

Increase of new HIV diagnoses among men who have sex with men in Poland, 2000 to 2011

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Re-emergence of the human immunodeficiency virus (HIV) epidemic among men who have sex with men (MSM) has been observed in countries of western Europe, North America and Australia since the mid-1990s. We aimed to describe the trends in notification rate of HIV infection among MSM in Poland in order to provide evidence for further public health action. We performed a descriptive analysis of 2000–11 surveillance data, accounting for missing information on transmission category through multiple imputations. There were 9,286 new HIV diagnoses in Poland in 2000–11, ranging from 546 to 1,095 per year. A total of 6,896 cases were male, 1,943 female. For 5,615 (60.5%) new diagnoses, the transmission category was not reported; among the rest, MSM constituted 24.1% (n=885/3,671). The rate of new HIV diagnoses among MSM per million men increased from 2.5 in 2000 to 33.8 in 2011; in the Mazowieckie region, which includes Warsaw, it rose from 2.2 to 88.8, when adjusting for missing data on transmission category. Our results suggest the need for enhanced, comprehensive prevention among MSM, especially in regions where the increasing rate of new HIV diagnoses suggests ongoing transmission.

Introduction

The global HIV epidemic is considered to have peaked during the second half of the 1990s [1]. However, several regions are experiencing increases of new infections, notably eastern Europe and central Asia, but also western Europe and North America. In particular, re-emergence of the HIV epidemic among men who have sex with men (MSM) has been observed in western Europe, North America and Australia since the mid-1990s [2]. In the European Union, the number of new HIV diagnoses among MSM increased by 33% between 2004 and 2011 [3]. In 2011, 39% of newly detected HIV infections were attributed to sex between men, 23% to heterosexual contacts and 5.4% to injecting drug use [3].

In contrast, the HIV epidemic in Poland remained stable until approximately 2005, at relatively low levels (<20 newly diagnosed HIV infections per million population),

with injecting drug use as the major mode of transmission [4,5]. People who inject drugs accounted for over 75% of HIV cases with known transmission category [4,5]. New HIV diagnoses among people infected through sexual intercourse were uncommon. However, the testing rate among the general population was among the lowest in Europe (at 8.3 per 1,000 population in 2011) [3] and the high proportion of late-presenting cases among sexually infected individuals (20–32%) indicated possible underestimation in the surveillance data of the sexual spread of the virus [4–6]. Until 2005, a slight increase in detection rate was attributed to epidemic maturation [7]. However, a significant increase in new HIV diagnoses across age cohorts occurred after 2005, suggesting emergence of the epidemic [7]. Changes in distribution of the main transmission categories among the people with new diagnoses were also reported, with increasing importance of MSM and heterosexual women and men who do not inject drugs [5,6,8]. However, conclusions were hampered by the high proportion of diagnoses with missing transmission category (over 60%) in routine surveillance data [3,5,6].

HIV prevention services for MSM in Poland remain limited. Monitoring of prevention efforts revealed that in 2007–10, only a few local outreach or community programmes, including education and condom distribution, were targeted at MSM [9]. Additional education was provided through a network of HIV voluntary counselling and testing centres located throughout the country, reaching an estimated 1,500–4,500 MSM clients annually [9]. Internet campaigns were also used. Novel methods such as pre-exposure prophylaxis, which has proved effective and safe [10], are unlikely to be implemented in Poland in near future.

The aim of our study was to analyse the trends in new HIV diagnoses among MSM in Poland, adjusting for missing transmission category in routine surveillance data.

Methods

Data sources

We used data from routine HIV/acquired immunodeficiency syndrome (AIDS) surveillance in Poland, which is a comprehensive case-based national system using European Union case definitions [3]. New HIV diagnoses are reported by laboratories and clinicians to regional public health departments. Regional departments collate the clinical and laboratory reports, collect additional information and forward the forms to the National Institute of Public Health - National Institute of Hygiene. The notifications may be name-based, but the patient has the right to refuse to reveal personal information on the report form. The system relies on paper forms and an electronic registry using a name-based identifier is maintained only at the central level. Clinical and epidemiological information (transmission category) is usually not available in the reporting laboratories. As the laboratories report more cases than clinicians do, there is a high proportion of patients with missing data (clinical characteristics and transmission category). The first AIDS-indicative disease is also reportable, by the diagnosing clinician, and reports of HIV infection and AIDS related to the same person are linked at the regional and/or central level. Therefore, reported HIV cases who develop AIDS are more likely to have complete information regarding transmission category.

