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HIV in the Russian Federation: mortality, prevalence, risk factors, and current understanding of sexual transmission

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Background: Although HIV infection in the Russian Federation was historically concentrated among marginalized populations (people who inject drugs, sex workers, MSM, and the prison population), recent evidence suggests that it has become a more generalized epidemic. The objective of our research was to explore how these trends in HIV prevalence and HIV-related mortality compare across Russia.

Methods: We calculated HIV-associated mortality for both male and female individuals in each region (oblast) of the Russian Federation using data from the Russian Fertility and Mortality Database (RusFMD). Using current data on HIV prevalence, we computed the correlation between HIV prevalence and HIV-associated mortality. We also used oblast-level data to examine the associations between HIV prevalence and the risk factors most commonly associated with HIV infection.

Results: Over the past 20 years, the Russian Federation has experienced a rapid increase in HIV-associated mortality in both male and female individuals. Our findings revealed significant heterogeneity, with higher rates of HIV-associated mortality reported in oblasts in the Siberian and Ural Federal Districts. There is a strong correlation (0.8) between HIV-associated mortality and virus prevalence. These findings confirm that there are regional disparities in access and adherence to antiretroviral therapy (ART), as indicated by the low correlation (−0.4) between virus prevalence and access to ART coverage. The results from our modeling analysis revealed that, in addition to the factors most commonly associated with this disease (e.g. intravenous drug use), knowledge about sexual transmission of HIV in the general population has a broad impact on its prevalence at the oblast level.

Conclusion: Interventions that reduce HIV prevalence, for example, opioid substitution therapy and needle-sharing programs for people who inject drugs, as well as the increased availability of educational and preventive programs may halt the spread of HIV across the Russian Federation. Similarly, increased access to treatment could help in reducing HIV-related mortality.

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Introduction

Between 2010 and 2019, the number of people with HIV (PWH) in Eastern Europe and Central Asia (EECA) nearly doubled, from an estimated 0.8 to 1.7 million individuals. The prevalence of HIV in this region also rose from 0.4 to 0.9% during this time interval [1]. Intravenous drug use is the predominant mode of HIV transmission in EECA. The European Center for Disease Prevention and Control [2] reported that 23% of the new HIV infections

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in 2018 were in persons who inject drugs (PWID). Historically, the prevalence of HIV has also been high among other marginalized groups, including sex workers, MSM, and members of the prison population [2].

The HIV epidemic in the Russian Federation leads this pattern, and it is one of the most affected countries in EECA. Approximately 31 000 HIV cases were registered in Russia in the year 2000; by contrast, 900 000 documented cases of HIV infection were reported in 2015 [3]. Although PWID and members of other marginalized communities have traditionally represented those most at risk, heterosexual transmission of HIV has increased in recent years. According to the Russian Federal AIDS Center [4], more than half of the new HIV infections reported in 2018 resulted from unsafe heterosexual contact. This phenomenon has led to the expansion of the epidemic from marginalized communities to the general population.

Studies performed to date mainly focused on regions and cities in which the HIV epidemic has been particularly acute, including Kemerovo, Sverdlovsk, St. Petersburg, and Krasnoyarsk [5–7]. Although the problems associated with HIV infection have received some attention at the national level, there is only limited knowledge of its impact from a sub-national (oblast) perspective.

The available scientific literature on HIV infection at the oblast level in Russia primarily addresses three main topics. The first set of these studies focused on HIV variants identified in oblasts that have been particularly affected by the epidemic. The overall conclusion from these studies is that different HIV variants are circulating in the various population groups in the Russian Federation [e.g. persons who inject drugs (PWID) [8]] as well as across the regions in the Russian Federation (e.g. Siberia [9] and Central Russia [10,11]).

The second set of studies focused on risk factors associated with HIV infection among several key populations. For example, Eritsyan *et al.* [12] analyzed correlates of HIV infection among PWID in eight cities in the Russian Federation and identified the emergence and ultimately the predominance of commercial (as opposed to homemade) heroin as the main factor associated with disease prevalence. By contrast, intravenous use of home-produced drugs was identified as the main factor behind the rise in new HIV infections in Togliatti City in Samara Oblast [13]. Furthermore, Kozlov *et al.* [14] reported that the frequency of psychostimulant use was a predictor of seroconversion in St. Petersburg and the wider Leningradskaya Oblast. Finally, the results of a study of heterosexual transmission revealed that the number of sexual partners and the frequency of unprotected sex were the most significant risk factors associated with the prevalence of HIV infection among heterosexual nondrug users in the four oblasts under study [15].

