Received: 4 February 2026 | Accepted: 6 June 2026

DOI: 10.1111/hiv.70270

ORIGINAL ARTICLE

History of sexually transmitted infections among mpox cases in the 2022 outbreak in Spain

Aina March-Yagüe[1] | **Diana Toledo**[1,2] | **Asunción Díaz**[3,4] | **Pere Godoy**[2,5] | **Olaia Pérez-Martínez**[6] | **Carles Pericas**[1,2,7,8] | **Alonso Sanchez-Migallon**[2,9] | **María Dolores Chirlaque**[2,9] | **Jesús Ospina**[2,7] | **María Grau**[1,2] | **Francisco Roig**[10] | **Angela Domínguez**[1,2] | **and the MONKPOX-ESP22 Subproject 3.2 Working Group**[1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19]

[1]Universitat de Barcelona, Barcelona, Spain

[2]CIBER de Epidemiología y Salud Pública-CIBERESP, Madrid, Spain

[3]Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Madrid, Spain

[4]CIBER de Enfermedades Infecciosas-CIBERINFEC, Madrid, Spain

[5]Institut de Recerca Biomèdica de Lleida-IRBLleida, Lleida, Spain

[6]Dirección Xeral de Saúde Pública, Santiago de Compostela, Spain

[7]Agència de Salut Pública de Barcelona, Barcelona, Spain

[8]Institut de Recerca Sant Pau, Barcelona, Spain

[9]Consejería de Salud de la Región de Murcia-IMIB, Murcia, Spain

[10]Subdirección General de Epidemiología y Vigilancia de la Salud de la Comunidad Valenciana, Valencia, Spain

[11]Consejería de Salud y Familias, Junta de Andalucía, Seville, Spain

[12]Servicio Andaluz de Salud, Seville, Spain

[13]Dirección General de Salud Pública del Servicio Canario de la Salud, Canary Islands, Spain

[14]Dirección General de Salud Pública de Castilla y León, Castile-Leon, Spain

[15]Agencia de Salut Publica de Catalunya, Barcelona, Spain

[16]Universitat Politécnica de Catalunya, Barcelona, Spain

[17]Universidad de Santiago de Compostela, Santiago de Compostela, Spain

[18]Centro Nacional de Microbiología, Madrid, Spain

[19]Centro de Coordinación de Alertas y Emergencias Sanitarias, Madrid, Spain

Correspondence
Aina March-Yagüe, Universitat de Barcelona, C. Casanova 143, Barcelona 08036, Spain.
Email: ainamy16@gmail.com

Funding information
Consorcio Centro de Investigación Biomédica en Red, Grant/Award Number: MONKPOX-ESP22; Agència de Gestió d'Ajuts Universitaris i de Recerca, Grant/Award Number: 2021/SGR 00702

Abstract

Objective: The aim was to describe the history of sexually transmitted infections (STIs) among adult mpox men cases and to analyse sociodemographic and epidemiological characteristics according to the presence or absence of any STI diagnosed 1 or 6 months previous to mpox diagnosis during the 2022 outbreak in Spain.

Methods: A cross-sectional study was conducted as part of a multicentre study in seven Spanish regions. Mpox patients were enrolled by the epidemiological surveillance services from June 2022 to January 2023. We conducted

descriptive and bivariate analyses to compare sociodemographic, epidemiological and clinical characteristics of mpox according to the presence of a previous STI diagnosis. Associations were assessed using logistic regression to estimate crude odds ratio (OR) and adjusted odds ratio (aOR) with 95% confidence intervals (95% CI).

Results: A total of 1202 mpox individuals were included (96.4% were men); 36% (417/1159) of males had previous STI during the 6 months previous to mpox diagnosis. Chemsex practice (aOR 1.66, 95% CI: 1.11–2.47), practicing sex in leisure places (aOR 1.68, 95% CI: 1.12–2.51), having HIV diagnosis (aOR 1.91, 95% CI: 1.32–2.77) and using pre-exposure prophylaxis (PrEP) (aOR 4.43, 95% CI: 3.05–6.45) were more frequent among males with a history of STI in the 6 months previous to mpox diagnosis. No statistical differences were found in mpox clinical manifestations and hospitalization according to STI history.

Conclusions: Overlapping risk behaviours and shared transmission routes contributed to the high prevalence of STI history in mpox cases. Epidemiological characteristics studied in mpox cases with previous STI may help identify target populations and planning an integrated prevention strategy.

KEYWORDS

mpox, outbreak, Spain, STI

INTRODUCTION

Mpox is a zoonotic disease caused by the monkeypox virus (MPXV) that was first detected in humans in Central Africa in 1970 [1]. Since then, MPXV has been considered endemic in several countries across Central and West Africa [2]. Despite endemic cases were limited to these regions, isolated cases and sporadic outbreaks have been reported outside endemic areas [3–6].

On 7 May 2022, the United Kingdom reported mpox in a traveller from Nigeria. By 25 May 2022, 86 mpox cases were confirmed in the United Kingdom from different clusters without any link to an endemic country [7, 8]. From that point onwards, the number of cases has continued to increase worldwide, being the first time that autochthonous mpox cases with no epidemiological links to West or Central Africa cases were reported [9–12]. On 23 July 2022 and until May 2023, the World Health Organization (WHO) declared this multistate mpox outbreak a Public Health Emergency of International Concern [13, 14]. In Spain, a total of 7522 mpox cases were reported in 2022 [15], becoming the most affected country in Europe [16], with the highest cumulative incidence [17].

This multistate outbreak exhibited a notable demographic shift with respect to previous outbreaks in endemic countries, predominantly affecting men identified as gay, bisexual and other men who have sex with men (MSM) [9, 10, 18, 19]. In contrast, previous outbreaks in endemic countries primarily affected children and populations in rural or forested regions [20]. Several studies have reported a high prevalence of sexually transmitted infections (STIs) among mpox cases during the 2022 multistate outbreak, with estimates ranging from 17% to 54% [21–26], and sexual or intimate contact was identified as the key transmission route [19, 24]. Some studies analyzing STI history identified gonorrhoea as the most frequent STI within the last year [21] or the last 6 months [23] previous to mpox diagnosis, while other studies reported syphilis as the most frequent concurrent STI in mpox patients [24, 27, 28].

Persistent transmission throughout the 2022 outbreak prompted concerns about mpox dissemination in other risk environments, including households, with possible consequences for a wider spectrum of the population. Moreover, while the 2022 outbreak was caused by subclade IIb, the emergent transmission of subclade Ib in 2024 makes it important to understand the possible syndemic drivers.

There are key questions that remain open regarding the sociodemographic, epidemiological and clinical factors associated with mpox and STI recent history. Prior STI may not be only a previous clinical event but also a multifactorial indicator regarding exposure to sexual networks, healthcare access, screening frequency, mpox transmission dynamics and clinical progression.

This study aims to analyze sociodemographic, epidemiological and clinical characteristics of mpox in adult men during the 2022 outbreak in Spain according to the presence or absence of any previous STI.