In order to minimise the effects of reporting delay, we used data on cases diagnosed up to the end of 2011, but reported by July 2012. The reporting delay was estimated once using all reported cases, and a second time excluding those cases that were notified only as a result of reporting completeness control activities.

We also used the results of an annual survey sent by mail to laboratories that offer HIV screening tests (as opposed to the laboratories performing confirmatory HIV tests, who report new diagnoses), for which data were available for 2003–11. In 2003–11, the number of participating laboratories ranged from 140 to 266, reflecting changes in the market of diagnostic services for HIV. The survey is voluntary and the response rate varied from 59% to 85% in 2003–11. Aggregated data on the number of diagnostic HIV tests performed in each laboratory were collected, excluding tests of blood donors. The reporting form allows disaggregation by transmission category and sex, but only several laboratories are able to provide this information. Only laboratories reporting 10 or more tests among MSM in a given year were included in the analysis in order to exclude data from laboratories not routinely collecting information on transmission category, acknowledging that we will also exclude those who test only a few MSM per year.

Adjustment for missing information on transmission category

Transmission category may be missing in the surveillance data because it is not known to clinicians or, even if known, may not be reported to the public health system by clinicians. In data reported by clinicians (e.g. AIDS case reports), transmission category is not specified for approximately 12% of cases, which suggests that lack of these data may be mostly due to inadequate completeness of reporting. The fact of reporting by a clinician is unlikely differential to transmission category. However, clinicians may be more likely to report cases diagnosed with AIDS, thus bias could result from a more common occurrence of AIDS in one of the categories. As the proportion of missing values for transmission category increased over time and as we expect regional differences related to local collaboration of public health services with clinicians, we assumed that the information is missing at random in any given the year of diagnosis, region and time of diagnosis (late presenter or other). We used a multiple imputation procedure imputing concurrently age (years), sex and transmission category (MSM vs other, conditional on sex) with five imputed datasets [11]. Iterative chained equations were used to account for non-normal distribution of the imputed variables [12]. In this method, the variables with missing values are iteratively imputed on the basis of regression equations estimated on an imputed dataset from the previous step, including as explanatory variables other variables that are being imputed as well as other available covariates.

We used logistic regression for sex and transmission category (MSM vs other) and linear regression for age. Additional explanatory variables included year of diagnosis, region and late presentation (yes vs no). Due to lack of data on CD4 count at diagnosis, we could not use the late presenter consensus definition as outlined in [13]. In our study, a late presenter was defined as person who developed AIDS within a year of HIV diagnosis. Estimates were then produced for each imputed dataset and combined using the Rubin's combination rule [11,12]. The analysis was conducted in STATA 10.1 using 'ice' and 'mim' commands [12].

Results

There were 9,286 new HIV cases diagnosed in Poland from 2000 to 2011, of whom 6,896 (78.0%) were male and 1,943 (22.0%) female (information on sex was missing for 447 cases). The transmission category was not reported for 5,615 (60.5%) cases. Among the rest (n=3,671), transmission categories included MSM (n=885, 24.1%), people who inject drugs (n=1,881, 51.2%), heterosexual men and women (n=861, 23.5%), children of HIV-positive mothers (n=141, 3.8%).

The evolution of characteristics of new HIV diagnoses among men in the study period is shown in Table 1. We note a remarkable shift in the transmission category distribution. Among cases with known transmission

TABLE 1

Characteristics of men with newly detected HIV infections, Poland, 2000–2011 (n=6,896)