The final set of studies focused on barriers to the use of antiretroviral therapy (ART) by those already diagnosed, which contributes to the rising HIV-associated mortality rates in the Russian Federation. The results of one study conducted in St. Petersburg reported that treatment adherence was comparatively low and exacerbated by frequent use of alcohol and psychostimulants; this ultimately led to little or no suppression of HIV replication and thus detectable viral loads [16]. Results from another study carried out in St. Petersburg revealed that social stigma was a significant barrier among female sex workers that limited the use of both preventive and therapeutic modalities. HIV-positive sex workers were also more likely to experience discrimination in healthcare settings [17].

None of these earlier publications included a systematic and up-to-date cross-oblast study of HIV prevalence and associated risk factors or HIV-associated mortality. Thus, the objective of our study is to compare HIV-related mortality, HIV prevalence, and associated factors at the oblast level across Russia. This objective was realized by addressing the following research aims: to estimate the HIV-associated mortality both nationally and in all Russian oblasts; to document the prevalence of HIV-associated mortality at the oblast level and examine the link between HIV-associated mortality and prevalence; and to explore the risk factors associated with HIV prevalence at the sub-national level.

Methods

Datasets

The analysis for our study was based on data obtained from four independent sources. First, data from the Russian Fertility and Mortality database (RusFMD) of the Centre for Demographic Research at the New Economic School (CDR NES) were used to estimate HIV-associated mortality in individual oblasts [18]. The dataset follows a unique coding system that is closely aligned with the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (ICD-10) codes. To estimate HIV-associated mortality at the oblast level, we identified individuals with HIV-related diagnoses (ICD-10 codes B20–B24). The RusFMD also contains mid-year population estimates that were used to calculate fertility and mortality rates. We have performed disaggregated analyses based on 'male' and 'female' designations, as these were the only classifications provided in the Russian dataset. Given the current realities in the Russian Federation, it would be difficult if not impossible to collect survey information using 'nonbinary' as a sex designation. The RusFMD is the only available and comprehensive dataset on mortality in Russia.

Second, data on HIV prevalence were also obtained from reports from the Russian Federal AIDS Center that are presented as cases per 100 000 persons [4]. Additionally, 2018 data on HIV prevalence covering the total adult population of Russia were obtained from the information bulletin number 44 titled ‘HIV Infection’ [4]. Data on access to ART was provided by an NGO-led project on HIV indicators in the Russian Federation [19]. The results summarized the proportion of people with HIV (PWH) in each oblast who have access to ART.

Third, we utilized data that address knowledge, attitude, and practices (KAPs) related to HIV infection. This information was collected from a survey entitled ‘Выборочное наблюдение поведенческих факторов, влияющих на состояние здоровья населения’ (Selective observation of behavioural factors affecting the health status of the population) that was conducted in 2018 by Rosstat. Fifteen thousand respondents were surveyed across the Russian Federation to collect representative results at the oblast level [20]. The survey respondents included persons aged 15 years or older who answered questions regarding the state of health, nutrition, social well being, marital status, physical education, and sports as well as habits that are considered harmful. One of the modules in the survey addressed knowledge and attitudes regarding HIV. The survey followed a stratified sampling to facilitate representative sampling at both national and subnational levels with a 99% response rate. This dataset was obtained via direct correspondence with Rosstat authorities. The data were summarized by oblast and used to generate a statistical analysis of the correlates of HIV prevalence. The nonresponse rate to the KAP queries was only 2%, which should have little-to-no impact on the overall validity of our results. The dataset was shared with our research teams via a CD-ROM that was received in December 2021 and is available on request.

Fourth, findings from the Rosstat repository of regional data were used to identify additional variables in a statistical model of correlates of HIV prevalence in the Russian Federation [21]. The variables cover topics that include the level of economic development and the availability of healthcare infrastructure.

