

## **Comparing COVID-19 between Prisons and the Community**

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### **Abstract**

Policy-makers need the best available evidence to inform policy decisions during public health emergencies. We illustrate this in the context of temporary prisoner release decisions due to the COVID-19 pandemic. We leverage parolee COVID-19 mortality rates in PA to show that prior estimates of the expected COVID-19 mortality rate for prisoners if released into the community, calculated from community rates, underestimate expected deaths by a factor of over 2.5. These results suggest a substantially smaller return to public health from temporary prisoner release programs than previously estimated and that, in some settings, such programs can increase COVID-19 risk. They also highlight the importance of selecting an appropriate comparison group when estimating counterfactuals to inform public policy.

**Keywords** – Prisons, COVID-19, Public Policy, Counterfactual Estimates

## **Introduction**

Public health emergencies, such as the COVID-19 pandemic, represent a unique challenge to prisons due to restrictions on social distancing and prisoner confinement (Hawks et al., 2020). In addition to efforts to reduce the spread of infectious diseases in prisons during these emergencies, policy-makers must decide whether, how, and when to temporarily release incarcerated individuals from prisons, in order to balance public health and public safety (National Academies of Sciences, Engineering, and Medicine, 2020). To motivate these decisions, policy-makers need precise information about the relative infectious disease risk for incarcerated individuals between prison and the community.

Throughout the pandemic, COVID-19 mortality rates<sup>1</sup> have been notably high in both prisons and the community – by April 2021 average mortality rates in U.S. prisons and the general community were 199.6 out of 100,000 and 168.9 out of 100,000, respectively (Marquez et al., 2021). Though data exists on COVID-19 mortality rates for incarcerated individuals in prisons, data on the hypothetical (i.e., counterfactual) mortality rate for these individuals, if they were instead living in the community, does not exist (National Academies of Sciences, Engineering, and Medicine, 2020). Prior estimates, which approximate this counterfactual rate using aggregate community rates among the non-prison population (controlling for sex, race, and age when possible) (Saloner et al., 2020; Schnepel, 2020; Marquez et al., 2021), are likely to be biased due to omitted and unobserved differences in risk factors between the prison and non-prison populations such as differences in health risks, pre-existing health conditions, and community risk factors given that prison populations disproportionately draw from disadvantaged communities.

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<sup>1</sup> We focus on COVID-19 mortality rates (as opposed to COVID-19 positive case rates) to circumvent issues with COVID-19 testing variation between prisons and the community.

First, our work provides a substantially improved estimate of the counterfactual COVID-19 mortality rate for incarcerated individuals were they to be released into the community. We do so by leveraging the community mortality rate of a group of individuals considerably similar to prisoners – parolees, recently released from prison. We find that prior estimates calculated using community rates among the non-prison population substantially underestimate the expected COVID-19 mortality rate of prisoners released into the community – by a factor of more than 2.5. Contrary to conventional wisdom, these results imply that temporary decarceration may not always decrease COVID-19 risk and may, unfortunately, increase it in some settings.

Second, we note how these results highlight the importance of selecting the best comparison group available when estimating time-sensitive policy counterfactuals. In the general policy setting, this work provides a “best practice” framework for why, and how, policy makers should attempt to leverage the best available data when making such policy decisions. In the specific prison decarceration setting, we recommend that policy-makers use parolee community rates whenever possible. When parolee data is not available, we recommend policy-makers leverage the results of this work. While noting that our results come from one jurisdiction over one period of time, we recommend policy-makers multiply estimates calculated using community rates among the non-prison population by at least a factor of two before using them to motivate temporary decarceration decisions during future public health emergencies.

## **Methods**

Pennsylvania prison population, parole population, and prisoner COVID-19 death data was provided by the Pennsylvania Department of Corrections (DOC). Pennsylvania parolee COVID-19 death data was provided by the Pennsylvania Department of Health. Pennsylvania community

COVID-19 death counts by demographic group and within nursing homes were collected from Pennsylvania Department of Health reports (Pennsylvania Department of Health, 2021a, 2021b)). Pennsylvania population data by age, sex, race, and county were obtained from the US Census Bureau's American Community Survey 2019 Five Year Estimate Tables (United States Census Bureau, 2021), and population data by health risk factors for COVID-19 was approximated using the national average estimate from Adams et al. (2020). All data was collected by DOC staff, covering the period of March 2020 through January 2021, and maintained securely on a password-protected computer.

