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Sexually transmitted infections in Belgian general practices: a nationwide continuing surveillance study, data from 2015 to 2020

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Research

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Abstract

Aim: The current study aims at describing sexually transmitted infections (STI) surveillance data collected from 2015 to 2020 as well as investigating patients' characteristics and risk factors in the sample population. *Background:* Reported STI cases are continuously increasing in Europe. In Belgium, 94.1% of citizens have a regular general practitioner (GP) or are affiliated to a general practice. By using GPs for surveillance, STIs can be monitored in the general population. Between January 2015 and December 2020, the Sentinel General Practitioners (SGP) network retrospectively reported five STIs: chlamydia, gonorrhoea, genital warts, herpes, and syphilis. *Methods:* In the SGP network database on STIs, participating GPs report on case-by-case basis through paper or online registration forms. We performed descriptive statistics, X^2 test and logistic regression using SAS® 9.4. Multivariate multiple logistic regression was performed to investigate the relationship between STIs and patients' characteristics. *Findings:* During the study period, 1009 cases were reported, corresponding to an episode-based incidence estimated at 121 per 100,000 inhabitants. The majority of patients (59.8%) were men, and 83.6% were under age 30. Among female patients 92.7% had heterosexual contacts whereas 64.4% of male patients did. Women were more likely to be diagnosed with chlamydia (odds ratio [OR] 1.56; 95% confidence interval [CI] 1.12–2.17) and herpes (OR 1.72, 95% CI 1.04–2.86) than men.

In this study, STI surveillance data were in agreement with literature. Continuous surveillance through the SGP network remains an important tool to obtain information about populations at risk and STI incidence in the general population.

Introduction

Sexually transmitted infections (STIs) are a common cause of acute disease and are caused by pathogens transmitted through person-to-person sexual contact; oral, vaginal, anal, sometimes skin-to-skin contact (World Health Organization, 2023). Reported STI cases are steadily increasing in Europe calling for more systematic surveillance. In Europe, chlamydia is the most common STI, with an incidence of 157/100,000 in 2019, and a male-to-female ratio of 0.8 (European Centre for Disease Prevention and Control, 2022a). Gonorrhoea comes second, with 31.6 cases per 100,000 inhabitants (European Centre for Disease Prevention and Control, 2023) and a male-to-female ratio of 3.2 (European Centre for Disease Prevention and Control, 2020), and syphilis third, with an incidence of 7.4/100,000 and a ratio of 8.6 (European Centre for Disease Prevention and Control, 2022b).

The explanation for the increase of cases is multifactorial. On the one hand, there has been an increase in STI screening in specific populations at risk of an STI infection, combined with sensitive diagnostics enhancing the detection of asymptomatic case (European Centre for Disease Prevention and Control, 2019). On the other hand, there is evidence of an increase in unsafe sexual practices in certain sub-populations, mainly decrease in condoms use (European Centre for Disease Prevention and Control, 2019).

The European Surveillance System (TESSy) allows to monitor and compare trends between European countries. However, national surveillance systems and case definitions may vary across Europe. Sentinel surveillance is used in different countries such as Belgium, France, and the Netherlands (European Centre for Disease Prevention and Control, 2022a; European Centre for Disease Prevention and Control, 2020; European Centre for Disease Prevention and Control, 2022b). Specifically in Belgium, there is no comprehensive national surveillance, thus STI surveillance in primary care is therefore complementary to other Belgian STI monitoring mechanisms such as National Reference Centre for STIs and the sentinel network of microbiological laboratories. Despite systematic reporting and monitoring efforts,

underreporting of STIs and asymptomatic cases remains a major issue in STI surveillance (European Centre for Disease Prevention and Control, 2019).

General practitioners (GPs) are a key actor of the first line healthcare system, contributing significantly to population health surveillance. Overall, 94.1% of citizens in Belgium have a referring GP or are affiliated to a general practice, with cross-regional differences. For example, only 83.9% of the population in the Brussels-Capital region is in the same situation (Berete *et al.*, 2020). Since 2013, Sciensano (ex-Scientific Institute of Public Health of Belgium) coordinates the surveillance of STIs in general practices through the Sentinel General Practitioners (SGP). STI episodes are reported and used as a proxy for all STIs in Belgian primary healthcare. This data source allows for continuous STI surveillance for the Belgian population.

As a follow-up to a previous study based on data for the years 2013–14 (Boffin *et al.*, 2017), the present study will explore and describe data from the STI surveillance by the SGP network over the 2015–2020 period. Secondly, we will investigate patient characteristics and factors associated with STIs within the population of patients consulting GPs in the network. Finally, we will estimate the overall incidence per STI.

