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Original Research

COVID-19 pandemic in prisons in Spain: characteristics of cases and implemented control measures, March 2020–June 2022

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ABSTRACT

Objectives: Our aim was to describe the epidemiological characteristics of COVID-19 cases in prison inmates in Spain and the control measures implemented to response to this public health challenge.

Study design: Retrospective observational study.

Methods: All COVID-19–confirmed cases reported to the Spanish information system in prisons between March 2020 and June 2022 were analyzed. Prevention plans and protocols established by penitentiary and health authorities were reviewed. Likewise, information on vaccines administered to prison inmates was described.

Results: A total of 8500 COVID-19 cases were reported to penitentiary public health surveillance. The overall cumulative incidence (CI) was 2054.18 cases per 10,000 inmate population. By epidemic periods, the average weekly CI was 1.15 per 10,000 inmate population during the first period, 6.91 during the second, 25.18 during the third, 3.53 during the fourth, 23.27 during the fifth, 34.72 during the sixth and 25.68 during the seventh period. The median age of cases was 49.2 years, 69.1% was born in Spain, 64.1% was asymptomatic and 16 cases died. Ninety-four percent were vaccinated. Control measures such as lockdown, suspending visitation rights and confining inmates in their cells were adopted at the beginning of the pandemic. These measures changed in accordance with the COVID-19 situation in the general population with a view to restoring the inmates' rights.

Conclusion: The COVID-19 pandemic has had a moderate incidence in Spanish prisons. Hospitalization and CFR were lower than the general population. The control measures adopted against COVID-19 have contributed to preventing and controlling the number of cases in prisons.

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Introduction

More than 10 million people are incarcerated worldwide.¹ Infectious diseases spread easily and quickly in closed institutions such as prisons, and outbreaks can lead to serious consequences. This results in prisoners being at higher risk for infectious diseases than outside communities. Highly infectious prison environments are characterized by overcrowding with unavoidable close contact and poor ventilation.² Furthermore, prisons have their own health

services, and the prevalence of high-risk behaviors among prison populations is higher than in the general population. The outbreak of COVID-19 in prisons has emphasized the need to implement prison-specific healthcare control measures.³

The first response from most European countries to the COVID-19 pandemic was to replicate the community measures, such as placing prisons in lockdown. To reduce overcrowding and cut the prison population, some countries reported that prisoners were released under judicial review between January and April.⁴ Furthermore, in April 2020, the European Committee for the Prevention of Torture (CPT) urged the implementation of alternatives to detention wherever possible.⁵

In Spain, around 42,000 people were incarcerated during 2020–2021 in 71 penitentiary centers. Our main objective was to describe the epidemiological characteristics of COVID-19 cases in

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Spanish prisons and the control measures implemented to respond to the public health challenge.

Methods

Study design and population

A retrospective study was performed between March 1, 2020, and June 30, 2022, in Spanish prisons, excluding those in Catalonia (all the study period) and, those in Basque Country (since October 1, 2021), whose competencies were decentralized. All COVID-19-confirmed cases among prisoners in Grades 1 and 2 were included. Most prisoners are placed by default in Grade 2, and they are allowed to share common areas and participate in educational or work activities. Prisoners considered dangerous are placed in Grade 1, which implies restrictions in terms of communication and other privileges. Grade 3 prisoners (semi-freedom) were not included in this analysis because their health care depends on regional healthcare systems, rather than on the prisons' healthcare services.

Source of information and variables

Epidemiological information was gathered by the penitentiary public health surveillance system. Sociodemographic and clinical information was collected by prison physicians as part of the standard surveillance system. The variables collected were the following: demographic variables (sex, age, birth region), clinical presentation (asymptomatic – those who were identified by screening or contact tracing showing no symptoms and who did not develop any throughout the course of infection; mild symptoms – defined as those who presented some symptoms; and severe symptoms – defined as those who needed hospitalization) and infection severity (hospitalization, intensive care unit (ICU) admission, exitus), date and penitentiary center of diagnosis.

We reviewed nationwide and regional prevention plans and protocols established by the authorities of the Ministries of Health and Home Affairs. Measures such as physical distancing (limited outside contacts, restricted access to non-essential staff, activities suspension, prisoners exchange), preventive measures (testing algorithms, access to and use of personal protection equipment, hygiene practices, voluntary isolation in cells, adaptation of schedules), ventilation, cleaning and disinfecting strategies were summarized.

