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Evolution of the epidemiological surveillance indicators of the main sexually transmitted infections in Spain: A retrospective observational study (2011-2019)

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ABSTRACT

Introduction: One of the most relevant aspects of sexual health promotion is the need to carry out health education by promoting a healthy affective-sexual education, with the capacity and resources to prevent sexually transmitted infections (STIs) and unwanted pregnancies. The aim of this study was to collect the evolution of epidemiological surveillance indicators of the main STIs, stratified by autonomous community after the publication of the Sexual and Reproductive Health Strategy in Spain in 2011 and until 2019.

Methods: A retrospective observational study of the Spanish population with STIs from 2011-2019. The study variables were indicators of the main STIs, including annual rates of notification of infections per 100,000 inhabitants.

Results: There is a lack of homogeneous and systematic epidemiological surveillance records for STIs. Overall, in Spain there was an upward trend in STIs, except for HIV, which showed a clear decrease.

Discussion: Despite existing regulations, strategies, and sex education programs in Spain, the main STIs have been increasing over the years, and Spain is one of the countries with the highest rates in Europe.

Introduction

In 2001, the World Health Organization (WHO) defined sexual health as "*a state of physical, mental and social well-being in relation to sexuality. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free from coercion, discrimination and violence.*" (World Health Organization (WHO), 2001).

That same year, the European Parliament approved Resolution 2001/2128 on sexual and reproductive health, with a series of recommendations to the governments of the member states on contraception, unwanted pregnancies, and sex education. In this regard, it considers three relevant aspects in the area of sexual health: the worrying increase in sexually transmitted infections, sexual violence, and the current lack of detailed statistics on sexual and reproductive health indicators at the European level. It rec-

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ommends that the governments of the member states develop a sound national policy on sexual and reproductive health promoting sex education interventions with a gender approach adapted to all stages of life. Finally, it urges the governments of the member states to research and provide the Committee on Women's Rights and Equal Opportunities with relevant data and information to create a European-wide database on sexual and reproductive health statistics (Parlamento Europeo, 2003).

In Spain, the first National Sexual Health Survey was conducted in 2009. Its objective was to collect relevant information on different aspects of the population's sexual health, identify information needs, and document existing health care at the time. This survey collected data from the population aged 16 years and older and asked questions such as the age of onset of sexual relations, the use of birth control methods or prevention against sexually transmitted infections, sexual abuse and/or rape, sexual information and related needs. The results from this survey showed that 29.3% of men between the ages of 17-18 and 24.8% between the ages of 15 -16 had initiated sexual relationships. While for females the age of sexual debut was later: 27.9% between 17 -18 years and 20.8% between 21-25 years (Ministerio de Sanidad, Política Social e Igualdad, 2009).

Regarding the use of protection during sexual relations, the results revealed that approximately 40% of the cases, both men and women, did not use any protection to avoid pregnancy during their first sexual intercourse. With their steady partners, 25.2% and 23.5% of men and women, respectively, never used contraceptive methods. Regarding the protection against sexually transmitted infections (STIs), 53% of men and 55% of women never used preventive methods.

In 2011, the Government of Spain, in collaboration with its Autonomous Communities (ACs) and in accordance with its sphere of competence, approved the Sexual and Reproductive Health Strategy, drawn up with the collaboration of scientific and professional societies and social organizations (Ministerio de Sanidad, Política Social e Igualdad, 2011).

During the preparation of this strategy, a wide territorial variability in sexual health care was observed. Most of the AC have specific programs and protocols for contraception in the Portfolio of Services, however, while some AC regulate this care in specific policies focused on aspects related to the prevention of STIs, Human Immunodeficiency Virus (HIV) and unwanted pregnancies, other regions do not consider this to be a priority area of intervention within their respective health plans.

This strategy is developed on the pillars of the theoretical framework that defines sexual health as a human right, the analysis of the sexual health situation in Spain provided by various scientific societies (such as the Spanish Society of Contraception or the State Federation of Family Planning) and the results of the 2009 National Survey of Sexual Health (Larrañaga, Martín and Bacigalupe, 2014, SEDRA-Federación de Planificación Familiar, 2021).

This strategy pays special attention to the promotion of sexual health through health education. The objective of healthy affective-sexual education is the experience of sexuality from childhood to old age, without fear or prejudice, based on communication, respect and pleasure, with the capacity and resources to prevent STIs and unwanted pregnancies.

