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Human rights protections and HIV prevalence among MSM who sell sex: Cross-country comparisons from a systematic review and meta-analysis

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Abstract

Laws and policies can affect the HIV risk of key populations through a number of direct and indirect pathways. We investigated the association between HIV prevalence among men who engage in transactional sex and language in the penal code protecting sexual minorities, including men who have sex with men (MSM), and sex workers. HIV prevalence among men who engage in transactional sex was assessed through meta-analysis of published literature and country surveillance reports. Meta-regression was used to determine the association between HIV prevalence and protective laws for sexual minorities and sex workers. Sixty-six reports representing 28 countries and 31,924 individuals were included in the meta-analysis. Controlling for multiple study- and country-level variables, legal protection for sexual minorities was associated with a 10.9% (95% CI: 3.8 to 18.0%) and sex workers associated with a 7.0% (95% CI: 1.3 to 12.8%) decrease in country-level HIV prevalence among men who engage in transactional sex. Laws that seek to actively protect sex workers and MSM may be necessary to decrease HIV risk for this key population.

INTRODUCTION

Globally, the HIV epidemic disproportionately affects key populations, including men who have sex with men (MSM) and sex workers. (Baral et al., 2014; 2012; Baral, Sifakis,

Cleghorn, & Beyrer, 2007; Beyrer et al., 2012; Oldenburg, Perez-Brumer, et al., 2014b; Strathdee et al., 2010) Vulnerability to HIV infection among these populations is driven by complex social forces at multiple levels, including individual (e.g., biological and behavioral factors), interpersonal (e.g., social and sexual networks), community (e.g., community stigma towards certain populations), and structural (e.g., laws and public policies). (Baral, Logie, Grosso, Wirtz, & Beyrer, 2013; Gruskin, Ferguson, Alfvén, Rugg, & Peersman, 2013) Recently, work with female sex workers has suggested the importance of macro-structural and community factors in determining HIV transmission (Tan & Melendez-Torres, 2015), and in particular has suggested that decriminalization of sex work could have a major effect in slowing the course of the HIV epidemic in this population (Shannon et al., 2014), and that criminalization has augmented the HIV epidemic for sex worker populations. (Beyrer et al., 2015) For male sex workers, laws related to homosexuality may be as important as those related to sex work on influencing the trajectory of the HIV epidemic. While there has been considerable theoretical discussion of the role of laws in shaping the HIV epidemic, (Beyrer et al., 2015; Boltaev et al., 2013; Feki et al., 2014; Strathdee, Wechsberg, Kerrigan, & Patterson, 2013) there have been relatively few empirical investigations, particularly among male sex workers. A recent study in Europe demonstrated an association between laws related to transactional sex and prevalence of buying and selling sex among MSM. (Berg, Schmidt, Weatherburn, & The EMIS Network, 2014) In particular, the role of protective laws in mitigating HIV transmission among this population has rarely been considered. (Overs & Hawkins, 2011) The current study seeks to address this gap in the literature.

One role of protective laws is to defend and support the human rights of populations. (Burris, 2006) Examples of these laws include protection against violence (e.g., domestic violence laws), employment non-discrimination laws, and protection from hate crimes. Research conducted in the United States has shown that laws conferring protections to gays and lesbians are associated with reductions in sexual orientation health disparities. For instance, in one study, researchers coded state policies according to whether their hate crime statutes and employment non-discrimination acts covered sexual orientation as a protected class, and then linked this policy information to individual-level data on mental health and sexual orientation from a nationally representative survey of adults. Sexual-orientation disparities in dysthymia (a mood disorder) were eliminated in states with protective policies; however, lesbian, gay, and bisexual (LGB) adults who lived in states with no protective policies were nearly 2.5 times as likely to have dysthymia than were heterosexuals in those same states. (Hatzenbuehler, Keyes, & Hasin, 2009)