Methods

Study setting and population

A steering committee composed of representatives of the regional authorities as well as GPs from the different regions (Brussels-Capital, Flanders, and Wallonia) validates the questionnaires and health topics to be surveilled. SGPs participate on a voluntary basis, and are invited to record cases within their practice for various topics such as influenza, falls in elderly, varicella, and STIs. The territorial distribution of the SGP network by population density is considered representative of Belgium (Boffin *et al.*, 2017; Boffin, Moreels, and Van Casteren, 2013), with an average coverage of the Belgian population of 1% (Moreels *et al.* 2023). The gender and age distribution of SGPs is comparable to that of non-sentinel GPs (Boffin *et al.*, 2017;Boffin, Moreels, and Van Casteren, 2013).

This study is a retrospective observational study based on a case-by-case episodic registration of STI cases within the SGP network. Data were collected from STI cases that were reported between January 2015 and December 2020. During this time frame five STIs were monitored: chlamydia (*Chlamydia trachomatis*), gonorrhoea (*Neisseria gonorrhoeae*), syphilis (*Treponema pallidum*), genital herpes (*herpes simplex virus 1 and 2*), and genital warts (*human papillomavirus (HPV*).

The study population consists of patients above 15 years old living in Belgium who were diagnosed with at least one STI by a sentinel GP. A new episode was included only if the STI was confirmed by laboratory tests (culture, serology, or PCR) or clinical diagnosis depending on the STI and according to (national) guidelines. However, the specific laboratory test results are not reported by GPs and depend on clinical laboratories performing the test. A reinfection refers to any new episode after a previous infection with the same STI and unrelated to the current episode (as judged by the GP), including during the period preceding the study period.

Surveillance method and reported indicators

GPs report on a case-by-case basis via paper forms (2015–2018) or online registration (2019–2020) using LimeSurvey. As there were no major changes to the questionnaires between 2015 and 2019, we selected only common items from the questionnaires (19 items in total) for analysis purposes, and merged variables as described below.

Firstly, we combined age groups 60–74 and >75 years and created a category >60 years. Secondly, we adjusted the number of partners in the six months before the consultation, defined as a categorical variable. However, prior to 2017 the following values were used: 0 partners, 1 partner, between 2 and 4 partners, and >4 partners. As of 2017, this became a binary variable with less than 3 and > = 3 partners as possible values. Subsequently, in order to harmonize the variable, the values 0 and 1 partners were labelled as <3 partners, while the values between 2 and 4 and more than 4 partners were labelled as > = 3 partners. We compared the characteristics (sex, age, education, and sexual orientation) between patients who reported 2–4 partners in 2015–2016 and patients who reported > = 3 partners in 2017–2018. This comparison showed that patients with 2–4 partners were more similar to patients with > = 3 partners than to patients who had less than 3. Consequently, we relabelled 2–4 partners as > = 3 partners. Finally, depending on analysis or reporting needs, the variable entitled sexual behaviour was used either as reported by SGPs (hetero-, bi-, or homosexual contacts) or as one category labelled 'same-sex sexual contacts', merging bi- and homosexual contacts.

Incidence and population coverage

The incidence was estimated using the ratio between the number of reported cases and sentinel population P (see formula).

$$P = \sum_{i=1}^{43} Pi = \sum_{i=1}^{43} \frac{Ni}{N_{GP}i} x N_{SGP}i$$

N_{SGP} represents the number of SGP or practices participating in our SGP network, N_{GP} the number of active GPs in Belgium, and N represents the number of inhabitants in Belgium. An active GP is defined as a GP who has at least 500 patient contacts per year, according to the health insurance data. The number of inhabitants per active GP was calculated in each of the Belgium's 43 districts to obtain national figures. This number was then further multiplied by the number of sentinel practices to estimate the minimum population coverage (sentinel population $P1$), and multiplied with the number of sentinel GPs to estimate the maximum population coverage (sentinel population $P2$).

The incidence is estimated as the average of two extreme incidences. The first incidence is estimated based on the number of sentinel practices, number of reported cases divided by $P1$ and multiplied by 100,000, is expected to be an underestimation (incidence 1). The second incidence is based on the number of sentinel practitioners participating, number of reported cases divided by $P2$ and multiplied by 100,000, which is expected to be an overestimation (incidence 2). In this article, we report the average incidence per 100,000 over the study period and give the interval between the lowest (min) and highest (max) estimated incidence, respectively incidence 1 and incidence 2, calculated as described above.

