



Sexually Transmitted Diseases among Italian Women in 1991-2011

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Authors' contributions

This work was carried out in collaboration between all authors. Authors may use the following wordings for this section MCS has designed the study, was responsible for data collection, statistical analysis and was the lead writer of this paper. Author VR has designed the study, managed database and has made statistical advice. Author AHLB helped to write the study. Author MF contributed in structuring and formatting data in the online reporting system. Authors LC and MR has revised the paper and author BS was responsible for the study coordination and has supervised and revised the manuscript. The Italian STD Surveillance Working Group was responsible for data collection. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication. All authors read and approved the final manuscript.

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ABSTRACT

Objective: The objectives are to identify variations in trends in single sexually transmitted diseases (STDs) over time and to monitor the prevalence of HIV infection among women with a diagnosis of STD.

Methods: Data were obtained from the Italian Sentinel STD Surveillance System in the period 1991-2011. This system collects information on diagnoses provided by a network of 12 specialised clinical centres, which offer treatment and care to STDs patients and are located in large cities.

Results: From January 1991 to December 2011, the system received detailed information on 27,350 new cases of STDs among women. The most frequently diagnosed STDs were ano-genital warts (33.2%), non-gonococcal non-chlamydial infections (31.3%), and latent syphilis (11.2%). Of the 17,561 (64.2%) women with a STD who underwent HIV testing, the HIV prevalence was 4.4% (95% CI: 4.1%-4.7%). Of the 778 HIV-positive women with a STD, 28.5% (95% CI: 25.4%-31.8%) was unaware of being HIV-infected.

Conclusion: The results obtained should contribute to increasing the commitment of governments and institutions to the prevention and control of STDs, promoting policies, laws, and initiatives for effective control (e.g., by developing information and education campaigns on STDs).

Keywords: Surveillance system; sexually transmitted disease; women; Italy.

ABBREVIATIONS

STDs: Sexually transmitted diseases, *MSM:* Men who have sex with men *WHO:* World Health Organization, *HIV:* Human immune deficiency virus *EU:* European Union, *NG-NC:* Non-gonococcal non-chlamydial *Ct:* *Chlamydia trachomatis*.

1. INTRODUCTION

The control and prevention of sexually transmitted diseases (STDs) among women are public-health priorities for several reasons: the large number of women who acquire a STD each year, the large proportion of infected women who are asymptomatic, the high prevalence of STDs among groups with at-risk sexual behaviour [i.e., women with more than one occasional sexual partner, newly arrived non-nationals with socio-economic hardships, and commercial sex workers], the increased biological susceptibility of some women, such as young women and the serious complications in the event of failed or incorrect diagnosis and treatment (i.e., chronic disease, infertility, oncogenic transformation, and synergy with HIV infection). In fact, some STDs can be prevented with vaccines, and in most cases can be cured if diagnosed and treated immediately and properly [1-10].

According to the World Health Organization (WHO), over 232 million new cases of STDs caused by protozoa or bacteria (*Trichomonas vaginalis*, *Chlamydia trachomatis*, *Neisseria gonorrhoea*, and syphilis) occur worldwide each year in women 15-49 years of age [2]. However, these infections constitute only a minority of STDs, in that each year there are also millions of cases of viral STDs, which mainly consist of

infection with the human immune deficiency virus (HIV), human herpes virus types 1 and 2, human papillomavirus and hepatitis B virus [11-16].

In the European Union (EU), a general reduction of STDs occurred throughout the 1980s and early 1990s. However since the mid-1990s, there has been an unexpected increase in the incidence of bacterial STD among women (i.e., syphilis, gonorrhoea, *Chlamydia trachomatis* infection), especially in large cities [17]. This re-emergence has led public-health authorities to implement measures for improving STDs surveillance and control throughout the EU, yet despite these efforts, there still exist many differences in STDs surveillance among individual countries [17].

In Italy, there are two main sources of data on STDs. One source is the Surveillance System for Infectious Diseases Subject to Mandatory Reporting; however, this system suffers greatly from under-reporting, in addition to the fact that it only records information on gonorrhoea and syphilis [18]. The other source is the Italian Sentinel STD Surveillance System, which is based on a network of clinical centres. This system has been active since 1991 and is coordinated by the Centro Operativo AIDS of the Istituto Superiore di Sanità [19]; it was developed based on analogous programs for the prevention

and control of STDs in other European countries [20].