The existence of protective laws for subgroups of populations may lead to reduction of HIV via several mechanisms. (Oldenburg et al., 2015) For example, in the absence of employment non-discrimination laws, it may be more difficult for MSM to find employment, and they may also be at higher risk of losing their employment. This may lead to reliance on sex work, and further to engaging in higher-risk commercial sexual encounters if clients are willing to pay more for condomless intercourse, which may lead to amplified HIV transmission. Protective laws for MSM and sex workers may also make it easier for MSM sex workers to access HIV prevention and other healthcare services. Importantly, protective laws may also reduce social stigma. Indeed, the existence of protective laws may

improve the social environment for stigmatized populations through changing social norms that reduce stigma. (Burris, 2006) Given that social stigma can be internalized and manifest as depression, which can be associated with increased sexual risk behavior, (Logie, Newman, Chakrapani, & Shunmugam, 2012; Oldenburg, Biello, et al., 2014c) reductions in social stigma via laws and policies may decrease HIV risk. Conversely, it is also possible that in some cases protective laws may lead to greater social engagement in gay communities, which could facilitate HIV transmission in certain settings if there is an increase in probability for contact between HIV-infected and HIV-uninfected men.

Men who engage in transactional sex (i.e., exchange sex for money, shelter, drugs, or other items of value) represent a diverse and heterogeneous group that bears a disproportionate burden of the HIV epidemic compared to men who do not engage in transactional sex. (Oldenburg, Perez-Brumer, et al., 2014b) Many, but not all, men who engage in transactional sex do so with other men, and as such may represent a subgroup of the MSM population. (Baral et al., 2014) However, men who engage in transactional sex may face multiple dimensions of stigma and discrimination that affect HIV risk at multiple levels. (Baral et al., 2013; Berg, Ross, Weatherburn, & Schmidt, 2013) At the structural level, men who engage in transactional sex may be affected by both sex work laws and homosexuality laws. Moreover, even in settings that have explicit language in their penal code protecting female sex workers (FSW), men who engage in transactional sex may not receive similar protections if gendered language is used, or their exact legal status may be unclear. These laws also implicitly make assumptions that sex workers are victims. For men who engage in transactional sex, this assumption obscures a multitude of power relations embedded within work structures that men may face through sex work, particularly in settings with high levels of stigma related to homosexuality. Lack of protection, or lack of perceived protection, may limit individuals' abilities to seek healthcare, including HIV prevention services, and may leave individuals at increased vulnerability to violence and discrimination, limited access to condoms and increasing HIV infection risk. (Pachankis et al., 2015; Poteat et al., 2011; Schwartz et al., 2015; Semugoma, Beyrer, & Baral, 2012) International organizations, civil rights leaders, and advocates have strongly argued for protective laws and against criminalization laws to protect affected groups from human rights abuses and to control spread of HIV (Forbes, 2010; Global Coalition on Women and AIDS, 2005); however, whether these laws are effective in reducing HIV risk among men with transactional sex is currently unknown.

Although decriminalization of same-sex activity and sex work remain essential goals for policy reform, from both the perspective of human rights and to address the HIV epidemic, specific language in the penal code that protects particular groups may go beyond decriminalization in terms of protections of groups. To investigate whether protective language in penal codes was associated with reduced HIV prevalence among men who engage in transactional sex at the country level, we conducted a meta-regression analysis of data extracted in a systematic review and meta-analysis. We estimated the relationship between national HIV prevalence among men who engage in transactional sex and the presence of protective language in countries' penal codes. The motivation for our research question is to provide empirical evidence bearing on the role of legal reform as a structural HIV prevention strategy. We hypothesized that the presence of protective language in the

penal code would be associated with decreased HIV prevalence among men engaged in transactional sex.

METHODS

Outcome Variable: Country-level HIV Prevalence Among Men Who Engage in Transactional Sex

We conducted a systematic review to identify studies published over the ten-year period between January 1, 2004 and July 31, 2013 reporting HIV prevalence among men who reported engagement in transactional sex. The methods we used for the systematic review and meta-analysis have been previously reported in detail. (Oldenburg, Perez-Brumer, et al., 2014b) Briefly, 7 electronic databases, conference abstracts for 4 international conferences, and HIV surveillance reports (including Demographic & Health Surveys and Integrated Biological and Behavioral Surveillance) were searched for studies reporting primary, quantitative data on HIV prevalence among men (individuals assigned a male sex at birth and presently identifying as a man) who reported exchanging sex for anything of value, including money or drugs. Reference lists of all included studies were also cross-checked to identify any additional articles that met inclusion criteria. Studies were excluded from the present analysis if they did not report biological assay-confirmed HIV prevalence (i.e., we excluded studies in which HIV status was reported by respondents but not confirmed biologically) or if they had a sample size of fewer than 50. Data extracted included HIV prevalence in the study, region and country of study origin, and year of publication. Study-level HIV prevalence was chosen as the outcome of interest because individual-level HIV data were not available in data extracted during the systematic review.