Among the control measures analyzed, information about vaccination schedule (type of vaccine and dose) was also collected and reviewed.

Data analysis

An epidemic curve was plotted with the number of confirmed cases by date of diagnosis as well as drawing a comparison with the epidemic period in the general population in Spain (data published by Institute of Health Carlos III – <https://cneccovid.isciii.es/>).

A descriptive analysis, overall and by age groups, was carried out using frequency tables for categorical variables and median and interquartile range (IQR) for continuous ones. The χ^2 test for independence was used to compare categorical variables and the non-parametric Mann–Whitney test to compare continuous variables.

Crude case fatality rate (CFR) was calculated as the total number of COVID-19 deaths divided by the total number of diagnosed cases.

The percentages of hospitalized cases and CFR in the inmate population were compared with the general population in Spain

(data published by Institute of Health Carlos III – <https://cneccovid.isciii.es/covid19>). (Note: Since March 28, 2022, the national surveillance and control strategy changed and only cases aged 60 years and older were reported.)

All the statistical analyses were performed using Stata software (version 16.0; Stata Corporation, College Station, TX, USA).

Results

Evolution of COVID-19 pandemic

Between March 12, 2020 (the first COVID-19 case in a Spanish prison), and June 30, 2022, 8500 COVID-19 prison cases were reported to the prison monitoring system. The evolution of the COVID-19 pandemic in the Spanish prison population is shown in Fig. 1.

Based on our data, seven different periods by COVID-19 number of cases per epidemiologic week can be described: *Period 1*: From the pandemic declaration to July 3, 2020, when the end of the state of emergency is announced; *Period 2*: From July 4 to December 31, 2020, when the cumulative incidence (CI) of confirmed cases shows the connection point between the second and third epidemic periods; *Period 3*: From January 1 to March 31, 2021, the CI of confirmed cases shows the connection point between the third and fourth epidemic periods; *Period 4*: From April 1 to June 30, 2021, the CI of confirmed cases shows the connection point between the fourth and fifth epidemic periods; *Period 5*: From July 1 to September 30, 2021, the CI of confirmed cases shows the connection point between the fifth and sixth epidemic periods; *Period 6*: From October 1 to March 28, 2022, when the COVID-19 national surveillance and control strategy changed and *Period 7*: From March 29 to data extraction date (June 30, 2022).

The first period accumulated 1.0% of the total cases; the second period accounted for 8.6%; the third for 13.8%; the fourth for 2.2%; the fifth for 14.7%; the sixth for 43.0% and the seventh period for 16.6%.

Cumulative incidence

The overall CI was 2054.18 cases per 10,000 inmate population in the study period. By epidemic periods, the average weekly CI was 1.15 per 10,000 inmate population during the first period, 6.91 during the second period, 25.18 during the third, 3.53 during the fourth, 23.27 during the fifth, 34.72 during the sixth and 25.68 during the seventh period.

The distribution of CI varied according to autonomous regions and epidemic periods. Globally, Aragón showed the highest CI (3163.00 cases per 10,000 inmate population) followed by La Rioja (2983.87), Valencia (2907.71), Castilla y León (2631.91) and Madrid (2591.56). During the first wave, Madrid showed the highest CI (118.25 per 10,000 inmate population), Castilla y León (630.04 per 10,000 inmate population) during the second wave, Aragón (1002.59 per 10,000 inmate population) during the third wave, Canary Islands (164.58 per 10,000 inmate population) during the fourth wave, La Rioja (1859.16 per 10,000 inmate population) during the fifth wave, Murcia (1092.38 per 10,000 inmate population) during the sixth wave and Extremadura (818.18 per 10,000 inmate population) during the seventh wave (Fig. 2).