METHODS

Study design and participants

This cross-sectional study was conducted as part of a multicentre study (MONKPOX-ESP22) in which the epidemiological surveillance services from seven Spanish regions have participated: Catalonia, Andalusia, Valencian Community, Canary Islands, Murcia, Galicia and Castile-Leon. These regions have a population of 30 542 681 inhabitants (64% of the whole Spanish population) and accounted for 56.21% of all mpox cases in Spain [29, 30].

The study included confirmed mpox cases with at least one household contact notified from June 2022 to January 2023. According to the Spanish protocol for early mpox detection and management [31], an mpox case was considered confirmed if a positive result for MPXV infection was obtained using a laboratory-tested clinical sample and a reliable and validated technique such as the polymerase chain reaction (PCR) test.

Mpox cases reported to the epidemiological surveillance services that could not be contacted for this study were excluded.

Sample size

This study was part of a broader project aimed at evaluating the effectiveness of preventive measures—both pharmacological as vaccination and non-pharmacological—against confirmed mpox cases with at least one household contact. The minimum sample size was calculated to estimate both vaccine effectiveness and the effectiveness of non-pharmacological preventive measures. Accordingly, the study anticipated the inclusion of 854 mpox cases and 1708 household contacts.

Data collection

Study data were collected by the epidemiological surveillance services staff within the framework of national public health surveillance, using the Spanish mpox protocol questionnaire [31]. Additionally, we included specific questions to analyze epidemiological and clinical features. Data were obtained through in-person or telephone interviews, and clinical records were checked in surveillance services.

The variables collected were as follows.

Sociodemographic variables

Age categorized in three groups (18–34, 35–49, ≥50 years old), sex assigned at birth (male/female), country of birth dichotomized into two categories (Spain/other countries), employment status at the time of the recruitment (yes/no) and education level according to the UNESCO International Standard Classification of Education [32] categorized in three groups (low, intermediate, high).

Epidemiological variables in the 21 days previous to mpox symptom onset

International travel (travel outside national borders); close contact with a confirmed case, defined according to the Spanish protocol for early detection and management of mpox [31]. Exposure settings reported as dichotomous variables (yes/no) included: occupational exposure among healthcare/social workers; occupational exposure in non healthcare/social workers; family setting exposure involving close contact with a confirmed case among family members; leisure setting exposure during social or recreational activities outside household, occupational, sexual or mass event contexts; attendance at mass events, defined as gatherings (public or private, planned or spontaneous) involving a concentration of people in a specific location [33]. Additional variables included sexual contact with a confirmed case (categorized as none, with men, with women, with both or unspecified); leisure setting sex defined as sexual contact occurring in public or private leisure venues, excluding mass events; chemsex, defined as the intentional use of drugs to facilitate prolonged sexual activity (yes/no) [34].

Clinical and disease progression variables

STI in the last 6 months: trichomoniasis, lymphogranulomatosis, genital herpes, gonorrhoea, syphilis, chlamydiosis, condylomata acuminata and crab lice (yes/no and data of diagnoses). Comorbidities: HIV status, other immunosuppressive condition, pre-exposure prophylaxis of HIV (PrEP) use (yes/no). Mpox symptoms: fever, asthenia, sore throat, muscle pain, headache, exanthem, lymphadenopathy (LAP) (yes/no). Complications: secondary bacterial infections, corneal infection, mouth ulcer, other (yes/no). Hospitalization (yes/no, data),

intensive care unit (ICU) admission (yes/no), death (yes/no). Sequelae 60 days post-symptom onset: skin lesions, decreased visual acuity, blindness, other (yes/no).

Study data were coded and stored using Research Electronic Data Capture (REDCap) version 13.6.0 (REDCap Systems, Vanderbilt University, USA), hosted at the Centro de Investigación Biomédica en Red (CIBER) attached to the Instituto de Salud Carlos III.

Study data collected in the database was identified solely by a six-digit code, ensuring that no personally identifiable information was included.

Outcome definition

The primary outcome was the presence of at least one STI diagnosed within 1 or 6 months preceding the mpox diagnosis. A previous STI was defined as a laboratory-confirmed diagnosis of at least one of the following conditions: trichomoniasis, lymphogranulomatosis, genital herpes, gonorrhoea, syphilis, chlamydiosis, condylomata acuminata or crab lice infestation.

STI diagnoses were verified by the staff of the epidemiological surveillance services using integrated laboratory surveillance records. Data regarding sample types and diagnostic techniques were not recorded for this study.

For syphilis, a new diagnosis was defined as a single reported diagnosis within the previous 6 months.

Statistical analysis

A descriptive analysis was conducted to assess the prevalence of previous STI among mpox cases aged ≥18 years. Sociodemographic, epidemiological and clinical characteristics were compared according to the presence of at least one STI diagnosed 1 or 6 months previous to mpox diagnosis, using the chi-squared test to evaluate differences in proportions.

Associations between dependent (any STI diagnosed 1 or 6 months previous to mpox diagnosis) and independent (sociodemographic, epidemiological and clinical characteristics) variables were estimated using the crude odds ratio (OR) and 95% confidence interval (CI) in a bivariate logistic regression analysis. Interactions between STI infection and other independent variables were explored using logistic regression models. Adjusted OR (aOR) and 95% CI were calculated by multivariate logistic regression model. Analyses were performed using a backward stepwise procedure, with a cut-off point of $p < 0.2$. For clinical and disease progression age group (years), education level, country of birth and other immunosuppression were fixed in the model.

All analyses were performed using the SPSS v.29 statistical package (IBM Inc., Armonk, NY, USA).

Ethical considerations

The study protocol was formally approved by the Ethics Committee of Instituto de Salud Carlos III (CEI PI 69_2022). This approval ensured that the study was conducted in accordance with the principles of the Helsinki Declaration.

RESULTS

A total of 1202 mpox cases were included in the study. Of them, 1159 (96.4%) were male and 43 (3.6%) were female. In the month previous to mpox diagnosis, 165 (14.2%) male cases and 2 (4.7%) female cases had at least one diagnosed STI. In the 6 months preceding mpox diagnosis, 417 male cases (36%) and 4 female cases (9.3%) had at least one STI. Sociodemographic characteristics and STI types among female mpox cases are detailed in Table S1. No interactions were observed between having previous STI and the other independent variables.

Among male mpox cases with an STI diagnosed 1 month previous to mpox diagnosis, most were aged 18–34 years (47.9%) or 35–49 years (47.3%), with the lowest proportion among those aged ≥50 years (4.8% vs 12.7%; aOR 0.39, 95% CI: 0.17–0.89). The most frequently reported sexual behaviour in the 21 days previous to the mpox symptoms onset was having sex exclusively with men (96.3%) and chemsex practice (22.1%), being chemsex more predominant among mpox cases with a previous STI (22.1% vs. 13.4%, respectively). PrEP use in HIV-negative cases was more common among those with previous STI (Table 1).

