A Geospatial Bibliometric Review of the HIV/AIDS Epidemic in the Russian Federation

Megan E. Gray Neils 1*, Herman O. I. Pfaeffle 2, Art T. Kulatti 2, Alena Titova 3, Galina S. Lyles 4, Yulia Plotnikova 5, Elena Zorkaltseva 6, Oleg B. Ogarkov 7, Serhiy M. Vitko 1, Rebecca A. Dillingham 1 and Scott K. Heysell 1*

1 UVA Division of Infectious Diseases & International Health, University of Virginia Medical Center, Charlottesville, VA, United States, 2 University of Virginia School of Medicine, Charlottesville, VA, United States, 3 College and Graduate School of Arts & Sciences, University of Virginia, Charlottesville, VA, United States, 4 UVA Division of Pulmonary & Critical Care Medicine, University of Virginia Medical Center, Charlottesville, VA, United States, 5 Irkutsk AIDS Center, Irkutsk, Russia, 6 Irkutsk State Medical Postgraduate Education Academy, Irkutsk, Russia, 7 Scientific Centre of the Family Health and Human Reproductive Problems, Irkutsk, Russia

Background: Increasing rates of HIV/AIDS in Eastern Europe and Central Asia contrast global trends, but the scope of HIV/AIDS research originating from Russian Federation and countries of the former Soviet Union has not been quantified.

Methods: We searched six major scientific databases in Russian and English languages with medical subject heading terms “HIV” or “AIDS” and “Russia” or “Soviet Union” from 1991 to 2016. Each abstract indexed was reviewed and tagged for 25 HIV/AIDS research themes, location of research focus and first author.

Results and Discussion: A total of 2,868 articles were included; 2,156 (75.1%) and 712 (24.8%) described research in the Russian Federation and countries of the former Soviet Union, respectively. There were 15 publications per million population in Russian Federation. Federal districts of the Russian Federation with the highest rates of HIV had the most limited publications. An interactive web-map with time-lapse features and links to primary literature was created using ArcGIS® technology [http://arcg.is/2FUIJ5v].

Conclusion: We found a lower than expected publication rate in the Russian Federation relative to rising HIV prevalence. The greatest deficits were in the most HIV burdened regions in the Russian Federation. Our findings highlight opportunities for new research strategies and public health efforts among key populations and subnational regions.

Keywords: HIV, acquired immunodeficiency syndrome, Russia, USSR, bibliometrics, intravenous substance abuse, publications, tuberculosis

INTRODUCTION

There are increasing rates of new Human Immunodeficiency Virus (HIV) infections in Eastern Europe and Central Asia, while the majority of other regions of the world now have decreasing rates of infection (1). The Russian Federation estimates over 1.1 million people living with HIV in the country in 2017 accounting for 80% of new HIV infections in all of Eastern Europe and Central Asia (2, 3). Research is required to inform appropriate scientific, public health, and policy interventions to combat the HIV epidemic and published output is generally reflective of near-current federal or regional priorities. As HIV research and public health efforts are expanding across the world, the
extent and scope of HIV research in the Russian Federation and Eastern Europe, mainly consisting of the countries of the former Soviet Union, have not yet be quantified or comparatively examined.

The Soviet Union dissolved in 1991. The first case of HIV was seen 4 years prior (4). This political and legislative transition led to significant economic and social challenges for both the Russian Federation and countries of the former Soviet Union. Though the Russian Federation is now considered an upper middle-income country, the response to the HIV epidemic has differed from other higher income settings (5). Currently, new HIV infections in the Russian Federation are acquired through injection drug use (IDU) in half of cases. However, the epidemic is growing not only in higher-risk populations such as people who inject drugs (PWID), men who have sex with men (MSM), and sex workers, but also in the those less historically marginalized from the health care system (2). As of 2016, HIV was one of the top ten causes of premature death in the Russian Federation, a 41% proportional increase from 2005 (6). The progression of HIV infection to acquired immunodeficiency syndrome (AIDS) and co-infections with Hepatitis B virus, Hepatitis C virus (HCV), and Mycobacterium tuberculosis (TB) all contribute to the rising mortality rate (7).

