

# Mitigating COVID-19 Burden in People Experiencing Incarceration: A Systematic Review

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**Journal of Correctional Health Care**

*DOI:*
10.1089/jchc.23.10.0090

E-pub ahead of print: 05/04/2024

Peer reviewed version

JOURNAL OF CORRECTIONAL HEALTH CARE

# Strategies to Mitigate Prison COVID-19 Burden: A Systematic Review



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| Journal: | *Journal of Correctional Health Care* |
| Manuscript ID | JCHC-23-10-0090 |
| Manuscript Type: | Literature Review |
| Keyword: | COVID-19, Prison, Pandemic, Incarceration, Prisoner |
| | |

# Strategies to Mitigate Prison COVID-19 Burden: A Review

People experiencing incarceration have poorer COVID-19 clinical outcomes compared to the general population. Many interventions were implemented in prisons to mitigate the burden of COVID-19. This systematic review seeks to analyse the effectiveness of these interventions. 22 studies were included. The reduction of prison population/inter-prison transfers, cohorting of new and infectious prisoners, mass asymptomatic testing (despite often low uptake), hygiene measures and prioritisation of people experiencing incarceration in vaccine policy had some evidence of effectiveness at reducing transmission and risk of COVID-19 in incarceration facilities. Visitation suspension had conflicting evidence of effectiveness. Studies were of low or medium quality. Inadequate control of confounding variables limited the reliability and validity of conclusions drawn. Many studies relied on retrospective, third-party data. Higher quality research is required.

**Keywords:** Prisoner, COVID-19, Pandemic, Incarceration, Prison



# Background

Many interventions were implemented in prisons to try to mitigate the high transmission and disease burden of COVID-19, but their effectiveness remains uncertain. Prisoners have poor COVID-19 clinical outcomes. (Braithwaite et al., 2021; Kim et al., 2022; Puglisi et al., 2023) They also have high rates of physical and psychiatric problems and are susceptible to serious disease. (De Viggiani, 2007; Novisky et al., 2021)

Interim guidance for managing COVID-19 in prisons was published by the World Health Organization (WHO) at the beginning of the pandemic. (World Health Organization, 2020) However, there were many different responses in prisons, and no uniform management plans. (Rapisarda & Byrne, 2020) Measures used to decrease COVID-19 transmission in the public were often less feasible in prisons. (Brennan, 2020) Prisons are often overcrowded, and social distancing is difficult to achieve. (Fair & Walmsley, 2021) Many countries adopted policies to release some non-violent prisoners, thus reducing the prison population. (Rapisarda et al., 2020; Rapisarda & Byrne, 2020) Fewer new prisoners also entered prisons. (Edge et al., 2021) Many prisons stopped visitations, and instead introduced video calls for communication. (Hewson et al., 2020) Prisoners were often kept in their cells for prolonged periods, up to 23 hours per day. (Brennan, 2020) Educational programmes were often suspended, due to the providers being deemed ‘non-essential workers’. (Brennan, 2020) There are differences in whether prisoners were a priority population for vaccination, even within the same country. (SAGE Group, 2021; Strodel et al., 2021) Prisoners had high rates of vaccine hesitancy. (Barsky et al., 2021; Liu et al., 2022)

An earlier systematic review assessed risks of COVID-19 in incarcerated populations along with strategies for mitigating the effect of COVID-19 on people experiencing incarceration. (Esposito et al., 2022) . Esposito et al appraised worldwide evidence (from four databases, compared with 12 databases in the present review), published up to November 2021, and necessarily included a large proportion of modelling studies, given the dearth of non-modelling-based data on potential mitigating strategies at the time of writing. COVID-19 modelling is highly variable in its accuracy and reliability. (Eker, 2020; Gerlee et al., 2022;

Gnanvi et al., 2021; Nixon et al., 2022) In light of the rapid rate of COVID-19 data published as the pandemic progressed, an up-to-date review of the cumulative literature base on effectiveness of interventions to mitigate COVID-19 risks in people experiencing incarceration, excluding modelling-based studies, is needed. This may identify lessons for further cycles of COVID-19 or potential future pandemics.

Therefore, the aim of this systematic review was to analyse the effectiveness of interventions to mitigate the transmission and risk of COVID-19 in the prison population.

# Methods

## *Inclusion and Exclusion Criteria*

The Centre for Reviews and Dissemination's (CRD) good practice guidelines were followed. (Akers et al., 2009) The inclusion and exclusion criteria are shown below.

[INSERT TABLE I HERE]

## *Search Strategy*

Twelve databases were searched, including health, criminology, sociology, and COVID-19 specific databases (Medline via OVID, Social Policy and Practice via OVID, Criminology Connection via ProQuest, ASSIA via ProQuest, EMBASE via OVID, SCOPUS, Web Of Science, CINAHL, Cochrane Library, Cochrane COVID-19 reviews, COVID-19 Evidence Reviews, L*OVE COVID-19 Evidence). Pre-prints were searched via the online EMBASE database to minimise publication bias.

A 'COVID-19' search string, developed for use by the Wales COVID-19 Evidence Centre, and a search string for 'people experiencing incarceration', developed by the authors, were combined. Grey literature suggested by stakeholders was screened to reduce publication bias and gain early insight from unpublished work. A first search was carried out on 17th December 2021 and a second on 25th October 2022.

## *Study Screening and Selection*

The references from the database searches were exported to Endnote (The EndNote Team, 2013) and then de-duplicated. References were then screened based on titles and abstracts and the inclusion criteria (Table I). Ten percent was screened by another reviewer (FB/AE) to assess consistency of applying inclusion and exclusion criteria. A third reviewer was available to consider differences in screening decisions, but this was not required.

After the screening process, potentially eligible full texts were retrieved and assessed against the inclusion criteria. Studies measuring the effectiveness of interventions with comparisons were prioritised. Data were extracted into a comprehensive table (Appendix B).

## *Quality Assessment*

Critical appraisals of each study were conducted, using tools relevant to study design. (Moola et al., 2020; Munn et al., 2015; National Heart Lung Blood Institute, 2021; Observatory, 2014) Key study limitations and strength of evidence were documented under the 'Methodological Appraisal' heading (Appendix B). During this assessment, studies were graded as low-, medium-, or high-quality evidence. The quality of evidence was anticipated to be poor. Studies were included even if they were deemed low-quality, but their findings were interpreted with caution.

## *Data Analysis*

We undertook thematic analysis (Braun & Clarke, 2006, 2012) of the types and effectiveness of interventions. Meta-analysis was not conducted due to low-quality heterogeneous evidence. Subgroup analysis was not done due to the low quality of evidence from the included studies.

# Results

## *Study Selection*

After database searching, **4516** references were exported into Endnote. (The EndNote Team, 2013) After de-duplication, **2684** references remained to be screened. After screening based on title and abstract, **212** references were assessed from full text for eligibility (Table I). Overall, **22** articles were included in this systematic review. Study characteristics and key results are presented in Tables II-VI and full details in Appendix B. The PRISMA flowchart (Page et al., 2021), documenting reasons for exclusion is available in Chart 1.

This review included two pre-post intervention studies (Borges et al., 2021; Hagan et al., 2020), one prospective paired study design (Parodi et al., 2022), two prospective cohort studies (Blackmore et al., 2022; Wadhwa et al., 2021), two prospective cross-sectional studies (Marco A et al., 2022; Mazzilli et al., 2021), four longitudinal studies (Biondi et al., 2022; Coleman et al., 2022; Mazzilli et al., 2022; Stufano et al., 2021) and 11 retrospective cohort studies. (Adamson et al., 2022; Brinkley-Rubinstein, LeMasters, et al., 2021; Chan et al., 2021; Chin, Ryckman, et al., 2021; Jiménez et al., 2020; Marco et al., 2021; Migisha et al., 2022; Reinhart & Chen, 2021; Towers et al., 2021; Vest et al., 2021; Zawitz et al., 2021)

Most studies were from the USA (Biondi et al., 2022; Brinkley-Rubinstein, LeMasters, et al., 2021; Chan et al., 2021; Chin, Ryckman, et al., 2021; Hagan et al., 2020; Jiménez et al., 2020; Reinhart & Chen, 2021; Towers et al., 2021; Vest et al., 2021; Wadhwa et al., 2021; Zawitz et al., 2021) but evidence from other countries across the world including several within Europe (Adamson et al., 2022; Blackmore et al., 2022; Coleman et al., 2022; Marco A et al., 2022; Marco et al., 2021; Mazzilli et al., 2021, 2022; Parodi et al., 2022; Stufano et al., 2021) and several low/middle income countries is also included. (Borges et al., 2021; Migisha et al., 2022) Salient results are highlighted by subsection in Tables II-VI. These subsections were chosen as they succinctly summarised the interventions tested in studies meeting the inclusion criteria. There were notable absences including a lack of data examining the effect of improved ventilation/air filtration systems.

[INSERT CHART 1 HERE]

## *Visitation Suspension*

Two studies with conflicting results about the effect of suspending visitation were identified (Table II). One was a pre-post- interventional study without a control (Borges et al., 2021), and the other was an uncontrolled retrospective cohort study. (Reinhart & Chen, 2021) Borges et al analysed case rates comparing a time-period during which visitation was banned (phase 1), to when it was re-permitted (phase 2). There were higher overall COVID-19 case rates in prisons when visitation was banned. (Borges et al., 2021) There were also no significant differences in COVID-19 incidence in people experiencing incarceration who had received visitation compared with those that did not, within the same prisons. Results were analysed over a short period, with the second testing period 15 days after visiting re-started, potentially an inadequate time interval to assess outcomes.

This was contradicted by an USA study assessing the effect of various COVID-19 anticontagion policies. (Reinhart & Chen, 2021) The authors noted that the suspension of visitations was associated with a 1.2% decrease in daily COVID-19 cases. The study focussed on overall COVID-19 cases (i.e. including community cases), rather than specific case numbers in the incarcerated population. This analysis included other interventions as covariates but was limited by retrospectively accessed publicly available data.

[INSET TABLE II HERE]

## *Reduction of the number of incarcerated residents*

Four studies assessed the reduction of the prison population (Table III). These were all uncontrolled retrospective cohort studies (Jiménez et al., 2020; Reinhart & Chen, 2021; Towers et al., 2021; Vest et al., 2021) Collectively, these studies found that reducing the prison population was associated with reduced COVID-19 cases in prisons and in the community.

COVID-19 cases generally decreased whilst at lower occupancy levels. (Towers et al., 2021) A study comparing different waves of the pandemic highlighted that a decrease in the prison population in the winter 2021 wave was associated with a reduction in per capita rates. (Towers et al., 2021) However, the reduction was not quantified, and other confounders (such as other interventions or baseline immunity) were not considered.

An analysis of 103 prisons reported that “low outbreak” prisons were housed at 85% capacity and “high outbreak” prisons were housed at 102% suggesting that reducing capacity in prison facilities was associated with fewer outbreak events. (Vest et al., 2021) However, definitions of “high” and “low” outbreaks were not provided. Comparable results were seen in Massachusetts, where COVID-19 cases were lower than average, especially for systems that released more of their population. (Jiménez et al., 2020) The Department of Corrections released an average of 8% of their prison population and had a case rate of 52/1000 people. In contrast, county jails, which released 21% of their population, had a lower case rate of 36/1000. However, no comparisons of demographics, testing or prison dynamics between the populations were documented.

In a cohort study of 1605 prisons, an analysis based on retrospective publicly available data showed a significant positive association between daily jail population and COVID-19 growth rates. (Reinhart & Chen, 2021) When controlling for anticontagion policies, mass release

events were associated with a 3.1% (95% CI, 1.9% to 4.3%) decrease in COVID-19 growth rates two weeks later and estimated that reduction of 80% of the prison population would account for a 2% reduction in total daily cases (including the general and prison population). (Reinhart & Chen, 2021)

Conflicting evidence was demonstrated in an Italian study. (Mazzilli et al., 2022) The authors noted that all prisons included in the study were running above intended capacity (mean 119% - 131% capacity through study period) however specific overcrowding was not found to be significantly associated with new cases in incarcerated individuals.