In the present study, we describe the characteristic of women with a STD collected by the Italian Sentinel STD Surveillance System, we identify variations in trends in single STD diagnoses over time, and we monitor the prevalence of HIV infection among women with other STDs in the past 21 years.

2. METHODOLOGY

A retrospective study was conducted using data obtained from the database of the Italian Sentinel STD Surveillance System between 1991 and 2011. This system collects information on diagnoses provided by a network of 12 specialised public clinical centres that perform diagnoses and provide treatment and care to women with STDs in major cities located throughout Italy. The centres provide data on all women with a diagnosis of a STD. A confirmation of the diagnosis based on a positive laboratory test result is required for non-viral STI, whereas the diagnosis of viral STIs is based on clinical criteria [21].

Only the first episode of STD is reported, that is, the system does not collect data on relapses, follow-up visits, or women reported for the same diagnosis from the same centre in the previous three months.

Socio-demographic (i.e., gender, age, nationality), behavioural (i.e., number of sexual partners in previous six months, contraceptive use in previous six months, use of injecting drugs) and clinical (i.e., previous STD) data are collected for every woman with a confirmed STD diagnosis. All women are offered HIV testing, and HIV serostatus is recorded.

The centres can be accessed by all women living in Italy, the tests are performed free-of-charge, and anonymity is guaranteed. Participating centres report data via the Internet to the coordination centre.

For the present study, a descriptive analysis of the socio-demographic, behavioural and clinical characteristics of women diagnosed with a STD was performed. The number of diagnoses and trends over time for the most frequently diagnosed STDs, and the HIV prevalence among women with STDs were also analysed.

The differences between proportions were evaluated using the Chi square test (a $P = .05$ was considered significant).

The analysis was performed using IBM SPSS Statistics 21.

3. RESULTS AND DISCUSSION

3.1 Results

From January 1991 to December 2011, the system received detailed information on 27,350 new cases of STDs among women. The annual number of STDs new cases was stable for the entire period, with an average of 1,287 cases per year. The median age of women with STD was 30 years (interquartile range: 24-38 years). The socio-demographic, behavioural and clinical characteristics of women diagnosed with a STD are reported in Table 1.

Since the late 1990s there has been an increase in the annual proportion of cases represented by non-Italian women. In particular, the proportion of non-Italian women has nearly tripled, from 7.5% in 1991 to 24.9% in 2011 ($P < .001$).

The most frequently diagnosed STD were ano-genital warts, non-gonococcal non-chlamydial (NG-NC) infections caused by *Gardnerella vaginalis* and/or *Mycoplasma genitalium* and/or *Ureaplasma urealyticum*, and/or *Streptococcus agalactiae*, and/or *Staphylococcus aureus*, and latent syphilis (Table 2).

Ano-genital warts and *Chlamydia trachomatis* (Ct) infections were more commonly diagnosed among women between the ages of 15 and 24 years, compared to older women (ano-genital warts: 37.8% vs. 31.4%, $P < .001$; Ct infection: 8.2% vs. 4.6%, $P < .001$).

Regarding the most commonly bacterial STDs, the number of new cases of syphilis I-II showed a trend of decrease until 1998 (from 25 cases in 1991 to 4 in 1998); from 1998 to 2007, the number of new cases of syphilis I-II increased by fourteen-fold (Fig. 1). The number of new cases of latent syphilis showed a trend of decrease until 1996 (from 153 cases in 1991 to 101 in 1996). From 1996 to 2005, the number of new cases of latent syphilis increased by two-fold (Fig. 1). Afterwards, both infections remained relatively stable.

Table 1. Socio-demographic, behavioural and clinical characteristics of women diagnosed with a STD, (Italian sentinel STD surveillance System, 1991-2011)