Summary statistics about the data are provided in Table 1. The prison and parole populations are notably similar on observable characteristics, particularly relative to the overall Pennsylvania community population. For example, over 90% of the prison and parole populations are male and over 45% are Black, relative to 49% and 11%, respectively, of the overall Pennsylvania community population.

We first replicate the prior literature, by calculating the number of “expected” prisoner deaths, if released, given community demographic group mortality rates (controlling for age, sex, race, county of residence, and health risk factors<sup>2</sup>) using indirect standardization. We then estimate expected prisoner deaths based on parolee mortality rates, first using aggregate-level indirect standardization (controlling for age, sex, race, county of residence, and health risk factors) and then, separately, using individual-level propensity score matching. We use a standard logistic model to predict individual-level propensity scores using age, sex, race, county of residence, health risk factors, convicted crime type, and minimum sentence length, but propensity score matching results are robust to alternative specifications.

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<sup>2</sup> Following Adams et al. (2020) we consider an individual to have a health risk factor if they have been diagnosed with cardiovascular disease, diabetes, respiratory disease, hypertension, or cancer.

## **Results**

By January 15, 2021, there had been 83 COVID-19 deaths among 41,000 state prisoners in Pennsylvania, for an unadjusted mortality rate of 203 per 100,000 prisoners (Figure 1; Table 1). This rate was similar to the unadjusted Pennsylvania population mortality rate of 198 per 100,000 individuals. When adjusting for all observable demographic differences between the prison and general populations, we calculate an expected prisoner death rate (had they been released into the community) of 51 per 100,000 individuals (Table 2, Panel 1A). This comparison to the Pennsylvania population suggests an adjusted death rate four times higher in prisons than in the community. However, when we instead adjust for differences with parolee data (i.e., individuals who are likely to be substantially similar to prisoners on unobservable dimensions) (Table 2, Panel 1B), using propensity score matching we calculate an expected prisoner death rate (had they been released in the community) of 133 per 100,000 individuals, suggesting an adjusted death rate only 1.5 times higher in prisons than in the community.<sup>3</sup> Note that the difference in estimates is due to selecting a better comparison group – parolees – and not whether the data is aggregated. When we use indirect standardization with aggregated parolee level data we calculate an expected prisoner death rate of 125 per 100,000 individuals (Table 2, Panel 1B). In each case, estimates calculated using the general Pennsylvania community population underestimate the expected mortality rate of prisoners released to the community by a factor of more than 2.5.

Table 2, Panel 2 presents an alternative way to highlight the problem with selecting the entire Pennsylvania population as the comparison group. Noting that the actual parolee mortality rate in Pennsylvania was 62 per 100,000, when we use indirect standardization to “predict” parolee

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<sup>3</sup> Note that model p-values range from .077 to .23, suggesting there may be no statistically significant difference between the mortality rate in prisons versus the community for incarcerated individuals.

deaths based on Pennsylvania population deaths we erroneously predict a mortality rate of 33 per 100,000, underestimating parolee deaths by a factor of two.

Finally, to further note the importance of selecting the right comparison group when estimating counterfactual risk, we conduct an additional exercise using a group at highest risk of COVID-19 in prisons – elderly, health-compromised prisoners. For this analysis “elderly” is defined as age 50+ (in the first specification), age 65+ (in the second specification) and age 85+ (in the third specification). While we are aware that on average prisoners age quicker than the general population and that “elderly” is generally defined as age 50+ for a prisoner population, we include older age categories here since our analysis specifically relates to COVID-19 mortality risk and prior research indicates that it is at extremely older ages that the risk of COVID-19 mortality increases exponentially (Goldstein and Lee, 2020). Very few individuals in this group are paroled and, if they were released, would likely be placed in nursing homes (known as Long Term Care Facilities (LTCFs)) in Pennsylvania. However, similar to prisons, LTCFs have had substantial challenges with COVID-19 due to restrictions on social distancing and confinement. Panel 3 of Table 2 presents the best available comparison for this subgroup - mortality rates for elderly, health-compromised prisoners relative to Pennsylvania LTCF mortality rates.<sup>4</sup> While the DOC COVID-19 mortality rate for elderly, health comprised prisoners is 981 per 100,000 (individuals age 50+), 2,552 per 100,000 (individuals age 65+), and 9,218 per 100,000 (individuals age 85+), the Pennsylvania LTCF COVID-19 mortality rate is substantially higher at 13,872 per 100,000 individuals. For this group, temporary release to LTCFs would increase their COVID-19 risk.