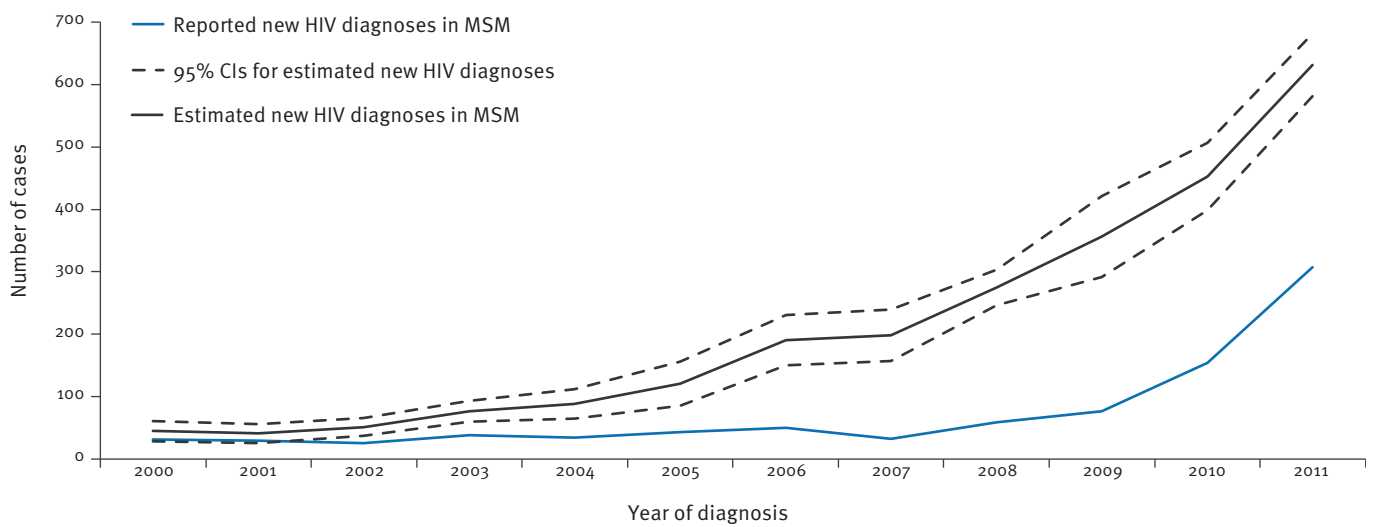
Characteristic	Year of diagnosis					p value ^b
	Total (2000–2011)	2000–2002	2003–2005	2006–2008	2009–2011	
	Number (%) ^a	Number (%) ^a	Number (%) ^a	Number (%) ^a	Number (%) ^a	
Age group (years)						
<25	1,241 (18.7)	356 (28.9)	284 (20.0)	282 (16.6)	319 (13.9)	<0.0001
25–34	2,978 (44.8)	497 (40.4)	619 (43.5)	779 (45.9)	1,083 (47.3)	–
35–44	1,561 (23.5)	271 (22.0)	324 (22.8)	403 (23.7)	563 (24.6)	–
≥45	863 (13.0)	107 (8.7)	196 (13.8)	235 (13.8)	325 (14.2)	–
ND	253	53	54	90	56	–
Transmission category						
Men (non-injectors) who have sex with men	885 (31.5)	88 (11.4)	117 (16.8)	142 (28.2)	538 (64.4)	<0.0001
Men who inject drugs	1372 (48.8)	603 (77.9)	447 (64.2)	205 (40.7)	117 (14)	–
Men (non-injectors) who have sex with women only	487 (17.3)	75 (9.7)	116 (16.7)	131 (26)	165 (19.8)	–
Children of HIV-positive mothers	65 (2.3)	8 (1)	16 (2.3)	26 (5.2)	15 (1.8)	–
ND	4,087	510	781	1,285	1,511	–
Late presenter^c						
No	6,189 (89.8)	1,162 (90.5)	1,302 (88.2)	1,588 (88.8)	2,137 (91.1)	0.010
Yes	707 (10.3)	122 (9.5)	175 (11.9)	201 (11.2)	209 (8.9)	–
Residence						
Urban	3,778 (89.3)	815 (93.9)	1,022 (92.1)	798 (86.3)	1,143 (86.1)	<0.0001
Rural	452 (10.7)	53 (6.1)	88 (7.9)	127 (13.7)	184 (13.9)	–
ND	2,666	416	367	864	1,019	–
Region of residence						
Dolnośląskie	1,009 (17.9)	230 (22.0)	276 (22.9)	231 (17.4)	272 (13.3)	<0.0001
Kujawsko-pomorskie	253 (4.5)	51 (4.9)	47 (3.9)	69 (5.2)	86 (4.2)	–
Lubelskie	143 (2.5)	39 (3.7)	27 (2.2)	22 (1.7)	55 (2.7)	–
Lubuskie	164 (2.9)	30 (2.9)	23 (1.9)	46 (3.5)	65 (3.2)	–
Łódzkie	416 (7.4)	97 (9.3)	95 (7.9)	101 (7.6)	123 (6.0)	–
Małopolskie	291 (5.2)	31 (3.0)	53 (4.4)	90 (6.8)	117 (5.7)	–
Mazowieckie	105 (18.7)	89 (8.5)	172 (14.3)	272 (20.5)	517 (25.3)	–
Opolskie	125 (2.2)	23 (2.2)	26 (2.2)	30 (2.3)	46 (2.3)	–
Podkarpackie	110 (2.0)	26 (2.5)	24 (2.0)	28 (2.1)	32 (1.6)	–
Podlaskie	112 (2.0)	30 (2.9)	21 (1.7)	16 (1.2)	45 (2.2)	–
Pomorskie	363 (6.5)	74 (7.1)	103 (8.6)	78 (5.9)	108 (5.3)	–
Śląskie	624 (11.1)	127 (12.2)	142 (11.8)	100 (7.5)	255 (12.5)	–
Świętokrzyskie	62 (1.1)	6 (0.6)	14 (1.2)	19 (1.4)	23 (1.1)	–
Warmińsko-mazurskie	291 (5.2)	90 (8.6)	70 (5.8)	69 (5.2)	62 (3.0)	–
Wielkopolskie	345 (6.1)	35 (3.4)	52 (4.3)	96 (7.2)	162 (7.9)	–
Zachodniopomorskie	266 (4.7)	67 (6.4)	60 (5.0)	60 (4.5)	79 (3.9)	–
ND	1,272	239	272	462	299	–
Reporting delay in months^d						
Mean (SD)	ND	ND	1.99 (3.9)	1.7 (3.1)	2.4 (3.8)	0.0001
Median (IQR)	ND	ND	1 (1–2)	1 (1–2)	1 (1–2)	–