The association between diagnosis of any STI during the preceding 6 months of mpox diagnosis is shown in Table 2. Participants who presented any STI were mostly aged 18–34 years (52.3%), followed by those aged 35–49 years (41.5% vs. 46.5%; aOR 0.64, 95% CI: 0.47–0.87), with the lowest proportions among the ≥50 years (6.2% vs. 14.6%; aOR 0.38, 95% CI: 0.22–0.66). In the 21 days prior to the mpox symptoms onset, family setting exposure was less frequent among those individuals with previous STI (1.9% vs. 3.2%; aOR 0.32, 95% CI: 0.11–0.90). Engaging in sexual activity at leisure places (84.0% vs. 72.1%; aOR 1.68, 95% CI: 1.12–2.51), and chemsex (21.3% vs. 10.9%; aOR 1.66, 95% CI: 1.11–2.47) were significantly more common among those mpox cases with previous STI. HIV-coinfection (aOR 1.91, 95% CI: 1.32–2.77) and PrEP use in HIV-negative cases (aOR 4.43, 95%

TABLE 1 Sociodemographic and epidemiological characteristics of adult male mpox cases according to diagnosis of any STI in the previous month of mpox diagnosis.

	Any STI in the previous month of mpox diagnosis					
	Yes (%) $N = 165$	No (%) $N = 994$	OR	*p*-value	aOR	*p*-value
Age group (years)						
18–34	79 (47.9)	428 (43.1)	Ref		Ref	
35–49	78 (47.3)	440 (44.3)	0.96 (0.68–1.35)	0.82	0.93 (0.63–1.35)	0.69
≥ 50	8 (4.8)	126 (12.7)	0.34 (0.16–0.73)	0.01	0.39 (0.17–0.89)	0.02
Country of birth						
Spain	91 (55.2)	560 (56.3)	Ref			
Other	74 (44.8)	434 (43.7)	1.05 (0.75–1.46)	0.78	–	–
Education level[a]						
Low	8 (5.0)	55 (5.6)	0.96 (0.44–2.10)	0.92	2.17 (0.91–5.16)	0.08
Intermediate	80 (49.7)	445 (45.3)	1.19 (0.85–1.68)	0.32	1.27 (0.87–1.86)	0.22
High	73 (45.3)	483 (49.1)	Ref		Ref	
Employed[b]	138 (84.1)	825 (83.5)	1.05 (0.67–1.65)	0.84	–	–
International travel[c,n]	20 (12.3)	104 (10.6)	1.19 (0.71–1.97)	0.52	–	–
Close contact with mpox case[d,n]	52 (31.9)	256 (26.0)	1.34 (0.93–1.91)	0.11	–	–
Healthcare/social worker[e,n]	0 (0.0)	2 (0.2)	–	–	–	–
Non healthcare/social worker[f,n]	4 (2.5)	15 (1.5)	1.62 (0.53–4.95)	0.40	–	–
Family setting exposure[g,n]	5 (3.0)	27 (2.7)	1.12 (0.42–2.94)	0.82	–	–
Leisure setting exposure[h,n]	8 (4.8)	60 (6.1)	0.79 (0.37–1.69)	0.54	–	–
Sexual activity[i,n]						
None	0 (0.0)	9 (0.9)	–	–	–	–
With men	158 (96.3)	859 (87.7)	3.68 (1.14–11.88)	0.03	2.38 (0.70–8.12)	0.17
With women	3 (1.8)	60 (6.1)	Ref		Ref	
With both	3 (1.8)	20 (2.0)	3.00 (0.56–16.07)	0.20	0.86 (0.08–9.07)	0.90
Unspecified	0 (0.0)	31 (3.2)	–	–	–	–
Leisure setting sex[j,n]	133 (82.1)	730 (75.5)	1.49 (0.97–2.28)	0.07	1.55 (0.89–2.69)	0.12
Chemsex[k,n]	36 (22.1)	132 (13.4)	1.83 (1.21–2.76)	0.004	1.58 (0.99–2.51)	0.05
Mass event attendance[l,n]	50 (30.5)	293 (29.8)	1.03 (0.72–1.48)	0.87	–	–
HIV status[m]						
HIV-negative non PrEP user	36 (21.8)	383 (39.3)	Ref		Ref	
HIV-negative PrEP user	61 (37.0)	259 (26.3)	2.51 (1.61–3.90)	<0.001	2.21 (1.34–3.64)	0.002
HIV positive	68 (41.2)	341 (34.7)	2.12 (1.38–3.26)	<0.001	1.63 (0.99–2.67)	0.05
Other immunosuppressive condition[o]	3 (1.9)	27 (2.9)	0.66 (0.20–2.20)	0.50	–	–

Note: Missing cases: [a]15 (1.3%); [b]7 (0.6%); [c]11 (0.9%); [d]10 (0.9%); [e]28 (2.4%); [f]28 (2.4%); [g]2 (0.2%); [h]3 (0.3%); [i]16 (1.4%); [j]30 (2.6%); [k]14 (1.2%); [l]13 (1.1%); [m]11 (0.9%); [n]In the 21 days pre-symptom onset; [o]76 (6.6%).

Abbreviations: aOR, adjusted odds ratio; OR, crude odds ratio; STIs, sexually transmitted infections.

CI: 3.05–6.45) were statistically more frequent among those with previous STI (Table 2).

The most frequent STI observed was gonorrhoea, diagnosed in 82 participants (7.1%) within 1 month and in 282 participants (24.3%) within 6 months previous to mpox diagnosis (Figure 1). No patient presented condylomata acuminata or crab lice infestation.

Most of the participants with STI and mpox had just one STI: 139 participants (12.0%) during the previous month and 275 participants (23.7%) in the

TABLE 2 Sociodemographic and epidemiological characteristics of adult male mpox cases according to diagnosis of any STI in the previous 6 months of mpox diagnosis.