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<sup>4</sup> We use aggregate-level comparisons for this analysis, as opposed to individual-level comparisons, as only aggregate level LTCF death data is provided in Pennsylvania Department of Health reports.

## **Discussion**

Counterfactual estimates derived from the community mortality rates of the non-prison population are biased due to omitted and unobserved differences in risk factors between the prison and non-prison populations. These differences involve various unobserved characteristics including housing stability, access to healthcare, employment, and availability of social support systems. The full extent of this misspecification is likely even larger than we estimate, as parolees are still not a perfect comparison group for prisoners since they are often paroled specifically because they are good candidates for adjusting well once released into the community.

When estimating counterfactuals, policy-makers should strive to find as similar a comparison group as possible to the population of interest. When this data is unavailable, they should strive to adjust their estimates appropriately based on compelling evidence from other states or previous time periods. In the case of COVID-19 mortality rates for prisoners released into the community, when data on parolees is unavailable policy-makers should increase estimates calculated using community rates from the non-prison population. Based on our results in Pennsylvania, we recommend policy makers multiple such estimates by at least a factor of two.

Our work suggests that, at least in certain contexts, for certain types of prisoners, and during certain periods of time, there may be few public health benefits of temporary/early prison release programs in response to public health emergencies. It should be kept in mind, however, that public health is only one objective for consideration when implementing such a policy. For example, public safety concerns must also be considered alongside public health concerns. Even if our analysis demonstrated that an early/temporary release policy could significantly reduce mortality rates among those released, policy-makers would still want information on whether those subject

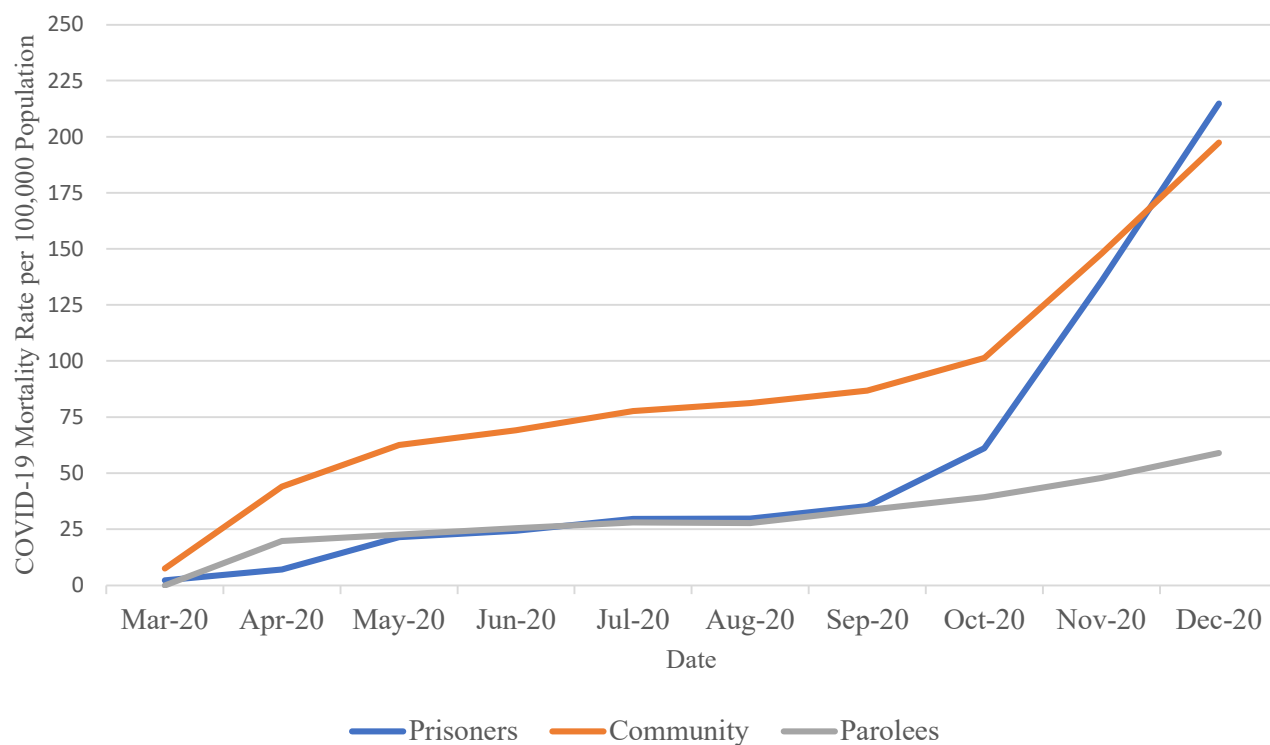
to early/temporary release pose a significant public safety risk in terms of committing new criminal activity in the community while released.