In 2015 the Russian Government released a “State Strategy to Combat the Spread of HIV” with goals to expand HIV screening, increase antiretroviral availability and reduce new HIV infections as well as mortality related to AIDS and co-morbid infections, specifically viral hepatitis and TB (7). HCV co-infection in people living with HIV is known to lead to more rapid progression to decompensated cirrhosis (8). Seventy-two percent of PWID in the Russian Federation are infected with HCV (9) and treatment for HCV is not routinely available to PWID (10, 11). TB has been a major public health issue in the Russian Federation since the early twentieth century (12), but contemporary Russia now faces the additional challenge of multi-drug resistant TB (MDR-TB). Thirty-four percent of all cases of TB in the Russian Federation are MDR-TB making it the third-highest burdened country in the world (13). PWID are the highest risk group for the acquisition of TB and MDR-TB in the Russian Federation, and co-infection with HIV increases treatment failure 7-fold and risk of death 3-fold (14). Eastern Europe also confronts similar challenges with MDR-TB (15). However, each country of the former Soviet Union has unique political and social landscapes that make it unwise to consider Eastern Europe and Central Asia as a distinct epidemiologic expanse without more localized data.

Given the immense HIV epidemic in the region of the Russian Federation and countries of the former Soviet Union, a robust research response would be expected. The first bibliometric analysis of AIDS was published in 1992, and captured the scientific literature that presented HIV as the causative infection of AIDS (4). Since that time, several bibliometric analyses have been completed to evaluate HIV/AIDS research in specific regions of the world (16–21), none have analyzed HIV/AIDS literature specifically in the Russian Federation. In order to better understand how the HIV epidemic in this region has been assessed and measured, we aimed to capture publicly available scientific literature pertaining to HIV/AIDS in the Russian Federation and countries of the former Soviet Union in both English and Russian language databases. Understanding the limitations of causative assumptions from this bibliometric work, we further developed an interactive web-map that could be used by researchers and policy makers to guide future interventions and allow for additional evaluation of research output.

METHODS

Bibliometric Analysis Study Design

Four major English-based scientific databases: PubMed®, Web of Science®, Embase (Elsevier)®, and eLibrary®, and two additional Russian databases: Central Scientific Medical Library, and Moscow State Medical University Library were searched using the medical subject heading terms “HIV” or “AIDS” AND “Russia” or “Soviet Union”- a term that links to other country-specific headings. The search was limited to articles electronically published after December 31, 1990 to coincide with the dissolution of the Soviet Union and the beginning of the HIV epidemic in the region, and before January 1, 2017 to assure to account for delayed postings of publications in the final year of review. Articles in English or Russian were included if HIV/AIDS, Russian Federation and/or former Soviet Union were contained within the title or abstract text, or if any author locations were in the Russian Federation or countries of the former Soviet Union. News articles, editorials, commentaries, and those that did not fit the search criteria were excluded.

Data Collection and Analysis

Title, author details and the available abstract text from each article were reviewed. Each article was manually tagged for 25 HIV research themes based on the information presented in the title and abstract. The city and country of the research focus were also collected. The research focus either represented the population of interest or the location where the laboratory research was conducted. In addition, the location of the first author was collected. Articles and data were initially stored using Zotero citation manager®, which also automatically extracted certain bibliographic data, such as article title, abstract text, author information, and digital object identifiers from included articles. Microsoft Excel® was used for data exportation and cleaning before transfer to IBM SPSS Statistics®, which was used for analysis. The chi-squared test was used to evaluate the differences in research themes with Bonferroni correction to determine statistical significance of multiple comparisons.

Web-Map Development

Data was translated into an interactive web application using ArcGIS®. Within the application there are three main maps. Map one displays the quantity of research articles from the Russian

Abbreviations: HIV, Human Immunodeficiency Virus; RF, the Russian Federation; FSU, Countries of the Former Soviet Union; HIV, Human Immunodeficiency Virus; PWID, people who inject drugs; MSM, men who have sex with men; IDU, Injection Drug Use; AIDS, Acquired Immunodeficiency Syndrome; HCV, hepatitis C virus; TB, Mycobacterium tuberculosis; MDR-TB, Multidrug resistant Mycobacterium tuberculosis.
TABLE 1 | Quantity of research articles per Russian federal district separated by research theme from 1991 to 2016.