Statistics

The analyses were performed using SAS® 9.4. We used descriptive statistics, X^2 test and logistic regression ($p < 0.05$). Independence

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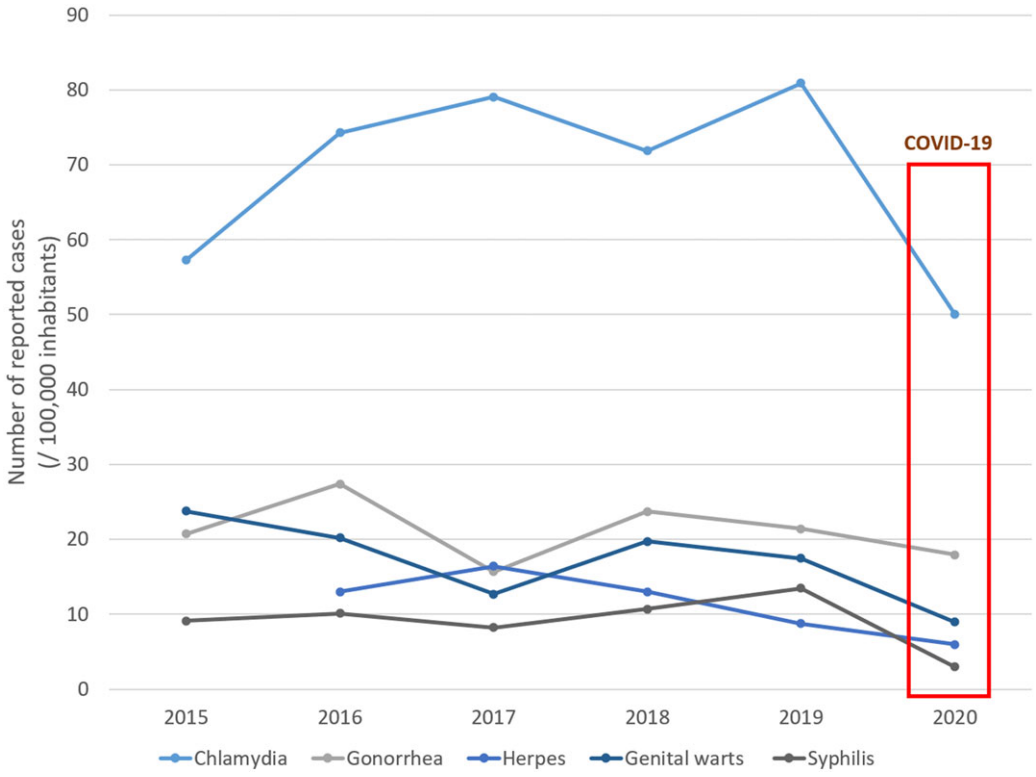

Figure 1. Number of reported STI cases per 100,000 inhabitants, Belgium, 2015–2020.
Each line represents incidence trends for an STI. The red box correspond to the COVID-19 period where a decreased has been registered although no causality has been shown.

of the qualitative variables (region, age group, sex, sexual behaviour, education level) were assessed using chi-square or Fisher's exact test, statistical significance set at $p < 0.05$. Cramer's V statistic derived from chi-square test was used to assess the strength of the association between two variables.

We checked the percentage of missing values (i.e. empty cells) per variable in order to verify if missing data were biased or missing at random (Altman & Bland, 2007). Since missing values represented less than 5% for each variable (see supplementary Table S1) and no pattern of missingness was found, we did not impute data (Schafer, 1999). We investigated the pattern distribution of variables over time (see supplementary Table S2).

In the multivariate multiple logistic regression models, the different STIs are binary dependent/outcome variables. The covariates are year, region, age, sex, sexual behaviour, education level, birth location (Belgium or by continent when foreign-born), number of partners, and co-infection. We checked interaction between age, sex, and sexual behaviour and used backward elimination as effect-selection method. We used logistic regression to obtain odds ratios (OR), Wald statistics, and Wald 95% confidence intervals (CI). Logistic regression analysis, powered by SAS 9.4, program included the removal of effects/variables with collinearity from the model. Logistic regressions were performed with 925 cases (91.7% of the sample), and 766 observations for genital herpes (data collection only started in 2016) due to missing values for the response or explanatory variables. We performed additional analysis (see supplementary Table S3) using a new variable 'sexual behaviour by sex' (heterosexual men, heterosexual women, MSM, WSW) as the STI distribution in the population varies according to sex and sexual behaviour (European Centre for Disease Prevention and Control, 2019).