Sexually transmitted infections constitute a significant public health issue worldwide. The WHO estimates that over one million people acquire a STI every day, compromising quality of life, sexual and reproductive health, and the health of newborns and children. Such infections are caused by over 30 different bacteria, viruses, and parasites, the most frequent being syphilis, gonorrhea, chlamydia, hepatitis B and C and human immunodeficiency virus (HIV) (World Health Organization (WHO), 2019).

In most cases, STIs are asymptomatic or only accompanied by mild symptoms, which means that a proper diagnosis is not always made (World Health Organization (WHO), 2005). However, they can have serious long-term consequences: chlamydia and gonorrhea are causes of pelvic inflammatory disease, genital herpes and syphilis can increase the risk of contracting HIV, and human papillomavirus infection is a cause of cervical cancer, leading to 266,000 deaths each year in Spain (World Health Organization (WHO), 2016). In addition, maternal diabetes and use of steroids may predispose a person to suffer from STIs (Lee et al., 2020; Devaraj et al., 2019).

It is necessary to underline that beyond their individual repercussions, STIs are also a serious public health problem, as people can remain asymptomatic for quite some time, which does not prevent transmission.

In Spain, epidemiological information on STIs is obtained through the Obligatory Notifiable Diseases System (EDO) and the Microbiological Information System (SIM) included in the National Epidemiological Surveillance Network (RENAVE) (Ministerio de Sanidad, Servicios Sociales e Igualdad, 2017).

The aim of this study was to collect the evolution of epidemiological surveillance indicators of the main STIs stratified by Autonomous Community during the period from 2011 to 2019.

Materials and methods

A retrospective observational study was conducted on the Spanish population with STIs between 2011–2019.

Territorially, Spain is organized into 17 Autonomous Communities; two cities with a statute of autonomy, Ceuta and Melilla, and 8125 local entities. An Autonomous Community is a territorial entity that, within the Spanish constitutional legal system, is endowed with autonomy, with its own institutions and representatives and certain legislative, executive and administrative powers. Their size varies from one to another, the largest (Andalusia) has a surface area of 87,599 km2 and the most populated with a total of 8,414,240 inhabitants in 2019 whereas the smallest (Melilla) has a surface area of 12 km2 and the smallest number of residents (86,487 inhabitants) (Gobierno de Eapana, 2021).

The study variables were the indicators of the main STIs (those considered sexually transmitted diseases and notifiable diseases) during the study period. The annual incidence HIV, Chlamydia Trachomatis, Gonococcal infection, Syphilis and Lymphogranuloma Venereum (LGV) was collected, by AC. For LGV it should be noted that only 12 AC have this incorporated in their respective surveillance systems (since 2016), and in the remaining AC this STI is not part of the official records.

Information on the main STIs was obtained from the EDO and SIM reports included in the RENAVE results. In the case of HIV, data were obtained from the HIV and Risk Behavior Surveillance Unit of the National Epidemiology Center of the Carlos III Health Institute in Madrid. All the data obtained from the different reports were contrasted with the National Epidemiology Center with the intention of obtaining as much data as possible and verifying the data provided by the reports of the aforementioned systems (Centro Nacional de Epidemiología, 2016; Centro Nacional de Epidemiología, 2017; Centro Nacional de Epidemiología, 2018; Centro Nacional de Epidemiología, 2020; Centro Nacional de Epidemiología, 2016; Centro Nacional de Epidemiología, 2017; Centro Nacional de Epidemiología, 2018; Centro Nacional de Epidemiología, 2014; Centro Nacional de Epidemiología, 2015; Sistema de Información Microbiológica Centro Nacional de Epidemiología, 2014; Sistema de Información Microbiológica, 2015; Sistema de Información Microbiológica, 2015; Sistema de Información Microbiológica, 2016; Sistema de Información Microbiológica, 2016; Sistema de Información Microbiológica, 2018).

Table 1
Rates per 100,000 inhabitants for the main STIs and HIV in Spain (2011-2019).