| Research Theme | Total | North Caucasus | Southern | Central | Volga | North-West | Ural | Siberian | Far East | Russia - All | Russia - Unknown |
|----------------|-------|---------------|----------|---------|-------|------------|------|----------|---------|-------------|-----------------|
| Number of articles | 2,156 | 10 | 64 | 521 | 117 | 380 | 63 | 215 | 55 | 177 | 554 |
| Research Theme (% of Districts) | 0.7 | 4.5 | 36.6 | 8.2 | 26.7 | 4.4 | 15.1 | 3.9 | – | – | – |
| Research Theme (% of Total) | 0.5 | 3 | 24.2 | 5.4 | 17.6 | 2.9 | 10 | 2.6 | 8.2 | – | 25.7 |
| Injection drug use | 544 | 6 | 24 | 81 | 33 | 167 | 19 | 46 | 6 | 61 | 101 |
| Virology | 717 | 3 | 28 | 252 | 30 | 50 | 26 | 128 | 39 | 27 | 134 |
| Sexually transmitted diseases | 477 | 0 | 6 | 59 | 21 | 126 | 26 | 48 | 36 | 22 | 133 |
| Prevention | 394 | 0 | 16 | 65 | 23 | 97 | 6 | 38 | 0 | 50 | 99 |
| Genetics/genomics | 427 | 3 | 13 | 181 | 15 | 30 | 9 | 83 | 11 | 11 | 71 |
| Antiretroviral therapy | 319 | 2 | 7 | 102 | 20 | 48 | 12 | 26 | 3 | 23 | 76 |
| Policy | 267 | 0 | 3 | 29 | 13 | 60 | 7 | 3 | 0 | 70 | 82 |
| Infants children adolescents | 194 | 4 | 13 | 29 | 9 | 38 | 7 | 12 | 1 | 16 | 65 |
| Tuberculosis | 211 | 0 | 3 | 31 | 28 | 28 | 5 | 23 | 4 | 27 | 62 |
| Substance use disorder | 185 | 1 | 6 | 28 | 9 | 68 | 5 | 9 | 0 | 15 | 44 |
| Opportunistic infections | 187 | 0 | 3 | 33 | 19 | 30 | 3 | 15 | 0 | 12 | 72 |
| Access to care | 130 | 0 | 1 | 13 | 7 | 49 | 6 | 4 | 0 | 18 | 32 |
| Hepatitis C virus co-infection | 141 | 1 | 3 | 23 | 12 | 25 | 6 | 16 | 0 | 13 | 42 |
| Stigma | 135 | 0 | 3 | 21 | 4 | 38 | 4 | 5 | 0 | 23 | 37 |
| Sex workers | 104 | 0 | 1 | 24 | 7 | 29 | 1 | 8 | 0 | 10 | 24 |
| Alcohol | 135 | 0 | 1 | 14 | 5 | 67 | 2 | 11 | 0 | 7 | 28 |
| Males who have sex with males | 106 | 2 | 5 | 23 | 2 | 34 | 4 | 3 | 0 | 9 | 24 |
| Prisoners/incarceration | 75 | 0 | 1 | 11 | 9 | 18 | 4 | 6 | 0 | 6 | 20 |
| Medication adherence | 51 | 0 | 1 | 5 | 4 | 23 | 1 | 1 | 0 | 3 | 13 |
| Psychiatric illness | 66 | 0 | 1 | 11 | 2 | 29 | 1 | 2 | 0 | 1 | 19 |
| Pre-exposure prophylaxis | 43 | 0 | 1 | 5 | 3 | 6 | 2 | 12 | 0 | 3 | 11 |
| Retention in care | 34 | 0 | 0 | 4 | 0 | 21 | 0 | 0 | 0 | 3 | 6 |
| Coping/spirituality | 19 | 0 | 2 | 2 | 1 | 8 | 1 | 1 | 0 | 1 | 3 |
| Disclosure | 18 | 0 | 0 | 1 | 0 | 13 | 0 | 0 | 0 | 0 | 4 |
| Mobile health | 5 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 1 |

Research theme order based on total dataset.

Federation over the geographic region from which the data or research topic originated. Map two displays the quantity of published studies based on the location of the primary researcher, or first author, highlighting potential research partnerships across the world. Map three and four are time-lapse maps of Map one and two respectively, that visually depict the progression of research from 1991 to 2016. Map one and two have a filter function that allows for interactive visualization as users adjust date ranges and narrow the map results by research themes or location. Additionally, article details are displayed below maps with hyperlinks to full article texts if available on public domains. Tables presenting analyzed data are also displayed below the first two maps. This web application is available to the public: [http://arcg.is/2FUJ5v].