Results

Population description

A total of 1009 STI-episodes were reported between 2015 and 2020. The episode-based incidence of the five monitored STIs was estimated at 121/100,000 (min 95.1 – max 140.6). The 2020 data contributed to 10% of the complete data, which is lower than previous years (Figure 1), i.e. 37% less than 2019. However, no significant difference was observed in the population characteristics, i.e. region, age, sex, sexual behaviour, and education, of patients with a confirmed STI in the SGP network between 2015 and 2020. Trends were consistent and reporting stable over time (Supplementary Table S2).

Population characteristics between 2015 and 2020 were similarly distributed across years, with the exception of age distribution (Table S2). We observe a disparity in regional contribution to the dataset of all reported cases: 78.6% were from the Flemish region and 16.3% from the Walloon region, while only 5.2% were from the Brussels-Capital region (Table 1). The majority of patients (77.6%) were born in Belgium. Those born abroad came mainly from other European countries (Table 1).

Patients under 30 years old (56.0%) and men (59.8%) represented the majority of the sample (Table 1). 64.4% of men had heterosexual contact and 25.1% were MSM, whereas among women 92.7% had heterosexual contacts and 2.3% women who have sex with women (WSW) (Figure 2).

An STI-related symptom was the motive for consulting a GP for 55.5% of patients. 16.2% of patients consulted because at least one of their partners had been infected with an STI. 8.7% of patients had an STI test for another reason such as pregnancy follow-up.

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Table 1. Description of the population, Belgium, 2015–2020

		Frequency	Percentage (%)
Region (*N* = 1009)	Brussels-Capital	52	5.15
	Flanders	793	78.59
	Wallonia	164	16.25
Age group (*N* = 991)	15–29 years	555	56.00
	30–44 years	273	27.55
	45–59 years	134	13.52
	> = 60 years	29	2.93
	Missing values	*18*	
Sex (*N* = 998)	Female	401	40.18
	Male	597	59.82
	Missing values	*11*	
Sexual behaviour (*N* = 995)	Heterosexual contacts	751	75.48
	Same sex contacts	162	16.28
	Unknown	82	8.28
	Missing values	*14*	
Education (*N* = 974)	Higher education	311	31.93
	Secondary education	324	33.26
	Primary education or less	40	4.11
	Unknown	299	30.70
	Missing values	*35*	
Birth location* (*N* = 993)	Belgium	771	77.64
	Other European country	92	9.26
	Asia, including Turkey	43	4.33
	Sub-Saharan Africa	41	4.13
	North Africa	23	2.32
	North America	1	0.01
	Central & South America	10	1.01
	Oceania	1	0.10
	Unknown	11	1.11
	Missing values	*16*	
Number of partners (*N* = 986)	<3	413	41.89
	> = 3	175	17.75
	Unknown	398	40.37
	Missing values	*23*	
Chlamydia (*N* = 1009)	First infection	487	48.27
	Reinfection	92	9.12
Genital warts/Condylomata acuminata (*N* = 1009)	First infection	109	10.80
	Reinfection	22	2.18
Gonorrhoea (*N* = 1009)	First infection	153	15.16
	Reinfection	23	2.28

(*Continued*)

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Table 1. (*Continued*)

		Frequency	Percentage (%)
Syphilis (*N* = 1009)	First infection	54	5.35
	Reinfection	22	2.18
Genital herpes+ (*N* = 829)	First infection	66	7.96
	Reinfection	9	1.09
Co-infection (*N* = 1009)	Yes	49	4.86

Legend: *N* is the total number excluding missing values.
Missing values percentage was calculated before calculating descriptive statistics per variable (Table S1).
+data registered from 2016 to 2020.
*location of birth are not informative on migration status, and only inform partially about ethnic minorities.