Year	C. Trachomatis	Gonococcal Infection	Syphilis	LGV	HIV
2011		5.72	7.64		7.62
2012		6.59	7.89		8.52
2013		7.12	8.00		9.36
2014		9.82	7.69		7.43
2015		11.14	8.37		9.16
2016	18.04	13.62	7.22	0.73	9.25
2017	24.60	18.76	10.65	1.14	8.98
2018	32.50	24.16	10.87	0.78	8.26
2019	44.18	28.88	13.29	1.24	5.74

The annual rates of notification of Chlamydia Trachomatis, Gonococcal, Syphilis and LGV infections per 100,000 inhabitants were used as an indicator of the extent of the main STIs in Spain and in the 17 AC. In the case of HIV, the number of cases notified in Spain and per AC was obtained, and the rates per 100,000 inhabitants of HIV were obtained from the absolute number of infections, classified by years and regions and according to the annual population. The rates per 100,000 inhabitants include all Spanish population, no age groups were excluded. For the country overall, the annual percentage change in these rates and their average were also calculated to estimate the trend of change based on the first year analyzed, and for each year the difference between each year and the previous year was calculated from the rate of the previous year. Regarding diagnostic criteria, the notification of positive cases of the different communicable diseases is subject to strict protocols in Spain, these diseases are subject to epidemiological surveillance and must be notified in a mandatory manner to the competent authorities at the different territorial levels. These protocols are intended to homogenize the content and form of reporting of cases from the Autonomous Communities to the National Epidemiology Center, which aggregates, analyzes, and disseminates the information. Likewise, for each disease subject to notification, the information from the reference laboratories is incorporated into the surveillance network for its specificity, being a source of confirmation and thus being able to legitimize the results. Therefore, for each disease, the structure of notification, surveillance mode and confirmation is the same.

Microsoft Excel version 365 was used to analyze the rates and trends during the study period. Finally, data for each AC were extracted in relation to the study variables, collected on a data collection sheet and subsequently tabulated in a spreadsheet.

Ethical-legal considerations

The research protocol was approved by the Clinical Research Ethics Committee (internal code 2020.053). For this type of retrospective study formal consent is not required.

Results

In Spain, the highest number of cases of C. trachomatis infection (17,718 cases) was reported in 2019 in the fifteen Autonomous Communities that have a surveillance system for this disease, reaching a rate of 44.18 cases per 100,000 inhabitants. The rates in the period from 2016-2019 experienced an interannual percentage increase of 34.5% (See Table 1 and Fig. 1).

When analyzing the gonococcal infection data for the period 2011-2019, a steady increase in rates was observed until 2013 (from 5.72 in 2011 to 7.12 in 2013). From that year onwards, between 2013 and 2019, the interannual percentage increase was 25.2% (See Table 1 and Fig. 1).

In relation to syphilis, the highest rate of the period was reached in 2019 (13.29 per 100,000 inhabitants). Analyzing the evolution, between 2011 and 2016 a stabilization was observed and between 2016 and 2019 the trend becomes more upward with a year-on-year percentage increase of 18.4% (See Table 1 and Fig. 1).

LGV surveillance is implemented in twelve Autonomous Communities. In 2019, 453 cases were reported in seven ACs. In 2019, the incidence rate for the set of ACs with a surveillance system was 1.24 cases per 100,000 (See Table 1 and Fig. 1).

In contrast, in the case of HIV in Spain, the number of detected cases was found to decrease throughout the study period, suffering a significant decrease in 2019 (5.74 cases per 100,000) which was the lowest rate of the entire study period. This figure may be influenced by the fact that the 2019 data are still provisional (See Table 1 and Fig. 1).