As opposed to the COVID-19 14-day CI in the general population in Spain, we observed a delay of two weeks in the CI in penitentiaries over the study period, although for the sixth period, the CI in prisons began to increase before that of the general population. The maximum value of 14-day CI in the general population was higher (first, second and sixth periods) than or similar (third and fourth) to

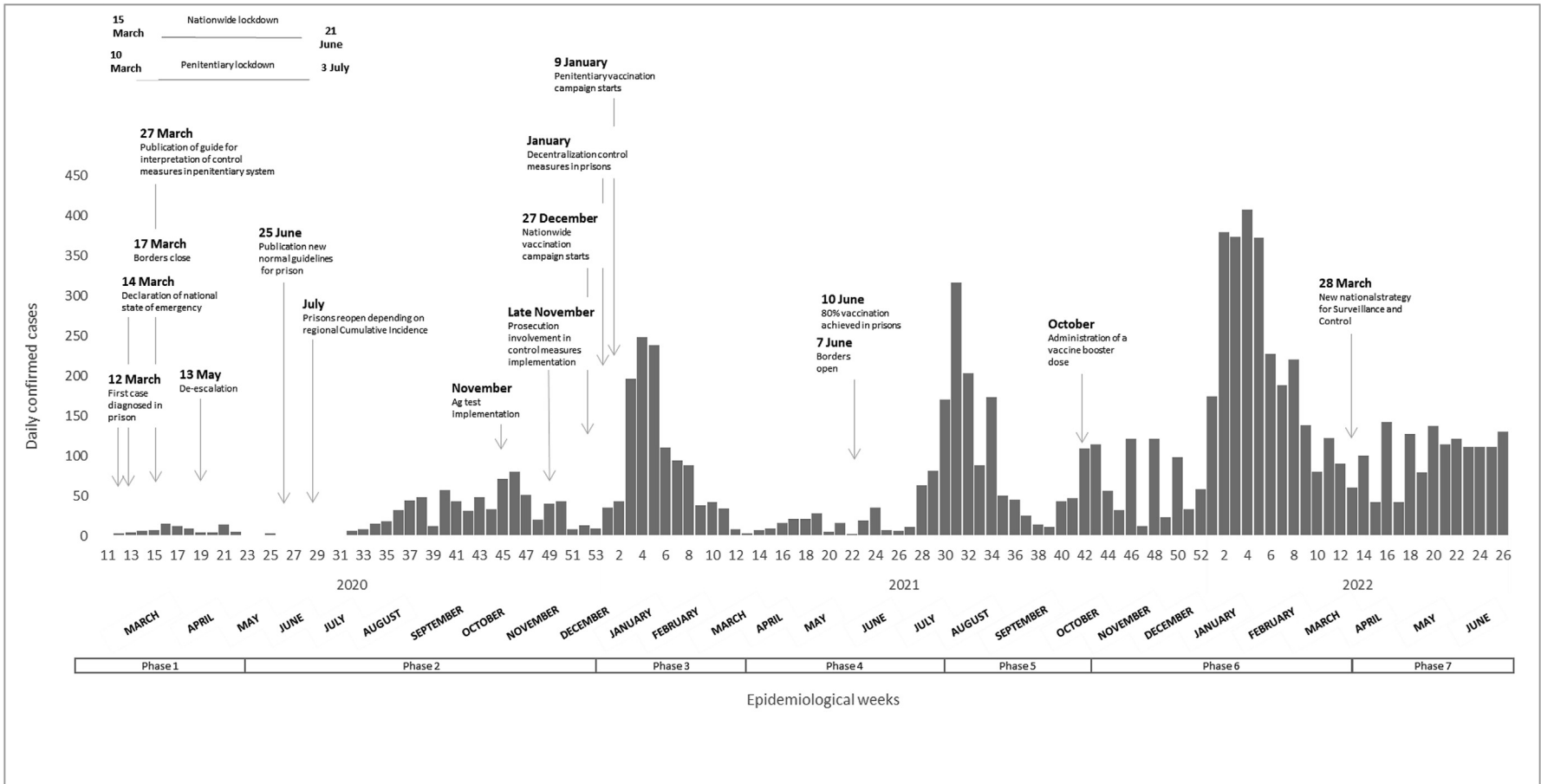


Fig. 1. Number of confirmed COVID-19 cases, national implemented control measures and announcements in prisons.