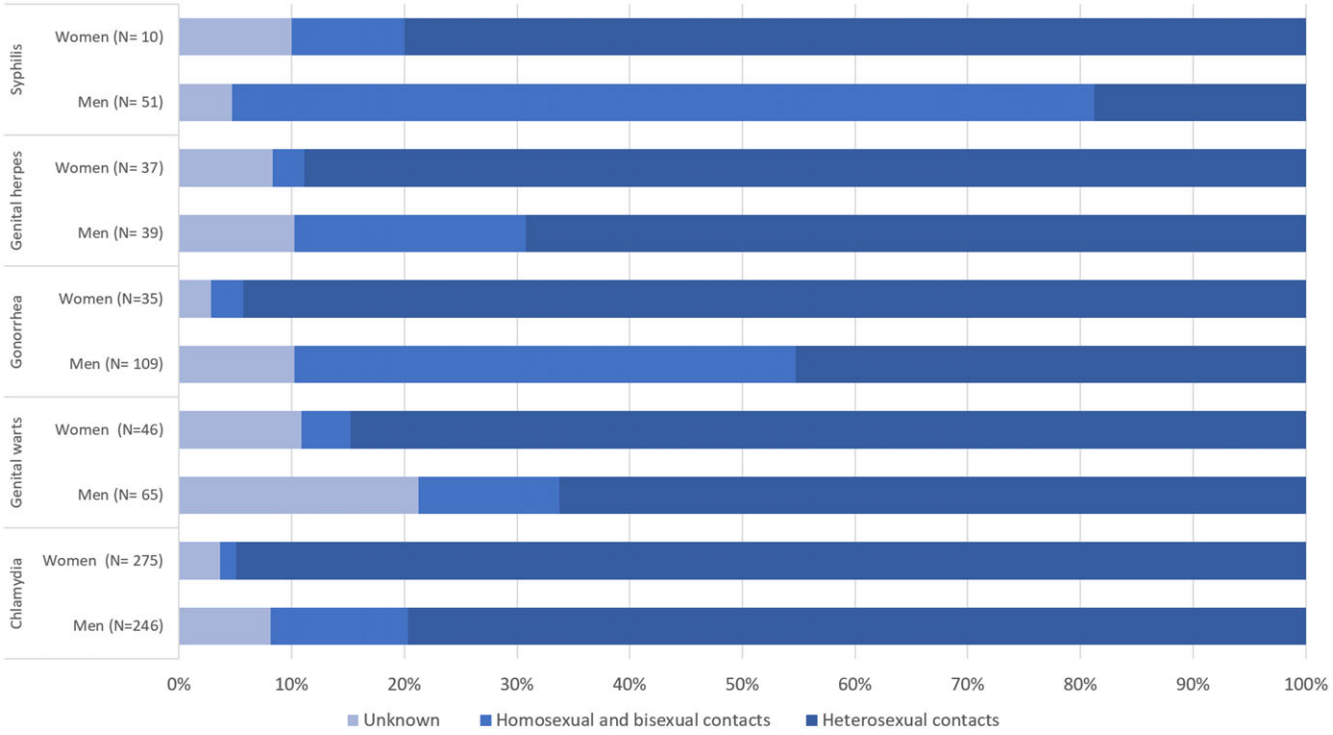

Figure 2. Distribution of sexual orientation by STI and patient sex, Belgium, 2015–2020.
Distribution is shown per STI wherein the first row related to women and the second to men. Table S4 shows the distribution in details.

Sexually transmitted infections distribution

In our study, chlamydia was the most common STI, accounting for 57.4% of cases reported, of which 9.1% were reinfections (Table 1). Incidence of chlamydia increased by 24 per 100,000 over the last period (World Health Organization) whereas trends in other STI remained stable. Co-infection, i.e. persons being infected with more than one STI concomitantly, accounted for 4.9%. The majority of co-infection cases, 95.9%, involved patients with two STIs: 44.9% chlamydia and gonorrhoea, 12.2% chlamydia and genital herpes, 10.2% chlamydia and syphilis, and a combination of chlamydia, gonorrhoea, herpes, or syphilis. The second most common STI was gonorrhoea, with 17.4% of registered cases. Overall, STI reinfections were low (Table 1).

Chlamydia

wThe episode-based incidence of Chlamydia in the Belgian general practice population in 2015–2020 is estimated at 68.8/100,000 patients (min 50.0 – max 80.9). Overall, 69.3% of female patients were diagnosed with chlamydia versus 50.1% of men. Among chlamydia cases, female patients represented 48.2% and male patients 51.8%. Heterosexual contacts were the most frequently reported chlamydia cases, about 95.0% of female and 80.0% male patients (Figure 2). 69.1% of chlamydia cases concerned patients between 15 to 29 years old, 22.5% between 30 and 44 years old. Heterosexual women had higher odds of being infected with chlamydia than heterosexual men (OR 1.48; 95% CI 1.05–2.1; Table S3), but have lower odds than MSM (OR 0.13; 95% IC 0.07–0.22;

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Table S3). Having more than 3 partners in the last six months rendered patients at higher odds of being infected with chlamydia (OR 1.58; 95% CI 1.01–2.46; Table 2). 84.1% of chlamydia cases were a first infection and 7.8% were a co-infection. Patients already having another STI had much higher odds of being positive for chlamydia (OR 25.52; 95% CI 7.80–83.45; Table 2).