[INSERT TABLE III HERE]

## *Testing Strategies*

One prospective cohort study (Wadhwa et al., 2021), one pre-post- intervention study with no control (Hagan et al., 2020) and three retrospective cohort studies (Blackmore et al., 2022; Chan et al., 2021; Marco et al., 2021) examined testing campaigns (Table IV). One assessed serial testing at three points, compared to single testing, to identify pre-symptomatic and asymptomatic prisoners.(Wadhwa et al., 2021) More cases were identified in the serial testing group, with a higher proportion of cases identified. Across the 19 people that tested positive across both groups (out of 197 people who had tested at least once), 12 were asymptomatic. However, there was a high refusal rate, with 40% of participants who had previously consented, refusing testing at least once. Thus, many people were not tested "serially", but this was not clearly documented. (Wadhwa et al., 2021)

Another study compared the numbers of COVID-19 cases identified with a mass-testing campaign, to cases identified during symptom-based testing.(Hagan et al., 2020) A median of 12.1 times more cases were picked up by mass-testing, compared to symptom-based testing. However, definitions of "mass-testing" were heterogeneous with percentages of prisoners tested at each site ranging from 2.3%-99.6%. (Hagan et al., 2020) Similar findings were demonstrated from a study at a single facility in Barcelona, Spain. (Marco et al., 2021) Mass asymptomatic testing was instituted within a prison block instituted following seven symptomatic cases being discovered. Mass testing revealed a further 33 cases, 31 (93.9%) of whom were asymptomatic. (Marco et al., 2021)

Blackmore et al assessed the effect of a mass asymptomatic testing regime during an outbreak event in a UK prison. (Blackmore et al., 2022) The authors noted that the number of positive tests rose markedly from before to after asymptomatic testing introduction, though specific figures were not documented. 26.8% of cases among residents were asymptomatic, highlighting the importance of asymptomatic testing regimes. Again, test uptake was low (48.3% in residents, 30.4% in staff). (Blackmore et al., 2022) These findings were mirrored by Chan et al who assessed the results of a mass-testing campaign for those with greater nursing needs within the New York Prison system. (Chan et al., 2021) 23% of asymptomatic patients within the sample of 978 people experiencing incarceration tested positive for SARS-CoV-2. (Chan et al., 2021) This study outlines the importance of mass-testing in these more vulnerable groups, noting that older age and background of diabetes mellitus significantly increased the risk of hospitalisation due to COVID-19. (Chan et al., 2021)

Several of these studies noted concerns regarding low uptake of voluntary COVID-19 testing within the incarcerated population and logistical difficulty of implementing mass PCR testing

campaigns within a prison facility. (Blackmore et al., 2022; Chan et al., 2021; Wadhwa et al., 2021) Three studies examined the feasibility of testing using non-PCR based testing strategies. Mazzilli et al examined the possible role of rapid antigen diagnostic tests (ag-RDT), a test with a more rapid turnaround time, in the context of screening new admissions to the incarceration facility. (Mazzilli et al., 2021) A sensitivity of 52.4% (95% CI: 29.8%-74.3%), specificity of 100% (95% CI: 99.2%-100%), and negative predictive value of 98% (95% CI: 96.8%-98.7%) for the rapid diagnostic test was reported. (Mazzilli et al., 2021) Marco et al also described a lower sensitivity (25%) and poorer negative predictive value (63%) with the 'ag-RDT' rapid test. (Marco A et al., 2022) This much smaller study (84participants (Marco A et al., 2022) compared with 507(Mazzilli et al., 2021)) had limited demographic/setting data so results should be compared with caution.

Parodi et al presented data from a prospective paired study design to demonstrate whether self-administered molecular salivary testing is a feasible choice over nasopharyngeal swabbing (NPS) in COVID-19 testing of people newly experiencing incarceration. (Parodi et al., 2022) The authors noted that 150/156 (96.2%) coupled saliva/NPS tests showed concordant results. It was noted that 9/165 (5.5%) participants consented to a salivary swab but refused a NPS suggesting that these may be more acceptable due to their less invasive nature.

[INSERT TABLE IV HERE]

## *Studies Employing Other Single Mitigating Strategies*

Four studies detailing other single interventions were included, two of which were uncontrolled retrospective cohort studies (Brinkley-Rubinstein, LeMasters, et al., 2021; Migisha et al., 2022) and two were longitudinal studies. (Biondi et al., 2022; Mazzilli et al., 2022) These studies are summarised in Table V.

Mazzilli et al found mandatory isolation within prison facilities in Lombardy, Italy to be ineffective as a means of COVID-19 prevention.(Mazzilli et al., 2022) No statistically significant association was observed between the incidence of new cases among incarcerated individuals and any enforced containment measures (measured by the daily number of incarcerated residents in preventive isolation in single/shared rooms).

Brinkley-Rubenstein et al described the effect of restriction of inter-prison transfer rates on the COVID-19 incidence. (Brinkley-Rubinstein, LeMasters, et al., 2021) The number of COVID-19 cases was positively correlated with the number of transfers three to five weeks before (cross-correlations greater than 0.4, $p<0.05$), suggesting that restriction of transfers is an effective prevention strategy.

A study in Uganda examined the role of self-reported facemask wearing and handwashing behaviours. (Migisha et al., 2022) Self-report of "ever" using facemasks along with performing handwashing after touching surfaces was protective against contracting COVID-19 (adjusted relative risk (aRR) 0.25, 95 CI=0.14-0.46) Self-reported use of facemask "always/most of the time" was protective (aRR 0.26, 95 CI=0.13-0.54). This study was prone to social desirability bias given the need to self-report hygiene-based behaviours. Furthermore, COVID-19 testing within the facility was only performed if patients reported symptoms.

It is already well established that COVID-19 vaccines are effective in incarceration settings, with vaccinated prisoners showing reduced rates of COVID-19 infection and remaining positive on PCR testing for shorter periods compared with their unvaccinated peers. (Brinkley-Rubinstein, Peterson, et al., 2021; Chin, Leidner, et al., 2021; Chin, Leidner, Lamson, et al., 2022; Chin, Leidner, Zhang, et al., 2022; McCarthy et al., 2022; Salvatore et al., 2023; Silverman et al., 2022; Simwanza et al., 2022; Stufano et al., 2022). These effectiveness-based studies were excluded from the present review as we sought to assess evidence surrounding interventions that increased vaccination uptake in incarceration facilities, thereby helping to mitigate COVID-19 risks. Biondi et al presented data collected in the USA discussing the role of prioritisation of people experiencing incarceration in state vaccine policy. (Biondi et al., 2022) Twenty-one of the sampled states prioritised vaccination of incarcerated residents. States with policies that prioritised vaccination of incarcerated people had significant increases in vaccination rates compared with other states over time. In states without prioritisation policy, vaccination rates in the general population were higher than in incarcerated people.

[INSERT TABLE V HERE]

## *Studies Employing Multiple Mitigating Strategies*

Five studies detailing multiple interventions were included (Table VI). Three were uncontrolled retrospective cohort studies (Adamson et al., 2022; Chin, Ryckman, et al., 2021; Zawitz et al., 2021) and two were longitudinal studies. (Coleman et al., 2022; Stufano et al., 2021) Multiple concurrent interventions in prisons may have been effective at reducing the transmission and burden of COVID-19. However, due to the assessment of multiple interventions, it cannot be quantified which elements were effective and these studies were judged as low-medium strength evidence.

A study from Italy involving two screening campaigns showed that serial testing, plus interventions such as closures of social spaces, personal protective equipment (PPE) and quarantining of new inmates could limit a COVID-19 outbreak, with only two prisoners testing positive across the study.(Stufano et al., 2021) However, there were baseline differences between participants, limited documentation surrounding contemporaneous community attack rates and the definition ‘serial testing’ was not specified.

Zawitz et al presented data collected from Cook County, USA examining multiple interventions, such as visitation bans, reduced activity programmes, cohorting of inmates and symptom screening. These cumulative interventions were effective in reducing new cases in both residents and staff after implementing interventions, even as cases increased dramatically in Chicago.(Zawitz et al., 2021) However, these data were represented graphically only with no detailed figures, statistical analysis or accounting for potential confounding factors such as local community case rates.

A study of an outbreak from a large UK prison discussed multiple interventions used to varying degrees over an outbreak period. (Adamson et al., 2022) Some interventions were already in place at the start of the outbreak period: mandatory face coverings, enhanced cleaning, safety briefings, reduced room capacity and sub-group socialisation. Others were introduced when the outbreak was declared: reverse cohorting (defined as preventing mixing of new resident-admissions with the general prison population to limit transmission in either direction between people living and working in the same prison block (Adamson et al., 2022), exclusion, cell isolation, asymptomatic testing and minimising of resident mixing.

Whole genome sequencing was also used to delineate between person-person spread and de novo cases. The authors recommend future use of cohorting and asymptomatic testing as these appeared effective in controlling spread.

A UK-based study discussed the role of reverse cohorting units, protective isolation units (separated areas within the prison for those with positive tests) and shielding units (separated areas within the prison for the clinically vulnerable) in the prevention of COVID-19 spread. (Coleman et al., 2022) The authors noted that cohorting units prevented re-infection from new prison admissions and the shielding unit had no COVID-19 infections linked to either outbreak. The authors documented attack rates (AR) of 9% and 19% in first and second outbreaks within the facility, noting a comparative AR of 80% at an incarceration facility in Marion Correctional Institution in Ohio, USA. (Burki, 2020) The lower attack rate was attributed to the implementation of the mitigating strategies, but limited data were provided about setting, testing strategies or community rates in the comparison facility so this should be considered with caution.

Chin et al discussed the use of reduction of out-of-room labour in prison, reducing shared accommodation spaces and decarceration. (Chin, Ryckman, et al., 2021) COVID infection rates in dormitory residents (more than three in a room) had an adjusted hazard ratio (AHR) of 2.49 when compared to residents of single/double occupancy cells. Accommodation areas with residents taking part in out-of-room labour also had higher rates of infection (AHR of 1.56, adjusted to include age, sex, ethnicity, pre-existing conditions). The authors note a reduction of prison capacity by 19.1% during study period but do not present data to demonstrate the effect of this on COVID-19 rates/outcomes. (Chin, Ryckman, et al., 2021)

[INSERT TABLE VI HERE]

# Discussion

## *Summary of Principal Findings*

Several interventions were implemented in prisons to reduce the transmission and risk of COVID-19. These included visitation suspensions, reduction of the prison population, testing campaigns, hygiene measures, reduction of inter-prison transfers, cohorting of new or infectious inmates and prioritising vaccination. Multiple concurrent interventions were often implemented, meaning the true effectiveness of their elements were hard to quantify, with all studies judged as low or medium quality.

Conflicting evidence was demonstrated about the effectiveness of suspending visitation in prisons. (Borges et al., 2021; Reinhart & Chen, 2021) Reducing the prison population seemed effective at reducing the transmission rate from COVID-19. (Jiménez et al., 2020; Reinhart & Chen, 2021; Towers et al., 2021; Vest et al., 2021) However, comparisons were made without considering demographic or testing differences within populations and some evidence conflicted with this finding. (Mazzilli et al., 2022) Screening and testing campaigns appear effective at identifying asymptomatic and pre-symptomatic infectious prisoners, particularly given the high numbers of asymptomatic cases present in incarceration facilities. (Blackmore et al., 2022; Coleman et al., 2022; Hagan et al., 2020; Marco et al., 2021; Wadhwa et al., 2021) Conflicting evidence was shown for the utility of non-PCR based testing. (Marco A et al., 2022; Mazzilli et al., 2021; Parodi et al., 2022) Increased use of

hygiene measures such as handwashing and use of face-covering appeared protective from COVID-19 infection. (Migisha et al., 2022) Cohorting was generally found to be effective in reducing COVID-19 rates (Adamson et al., 2022; Coleman et al., 2022; Zawitz et al., 2021) but single/shared cell isolation was ineffective. (Mazzilli et al., 2022) Reduction of inter-prison transfer also resulted in lower COVID-19 incidence. (Brinkley-Rubinstein, LeMasters, et al., 2021) Prioritising the prisoner population in vaccine policy was associated with higher uptake rates although no data were presented to specifically demonstrate better COVID outcomes resulting. (Biondi et al., 2022)

## *Context of Other Literature*

Esposito et al presented data published up to November 2021 discussing mitigating strategies for COVID-19 in prisons. (Esposito et al., 2022) Several of these are included the present review (Brinkley-Rubinstein, LeMasters, et al., 2021; Chan et al., 2021; Chin, Ryckman, et al., 2021; Jiménez et al., 2020; Marco et al., 2021; Reinhart & Chen, 2021; Vest et al., 2021), but 14 of the 21 papers discussed by Esposito et al did not meet the present review's inclusion criteria. (Blair et al., 2021; Brinkley-Rubinstein, Peterson, et al., 2021; Clarke et al., 2020; Gouvea-Reis et al., 2021; Leibowitz et al., 2021; Lemasters et al., 2020; Marmolejo et al., 2020; Marquez et al., 2021; Pagano et al., 2020; Parsons & Worden, 2021; Pitts & Inkpen, 2020; Toblin & Hagan, 2021; Wilburn et al., 2021; Zeveleva & Nazif-Munoz, 2022) This was either due to a reliance on modelling data, data presented assessing vaccine effectiveness (a fact well established by the time the present study was written and hence not included) or a lack of comparative data presented to be able to draw valid conclusions regarding the effectiveness of interventions. For this reason, it is apparent that many of the conclusions made by Esposito et al are based on inferences rather than objective data.