**Thematic Analysis**

A core group of authors collectively enumerated the major findings of the comparative analysis for the Russian Federation to countries of the former Soviet Union and regional differences within the Russian Federation. Thematic analyses were centered in major priorities of international consensus statements for ending the HIV epidemic and the policy priorities of the Russian government’s “Strategy to Combat the Spread of HIV.” Prioritized themes were displayed visually in Results figure and included in the Discussion.

**RESULTS**

A total of 2,868 articles were included, 2,156 (75.1%) and 712 (24.8%) had research focus in the Russian Federation and countries of the former Soviet Union, respectively. Of the 2,156 articles originating from the Russia, 713 (33.9%) had no clear location of the research focus. They were categorized as originating either from “Russia—ALL,” indicating that there was more than one federal district included...
The most prolific federal districts for published research were Central and Northwest. Ural and Siberia had the highest HIV prevalence rates, though their published research productivity was comparatively much lower. The North, South and Far East federal districts showed a slower increase in HIV prevalence with similarly low numbers of published research.

Given thematic analyses and corresponding to the priorities within the Russian Federation’s state strategy to combat HIV and comorbidities, we evaluated trends in TB and HCV research themes over time. The percentage of articles per year related to both TB and HCV as a proportion of the total number of articles trended up in both the Russian Federation and countries of the former Soviet Union, yet this increase was significantly greater for countries of the former Soviet Union when compared to the Russian Federation (Figure 4). The trends in TB and HCV themed HIV research can also be visually depicted through use of the web-map, which shows the total articles related to TB and HCV by research location over time (Figure 4).

**DISCUSSION**

Our systematic geospatial review of HIV/AIDS related research in Eastern Europe/Central Asia and the Russian Federation revealed fewer than expected publications over a 25 year period by formal bibliometric analysis. Of the articles from the Russian Federation, there were 15 publications per million population, which is lower than what has been seen in other comparable bibliometric studies (16). Compared to the Russian Federation with its population of nearly 144 million, a bibliometric analysis of HIV/AIDS research in Lesotho, a
TABLE 2 | A comparison of publication quantity and proportion by research theme relative to total output between the Russian Federation and countries of the Former Soviet Union from 1991 to 2016.

| Research theme | N Total | % RF | N FSU | % FSU | P* |
|-----------------|---------|------|-------|-------|-----|
| Total articles  | 2868    | 100  | 2156  | 75.2  | 710 | 24.8 |
| Injection drug use | 890    | 31.0 | 544   | 25.2  | 346 | 48.6 |
| Virology        | 824     | 28.7 | 717   | 33.3  | 107 | 15  |
| Sexually transmitted diseases | 640    | 23.2 | 477   | 22.1  | 163 | 22.9 |
| Prevention      | 545     | 19.0 | 394   | 18.3  | 151 | 21.2 |
| Genetics/genomics | 544    | 19.0 | 427   | 19.8  | 117 | 16.4 |
| Antiretroviral therapy | 406    | 14.2 | 319   | 14.8  | 87  | 12.2 |
| Policy          | 399     | 13.9 | 267   | 12.4  | 132 | 18.5 |
| Infants children | 312     | 10.0 | 194   | 9.0   | 188 | 16.6 |
| Tuberculosis    | 310     | 10.8 | 211   | 8.8   | 99  | 13.9 |
| Substance use disorder | 291    | 10.1 | 185   | 8.6   | 106 | 14.9 |
| Opportunistic infections | 278    | 9.7  | 187   | 8.7   | 91  | 12.8 |
| Access to care  | 228     | 7.9  | 130   | 6.0   | 98  | 13.8 |
| Hepatitis C virus co-infection | 212    | 7.4  | 141   | 6.5   | 71  | 10  |
| Stigma          | 197     | 6.9  | 135   | 6.3   | 62  | 8.7  |
| Sex workers     | 170     | 5.9  | 104   | 4.8   | 66  | 9.3 |
| Alcohol         | 163     | 5.7  | 135   | 6.3   | 28  | 3.9 |
| Males who have sex with males | 158    | 5.5  | 106   | 4.9   | 52  | 7.3 |
| Prisoners/incarceration | 113   | 3.9  | 75    | 3.5   | 38  | 5.3 |
| Medication adherence | 74     | 2.6  | 51    | 2.4   | 23  | 3.2 |
| Psychiatric illness | 72     | 2.5  | 66    | 3.1   | 6   | 0.8 |
| Pre-exposure prophylaxis | 54     | 1.9  | 43    | 2.0   | 11  | 1.5 |
| Retention in care | 39     | 1.4  | 34    | 1.6   | 5   | 0.7 |
| Coping/Spirituality | 23     | 0.8  | 19    | 0.9   | 4   | 0.6 |
| Disclosure      | 24      | 0.8  | 18    | 0.8   | 6   | 0.8 |
| Mobile health   | 6       | 0.2  | 5     | 0.2   | 1   | 0.1 |