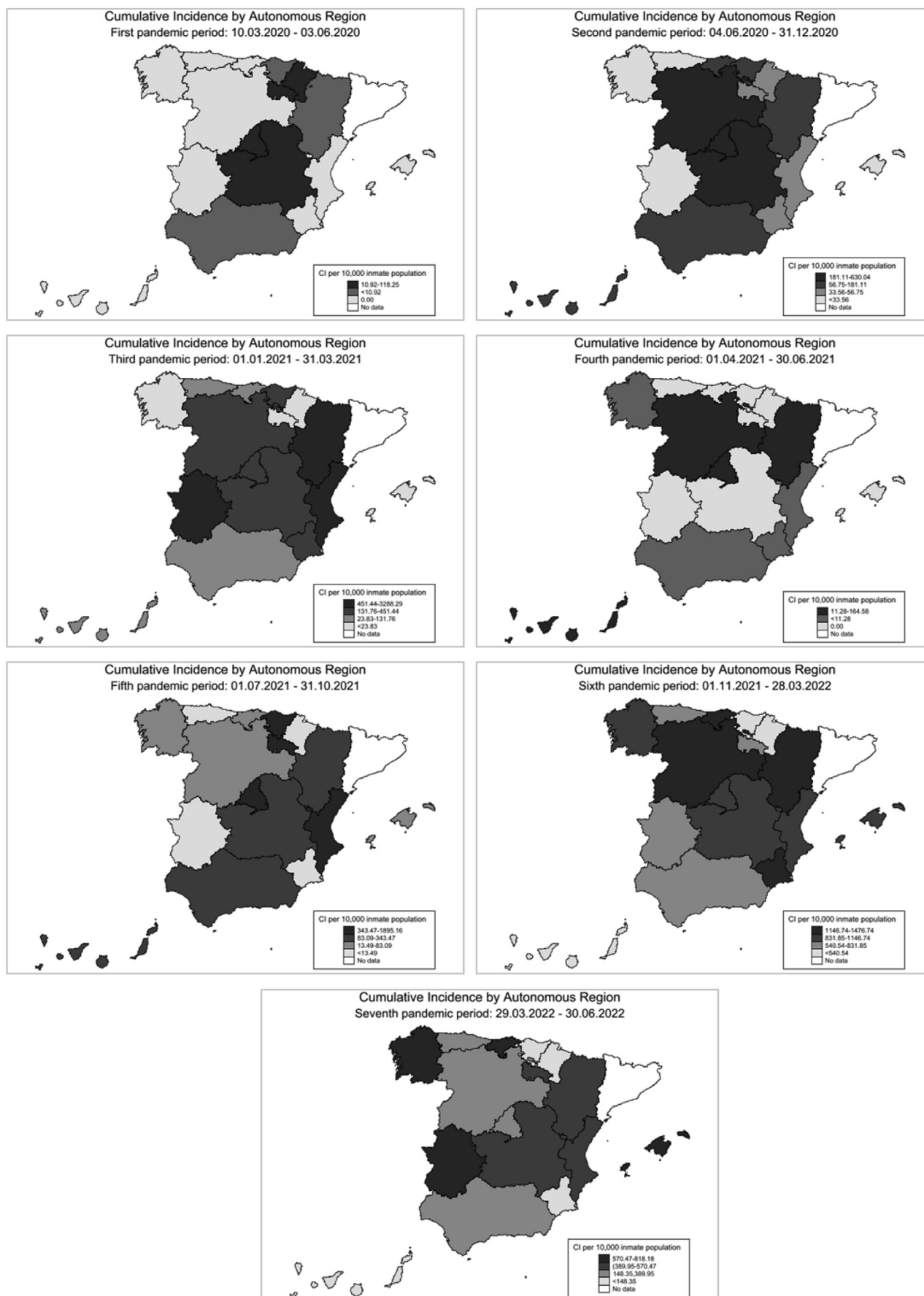


Fig. 2. Cumulative incidence of COVID-19 cases in penitentiary institutions by inmate population and autonomous regions and pandemic periods, Spain, March 2020–June 2022.