Characteristic	Women (No. 27,350)	
	No.	% ^a
Nationality		
National	19,952	77.1
Non-National	5,932	22.9
<i>Europe</i>	3,096	52.2 ^b
<i>African</i>	1,069	18.0 ^b
<i>Americas</i>	1,080	18.2 ^b
<i>Asia</i>	426	7.2 ^b
<i>nd^c</i>	261	4.4 ^b
Missing	1,466	
Education		
None	381	1.6
Primary school	10,149	42.6
High school	11,036	46.3
University degree	2,270	9.5
Missing	3,514	
Number of sexual partners in previous six months		
0	786	3.0
1	17,281	65.6
2-5	7,238	27.5
≥ 6	1,037	3.9
Missing	1,008	
Contraceptive use in previous six months		
None	12,767	49.3
Condom, always	1,343	5.2
Condom, seldom	5,676	22.0
Oral contraceptive	5,159	19.9
Other	927	3.6
Missing	1,478	
Injecting drug use		
Yes	724	3.2
No	21,987	96.8
Missing	4,639	
Previous STD		
Yes	4,403	17.2
No	21,189	82.8
Missing	1,758	

^aPercentages based on total number of women for whom information was available; ^bPercentage among Non-Italian women; ^cnd= country of origin not determined

The number of new cases of gonorrhoea showed a trend of decrease until 1999 (from 15 cases in 1991 to 6 cases in 1997), then it increased by six-fold between 1997 and 2006 and afterwards decreased until 2011 (No. 8) (Fig. 1).

The number of new cases of Ct infection showed a trend of decrease until 2000 (from 73 cases in 1991 to 49 cases in 2000), then it doubled between 2000 and 2011 (Fig. 1).

The number of new cases of NG-NC infections remained relatively stable at around 569 cases

per year until 2002; it then decreased gradually, reaching 127 cases in 2011.

Table 2. Distribution of STD diagnoses among women (Italian Sentinel STD Surveillance System, 1991-2011)

Diagnosis	Women	
	No.	%
Ano-genital warts	9,070	33.2
NG-NC ^a infections	8,565	31.3
Latent syphilis	3,068	11.2
Genital herpes	1,755	6.4
<i>Molluscum contagiosum</i>	1,608	5.9
<i>Chlamydia trachomatis</i> infections	1,518	5.5
Syphilis I-II ^b	572	2.1
Trichomoniasis cervical-vaginitis	453	1.7
Pediculosis	410	1.5
Gonorrhoea	286	1.0
Other	45	0.2
Total	27,350	100.0

^aNG-NC = non gonococcal non chlamydial

^bPrimary and secondary syphilis

With regard to viral STDs, the annual number of new cases of ano-genital warts showed a trend of decrease until 2002 (from 368 cases in 1991 to 261 cases in 2002) (Fig. 2); it then gradually increased, with three times as many cases in 2011 compared to 2002 (781 cases vs. 261 cases), whereas the number of new cases of genital herpes remained stable until 2006 (with an average of 73 cases for year); it then gradually increased, from 99 cases in 2006 to 147 cases in 2011 (Fig. 2).

3.1.1 HIV infection among women with STDs

Among the 17,561 women with a STD who underwent HIV testing (64.2% of all women diagnosed with a STD), the prevalence of HIV infection was 4.4% (95% CI: 4.1%-4.7%) (No. 778). In the period 2000-2011, there was an increase in the percentage of women with a STD who were tested for HIV, from 48.0% in 2000 to 69.0% in 2011 (Fig. 3).

When considering the entire study period, there was an overall trend of gradual decrease in the prevalence of HIV infection. However, during this period there were a number of peaks in the HIV prevalence. The higher peak occurred in 1991 (8.0%) and the lowest prevalence was observed in 2005-2006 (1.6%) (Fig. 3). In the last three years, the HIV prevalence remained stable around 2.7%.

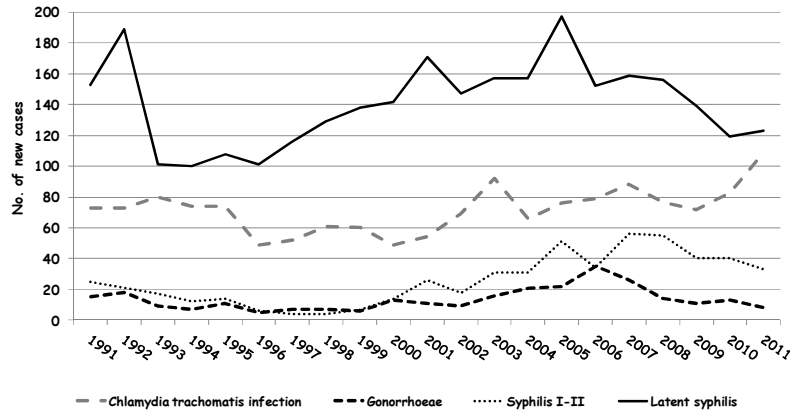


Fig. 1. Number of new cases of the most commonly diagnosed bacterial STDs among women in Italy (Italian Sentinel STD Surveillance System, 1991-2011)

