Primary drug-related crime in the Czech Republic from a geographical perspective: study of urban, suburban and rural differences

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Abstract

Illicit drug use and drug-related crime constitute a significant issue and create large economic and societal costs both at national and regional level. The aim of this article is to examine the differences in primary drug-related crime between urban, suburban and rural local police departments in Czechia. The primary drug-related crime rate in local police departments was constructed from the data collected in the national crime database and the geographical classification of these departments was taken from previous research. To analyze the differences among urban, suburban and rural departments, we used the general linear model. The models with measures that were not standardized for the number of inhabitants were all significant, while not all the models with standardized measures were significant. Overall primary drug-related crime, unauthorized production and other handling of illicit drugs and possession of illicit drugs models with standardized measures showed no significant differences between departments. The cultivation of plants model with standardized measure shows an increase in the predicted values of independent variables in suburban and rural departments compared to urban departments. Our research results show that local urban police departments are not related to higher rates of standardized primary drug-related crime, although there are differences in specific drug law offences. It suggests that drug-related issues are prevalent in all types of departments, however, the specific issues differ between them. Conclusions: The research showed that standardized primary drug-related crime rate in urban departments is not higher than in suburban or rural local police departments.

Keywords

Primary drug-related crime,
Drug law offences,
Geographical analysis,
Drug market policing,
Urban,
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Highlights for public administration, management and planning:

- Primary drug-related crime in local urban police departments is not higher than in suburban or rural ones (Prague as outlier was excluded from the analysis).
- Urban and suburban local police departments are not different in manufacturing and possession of precursors and involvement of foreign nationals in primary drug-related crime. This suggests that this specific type of primary drug-related crime is typical for suburban as well as urban local police departments, while in rural ones, primary drug-related crime is the domain of Czech nationals.
- Organized primary drug-related crime seems to be an urban phenomenon.

1 Introduction

Illicit drug use and primary drug-related crime constitute significant issues at the global as well as at local and Czech level. Drug use and primary drug-

related crime are accompanied by a significant burden (Degenhardt et al. 2018 and costs to society (Bretteville-Jensen et al. 2017; Záborský et al. 2011). Law enforcement focused on drug-related crime is one of the basic policy approaches in this area. The expenditures allocated to drug law en-

forcement comprise the largest share of the drug budget in the majority of countries included in a recent pan-European study (Bretteville-Jensen et al. 2017). In the Czech Republic, law enforcement in the area of drug-related crime comprises a large part of the drug budget (Zábranský et al. 2011). Primary drug-related crime may be considered as one of the factors contributing to the polarization tendencies among the regions of the Czech Republic (see Hlaváček & Koutský 2011) and in general understanding it is related to large cities or to the transformation of old industrial regions (e.g. Koutský et al. 2011).

Štefunková (2011) distinguishes between different categories of drug-related crime. In this study, we focus on primary drug-related crime, which consists of crimes violating drug laws (Štefunková 2011). We do not focus on secondary drug-related crime (mainly property and violent crime), which does not include dealing directly with illicit drugs, but which is associated with drug use; for example, it includes property crime with the aim to obtain financial resources for drugs (Štefunková 2011). We focus on primary drug-related crime because it is recorded in police statistics (ESSK) while the latter is only estimated by police officers on the level of district police departments (Roubalová et al. 2019).

Primary drug-related crime is a current issue, because an increase in the rates can be observed at present. Since 2007, the overall number of drug supply offences increased by 22% in the European Union (EMCDDA 2019); moreover, between 2009 and 2014, Zeman et al. (2017) observed an 80% increase in the number of drug law offences, while general crime rates had decreased. Primary drug-related crime can also be interpreted as an indicator of patterns and trends in illicit drug use (Hartnoll et al. 1998; Mounteney & Griffiths 2019). The advantage over other indicators is that the data from ESSK are readily available at the level of local police departments and thus provide a suitable scale for geographical measurement.