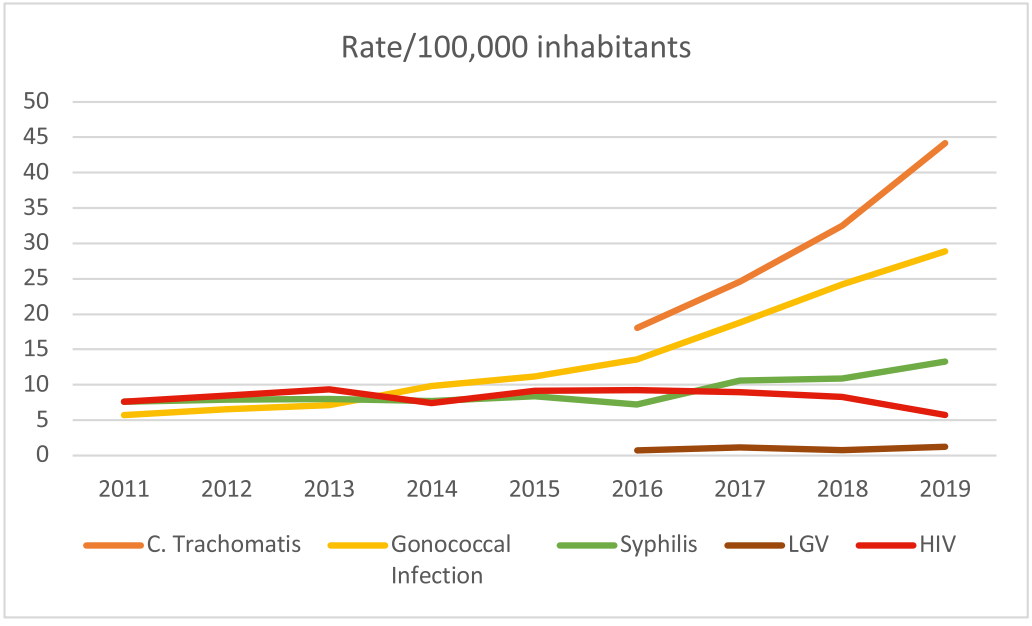

Fig. 1. Evolution of epidemiological surveillance indicators of the main STIs/HIV in Spain during the period 2011-2019.

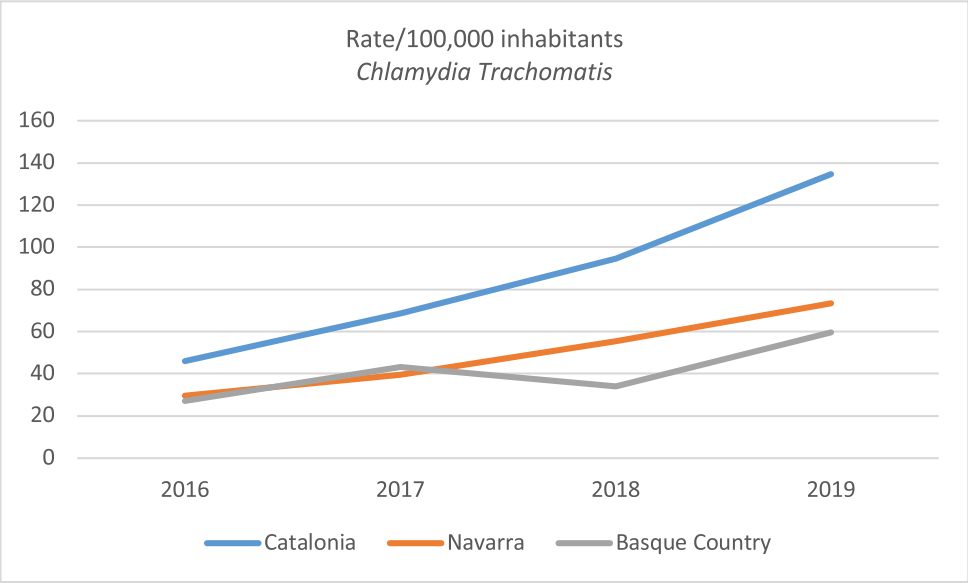

Fig. 2. Evolution of C. trachomatis in the ACs with the highest incidence between 2016 and 2019.

Chlamydia trachomatis

Upon analyzing the incidence by AC, it was observed that in 2019 the populations located in the northeast of the country had higher rates, specifically Catalonia, Navarra and the Basque Country (134.66; 73.41 and 59.63). Meanwhile, the least affected were the autonomous cities of Ceuta and Melilla, with no reported cases. See Fig. 2.

It is noteworthy that in all the ACs that reported data on this STI, incidence rates increased throughout the study period, in this case between 2016 and 2019, since before 2016 it was not reported in all the ACs and in those that did, the number of cases reported (not rates) was provided. It is worth noting the exception of the Community of Extremadura, which went from 7.86 in 2016 to 5.46 in 2019.

Gonococcal infection

In relation to gonococcal infection, the high rate reported by the Communities of Catalonia, Balearic Islands and Basque Country in 2019 stands out: 75.26; 35.04 and 33.87, respectively. In the case of the Basque Country, its incidence doubled compared to the previous year (from 14.54 in 2018 to 33.87 in 2019). See Fig. 3.