We used these resources for our study for several specific reasons. First, our study is an exploration of HIV-associated mortality, disease prevalence, and related factors. To accomplish this goal, we needed to rely on data from different sources to create a unified dataset. Second and more importantly, these resources included representative variables at the oblast level. This permitted us to draw robust links between HIV-associated mortality and disease prevalence (predicated on access to ART) and HIV prevalence and critical related factors.

Statistical analyses

Calculation of HIV-associated mortality

To estimate the age-standardized mortality rate associated with HIV, we used data on deaths listed by specific condition from the RusFMD at the CDR NES. This database contains information on the population categorized by age group that was used for age standardization. We also used population standardization factors from the European Standard Population Scale [22].

The causes of death are classified based on ICD-10 codes [23]. The age-standardized HIV-associated mortality rates by oblast and year were calculated using the following equation:

$$\mathrm{HIVM} = \sum\nolimits_x \left(\frac{d_x}{p_x} P_x\right) / \sum\nolimits_x P_x$$

where HIVM is the HIV-associated mortality; d_x is the number of deaths in age group x by number or condition; p_x is the population of age group x; and P_x is the proportion of the population in age group x relative to the overall standard population. Age-standardized mortality rates were calculated for the entire country as well as on the oblast level for the years 2000 and 2018.

Correlation between HIV-associated mortality and prevalence

In addition to our calculation of HIV-associated mortality, we also computed a correlation coefficient for the relationship between age-standardized HIV mortality and HIV prevalence (both for the year 2018) at the oblast level.

Analysis of correlates of HIV prevalence

We used the data on HIV prevalence per 100 000 persons described above as a dependent variable in an ordinary least squares (OLS) model to capture the main correlates of HIV prevalence. As this was designed as an exploratory and descriptive study, we used HIV prevalence as a dependent variable in our model. We used several sets of independent variables to perform this analysis. First, we included three variables associated with KAPs that focus specifically on HIV from the survey of health-related behavioral factors described above. The available data were summarized by oblast, and the following variables were derived: knowledge about the virus, including the basis for its transmission (using a proxy variable that was based on whether the respondent knew that condom use could reduce the risk of virus transmission); misconceptions and rumors (using a proxy variable that was based on whether the respondent thought that HIV could be transmitted by sharing food utensils with a virus carrier); and practices (using a proxy variable that was based on whether the respondent knew where to obtain an HIV test). The dataset did not include any questions that addressed respondent knowledge or beliefs regarding HIV transmission through fomites that are likely to encounter blood (e.g. toothbrushes and floss). Thus, this information was not included in the analysis. Of note, these questions were directed toward respondents who reported that they were aware of the existence of HIV, which included 97.5% of all respondents to the survey. Data on the prevalence of drug use was represented by the number of patients with drug addiction who were registered at medical and preventive organizations per 100 000 persons [24]. We acknowledge the need to include HIV-related information for other critical populations (e.g. MSM, sex workers, and the prison population); however, there are no reliable data addressing this issue at either the national or subnational level in Russia. Although current guidance from the WHO suggests that MSM represent approximately 1% of the adult population in Russia [25], the use of this estimate would require oblast-specific data on the total adult population. To the best of our knowledge, this information was not collected by Rosstat. Thus, we did not include this estimate in our analysis. Finally, the following variables from Rosstat's regional data repository were also used to generate the model, including the level of economic development [represented by the gross regional product (GRP) per capita in real terms), real GRP per capita growth, the density of the population, the fraction of the population living in cities, the overall poverty rate, and the female-to-male population ratio. We also included data that addressed healthcare infrastructure. These findings were represented by three variables, including the number of doctors, nurses, and hospital beds, each per 10 000 people. All of the aforementioned variables capture data at the oblast level for 2018. The additional variables are particularly useful as they all represent findings at the oblast level. To the best of our knowledge, there are no data on access to primary prevention (e.g. clean needles, health education, condoms). Thus, these variables were not considered in the modeling exercise. A detailed list of the variables is included in the Appendix, http://links.lww.com/QAD/C729.

For our analysis, we used the OLS method to perform a regression analysis of the $\log_{10}$ of HIV prevalence against the $\log_{10}$ value of each of the independent variables, given that we aim to describe the link between HIV prevalence and its determinants. As our findings are presented as independent variables with various measurement units, including some that are quite dispersed (e.g. gross regional income per capita), we generated the natural logarithm of all variables and used a log–log modeling approach, as per established practice. The log transformation provides us with the desired linearity, which is one of the preconditions for performing an OLS regression analysis. This also permits us to generate a straightforward interpretation of the parameter coefficients.