Research into illicit drug use has primarily focused on individual and biomedical pathways, while the environmentally and geographically related questions are relatively unexplored (McLafferty 2008). In the Czech context, the investigation of these questions in illicit drug use has been limited. Except for the low number of such studies, the scale of measurement is an issue. The appropriate scale for crime measurement has already been discussed in the Czech context (Jířková 2017; Nemeškal et al. 2018). However, attention has been focused rather on police districts than on lo-

cal police departments, although local police departments are more specific and homogeneous units (Jířková 2017; Nemeškal et al. 2018). The different levels of measurement are related to the different predictors and allow us to investigate different phenomena (Jířková 2017). The administrative indicators of drug use were reported and analyzed at the NUTS3 level (Lejčková et al. 2007; Mravčík et al. 2018). This level of measurement allows only limited geographical investigation. Furthermore, there are studies using multilevel analysis based on the results of surveys that include geographical data (Kážmer et al. 2014, 2019; Spilková et al. 2015). These studies use variables such as the rate of unemployment or the size of the city where the survey data were collected (Kážmer et al. 2014, 2019; Spilková et al. 2015).

The issue of insufficient structuring of regional health data in national databases was pointed out by Gavurova et al. (2017), Gavurova & Soltes (2016) and Soltes & Gavurova (2014) in studies using the geographical approach which were considerably limited by the unavailability of data at the lowest geographical scale, due to personal data protection (medical data) or by their quality. Thus, they appeal to the legislative process that should allow the access to such geographical data that might allow comparative analyzes. The insufficient availability is also reported in the case of law enforcement data by Singleton et al. (2018). Although according to UNODC (2020) the drug use is more prevalent in urban areas and urbanization is a risk factor for drug use, the lack of disaggregated data makes it difficult to analyze it globally.

The drawback of the measures used in the above-mentioned studies is that these measures are general or not specific enough and thus do not capture the finer spatial phenomena to a sufficient degree of geographical specificity. One of these phenomena is suburbanization. Suburbanization is one of the most distinctive spatial processes taking place in the Czech Republic (Špačková et al. 2016). It is documented by the fact that the number of municipalities which are classified as suburban has increased by about 60 % from 2008 to 2013 (Špačková et al. 2016). This process of suburbanization has been investigated in relation to crime. It was found that suburban space is associated with property crime (Jířková 2017) and urban space with generally high rates of crime (Jířková et al. 2018). Furthermore, Nemeškal et al. (2018) found that high crime rates are related to suburban hinterland and larger cities, while the lowest crime rates were identified in rural areas. However, the relationship between primary drug-related

crime and the urbanization rate has not been addressed by this type studies, as indicated by the lack of mentions of such research by [Jíchová et al. \(2014\)](#) and [Nemeškal et al. \(2018\)](#).

The urban cores were considered as spaces where the drug issues were concentrated ([Bless et al., 2000](#)). However, [Schifano \(2008\)](#) shows that this does not appear to be a consistent observation from the literature review. The risk factors of social and physical environment (stress, neighbourhood disadvantage, population density, immigration, social norms and attitudes in promoting/mitigating substance misuse) that might lead to the increased substance use in the urban spaces might be out weighted by a relative proximity of health services ([Schifano 2008](#)). The research using drug-related indicators based in the US context focused on the differences between urban, suburban and rural space, and primarily on the spatial distribution of drug-related fatal overdoses. For the period between 1999 and 2003 metropolitan areas showed higher rates of opioid overdose mortality ([Dasgupta et al. 2008](#)). A study focusing on a more recent period found that fatal drug overdoses are no longer predominantly an urban phenomenon ([Paulozzi et al. 2008](#)). [Hedegaard et al. \(2019\)](#) found that the differences between urban and rural overdoses lie in the type of substance leading to the overdose. In urban space, there is a higher number of cocaine overdoses while rural spaces are associated with a higher number of natural and semi-synthetic opioids and psychostimulant drug overdoses ([Hedegaard et al. 2019](#)). Research in the Czech Republic ([Spilková et al. 2015](#); [Kážmer et al. 2014, 2019](#)) which focused on the differences between the urban and other types of space using the less specific measure of city size is inconclusive, and points to the fact that in some cases, risky behavior is related to urban spaces, while in other cases it is not. [Kážmer et al. \(2014\)](#) found a higher prevalence of multiple health risks in places with a lower number of inhabitants, while [Kážmer et al. \(2019\)](#) found that adolescents from urbanized areas are at a higher risk of cannabis use.