On the strategies of reduction of numbers of incarcerated residents, asymptomatic testing regimes, and hygiene measures the present study found confirmatory results with Esposito et al, suggesting ongoing effectiveness of these measures. Conflicting results were found for visitation suspension, single cell isolation and quarantine measures suggesting more recent data find these to be a less effective mitigating strategy than previously described. The present study found additional positive effects for cohorting of prisoners and prioritisation of prisoners within vaccine policy.

## *Further Research & Policy Implications*

This systematic review demonstrates the poor evidence base concerning the effectiveness of interventions to mitigate COVID-19 burden in the prison population. Inadequate control of confounding variables limited the reliability and validity of conclusions drawn. The incarcerated population should be considered a priority population due to poor COVID-19 outcomes (Braithwaite et al., 2021; Kim et al., 2022; Puglisi et al., 2023) and lack of evaluation of mitigating interventions.

Further research with high quality randomised controlled trials is required to evaluate mitigating interventions in prisons and confidently draw conclusions on causal effects. We recognise that performing such studies in the context of incarceration facilities is highly complex and potentially challenging. Control strategies required to reliably test the effectiveness of individual mitigating interventions may be unethical and multiple layers of mitigating strategies may need to be evaluated together.

Greater standardisation of national policy regarding baseline mitigating strategies in incarceration facilities may allow more effective comparison between facilities with comparable population demographics/community locations. Quality of studies could also be improved with better pandemic readiness allowing prison teams to immediately liaise with researchers so that prospective verifiable data could be collected rather than relying on third party (e.g. governments/prisons, unconnected with the research teams themselves) retrospective data. The longer-term impacts of the interventions should be assessed such as on mental health and long COVID outcomes. Several case studies noted the importance of ventilation/air filtration in the context of prison COVID-19 outbreaks but did not present data to demonstrate the effectiveness of this intervention. (Duarte et al., 2022; Kwan et al., 2023) Further research to test the role of this intervention is needed. Very few studies present comparative data on improving vaccine uptake and further research is required.

## *Strengths and Limitations*

Our review assesses interventions to reduce transmission and risk of COVID-19 in incarceration settings worldwide, from the first 30 months of the pandemic. It focuses on comparative clinical data with PRISMA guidelines followed. The present review used exclusively real-world data, choosing to exclude modelling studies due to their variable reliability.

Comprehensive search terms using 12 databases generated evidence from both high and low/middle income countries. Due to differences in interventions, demographics of prisoners and burden of COVID-19 by country, evidence was heterogenous and may not be transferable globally. Studies not published in English were excluded leading to some selection bias.

Many studies took place over short time-periods, so evidence of effectiveness of interventions is potentially incomplete. Longer-term outcomes, such as long COVID, were notably missing from the literature.

# Conclusion

This systematic review shows that various mitigating interventions were implemented in incarceration facilities during the COVID-19 pandemic. These included decarceration, testing campaigns and cohorting, which seemed effective at reducing COVID-19 transmission. Multiple interventions were often put in place at the same time, making the effectiveness of specific intervention elements hard to assess.

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| Table I: Inclusion/Exclusion Criteria | | |
|---|---|---|
| | Inclusion | Exclusion |
| Population | Adult prisoners, aged 18 and over, around the world during the COVID-19 pandemic | Studies not based on prisoners or those incarcerated<br><br>Studies based on populations detained in forensic hospitals<br><br>Studies based on migrants detained in detention centres<br><br>Studies based on populations in juvenile or youth prisons, or prisoners under the age of 18<br><br>Studies on ex-prisoners post-release |
| Intervention | Any interventions to decrease the transmission and risk of COVID-19 in prisons e.g. decarceration, stopping visitors<br><br>Intervention such as mass testing, were included, as they were hypothesised to prompt further management of COVID-19 | Studies not documenting interventions put in place to reduce the risk and transmission of COVID-19, such as other interventions to improve the mental health of prisoners<br><br>Interventions to reduce crime, arrests or the number of people entering prison e.g. fewer people getting sentenced to reduce the prison population<br><br>Interventions in the court process e.g. online hearings<br><br>Studies focussed on the effectiveness of vaccines in prisons were excluded, as they are not prison specific and are hypothesised to be the same in the non-prisoner population, where high quality studies have already been assessed |
| Comparative | Any comparator group, including but not limited to:<br><br>Comparison to before interventions were implemented<br><br>Comparisons to prison systems without the same mitigation strategies | No comparators<br><br>Modelling-based Studies |
| Outcomes | Transmission of COVID-19<br><br>Hospitalisation from COVID-19<br><br>Death from COVID-19<br><br>Harms or adverse effects | No clinical outcomes documented |

**Table II:** Summary of Studies Discussing Visitation Suspension

| Study | Sample Size/Setting | Intervention/Comparison | Results | Design Limitations |
|---|---|---|---|---|
| (Borges et al., 2021) | n = 778 phase 1, n = 453 phase 2 / 7 prisons Sergipe, Brazil | Re introduction of in-person visiting / Pre vs post (phase 1 vs 2) reintroduction of visiting | Positive cases significantly higher in first phase of the study by 12.9%,<br>No significant difference in positive cases for COVID-19 between inmates that had/had not received in person visits<br>No relationship between positive tests and visiting when adjusted for age, sex and co-morbidities | Small window of time to test for infection (15 days after in person visiting started for 4 days)<br>No confounders or other intervention effects noted - other measures were put in place after phase 1 e.g. cohorting<br>No mention of the concurrent R level/prevalence in community/staff/prison at the time<br>Only non-symptomatic visitors were allowed |
| (Reinhart & Chen, 2021) | n = 319,084 (60% of US jail population) / multiple states, USA | Suspension of visitation / no intervention | Prison visitation ban caused a daily 1.2% decrease in daily cases | Did not account for staff movement<br>Testing rates not documented<br>Results were estimates only - must be interpreted with care<br>Other interventions put in place concurrently<br>Reliant on public data |

**Table III:** Summary of Studies Discussing Reduction of Numbers of Incarcerated Residents

| Study | Sample Size/Setting | Intervention/Comparison | Results | Design Limitations |
|---|---|---|---|---|
| (Jiménez et al., 2020) | n = 14,987 / Jail/multiple facilities Massachusetts, USA | Decarceration / Lower proportion of decarceration | COVID-19 case incidence higher in institutions releasing a lower proportion of their baseline prisoners | No documentation of testing rates/ No documentation of demographics between populations Relationships represented graphically only |
| (Reinhart & Chen, 2021) | n = 319,084 (60% of US jail population) / multiple states, USA | Decarceration / No intervention | Decarceration associated with 4.6% decrease in growth rates in counties with above median population density Reducing jail population by 80% in the sample period would be associated with a 2% reduction in daily COVID growth rate | Results partially derived from modelling rather than real world data Did not account for staff movement Testing rates/strategies not documented Results were estimates only - must be interpreted with care Other interventions put in place concurrently |
| (Towers et al., 2021) | Total sample size not documented / 101 prisons across multiple states, USA | Decarceration / Prior to decarceration | 4% decrease in the prison population during winter period significantly associated with a decrease in per capita rates during the winter (2021) months | Other confounders not considered e.g. other concurrent interventional methods No documentation of exact proportion of reduction in per capita rates, or testing rates/protocols between facilities Daily incidence Community data & serial prevalence Prison data, so results extrapolated No demographic information documented Reliant on public data |
| (Vest et al., 2021) | N = 130,610 / 103 prison facilities Texas, USA | Being housed at less than 85% capacity / Being housed at more than 85% capacity | “Low” outbreak prisons were at 85% capacity “High” outbreak prisons were housed at 102% capacity “High” death profile prisons housed at 94% | Unclear how 85% capacity figure is calculated Does not define low or high outbreaks Demographics e.g. sex and pre-existing health problems not documented Reliant on public data |

**Table IV:** Summary of Studies Discussing Testing Strategies

| Study | Sample Size/Setting | Intervention/Comparison | Results | Design Limitations |
|---|---|---|---|---|
| (Blackmore et al., 2022) | n = 851 / Category B closed male prison North West England, UK | Mass Asymptomatic PCR Testing / Cases pre-post introduction of asymptomatic testing and prison versus community cases | Number of positive tests rose markedly from period prior to asymptomatic testing regime to period following introduction<br>26.8% of cases among residents were asymptomatic | Male only prison<br>Uptake of testing for staff and residents optional - low uptake in both groups<br>Limited specific data documented regarding pre/post implementation of mass testing protocol<br>Symptoms self reported therefore subject to bias<br>Staff had access to independent testing in community – data not documented |
| (Chan et al., 2021) | n = 978 / multiple facilities New York, USA | Asymptomatic PCR testing for those with greater nursing needs / Symptomatic testing protocol & general incarcerated population data | 23% asymptomatic residents tested positive for COVID-19<br>Up to 61% of asymptomatic patients with a positive test result remained asymptomatic for at least 14 days<br>Older age and background of diabetes mellitus strongly increased risk of hospitalisation for covid | Asymptomatic testing cohort (greater nursing needs) significantly older/greater co-morbidities than overall jail population<br>Data on COVID-19 outcomes censored for people released from jail before study ended<br>Limited comparative data documented |
| (Hagan et al., 2020) | n = 16,392 / 16 facilities, 6 jurisdictions, USA | Asymptomatic mass PCR testing / symptom-based testing pre mass testing | 1.5-157 fold increase (median 12.1 fold increase) in infection rates after mass testing instigated | Percentage of 'mass testing' varied between sites, i.e. in one site only 2.3% were offered testing, Convenience sample - not representative of USA, Statistical significance testing not performed<br>R rate/prevalence in facilities not documented |
| (Marco et al., 2021) | n = 946 / Quatre Camins Prison, Barcelona, Spain | Asymptomatic mass PCR testing / | 7/155 (4.5%) inmates tested positive on basis of symptomatic testing<br>Asymptomatic mass testing initiated which demonstrated a further 33 positive, 31 (93.9%) of whom were asymptomatic | Male only facility<br>Outbreak control measures initiated following initial positive test results - data showing efficacy of these not presented, rates may be affected by these interventions |
| (Marco A et al., 2022) | n = 84 / Figueras prison Girona, Spain | Use of Rapid Antigen Testing (RAT) / RAT versus PCR results | RAT sensitivity of 25% and negative predictive value of 63% compared to PCR gold-standard | Unclear whether results can be extrapolated to all brand/manufacturer versions of RAT<br>Three-day delay between RAT and confirmatory rt-PCR - positive results may be indicative of new infection rather than RAT error<br>Short letter form report – limited details over methods documented<br>Symptoms in all tested individuals not noted<br>No demographic information reported and limited information on prison setting. |
| (Mazzilli et al., 2021) | n = 504 / San Vittore pre-trial jail Milan, Italy | Use of Rapid Antigen Testing (RAT) / RAT versus PCR results | RAT sensitivity was 52.4% and negative predictive value 98% compared to PCR gold-standard | Little known about participant characteristics<br>Scant documentation regarding RAT tests - unclear whether results can be extrapolated to all brand/manufacturer versions of RAT<br>Limited statistical analysis |
| (Parodi et al., 2022) | n = 1,108 / San Vittore pre-trial jail Milan, Italy | Use of self-collected salivary swab PCR testing / Nasopharyngeal swab PCR testing | 150/156 (96.2%) coupled saliva/NPS tests showed concordant results.<br>9/165 (5.5%) participants consented to a salivary swab but refused a NPS | Change of protocol part way through study - direct comparison of tests not possible for vast majority of samples (943/1108)<br>Low numbers reduce validity of results - no sensitivity/specificity analyses performed. |
| (Wadhwa et al., 2021) | n = 137 (serial testing group) n=87 (single test group) / Cook County Jail Chicago, USA | Serial testing protocol (at 3 time points) / Single testing protocol plus interview | serial testing cohort = 17/96 (18%) with at least one test were positive<br>single testing cohort = 2/76 (3%) positive<br>12/19 (63%) with positive tests were asymptomatic at testing | High refusal rates in the serial testing group - many people not tested 'serially'<br>Limited comparison of results and symptoms at different time points<br>2 groups not similar in size<br>Limited demographics described |