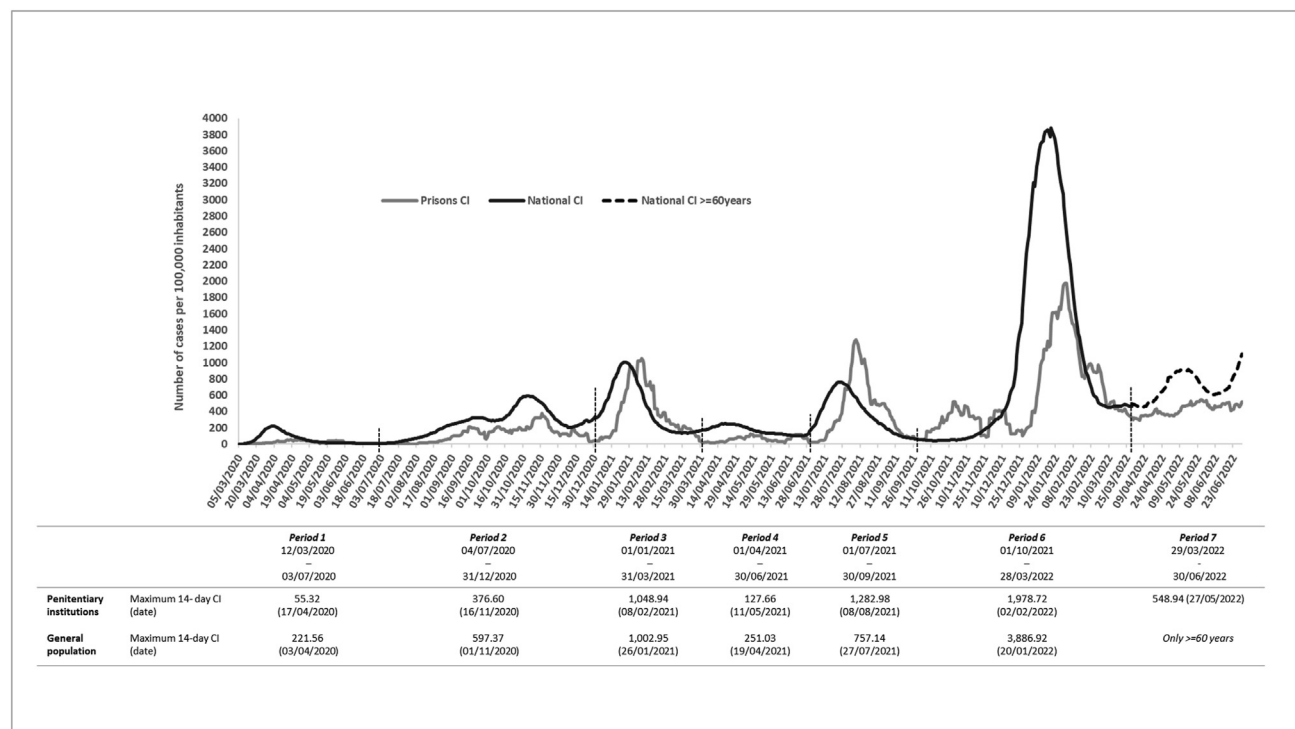


Fig. 3. COVID-19 14-day cumulative incidence in penitentiaries and in the general population.

Table 1
Demographic and clinical characteristics of COVID-19 cases in prisons, Spain, March 2020–June 2022.

	Total		Age group (years)								P-value
			18–29		30–39		40–49		≥50		
	N	%	N	%	N	%	N	%	N	%	
Total	8500	100	1503	17.7	2549	30.0	2392	28.1	2506	24.2	0.431
Sex											
Men	8006	94.2	1414	94.1	2415	94.7	2240	93.6	1937	94.2	
Women	494	5.8	89	5.9	134	5.3	152	6.4	119	5.8	<0.001
Region of birth											
Spain	5877	69.1	821	54.6	1667	65.4	1756	73.4	1633	79.4	
Latin America	827	9.7	192	12.8	279	10.9	215	9.0	141	6.9	
Europe	765	9.0	139	9.2	253	9.9	207	8.6	166	8.1	
North Africa & Middle East	747	8.8	295	19.6	253	9.9	125	5.2	74	3.6	
Sub Saharan Africa	210	2.5	42	2.8	77	3.0	65	2.7	26	1.3	
Asia & Pacific	64	0.8	10	0.7	17	0.7	23	1.0	14	0.7	
Unknown	10	0.1	4	0.3	3	0.1	1	0.04	2	0.1	<0.001
Clinical presentation											
Asymptomatic	5451	64.1	1049	69.8	1653	64.8	1515	63.3	1234	60.0	
Mild symptoms	2912	34.3	452	30.1	885	34.7	851	35.6	724	35.2	
Severe symptoms	137	1.6	2	0.1	11	0.4	26	1.1	98	4.8	<0.001
Hospitalization – Yes	137	1.6	2	0.1	11	0.4	26	1.1	98	4.8	
Death	16	0.2	0	0	0	0	2	0.1	14	0.7	<0.001

Table 2
Hospitalization and CFR rate among the COVID-19 cases in penitentiary institutions and the general population^a according to pandemic period.