Gonorrhoea

The episode-based incidence of gonorrhoea in the Belgian general practice population in 2015–2020 is estimated at 21.1/100,000 patients (min 17.9 – max 27.0). Reinfection represented less than 3.0% of the overall cases. Patients infected with another STI had much higher odds of being diagnosed with gonorrhoea (OR 12.24; 95% CI 6.13–24.43; Table 2). Men represented 79.7% of gonorrhoea reported cases, while only 20.4% of cases were women. Female patients were significantly less likely to be diagnosed with a gonorrhoea infection (OR 0.45; 95% CI 0.29–0.71; Table 2). MSM have higher odds of being infected with gonorrhoea (OR 3.75;95% IC 2.33–6.1; Table S3) than heterosexual men, whereas heterosexual women had lower odds than heterosexual men (OR 0.52; 0.32–0.85; Table S3).

Genital warts

The episode-based incidence of genital warts in the Belgian general practice population in 2015–2020 is estimated at 17.1/100,000 patients (min 9.0 – max 24.0). Female patients represented 35.9% of genital warts cases. Patients above 30 years old were more likely of having genital warts than those between 15 and 29 years old (Table S3). Being affected by *condylomata acuminata* was not associated with the sex of the patient, while significantly associated with sexual orientation (Wald statistic 20.32; $p < 0.0001$). People having same-sex sexual contacts had lower odds (OR 0.48; 95% CI 0.26–0.98; Table 2) than heterosexual contacts.

Genital herpes

The episode-based incidence of genital herpes in the Belgian general practice population in 2016–2020 is estimated at 11.5/100,000 patients (min 6.0 – max 16.4). 52.0% of genital herpes cases involved men, of whom 69.2% had heterosexual contacts and 20.5% MSM (Figure 2). 48.0% of genital herpes cases concerned women, of whom 88.9% had heterosexual contacts (Figure 2). Female patients were at higher odds of being infected with genital herpes (OR 1.72; 95% CI 1.04–2.86; Table 2).

Syphilis

The episode-based incidence of syphilis in the Belgian general practice population in 2015–2020 is estimated at 9.0/100,000 patients (min 3.0 – max 13.5). Among the reported syphilis cases, women accounted for 13.3% and men 86.7%, of which 76.6% were MSM, men having homosexual or bisexual contacts (Figure 2). Overall, MSM represented 66.0% of patients infected with syphilis and had higher odds of being infected with syphilis (OR 12.56; 6–26.27; Table S3).

Discussion

Summary of main findings

This research is a continuation of a nationwide general practice-based study. In the 2013–2014 Belgian general practice population, chlamydia was the most common STI (incidence 44.1/100 000) followed by genital warts (incidence 24.0/100,000), gonorrhoea (18.9/100,000), and syphilis (incidence 9.9/100,000) (Boffin *et al.*, 2017). Compared with the previous surveillance period 2013–2014 (Boffin *et al.*, 2017) and recent European data (European Centre for Disease Prevention and Control, 2023; European Centre for Disease Prevention and Control, 2020; European Centre for Disease Prevention and Control, 2022b; European Centre for Disease Prevention and Control, 2019), the incidence of chlamydia increased, while the incidence of other STIs remained stable. Women were more likely to be infected with chlamydia (OR 1.56; 95% CI 1.12–2.17) and genital herpes (OR 1.72; 95% CI 1.04–2.86) than men. Same-sex sexual behaviour was strongly associated with gonorrhoea (OR 3.26; 95% CI 2.08–5.1) and syphilis (OR 13.68; 95% CI 7.38–25.35) infection. In 2020, the number of reported cases was lower than previously reported within the SGP network. We assume that lockdowns during the Covid-19 pandemic reduced the number of patients who had physical consultations in 2020 (including STI screening and testing) (Crane *et al.* 2021) and decreased physical contacts, which led to a reduction in STI transmission.

Comparison with existing literature

The over-representation of men among syphilis and gonorrhoea cases in our study is consistent with other findings (European Centre for Disease Prevention and Control, 2020; European Centre for Disease Prevention and Control, 2022b). However, the contrast between men and women observed for chlamydia may be biased. A recent prevalence study suggests a heterogeneous distribution of chlamydia in the Belgian population (Fischer *et al.*, 2021). The observed difference could also be due to screening practices focusing mainly on young women and MSM (European Centre for Disease Prevention and Control, 2019; Sciensano, 2023a). While women represent 51.0% of the Belgian population and men 49.0% (IBZ service public fédéral intérieur, 2023), women accounted for 40.0% of the reported cases in the current study. Women appear to consult their GP more regularly than men (Berete *et al.* 2020), albeit less frequently for STI-related issues. Nevertheless, GPs are the primary point of contact, despite the existence of other services where screening is possible: gynaecologists, or family planning clinics or STI care services (Meurer, Heintze, and Schuster, 2023). Furthermore, some studies suggest that women may feel uncomfortable talking about their sexual history (Dixon-Woods *et al.*, 2001; Pavlin *et al.*, 2008).