Analyzing all the Autonomous Communities, the trend increased throughout the study period, doubling, and even tripling in some Communities when analyzing the data reported in 2011 compared to 2019.

Syphilis

In the case of syphilis, greater variability was found compared to the other STIs, since it did not follow a linear trend throughout the study period. It is necessary to highlight that depending on the AC, the highest reported rate was different throughout the study period, for example in the case of Andalusia, Aragon, Canary Islands, Cantabria, Castilla la Mancha, Castilla Leon and Catalonia, the highest incidence was obtained in 2019. For Asturias, Balearic Islands, Navarra, Basque Country, and the Valencian Community the highest incidence was in 2018 and for Extremadura and Madrid the highest incidence was in 2017.

The rest of the ACs obtained their highest rate in 2012, as in the case of Murcia, Ceuta in 2013, Galicia in 2014 and La Rioja and Melilla in 2015.

Analyzing 2019, the last year with official data, the highest rates were reported in Catalonia (30.53), Balearic Islands (19.94), Canary Islands (18.47), Asturias (14.22), Aragon (12.99 and Andalusia (10.18). Cantabria and Galicia did not report any cases that year. See Fig. 4.

Lymphogranuloma venereum (LGV)

LGV rates are very low compared to the rest of STIs. Even so, Catalonia reported the highest rate, specifically a 4.14 in 2019, following an upward trend throughout the study period. However, Madrid stood out as the only AC with decreasing rates. See Fig. 5.

HIV

After analyzing the data obtained, the highest number of cases was observed in Madrid with a rate of 18.60 in 2011, although throughout the study period it decreased to 2.33 in 2019. Catalonia also reported high rates, specifically 11.58 in 2011, 12.46 in 2012 and a subsequent gradual decrease until reaching the lowest rate of the study period in 2019 with a rate of 6.03. In third place, the Valencian Community with a rate of 8.44 in 2012, increasing to 9.63 in 2017, with a slight decrease in 2018 and increasing again in 2019, reporting a rate of 9.41. Finally, Andalusia reported a rate of 7.61 in 2013, increasing to 9.01 in 2015 and A subsequent gradual decline throughout the study period, reaching its lowest rate in 2019 (5.99), although this may be due to the fact that the 2019 data are still provisional. See Fig. 6.

Discussion

In Spain, an increase in a number of STIs (C. Trachomatis, gonococcal infection, syphilis and LGV) has been observed since the beginning of 2010. C. trachomatis, gonococcus and syphilis infections are the most common STIs, while LGV has much lower rates, although this is probably because five autonomous communities do not include LGV in their surveillance systems.

In the case of C. trachomatis, it should be noted that this is one of the most frequent STIs in the world (European Centre for

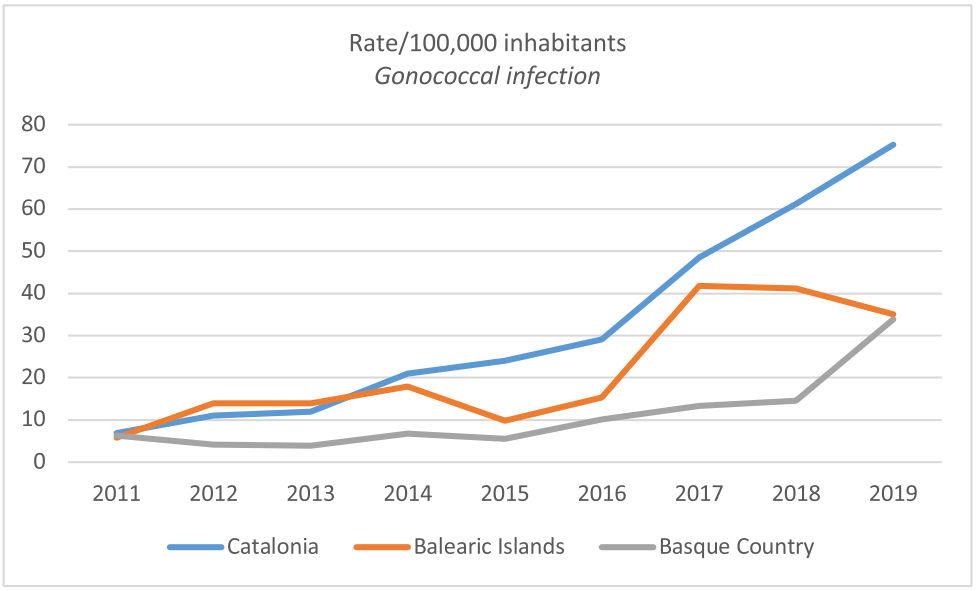

Fig. 3. Evolution of gonococcal infection in the Autonomous Communities with the highest incidence between 2011 and 2019.