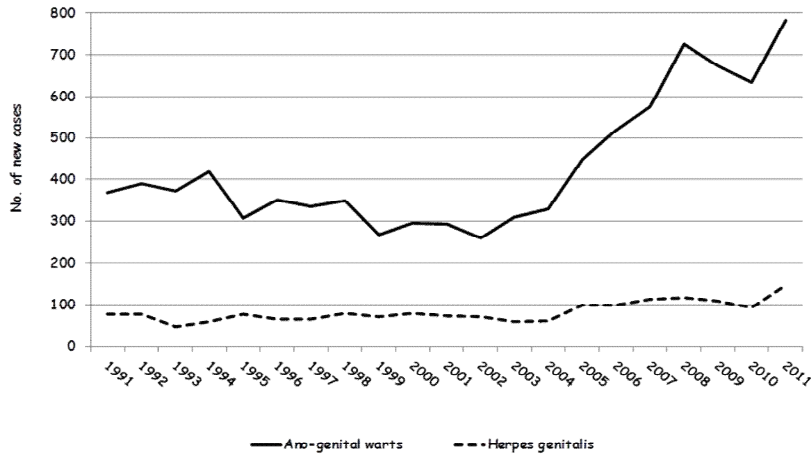


Fig. 2. Number of new cases of the most commonly diagnosed viral STDs among women in Italy (Italian Sentinel STD Surveillance System, 1991-2011)

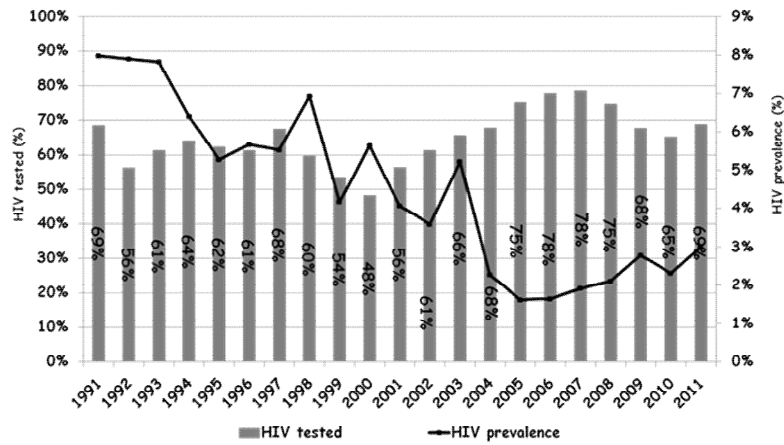


Fig. 3. Proportion of women with an STD tested for HIV and the prevalence of HIV infection, by year (Italian Sentinel STD Surveillance System, 1991-2011)

Table 3. Prevalence of HIV infection by exposure category^a and concomitant STD among women: 1991-2000 and 2001-2011 (Italian Sentinel STD Surveillance System)

	1991-2000		2001-2011		<i>P</i> ^b
	No. of women tested for HIV	HIV prevalence (%)	No. of women tested for HIV	HIV prevalence (%)	
Exposure category^a					
Non-injecting drug user	7,047	2.6	6,661	2.5	>.05
Injecting drug user	470	63.0	119	35.3	<.001
Concomitant STD					
Syphilis I-II	105	8.6	342	2.9	= .05
Genital herpes	517	10.4	740	5.0	< .001
Ano-genital warts	2,433	10.4	4,003	3.4	< .001
Gonorrhoea	77	3.9	166	1.2	> .05
Latent syphilis	856	2.3	1,383	0.9	= .05
NG-NC ^c infections	2,816	2.5	1,255	1.0	= .05
<i>Chlamydia trachomatis</i> infections	408	3.2	761	1.2	= .05

^a The categories are mutually exclusive ^b *P* of comparison between HIV prevalence 1991-2000 vs. HIV prevalence 2001-2011

^c NG-NC = non gonococcal non chlamydial

However, during the last years, the prevalence of HIV, after a period of decrease, seems to remain relatively stable, and about 40% of women with STDs has not been tested for HIV, despite the participating centres are highly active in HIV prevention.