	Penitentiary institutions		General population	
	Hospitalization rate	CFR	Hospitalization rate	CFR
Period 1 (12/03/2020–03/07/2020)	20.2%	2.38%	44.1%	11.8%
Period 2 (04/07/2020–31/12/2020)	4.1%	0.14%	7.4%	1.5%
Period 3 (01/01/2021–31/03/2021)	2.6%	0.59%	7.7%	1.8%
Period 4 (01/04/2021–31/03/2021)	3.7%	0%	7.2%	0.8%
Period 5 (01/07/2021–30/09/2021)	2.5%	0.08%	3.8%	0.5%
Period 6 ^a (29/03/2022–30/06/2022)	0.5%	0.14%	1.5% ^a	0.2% ^a

^a Data available for the general population until 28/03/2022.

that of penitentiaries in all epidemic periods, with the exception of the fifth one, where the peak of 14-day CI in penitentiaries was 1282.98 versus 742.70 in the general population. In the sixth period, the 14-day CI in the general population reached a value of 3886.92 in January 21, 2022, while the maximum CI value in the prisoners was 1978.72 in February 2, 2022 (Fig. 3).

Table 1 shows the main characteristics of the 8500 COVID-19 prison cases. The median age of COVID-19 cases was 49.2 years (IQR: 32.2–49.2 years), similar in males and females, and 24.2% of cases were older than 50 years. Women accounted for 5.8% of the total number of cases.

69.2% of cases were born in Spain, followed by 9.7% from Latin-American countries, 9.0% from Europe and 8.8% from North Africa and Middle East. The median age of Spanish cases was 41.9 years (IQR: 33.9–50.5 years), whereas it was 36.4 years for foreign cases (IQR: 29.2–44.9 years) ($P < 0.001$).

Most cases, 64.1% (5451 cases) were asymptomatic, identified by screening or contact tracing, 34.3% (2912 cases) presented mild symptoms, and 1.6% showed severe symptoms that required hospitalization ($P < 0.001$). By sex, 64.6% of men were asymptomatic versus 56.9% of women ($P = 0.001$), 33.8% of men presented mild symptoms compared to 41.7% of women ($P < 0.001$) and 1.6% of men and 1.4% of women presented severe symptoms ($P < 0.723$).

The presence of severe symptoms was more likely among patients older than 50 years (4.8%) than younger (0.1%, 18–29 years; 0.4%, 30–39 years and 1.1%, 40–49 years; $P < 0.001$). Among all cases, 1.6% (137 cases) were hospitalized. The percentage of patients hospitalized increased with age; 71.5% of the hospitalizations occurred among cases aged 50 years and older. The highest percentage of hospitalizations occurred during the first period (20.2%) and the lowest in the sixth (0.5%), as in the general population (Table 2).

Sixteen cases died (CFR: 0.19%), their median age being 61.5 years (IQR: 51.6–76.3 years). Seven deaths (43.7%) (CFR: 0.59%) were during the third period, five deaths (31.2%) (CFR: 0.08%) happened during the sixth period, two deaths (12.5%) (CFR: 2.38%) during the first period, and one death (6.2%) (CFR: 0.14%) during second and (CFR: 0.08%) fifth period, respectively. All deaths were from COVID-19, except four people who died of other causes.

Control measures

The main national events and public health measures are shown in Fig. 1. The initial response was to emulate the community's response to COVID-19: placing prisons in lockdown, suspending visitation rights and confining inmates to very little movement outside their cells. As visitation was suspended, free telephone and videoconferencing with families and attorneys were implemented.

On January 31, 2020, the General Secretariat of Penitentiaries sent an action algorithm for prisons, included as part of the first General Protocol of Action. This algorithm provided contact tracing guidance. First control measures for prisons were issued on March 5, 2020, after the first cases were reported in Spain (February 26). Prisons in four provinces were the first penitentiaries in lockdown due to community transmission being detected. On March 10, 2020, the rest of Spanish prisons were closed. On March 12, the state of emergency was declared.⁶ The Ministries of Health and Home Affairs (the General Secretariat of Penitentiaries) published a technical report on March 27, 2020. In this document, the following main measures were established: collection of samples and their transport to the laboratory, isolation and transfer of probable and confirmed cases, contact tracing, judicial proceeding of cases under investigation.