**Table V:** Summary of Studies Employing Other Single Mitigating Strategies

| Study | Sample Size/Setting | Intervention/Comparison | Results | Design Limitations |
|---|---|---|---|---|
| (Biondi et al., 2022) | n = 690,343 (mean) / multiple facilities within 36 states, USA | Prioritisation of people experiencing incarceration within vaccine rollout schedules / vaccination uptake in states that did not | States with policies that prioritised vaccination of incarcerated people had significant increases in vaccination rates compared with other states over time<br>In states with no prioritisation policy, vaccination rates in the general population were higher than in incarcerated people. | Results reliant on accuracy of publicly available source data - data represented graphically only in published paper<br>Data not included for 14 states due to limited publicly reported data and specific to US<br>Varied vaccination dosing schedules between states which may affect vaccination rates (single dose versus 2-dose full course vaccines) |
| (Brinkley-Rubinstein, LeMasters, et al., 2021) | total number of incarcerated individuals not stated / South-Eastern state in the USA (specific details not given) | Restriction of inter-prison transfer of people experiencing incarceration / case numbers pre-post transfers | COVID-19 cases positively correlated with number of transfers three to five weeks before ($p<0.05$) | Limited data presented re location of study and total population included<br>Data reliant on accuracy of publicly reported dataset<br>Data surrounding other interventions undertaken in the state's prison system not presented. Aggregation of state data may lead to ecological bias<br>No description of testing protocols within each prison |
| (Mazzilli et al., 2022) | n = 7599 / 18 facilities Lombardy region, Italy | Mandatory enforced quarantine in shared or single cells / COVID-19 incidence during time periods with varying degrees of intervention enforced | No statistically significant association was observed between the incidence of new cases among incarcerated individuals and any enforced containment measures<br>Overcrowding was not found to be significantly associated with new cases in incarcerated individuals | Implementation and consistency of mitigating interventions not clearly documented between different prison sites and time periods<br>Population numbers are an estimation<br>Results rely upon accuracy of prison data reports |
| (Migisha et al., 2022) | n = 690 / Moroto Prison, Northern Uganda | Handwashing and sanitising behaviours, frequency of mask wearing within facility (self-reported) / relative risk COVID-19 based on patient behaviour reports | Self-report of "ever" using of facemasks along with performing handwashing after touching surfaces was protective against contracting COVID-19 (aRR 0.25, 95 CI=0.14-0.46)<br>Self-reported use of facemask "always/most of the time" was protective (aRR 0.26, 95 CI=0.13-0.54) | Self-reporting of hygiene measures likely to lead to social desirability bias<br>COVID-19 testing was only performed if residents reported symptoms – this likely to lead to underreporting hence undertesting as residents may fear quarantine<br>Does not account for asymptomatic cases<br>Study performed when a prison escape event<br>had recently taken place; 24% of non-cases and 25% of cases had escaped<br>Positive cases not controlled for other behaviours/exposures |

**Table VI:** Summary of Studies Discussing employing multiple mitigating strategies

| Study | Sample Size/Setting | Intervention/Comparison | Results | Design Limitations |
|---|---|---|---|---|
| (Adamson et al., 2022) | n = 1690 / Prison facility in Wales, UK | Whole genomic sequencing (WGS), restriction of movements for residents, suspension of communal dining, asymptomatic testing, cell isolation, mandating self-isolation for symptomatic staff / Other preventive interventions, symptomatic versus asymptomatic cases identified | Epidemiological investigations demonstarted admission blocks to be a common hub for infections<br>WGS demonstrated infection progression which in turn supported the efficient implementation of control measures<br>85/211 (40.3%) of resident positive cases were asymptomatic | Multiple interventions instigated – impossible to comment upon proportion of benefit from each<br>No detailed information on testing rates within the institution<br>Limited information regarding uptake rates of asymptomatic testing<br>Residents might also have been reluctant to report symptoms knowing this would incur cell-isolation.<br>No detailed description of data collection. |
| (Chin, Ryckman, et al., 2021) | n = 119,401 / Multiple facilities California, USA | Decarceration, reduction of out-of-room labour in prison, reducing shared accommodation spaces / Compared out of room labour versus in room labour, dormitories versus single cells | Adjusted hazard ratio (AHR) of COVID infection rates = 2.49 in dormitory residents (more than 3 in a room) AHR of COVID-19 infection = 1.56 in prisoners taking part in out-of-room labour | Multiple data sets excluded from analysis for varying reasons eg – lack of follow up time<br>No comparisons to the general population<br>Two time point data detailing prison numbers and demographics pre/post decarceration but clinical outcome data only presented for second time point so unable to comment on effects of decarceration. |
| (Coleman et al., 2022) | n = 950 (period 1) & 842 (period 2) / Category B prison, UK | Establishment of reverse cohorting units, protective isolation units and shielding units / Two outbreak periods compared with varying interventions | Confirmed/probable/possible cases in Outbreak 1: N =88; 9% of total prison population. Outbreak 2: N =160; 19% of total prison population<br>Cohorting units prevented re-infection from new prison admissions and the shielding unit had no COVID-19 infections linked to either outbreak<br>Attack rate (AR) 9% and 19% in first and second outbreaks, respectively versus Marion Correctional Institution in Ohio, USA – AR= 80% | Male only prison<br>Testing only freely available late in first outbreak period – only 33% of probable cases tested<br>Mass asymptomatic testing protocols not used consistently over study periods.<br>“Probable cases” in first outbreak period defined by subject reported symptoms, so subject to bias<br>Multiple interventions introduced together so cannot establish effectiveness of each strategy<br>Testing availability and possible reporting bias difference from first to second outbreak periods<br>Minimal information documented about prison with which attack rate comparison made |
| (Stufano et al., 2021) | n =426 (campaign 1) & 480 (campaign 2) / Bari correctional facility, Italy | Antigen screening programme and other preventive measures, pathways for new inmates, closing of social spaces, isolation of COVID contacts, PPE, and COVID education / first-second campaign, staff-inmates | No statistical differences in the frequency of positive cases between two campaigns<br>Full risk management plan was able to prevent COVID-19 outbreaks in correctional facility | Limited data regarding exactly when each intervention undertaken - unable quantify which measures were effective<br>Antigen testing was used rather than PCR<br>Demographics between first and second campaign groups had statistical differences in age and gender percentage |
| (Zawitz et al., 2021) | n = 4884 / Cook County Jail, Chicago, USA | Multiple interventions eg – hygiene measures, cohorting, quarantine, vistation suspension / rates versus general population | COVID-19 case rate in prisoners and staff decreased following implementation of interventions whilst cases in the general population were increasing | Data only represented graphically so cannot quantify the effectiveness of interventions<br>Multiple interventions concurrently, unable to determine effectiveness of single interventions<br>No demographics noted<br>Testing rates not documented<br>Comparison made to the general public, but no documentation of testing rates/local lockdown policies in place |

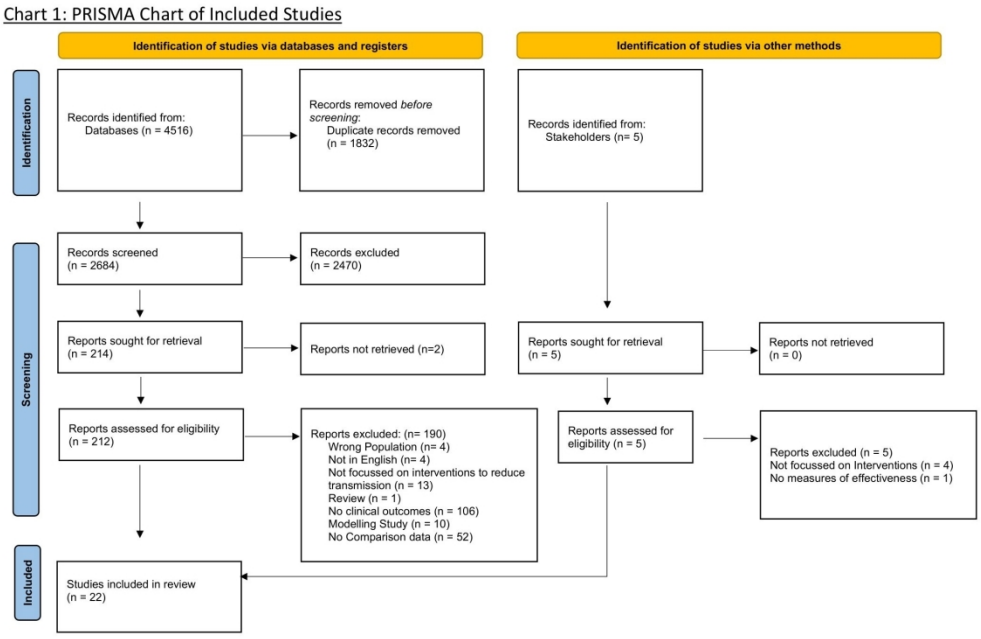


Chart 1: PRISMA Chart of included studies

267x173mm (200 x 200 DPI)

# Search Strategy of Databases and Results Yielded

## SEARCH ROUND 2

### Medline via OVID

Searched 25/10/22

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw. | 4969 |
| #2 | (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome).ti,ab,kw. | 309682 |
| #3 | ((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)).ti,ab,kw. | 10968 |
| #4 | Exp Coronavirus/ | 152809 |
| #5 | Exp COVID-19/ | 192613 |
| #6 | #1 OR #2 OR #3 OR #4 OR #5 | 326642 |
| #7 | (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*").ti,ab,kw. | 72651 |
| #8 | Exp Prisons/ | 11465 |
| #9 | Exp Prisoners/ | 18259 |
| #10 | #7 OR #8 OR #9 | 79586 |
| **#11** | **#10 AND #6** | **982** |
| **#12** | **limit 11 to dt=20211217-20221021** | **297** |

### Social Policy and Practice via OVID DONE

| **Search Number** | **Search String** | **Number of results yielded** |
|---|---|---|
| #1 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab. | 11 |
| #2 | (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome).ti,ab. | 5121 |
| #3 | ((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)).ti,ab. | 19 |
| #4 | #1 OR #2 OR #3 | 5126 |
| #5 | (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*").ti,ab. | 19148 |
| **#6** | **#4 AND #5** | **150** |
| **#7** | **limit 6 to yr="2021 -Current"** | **81** |

### Criminology Connection DONE

From after 17.12.21

| **Search Number** | **Search String** | **Number of results yielded** |
|---|---|---|
| #1 | ab(((corona* or corono*) N/1 (virus* or viral* or virinae*))) | 2 |
| #2 | ti(((corona* OR corono*) NEAR/1 (virus* OR viral* OR virinae*))) | 0 |
| #3 | ti((coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS- CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome)) | 895 |

| | | |
|---|---|---|
| #4 | ab((coronavirus* OR coronovirus* OR coronaviri* OR 2019-nCoV OR 2019nCoV OR nCoV2019 OR nCoV-2019 OR covid-19* OR covid19* OR ncov* OR n-cov* OR HCoV* OR SARS-CoV-2 OR SARSCoV-2 OR SARSCov2 OR SARS-CoV2 OR severe acute respiratory syndrome)) | 918 |
| #5 | ab(((outbreak* OR pandemic* OR epidemic*) N/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan))) | 9 |
| #6 | ti(((outbreak* OR pandemic* OR epidemic*) NEAR/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan))) | 6 |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 1217 |
| #8 | ti((Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*")) | 5798 |
| #9 | ab((Prison* OR incarcerat* OR "detention* center*" OR jail* OR penal OR gaol* OR inmate* OR "youth* offender*" OR "penal system*" OR detain* OR offender* OR criminal* OR perpetrator* OR "correction* facilit*")) | 2506 |
| #10 | #8 OR #9 | 7373 |
| **#11** | **#10 AND #7** | **144** |

Assia via Proquest DONE

| Search number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | ab(((corona* or corono*) N/1 (virus* or viral* or virinae*))) | 10 |
| #2 | ti(((corona* OR corono*) NEAR/1 (virus* OR viral* OR virinae*))) | 1 |
| #3 | ti((coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS- CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome)) | 2546 |
| #4 | ab((coronavirus* OR coronovirus* OR coronaviri* OR 2019-nCoV OR 2019nCoV OR nCoV2019 OR nCoV-2019 OR covid-19* OR covid19* OR ncov* OR n-cov* OR HCoV* OR SARS-CoV-2 OR SARSCoV-2 OR SARSCov2 OR SARS-CoV2 OR severe acute respiratory syndrome)) | 3100 |
| #5 | ab(((outbreak* or pandemic* or epidemic*) N/10 (Wuhan or Hubei or China or Chinese or Huanan))) | 63 |
| #6 | ti(((outbreak* OR pandemic* OR epidemic*) NEAR/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan))) | 40 |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 3373 |
| #8 | ti((Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*")) | 436 |
| #9 | ab((Prison* OR incarcerat* OR "detention* center*" OR jail* OR penal OR gaol* OR inmate* OR "youth* offender*" OR "penal system*" OR detain* OR offender* OR criminal* OR perpetrator* OR "correction* facilit*")) | 1025 |
| #10 | #8 OR #9 | 1070 |
| **#11** | **#10 AND #7** | **49** |

Embase via OVID
DONE

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw. | 5371 |
| #2 | (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome).ti,ab,kw. | 336,580 |
| #3 | ((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)).ti,ab,kw. | 10,793 |
| #4 | Exp Coronavirus/ | 99,740 |
| #5 | Exp COVID-19/ | 268,335 |
| #6 | #1 OR #2 OR #3 OR #4 OR #5 | 371,977 |
| #7 | (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*").ti,ab,kw. | 94,353 |
| #8 | Exp Prisons/ | 2,355 |
| #9 | Exp Prisoners/ | 19,956 |

| | | |
|---|---|---|
| #10 | #7 OR #8 OR #9 | 99,081 |
| **#11** | **#10 AND #6** | **1,063** |
| **#12** | **limit 11 to dd=20211217-20221021** | **148** |