Another factor that must be weighed alongside the public health and public safety costs of an early/temporary release policy is the risk of additional time spent incarcerated. There are plenty of reasons identified in existing research to believe that too many people are incarcerated in the United States, and that this has a variety of detrimental effects in terms of both human and financial capital (National Academies of Sciences, Engineering, and Medicine, 2014). Even if it is the case that prisoners are no safer from (or even more at risk of) public health risks if released to the community, incarceration poses significant costs on other areas of an incarcerated individual's life such that it may warrant early prison release on those bases alone.

During the COVID-19 pandemic and future public health emergencies, policy-makers should implement policies to reduce health risks in both prisons and community supervision programs (National Academies of Sciences, Engineering, and Medicine, 2020). Additionally, policy-makers should evaluate when and for whom to pursue decarceration policies in order to balance tradeoffs between public health and public safety. Our estimates provide additional evidence to inform this decision, highlight that the returns to public health from temporary decarceration are substantially lower than previously suggested, and show the importance of using the best evidence available to inform policy decisions.



**Figure 1.** Trends in Pennsylvania's Unadjusted COVID-19 Mortality Rates per 100,000 Population - Prisoners, Parolees, and the Community (March 2020 - January 2021)



**Table 1.** Pennsylvania DOC, Parole, and Community Populations in 2020

	DOC	PA Community	Parole
Median age	38	41	38
% male	94.4%	49.0%	90.2%
% Black	46.7%	11.2%	44.5%
% white	43.0%	80.5%	43.9%
% with COVID-19 health risk factors	61.1%	45.4%	46.8%
COVID-19 mortality rate per 100,000	197.5	203.4	62.4

**Table 2.** Pennsylvania Prisoner Adjusted COVID-19 Mortality Rates (Mar 15, 2020 - Jan 15, 2021)

	Mortality Rate per 100,000 <sup>a</sup>	DOC Mortality Rate Relative to Release <sup>b</sup>
<b>Panel 1 – Prisoner Release Counterfactuals</b>		
<b>DOC Actual Deaths</b>	203.4	--
<b>A. DOC Expected Deaths Based on PA Population Rates</b>		
Age-adjusted	36.8	552.7%
Sex-adjusted	198.4	102.5%
Race-adjusted	205.4	99.0%
County-adjusted	201.7	100.8%
COVID-19 health risk factor-adjusted <sup>c</sup>	219.4	92.7%
All combined factors-adjusted <sup>d</sup>	50.8	400.4%
<b>B. DOC Expected Deaths Based on Parolee Rates</b>		
Propensity Score Matching <sup>e</sup>	133.0	152.9%
All combined factors-adjusted <sup>d</sup>	125.6	161.9%
<b>Panel 2 – Parolee / Community Comparison</b>		
<b>Parolee Actual Deaths</b>	62.4	--
<b>Parolee Expected Deaths Based on PA Population Rates</b>		
All combined factors-adjusted <sup>d</sup>	32.6	--
<b>Panel 3 – LTCF / Prisoner Comparison</b>		
<b>PA Population Long-Term Care Facility Deaths</b>	13,872.0	--
<b>DOC Elderly Deaths</b>		
Age 50 and up with health risk factors	981.7	7.1%
Age 65 and up with health risk factors	2,551.2	18.4%
Age 85 and up with health risk factors	9,217.9	66.4%

<sup>a</sup> The COVID-19 actual prisoner mortality rate (Row 1) and expected prisoner mortality rates based on various adjustments.

<sup>b</sup> The percent difference between the COVID-19 actual prisoner mortality rate and the expected prisoner mortality rate based on various adjustments.

<sup>c</sup> COVID-19 health risk factors are defined based on the Center for Disease Control and Prevention (CDC) list of conditions making someone "vulnerable" (or at increased risk of severe illness) from COVID-19:  
<https://www.cdc.gov/coronavirus/2019-ncov>

<sup>d</sup> This adjustment is a combined adjustment for age, sex, race, county, and health risk factors.

<sup>e</sup> This is an individual-level adjustment using a Propensity Score Matching (PSM) model to compare parolees to prisoners. Parolees are former prisoners, and are thus drawing from the same population, with the primary difference being one group (prisoners) remains in prison while the other group (parolees) are supervised in the community.

## Declaration of Interest Statement

The authors report there are no competing interests to declare.

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