Furthermore, new prison admission was placed in quarantine to prevent transmission from asymptomatic cases. At the end of the quarantine period, a screening test was performed.

First de-escalation measures were announced by the General Secretariat of Penitentiaries to prisons on May 13, including health measures. On June 10, an updated and consolidated version was published by the Ministries of Health and Home Affairs.

For the second COVID-19 period, a dynamic control strategy was implemented in phases according to regional CI: a) Phase I, when CI was lower than 250, open visits (*vis a vis*) and family visits were cancelled; b) Phase II, ($CI > 250$), in-person visiting at 50% capacity and suspension of exit permits and c) Phase III ($CI > 500$), full lockdown of the center.

On June 25, the General Secretariat of Penitentiaries published a 'new normal' measure report related to: resumption of prison activities, inmate transfers, exits, appointments with relatives, resumption of face-to-face visits for inmates who were on probation by a judicial authority, as long as their health and the pandemic situation allowed for it.⁷

To face the third COVID-19 period in prison, the Spanish Prosecutor's Office began to review the restrictions in place to align them with the measures proposed by public health institutions as of late November 2020.⁸

Quarantine of close contacts (residents in the same module as the case) was established in the form of cell isolation for 10 days, if they were not vaccinated or fully vaccinated, and in the form of restricted movement within their module and in 'bubble' groups in the courtyard, if they were vaccinated. For new admissions to prison and furloughs, a cell quarantine was maintained for 7 days for people who were fully vaccinated and for 10 days if they had not been vaccinated. In the context of community transmission, limited contact between prison and the outside world was recommended.

The COVID-19 vaccination campaign started on January 9, 2021, in penitentiaries (vaccination in the general population started on December 27, 2020). The inmate population was considered a vulnerable population, as they are in closed environments with a higher risk of exposure to the disease and infection. At that time, there were four vaccines approved for use in Spain: BioNTech-Pfizer (Cominarty, BNT162b2), Moderna (Spikevax, mRNA-1273), Janssen (Ad26. COV2-s (recombinant)) and Oxford-AstraZeneca (Vaxzevria, ChAdOx1/nCoV-19). In the first months of the prison vaccination campaign, health authorities prioritized the Janssen vaccine over other types/brands because it required only one dose. In the following months, the other brands were used interchangeably.

Since October 2021, a booster dose was administered in penitentiaries. The vaccination status of prisoners was assessed on admission to prison and they were vaccinated if necessary, according to national recommendations for the general population.

By June 30, 2022, 94.0% inmates were fully vaccinated, 3.1% were still pending to completion of the vaccine series and 2.9% inmates refused vaccination. Regarding the vaccines type/brand, 31.7% of inmates received the Janssen Covid-19 vaccine, 33.7% Pfizer-BioNTech's, 29.5% Moderna's, 2.9% others. Among fully vaccinated inmates, the Janssen Covid-19 vaccine was the more frequently used (65.8%) as a first dose, followed by Pfizer-BioNTech's (18.7%) and Moderna's (10.0%). As a booster dose, 53.5% received the Moderna Covid-19 vaccine and 44.9% Pfizer-BioNTech's.

The median age of inmates vaccinated was 41 years (IQR: 33–49 years), whereas the median age of those refusing vaccination was 36 years (IQR: 28–45 years) ($P < 0.001$). Three percent of men refused vaccination compared to 1.7% of women ($P < 0.001$).

Discussion

To our knowledge, this is the first study that describes the epidemiology of the COVID-19 pandemic in Spanish prisons and the implementation of public health measures. Our results show a moderate incidence of coronavirus disease in prisons.

Hospitalization and CFR were lower than the general population, although they are not fully comparable populations.