All analyses were performed using Stata 14 (StataCorp LLC, College Station, Texas, USA).

Results

HIV-associated mortality in the entire Russian Federation in the years 2000 and 2018 is presented in Table 1. Our analysis revealed that the HIV-associated mortality rate for male individuals increased from 0.2 per 100 000 in 2000 to 18.5 per 100 000 in 2018. HIV-associated mortality among female HIV patients followed a similar upward trend during this period, increasing from 0.0 per 100 000 in 2000 to 8.7 per 100 000 in 2018.

Table 1. HIV-associated mortality among male and female individuals in the Russian Federation.

	2000	2018
HIV/AIDS mortality per 100 000 (males)	0.2	18.5
HIV/AIDS mortality per 100 000 (females)	0.0	8.7

Sources: Russian Fertility and Mortality database (RusFMD) and the authors' calculations.

The distribution of HIV-associated mortality at the oblast level in 2018 is shown in the two heat maps presented in Fig. 1. As shown, disproportionately high levels of HIV-associated mortality among female individuals (panel a) and male individuals (panel b) were concentrated in a few oblasts in the Siberian Federal district. Rates of HIV-associated mortality among male individuals are particularly high in regions that include Kemerovo (88.9 per 100 000), Irkustskaya Oblast (56.6 per 100 000), and Novosibirskaya Oblast (53.46 per 100 000). HIV-associated mortality among male individuals is also acutely high (50.3 per 100 000) in the Sverdlovskaya Oblast in the Ural Federal District. By contrast, rates of HIV-associated mortality among male individuals were notably low in Tuva (0.5 per 100 000), Belgorod (1.3 per 100 000), and Yakutia (1.5 per 100 000). HIV-associated mortality among female individuals followed nearly the same pattern, with notably high rates in regions that include Kemerovo, Irkutsk, and Sverdlovsk.

The findings presented in Fig. 2 document HIV prevalence (per 100 000) by oblast in 2018. One of the most important findings from Fig. 2 is that the regional patterns of HIV prevalence closely match those for HIV-associated mortality as noted above. The four regions with the highest HIV prevalence were Chelyabinsk (3034.5 per 100 000), Irkutsk (1997.45 per 100 000), Kemerovo (1890.09 per 100 000), and Sverdlovsk (1804.3 per 100 000). By contrast, the prevalence of HIV was notably low in Tuva (55.2 per 100 000), Dagestan (84.2 per 100 000), and Kalmikya (93.4 per 100 000). The parallels observed between rates of HIV-associated mortality and disease prevalence were confirmed by correlation analysis. Our findings revealed that the correlation coefficients determined for HIV-associated mortality rates and prevalence for male individuals were 0.83 and 0.84 for female individuals.

Figure A1 in the Supplementary materials (http://links.lww.com/QAD/C729) summarizes the prevalence (in percentage) of ART usage among PWH. As shown, individuals living in the European part of Russia have