Exposure Variable: Laws Related to Homosexuality and Sex Work

Laws related to homosexuality and sex work were extracted from the UNAIDS AIDSInfo website (www.aidsinfoonline.org). This site collects and organizes country-level HIV data, including HIV testing, prevalence, and treatment estimates as well as compiling country-level laws and policies. Data regarding protective laws for sex workers and sexual minorities, including MSM, were coded based on country responses to the topic “Has laws that protect sex workers” and “Has laws that protect men who have sex with men” and were based on penal codes as of 2011. Protective laws for MSM were cross-checked with the 2013 International Lesbian Gay Bisexual Trans and Intersex Association (ILGA) world survey of criminalization and protection of same-sex relationships and activity. (Itaborahy & Zhu, 2013) The presence of any laws protecting MSM was coded as presence of protective language in the penal code for MSM. Criminalization of same-sex activity and sex work were also extracted from the UNAIDS AIDSInfo website. The majority of laws related to criminalization of same-sex activity and protection of sexual minorities were enacted prior to studies included in this analysis (Itaborahy & Zhu, 2013), with the exception of Nepal which legalized same-sex activity in 2008.

Control Variables

Additional country-level data that were used as covariates included general male population HIV prevalence, GDP per capita, unemployment among males, and population structure.

These variables were chosen because they are well measured in almost all countries worldwide and are plausible confounders of the relationship between laws and HIV prevalence among men who engage in transactional sex. These variables may potentiate engagement in sex work (e.g., in countries with higher unemployment, there may be increased reliance on sex work), and economic vulnerability has been shown to be associated with amplified HIV transmission. (Deering et al., 2013; Oldenburg, Perez-Brumer, & Reisner, 2014a) General male population HIV prevalence was calculated as previously described, (Baral et al., 2007; Oldenburg, Perez-Brumer, et al., 2014b) using UNAIDS 2009 data for the total estimated number of HIV cases as the numerator and the United States Census Bureau International Division data for the total number of men aged 15 and over in the global population in 2009 as the denominator. GDP per capita and unemployment among males (percent of total labor force) were extracted from the World Bank Development Indicators database (<http://data.worldbank.org/data-catalog/world-development-indicators>), and were extracted for the year closest to each study's publication. Population structure was defined as the proportion of the population aged 15–24 years, and data were extracted from the UN Department of Economic and Social Affairs 2012 Revision (http://esa.un.org/unpd/wpp/unpp/panel_indicators.htm). Study-level variables included year of publication and region from which the data arose.

Statistical Analysis

Random-effects meta-regression was used to create bivariate and multivariable models assessing the association between HIV prevalence and protective laws, controlling for other factors. Meta-regression is a method that models the effect of variables on study effect sizes (in this case, the effects of laws and other factors on HIV prevalence among men who engage in transactional sex). (Stanley & Jarrell, 1989) The meta-regression model is weighted by the power of each individual study. For a random-effects model, the weight for meta-regression is the inverse of both the within- and between-study variance. A random effects model was chosen to account for between-study heterogeneity. (Oldenburg, Perez-Brumer, et al., 2014b) First, bivariate meta-regressions were run including HIV prevalence at the study level as the dependent variable and protective laws for 1) MSM and 2) sex workers as the independent variable (Model 1). A series of nested multivariable meta-regression models were then run for each independent variable of interest, adjusting for study-specific factors as well as male HIV prevalence in the general population (Model 2), and further adjustment for punitive laws (Model 3) and economic factors (Model 4). All analyses were run in Stata 13.1 (StataCorp, College Station, TX). (Harbord & Higgins, 2008)

RESULTS

Of 20,193 titles and abstracts, 547 conference abstracts, and 165 surveillance reports screened, 446 reports were selected for further review, and 66 that reported biological assay-confirmed HIV prevalence and had a sample size of 50 were included in the meta-analysis, representing 31,924 men who engaged in transactional sex with other men in 28 countries. The most commonly-represented regions included Asia (South Asia: 21.1% of studies, East Asia: 18.2%, and Southeast Asia: 18.2%), followed by Latin America (13.2%), Europe (12.1%), Sub-Saharan Africa (10.6%), and North America (6.1%).