Most COVID-19 cases were asymptomatic, only 1.6% of the total were hospitalized and the CFR was 0.19% during the study period. Data published from a COVID-19 outbreak observed in a Catalanian prison also reported that 95% of cases were asymptomatic.⁹ The presence of severe symptoms, hospitalization and death were more frequent among older people, as was the case with the general population.¹⁰

Since the COVID-19 pandemic was declared, 8500 cases have been reported to the public health Central Prison Monitoring System over a period of 28 months, from March 1, 2020, to June 30, 2022. The early nationwide lockdown implemented in penitentiaries on March 10 led to a first flat epidemic curve. The number of cases began to increase as of September 2020, when the second pandemic period started. During this period, there were movement restrictions both in the general population and penitentiaries, which were correlated with a decrease in CI at the end of 2020. The third pandemic period began in prisons at the end of January 2021, approximately two weeks later than in the general population. During that period, the CI in prisons was similar to the CI observed in the general population, unlike what occurred in the previous two. In February 2021, control measures in prison were decentralized. From that moment on, the recommendations and measures adopted were based on the CI of the province where the prison was located, together with the prisons' inspection judges and the bodies responsible for public health in each autonomous region. The fourth pandemic period was milder than the previous ones, probably due to the large number of cases that occurred in the immediately preceding period and the vaccination program that started in prisons at the beginning of January 2021. As in previous periods, in the fifth pandemic period, the increase in prison cases was observed two weeks after the increase in the general population. During this period, the maximum 14-day CI peak observed in prisons exceeded that reached in the general population (1282.98 vs 742.70 per 100,000 inhabitants, respectively). The beginning of the sixth pandemic period came early in the prison compared to the general population, but 14-day CI in the general population was higher than inmate population (3886.92 vs 1978.72 per 100,000 inhabitants, respectively).

The higher number of cases observed in the fifth and sixth pandemic periods in the inmate population could be due to some extent to the vaccination campaign conducted in prisons. Most inmates were vaccinated with Janssen, following the recommendation approved by the Ministry of Health's Interterritorial Board. This vaccine only required one dose, which made it easier to complete vaccination in this fast-changing population (entry-exit in prison) that has a high degree of mobility. However, several subsequent studies have shown that loss of immunity occurs faster in people vaccinated with Janssen, as opposed to those vaccinated with Moderna or Pfizer.^{11–13} According to data published by the Spanish Ministry of Health, Janssen's vaccine showed a much lower efficacy against infection and symptomatic infection, while the protection against hospitalization and death was somewhat lower for Janssen's vaccine than others (Pfizer, Moderna and AstraZeneca).¹⁴ Furthermore, the large increase observed in the sixth period was due to the emergence of the new Omicron variant of SARS-CoV2, which had higher transmissibility but lower symptomatology and risk of hospitalization.^{15,16}

The moderate incidence of COVID-19 cases shown in our study contrasts with the deficiencies of the prison systems worldwide, e.g., overcrowding in prison settings, lack of resources and health and social support in the prison health-care services,^{17–19} which have posed additional challenges to mitigate the effects of this

disease in the prison population. In Spanish prisons, as in most European countries,^{4,20,21} the control measures implemented against COVID-19 emulated the community's response: prison lockdown, suspending visitation rights and limiting movement outside the cells. In our context, the collaboration between the health care and public health services in the regions where the prisons are located has made it possible to provide a level of care to the prison population comparable to that of the general population in the face of the COVID-19 pandemic. Furthermore, the measures established during the pandemic were well accepted by inmates, despite their rights being restricted in terms of communication, permits and others. In this regard, the intervention of health and management teams and the information on health education provided to inmate by all workers played an essential role. On-demand consultations, group workshops and other types of meeting were organized to inform inmates about the benefits of hygiene measures (handwashing, use of mask, social distancing, ...) and restrictive measures (restriction of communication with relatives, open visits, exit permits, quarantine and isolation) in order to control the epidemic.

In conclusion, although prisons are closed settings that could amplify and spread infectious diseases both inside and outside their walls, measures established in Spanish prisons have made it possible to contain the spread of the COVID-19 epidemic.

Author statements

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Ethics approval

The study was performed in accordance with the requirements of the Spanish legislation on data protection. Ethical approval was not sought since data were collected by routine surveillance systems. No personal identifiers were collected in this study; only aggregated anonymized data were used. Informed consent for epidemiological surveillance is deemed unnecessary according to national regulations (Act 33/2011, of October 4, General Public Health, BOE-A-2011-15623. Section 41 and Constitutional Act 3/2018, of December 5, on the protection of Personal Data and Guarantee of Digital Rights. Additional provision 17).

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Competing interests

The authors declare no competing interests.

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