HIV: human immunodeficiency virus; IQR: interquartile range; mothers; ND: no data available; SD: standard deviation.

^a Percentages were not calculated for variables for which data were not available.^b p value for change of the characteristic distribution across the study period.^c In our study, a late presenter was defined as person who developed AIDS within a year of HIV diagnosis.^d Excluding cases reported as a result of control activities.

FIGURE 1

New HIV diagnoses among men who have sex with men, Poland, 2000–2011^a

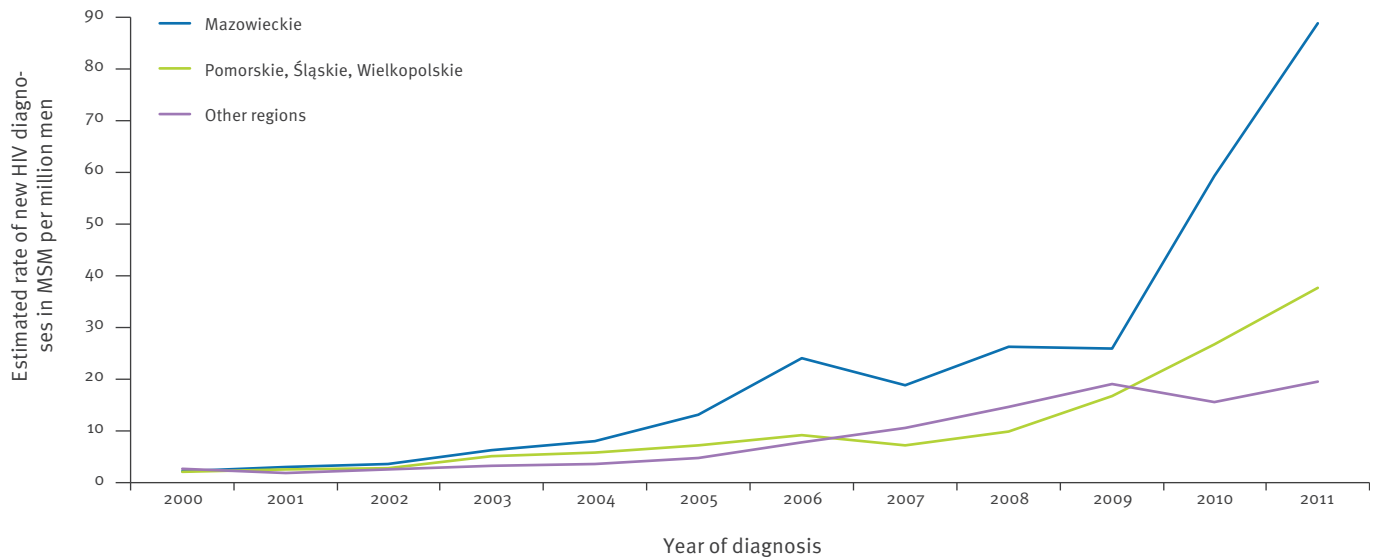


CI: confidence interval; HIV: human immunodeficiency virus; MSM: men who have sex with men.

^a Reported number and the number estimated using multiple imputations of transmission category.

FIGURE 2

Estimated rate of new HIV diagnoses in men who have sex with men^a per million men by region^b, Poland, 2000–2011



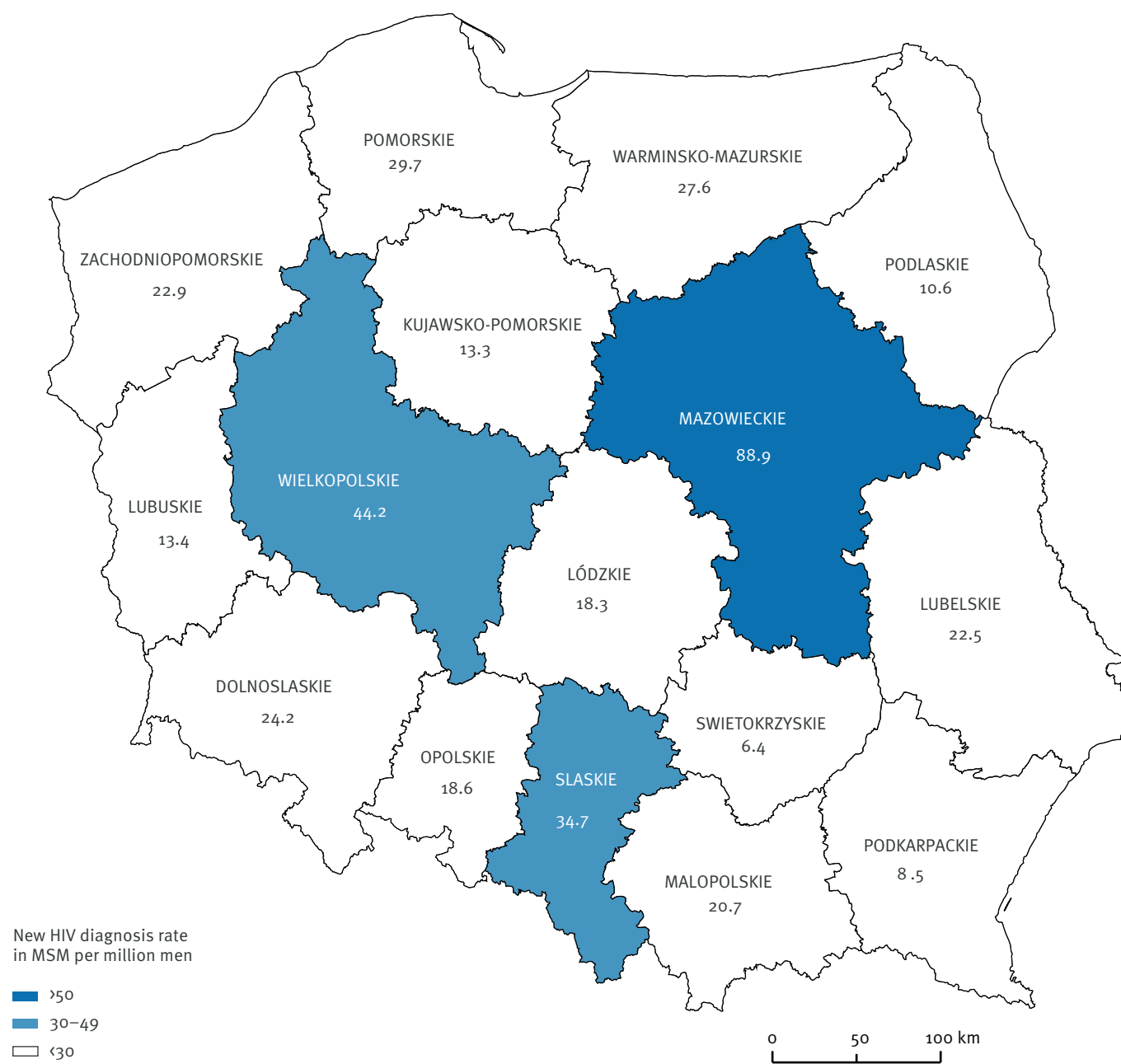
HIV: human immunodeficiency virus; MSM: men who have sex with men.