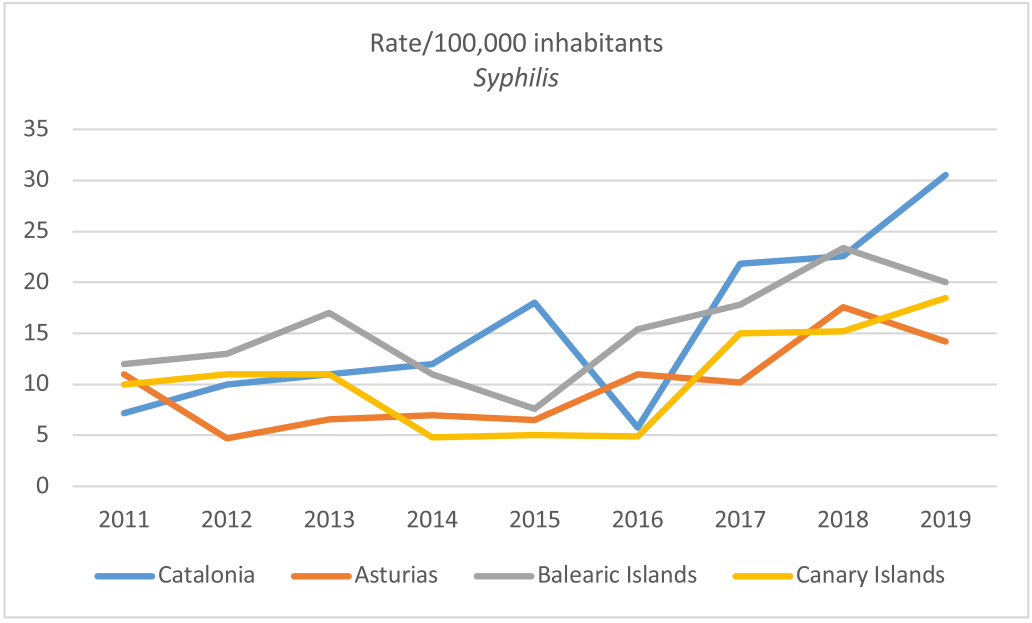

Fig. 4. Evolution of syphilis in the ACs with the highest incidence between 2011 and 2019.

Disease Prevention and Control (ECDC), (2018); Centers for Disease Control and Prevention, 2007). In Europe, and especially in the Nordic countries, the prevalence of C. trachomatis has been increasing since the beginning of the 20th century, affecting countries such as Norway, Denmark, Sweden and the United Kingdom to a greater extent (World Health Organization (WHO), 2016). Specifically, 403,807 cases were reported in Europe in 2016, with an overall rate of 185/100,000 inhabitants. Although a stable trend in overall incidence has been observed in recent years, there are differences between the different European surveillance systems, (more than 5,000-fold between the maximum and minimum) and therefore the current overall incidence may be underestimated (European Centre for Disease Prevention and Control (ECDC), 2018).

At the European level, according to the European Centre for Disease Prevention and Control (ECDC), gonococcal infection is on the rise across Europe. In 2017 alone there were more than 89,000 confirmed cases (240 per day). Specifically, the UK reported 55% of all cases (75 per 100,000), followed by Ireland (47), Denmark (33), Iceland (29), Norway (27) and Sweden (25) (European Centre for Disease Prevention and Control (ECDC), 2018).

Moreover, in 2018 in Europe there were 33927 confirmed cases of syphilis, after showing a decrease until that year. The highest rate was observed in Malta (17.9 cases per 100,000 inhabitants), followed by Luxembourg (17.1), United Kingdom (12.6) and Spain (10.3). In the case of LGV, France, the Netherlands, Spain, and the United Kingdom were the countries with the highest number of infections, accounting for 86% of cases in Europe as a whole. It is noteworthy that while Spain, Belgium, and the Netherlands, suffered an increase in the number of reported cases in 2017 compared to the previous year, in France and the United Kingdom the cases decreased (European Centre for Disease Prevention and Control (ECDC), 2018).