Our study focuses on the specific indicator of drug use – primary drug-related crime. This indicator is available at the level of local police departments, which allows for an analysis at a fine scale which is substantial for the analysis of the spatial patterns of (primary drug-related) crime, namely of the differences between urban, suburban and rural space. It is important to study this under-researched spatial aspect of primary drug-related crime because the phenomena of drug use are changing (cf.

[Mravčík et al. 2018](#)), and these changes might be related to shifts in geographical and social structure, such as urbanization. The aim of this article is to conduct a study of the differences in primary drug-related crime among urban, suburban and rural localities in the Czech Republic. To the best knowledge of the authors, a geographical analysis of primary drug-related crime on this level of local police departments has not yet been conducted in the context of Central Europe. This article will begin to fill this significant knowledge gap and, furthermore, we hope to provide a starting point for future studies both in the Czech Republic and in other countries in the region.

2 Methods

2.1 Research design

The aim of our analysis was to compare urban, suburban and rural (other) localities in terms of primary drug-related crime. In order to do that, we used the identification of urban, suburban and rural (other) municipalities ([Špačková et al. 2016](#)) and rates of primary drug-related crime. The analysis is focused on the level of local police departments which provide the basic unit for our analysis. The data used are from the 2013-2015 period. We averaged yearly data for all the police departments, similarly to [Nemeškal et al. \(2018\)](#), to address the issue of fluctuating police activity.

2.2 Data processing and statistical analysis

Data processing was carried out in Microsoft Excel and the statistical analysis in IBM SPSS 24. The measure of primary drug-related crime was obtained from the national crime database (ESSK). For the analysis of primary drug-related crime, we used the disaggregated dataset containing information about the arrested under the crime categories defined by Act No. 40/2009 Coll., the Penal Code: Sections 283 (Unauthorized production and other handling of narcotic and psychotropic substances and poisons), 284 (Possession of a narcotic or psychotropic substance or poison), 285 (Unauthorized cultivation of plants containing a narcotic or psychotropic substance), 286 (Manufacturing and possession of an article for the unauthorized production of a narcotic or psychotropic substance or poison), 287 (Promotion of drug use). Using this data set, we constructed a variable capturing the nationality of the arrested (Czech and other nationality) based on the nationalities

recorded by the police. The other variable distinguishes the arrested for drug-related organized crime. We classified the arrested as such, if their offence was classified under at least one of the crime subcategories which define drug-related organized crime by law: Article 283 (2) (a), Article 283 (4) (c), Article 286 (2) (a), Article 287 (2) (a). Furthermore, each arrested was assigned with the location of local police departments in the original dataset. This location was updated to correspond to the structure of municipalities. Similarly to [Nemeškal et al. \(2018\)](#), we merged some of the local police departments, arriving at the number of 344 out of the 533 local police departments.

The next step of data processing was data aggregation at the level of the municipalities. We summed the number of the individuals arrested with the following characteristics separately for the years 2013–2015: individuals arrested for primary drug-related crime, individuals arrested for specific categories (unauthorized production and other handling of illicit drugs, possession of illicit drugs, cultivation of plants, manufacturing and possession of precursors, promotion of drug use), for drug-related organized crime, and arrested with foreign nationality. These sums were averaged for the 2013–2015 period. Furthermore, we used variables standardized and not standardized to the number of inhabitants in the municipality.

To identify the urban, suburban and rural (other) municipalities, we used the data collected and analyzed over the years by the Urban and Regional Laboratory at Charles University. For the analysis, we employed the 2013 classification of municipalities ([Špačková et al. 2016](#)), which divides the territory of the Czech Republic into three types of municipalities: urban cores, four zones of suburban villages, and the remaining (rural) settlements ([Špačková et al. 2016](#)). We decided to merge different suburban zones into one category. Since the municipalities provide much smaller units than local police departments, we had to assign the number of inhabitants from different types of municipalities (urban, suburban, rural) to the merged local police departments. Based on this data, we computed a share of inhabitants from different types of municipalities in specific local police departments. With this information we carried out K-means cluster analysis to divide the local police departments into three categories: urban, rural and suburban.

The final statistical analysis was conducted with the above described independent categorical variable dividing the local police departments into three categories, and the above described dependent variables. To analyze the differences between lo-

cal police departments, we used the general linear model. Furthermore, we computed the grand mean for each variable and the mean within each variable for the local police departments categories. We also focused on the analysis of outliers because we suspected that due to the nature of the topic, the outliers may bias the analysis. We used the values of standardized residuals, Cook's distance and centered leverage value to identify the outliers. For each variable, we identified between one and three outliers (including Prague) which were excluded from the analysis.