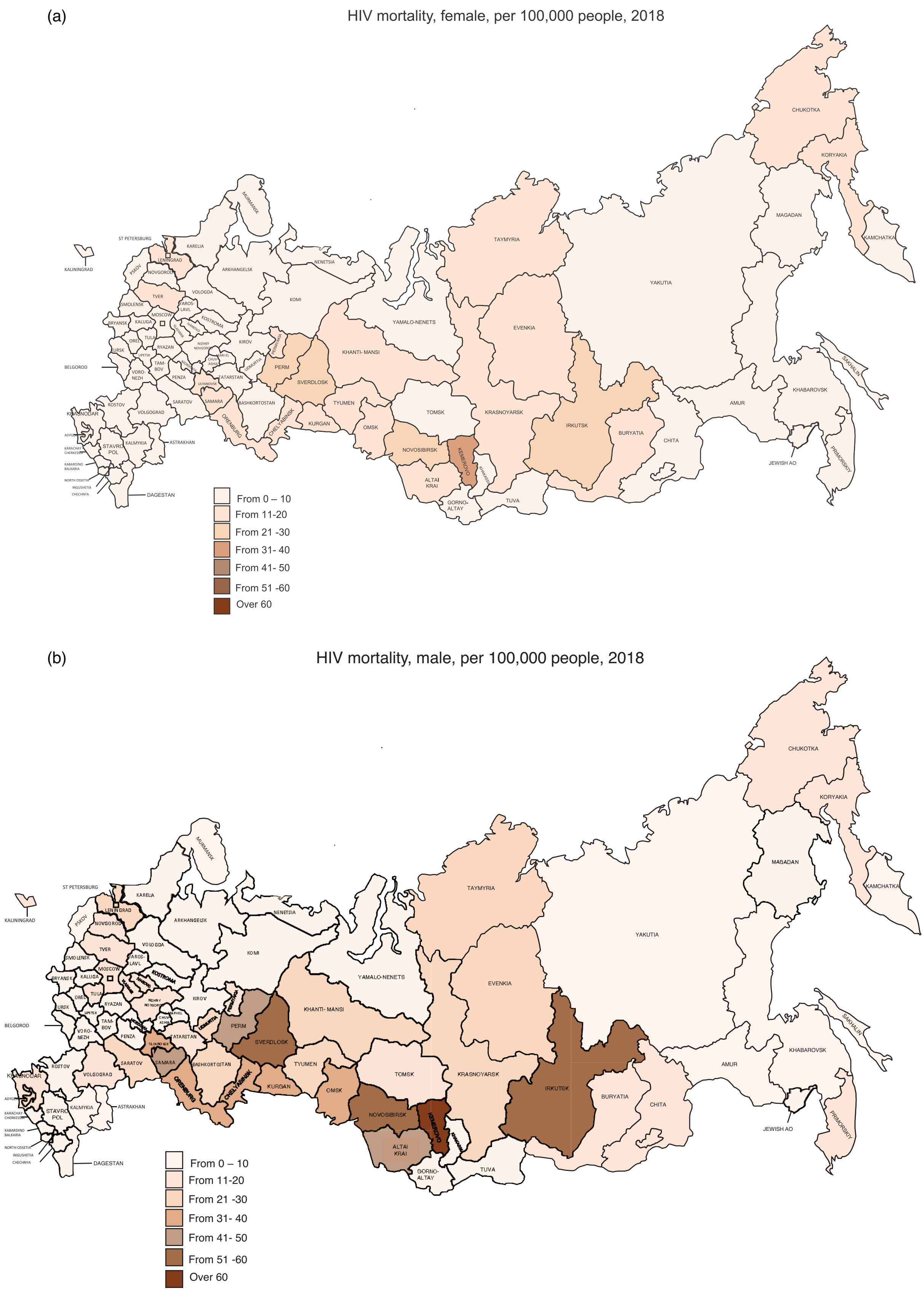

Fig. 1. Russian Federation: HIV mortality by oblast in 2018, female (panel a) and male (panel b). Source: Russian Fertility and Mortality database (RusFMD) and author's calculations.