SCOPUS
DONE

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | TITLE-ABS ((corona* or corono*) W/1 (virus* or viral* or virinae*)). | 4,527 |
| #2 | TITLE-ABS((coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome)) | 54,569 |
| #3 | TITLE-ABS((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)). | 7,162 |
| #4 | #3 OR #4 OR #5 | 28,048 |
| #5 | TITLE-ABS(Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*"). | 63,848 |
| **#6** | **#4 AND #5** | **118** |

WEB SCIENCE DONE

| Search number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | TI=((corona* or corono*) NEAR/1 (virus* or viral* or virinae*)) | 45 |
| #2 | AB=((corona* OR corono*) NEAR/1 (virus* OR viral* OR virinae*)) | 256 |
| #3 | AB=(coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS- CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome) | 22,282 |
| #4 | TI=(coronavirus* OR coronovirus* OR coronaviri* OR 2019-nCoV OR 2019nCoV OR nCoV2019 OR nCoV-2019 OR covid-19* OR covid19* OR ncov* OR n-cov* OR HCoV* OR SARS-CoV-2 OR SARSCoV-2 OR SARSCov2 OR SARS-CoV2 OR severe acute respiratory syndrome) | 19,277 |
| #5 | TI=((outbreak* or pandemic* or epidemic*) NEAR/10 (Wuhan or Hubei or China or Chinese or Huanan)) | 185 |
| #6 | AB=((outbreak* OR pandemic* OR epidemic*) NEAR/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan)) | 420 |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 27,008 |
| #8 | AB=((Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*")) | 1,717 |
| #9 | TI=((Prison* OR incarcerat* OR "detention* center*" OR jail* OR penal OR gaol* OR inmate* OR "youth* offender*" OR "penal system*" OR detain* OR offender* OR criminal* OR perpetrator* OR "correction* facilit*")) | 764 |
| #10 | #8 OR #9 | 1,955 |
| **#11** | **#10 AND #7** | **96** |

CINAHL DONE
From Dec 21- Oct 22

| Search number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | TI (corona* or corono*) w1 (virus* or viral* or virinae*) | 23 |
| #2 | AB (corona* or corono*) w1 (virus* or viral* or virinae*) | 118 |
| #3 | TI (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome) | 25,258 |
| #4 | AB (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome) | 20,774 |

| | | |
|---|---|---|
| #5 | TI (outbreak* or pandemic* or epidemic*) w10 (Wuhan or Hubei or China or Chinese or Huanan) | 105 |
| #6 | AB (outbreak* or pandemic* or epidemic*) w10 (Wuhan or Hubei or China or Chinese or Huanan) | 156 |
| #7 | (MH "COVID-19") | 7,246 |
| #8 | (MH "Coronavirus+") | 474 |
| #9 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 | 32,174 |
| #10 | TI (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*") | 756 |
| #11 | AB (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*") | 1,700 |
| #12 | (MH "Prisoners") | 338 |
| #13 | (MH "Correctional Facilities") | 305 |
| #14 | #10 OR #11 OR #12 OR #13 | 1,952 |
| **#15** | **#9 AND #14** | **120** |

COCHRANE REVIEW
Limited to last year DONE

| Search Number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | (coronavirus or coronavirus or covid* or SARSCoV2):ti,ab,kw. | 0 |
| #2 | (prison* or incarcerat* or 'detention* center*' or jail* or penal or gaol* or inmate* or 'youth offender*' or 'penal system*' or detain* or offender* or criminal* or perpetrator* or 'correction* facilit*'):ti,ab,kw. | 284 |
| #3 | MeSH descriptor: [COVID-19] explode all trees | 2317 |
| #4 | MeSH descriptor: [Coronavirus] explode all trees | 1141 |
| #5 | MeSH descriptor: [Prisons] in all MeSH products | 348 |
| #6 | #1 or #3 or #4 | 1571 |
| #7 | #2 or #5 | 284 |
| #8 | #6 AND #7 | **3** |

Cochrane COVID-19 Reviews
Hand searched 0

COVID-19 Evidence Reviews
Hand Searched 0

L*OVE COVID-19 Evidence
From Dec 17 2021 DONE

| Search Number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*" | **358** |

# SEARCH ROUND 1

## Medline via OVID

Searched 17/12/21

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw. | 4,029 |
| #2 | (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome).ti,ab,kw. | 216,665 |

| | | |
|---|---|---|
| #3 | ((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)).ti,ab,kw. | 9,306 |
| #4 | Exp Coronavirus/ | 112,908 |
| #5 | Exp COVID-19/ | 126,653 |
| #6 | #1 OR #2 OR #3 OR #4 OR #5 | 231,152 |
| #7 | (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*").ti,ab,kw. | 69,211 |
| #8 | Exp Prisons/ | 11,089 |
| #9 | Exp Prisoners/ | 17,815 |
| #10 | #7 OR #8 OR #9 | 76,125 |
| **#11** | **#10 AND #6** | **691** |

## Social Policy and Practice via OVID

Searched 17/12/21

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab. | 12 |
| #2 | (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome).ti,ab. | 2,952 |
| #3 | ((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)).ti,ab. | 14 |
| #4 | #1 OR #2 OR #3 | 2,957 |
| #5 | (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*").ti,ab. | 16,051 |
| **#6** | **#4 AND #5** | **98** |

## Criminology Connection via ProQuest

Searched 17/12/21

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | ab(((corona* or corono*) N/1 (virus* or viral* or virinae*))) | 10 |
| #2 | ti(((corona* OR corono*) NEAR/1 (virus* OR viral* OR virinae*))) | 1 |
| #3 | ti((coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS- CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome)) | 2264 |
| #4 | ab((coronavirus* OR coronovirus* OR coronaviri* OR 2019-nCoV OR 2019nCoV OR nCoV2019 OR nCoV-2019 OR covid-19* OR covid19* OR ncov* OR n-cov* OR HCoV* OR SARS-CoV-2 OR SARSCoV-2 OR SARSCov2 OR SARS-CoV2 OR severe acute respiratory syndrome)) | 1944 |
| #5 | ab(((outbreak* OR pandemic* OR epidemic*) N/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan))) | 65 |
| #6 | ti(((outbreak* OR pandemic* OR epidemic*) NEAR/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan))) | 18 |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 3184 |
| #8 | ti((Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*")) | 141,936 |
| #9 | ab((Prison* OR incarcerat* OR "detention* center*" OR jail* OR penal OR gaol* OR inmate* OR "youth* offender*" OR "penal system*" OR detain* OR offender* OR criminal* OR perpetrator* OR "correction* facilit*")) | 206,694 |
| #10 | #8 OR #9 | 271,816 |
| **#11** | **#10 AND #7** | **526** |

## ASSIA via ProQuest

Searched 17/12/21

| Search number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | ab(((corona* or corono*) N/1 (virus* or viral* or virinae*))) | 45 |
| #2 | ti(((corona* OR corono*) NEAR/1 (virus* OR viral* OR virinae*))) | 9 |
| #3 | ti((coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS- CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome)) | 4,705 |

| | | |
|---|---|---|
| #4 | ab((coronavirus* OR coronovirus* OR coronaviri* OR 2019-nCoV OR 2019nCoV OR nCoV2019 OR nCoV-2019 OR covid-19* OR covid19* OR ncov* OR n-cov* OR HCoV* OR SARS-CoV-2 OR SARSCoV-2 OR SARSCov2 OR SARS-CoV2 OR severe acute respiratory syndrome)) | 5,340 |
| #5 | ab(((outbreak* or pandemic* or epidemic*) N/10 (Wuhan or Hubei or China or Chinese or Huanan))) | 320 |
| #6 | ti(((outbreak* OR pandemic* OR epidemic*) NEAR/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan))) | 134 |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 6,375 |
| #8 | ti((Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*")) | 21,923 |
| #9 | ab((Prison* OR incarcerat* OR "detention* center*" OR jail* OR penal OR gaol* OR inmate* OR "youth* offender*" OR "penal system*" OR detain* OR offender* OR criminal* OR perpetrator* OR "correction* facilit*")) | 43,603 |
| #10 | #8 OR #9 | 48,127 |
| **#11** | **#10 AND #7** | **138** |

## EMBASE via OVID

Searched 17/12/21

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | ((corona* or corono*) adj1 (virus* or viral* or virinae*)).ti,ab,kw. | 4,104 |
| #2 | (coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome).ti,ab,kw. | 216,882 |
| #3 | ((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)).ti,ab,kw. | 9,148 |
| #4 | Exp Coronavirus/ | 71,390 |
| #5 | Exp COVID-19/ | 168,527 |
| #6 | #1 OR #2 OR #3 OR #4 OR #5 | 242,020 |
| #7 | (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*").ti,ab,kw. | 90,051 |
| #8 | Exp Prisons/ | 1,407 |
| #9 | Exp Prisoners/ | 19,303 |
| #10 | #7 OR #8 OR #9 | 94,620 |
| **#11** | **#10 AND #6** | **675** |

## SCOPUS

Searched 17/12/21

| Search Number | Search String | Number of results yielded |
|---|---|---|
| #1 | TITLE-ABS ((corona* or corono*) W/1 (virus* or viral* or virinae*)). | 4,954 |
| #2 | TITLE-ABS((coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome)) | 36,854 |
| #3 | TITLE-ABS((outbreak* or pandemic* or epidemic*) adj10 (Wuhan or Hubei or China or Chinese or Huanan)). | 12,645 |
| #4 | #3 OR #4 OR #5 | 51,846 |
| #5 | TITLE-ABS(Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*"). | 224,652 |
| **#6** | **#4 AND #5** | **78** |

## Web Of Science

Searched 17/12/21

| Search number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | TI=((corona* or corono*) NEAR/1 (virus* or viral* or virinae*)) | 790 |

| | | |
|---|---|---|
| #2 | AB=((corona* OR corono*) NEAR/1 (virus* OR viral* OR virinae*)) | 3,290 |
| #3 | AB=(coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS- CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome) | 171,102 |
| #4 | TI=(coronavirus* OR coronovirus* OR coronaviri* OR 2019-nCoV OR 2019nCoV OR nCoV2019 OR nCoV-2019 OR covid-19* OR covid19* OR ncov* OR n-cov* OR HCoV* OR SARS-CoV-2 OR SARSCoV-2 OR SARSCov2 OR SARS-CoV2 OR severe acute respiratory syndrome) | 202,346 |
| #5 | TI=((outbreak* or pandemic* or epidemic*) NEAR/10 (Wuhan or Hubei or China or Chinese or Huanan)) | 3,274 |
| #6 | AB=((outbreak* OR pandemic* OR epidemic*) NEAR/10 (Wuhan OR Hubei OR China OR Chinese OR Huanan)) | 8,896 |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 | 246,600 |
| #8 | AB=((Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*")) | 119,228 |
| #9 | TI=((Prison* OR incarcerat* OR "detention* center*" OR jail* OR penal OR gaol* OR inmate* OR "youth* offender*" OR "penal system*" OR detain* OR offender* OR criminal* OR perpetrator* OR "correction* facilit*")) | 88,525 |
| #10 | #8 OR #9 | 169,719 |
| **#11** | **#10 AND #7** | **911** |

## CINAHL

Searched 17/12/21

| Search number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | TI (corona* or corono*) w1 (virus* or viral* or virinae*) | 164 |
| #2 | AB (corona* or corono*) w1 (virus* or viral* or virinae*) | 408 |
| #3 | TI coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome | 59,014 |
| #4 | AB coronavirus* or coronovirus* or coronaviri* or 2019-nCoV or 2019nCoV or nCoV2019 or nCoV-2019 or covid-19* or covid19* or ncov* or n-cov* or HCoV* or SARS-CoV-2 or SARSCoV-2 or SARSCov2 or SARS-CoV2 or severe acute respiratory syndrome | 47,661 |
| #5 | TI (outbreak* or pandemic* or epidemic*) w10 (Wuhan or Hubei or China or Chinese or Huanan) | 600 |
| #6 | AB (outbreak* or pandemic* or epidemic*) w10 (Wuhan or Hubei or China or Chinese or Huanan) | 1,111 |
| #7 | (MH “COVID-19”) | 21,116 |
| #8 | (MH “Coronavirus+”) | 2,424 |
| #9 | #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 | 77,051 |
| #10 | TI (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*") | 17,233 |
| #11 | AB (Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*") | 25,939 |
| #12 | (MH “Prisoners”) | 9,833 |
| #13 | (MH “Correctional Facilities”) | 6,646 |
| #14 | #10 OR #11 OR #12 OR #13 | 37,334 |
| **#15** | **#9 AND #14** | **335** |