3 Results

The cluster analysis of local police departments yielded the following results. A total of 45 local police departments (13 % of local police departments) were categorized as suburban, 174 (51 % of local police departments) as rural, and 125 (36 %) as urban. [Table 1](#) shows the grand mean of the variables and the mean for the different categories of local police departments for the specific variables.

[Table 2](#) and [Fig. 1](#) shows the results of general linear models. Models with variables not standardized for the number of inhabitants are all significant at 0.001 level except for the cultivation of plants model that is significant at 0.01 level. All the parameters in the models are significant at 0.05 level, except for the parameter comparing urban and suburban local police departments in the cultivation of plants model. Except for this result, other models showed a decrease in the predicted values of independent variables in suburban and rural local police departments compared to urban local police departments.

The models with independent variables standardized for the number of inhabitants show different results. The models of overall primary drug-related crime, unauthorized production and other handling of illicit drugs, and possession of illicit drugs are not significant. The cultivation of plants model shows an increase in the predicted values of independent variables in suburban and rural local police departments compared to urban local police departments. Considering the manufacturing and possession of precursors model and the foreign nationality related primary drug-related crime model, the only significant parameter at 0.05 level was the one comparing rural and urban local police departments, showing a decrease in the predicted values of independent variables. The promotion of drug use model and organized primary drug-related crime model are significant and show

Fig. 1 Unadjusted odds ratios for SEL and non-SEL population for the lifetime prevalence of illicit drug exposure (relationships significant at the 5% alpha level)

Table 1 The grand mean of the variables and mean for the different categories of police local police departments

	Variables not standardized to the number of inhabitants			Variables standardized to the number of inhabitants		
	Mean	Confidence Interval (95%)		Mean	Confidence Interval (95%)	
		Lower	Upper		Lower	Upper
Grand mean: primary drug-related crime	31.487	27.239	35.734	4.121	3.723	4.518
Mean for the specific category: suburban	20.244	10.238	30.251	3.950	3.013	4.887
Mean for the specific category: rural	15.546	10.457	20.635	4.155	3.676	4.634
Mean for the specific category: urban	58.669	52.641	64.697	4.257	3.695	4.819
Grand mean: unauthorized production and other handling of illicit drugs	25.315	21.923	28.708	3.287	2.936	3.639
Mean for the specific category: suburban	16.311	8.319	24.303	3.076	2.248	3.904
Mean for the specific category: rural	12.626	8.562	16.691	3.303	2.879	3.727
Mean for the specific category: urban	47.008	42.193	51.823	3.483	2.986	3.980
Grand mean: possession of illicit drugs	3.710	2.979	4.440	0.487	0.423	0.552
Mean for the specific category: suburban	2.311	0.590	4.033	0.543	0.391	0.695
Mean for the specific category: rural	1.713	0.837	2.588	0.453	0.375	0.530
Mean for the specific category: urban	7.105	6.068	8.142	0.466	0.375	0.557
Grand mean: cultivation of plants	2.246	1.682	2.811	0.400	0.342	0.458
Mean for the specific category: suburban	1.826	0.474	3.179	0.433	0.294	0.571
Mean for the specific category: rural	1.684	0.954	2.413	0.544	0.469	0.618
Mean for the specific category: urban	3.229	2.517	3.941	0.223	0.151	0.296
Grand mean: manufacturing and possession of precursors	0.984	0.695	1.274	0.078	0.062	0.095
Mean for the specific category: suburban	0.667	-0.015	1.349	0.084	0.044	0.123
Mean for the specific category: rural	0.351	0.004	0.697	0.053	0.033	0.073
Mean for the specific category: urban	1.935	1.525	2.346	0.099	0.075	0.122
Grand mean: promotion of drug use	0.304	0.186	0.422	0.024	0.014	0.034
Mean for the specific category: suburban	0.022	-0.256	0.300	0.007	-0.015	0.030
Mean for the specific category: rural	0.092	-0.049	0.233	0.015	0.004	0.027
Mean for the specific category: urban	0.798	0.631	0.966	0.049	0.036	0.063
Grand mean: organised drug-related crime	0.197	0.060	0.334	0.006	0.001	0.011
Mean for the specific category: suburban	<0,001	-0.322	0.322	<0,001	-0.011	0.011
Mean for the specific category: rural	0.034	-0.129	0.198	0.004	-0.002	0.010
Mean for the specific category: urban	0.556	0.362	0.751	0.015	0.008	0.022
Grand mean: foreign-nationality-related drug crime	2.478	1.806	3.149	0.288	0.216	0.359
Mean for the specific category: suburban	1.178	-0.404	2.759	0.273	0.105	0.441
Mean for the specific category: rural	0.868	0.064	1.672	0.190	0.104	0.276
Mean for the specific category: urban	5.387	4.434	6.340	0.400	0.299	0.501