The existence of protective laws for MSM was documented in 17 countries (60.7%) and for sex workers in 13 countries (48.1%, Figure 1). Documentation of the existence of protective laws for sex workers was not available for Israel. Figure 1 illustrates overlaps in countries with protective laws for MSM and sex workers, with 6 countries (22.2%) being discordant in the existence of protective laws for MSM or sex workers. Specifically, Bangladesh and Senegal contained protective language in the penal code for sex workers but not for MSM, whereas El Salvador, Mexico, Nepal, and Spain contained protective language in their penal code for MSM but not for sex workers (Figure 1).

Table 2 shows the results of the regressions assessing the relationship between the existence of country-level protective laws for MSM and HIV prevalence among men who engage in transactional sex. In the unadjusted model (Model 1), the existence of a protective law was marginally associated with a -4.9% (95% CI: -10.2%, 0.5%) decrease in HIV prevalence among men who engage in transactional sex. In the fully adjusted model (Model 4), the decrease in HIV prevalence was more than twice as large and was statistically significant: -11.0% (95% CI: -18.1%, -3.8%), indicating that on average countries with protective language in the penal code for MSM had 11% lower HIV prevalence compared to those without protective language.

Table 3 shows the results of the regressions assessing the relationship between the existence of country-level protective laws for sex workers and HIV prevalence among men who engage in transactional sex. In the unadjusted model (Model 1), the existence of a protective law was statistically significantly associated with a -5.5% (95% CI: -10.9%, -0.03%) decrease in HIV prevalence. In the fully adjusted model (Model 4), the decrease was larger and remained statistically significant: -7.0% (95% CI: -12.8%, -1.3%), indicating that on average countries with protective language for sex workers in the penal code had 7% lower HIV prevalence compared to those with no protective language. Punitive laws were not associated with HIV prevalence among men who engage in transactional sex.

DISCUSSION

In this study, we documented a lower HIV prevalence among men who engage in transactional sex in countries that contained protective laws for MSM and sex workers compared to those in countries without such laws. Prior studies in the United States have shown that state laws and policies are robust determinants of health outcomes among sexual minorities, including suicide (Hatzenbuehler, 2011) and psychiatric disorder, (Hatzenbuehler et al., 2009; Hatzenbuehler, Keyes, & McLaughlin, 2011) as well as HIV outcomes such as PEP and PrEP use. (Oldenburg et al., 2015) Our study contributes to a new body of research on public policies and HIV outcomes, and specifically an emerging literature relating to transactional sex. (Berg et al., 2014; Pachankis et al., 2015)

Decriminalization of both same-sex behavior and sex work remain important goals globally, and empirical evidence suggests that decriminalization has positive effects for groups in terms of violence and health outcomes. For example, in Rhode Island, where indoor sex work was decriminalized in 2003, a decrease in sexual violence was noted following decriminalization. (Cunningham & Shah, 2014) The results of the present study, however,

underscore the need to consider the protection of human rights above and beyond decriminalization of same-sex behavior and sex work. In particular, the results of the present study found that, independent of criminalization of either same-sex behavior or sex work, protective laws were associated with decreased HIV prevalence.

The results of this study should be considered in the context of several important limitations. Due to the nature of the available data, the outcome was HIV prevalence at the study level. This study was thus an ecologic analysis, and individual-level inferences cannot be drawn from these data. We cannot rule out that protective laws reflect underlying social changes making discrimination and stigma undesirable rather than being themselves causally responsible for these changes. For example, attitudes towards the LGBT community in the United States changed prior to the overturning of “Don’t Ask, Don’t Tell” and of laws related to the legal right to marriage for same sex couples. (Jones, Cox, & Navarro-Rivera, 2014) In addition, heterogeneity in legislation within countries (for example, state-level laws within the United States) may be an important determinant of HIV vulnerability in this population. We were not able to analyze the effect of legislation at units smaller than the country. However, even if there is heterogeneity within countries, country-level laws likely still influence the environment in which individuals live. Another important limitation is selection effects. Countries that do not publish data on HIV prevalence among men who engage in transactional sex may be the countries where the relationship between laws and HIV prevalence in this group are the strongest. For example, we did not have any data arising from the Middle East and limited data from Sub-Saharan Africa. Thus, our results are not generalizable to these contexts and, importantly, may underestimate the relations that could be observed in other countries. Further work should consider the effect of legal reform on HIV epidemiology as laws change. In addition to the protection of human rights, protective laws likely have tangible impacts on the health of individuals living under them and should be included in advocacy in legal reform, in addition to decriminalization.