## Cochrane Library

Searched 21/12/21

| Search Number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | (coronavirus or coronavirus or covid* or SARSCoV2):ti,ab,kw. | 8906 |
| #2 | (prison* or incarcerat* or ‘detention* center*’ or jail* or penal or gaol* or inmate* or ‘youth offender*’ or ‘penal system*’ or detain* or offender* or criminal* or perpetrator* or ‘correction* facilit*’):ti,ab,kw. | 3596 |
| #3 | MeSH descriptor: (Abdalbary, Kakani et al.) explode all trees | 918 |
| #4 | MeSH descriptor: (Birkie, Necho et al.) explode all trees | 612 |
| #5 | MeSH descriptor: [Prisons] in all MeSH products | 136 |

| | | |
|---|---|---|
| #6 | #1 or #3 or #4 | 8912 |
| #7 | #2 or #5 | 3597 |
| #8 | #6 AND #7 | **15** |

## COVID-19 Databases

## Cochrane COVID-19 reviews

Hand searched 66 reviews

**0** relevant

## COVID-19 Evidence Reviews

Hand searched

**2** articles exported

## L*OVE COVID-19 Evidence

Searched 17/12/21

| Search Number | Search Strategy | Number of results yielded |
|---|---|---|
| #1 | Prison* or incarcerat* or "detention* center*" or jail* or penal or gaol* or inmate* or "youth* offender*" or "penal system*" or detain* or offender* or criminal* or perpetrator* or "correction* facilit*" | **858** |

# Appendix B: Complete Table of Included Studies

| Study (author, year, country) | Study Design | Aim of Study | Sample Size, participants, setting | Data collection and date of the study | Intervention | Comparison | Results | Overall Assessment of the Strength of Evidence and Methodological Appraisal |
|---|---|---|---|---|---|---|---|---|
| Does In-Person Visiting Affect the Number of COVID-19 Cases in Prisons? L. P. Borges, A. F. Martins, D. R. V. de Souza, J. M. de Rezende Neto, A. A. Santos, B. M. Oliveira, et al. 2021, Brazil (Borges *et al.*, 2021) | Pre- and Post-intervention study without a control | To analyse whether in-person visiting affected the number of cases of COVID-19 infection in the state of Sergipe in Brazil | Involved inmates from 7 prisons in Sergipe, Brazil, 778 inmates tested before in person visiting, 453 tested in the second phase (excluded 253 who tested positive in phase 1 and 71 who were not in prison at the time of testing). | Performed in 2 phases, first phase half the inmates randomly selected from each cell, antibodies tested using finger prick/lateral flow, antigen test for symptomatic or those who were asymptomatic and had a doubtful/positive IgM test, first screening phase from 31st August - 9 September 2020 Second phase (15 days after in person visiting re-started) those who had tested negative for antigens and antibodies were re-screened from 5-9 October 2020 | Re introduction of in-person visiting | Before in-person visiting was allowed | Of the 778 participants in stage 1, 147 (18.9%) had a positive IgM result (active or recent infection) and 188 (24.2%) had positive IgG result (past infection), 86 positive for IgM and IgG, 8 (1%) positive for COVID antigens,<br>In phase 2, 453 tested, 89 (19.6%) had a positive result for COVID-19, 63 (13.9%) had positive result from IgM and 36 (7.9%) positive for IgG, 10 positive for both and 1 antigens positive<br>Positive cases significantly higher in first phase of the study by 12.9%, no significant difference in positive cases for COVID-19 between inmates that had received in person visits, no relationship between the positive tests and visiting when adjusted for age, sex and co-morbidities | **Low**<br><br>Small window of time to test for infection, second testing only happened 15 days after in person visiting started and only lasted for 4 days, not a long enough time for follow up, no confounders or other interventions noted, no mention of the R level at the time, or the prevalence in the community/staff/prison at the time, only non-symptomatic visitors were allowed, no touching between incarcerated people and visitors, cannot say that this is causal as other measures were put in place after phase one e.g. cohorting, no mention of implication on hospitalisation or death rates |
| Association of Jail Decarceration and Anticontagion Policies With COVID-19 Case Growth Rates in US Counties, E. Reinhart and D. L. Chen 2021, USA (Reinhart and Chen, 2021) | Retrospective cohort study with panel regression models | Inferred aim: to evaluate the association of jail decarceration and government anticontagion policies with reductions in the spread of COVID-19 | Total of 1605 counties with data available on jail population and COVID-19 cases included, sample represents 51% of US counties, 72% of US population and 60% of US jail population | Data from January to November 2020 to analyse COVID-19 cases (from New York Times) at county level, jail populations data (from Vera Institute) and anticontagion policies analysed in a panel regression model, other covariates included, such as nursing home visitation bans, school closures, mask mandates, prison visiting bans, stay at home orders, closure of | 1) Mass decarceration<br>2) Prison visitation bans | No interventions | Reducing jail population by 80% in the sample period would be associated with a 2% reduction in daily COVID growth rate (calculated from quadratic specification during panel regression models)<br>Prison visitation ban caused a daily 1.2% decrease in daily cases, jail decarceration associated with 4.6% decrease in growth rates in counties with above median population density compared to those below (0.5%) | **Medium**<br><br>Did not account for staff coming in and out, several controls and confounders noted, testing rates not documented, results were just estimates and therefore must be interpreted with care, hard to determine causality due to numerous other interventions in place at the same time, no mention of hospitalisation or death rates |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | non-essential businesses | | | | |
| Prison Population Reductions and COVID-19: A Latent Profile Analysis Synthesizing Recent Evidence From the Texas State Prison System, N. Vest, O. Johnson, K. Nowotny and L. Brinkley-Rubinstein 2021, USA (Vest *et al.*, 2021) | Retrospective cohort study | Inferred aim: to characterize Texas prisons on levels of COVID-19 cases and deaths among incarcerated residents and COVID 19 cases among prison staff | Total sample of 103 Texas prison facilities, 3 prison facilities excluded due to identifying as holding facilities and did not report COVID data, 130,610 entire prison population included in analysis and 37,201 staff | Data analysis of publicly available data from the Texas department of criminal justice (TBDJ) in collaboration with the COVID Prison Project, collected from March 1 2020 to July 24 2020, used latent profile analysis to provide patterns of COVID in Texas jails, categorised into low outbreak, high death and high outbreak groups | Being housed at less than 85% jail capacity | Being housed at over 85% capacity | Low outbreak prisons were at 85% capacity (does not state if this is an average), high outbreak profiles were housed at 102%, high death profiles housed at 94%, more than half the total number of COVID deaths in Texas were from 5 prisons, suggests that there are COVID hotspots | **Low**<br><br>Does not state how the figure of 85% prison capacity is derived, whether it Is an average or a mean? Does not classify what is meant by low or high outbreak and does not give a breakdown of number per facility or why each facility was included in each category, characteristics of prisoners were not documented, other mitigation policies not documented, many other confounders which were not documented e.g. sex and pre-existing health problems, no mention of hospitalisation or death rates, reliant on public data |
| Epidemiology of COVID-19 Among Incarcerated Individuals and Staff in Massachusetts Jails and Prisons, M. C. Jimenez, T. L. Cowger, L. E. Simon, M. Behn, N. Cassarino and M. T. Bassett, 2020, USA (Jiménez *et al.*, 2020) | Retrospective cohort study | inferred aim: to describe the covid 19 burden in Massachusetts jails and prisons and its association with decarceration and testing rates | At baseline 14,987 people were incarcerated, as of July 8, 664 incarcerated individuals had tested positive for COVID-19 | Data collected from 16 Massachusetts department of corrections (MA DOC) and 13 county level systems, used publicly available anonymised data, data from general population inferred from the COVID tracking project and Massachusetts government - Does not specifically state but has references from these websites. April 5-July 8 2020 | Decarceration | Lower proportion of decarceration | COVID-19 case incidence was higher amongst systems who released a lower proportion of their baseline prisoners e.g. Department of corrections had a case rate of 52/1000 and released an average of 8% of their population compared to county jails which released 21% of overall population and had a case rate of 36/1000 | **Low**<br><br>No documentation of testing rates or why people were tested in these prisons therefore unable to make meaningful comparisons, no documentation of demographics between these two populations, no tables documenting results, just a diagram, no documentation of hospitalisation or death rates |
| A Study of SARS-COV-2 Outbreaks in US Federal Prisons: the Linkage Between Staff, Inmate, and Community Transmission, S. Towers, D. Wallace, J. Walker, J. Eason, J. Nelson and T. Grubesic, USA (Towers *et al.*, 2021) | Retrospective cohort study | inferred aim: to examine COVID-19 cases from 101 federal prisons, examine the per capita outbreak size in staff and prisoners compared to the community and to examine the impact of | 101/121 prisons analysed from data from the US federal BOP website, some excluded due to some facilities having medical centres, and private run facilities excluded, total sample size of all | Data collected from 16/4/2020 to 31/1/2021 from the US federal bureau of prisons website, county level data of COVID incidence of general population from 22/1/2020 and 31/1/2021 from John Hopkins University Coronavirus Resource Centre, restricted analysis to after | Decarceration | Before decarceration | When comparing summer and winter waves, there was a 4% decrease in the prison population in the winter wave, was significantly associated with the decrease in per capita rates during the winter months, does not quantify by how much though | **Low**<br><br>4% decrease is quite a small amount, may have had a more substantial impact if greater proportion released, other confounders not considered e.g. other interventional methods such as social distancing, how much the per capita rates decreased was not documented, no demographic information, transparent documentation of limitations, no documentation of hospitalisation or death rates |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | decarceration on per capita rates | prisoners/staff not documented | 18/5/2020, which was after recommendations for management of COVID-19 was released | | | | |
| Identification of Presymptomatic and Asymptomatic Cases Using Cohort-Based Testing Approaches at a Large Correctional Facility—Chicago, Illinois, USA, May 2020, A. Wadhwa, K. A. Fisher, R. Silver, M. Koh, M. M. Arons, D. A. Miller, et al., USA (Wadhwa *et al.*, 2021) | Prospective cohort study | To evaluate serial testing as a method of identifying pre-symptomatic and asymptomatic cases and to describe symptomology among persons identified during the investigation | Testing strategies implemented in 12 housing units of the Cook County Jail, serial testing group n=137 from 7 units, single test and interview group n=87 from 5 units, from May 1-19 2020 | Housing units selected for inclusion if at least 1 detained person had a positive COVID test and the unit was placed in quarantine, all specimens collected using nasopharyngeal swabs, RT PCR on all samples, all people in one unit were in the same group, data collected about symptoms via brief interviews | Serial testing cohort (at 3 time points) | Single test and interview at end of quarantine | Total of 197 people agreed to take part in at least 1 component, either testing or interview or both, 171 (88%) consented to interview and testing, in serial testing group, 96 people tested at least once, where 17 (18%) were positive, of the 17 people, 16 (94%) were positive on day 1 and 1 (6%) was positive on day 3-5. in the single test comparison, 76 people were interviewed and tested, with 2 (3%) having a positive result on day 13-14, across both groups, 12/19 (63%) of the prisoners with positive tests were asymptomatic at testing, this could mean that prompt quarantine and isolation could happen when people are asymptomatic or pre symptomatic | **Low**<br><br>High refusal rates in the serial testing group, therefore many people not tested 'serially', 2 groups not similar in size, in serial testing group does not state if people were positive on day 3, whether they were negative on day 1 or whether they had declined testing, very short time period of testing, not long enough to follow up, does not give a breakdown of demographics in each group, no documentation of hospitalisation or death rates |
| Mass Testing for SARS-CoV-2 in 16 Prisons and Jails - Six Jurisdictions, United States, April-May 2020, L. M. Hagan, S. P. Williams, A. C. Spaulding, R. L. Toblin, J. Figlenski, J. Ocampo, et al. USA (Hagan *et al.*, 2020) | Pre- /post-intervention study without a control | Inferred aim: to describe results of mass testing events among incarcerated and detained persons and cases identified through earlier symptom-based testing | Data requested from 15 jurisdictions, 6 jurisdictions reported COVID-19 prevalence from mass testing events, across facilities 16,392 prisoners were offered testing (2-99.6% of total population) | Data provided from 6 jurisdictions about 16 adult facilities in May 2020, jurisdictions chosen based on discussions with investigators about mass testing which was conducted during April 11-may 20 | Mass testing | Symptom based testing pre mass testing | Interval between first symptomatic case and mass testing was 2-41 days (median 25 days), after mass testing a total of 7,597 previously unrecognised infections were identified, which represents a 1.5-157 fold increase (median 12.1 fold increase), testing refusal rates ranged from 0-17.3% (median 0%), in 2 prisons, people who had been mass tested but were a close contact and quarantined had a positive retesting rate after 7 days of 20.5% and 26.8%, need for multiple testing,<br>over half identified first case from staff therefore important to test staff often | **Low**<br><br>Percentage of 'mass testing' varied between sites, i.e. in one site only 2.3% were offered testing, convenience sample - not representative of USA, statistical significance testing not done due to differing in demographics, does not state whether the prisons were having an 'outbreak' at the time, no details about whether people were symptomatic or not, mass testing of staff not documented, no documentation of hospitalisation or death rates |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Efficacy of the Measures Adopted to Prevent COVID-19 Outbreaks in an Italian Correctional Facility for Inmates Affected by Chronic Diseases, A. Stufano, N. Buonvino, F. Cagnazzo, N. Armenise, D. Pontrelli, G. Curzio, et al. 2021, USA (Stufano *et al.*, 2021) | Longitudinal study | Inferred aim: to investigate the efficacy of specific procedures and of a serial testing approach for inmates affected by chronic disease, | 426 inmates and 367 staff tested during first campaign, 480 inmates and 325 workers during second campaign, study performed at Bari correctional facility and had an average occupancy of 122%, enrolled all residential and new inmates present in correctional facility at the time and all employees, inclusion was voluntary | Campaigns involved two screening surveys by antigen tests performed in the prisoners and correctional workers, first period was 10 Nov - 9 Dec 2020, then 10 Dec-27 Jan 2021 (where people underwent an antigen test at least 30 days after 1st test) | 1) Antigen screening programme and other preventative measures, pathways for new inmates, closing of social spaces, isolation of COVID contacts, PPE, and COVID-19 education | Comparison between inmates and staff | 2 new inmates tested positive in first campaign, no positive cases in the second (both asymptomatic until recovery), no further positive cases observed among inmates outside of testing campaigns, 6 workers tested positive in 1st campaign and then no positive cases in second campaign, 2 tested positive outside of the campaign for symptom onset at home, full risk management plan was able to prevent COVID-19 outbreaks in correctional facility, no statistical differences in the frequency of positive cases between two campaigns | **Low**<br><br>May not be representative of a normal prison as may have more medical support than the average prison and very high levels of Caucasian people, cannot quantify which measures were effective or not, also no breakdown of when interventions were started in the prisons, antigen testing was used rather than PCR which is not as accurate and not all asymptomatic cases may have been picked up, groups between first and second campaign had statistical differences in age and gender percentage, aim is to investigate a serial testing approach but testing twice may not be able to be counted as 'serial testing', no documentation of hospitalisation or death rates |
| Outbreak of COVID-19 and interventions in a large jail - Cook County, IL, United States, 2020, C. Zawitz, S. Welbel, I. Ghinai, C. Mennella, R. Levin, U. Samala, et al. USA (Zawitz *et al.*, 2021) | Retrospective cohort study | Inferred aim: to describe the outbreak of COVID-19 among prisoners and staff at CCJ and interventions to reduce transmission. | Study took place in Cook County Jail, USA, had an average population of 4884 during this time, which was used as the population denominator | During March 1 - April 2020, however first positive COVID-19 test was not until 28 March 2020, does not state specifically how data was collected about prisoners, symptomatic people tested by rRT-PCR test | Multiple interventions | Rates in the general population | After implementation of interventions, cases in prisoners and staff decreased as cases in the general population were increasing<br><br>Interventions:<br>1) cleaning and eliminating Aerosol Generating Procedures (AGP) procedures in common areas, PPE and hand hygiene<br>2) sheltering in place e.g. reducing activity programmes, restrictions of movement<br>3) suspended visits<br>4) cohorting of newly detained people<br>5) screening, social distancing and quarantine<br>5) staff screening for fever | **Low**<br><br>No statistics or documentation of results shown, just shown in a diagram therefore unable to quantify the effectiveness of interventions, due to multiple interventions put in place, unable to determine the effectiveness of single interventions, no demographics noted of the prison population, testing rates not documented alongside therefore unable to make meaningful comparisons, compares to the general public, but no documentation of what interventions were put in place in the public at this time, no documentation of hospitalisation or death rates |