WSW represent less than 0.9% of patients in our study. Practitioners often do not proactively ask for STI screening of WSW and they are mistakenly considered as low-risk or no-risk population (Chetcuti *et al.*, 2013), they also perceived to have less access to STI-related care (Meurer, Heintze, and Schuster, 2023). Among reported cases in our study, MSM represented 16.3% of our sample and 66.0% of syphilis reported cases, whereas they represent around 3.0% of the Belgian population (Marcus *et al.*, 2013). They are often the main target group of public health campaigns on sexual health and sexual health studies (Dixon-Woods *et al.*, 2001;Pavlin *et al.*, 2008; Wood, Salas-Humara and Dowshen, 2016).

In addition to sexual orientation, the number of partners is a factor investigated to determine the risk of being infected with an STI (European Centre for Disease Prevention and Control, 2019). In this study number of sexual partners was unknown for around 40.0% of reported cases. The information on sexual orientation and the number of partners may not be available to the GP due to the patient's refusal to disclose or the GP's lack of investigation.

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Table 2. Multivariate logistic regression analysis of associations between age, sex, sexual behaviour, education, number of partners, co-infection status, and region by STI diagnosis, Belgium, 2015–2020

Covariates		Chlamydia		Gonorrhoea		Genital warts		Genital herpes+		Syphilis	
		OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age group	15–29 years (Ref.)	1		1		1		1		1	
	30–44 years	0.43***	0.30–0.62	NA		NA		1.43	0.78–2.63	2.78**	1.40–5.52
	45–59 years	0.20***	0.13–0.32	NA		NA		3.08***	1.59–5.98	2.96**	1.34–6.54
	> = 60 years	0.23**	0.09–0.56	NA		NA		2.95	0.94–2.86	<0.001	0.001–999.99
Sex	Male (Ref.)	1		1		1		1		1	
	Female	1.56**	1.12–2.17	0.45***	0.29–0.71	NA		1.72*	1.04–2.86	NA	
Sexual Behaviour	Heterosexual contacts (Ref.)	1		1		1		1		1	
	Same-sex contacts	0.15***	0.09–0.24	3.26***	2.08–5.10	0.48*	0.24–0.98	NA		13.68***	7.38–25.35
	Unknown	0.42**	0.24–0.74	1.37	0.70–2.67	3.08***	1.66–5.73	NA		0.96	0.22–4.28
Education	Higher education (Ref)	1		1		1		1		1	
	Secondary education	0.70	0.48–1.02	NA		2.44**	1.42–4.17	NA		NA	
	Primary education or less	0.33**	0.14–0.72	NA		2.66*	1.10–6.42	NA		NA	
	Unknown	0.68	0.46–1.02	NA		1.28	0.71–2.31	NA		NA	
Number of partners	<3 (Ref.)	1		1		1		1		1	
	> = 3	1.58*	1.01–2.46	NA		NA		NA		NA	
	Unknown	1.65**	1.14–2.37	NA		NA		NA		NA	
Co-infection	Yes	25.52***	7.80–83.45	12.24***	6.13–24.43	NA		NA		NA	
	No (Ref)	1		1		1		1		1	
Region	Brussels-Capital	0.23***	0.11–0.47	NA		4.53***	2.26–9.10	NA		NA	
	Wallonia	1.07	0.71–1.62	NA		0.97	0.56–1.70	NA		NA	
	Flanders (Ref.)	1		1		1		1		1	

Legend: The logistic regression model remove autocorrected variables and select the best fitted model to explain our dependent variable (STI). NA: Not applicable means the logistic model did not retain the variable as predictor because it did not significantly improve the fit of the model, thus did not compute OR. Significant codes, *p* values: *0.05, **0.01, ***0.001.

N = 925 observations used to run the model applied to the entire dataset (registration from 2015 onwards). Observations with missing values for the response or explanatory variables were deleted from the dataset to run the model.

+*N* = 766 observations (genital herpes) used to run the model applied to the entire dataset (registration from 2016 onwards).