	Any STI in the previous 6 months of mpox diagnosis					
	Yes (%) $N = 417$	No (%) $N = 742$	OR	*p*-value	aOR	*p*-value
Age group (years)						
18–34	218 (52.3)	289 (38.9)	Ref		Ref	
35–49	173 (41.5)	345 (46.5)	0.67 (0.52–0.86)	0.002	0.64 (0.47–0.87)	0.004
≥ 50	26 (6.2)	108 (14.6)	0.32 (0.20–0.51)	<0.001	0.38 (0.22–0.66)	<0.001
Country of birth						
Spain	211 (50.6)	440 (59.3)	Ref		Ref	Ref
Other	206 (49.4)	302 (40.7)	1.42 (1.12–1.81)	0.004	1.30 (0.97–1.74)	0.09
Education level[a]						
Low	14 (3.4)	49 (6.7)	0.46 (0.25–0.86)	0.02	–	–
Intermediate	186 (45.1)	339 (46.3)	0.89 (0.70–1.14)	0.36	–	–
High	212 (51.5)	344 (47.0)	Ref			
Employed[b]	357 (85.8)	606 (82.3)	1.30 (0.93–1.81)	0.13	–	–
International travel[c,n]	48 (11.7)	76 (10.3)	1.15 (0.78–1.68)	0.49		
Close contact with mpox case[d,n]	135 (32.6)	173 (23.5)	1.57 (1.20–2.05)	<0.001	1.33 (0.96–1.86)	0.09
Healthcare/social worker[e,n]	0 (0.0)	2 (0.3)	–	–	–	–
Non healthcare/social worker[f,n]	7 (1.7)	12 (1.7)	1.03 (0.40–2.64)	0.95	–	–
Family setting exposure[g,n]	8 (1.9)	24 (3.2)	0.58 (0.26–1.31)	0.19	0.32 (0.11–0.90)	0.03
Leisure setting exposure[h,n]	20 (4.8)	48 (6.5)	0.73 (0.42–1.24)	0.24	–	–
Sexual activity[i,n]						
None	0 (0.0)	9 (1.2)	–	–	–	–
With men	391 (94.9)	626 (85.6)	5.00 (2.26–11.07)	<0.001	2.14 (0.92–5.02)	0.08
With women	7 (1.7)	56 (7.7)	Ref		Ref	Ref
With both	8 (1.9)	15 (2.1)	4.27 (1.33–13.66)	0.02	1.89 (0.46–7.72)	0.38
Not specified	6 (1.5)	25 (3.4)	1.92 (0.59–6.30)	0.28	1.58 (0.42–5.94)	0.50
Leisure setting sex[j,n]	346 (84.0)	517 (72.1)	2.03 (1.49–2.76)	<0.001	1.68 (1.12–2.51)	0.01
Chemsex[k,n]	88 (21.3)	80 (10.9)	2.20 (1.58–3.06)	<0.001	1.66 (1.11–2.47)	0.01
Mass event attendance[l,n]	144 (34.9)	199 (27.1)	1.44 (1.11–1.86)	0.01	–	–
HIV status[m]						
HIV negative-non PrEP user	82 (19.8)	337 (45.9)	Ref		Ref	
HIV negative- PrEP user	187 (45.2)	133 (18.1)	5.78 (4.16–8.02)	<0.001	4.40 (3.03–6.41)	<0.001
HIV positive	145 (35.0)	264 (36.0)	2.26 (1.65–3.09)	<0.001	1.92 (1.33–2.77)	<0.001
Other immunosuppressive condition[o]	9 (2.3)	21 (3.0)	0.77 (0.35–1.70)	0.51	–	–

Note: Missing cases: [a]15 (1.3%); [b]7 (0.6%); [c]11 (0.9%); [d]10 (0.9%); [e]28 (2.4%); [f]28 (2.4%); [g]2 (0.2%); [h]3 (0.3%); [i]16 (1.4%); [j]30 (2.6%); [k]14 (1.2%); [l]13 (1.1%); [m]11 (0.95%); [o]76 (6.6%). [n]In the 21 days pre-symptom onset.

Abbreviations: aOR, adjusted odds ratio; OR, crude odds ratio; STIs, sexually transmitted infections.

previous 6 months. Two STIs were reported in 25 (2.2%) participants within the previous month and in 116 (10.0%) within the previous 6 months. Three STIs were reported in one participant in the previous month and 24 (2.1%) in the previous 6 months. Two participants (0.2%) had four STIs in the 6 months previous to mpox diagnosis (Figure 2).

No significant statistical differences about clinical characteristics were found between mpox cases with and without previous STI in the prior month of mpox

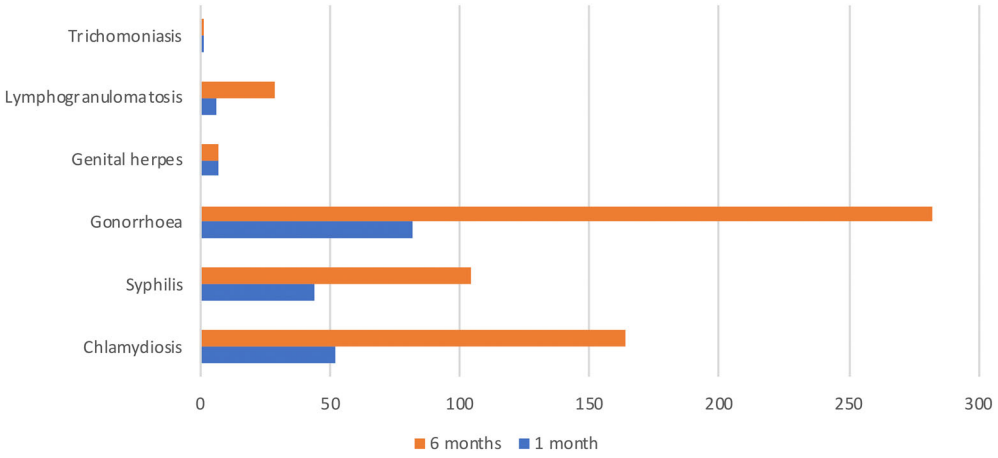

FIGURE 1 Distribution of sexually transmitted infection (STI) diagnosed within the previous month or the previous 6 months of mpox diagnosis.

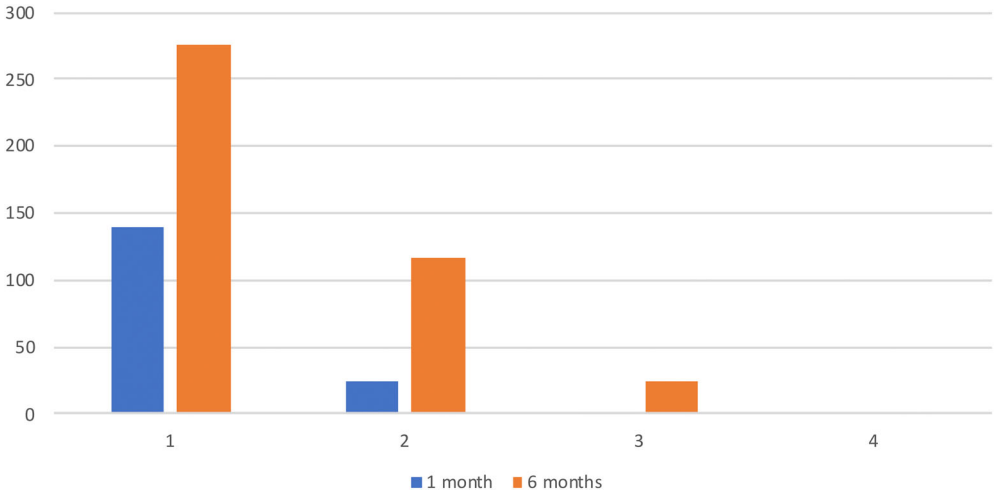

FIGURE 2 Total number of sexually transmitted infections (STIs) diagnosed within the previous month or the previous 6 months of mpox diagnosis.

diagnosis (Table 3). Most clinical characteristics were slightly more frequent in mpox cases with previous STI: fever, asthenia, sore throat, headache, generalized and localized LAP, anogenital and oral exanthems, secondary bacterial infections, mouth ulcer and other sequelae. Muscle pain, exanthems in other locations, cornea infection, other complications, skin lesions, decreased visual acuity and blindness were marginally more frequent in mpox cases without previous STI. Lower hospitalization percentages were reported in individuals with STI in the previous month to mpox diagnosis.

DISCUSSION

The findings of this study provide a deeper understanding of the association between mpox and previous STI in seven Spanish Regions. We provide data on 1202 cases of whom 167 (13.9%) had a previous STI in the month preceding mpox diagnosis, and 421 (35.0%) had been diagnosed with an STI within the previous 6 months. Our findings show a significant association between PrEP use and mpox exposure, highlighting the need for targeted preventive measures as complete mpox vaccination.