P < 0.0021 (Bonferroni Correction Factor α = 0.05), RF, Russian Federation; FSU, Countries of the former Soviet Union.

A low proportion of all articles from the Russian Federation (3.5%) were tagged with the theme of prisoners/incarceration. Yet the Russian Federation has the highest incarceration rate of any country in Eastern Europe (446 per 100,000), second in the world to the United States (27), and prisons are one of the main settings for the convergence of HIV, HCV and TB acquisition, all amplified by patterns of IDU (10). In the Russian Federation, the HIV prevalence is six times higher than the general population (10). Meanwhile increases in incarceration rates have been shown to account for increases in TB incidence, and TB outbreaks in the community have been linked to TB outbreaks in prisons (27). Co-infection of HIV and HCV among PWID in the Russian Federation is estimated to be as high as 90% (28). While children co-infected with HIV and HCV in the Russian Federation had the highest treatment rate (61%) for HCV of 4 other European countries in one report (29), this trend has not been noted in Russian adults. For instance, only 3% of patients with known HCV reported ever receiving HCV treatment in a cohort of PWID in St. Petersburg (11). Given the significant treatment success rate for HCV achieved with contemporary direct acting antiviral agents for HCV (30), comparable increases in HIV/HCV research output would have been expected. While we observed a proportional increase in HCV themed research in the Russian Federation over the bibliographic time period, the increase was more pronounced for countries of the former Soviet Union.

The Russian government’s State Strategy goals include the development of new technologies for prevention, diagnosis and treatment of HIV with scientifically informed responses (7). There has been an early focus on HIV screening relative to the remaining cascade of HIV care, although current signs suggest a growing commitment to treatment as prevention efforts (3), including among people presenting for hepatitis or TB care (13, 31). Considering the staggering number of TB infections in the Russian Federation with increasing numbers of MDR-TB and extensively drug-resistant-TB (XDR-TB), indicating resistance to nearly all classes of TB therapy, there was a lower than
expected proportion of articles with TB as a research theme (only 10.8% of Russian articles). There was no significant increase in TB themed research over time when compared to countries of the former Soviet Union. TB prevalence also varies among Russian federal districts and is 1.6 times more common in Siberia, and increasingly so among the population of PWID (5, 32). Importantly, we observed the most notable mismatches between scientific output and population adjusted estimates of HIV prevalence in the Siberian and neighboring Ural and Volga regions. Mirroring the separation of HIV and TB research in the Russian Federation, present Russian health care infrastructure favors the division of TB and HIV services. For example, TB physicians cannot directly prescribe antiretroviral therapy. It must be approved by committee and distributed through centralized HIV treatment facilities (32). Our findings suggest that especially in regions such as Volga, Ural and Siberia, expanded research efforts to study access and retention in care for PLWH and TB or PWID are needed to fill critical knowledge gaps.

Two other major high risk populations for HIV acquisition and transmission are MSM and sex workers. There was a statistically significant difference in total number of publications addressing sex workers between the Russian Federation and countries of the former Soviet Union (4.8 vs. 9.3%, \( p = <0.001 \)) with a similar pattern for MSM (4.9 vs. 7.3%, \( p = 0.018 \)). Limited epidemiologic data in the Russian Federation estimated rates of HIV acquisition due to MSM to be 4–6%, but a recent respondent driven sampling study in Moscow showed that of MSM tested for HIV there was a prevalence of >15% (33). Together this suggests that the true magnitude of MSM as an HIV risk group is likely underestimated. The majority of MSM related publications originated from the Central and Northwest districts (78%). While these districts are the most populated regions in the Russian Federation, the small number of publications in the remainder of the Federation is noteworthy.