Interestingly, recent studies and modelling suggest that a high number of partners is not sufficient to increase risk. Unprotected sex combined with a high number of partners, as well as partners' sexual history, increases the risk of getting infected with an STI (Azizi *et al.*, 2017; Cohen, Council and Chen, 2019). Moreover, having one STI can increase the risk of being infected with another STI, especially in the case of HIV (Cohen., Council and Chen, 2019). Co-infections were observed in less than 5.0% of our samples. Furthermore, studies suggest that pre-exposure prophylaxis (PrEP), predominantly used in MSM, is associated with a reduction in preventive behaviours and use of condoms, among others, which increases the risk of STIs (Barreiro, 2018). HPV vaccination should also be reported to inform on genital warts evolution in the population, currently there are disparities between regions in uptake and coverage (Tjalma *et al.*, 2018), importantly since august 2020 HPV vaccination is reimbursed for boys and girls under 18 (Office de la naissance et de l'enfance, 2022).

STI surveillance may vary according to country priorities in disease reporting and notification. The five most common STIs under international surveillance by World Health Organization are: Chlamydia, gonorrhoea, syphilis, Trichomonas vaginalis, and genital herpes (World Health Organization, 2023), while within the SGP network Trichomonas vaginalis is not monitored. In Belgium, there is no mandatory notification at national level of these five surveilled STIs in Belgium (Sciensano, 2023b). Nonetheless, at Flemish and Brussels-Capital regional level registration of gonorrhoea and syphilis cases is required (AZG, 2023; Sciensano, 2022), whereas in the Walloon region, only congenital syphilis notification is (Sciensano, 2021). In this paper, the focus is primary care surveillance of STIs, however other networks of surveillance exist: sentinel laboratories network, HIV reference centres, and sentinel clinicians for STIs network which includes gynaecologists, dermatologists, etc. As unique patient identifiers do not exist at national level for health data (except for cancer), networks are not integrated together and databases at various level are currently not interoperable.

Strengths and limitations

The study contains limitations, indeed it could include a representativeness/sampling bias and not cover diversity of socio-economic status and ethnic minorities. Furthermore, we did not have information about the (a)symptomatic nature of STIs and if symptoms led to the testing. Starting in 2022, we are recording the motivation to test in a more granular manner including whether the patient has symptoms. To improve the surveillance, starting in 2021, we began adding questions related to the use of PrEP, condom use, HIV status, and HPV vaccination status.

In addition, the educational level in the general population has a slightly different distribution compared to our study (STATBEL, 2023): 32.6% of the general population had a university level of education compared to 31.9% in our study population, 55.3% had a secondary level compared to 33.3%, and 12.0% were without diplomas or had a primary level instead of 4.1%. It is important to note that the level of education is unknown for more than 30.0% of the study population.

Noticeably, the Flemish region represents about 60.0% of the Belgian population (57.6% in 2020, (IBZ service public fédéral intérieur, 2023)), whereas it represented 78.6% of the study population. Furthermore, the disparity between regions is likely multifactorial, on the one had it could reflect artefacts in GPs' participation, on the other hand it could be due to differences in prevention policies as well as healthcare system across regions (Berete *et al.*, 2020; Région de Bruxelles-Capitale, 2023). Nevertheless, previous analyses showed the network can be considered overall representative of the Belgian population and of the population that usually consults GPs at national level Boffin, Moreels, and Van Casteren, 2013; Boffin *et al.*, 2017).

Conclusion

Results from the study are consistent with previous findings and show that GPs remain key informants for STI surveillance in the general population. STI surveillance in general practices enables to monitor STI rates and trends, and to describe STI-infected patients within the general population. Continuous STI surveillance is important, as is the need to improve and strengthen data quality to make it more representative and accurate, in order to better shape appropriate local prevention and healthcare system policies.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S1463423624000422

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Author contributions. SB was responsible for the study conception. AL, SB, SM, and WVB were involved in the design of the questionnaire and/or its update. SB and SM participated in the data management and monitoring. SB analysed, interpreted data, and prepared the initial draft of the manuscript including figures. AL, SB, and SM were involved in writing the final version of the manuscript. AL, SB, SM, RDS, and WVB read the manuscript and revised it critically before approving the final version. All authors granted approval for publication.

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Competing interests. None declared

Ethical standards. The Belgian SGP network was approved as a whole by the Ethical Committees of the Scientific Society of Flemish GPs and the Catholic University of Louvain (UCLouvain). Informed consent was waived by the Ethical Committees of the Scientific Society of Flemish GPs and the Catholic University of Louvain (UCL). This study was conducted in accordance to the relevant guidelines and regulations. We have used the RECORD checklist for reporting.

This study contains no identity revealing information of participants, therefore consent to publish was deemed 'Not Applicable'.

The data underlying this article cannot be shared publicly due to privacy and data sharing policies. The data will be shared on reasonable request to the corresponding author.

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