^a Estimated rate based on multiple imputations of transmission category.

^b Regions were grouped according to the rate of detection in MSM in 2011: 88.9/million men in Mazowieckie (region including the capital, Warsaw); 31.4–45.5/million men (Pomorskie, Śląskie, Wielkopolskie); 7.4–25.3/million men (other regions).

FIGURE 3

Estimated rate of new HIV diagnoses in men who have sex with men^a per million men by region, Poland, 2011

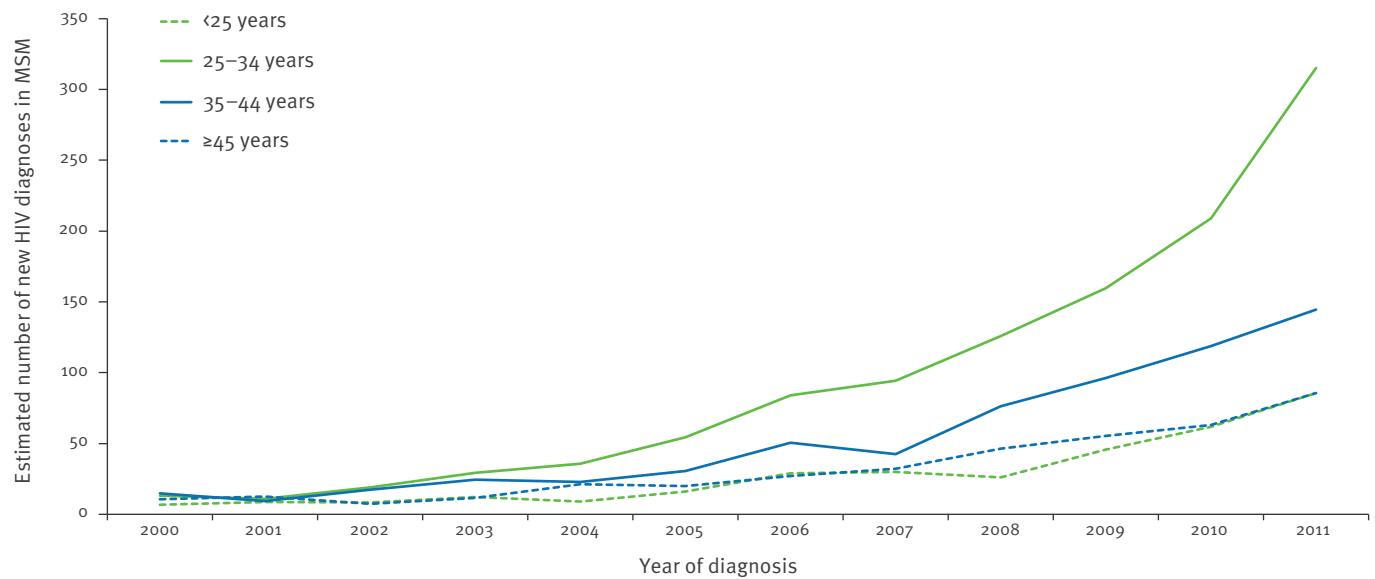


HIV: human immunodeficiency virus; MSM: men who have sex with men.

^a Estimated rate based on multiple imputations of transmission category.