Our approach of macro bibliometric analysis carries inherent limitations. Firstly, articles were tagged with research themes based on abstract review alone and may therefore have been incomplete or subject to misclassification. We suspect this form of classification bias was small in magnitude and without directionality, as abstracts were reviewed by committee. Importantly, the literature search likely did not capture all output in the Russian Federation or countries of the former Soviet Union. The MeSH term “Soviet Union” was an umbrella term for seven of the 15 countries (Armenia, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Ukraine and Uzbekistan). Countries that were not included in the umbrella were Estonia, Latvia, Lithuania, Azerbaijan, Tajikistan, Uzbekistan, and Belarus. Thus,
while many articles regarding the eight countries not included within the umbrella term were still captured because “Soviet Union” was found in the title or abstract, this may partly explain the observed frequency of articles from Ukraine. Output that was not published in publicly available sources, as is common for doctoral theses, “gray” literature, or working reports, or even that which was published in smaller journals that were not indexed in the major databases we utilized would also be missed. While the majority of research from countries of the former Soviet Union will at least have been referenced in English, if research was exclusively referenced in a database that was not English or Russian language, it may not have been
included. Accessing research that was not in databases would have required extensive onsite participation and authorization from local universities, ministries of health and other repositories that would have been beyond the scope of this review and would have been subject to retrieval biases. Additionally, the comparison of research output relative to the Russian Federation...
regional HIV prevalence was dependent upon regional reports that did not account for deaths among people living with HIV or comparative proportions tested negative for HIV. True prevalence or incidence could not accurately be recorded. A small number of articles may have been represented as multiple data points in the analysis because of links to multiple countries or cities within the Russian Federation. Lastly, given the number and diversity of countries within the former Soviet states and the potential underrepresentation of individual countries throughout the study period given our search strategy, the bulk of secondary analyses and policy related discussion was restricted to the Russian Federation.

CONCLUSION

This geospatial bibliometric review of HIV/AIDS related scientific literature in the Russian Federation and countries of the former Soviet Union shows a lower than expected publication rate in the Russian Federation in response to a massive and growing HIV epidemic. Differences in research themes between the Russian Federation and countries of the former Soviet Union and lagging publication rates among Russian federal districts with high HIV prevalence may indicate opportunities for new research priorities to guide future HIV interventions, in conjunction with those currently proposed by the Russian government. Our findings suggest such focus to include the federal districts of Volga, Ural and Siberia with expansion of interventional research in HIV-related TB and viral hepatitis, and among higher risk populations, such as PWID. An interactive web-map displaying these findings was successfully developed and is now available as a tool for researchers and policymakers.

AUTHOR CONTRIBUTIONS

HP, AK, AT, SV, and MG performed data collection and analysis. HP, AK, SH, OO, GL, RD, EZ, and YP contributed to web-map development. MG and SH wrote the manuscript. YP, EZ, OO, RD, and SH provided edits to the manuscript.

FUNDING

This research was partly funded by the award 5T32 A1007046 - 40 (to MG) and R01 DA044137 (to SH) from the National Institutes of Health and Russian Foundation for Basic Research grant 17-54-30020 (to OO). The supporting institutes had no role in the study design, collection, analysis, interpretation or manuscript composition. The content is solely the responsibility of the authors and does not necessarily represent the official views of the supporting institutes.

ACKNOWLEDGMENTS

We are indebted to the University of Virginia’s Scholars’ Lab for their work in technical aspects of the web-map development. We acknowledge Paige Karp, Diana Renelt and other University of Virginia students who contributed to early stages of the project.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2020.00075/full#supplementary-material