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| A large outbreak of COVID-19 in a UK prison, October 2020 to April 2021, Adamson J, Smith C, Pacchiarini N, Richard Connor T et al 2022 UK (Adamson *et al.*, 2022) | Retrospective cohort study | Evaluate the effectiveness of control measures including whole genome sequencing (WGS) to assess person-to-person spread of COVID-19, and determine how infections are spread within the prison setting | 453 cases of COVID-19 in a large male jail in Wales-242 staff cases and 211 in the incarcerated population | From October 2020-April 2021, data collected on resident and staff demographics, inmates cell numbers, interviews with staff re their movements within the prison-prisoner transfer dates used to plot epidemiological curves-WGS was carried out to examine the genetic link between instances of COVID-19, support epidemiological investigation and to govern which disease control initiatives would be put in place. Interviews with staff to determine their movements, and attempt to map spreading of infection supported WGS-however, as a result of isolation measures-prisoners could not be interviewed-and information on prisoner movement was gained from staff interviews only | Whole genomic sequencing, disease control initiatives such as limitations placed on movements for residents, refraining from communal dining, asymptomatic testing, cell isolation, mandating self-isolation for symptomatic staff | (implied) Other means of curtailing COVID-19 spread, i.e. mandatory face coverings, regular cleaning | Epidemiological investigations found that admission blocks to be a common hub for infections<br>Case distribution monitored infection progression which in turn supported the efficient implementation of control measures | Low<br>Small case load of only 453 cases<br>Only staff perspective on movements to support WGS, prisoners were not interviewed<br>Staff movements only within the prison were taken into account, staff were not questioned on possible community transmission, further limiting the scope of the WGS findings |

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| COVID-19 in the New York City Jail System: Epidemiology and Health Care Response, March–April 2020. Chan J, Burke K, Bedard R, Griggs J et al. 2021, USA (Chan *et al.*, 2021) | Retrospective cohort study | Describe characteristics of covid-19 outbreak in a city prison-main outcome of interest was admission with COVID-19 like symptoms | The study presented data representing 978 incarcerated individuals within the New York prison system | March 11-April 28 2020 2 rounds of asymptomatic COVID-19 testing were carried out, second round of testing geared towards patients with greater nursing care needs Patients were classified as having COVID-19 if they had a positive PCR test | Asymptomatic covid testing for those with greater nursing needs | Symptomatic testing protocol | 568 tested positive out of the 978 tests performed. Roughly ¼ of asymptomatic patients (23%) tested positive for COVID-19 Up to 61% of asymptomatic patients with a positive test result remained asymptomatic for at least 14 days Older age and background of diabetes mellitus strongly increased risk of hospitalisation for covid | Medium<br><br>Relatively small population sample, however appropriate statistical analysis (regression) used to address confounding factors-the reliability of covid-19 testing and hospitalisation is unclear, and difficult to ascertain, since there is no mention of which researchers obtained this data, and therefore, whether these were standardised processes. |
| Association of State COVID-19 Vaccination Prioritization With Vaccination Rates Among Incarcerated Persons Biondi, B. E. ;Leifheit, K. M. ;Mitchell, C. R. ;Skinner, A. ;Brinkley-Rubinstein, L. ;Raifman, J. 2022 USA (Biondi *et al.*, 2022) | Longitudinal study | The stated aim was to assess the effect of state vaccination prioritisation policy regarding incarcerated people on the percentage of incarcerated people fully vaccinated for COVID-19 | The study presented data representing a mean population of 690,343 incarcerated residents within 36 US states | Vaccination data was collected between 20/10/2020 and 20/06/2021 from the publicly available Marshall Project and Associated Press sources. COVID-19 US State Policy database was used to source vaccination phase data and dates of incarcerated persons' vaccination eligibility. | Prioritisation of people experiencing incarceration within vaccine rollout schedules | States prioritising vaccination versus those who did not | 21 of the sampled states prioritised vaccination of incarcerated residents. States with policies that prioritised vaccination of incarcerated people had significant increases in vaccination rates compared with other states over time. In states with no prioritisation policy, vaccination rates in the general population were higher than in incarcerated people. | **Medium**<br><br>Large sample size in large geographical area. Results reliant on accuracy of publicly available source data. Data represented graphically only in published paper. Data not included for 14 states due to limited publicly reported data and specific to US, therefore conclusions should be extrapolated to other areas with caution. Varied vaccination dosing schedules between states which may effect vaccination rates (single dose versus 2-dose full course vaccines) |

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| Antigenic rapid test for SARS-CoV2 screening of individuals newly admitted to detention facilities: sensibility in an asymptomatic cohort. Mazzilli S, Oliani F, Restivo A, Giuliani R et al 2021 Italy (Mazzilli *et al.*, 2021) | Prospective cross-sectional study | Examine the uptake of antigen detecting rapid diagnostic tests during second COVID-19 peak in Italy | 504 prisoners were tested out of 578 in a pre-trial jail in San Vittore jail in Milan, 42 men and 462 women | Data were collected from 1st October to 31st December 2020, both reverse transcriptase polymerase chain reaction (rt-PCR) and rapid antigen detection (ag-RDT) tests were done for newly incarcerated inmates- those testing positive were placed in isolation areas. Repeat tests with rt-PCR were performed for all before being moved to the main jail area. | Antigen Rapid Diagnostic Testing as a screening tool | Compared to PCR testing results | 21 positive rt-PCR tests, 10 of these tests were negative to ag-RDT testing and 11 were positive to ag-RDT testing-this is thought to be due to the rt-PCR CT values. -for ag-RDT and rt-PCR positive tests, the CT value of the rt-PCR positive tests was 27, in tests that were ag-RDT negative and rt-PCT negative, the CT value was 35 agRDT sensitivity was 52.4% and PPV 100% , NPV 98% | **Low**<br><br>Little known about participant characteristics, small number of participants and tests, limited statistical analysis |
| COVID-19 Infection Among Incarcerated Individuals and Prison Staff in Lombardy, Italy, March 2020 to February 2021 Mazzilli, S. ;Tavoschi, L. ;Soria, A. ;Fornili, M. ;Cocca, G. ;Sebastiani, T. ;Scardina, G. ;Cairone, C. ;Arzilli, G. ;Lapadula, G. ;Ceccarelli, L. ;Cocco, N. ;Bartolotti, R. ;De Vecchi, S. ;Placidi, G. ;Rezzonico, L. ;Baglietto, L. ;Giuliani, R. ;Ranieri, R. 2022 Italy (Mazzilli *et al.*, 2022) | Longitudinal study | The stated aim was to report the extent/dynamics of the COVID-19 pandemic within the Lombardy prison system | The study presented data representing a mean of 7599 incarcerated residents in 18 facilities within the Lombardy region of Italy | COVID-19 related data was collated from daily reports provided by individual prisons as a regional mandated requirement to Prison Superintendence of the Lombardy region. Prison population data was estimated as the number of residents in each facility on the last day of the month.<br><br>General population data was collated from publicly available sources: Italy National Institute of Statistics and GitHub repositories developed by the Italian Presidency of the Council of Ministers and the Italian Department of Civil Protection. | Mandatory enforced quarantine in shared or single cells | Time periods compared with varying degrees of mitigating interventions enforced | No statistically significant association was observed between the incidence of new cases among incarcerated individuals and any enforced containment measures (measured by the daily number of incarcerated individuals in preventive isolation in single or shared rooms)<br><br>The study noted that all prisons included in the study were running above intended capacity (mean 119% - 131% capacity through study period) however specific overcrowding was not found to be significantly associated with new cases in incarcerated individuals. (coefficient, 0.0030; 95% CI, −0.0044 to 0.0103; P = .43) | **Low**<br><br>Small sample size in small geographical area. Implementation and consistency of mitigating interventions not clearly documented between different prison sites and time periods – unclear if any change in case rates is due to these factors or not. Authors note unable to calculate numbers of patients admitted/moved/released from prison therefore population numbers are an estimation. Results rely upon accuracy of prison data reports. |

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| Covid-19 in the California State Prison System: An Observational Study of Decarceration, Ongoing Risks, and Risk Factors Chin ET, Ryckman T, Prince L, Leidner D, Alarid-Escudero F, Andrews JR, Salomon JA, Studdert DM , Goldhaber-Fiebert JD 2021 USA(Chin, Ryckman, *et al.*, 2021) | Retrospective cohort study | To quantify changes to California's prison population since the pandemic began and identify risk factors for COVID-19 infection | Data from California state, USA, representing 119,401 people experiencing incarceration between 1 March and 10 October 2020 | Californian department of corrections and rehabilitation (CDCR) provided data on all prisoners over 18 who resided in prison during study date, data included variables on demographics (sex, age, race), health characteristics, location, participation in prison labour, education and COVID-19 testing history | Decarceration, reduction of out-of-room labour in prison, reducing shared accommodation spaces | Compared out of room labour versus in room labour, shared dormitories versus single occupancy cells | COVID infection rates in dormitory residents (more than 3 in a room) had an adjusted hazard ratio of 2.49 when compared to residents of cells, those with prisoners taking part in out-of-room labour also had higher rates of infection AHR of 1.56, adjusted to include age, sex, ethnicity, pre-existing conditions, reduction of prison capacity by 19.1% during study period | **Medium**<br><br>7 prisons having an outbreak were excluded from analysis due to not having enough time for follow up, 3 were excluded due to an outbreak caused by mass introduction of cases and 1 was exclude due to having testing rates that differed substantially between dormitories and cells, no comparisons to the general population. Two time point data detailing prison numbers and demographics pre/post decarceration but clinical outcome data only presented for second time point so unable to comment on effects of decarceration. |

