.unodc.org/pdf/criminal\\_justice/UN\\_Standard\\_Minimum\\_Rules\\_for\\_the\\_Treatment\\_of\\_Prisoners.pdf](https://www.unodc.org/pdf/criminal_justice/UN_Standard_Minimum_Rules_for_the_Treatment_of_Prisoners.pdf). Accessed November 13, 2019.

36. Brown JL, Sales JM, DiClemente RJ. Combination HIV prevention interventions: the potential of integrated behavioral and biomedical approaches. *Curr HIV/AIDS Rep*. 2014;11(4):363-75.

37. Jones A, Cremin I, Abdullah F, et al. Transformation of HIV from pandemic to low-endemic levels: a public health approach to combination prevention. *Lancet*. 2014;384(9939):272-9.

38. Kuteesa MO, Weiss HA, Abaasa A, et al. Feasibility of conducting HIV combination prevention interventions in fishing communities in Uganda: A pilot cluster randomised trial. *PLoS One*. 2019;14(3):e0210719.

39. Khan B, Duncan I, Saad M, et al. Combination interventions for Hepatitis C and Cirrhosis reduction among people who inject drugs: An agent-based, networked population simulation experiment. *PLoS One*. 2018;13(11):e0206356.

40. Martin NK, Hickman M, Hutchinson SJ, et al. Combination interventions to prevent HCV transmission among people who inject drugs: modeling the impact of antiviral treatment, needle and syringe programs, and opiate substitution therapy. *Clin Infect Dis*. 2013;57 Suppl 2:S39-45.

41. Stöver H, Hariga F. Prison-based needle and syringe programmes (PNSP)-Still highly controversial after all these years. *Drugs (Abingdon Engl)*. 2016 May 20; 23(2): 103-112.

42. Moazen B, Assari S, Neuhann F, et al. The guidelines on infection control in prisons need revising. *Lancet*. 2019 Jul 27;394(10195):301-302.

Table 1. Characteristics of the countries with past or current NSP in prisons

Country	Imprisonment Rate (per 100,000) <sup>1</sup>	Drug injection in prison (%) <sup>14</sup>	NSP available in prisons	NSP coverage in prisons	comments
Germany	75	22.2	Yes <sup>15-17</sup>	At least 1 prison	
Luxemburg	107	31	Yes <sup>16,17</sup>	Not available	
Portugal	127	1.9	No <sup>15,27</sup>	Program stopped in 2007 after a pilot phase.	
Romania	111	NA	Yes <sup>16,21</sup>	0%->50% of prisons	
Spain	126	3.1	Yes <sup>15,17-19,22-27</sup>	17.4%-36% of prisoners	

Records Identified Through Database Searching  
PubMed/MEDLINE (n = 5,114)  
ISI Web of Science (n = 5,798)  
EBSCO (n = 5,750)  
ScienceDirect (n = 4,546)  
Included Eligibility Screening Identification  
Records Identified Through Gray Literature Searching (n = 6,672)  
Records After Duplicates Removed (n = 23,969)  
Records Excluded Because of

Irrelevant Titles (n = 22,765)  
 Abstract Screened  
 (n = 1,204)  
 Records Excluded  
 Data from outside the EU (n = 148)  
 Collected before 2008 (n = 49)  
 Lack of valid references (n = 71)  
 No authors listed (n = 6)  
 Full-Text Articles Irrelevant content (n = 481)  
 Assessed for Eligibility  
 (n = 449)  
 Studies Included in  
 Qualitative Synthesis  
 (n = 26)  
 Records Excluded Because of  
 Irrelevant Content or Outdated  
 Data (n = 423)  
 Web Appendix 1: The search terms to identify peer-reviewed publications on NSP in prisons in the EU

## Contents

HIV/AIDS.....	2
TB.....	2
Hepatitis.....	2
Comorbidity/Coinfection.....	2
Prison.....	2
IEC.....	3
Condom.....	3
Sexual violence.....	3
OST.....	3
NEP.....	3
Medical/Dentalservice.....	4
Tattooing/Piercing.....	4
PEP.....	4
TestingCounseling.....	4
Treatment,Care,Support.....	4
TB.....	4
PMTCT.....	5
STDs.....	5
ViralHepatitis.....	5
Occupational hazards .....	5