REFERENCES

1. Unaids. AIDS by the Numbers, AIDS is not Over, But it Can Be. (2020). Available online at: https://www.unaids.org/sites/default/files/media_asset/ AIDS-by-the-numbers_2016_en.pdf (accessed April 19, 2018).
2. Federal Scientific for the Prevention and Combat of AIDS of the Public Office of the Central Scientific Research Institute Rospotrebnadzor. Spravka, VICH infektsiya v Rossiskoi Federatsii na 30 iyunya 2016 goda.”Reference on HIV infection in the Russian Federation as of June 30, 2016”. Perm Krai Public Heal Off Perm Krai Cent Prev Combat AIDS Infect.
3. King EJ. Civil society and health. In: Greer SL, Wismar M, Pastorno G, Kosinska M, editors. Civil Society and Health: Contributions and Potential. Copenhagen: World Health Organization (2017). Sections 8.1–8.4.
4. Pratt GF. A decade of AIDS literature. Bull Med Libr Assoc. (1992) 80:380–1. Available online at: https://core.ac.uk/download/pdf/46714697.pdf
5. Beyrer C, Wirtz AL, O’Hara G, Léon N, Karatchkine M. The expanding epidemic of HIV-1 in the Russian Federation. PLoS Med. (2017) 14e1002462. doi:10.1371/journal.pmed.1002462
6. Global Burden of Disease Profile. Russian Federation. (2018). Available online at: http://www.healthdata.org/russia (accessed February 19, 2019).
7. Russian Government. Approving the State Strategy to Combat the Spread of HIV in Russia Through 2020 and Beyond. (2016). Available online at: http://government.ru/en/docs/24983/ (accessed April 19, 2018).
8. Fierer DS, Dietrich DT, Fiel MI, Branch AD, Marks KM, Fusco DN, et al. Rapid progression to decompensated cirrhosis, liver transplant, and death in HIV-infected men after primary hepatitis C virus infection. Clin Infect Dis. (2013) 56:1038–43. doi: 10.1093/cid/cis1206
9. Nelson PK, Mathers BM, Cowie B, Hagan H, Des Jarlais D, Horyniak D, et al. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews. Lancet. (2011) 378:571–83. doi:10.1016/S0140–6736(11)61997–0
10. Altice FL, Azbel L, Stone J, Brooks-Pollock E, Smyrnov P, Dvoryak S, et al. The perfect storm: incarceration and the high-risk environment perpetuating transmission of HIV, hepatitis C virus, and tuberculosis in Eastern Europe and Central Asia. Lancet. (2016) 388:1228–48. doi:10.1016/S0140–6736(16)30856-X
11. Tsui JI, Ko SC, Krupitsky E, Lioznov D, Chaisson CE, Gnatienko N, et al. Insights on the Russian HCV care cascade: minimal HCV treatment for HIV/HCV co-infected PWID in St. Petersburg. Hepatol Med Policy. (2016) 1:13. doi:10.1186/s41124–016–0020-x
12. Yablonskii PK, Vizel AA, Galkin VB, Shulgina M V. Tuberculosis in Russia. Its history and its status today. Am J Respir Crit Care Med. (2015) 191:372–6. doi:10.1164/rcrm.201305–0926OE
13. Keshavjee S, Yedilbayev A, Sweeney C. The Sputnik Initiative: Patient-Centered Accompaniment for Tuberculosis in Russia | Partners in Health. (2014). Available online at: https://www.pih.org/practitioner-resource/the-sputnik-initiative-patient-centered-accompaniment-for-tuberculosis-in-r (accessed July 5, 2018).
14. TB/HIV coinfection (2018). Available online at: http://www.euro.who.int/en/health-topics/communicable-diseases/tuberculosis/data-and-statistics/tbhiv-coinfection (accessed July 5, 2018).
15. Post FA, Grint D, Werlinrud AM, Panteleev A, Riekstina V, Malashenkov EA, et al. Multi-drug-resistant tuberculosis in HIV-positive patients in Eastern Europe. *J Infect*. (2014) 68:259–63. doi: 10.1016/j.jinf.2013.09.034

16. Uusiku A, Toompere K, Laisaar KT, Rosenthal M, Pürjer ML, Knellwolf A, et al. HIV research productivity and structural factors associated with HIV research output in European Union countries: a bibliometric analysis. *BMJ Open*. (2015) 5:e006591. doi: 10.1136/bmjopen-2014–006591

17. Fajardo-Ortiz D, Lopez-Cervantes M, Duran L, Dumontier M, Lara M, Ochoa H, et al. The emergence and evolution of the research fronts in HIV/AIDS research. *PLoS ONE*. (2017) 12:e0178293. doi: 10.1371/journal.pone.0178293

18. Mugomere E, Bekele BS, Mafaea M, Maibrise C, Tarirai C, Aiyuk SE. A 30-year bibliometric analysis of research coverage on HIV and AIDS in Lesotho. *Health Res Policy Syst*. (2017) 15:21. doi: 10.1186/s12961–017–0183-y