FIGURE 4

Estimated number of new HIV diagnoses in men who have sex with men^a by age group, Poland, 2000–2011



HIV: human immunodeficiency virus; MSM: men who have sex with men.

^a Estimated number based on multiple imputations of transmission category

category, the dominating category – men who inject drugs (77.9% (603/774) in 2000–02) was gradually replaced by MSM (non-injectors) and men (non-injectors) who have sex with women only (64.4% (538/835) and 19.8% (165/835) respectively in 2009–11).

Of the 5,396 cases with information on reporting delay, 4,966 (92.0%) were reported within 12 months of diagnosis and 87.7% (n=4,733) within six months of diagnosis. Excluding 351 cases reported as a result of control activities in one laboratory in 2010, the proportions reported within 12 months and 6 months were 98.4% and 93.8% respectively and the median delay was one month (interquartile range: 1–2) (Table 1).

Between 2000 and 2011, the annual number of reported new HIV diagnoses among MSM increased almost 10-fold; when imputing data on missing transmission category, the increase was 14-fold (from 2.5 per million in 2000 to 33.8 per million in 2011). Moreover, whereas the imputed data showed the increase already in 2005–06, it was only evident in 2009–10 in the raw reported data (Figure 1).

Trends by administrative region demonstrate especially high rates of new HIV diagnoses in Mazowieckie (the region including the capital city of Warsaw) (Figure 2). In this region, adjusting for missing data on transmission category, the rate of new HIV diagnosis in MSM increased from 2.2 per million men in 2000 to 88.9 per million men in 2011. The rates of new HIV diagnosis in

MSM in 2011 ranged from 6.4 to 88.9 per million men across regions (Figure 3).

The most rapid increase in the number of new HIV diagnoses among MSM occurred in those aged 25–34 and 35–44 years (Figure 4). The estimated annual number of (reported) HIV diagnoses among MSM aged 25–34 years increased over 20 times, from 13 in 2000 to 315 in 2011.

Data on HIV prevalence among MSM presenting for diagnostic testing at selected laboratories across Poland that participated in an annual survey from 2003 to 2011 shows that the positivity rate per 100 tests increased significantly after 2005, and stabilised at a higher level in 2009–11 (Table 2).

Discussion

Our study suggests a 14-fold increase in the number of new diagnoses among MSM in Poland from 2000 to 2011, when imputing data on missing transmission category. This increase occurred concomitantly in all age groups, but was more pronounced among younger MSM (aged 25–44 years).

There were no systematic changes in the surveillance system or testing policy during the study period. However, testing for HIV, especially self-initiated testing was repeatedly encouraged. Additionally, the number of voluntary testing and counselling sites offering free-of-charge, anonymous testing increased [14]: such

TABLE 2Prevalence of HIV among men who have sex with men presenting for diagnostic testing at selected laboratories^a, Poland, 2003–2011

Data collected	Year of diagnosis				p value
	Total (2003–2011)	2003–2005	2006–2008	2009–2011	
Number of participating laboratories ^b	26	19	11	10	–
Number of regions in which the participating laboratories were located ^c	14	14	10	8	–
Number of reported tests among men who have sex with men	4,216	1,385	1,239	1,592	–
Number of positives ^d	401	75	200	126	–
Positivity rate per 100 tests	9.5	5.4	16.1	7.9	<0.0001 (Poisson regression – categorical) 0.061 (Poisson regression – linear trend)

HIV: human immunodeficiency virus; IQR: interquartile range; MSM: men who have sex with men.

^a Laboratories participating in an annual survey; only laboratories reporting 10 or more tests among MSM in a given year were included in the analysis.

^b Only six laboratories were included in all three time periods.

^c Of the 16 regions in Poland, Lubelskie and Śląskie were not covered as no laboratories from these regions were able to provide a breakdown by exposure category.

^d Positive in screening test (data on whether the test result was confirmed were not collected).

sites were mentioned as the last test setting by 45% of MSM in Poland in 2010 [15].