a decrease in the predicted values of independent variables in suburban and rural local police departments compared to urban local police departments.

4 Discussion

To the best of our knowledge, this study presents the first investigation of urban, suburban and rural differences using drug-related indicators, namely the indicator of primary drug-related crime in the Czech Republic. The results show an important dynamic of the differences between urban, suburban and rural localities. Primary drug-related crime

in urban departments is not significantly higher than in suburban or rural departments. The urban and suburban departments do not differ in manufacturing and possession of precursors and involvement of foreign nationals in primary drug-related crime. The promotion of drug use and organized primary drug-related crime seems to be an urban phenomenon. This study demonstrates that the social and geographical approach to drug-related indicators provides important insights into drug-related issues and that the indicators used in this study at fine scale of measurement have the potential to be used in more complex analyses. Furthermore, the results show that it is significant to use mea-

Table 2 General linear models for primary drug-related crime

	Models with independent variables not standardized for the number of inhabitants				Models with independent variables stanrdized the number of inhabitants			
	P-value	B	Confidence Interval (95%)		P-value	B	Confidence Interval (95%)	
			Lower	Upper			Lower	Upper
Model 1: Primary drug-related crime	<0,001				0.857			
Suburban	<0,001	-38.425	-50.107	-26.743	0.581	-0.307	-1.400	0.785
Rural	<0,001	-43.123	-51.012	-35.235	0.786	-0.102	-0.841	0.637
Urban (ref.)								
Model 2: Unauthorized production and other handling of illicit drugs	<0,001				0.690			
Suburban	<0,001	-30.697	-40.027	-21.366	0.408	-0.407	-1.373	0.559
Rural	<0,001	-34.382	-40.683	-28.081	0.588	-0.180	-0.833	0.473
Urban (ref.)								
Model 3: Possession of illicit drugs	<0,001				0.578			
Suburban	<0,001	-4.794	-6.804	-2.784	0.390	0.077	-0.099	0.254
Rural	<0,001	-5.392	-6.749	-4.035	0.831	-0.013	-0.132	0.106
Urban (ref.)								
Model 4: Cultivation of plants	0.009				<0,001			
Suburban	0.072	-1.403	-2.931	0.126	0.009	0.209	0.053	0.365
Rural	0.003	-1.545	-2.565	-0.526	<0,001	0.320	0.216	0.425
Urban (ref.)								
Model 5: Manufacturing and possession of precursors	<0,001				0.014			
Suburban	0.002	-1.269	-2.065	-0.473	0.521	-0.015	0.031	-0.061
Rural	<0,001	-1.585	-2.123	-1.047	0.004	-0.045	-0.014	-0.077
Urban (ref.)								
Model 6: Promotion of drug use	<0,001				<0,001			
Suburban	<0,001	-0.776	-1.101	-0.452	0.002	-0.042	-0.068	-0.015
Rural	<0,001	-0.706	-0.926	-0.487	<0,001	-0.034	-0.052	-0.016
Urban (ref.)								
Model 7: Organised drug-related crime	<0,001				0.026			
Suburban	0.004	-0.556	-0.933	-0.180	0.029	-0.015	-0.028	-0.002
Rural	<0,001	-0.522	-0.776	-0.268	0.020	-0.011	-0.020	-0.002
Urban (ref.)								
Model 8: Foreign nationality related drug drime	<0,001				0.008			
Suburban	<0,001	-4.209	-6.056	-2.363	0.204	-0.127	-0.323	0.069
Rural	<0,001	-4.519	-5.766	-3.272	0.002	-0.210	-0.342	-0.078
Urban (ref.)								