19. Uthman OA. Pattern and determinants of HIV research productivity in sub-Saharan Africa: bibliometric analysis of 1981 to 2009 PubMed papers. *BMC Infect Dis*. (2010) 10:47. doi: 10.1186/1471–2334.10–47

20. Falagas ME, Bliziotis IA, Kondilis B, Soteriades ES. Eighteen years of research on AIDS: contribution of and collaborations between different world regions. *AIDS Res Hum Retroviruses*. (2006) 22:1199–205. doi: 10.1089/aid.2006.22.1199

21. Bai J, Li W, Huang Y-M, Guo Y. Bibliometric study of research and development for neglected diseases in the BRICS. *Infect Dis Poverty*. (2016) 5:89. doi: 10.1186/s40249–016–0182–1

22. United Nations Office on Drugs and Crime. *Drug Trafficking*. (2018). Available online at: http://www.unodc.org/unodc/en/drug-trafficking/index.html (accessed July 5, 2018).

23. World Prison Brief (2016). Available online at: http://www.prisonstudies.org/world-prison-brief-data (accessed April 18, 2018).

24. Larney S, Peacock A, Leung J, Colledge S, Hickman M, Vickerman P, et al. Global, regional, and country-level coverage of interventions to prevent and manage HIV and hepatitis C among people who inject drugs: a systematic review. *Lancet Glob Heal*. (2017) 5:e1208–20. doi: 10.1016/S2214–109X(17)30373–X

25. Parsons D, Burrows D, Bolotbaeva A. Advocating for opioid substitution therapy in Central Asia: much still to be done. *Int J Drug Policy*. (2014) 25:1174–7. doi: 10.1016/j.drugpo.2014.01.004

26. Chingin A, Fedorova O. Turkmenistan Drug Situation and Drug Policy. *Frontiers in Public Health | www.frontiersin.org*. 2014. Available online at: https://rpm.coe.int/drug-situation-and-drug-policy-by-alex-chingin-and-olga-fedorova-decem/168075f300 (accessed August 6, 2018).

27. Stuckler D, Basu S, McKee M, King L. Mass incarceration can explain population increases in TB and multidrug-resistant TB in European and Central Asian countries. *Proc Natl Acad Sci USA*. (2008) 105:13280–5. doi: 10.1073/pnas.0801200105

28. Report of the Global Commission on Drug Policy. *The Negative Impact of the War on Drugs on Public Health: The Hidden Hepatitis C Epidemic*. (2013). Available online at: www.arud.ch (accessed July 5, 2018).

29. Turkova A, Giacomet V, Goetghbeuer T, Mikoenko M, Nicolini LA, Noguer-Julian A, et al. HCV treatment in children and young adults with HIV/HCV co-infection in Europe. *J virus Erad*. (2015) 1:179–84.

30. Gutierrez JA, Lawitz EJ, Poodrad F. Interferon-free, direct-acting antiviral therapy for chronic hepatitis C. *J Viral Hepat*. (2015) 22:861–70. doi: 10.1111/jvh.12422

31. Ogarkov OB, Ebers A, Zhdanova S, Moiseeva E, Koshcheyev ME, Zorkaltseva E, et al. Administrative interventions associated with increased initiation on antiretroviral therapy in Irkutsk, Siberia. *Public Heal Action*. (2016) 6:252–4. doi: 10.5588/pha.16.0050

32. Heysell SK, Ogarkov OB, Zhdanova S, Zorkaltseva E, Shugaeva S, Gratj J, et al. Undertreated HIV and drug-resistant tuberculosis at a referral hospital in Irkutsk, Siberia. *Int J Tuberc Lung Dis*. (2016) 20:187–92. doi: 10.5858/ijtlrd.14.0961

33. Wirtz AL, Zelaya CE, Latkin C, Peryshkina A, Galai N, Mogilnui V, et al. The HIV care continuum among men who have sex with men in Moscow, Russia: a cross-sectional study of infection awareness and engagement in care. *Sex Transm Infect*. (2016) 92:161–7. doi: 10.1136/sxtrans-2015–052076

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2020 Gray Neils, Pfaeffle, Kalatti, Titova, Lyles, Plotnikova, Zorkaltseva, Ogarkov, Virko, Dillingham and Heysell. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.