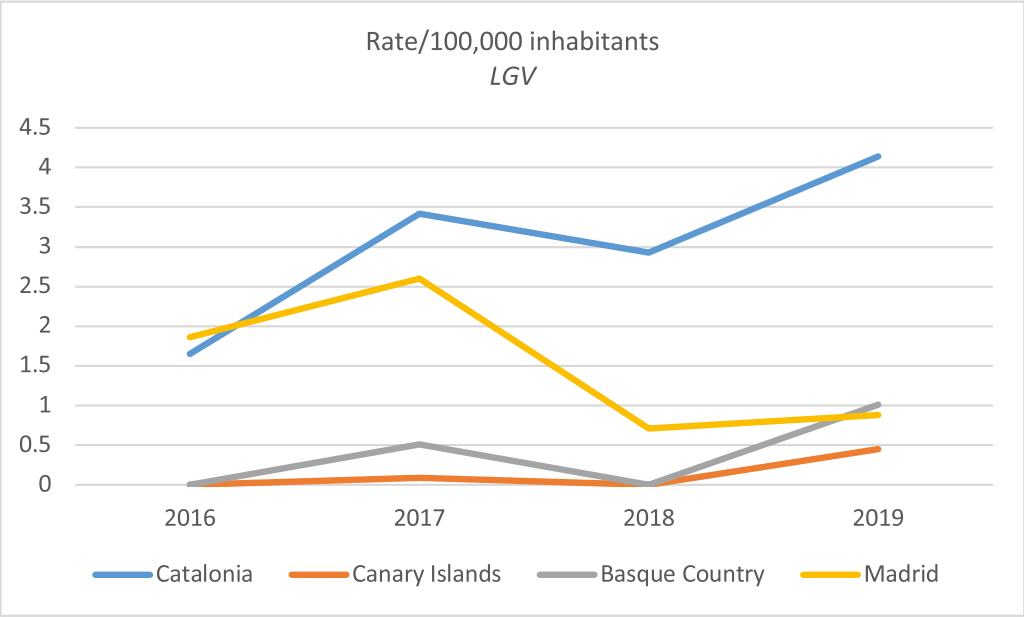

Fig. 5. Evolution of LGV in the ACs with the highest and lowest incidence during the study period (2016-2019).

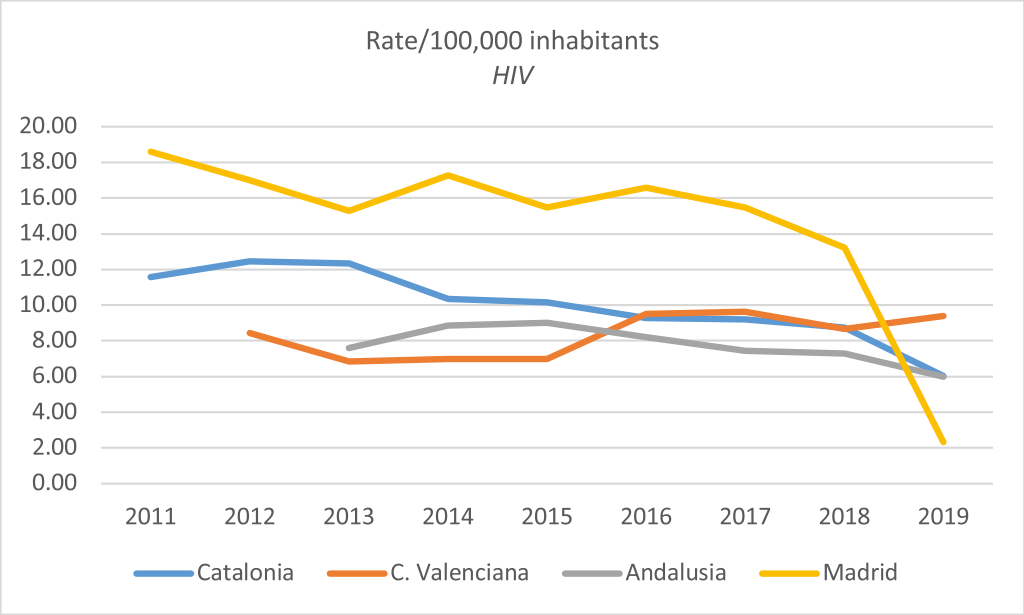

Fig. 6. Evolution of annual incidence rates of HIV in the ACs with the highest number of reported cases (2011-2019).