Note: B with 95% CI for models with independent variables not standardized and standardized for the number of inhabitants, statistically significant at 0.05 level; ** statistically significant at 0.01 level

asures that are standardized for the number of inhabitants.

The differences between the models using standardized and non-standardized measures suggest that the higher rate of primary drug-related crime in urban departments is caused by the higher number of inhabitants rather than higher rate of primary drug-related crime itself. These results show that primary drug-related crime in urban departments is not higher than in suburban or rural departments. Contrary to the research of general crime rates (Jířchová et al. 2018; Nemeškal 2018),

our research results show that urban departments are not related to higher rates of primary drug-related crime. It suggests that primary drug-related crime is different to general crime rates and conditioned by different processes. A plausible interpretation is that primary drug-related crime is evenly distributed in the population of the Czech Republic. This is in line with finding of Schifano's (2008) review that the substance misuse is not consistently typical for urban centers. The risk factors of social and physical environment (stress, neighborhood disadvantage, population density, immigra-

tion, social norms and attitudes in promoting/mitigating substance misuse) that might lead to the increased substance use in the urban spaces might be out weighted by a relative proximity of health services (Schifano 2008).

Our results do not suggest differences between the three categories of police departments in overall rate of primary drug-related crime; however, we identified differences in specific variables. The analysis showed that the cultivation of plants rate is higher in rural and suburban departments in comparison to urban departments. We provide two interpretations of this finding which should be explored by future research. One interpretation is that inhabitants of suburban and rural spaces have more opportunities for cannabis home growing, either indoors or outdoors. The other interpretation is that cannabis sold at the urban drug market is grown in suburban or rural departments. The results show that urban and suburban departments are not different in manufacturing and possession of precursors and involvement of foreign nationals in primary drug-related crime. It suggests that this specific type of primary drug-related crime is typical for suburban as well as urban departments, while in rural departments primary drug-related crime is the domain of Czech nationals. The promotion of drug use and organized primary drug-related crime seems to be more of an urban phenomenon. These results are in line with the body of international literature which shows that drug-related issues are not exclusively urban anymore (Paulozzi et al. 2008) but that the differences lie in specific forms of drug-related behavior (Hedegaard et al. 2019). A similar situation was found in the Czech Republic, where risky behavior is in some cases related to the urban spaces and in others is not (Spilková et al. 2015; Kážmer et al. 2014, 2019). Concerning crime rates, suburban space was identified as related to a specific category of crime - property crime (Jířková 2017).

The strength of this study lies in its focus on the geographical predictor of primary drug-related crime on a very fine scale of measurement that to the best of our knowledge, has not used before in the Czech Republic. This study is limited by the factors that should be addressed by future research. The analysis of the association between the two phenomena should be extended into more complex models, using other data sources in future research. Our research provides significant information, supporting the future use of the variables included in this study. Furthermore, the study is focused on a select period of time, and can be conducted for a longer period of time and focus on the tem-

poral dynamic of the issue. Another limitation is that the analysis is not differentiated by the type of illicit drug, however, this is due to the fact that the statistics do not provide such information. We suggest using other indicators providing this information in future studies, for example the indicators from the field of public health (Petruželka et al. 2019). The issue with these indicators is that institutions are hesitant to provide data with such fine measurement and prefer to provide data on the level of district. Another limit in using police-based indicators to approximate drug related issues is that it is influenced by the priorities and activity of police (Hartnoll et al. 1998; Mounteney & Griffiths 2019). For example, the rate of primary drug-related crime in certain departments might be influenced by the local priority to focus on primary drug-related crime or primary drug-related crime involving foreign nationals. This supports the argument that it would be beneficial to conduct the analysis with other indicators. It is also important to acknowledge that Prague as an outlier was excluded from the analysis and thus the results do not include the capital city.

5 Conclusions

This research demonstrated that primary drug-related crime in urban departments is not higher than in suburban or rural departments. The results do not suggest differences between three categories of police departments (urban, suburban, rural) in the overall rate of primary drug-related crime; however, we identified differences in specific variables. This points to the fact that even rural departments are not spared of primary drug-related crime and drug-related issues which is important information for planning of the institutional response. For example, the treatment and support network should not omit rural areas and the services should be available in these areas.

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