The results of this study suggest the need for legal and policy reform to achieve improvements in protective laws for subgroups of MSM, including those who engage in transactional sex. Recently, there have been many changes in terms of both protective and punitive laws for MSM. In the United States, there has been progress in many states with the right to marriage, with many states adopting policies legalizing same-sex marriage. (Human Rights Campaign *Human Rights Campaign 2013 Annual Report*, 2013) In India, on the other hand, although the country’s anti-homosexuality law was determined unconstitutional in 2009 (Misra, 2009), decriminalization was overturned in 2013. The emerging scientific evidence base on the relationship between laws and health outcomes, to which we contribute with this study, will help to ground these arguments in both human rights and empirical evidence for the beneficial effect of protecting populations.

In conclusion, the results of this study demonstrate that merely abolishing punitive laws that criminalize key populations may be insufficient to reduce HIV prevalence among men who engage in transactional sex. Laws that actively protect these groups will likely be necessary to achieve reductions in HIV risk, and governments should seek to implement active legal protections for sex workers and MSM as effective HIV prevention strategies.

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Figure 1.

A. Homosexuality and B. Sex work laws by country included in this study. Blue indicates that the country has protective language in their penal code for MSM/sex workers, and that homosexuality/sex work is not criminalized. Green indicates that the country does not have protective language in their penal code for MSM/sex workers, but that homosexuality/sex work is not criminalized. Orange indicates that the country does have protective language for MSM/sex workers in the penal code, but homosexuality/sex work is criminalized. Red indicates that the country does not have protective language for MSM/sex workers in the penal code, and homosexuality/sex work is criminalized. Countries are labeled as “no data” if there was no HIV prevalence data for men who engage in transactional sex for that country.

Table 1

Descriptive characteristics of the study sample

Variable	Mean (SD) or N (k ¹ , %)
Region	
<i>East Asia</i>	7,221 (12, 18.2%)
<i>Europe</i>	1,854 (8, 12.1%)
<i>Latin America</i>	1,704 (9, 13.6%)
<i>North America</i>	607 (4, 6.1%)
<i>South Asia</i>	14,453 (14, 21.1%)
<i>Southeast Asia</i>	4,477 (12, 18.2%)
<i>Sub-Saharan Africa</i>	1,608 (7, 10.6%)
Year of publication	
<i>2004</i>	508 (3, 4.6%)
<i>2005</i>	3,005 (7, 10.6%)
<i>2006</i>	3,017 (9, 13.6%)
<i>2007</i>	1,850 (3, 4.6%)
<i>2008</i>	5,480 (9, 13.6%)
<i>2009</i>	2,020 (6, 9.1%)
<i>2010</i>	2,079 (9, 13.6%)
<i>2011</i>	6,277 (7, 10.6%)
<i>2012</i>	2,413 (9, 13.6%)
<i>2013</i>	5,275 (4, 6.1%)
General population HIV prevalence, males ²	0.8% (1.3%)
GDP per capita (USD) ³	8,559 (12,787)
Population structure ⁴	17.7% (3.2%)
Country-level unemployment, males ⁵	5.0% (2.9%)

¹ N: number of individuals; k: number of studies;

² Data from UNAIDS for total estimated number of HIV cases as numerator and U.S. Census Bureau International Division for total number of men aged 15 and over.

³ In United States Dollars, data from the World Bank Development Indicators Database;

⁴ data from the United Nations Department of Economic and Social Affairs;

⁵ percent of total labor force, data from the World Bank Development Indicators Database.