Regarding HIV data in Spain during the study period, after the exponential growth in the 1990s, the number of cases has shown a clear decrease (except in 2013). This is possibly because the proportion of patients infected by injecting drugs has decreased in favor of infection through sexual contact and thanks to the campaigns and education programs that have been carried out, which have heightened the awareness among the population (Riesgo, 2019, Pérez-Morente et al., 2020).

Although HIV continues to be one of the major public health problems in the world, there has been a downward trend in most countries, with Spain following the European trend (European Centre for Disease Prevention and Control (ECDC), 2018). However, the report of the ECDC and the regional office for Europe of the World Health Organization (WHO) has recently published the figures of HIV in Europe, revealing worrying data of an increase in Eastern European countries between 2017-2020 (European Centre for Disease Prevention and Control, 2021).

Study limitations

There is a lack of homogeneous and systematic records of STI data in Spain, since each Autonomous Community records STIs differently, and subsequently communicates the data to the Spanish Ministry of Health, Social Services and Equality. Due to the pandemic caused by COVID-19, the surveillance services of the ACs have been overwhelmed and therefore the 2019 data are considered provisional since some of the records are still in the process of being filtered and analyzed (mainly by ACs that have not been able to declare all their cases for all STIs). However, the data available for those reflected in this article has been verified, as

this information was provided by the National Epidemiology Center of the Carlos III Institute of Health in Madrid and has followed the corresponding confirmation and notification protocol. Moreover, not all the Autonomous Communities have a surveillance system for STIs, and therefore the data provided by the surveillance systems do not cover the entire national territory. Although the Epidemiological Surveillance System of the National Epidemiology Center performs a filtering of duplicates with the data reported by the Autonomous Communities, it is not possible to evaluate whether there are duplicate data among the different Autonomous Communities, since the national-level registries lack identifiers to do so. Finally, although the annual prevalence of Trichomoniasis was initially considered as a variable, it could not be collected because it does not appear in the published reports since it does not form part of the Obligatory Notifiable Diseases in Spain.

Our data were obtained from databases that had been cleaned by epidemiological surveillance systems, containing highly specific information collected in a homogeneous and systematized manner and in accordance with the Organic Law 3/2018, of December 5, on Personal Data Protection and guarantee of digital rights. Due to the characteristics of these official databases, there are possible confounding factors that we were unable to include in our analyses. Thus, we were unable to obtain a description of the population (e.g., age, sex, ethnicity) to interpret the results. Similarly, we were unable to include the number of tests performed/positivity rate. For this reason, we could not perform a precision analysis of the rates presented. Likewise, we were unable to address demographic profiles between regions or between years or the amount of missing data. For this reason, we have not performed sensitivity analyses assessing potential confounders.

Conclusions

Despite the existing regulations, strategies, and sex education programs in Spain, the main STIs have been increasing over the years. The evolution of the main STIs in Spain follows the same upward pattern as in Europe, and Spain is one of the countries with the highest rates.

In Spain, it is striking that the highest rate of C. Trachomatis, Gonococcus and LGV was in 2019, increasing year after year. The highest figure for Syphilis was recorded in the year 2017 and for HIV in 2013. By region, Catalonia is the A.C. with the highest rates of all STIs analyzed.

Given the limitations for comparing rates and cases due to the lack of homogeneity in official records, it would be advisable to strengthen epidemiological surveillance and public health systems.

Despite the current focus on the COVID-19 pandemic, it is important not to lose sight of other public health issues such as STIs.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Pellico-López Amada: Conceptualization, Investigation, Data curation, Writing – original draft, Writing – review & editing, Supervision. **Ruiz-Azcona Laura:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Supervision. **Sánchez Movellán Mar:** Writing – review & editing. **Ajo Bolado Purificación:** Writing – review & editing. **García-Vázquez José:** Writing – review & editing. **Manjón Rodríguez Jimena:** Investigation, Resources, Writing – review & editing. **Cayón-De las Cuevas Joaquín:** Investigation, Data curation, Writing – review & editing. **Paz-Zulueta María:** Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition.

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