## HIV/AIDS

HIV OR Human Immunodeficiency Virus OR Immunodeficiency Virus, Human OR Immunodeficiency Viruses, Human OR Virus, Human Immunodeficiency OR Viruses, Human Immunodeficiency OR Human Immunodeficiency Viruses OR AIDS Virus OR AIDS Viruses OR Virus, AIDS OR Viruses, AIDS OR Acquired Immune Deficiency Syndrome Virus OR Acquired Immunodeficiency Syndrome Virus OR Acquired Immunodeficiency Syndrome OR Immunologic Deficiency Syndrome, Acquired OR Acquired Immune Deficiency Syndrome OR Acquired Immuno-Deficiency Syndrome OR Acquired Immuno Deficiency Syndrome OR Acquired Immuno-Deficiency Syndromes OR Immuno-Deficiency Syndrome, Acquired OR Immuno-Deficiency Syndromes, Acquired OR Syndrome, Acquired Immuno-Deficiency OR Syndromes, Acquired Immuno-Deficiency OR Immunodeficiency Syndrome, Acquired OR Acquired Immunodeficiency Syndromes OR Immunodeficiency Syndromes, Acquired OR Syndrome, Acquired Immunodeficiency OR Syndromes, Acquired Immunodeficiency

## TB

Tuberculosis OR Tuberculoses OR Kochs Disease OR Disease, Kochs OR Koch's Disease OR Disease, Koch's OR Koch Disease OR Latent Tuberculosis OR Latent Tuberculoses OR Tuberculoses, Latent OR Tuberculosis, Latent OR Latent Tuberculosis Infection OR Infection, Latent Tuberculosis OR Infections, Latent Tuberculosis OR Latent Tuberculosis Infections OR Tuberculosis Infection, Latent OR Tuberculosis Infections, Latent

## Hepatitis

Hepatitis OR Hepatitides OR Chronic Hepatitis OR Cryptogenic Chronic Hepatitis OR Chronic Hepatitis, Cryptogenic OR Hepatitis, Cryptogenic Chronic OR Hepatitis, Chronic, Cryptogenic OR Hepatitis, Chronic Active OR Chronic Active Hepatitis OR Hepatitis, Chronic Persistent OR Chronic Persistent Hepatitides OR Chronic Persistent Hepatitis OR Hepatitis B, Chronic OR Chronic Hepatitis B OR Hepatitis B OR Hepatitis C, Chronic OR Chronic Hepatitis C OR Parenterally-Transmitted Non-A, Non-B Hepatitis OR Parenterally Transmitted Non A, Non B Hepatitis OR PT-NANBH OR Hepatitis, Viral, Non-A, Non-B, Parenterally-Transmitted

## Comorbidity/Coinfection

Comorbidity OR Comorbidities OR Multimorbidity OR Multimorbidities OR Coinfection OR Coinfections OR Polymicrobial Infection OR Infection, Polymicrobial OR Infections, Polymicrobial OR Polymicrobial Infections OR Co-infection OR Co infection OR Co-infections OR Mixed Infection OR Infection, Mixed OR Infections, Mixed OR Mixed Infections OR Secondary Infections OR Infection, Secondary OR Infections, Secondary OR Secondary Infection

## Prison

Prisons OR Prison OR Prison\* OR Concentration Camps OR Incarcerate\* OR Penitentiary OR Penitentiaries OR Jail\* OR inmate\* OR Inmates OR Correctional setting OR Correctional settings OR Correctional Centre OR Correctional Centers OR Incarceration

## IEC

Information Services OR Information Service OR Service, Information OR Services, Information OR Information Specialists OR Information Specialist OR Specialist, Information OR Specialists, Information OR Information Networks OR Information Network OR Network, Information OR Networks, Information OR Education OR Workshops OR Workshop OR Parenting Education OR Education, Parenting OR Training Programs OR Program, Training OR Programs, Training OR Training Program OR Educational Activities OR Activities, Educational OR Activity, Educational OR Educational Activity OR Literacy Programs OR Literacy Program OR Program, Literacy OR Programs, Literacy OR Communication OR Personal Communication OR Communication, Personal OR Communication Programs OR Communication Program OR Program, Communication OR Programs, Communication OR Communications Personnel OR Personnel, Communications

## Condom

Condoms OR Condom OR Condom Manufacture OR Manufacture, Condom OR Contraceptive Devices, Male OR Contraceptive Device, Male OR Device, Male Contraceptive OR Devices, Male Contraceptive OR Male Contraceptive Device OR Male Contraceptive Devices

## Sexual violence

Rape OR Sex Offenses OR Offense, Sex OR Offenses, Sex OR Sex Offense OR Sexual Violence OR Sexual Violences OR Violence, Sexual OR Violences, Sexual OR Sexual Abuse OR Abuse, Sexual OR Abuses, Sexual OR Sexual Abuse