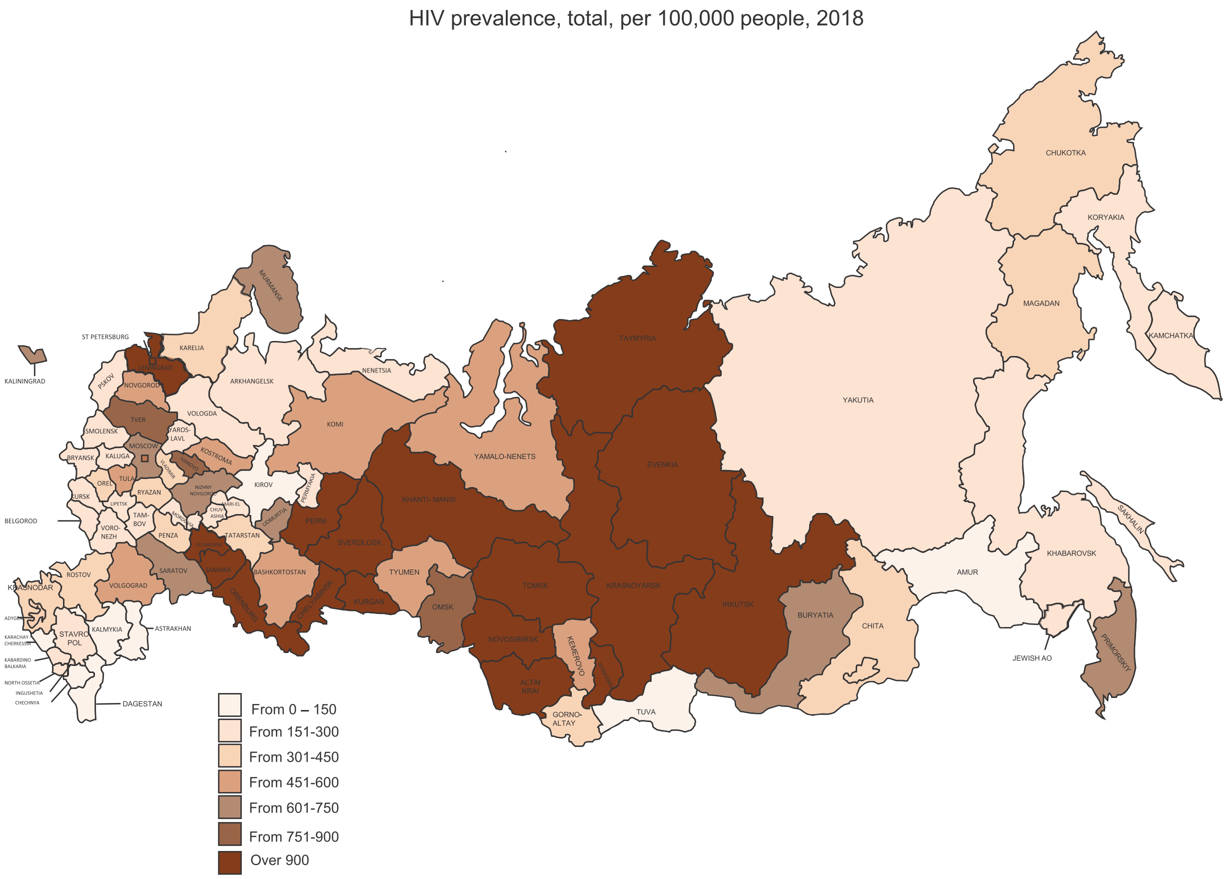

Fig. 2. Russian Federation: HIV prevalence by oblast for 2018. Source: Federal AIDS Centre and authors' estimates.

substantially greater access to ART. This does not match well with the prevalence of HIV in the Russian Federation, as previously discussed. This finding was confirmed by the low correlation between the prevalence of HIV and access to ART (correlation coefficient of −0.45). These findings may also explain the high correlation between HIV prevalence and mortality at the oblast level. The results of the OLS analysis of correlates of HIV prevalence are presented in Table 2. Our results feature a high positive association between the level of regional development (i.e. GRP per capita) and HIV prevalence (coefficient 0.52, 95% CI 0.03−1.01). Our results also document a positive and statistically significant association between our proxy variables used to document the prevalence of both drug use and HIV infection (coefficient 0.39, 95% CI = 0.06−0.73). Finally, our results also reveal a statistically significant inverse association between awareness of the sexual transmission of HIV and disease prevalence (coefficient −1.49, 95% CI = −3.27 to 0.29). The results of *F*-tests reveal the strong joint significance of the independent variables (Table 2). Finally, given the cross-sectional nature of the sample, we caution against drawing temporal links between HIV prevalence and previous prominent transmission modes (e.g. IDU).

Discussion

To the best of our knowledge, this is the first study to provide a comprehensive analysis of HIV prevalence, HIV-associated mortality, and the connections between HIV prevalence, the dominant risk factors, and knowledge about sexual transmission at the subnational level in the Russian Federation. Our findings revealed that rates of HIV-associated mortality are higher in male individuals than female individuals and are currently concentrated primarily within a few regions of Siberia and the Ural Federal district. Our results also revealed a strong correlation between HIV-associated mortality and virus prevalence. Our analysis of risk factors and other correlates suggest that awareness of safer sex practices was associated with a reduced prevalence of HIV. In addition, and consistent with existing evidence, we found that higher rates of intravenous drug use at the oblast level were associated with a higher prevalence of HIV.