Previous studies (in 2004 and 2005) estimated that in MSM, a large proportion of HIV infections – larger than that among people who inject drugs – might have been undiagnosed [16,17]. Improving access to testing over the study period could have led to a rise in the testing rates among MSM and, in consequence, contributed to the observed increase in notification rate. However, we also noted an increase in HIV prevalence among MSM coming for testing (from 5.4% in 2003–05 to 16.1% in 2006–08 and 7.9% in 2009–11). Although this increase alone would not fully explain the notification trend, it indicates that an upsurge of new HIV infections may also play a role. To further support the hypothesis of increasing HIV incidence among MSM, other studies found a high proportion (>30%) of recent infections confirmed by recent infection testing algorithm (RITA) testing among new diagnoses among MSM [18,19]. On the other hand, the proportions of respondents in behavioural surveys who reported having ever been tested were comparable in 2004 and 2010, 57% and 62% respectively, although it must be borne in mind that the study designs were different [15,16]. Either increased frequency of testing among those who were tested or a possible increase in disclosure of MSM status when testing for HIV may be additional factors that affect the surveillance trend. The observed trend is likely to be influenced by a number of factors, but

the available information supports the hypothesis of emergence of the HIV epidemic among MSM in Poland.

Re-emergence of the HIV epidemic in MSM was noted in several western countries and attributed to increasing frequency of high-risk behaviours among MSM [2,20–22]. Inconsistent condom use and a high number of partners was also confirmed in Poland in a community-based survey among clients of HIV voluntary counselling and testing sites in 2004–07 [14,16] as well as (more recently) by an Internet survey among MSM (EMIS) [15]. The proportion of MSM who reported 10 or more partners in the past 12 months in these studies was estimated at 20%. In the community-based survey, past-12 months consistent condom use with non-stable or casual partners was approximately a third; in the Internet survey, the level rose to a half of the respondents. This level of risky behaviour is similar to that seen in western European countries [23], some of which noted an increasing HIV incidence in the recent past [2]. In contrast, the proportion of non-testers is higher in Poland than it is in western European countries. An important proportion of undiagnosed infections reaching an advanced phase could have contributed to increased spread of the virus. It has been suggested that in longer-lasting epidemics, individuals in the advanced stages of disease who are not diagnosed (and not treated) could contribute greatly to re-emergence of the epidemic [24]. Once the new infections start to appear, the epidemic could

pick up with transmission at the acute infection stage. A recent molecular study showed clustering of strains from recently infected MSM, suggesting transmission events often occur from a recently infected MSM as a source [25]. Transmission from long-standing undiagnosed infections followed by intensified transmission from recently infected individuals was proposed to explain the increasing spread of HIV among MSM in Germany in the early 2000s [26].

Our results show that the highest diagnosis rate and the fastest, over 40-fold, increase during the past decade occurred in one region, Mazowieckie, which includes the capital, Warsaw. The increase could be related to the higher proportion of MSM in the capital and more extensive sexual networks. Although we have no data on this for Mazowieckie, a higher concentration of MSM was noted in London, for example, as compared with other part of the United Kingdom [27].

Our study has several limitations. Firstly, we based on surveillance data, which are prone to various biases related to case ascertainment and collection of sensitive information. We cannot exclude misclassification of transmission category by reporting clinicians. Secondly, we relied on the small fraction of cases for whom we obtained reliable clinical reports: the rest was assumed to be missing at random. However, taking into consideration stigmatisation of same-sex relationships in Poland, MSM are rather less likely to reveal their exposures than heterosexual persons or people who inject drugs, so we are more likely to underestimate than to overestimate the HIV rates among MSM. Thirdly, we did not fully account for reporting delay. However, we noted that less than 10% of cases were notified with a delay of over six months, so only a small correction is expected after this time.

Our findings call for enhanced, comprehensive prevention among MSM, including revision of testing strategies, treatment of other sexually transmitted infections and possibly implementation of recently proven techniques such as pre-exposure prophylaxis, along with expanding individual- and community-level behavioural interventions for the prevention of HIV and other sexually transmitted infections and continued access to antiretroviral therapy for those already infected [28-31]. These efforts should be a priority especially in regions with the highest transmission; however, more data are needed on possible regional differences and specific behaviours driving the epidemic in Poland as well as more generally in countries with marked regional differences.

It is of note that the increase in number of new HIV diagnoses among MSM was evident several years earlier when using the imputed dataset compared with the raw surveillance data. This underscores the need to assure data quality and improve the analysis of routine data by correcting for missing data on important descriptors such as transmission category.

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