Male participants accounted for 96.4% of the sample, a proportion consistent with other studies conducted during the mpox multistate outbreak [9, 10, 18, 19]. Similarly, Ramírez-Olivencia et al. in a multicentre study with a Spanish cohort reported a greater number of male individuals ($N = 1450$) than female individuals ($N = 15$) [28].

Association was observed among individuals reporting chemsex practices (aOR: 1.66; 95% CI: 1.11–2.47) and sexual activity in leisure settings (aOR 1.68; 95% CI: 1.12–2.51), both of which more frequent among

TABLE 3 Clinical characteristics and disease progression in adult male mpox cases according to diagnosis of any STI in the previous month of mpox diagnosis.

	Any STI in the previous months of mpox diagnosis					
	Yes (%) $N = 165$	No (%) $N = 994$	OR	*p*-value	aOR	*p*-value
Fever	107 (64.8)	604 (60.8)	1.19 (0.84–1.68)	0.319		
Asthenia	62 (37.6)	346 (34.8)	1.13 (0.80–1.59)	0.491		
Sore throat	49 (29.7)	258 (26.0)	1.21 (0.84–1.73)	0.314	1.34 (0.91–1.98)	0.135
Muscle pain	42 (25.5)	257 (25.9)	0.98 (0.67–1.43)	0.913		
Headache	48 (29.1)	283 (28.5)	1.03 (0.72–1.48)	0.870		
Generalized LAP	23 (13.9)	84 (8.5)	1.76 (1.07–2.88)	0.026	1.64 (0.96–2.79)	0.070
Localized LAP	76 (46.1)	419 (42.2)	1.17 (0.84–1.63)	0.348		
Anogenital exanthems[a]	109 (67.3)	624 (63.3)	1.19 (0.84–1.70)	0.327		
Oral exanthems[a]	43 (26.5)	240 (24.3)	1.12 (0.77–1.64)	0.547		
Other exanthems[a]	76 (46.9)	516 (52.3)	0.81 (0.58–1.12)	0.201	0.76 (0.53–1.09)	0.139
Hospitalization	4 (2.4)	33 (3.3)	0.72 (0.25–2.07)	0.546		
Secondary BI[b]	6 (3.6)	34 (3.4)	1.06 (0.44–2.58)	0.890		
Cornea infection[b]	0 (0.0)	6 (0.6)	–	–		
Mouth ulcer[b]	5 (3.0)	17 (1.7)	1.79 (0.65–4.93)	0.257		
Other complications[b]	3 (1.8)	20 (2.0)	0.90 (0.27–3.07)	0.867		
Skin lesions[a]	40 (24.7)	248 (25.2)	0.98 (0.66–1.43)	0.900		
Decreased visual acuity[a]	1 (0.6)	11 (1.1)	0.55 (0.07–4.29)	0.569		
Blindness[a]	0 (0.0)	1 (0.1)	–	–		
Other sequelae[a]	4 (2.5)	(2.0)	1.22 (0.41–3.63)	0.717		

Note: Missing cases: [a]11 (0.9%); [b]1 (0.1%). Multivariate analysis was adjusted by age group, education level, country of birth and other immunosuppressive condition.

Abbreviations: aOR, adjusted odds ratio; BI, bacterial infection; LAP, lymphadenopathy; OR, crude odds ratio.

individuals with history of STI within the 6 months previous to mpox diagnosis. Santos et al. in Brazil reported that, in MSM participants, the incidence of chemsex was six times more common among those diagnosed with mpox, suggesting that chemsex may increase participants exposure to MPXV [35]. This pattern could potentially be extrapolated to other STIs. In fact, Evers et al., in a cross-sectional study in the Netherlands found that MSM who used multiple drugs are at particular risk for STI [36], highlighting the need for targeted STI prevention and care strategies within this population.

Family setting exposure was less frequent among individuals with a history of STI within the 6 months previous to mpox diagnosis (aOR 0.32, 95% CI: 0.11–0.90), suggesting that sexual contact occurring outside the household may represent the main transmission route among mpox cases. These findings shift the focus of epidemiological surveillance from the family settings to community-based sexual health interventions. Consequently, epidemiological surveillance should prioritize social–sexual mapping over family proximity.

A higher proportion of participants with a history of STI had an HIV diagnosis compared to those without recent STI history, both within 1 month (aOR 1.63, 95% CI: 0.992–2.67) or 6 months (aOR 1.91, 95% CI: 1.32–2.77) prior to mpox diagnosis. Similarly, PrEP use was higher among mpox cases with previous STI, either 1 month (aOR 2.21, 95% CI: 1.34–3.64) or 6 months (aOR 4.43, 95% CI: 3.05–6.45) before mpox diagnosis. In the study by Silva et al., mpox cases with bacterial STI coinfection were more likely to have an HIV diagnosis compared to those without bacterial STI (66.5% vs. 45.2%), and from those who tested negative for HIV, PrEP use was also higher in participants with bacterial STI coinfection (41.8% vs. 29.9%) [27]. These results emphasize the role of sexual contact in the transmission of mpox as well as other STIs. In Spain, a report from the Ministry of Health including data from November 2019 to May 2025 found a high level of adherence to the PrEP

programme, with only 16.1% of participants discontinuing participation [37]. PrEP users undergo mandatory STI testing every 3 months in Spain, and this systematic monitoring is a key factor to consider, as it significantly enhances the detection rates of STI [38]. It is crucial to improve education in safe sex practices combined with the use of PrEP, as well as to ensure adherence.

Our results showed that 14.2% of male participants had an STI in the month previous to mpox diagnosis. Other studies in Spanish cohorts have reported similar findings, with coinfection of 17.0% and concurrent STI and mpox diagnoses of 19.2% [24, 25]. In a cohort from Río de Janeiro (Brazil), the overall prevalence of any concomitant bacterial STI at the baseline mpox assessment was 37.3% among tested mpox cases (201/538) between June 2022 and January 2024 [27]. In a study carried out in Buenos Aires (Argentina) during the 2022–2023 mpox outbreak, this percentage was also higher (25.2%) [39], while Thornhill et al. in an international collaborative group found that 29% of mpox cases had a concomitant STI [22]. Hoffman et al. reported that 29% of mpox cases had STI in the previous 4 weeks to mpox diagnosis [23]. Differences observed between countries could be explained by differences in public health measures, healthcare access, testing protocols or sociodemographic factors.