Our findings confirm the rapid rise in HIV-associated mortality with a greater impact on male individuals than female individuals. This finding is consistent with recent evidence reported in the Lancet Global Burden of Disease (GBD) series, which also identified a significant rise in

Table 2. Results of ordinary least squares regression analysis of correlates of HIV prevalence in $\log_{10}$ (per 100 000).

Variable	$\log_{10}$ HIV prevalence and 95% confidence interval
Percentage reporting that they are aware that condoms are effective in reducing the risk of HIV (log)	-1.49^{*} (−3.27 to 0.29)
Percentage reporting that they know where to obtain a test for HIV (log)	0.54 (−0.77 to 1.86)
Percentage reporting that they believe that HIV can be transmitted by sharing food utensils (log)	0.34 (−0.69 to 1.37)
Gross regional product (GRP) per capita, (log)	0.52^{**} (0.03–1.01)
Total patients with drug addiction, per 100 000 people (log)	0.39^{**} (0.06–0.73)
Intercept	-46.92^{**} (−85.08 to −8.76)
Number of observations	81
F test	*P* value = 0.0001
R^2	0.36

The full table also includes the following information: GRP per capita growth, population density (per square km), the fraction of the population living in an urban setting, doctors per 10 000 persons, nurses per 10 000 persons, hospital beds per 10 000 persons, female to male ratio, and poverty rate (all in log form; Appendix Table A3, http://links.lww.com/QAD/C729); $^{**}P$ less than 0.05, and $^{*}P$ less than 0.10. The values reported above are parameter estimates based on the results of regression analyses. All models were estimated with robust standard errors (SE). The tables also report the 95% confidence intervals. Sources: Rosstat, Federal AIDS Center, and authors' estimates.

HIV-associated mortality in Russia [26]. Interestingly, the results of the GBD study do not suggest that the observed increases in HIV-associated mortality correlated directly with economic upheaval, as is typical for many other causes of mortality [26]. Moreover, the national level HIV rates are higher than the equivalent indicators for countries in the wider Eastern European region that have consistently had higher HIV-related mortality rates compared with Western European countries [2].

We also determined that HIV-associated mortality is higher in regions with higher HIV prevalence, a finding that is consistent with the relatively low levels of ART use among HIV-positive individuals in Russia, as shown in the Results section of the article [19]. Previous evidence has shown that HIV-infected individuals who have access to HAART, generally, have greater chances of survival when compared with their counterparts without access to this drug regimen [27,28]. Nonetheless, the use of ART in the Russian Federation remains low. Available national-level data suggest that only ∼45% of those diagnosed with HIV in 2018 received ART; this fraction represented only 35% of the estimated number of PWH in the Russian Federation [29]. Several factors should be kept in mind when considering the comparatively low levels of ART coverage in Russia: social stigma [29], barriers that include the 'labyrinthine bureaucracy' that currently governs access to ART, 'system verticalization' [30], and price [31]. However, while the price of ART has been a problem in the past, several recent positive developments have been introduced to address this issue. Over the past 10 years, the fraction of antivirals produced domestically in Russia increased from 9.5 to 46.5%, thereby reducing the price of first-line antiretrovirals by ∼10-fold [31].

The results of our modeling exercise suggest that there is a strong link between the prevalence of intravenous drug use and HIV infection at the oblast level. Previous studies documented the high incidence of HIV infection in oblasts bordering Kazakhstan and those located in proximity to the principal overland heroin and opioid trafficking routes from Afghanistan, which remains among the world's largest producers of illicit opioids [7]. There are several reasons why the use of intravenous drugs persists as one of the main modes of HIV transmission in the Russian Federation. First and foremost, Russia has no programs involving opioid substitution therapy [7] while access to needle and syringe exchange programs decreased abruptly after Russia disengaged from the Global Fund [32]. However, even before this event, access to syringes and needles was frequently limited because pharmacies were unable to maintain adequate stocks and/or presented negative attitudes towards PWID [33]. The results of our modelling, which document the correlation between HIV prevalence and HIV-associated mortality, highlight the nontrivial potential benefit of introducing and scaling up these interventions. Cepeda *et al.* [32] suggested that extending opioid substitution therapy and needle-sharing programs to 50% of PWID, providing access to ART for those in need, and initiating efforts designed to integrate drug and HIV treatment services would result in a 53 and 76% reduction within 10 years in the number of new infections in Omsk and Ekaterinburg, respectively, which are two cities with severe HIV epidemics associated with intravenous drug use.