Table 2

Associations between legal protection for MSM and HIV prevalence

	Model 1 ¹	Model 2 ²	Model 3 ³	Model 4 ⁴
Country contains language in the penal code that protects the human rights of MSM ¹	−4.9% (−10.2 to 0.5%)	−8.6% (−14.5 to −2.7%)	−11.2% (−17.1 to −5.2%)	−11.0% (−18.1 to −3.8%)
Region		Ref	Ref	Ref
East Asia		6.5% (−0.2 to 13.1%)	2.1 (−6.5 to 10.8%)	−4.0% (−17.8 to 9.9%)
Europe		14.7% (7.9 to 21.5%)	9.4% (0.1 to 18.8%)	9.6% (−1.7 to 21.0%)
Latin America		15.1% (5.4 to 24.9%)	12.5% (0.3 to 22.2%)	5.3% (−11.5 to 22.1%)
North America		−7.7% (−15.3 to −0.2%)	−0.2% (−14.5 to 11.0%)	0.4% (−14.2 to 15.0%)
South Asia		4.1% (−2.9 to 11.2%)	1.7% (−5.3 to 8.6%)	2.5% (−5.1 to 10.1%)
Southeast Asia		22.4% (6.8 to 38.1%)	23.9% (4.9 to 42.9%)	26.0% (3.1 to 48.9%)
Sub-Saharan Africa				
Year		0.6% (−0.2 to 1.4%)	0.6% (−0.2 to 1.4%)	0.6% (−0.3 to 1.4%)
Male general population HIV prevalence		−127.1% (−4.84 to 230%)	−22.6% (−377 to 331%)	−36.4% (−435 to 362)
Criminalization of sex work			−4.3% (−10.8 to 2.3%)	−3.8% (−11.1 to 3.6%)
Criminalization of homosexuality ²			−10.3% (−22.3 to 0.2%)	−10.8% (−23.4 to 1.8%)
GDP per capita				0.2% (−0.2 to 0.6%)
Population structure ³				−0.2 (−1.6 to 1.2%)
Country-level unemployment among men				0.2% (−0.6 to 1.0%)
N (k) ⁵				31,924 (66)
Adjusted R ²	3.3%	65.4%	68.8%	68.1%

Random effects meta-regression with HIV prevalence as the dependent variable.

Abbreviations: MSM = men who have sex with men, GDP = gross domestic product.

¹Country contains language in the penal code that is protective for MSM (i.e., protection from hate crimes or discrimination);

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² country contains language in the penal code that makes same-sex behavior a criminal offense;
³ proportion of population aged 15–24 years; N: number of individuals; k: number of studies.

Table 3

Associations between legal protection for sex workers and HIV prevalence

	Model 1 ¹	Model 2 ²	Model 3 ³	Model 4 ⁴
Country contains language in the penal code that protects the human rights of sex workers ¹	-5.5% (-10.9 to -0.03%)	-8.2% (-13.6 to -2.9%)	-7.9% (-13.3 to -2.5%)	-7.0% (-12.8 to -1.3%)
Region		Ref	Ref	Ref
East Asia				
Europe		2.7% (-5.0 to 10.4%)	0.6% (-0.5 to 10.8%)	-0.1% (-14.8 to 14.5%)
Latin America		12.6% (5.4 to 19.7%)	10.0% (-0.4 to 20.4%)	14.2% (2.4 to 25.9%)
North America		15.7% (6.0 to 25.5%)	14.4% (3.9 to 24.8%)	14.8% (3.2 to 32.7%)
South Asia		-7.3% (-14.6 to 0.03%)	-5.3% (-18.2 to 7.6%)	-0.2% (-15.3 to 14.8%)
Southeast Asia		5.6% (-1.1 to 12.3%)	5.4% (-1.3 to 12.2%)	5.6% (-1.7 to 12.9%)
Sub-Saharan Africa		30.2% (14.6 to 45.7%)	29.8% (9.2 to 50.4%)	38.4% (15.0 to 61.8%)
Year		0.6% (-0.2 to 1.4%)	0.6% (-0.2 to 1.5%)	0.8% (-0.1 to 1.7%)
Male general population HIV prevalence		-286% (-672 to 101%)	-223% (-632 to 185%)	-334 (-773 to 104%)
Criminalization of sex work ²			-2.5% (-10.0 to 4.9%)	-0.2% (-8.3 to 7.8%)
Criminalization of homosexuality			-2.7% (-13.4 to 8.0%)	-3.1% (-14.1 to 7.9%)
GDP per capita				-0.1% (-0.5 to 0.3%)
Population structure ³				-1.0% (-2.3 to 0.3%)
Country-level unemployment among males				-0.1% (-0.9 to 0.7%)
N (k)				
Adjusted R ²	5.0%	66.0%	65.7%	65.7%

Random effects meta-regression with HIV prevalence as the dependent variable.

Abbreviations: MSM = men who have sex with men, GDP = gross domestic product.

¹Country contains language in the penal code that is protective for sex workers (i.e., protection from hate crimes or discrimination);

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country contains language in the penal code that makes sex work a criminal offense;
2 proportion of population aged 15–24 years.
3