In our study, 23.7% of individuals presented one STI and 10% presented two STIs in the 6 months previous to mpox diagnosis, results that are similar to those obtained by Curran et al. during the preceding year to mpox diagnosis: 20% had one STI and 11% had two STIs [21]. In the present study, the most frequent STI detected was gonorrhoea in the month previous (7.1%) or in the 6 months (24.3%) previous to mpox diagnosis, followed by chlamydiosis (4.5% in the previous month and 14.2% in the previous 6 months) and syphilis (3.8% in the previous month and 9.0% in the previous 6 months). Hoffman et al. reported that the most frequent STI diagnosed during the 6 months previous to mpox diagnosis was gonorrhoea, which was found in 32.4% of all mpox cases [23]. Curran et al. also found that gonorrhoea was the most frequent reportable STI diagnosed during the preceding year to mpox diagnosis, reported in 28% of the mpox cases [21]. Other studies that analysed STI coinfection as a co-diagnosis of STI and mpox identified syphilis as the most frequent STI [24, 27, 28]. According to the latest available data, STI continues to rise, with an increase in the number of cases across Europe [40]. A report from the Ministry of Health in Spain found that in 2024, the rate per 100 000 inhabitants was 76.63 for gonorrhoea, 86.26 for chlamydia infection and 24.54 for syphilis [41], which is in line with results found in this study. Although the increase in STI has been partially attributed to improvements in surveillance systems and the use of more sensitive diagnostic techniques, other causes must be considered, such as sociocultural changes or sexual practices associated with increased risk of transmission.

In this study, higher percentages of general clinical signs (fever, asthenia and sore throat), generalized and localized lymphadenopathy, anogenital and oral exanthems, and mouth ulcers were detected in individuals with a STI in the previous month to mpox diagnosis, although no statistical differences were found. It has been documented that coinfection of mpox with other STI may exacerbate disease severity, worsen clinical outcomes, elongate the recovery process and potentially contribute to morbidity associated with the infection [42]. This impact in disease severity may be less pronounced in Spain or other European countries due to effective public health interventions against mpox such as vaccination coverage and better access to treatment. Emphasizing the importance of comprehensive STI screening in individuals suspected of having mpox would contribute significantly to early detection of STI coinfections, as well as better targeted treatment and improved infection control measures.

Lower hospitalization percentages were reported in the present study in individuals with STI in the previous month to mpox diagnosis. Despite the lack of statistical significance of this result, this could be partially explained by the fact that individuals with mpox signs and symptoms who have contacted with STI services or sexual healthcare providers might be more likely to seek medical attention, and these providers might be more likely to recognize them and initiate testing for mpox [21]. Individuals presenting mpox signs and symptoms who were not actively engaged in routine sexual healthcare might be less likely to have an early diagnosis, what can lead to disease progression and higher rates of hospitalization.

Currently, mpox in Spain is still ongoing. From January 2024 to 9 December 2025, a total of 1402 cases were reported [43]. Most cases had occurred in men (97.6%) and in the 30–39 age group (40.7%). The most probable transmission route was contact in the context of a sexual relationship (84.1%), and no significant changes have been observed in the clinical and epidemiological characteristics of individuals with symptom onset from 2024 onwards, compared to those reported previously [43]. Taking into account the persistence of mpox and the evidence that the predominant transmission route is high-risk sexual-related practices, the Ministry of Health in Spain has incorporated mpox into STI prevention campaigns targeting the general population [44].

Although no multistate outbreaks comparable to that of 2022 have emerged, a sustained notification of cases

has been persisting since then in non-endemic countries. In addition, international mobility must also be taken into account in our globalized world, as it increases the likelihood of importing cases from other countries [45, 46]. From January 2024 to 9 December 2025, Spain has reported 168 cases with a travel history in the 21 days previous to symptom onset, of which 39 were classified as imported cases [43]. This context is particularly relevant considering that, in 2024, an increase in MPXV subclade Ia and Ib was reported in the Democratic Republic of the Congo [47], and for the first time in 2024, clade I has been associated with sexual transmission [48]. Clade I is associated with greater disease severity, a pronounced rash, higher lethality and increased human-to-human transmission compared to clade II [45]. On 10 October 2025, Madrid Community reported a confirmed case of MPXV subclade Ib without recent travel history, becoming the first autochthonous case of this subclade in Spain and in the European Union/European Economic Area [49, 50]. On 9 December 2025, clade information was available for 693 cases in Spain, with 15 cases identified as clade I, representing more than half of the cases reported in Catalonia at that time [43]. Studying mpox outbreaks and their interaction with other STI helps to understand the transmission dynamics, identify risk factors and prepare more targeted and effective responses in future outbreaks.

The main limitation of this study is that we do not have information about concomitant diagnosis of any STI at the baseline mpox diagnosis. Despite this challenge, we have data available about previous STI in the last 6 months previous to mpox diagnosis. This information permitted us to create two time points measures (1 and 6 months) that could be valuable for planning public health interventions.

As this is an observational study, it can establish associations but cannot prove causation. In addition, because the study is limited to a single country, differences between countries in access to healthcare services and socioeconomic variables may limit the generalizability of the findings to populations in other countries.

Some of the variables may be affected by social response bias (responding with what is considered socially acceptable). Spanish health guidelines require PrEP users to complete STI screenings at 3-month intervals [38], which may increase the perceived risk or prevalence of STI among PrEP users compared to non-users.

A notable strength of this study is the use of a large sample and a standardized questionnaire across all the epidemiological surveillance services included in the study, allowing a representative analysis of the cases involved in the 2022 Spanish mpox outbreak.

CONCLUSION

Results from this study showed a high prevalence of previous STI in mpox cases during the 2022 outbreak in Spain, mainly in MSM individuals. Diagnosis of STI in mpox cases is essential due to differences in the control strategies for each STI. Epidemiological characteristics studied in mpox cases with previous STI may help identify populations with an increased risk of exposure to mpox infection, allowing targeted prevention, as well as assessing risk factors associated with STI in mpox cases. PrEP users should be informed about preventive measures such as complete mpox vaccination to reduce their risk of infection.

AUTHOR CONTRIBUTIONS

The study conception, design and supervision were performed by, P.G, A.D, A.D. and D.T. Data collection were performed by A.M.Y., O.P.M., C.P., A.S.M., M.D.C., J.O., M.G. and F.R. The analysis and manuscript drafting were carried out by A.M.Y., A.D. and D.T. Figures were performed by A.M.Y. All authors commented on previous versions of the manuscript and approved the final manuscript.

ACKNOWLEDGEMENTS

Members of the MONKPOX-ESP22 Subproject 3.2 Working Group. Andalusia: Nicola Lorusso, Miguel Mingo (Consejería de Salud y Familias. Junta de Andalucía), Eduardo Briones (Servicio Andaluz de Salud). Canary Islands: Laura García, Julio Morais, Óscar Pérez, Álvaro Torres (Servicio de Epidemiología y Prevención. Dirección General de Salud Pública. Servicio Canario de la Salud). Castile-Leon: Virginia Álvarez, Saray Martín, María del Carmen Pacheco (Consejería de Sanidad. Dirección General de Salud Pública de Castilla y León). Catalonia: Nuria Soldevila (U. Barcelona/CIBERESP); Itziar Martínez, Jacobo Mendioroz (Agencia de Salut Publica de Catalunya); Pilar Ciruela, Ana Martínez (Agencia de Salut Publica de Catalunya/CIBERESP); Joan Pau Millet, Cristina Rius (Agencia de Salut Publica de Barcelona/CIBERESP); Lesly Acosta (U. Politécnica de Catalunya). Galicia: Ana Vázquez (Servizo de Epidemioloxía, Dirección Xeral de Saúde Pública. Xunta de Galicia), Carla Guerra-Tort, Lucía Martin-Gisbert (Departamento de Medicina Preventiva y Salud Pública, Universidad de Santiago de Compostela). Murcia: Lorena Aroca, Lorena Pérez (Consejería de Salud, Región de Murcia). Valencian Community: Hermelinda Vanaclocha (Subdirecció General

d'Epidemiologia, Vigilància de la Salut). State level: María Paz Sanchez-Seco (Centro Nacional de Microbiología/CIBERINFEC); Bernardo Guzmán (Centro de Coordinación de Alertas y Emergencias Sanitarias); María Jose Sierra (Centro de Coordinación de Alertas y Emergencias Sanitarias/CIBERINFEC).