Furthermore, our results revealed that having some knowledge of how HIV is transmitted is inversely associated with HIV prevalence at the sub-national level. This is an important finding, which suggests that prevention and counseling programs designed to improve client awareness can be used to reduce the risk of HIV infection [34]. However, Russia lags behind the global effort to develop HIV prevention policies, which is a systemic problem that unfortunately reflects the overall clinical orientation of the Russian healthcare system [35]. Russia also has no government-funded condom distribution programs. Thus, while condoms are easily accessible, anecdotal evidence suggests that they are used infrequently. Condom use has been repeatedly discouraged by organizations that promote 'faithfulness' and 'traditional values' [29]. Moreover, given the current focus on traditional family values and the increasing influence of the Russian Orthodox Church, there is very little opportunity to provide human sexual education, engage in discussions of sexuality, or promote condom use [29]. The actions of the Russian Orthodox Church in its role as a moral entrepreneur and 'norm-protagonist' against sexual minorities have been well documented [36]. The situation faced by victims of human trafficking is particularly dire. These individuals are for the most part undocumented; necessary outreach and resources for these individuals are minimal to nonexistent [37].

Our study has some limitations. First, HIV prevalence may be underreported, given the difficulties in arriving at precise estimates of HIV prevalence in countries with a concentrated epidemic. This may have resulted in a significant downward bias to our findings, both those reflected by the descriptive statistics as well as in the modeling analysis. Second, the available mortality data document only the primary cause of death. These deaths may not all be specifically HIV-related, even those recorded for PWH. Given the high rate of co-infection with both HIV and TB in the Russian Federation, this problem may also introduce bias in the estimates provided. Third, our modeling is based on OLS analysis and thus establishes association, rather than causation. Finally, the R^2 value resulting from the OLS analysis is $\sim$0.4; this finding suggests that other factors, apart from those captured in the model, might also explain the variation in the rate of HIV prevalence among oblasts in the Russian Federation. More data, particularly on other marginalized communities (e.g. MSM, sex workers) should be collected at the national level in order to create a more complete picture. Given the current social and religious realities in Russia, the fraction of the population represented by sexual minorities and other high-risk/marginalized communities is difficult to determine. Likewise, our population data at the oblast level includes all persons and was not limited to adults. Thus, we did not include calculations based on the WHO-recommended estimate of the size of the MSM population. Finally, the data used in our analysis were from KAP respondents and those reported by the authorities (for the control variables). Thus, the standard caveats regarding survey recall bias are also applicable in this case. Nonetheless, our study is a comprehensive effort to compile oblast-level data from various sources in order to analyze oblast-level patterns of both prevalence and mortality because of HIV and their associated factors.

In conclusion, our findings suggest the need for several new policy changes. First, any efforts made to reduce the prevalence of HIV are likely to have a direct impact on HIV-associated mortality. This may be achieved by increasing the availability of needle-sharing programs and the introduction of opioid substitution therapy for PWID. Although the legalization of opioid agonist treatments and needle exchange programs might be a useful first step toward controlling the HIV epidemic, caution must be exercised. These efforts should not be misconstrued as justifying a 'war on drugs' focused on police action and not the healthcare needs of IDUs and other PWH. If anything, actions of this nature would result in further marginalization, thereby reducing the efficacy of the outreach programs. Second, given that our findings also suggest the importance of knowledge regarding HIV transmission, prevention programs that focus on the benefits of safer sex practices might be scaled up and targeted to both the general population as well as those identified as high risk for infection. Some of these programs might be administered cost-effectively by nongovernmental agencies via social contracting [38]. The social and political transformations underway in Russia will most likely present serious challenges in addressing the HIV epidemic. However, the global goals of ending HIV-related mortality and eliminating new HIV infections must remain under focus.

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Ethical clearance: this study is a secondary analysis based on data available in the public domain. No ethical clearance was needed or sought.

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Conflicts of interest

There are no conflicts of interest.

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