Table 3 shows the prevalence of HIV infection by exposure category and concomitant STD among women before and after the year 2000. The HIV prevalence was nearly halved from the period 1991-2000 to the period 2001-2011 among injecting drug user women ($P < .001$).

After 2001 a more significant ($P < .001$) reduction of HIV prevalence was observed among women with diagnosis of ano-genital warts or of genital herpes.

Of the 778 HIV-positive women with a STD, 222 (28.5%; 95%CI: 25.4%-31.8%) was unaware of being HIV-infected, that is, they were diagnosed with HIV infection at the time of the STD diagnosis. The percentage of women that was unaware of being HIV-infected showed a gradual increase over time (from 18.1% in 1991-1995 to 39.6% in 2006-2011; $P < .001$).

3.2 Discussion

The data collected by the Sentinel STD Surveillance System indicate that in the past two decades STDs have been widespread among women in Italy and that the number of reported cases has not decreased over time.

This system provides data on other common STDs (i.e. ano-genital warts, NG-NC infections,

genital herpes) in addition to syphilis and gonorrhoea, notified to the Surveillance System for Infectious Diseases Subject to Mandatory Reporting.

In Italy, the STDs that are subject to mandatory reporting (i.e., syphilis and gonorrhoea) represent about 14% of the cases diagnosed and treated among women in the clinical centres that participate in the Sentinel STD Surveillance System.

Since 2000, there has been an increase in the cases of syphilis and gonorrhoea among women reported to the sentinel system, as observed in other European countries [17]. This increase corresponds to the syphilis epidemic, accompanied by an increase in gonorrhoea, which began after 2000 among MSM.

In the period 2000-2011, there has been an increase in the cases of Ct infection among women reported to the sentinel system, as observed in other European countries [17,22]. The introduction of molecular amplification techniques for the identification of Ct [i.e., nucleic acid amplification tests (NAAT)] probably contributed to this increase.

The association of Ct infection with young age (15-24 years) has also been reported in other countries [23-25] and is consistent with the finding that in 2010 three quarters of all cases of Ct infection in Europe were reported among young persons (i.e., 15-24 years of age) [22]. This association is probably related to the fact that genital tissues in young persons are still

immature and thus more receptive to pathogens [24,25]. The sharp increase in the number of cases of ano-genital warts after 2002 can only be attributed in small part to the increased awareness following the anti-HPV vaccination campaign, which was implemented only in 2008. In the past decade, an increase in the number of diagnoses of ano-genital warts has also been reported in the United Kingdom especially among young women, although no specific reason for this increase has been reported in either of these countries [26].

Moreover, the introduction of molecular biology tests for HPV identification could have contributed to this rise [27].

The increase in HIV testing rates in recent years and the progressive decrease in the prevalence of HIV infection among women with STDs reflect the effectiveness of the HIV prevention programs that have been conducted in the STD clinical centres since 1991. However, HIV prevalence among women diagnosed with STD is twenty-five-fold higher than that estimated in the general population [28], highlighting the strong interaction between HIV infection and other STDs [29].

4. CONCLUSION

The STDs are a group of infectious diseases widespread among women, which showed an increase in recent years in various European countries.

Our data show that also in Italy in the last decade an increase in most commonly bacterial and viral STDs, such as syphilis, *Chlamydia trachomatis* infection and ano-genital warts.

These results stress the need for specific prevention activities, in particular:

- information campaigns on STDs;
- education campaigns on “sexual health” (e.g., correct condom use, reduction of the number of sexual partners);
- information on the need to seek medical care in case of signs or symptoms of STDs; and
- early diagnosis (e.g., screening for Ct in women between 15 and 24 years of age).

Moreover, our data show that HIV prevalence among women with STD is about twenty-fold higher than that estimated in the general population, stressing the need to test for HIV all

women diagnosed with any STD, especially when reporting the use of injecting drugs [30,31].

Finally, this study could contribute to increasing the commitment of health authorities and institutions to the prevention and control of STDs among women, by promoting policies, laws, and initiatives for the effective control of STDs, such as the development of a national plan for STDs prevention, programs for behaviour surveillance, the introduction of targeted screening, and education of the correct and consistent use of condoms [1].

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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