FUNDING INFORMATION

This work was supported by CIBER Strategic Action for Monkeypox (grant number [MONKPOX-ESP22])—Consorcio Centro de Investigación Biomédica en Red (CB 2021) and CIBERESP; Instituto de Salud Carlos III; Ministerio de Ciencia e Innovación and Unión Europea—NextGenerationEU and the Catalan Agency for the Management of Grants for University-AGAUR (grant number [2021/SGR 00702]).

CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The study protocol was formally approved by the Ethics Committee of Instituto de Salud Carlos III (CEI PI 69_2022). This approval ensured that the study was conducted in accordance with the principles of the Helsinki Declaration. No personally identifiable data from any subject were included, and all data were fully anonymized.

ORCID

Aina March-Yagüe https://orcid.org/0000-0002-9733-9769

Diana Toledo https://orcid.org/0000-0003-0794-9238

REFERENCES

1. Marennikova SS, Seluhina EM, Malceva NN, et al. Isolation and properties of the causal agent of a new variola-like disease (monkeypox) in man. *Bull World Health Organ*. 1972;46:599-611.
2. Petersen E, Kantele A, Koopmans M, et al. Human monkeypox. *Infect Dis Clin N Am*. 2019;33:1027-1043.
3. Centers for Disease Control and Prevention (CDC). Update: multistate outbreak of monkeypox–Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin. *MMWR Morb Mortal Wkly Rep*. 2003;52(27):642-646.
4. Ng OT, Lee V, Marimuthu K, et al. A case of imported monkeypox in Singapore. *Lancet Infect Dis*. 2019;19(11):1166. doi:10.1016/S1473-3099(19)30537-7
5. Vaughan A, Aarons E, Astbury J, et al. Two cases of monkeypox imported to the united Kingdom, September 2018. *Euro Surveill*. 2018;23:1800509.
6. Erez N, Achdout H, Milrot E, et al. Diagnosis of imported monkeypox, Israel, 2018. *Emerg Infect Dis*. 2019;25:980-983.
7. European Centre for Disease Prevention and Control (ECDC). *Epidemiological update: Monkeypox multi-country outbreak*. ECDC; 2022.
8. Vivancos R, Anderson C, Blomquist P, et al. Community transmission of monkeypox in the United Kingdom, April to May 2022. *Euro Surveill*. 2022;27(22):2200422. doi:10.2807/1560-7917.ES.2022.27.22.2200422
9. Iñigo Martínez J, Gil Montalbán E, Jiménez Bueno S, et al. Monkeypox outbreak predominantly affecting men who have sex with men, Madrid, Spain, 26 April to 16 June 2022. *Euro Surveill*. 2022;27(27):2200471. doi:10.2807/1560-7917.ES.2022.27.27.2200471
10. Selb R, Werber D, Falkenhorst G, et al. A shift from travel-associated cases to autochthonous transmission with Berlin as epicentre of the monkeypox outbreak in Germany, May to June 2022. *Euro Surveill*. 2022;27(27):2200499. doi:10.2807/1560-7917.ES.2022.27.27.2200499
11. Perez Duque M, Ribeiro S, Martins JV, et al. Ongoing monkeypox virus outbreak, Portugal, 29 April to 23 May 2022. *Euro Surveill*. 2022;27(22):2200424. doi:10.2807/1560-7917.ES.2022.27.22.2200424
12. World Health Organization (WHO). Multi-country monkeypox outbreak: situation update. 2022 https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON393
13. World Health Organization. WHO Director-General's statement at the press conference following IHR Emergency Committee regarding the multi-country outbreak of monkeypox–July 23, 2022. Accessed May 27, 2024. https://www.who.int/director-general/speeches/detail/who-director-general-s-statement-on-the-press-conference-following-IHR-emergency-committee-regarding-the-multi–country-outbreak-of-monkeypox
14. Nuzzo JB, Borio LL, Gostin LO. The WHO declaration of monkeypox as a global public health emergency. *JAMA*. 2022;328:615.
15. Ministerio de Sanidad. Instituto de Salud Carlos III. Situación epidemiológica de los casos de mpox en España. Accessed February 11, 2025. https://cne.isciii.es/documents/d/cne/situacion-epidemiologica-de-los-casos-de-mpox-20250318
16. García-García D, Gómez-Barroso D, Hernando V, et al. Estimates of mpox effective reproduction number in Spain, April-August 2022. *Epidemiol Infect*. 2023;151:e112. doi:10.1017/S0950268823000985
17. World Health Organization. 2022-23 Mpox (monkeypox) outbreak: global trends. 2023 Accessed April 12, 2024. https://worldhealthorg.shinyapps.io/mpx_global
18. Betancort-Plata C, Lopez-Delgado L, Jaén-Sanchez N, et al. Monkeypox and HIV in the Canary Islands: a different pattern in a mobile population. *Trop Med Infect Dis*. 2022;7(10):318. doi:10.3390/tropicalmed7100318
19. Laurenson-Schafer H, Sklenovská N, Hoxha A, et al. Description of the first global outbreak of mpox: an analysis of global surveillance data. *Lancet Glob Health*. 2023;11(7):e1012-e1023. doi:10.1016/S2214-109X(23)00198-5
20. Mitjà O, Ogoina D, Titanji BK, et al. Monkeypox. *Lancet*. 2023;401:60-74.