## OST

Opiate Substitution Treatment OR Opiate Substitution Treatments OR Substitution Treatment, Opiate OR Substitution Treatments, Opiate OR Treatment, Opiate Substitution OR Treatments, Opiate Substitution OR Opioid Substitution Treatment OR Opioid Substitution Treatments OR Substitution Treatment, Opioid OR Substitution Treatments, Opioid OR Treatment, Opioid Substitution OR Treatments, Opioid Substitution OR Opioid Substitution Therapy OR Opioid Substitution Therapies OR Substitution Therapies, Opioid OR Substitution Therapy, Opioid OR Therapies, Opioid Substitution OR Therapy, Opioid Substitution OR Opiate Replacement Therapy OR Opiate Replacement Therapies OR Replacement Therapies, Opiate OR Replacement Therapy, Opiate OR Therapies, Opiate Replacement OR Therapy, Opiate Replacement OR Opioid Replacement Therapy OR Opioid Replacement Therapies OR Replacement Therapies, Opioid OR Replacement Therapy, Opioid OR Therapies, Opioid Replacement OR Therapy, Opioid Replacement

## NEP

Needle-Exchange Programs OR Needle Exchange Programs OR Needle-Exchange Program OR

Program, Needle-Exchange OR Programs, Needle-Exchange OR Syringe-Exchange Programs OR Program, Syringe-Exchange OR Programs, Syringe-Exchange OR Syringe Exchange Programs OR Syringe-Exchange Program OR Supervised Injecting Centers OR Center, Supervised Injecting OR Centers, Supervised Injecting OR Injecting Center, Supervised OR Injecting Centers, Supervised OR Supervised Injecting Center OR Supervised Injecting Facilities OR Facilities, Supervised Injecting OR Facility, Supervised Injecting OR Injecting Facilities, Supervised OR Injecting Facility, Supervised OR Supervised Injecting Facility

### Medical/Dental services

Medical Services OR Dental Care OR Dental Health Services OR Services, Dental Health OR Health Services, Dental OR Dental Health Service" OR Health Service, Dental OR Service, Dental Health

### Tattooing/Piercing

Tattooing OR Tattoos OR Tattoo\* OR Body Modification, Non Therapeutic OR Body Modifications, Non-Therapeutic OR Non-Therapeutic Body Modifications OR Non-Therapeutic Body Modification OR Non Therapeutic Body Modification OR Cultural Body Modification OR Body Modification, Cultural OR Body Modifications, Cultural OR Cultural Body Modifications OR Body Piercing OR Body Piercings OR Piercings, Body OR Piercing, Body OR Ear Piercing OR Ear Piercings OR Piercing, Ear OR Piercings, Ear OR Nipple Piercing OR Nipple Piercings OR Piercing, Nipple OR Piercings, Nipple OR Lip Piercing OR Lip Piercings OR Piercing, Lip OR Piercings, Lip OR Navel Piercing OR Navel Piercings OR Piercing, Navel OR Piercings, Navel OR Tongue Piercing OR Piercing, Tongue OR Piercings, Tongue OR Tongue Piercings OR Eyebrow Piercing OR Eyebrow Piercings OR Piercing, Eyebrow OR Piercings, Eyebrow OR Penile Piercing

### PEP

Post-Exposure Prophylaxis OR Post Exposure Prophylaxis OR Prophylaxis, Post-Exposure OR Post-Exposure Prevention OR Post Exposure Prevention OR Prevention, Post-Exposure OR Preventive Health Care OR Care, Preventive Health OR Health Care, Preventive OR Services, Preventive Health OR Preventive Health OR Health, Preventive OR Health Services, Preventive OR Health Service, Preventive OR Preventive Health Service OR Service, Preventive Health OR Preventive Health Programs OR Health Program, Preventive OR Health Programs, Preventive OR Preventive Health Program OR Program, Preventive Health OR Programs, Preventive Health OR Preventive Programs OR Preventive Program OR Program, Preventive OR Programs, Preventive

### Testing Counseling

Counseling OR Counselors OR Counselor

### Treatment, Care, Support

Is already covered

### TB

Is already mentioned above

### PMTCT

PMTCT OR Mother-to-Child Transmission

### STDs

Sexually Transmitted Diseases OR Disease, Sexually Transmitted OR Diseases, Sexually Transmitted OR Sexually Transmitted Disease OR STIs OR STI OR Venereal Diseases OR Disease, Venereal OR Diseases, Venereal OR Venereal Disease OR Sexually Transmitted Infections OR Infection, Sexually Transmitted OR Infections, Sexually Transmitted OR Sexually Transmitted Infection OR Transmitted Infection, Sexually OR Transmitted Infections, Sexually OR STDs OR Sexually Transmitted Diseases, Viral OR Viral Sexually Transmitted Disease OR Venereal Diseases, Viral OR Viral Venereal Diseases OR Disease, Viral Venereal OR Diseases, Viral Venereal OR Venereal Disease, Viral OR Viral Venereal Disease OR Sexually Transmitted Disease, Viral OR Viral Sexually Transmitted Diseases

### Viral Hepatitis

Is already mentioned above

### Occupational hazards

Occupational Exposure OR Exposure, Occupational OR Exposures, Occupational OR Occupational Exposures