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| Investigation of a COVID-19 outbreak at a regional prison, Northern Uganda, September 2020 Migisha R, Morukileng J, Biribawa C, Kadobera D, Kisambu J, Bulage L, Ndyabakira A, Katana E, Mills LA, Riolexus Ario A, Harris JR 2022 Uganda (Migisha *et al.*, 2022) | retrospective cohort study | The stated aim was to investigate the outbreak "to identify factors associated with the introduction and spread of infection in Moroto Prison and to recommend control and preventive measures for the future" | The study presented data from Moroto Prison, Northern Uganda representing an incarcerated population of 690 attended by a staff of 90. | Data was collected via a number of methods – retrospective staff administered questionnaires completed by residents and staff/staff family members reporting clinical symptoms and mitigation behaviours, review of prison and referral hospital medical records, and data collected on a tour of the site. Data collected related to the time period August – September 2020, although exact dates of collection are unclear. | Handwashing and sanitising behaviours, frequency of mask wearing within facility | Compared resident reports of frequency of handwashing practices, frequency of facemask use, And level of interaction with the local community on a 4-point scale ranging from "always" to "rarely". | Self-report of ever using of facemasks along with performing handwashing after touching surfaces was protective against contracting COVID-19 (aRR 0.25, 95 CI=0.14-0.46) Self-reported use of facemask always/most of the time was protective (aRR 0.26, 95 CI=0.13-0.54)<br><br>People experiencing incarceration who were recently transferred to prison had a 50% increased risk of contracting COVID-19 (aRR 1.50, 95 CI=1.02-2.22)<br><br>aRR = Adjusted risk ratio | **Low**<br><br>Small sample size in small geographic location at one prison facility. Data on mitigating factors such as handwashing/mask-wearing was reported by residents to staff administering questionnaire – this is likely to lead to social desirability bias. COVID-19 testing was only performed if residents reported symptoms – this likely to lead to underreporting hence undertesting as residents may fear quarantine; does not account for asymptomatic cases. Study performed when a prison escape event had recently taken place; 24% of non-cases and 25% of cases had escaped therefore data should be interpreted with caution. Positive cases not controlled for other behaviours/exposures therefore cannot be sure that mitigating behaviours are cause of lower rates. |
| Feasibility and acceptability of saliva-based testing for the screening of SARS-CoV-2 infection in prison. Parodi C, Ottaviano E, Cocco N, Ancona S, Bianchi S, Massa V , Bartolotti R, Pezzoni B, Giuliani R, Borghi E, Ranieri R 2022 Italy (Parodi *et al.*, 2022) | Prospective paired study design | The aim was to demonstrate whether self-administered molecular salivary testing is a viable choice over nasopharyngeal swabbing (NPS) in COVID-19 testing of people newly experiencing incarceration | The study presented data representing 1,108 residents detained at Milan San Vittore pre-trial prison | Two testing protocols used during studies. Protocol 1 tested subjects on arrival with both NPS and saliva swabs and two weeks later with NPS. A second protocol was introduced after approximately 1 month (due to concerns about ingested food affecting results of saliva testing) whereby salivary tests alone were collected on arrival with NPS performed after 2 weeks. Data was collected between 02/02/2021 and 30/07/2021 | saliva swab for PCR testing of COVID-19 RNA | NPS versus self-collected salivary swab results compared | 150/156 (96.2%) coupled saliva/NPS tests showed concordant results.<br><br>9/165 (5.5%) participants consented to a salivary swab but refused a NPS suggesting that these may be more acceptable due to their less invasive nature. | **Low**<br><br>Small sample population in small geographical region. Change of protocol part way through study means direct comparison of tests not possible for vast majority of samples (943/1108); low numbers reduce validity of results. No sensitivity/specificity analyses performed. No tests for statistical significance performed –any difference/similarities in test results possibly attributable to chance. |

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| Testing for COVID-19 during an outbreak within a large UK prison: an evaluation of mass testing to inform outbreak control Blackmore C, Czachorowski M, Farrington E, O'Moore , Plugge E 2022 UK (Blackmore *et al*., 2022) | Prospective cohort study | The study aimed to describe the results of a mass testing regime implemented in a male prison in the North West of England following the identification of a COVID-19 outbreak | The study presented data representing 851 residents detained at a Category B closed male prison in the North West of England | Data was collected between 12/10/2020 and 20/03/2021 via the Prison National Offender Management Information System (p-NOMIS) for Residents, with PCR test results linked to this.<br><br>Asymptomatic testing protocol used per UK Government guidelines:<br>• At day 0 (the first day mass testing is available)<br>• Between days 5 and 7<br>• On day 28, after the last confirmed or suspected case (amended to 14 days in January 2022) | Asymptomatic mass testing protocol using PCR samples, processed by the local Lighthouse Laboratory using the ThermoFisher TaqPathTM COVID-19 test | Cases pre/post introduction of asymptomatic testing and prison versus community cases | 26.8% of cases among residents were asymptomatic reinforcing the importance of asymptomatic testing regimes. Test uptake low (48.3% in residents, 30.4% in staff)<br><br>Overall test positivity rate during the study was 14.4% in residents. Test positivity was highest in the first round of testing (22.8%) and dropped off markedly into the second (3.8%) and third round (4.2%) of testing. Significant difference was demonstrated between the proportion of positive tests in round 1 versus 2 ($X2 = 54.10$, $P < 0.0001$) and between the proportion of positive tests in round 1 versus 3 ($X2 = 61.41$, $P < 0.0001$). Number of positive tests rose markedly from period prior to asymptomatic testing regime to period following introduction.<br><br>Cases within the area of prison with new arrivals did not show highest test positivity rate suggesting that introduction of cases into the prison is more likely mediated by staff to resident transmission.<br><br>Patterns of prison positivity did not mirror cases within the community at the corresponding time. | **Low**<br>Small sample size within small geographical location<br>Male only prison therefore data not representative of all prison populations<br>Uptake of testing for staff and resident optional - low uptake in both groups meaning results should be interpreted with caution<br><br>Staff had access to independent testing in community – this data not documented<br><br>Limited specific data documented regarding pre/post implementation of mass testing protocol<br><br>Data regarding symptomatology self reported therefore subject to bias, in both residents and staff |

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| Public Health response to an outbreak of SARS-CoV2 infection in a Barcelona prison A. Marco A, Gallego C, Pérez-Cáceres V, Guerrero RA, Sánchez-Roig M, Sala-Farré RM, Fernández-Náger J, Turu E 2021 Spain (Marco *et al*., 2021) | Retrospective cohort study | The inferred aim was to describe an outbreak at a Quatre Camins Prison, Barcelona | Data from Quatre Camins Prison, Barcelona, Spain representing 946 residents | Data collected between 31/03/2020 and 09/04/2020. PCR swab data collected in mass testing protocol in response to several asymptomatic cases in one prison block (MR4) | Asymptomatic mass testing protocol using PCR nasopharyngeal swabs | Cases pre/post introduction of asymptomatic mass testing | 7/155 (4.5%) inmates tested positive on basis of symptomatic testing. Asymptomatic mass testing initiated which demonstrated a further 33 positive, 31 (93.9%) of whom were asymptomatic | **Low**<br><br>Small sample size in single facility. Male only prison therefore data not representative of all prison populations. Outbreak control measures initiated following test results including isolation of MR4 block, PPE usage and regular measurement of clinical observation in residents but data showing efficacy of these not presented. |
| Implementation of novel and conventional outbreak control measures in managing COVID-19 outbreaks in a large UK prison Coleman PC, Pailing A, Roy A, O'Moore E, Chandan JS, Lumby V, Newton P, Taylor A, Robinson E, Swindells J, Dowle S, Gajraj R 2022 UK (Coleman *et al*., 2022) | Longitudinal study | The inferred aim of the study was to describe the effect of multiple public health measures on the spread of SARS-CoV-2 within a single prison facility in the UK | The study presented data representing 950 and 842 residents through two respective outbreak periods within a Category B prison in the UK | Data was collected and analysed through two outbreak periods (23/03/2020 - 26/06/2020 and 20/11/2020-22/01/2021) via electronic records of PCR testing results utilising Cobas® SARS-CoV-2 dual target real time PCR assay (Roche Diagnostics, Switzerland) | establishment of reverse cohorting units, protective isolation units and shielding units | Two outbreak periods compared with varying interventions in place in each period, comparison made of attack rates versus other prison facilities | Confirmed/probable/possible cases in Outbreak 1: N =88; 9% of total<br>prison population. Outbreak 2: N =160; 19% of total prison population<br><br>Cohorting units prevented re-infection from new prison admissions and the shielding unit had no COVID-19 infections linked to either outbreak<br><br>Attack rate (AR) 9% and 19% in first and second outbreaks, respectively. Comparison made with Marion Correctional Institution in Ohio, USA – AR= 80% | **Low**<br><br>Small sample size in small geographical location<br>Male only prison therefore data not representative of all prison populations<br>Testing only freely available from late in first outbreak period (12th May 2020) – only 33% of probable cases tested -data on confirmed case rates to be interpreted with caution. Mass asymptomatic testing protocols not used consistently over study periods.<br>"Probable cases" in first outbreak period defined by subject reported symptoms, therefore subject to bias<br>Multiple interventions introduced contemporaneously therefore impossible to establish effectiveness of each mitigating strategy<br>Testing availability and possible reporting bias difference between first and second outbreak periods means comparisons between outbreak periods should be made with caution |

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| The Association between Intersystem Prison transfers and COVID-19 incidence in a state prison system Brinkley-Rubinstein L, LeMasters K, Nguyen P, Nowotny K, Cloud D, Volfovsky A 2021 USA | Retrospective cohort study | The stated aim was to examine the relationship between intersystem prison transfers and COVID-19 incidence in a state prison system | Data from a large, southeastern state in the USA presented (specific details not given) – total number of incarcerated individuals not stated | Data collected between April and October 2020 from publicly available COVID Prison Project dataset. Transfer data collected from the state's offender public information database | Restriction of inter-prison transfer of people experiencing incarceration | Case numbers pre/post transfers | The number of COVID-19 cases was positively correlated with the number of transfers three to five weeks before (cross-correlations greater than 0.4, $p<0.05$) | **Low**<br><br>Limited data presented re location of study and total resident numbers. Data reliant on accuracy of publicly reported dataset. Data surrounding other preventative measures taken in the state's prison system not presented therefore results should be interpreted with caution. Aggregation of state data may lead to ecological bias. No description of testing protocols within each prison thus data to be interpreted with caution. |
| Low sensitivity of rapid antigenic tests as a screening method in an outbreak of SARS-CoV-2 infection in prison (Baja sensibilidad de los test rápidos antigénicos como método de cribado en un brote de infección por SARS-CoV-2 en prisión) Marco A, Solé C, Abdo IJ, Turu E 2022 Spain (Marco A *et al.*, 2022) | Prospective cross sectional study | The inferred aim was to report the efficacy of rapid antigen testing as a screening tool for SARS-CoV-2 positivity in prison residents, compared with Gold standard rt-PCR testing | The study presented data representing 84 residents incarcerated within the residential unit of Figueras prison in Girona, Spain. | Data was collected between 23-28/12/2020 – the method of collection was not documented | Use of Rapid Antigen Testing (RAT) (PanbioTM COVID-19 Ag tests, Abbott) as a screening tool | RAT versus rt-PCR results | Of the initial round of testing (triggered by 3 positive RAT results in patients with respiratory symptoms) 72/81 (88.9%) remaining residents tested negative on RAT and 9/81 (11.1%) tested positive on RAT.<br><br>Of the 72 negative RAT results, 27/72 (37.5%) then tested positive on confirmatory rt-PCR testing.<br><br>The authors estimate a RAT sensitivity of 25% and negative predictive value of 63% based on this study. | **Low**<br><br>Very small sample size in single institution<br>Unclear whether results can be extrapolated to all brand/manufacturer versions of RAT<br>Three day delay between RAT and confirmatory rt-PCR means that positive results may be indicative of new infection rather than RAT error<br>Short letter form report – limited details over methods documented. Symptoms in all tested individuals not noted. No demographic information reported and limited information on prison setting. |