21. Curran KG, Eberly K, Russell OO, et al. HIV and sexually transmitted infections among persons with monkeypox-eight U.S. jurisdictions, may 17-July 22, 2022. *MMWR Morb Mortal Wkly Rep*. 2022; 71(36):1141-1147. doi:10.15585/mmwr.mm7136a1
22. Thornhill JP, Barkati S, Walmsley S, et al. Monkeypox virus infection in humans across 16 countries-April-June 2022. *N Engl J Med*. 2022;387(8):679-691. doi:10.1056/NEJMoa2207323
23. Hoffmann C, Jessen H, Wyen C, et al. Clinical characteristics of monkeypox virus infections among men with and without HIV: a large outbreak cohort in Germany. *HIV Med*. 2023;24: 389-397.
24. Tarín-Vicente EJ, Alemany A, Agud-Dios M, et al. Clinical presentation and virological assessment of confirmed human monkeypox virus cases in Spain: a prospective observational cohort study. *Lancet*. 2022;400:661-669.
25. Maldonado-Barrueco A, Sanz-González C, Gutiérrez-Arroyo A, et al. Sexually transmitted infections and clinical features in monkeypox (mpox) patients in Madrid, Spain. *Travel Med Infect Dis*. 2023;52:102544. doi:10.1016/j.tmaid.2023.102544
26. Català A, Clavo-Escribano P, Riera-Monroig J, et al. Monkeypox outbreak in Spain: clinical and epidemiological findings in a prospective cross-sectional study of 185 cases. *Br J Dermatol*. 2022;187:765-772.
27. Silva MST, Torres TS, Coutinho C, et al. Mpox, sexually transmitted infections and combination prevention: insights from a major cohort in Rio de Janeiro, Brazil. *AIDS*. 2024;38(13):1845-1849. doi:10.1097/QAD.0000000000003991
28. Ramírez-Olivencia G, Velasco Arribas M, Vera García MM, et al. Clinical and epidemiological characteristics of the 2022 mpox outbreak in Spain (CEME-22 study). *Open Forum Infect Dis*. 2024;11(3):ofae105. doi:10.1093/ofid/ofae105
29. Instituto Nacional de Estadística. Cifras oficiales de población resultantes de la revisión del Padrón municipal a 1 de enero de 2021. Resumen por comunidades autónomas. (Official population figures resulting from the revision of the Municipal Register as of 2021 January 1. Population by Autonomous Communities). 2023 Accessed May 27, 2024. https://www.ine.es/jaxiT3/Tabla.htm?t=2915
30. Ministerio de Sanidad. Instituto de Salud Carlos III. Situación epidemiológica de los casos de mpox en España. 2023 Accessed February 11, 2025. https://cne.isciii.es/documents/d/cne/situacion-epidemiologica-de-los-casos-de-mpox-310123
31. Ministerio de Sanidad, Instituto de Salud Carlos III. Protocolo para la detección precoz y manejo de casos ante la alerta de viruela de los monos (monkeypox) en España. (Protocol for early detection and case management in the context of the mpox alert in Spain). 2022 Accessed May 27, 2024. https://www.sanidad.gob.es/profesionales/saludPublica/ccayes/alertasActual/alertaMonkeypox/docs/ProtocoloMPX_20220805.pdf
32. UNESCO. International standard classification of education 2011. 2011 Accessed October 17, 2024. https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf
33. Doherty M, Franklin J, Restrepo MH, et al. Gatherings in the context of the 2024 mpox outbreak: Public health guidance. 2024.
34. Ministerio de Sanidad. Abordaje del fenómeno del chemsex. Informes, Estudios e Investigación. Secretaría del Plan Nacional sobre el SIDA. 2020.
35. Santos GRS, Ribeiro CJN, Lima SVMA, et al. Chemsex among men who have sex with men during the Mpox health crisis in Brazil: a nationwide web survey. *Public Health Nurs*. 2024; 41(3):589-601. doi:10.1111/phn.13308
36. Evers YJ, van Liere GAFS, Hoebe CJPA, et al. Chemsex among men who have sex with men living outside major cities and associations with sexually transmitted infections: a cross-sectional study in The Netherlands. *PLoS One*. 2019;14(5): e0216732. doi:10.1371/journal.pone.0216732
37. División de Control de VIH, ITS, Hepatitis virales y Tuberculosis. Sistema de información de programas de Profilaxis Pre-exposición al VIH en España (SIPrEP). Informe de resultados noviembre 2019-mayo 2025. Ministerio de Sanidad, 2025. https://www.sanidad.gob.es/ciudadanos/enfLesiones/enfTransmisibles/sida/PrEP/Informe_SiPreP__septiembre2025.pdf
38. Grupo de Trabajo de PrEP. División de Control de VIH, ITS, Hepatitis virales y Tuberculosis. Ministerio de Sanidad. Manual de implementación de un Programa de Profilaxis Preexposición al VIH en España. Actualización diciembre de 2021. https://www.sanidad.gob.es/areas/DCVIHT/vihSida/PrEP/docs/Manual_PrEP_FINAL.pdf
39. Mauas R, Rolón MJ, Montaldo F, et al. Clinical and epidemiological characteristics of the 2022–2023 Mpox outbreak in Buenos Aires, Argentina. Características clínicas y epidemiológicas del brote de Mpox en Buenos Aires, Argentina, 2022–23. *Medicina (B Aires)*. 2025;85(1):64-77.
40. European Centre for Disease Prevention and Control. *Annual Epidemiological Reports for 2023*. ECDC; 2023.
41. Unidad de vigilancia de VIH, ITS y hepatitis B y C. *Vigilancia epidemiológica de las infecciones de transmisión sexual, 2024*. Centro Nacional de Epidemiología, Instituto de Salud Carlos III/División de Control de VIH, ITS, Hepatitis virales y Tuberculosis, Dirección General de Salud Pública y Equidad en Salud; 2025.
42. Liu BM, Rakhmanina NY, Yang Z, et al. Mpox (Monkeypox) virus and its co-infection with HIV, sexually transmitted infections, or bacterial superinfections: double whammy or a new prime culprit. *Viruses*. 2024;16(5):784. doi:10.3390/v16050784
43. Situación epidemiológica de los casos de mpox en España. Ministerio de Sanidad. 2025 https://cne.isciii.es/documents/d/cne/situacion-epidemiologica-de-los-casos-de-mpox_20251209
44. Campaña Prevención de ITS. Ministerio de Sanidad. 2025 https://www.sanidad.gob.es/ciudadanos/enfLesiones/enfTransmisibles/sida/Campanas/prevencionITS/home.htm
45. Caumes E. Travel and sex: addressing the spread of sexually transmitted infections. *J Travel Med*. 2024;31(4):taae066. doi:10.1093/jtm/taae066
46. Qiao H, Paansri P, Escobar LE. Global Mpox spread due to increased air travel. *Geospat Health*. 2024;19(1):1261. doi:10.4081/gh.2024.1261
47. European Centre for Disease Prevention and Control (ECDC). Mpox worldwide overview. 2025 https://www.ecdc.europa.eu/en/mpox-worldwide-overview

48. Kibungu EM, Vakaniaki EH, Kinganda-Lusamaki E, et al. Clade I-associated mpox cases associated with sexual contact, The Democratic Republic of the Congo. *Emerg Infect Dis*. 2024; 30(1):172-176. doi:10.3201/eid3001.231164
49. Ministerio de Sanidad. Centro de Coordinación de Alertas y Emergencias Sanitarias (CCAES). Detección del primer caso de mpox clado Ib en España de transmisión autóctona, 16 de octubre de 2025. 2025 Accessed October 24, 2025. https://www.sanidad.gob.es/areas/alertasEmergenciasSanitarias/alertasActuales/alertaMonkeypox/docs/20251016_Informe_situacion_mpox_autoctono_cladoIb.pdf
50. European Center for Disease Prevention and Control. Mpox due to monkeypox virus clade Ib-Spain 2025. Weekly Communicable Disease Threats Report, Week 42, 11–17 October 2025. 2025.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: March-Yagüe A, Toledo D, Díaz A, et al. History of sexually transmitted infections among mpox cases in the 2022 outbreak in Spain. *HIV Med*. 2026;1-13. doi:10.1111/hiv.70270