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## COVID-19 Case and Mortality Rates in the Federal Bureau of Prisons



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**Introduction:** People living in correctional facilities are at high risk for contracting COVID-19. To characterize the burden of COVID-19 in the Federal Bureau of Prisons, inmate testing, case, and mortality rates are calculated and compared with those of the U.S.

**Methods:** Federal Bureau of Prisons data were derived from its inmate management system and a Federal Bureau of Prisons COVID-19–specific database. U.S. data were derived from the Centers for Disease Control and Prevention and the U.S. Census. Data were aggregated from February to September 2020 and accessed in September and November 2020. Testing rates were calculated for both the Federal Bureau of Prisons and the U.S. Case and infection fatality rates were calculated overall and by institution and compared with those of the U.S. An age- and sex-standardized mortality ratio was calculated.

**Results:** The Federal Bureau of Prisons tested more than half of its inmates (50.3%); its crude case and mortality rates were 11,710.1 and 77.4 per 100,000, respectively. Compared with the U.S., the case ratio was 4.7, and the standardized mortality ratio was 2.6. The infection fatality rate for both the Federal Bureau of Prisons and the U.S. was 0.7%. Among institutions that tested  $\geq 85\%$  of inmates, the combined infection fatality rate was 0.8% and ranged from 0.0% to 3.0%.

**Conclusions:** The Federal Bureau of Prisons COVID-19 case rates and standard mortality ratio were approximately 5 and 2.5 times those in U.S. adults, respectively, consistent with those of prisons nationwide. High testing rates and standardized death reporting could result in a more accurate infection fatality rate in the Federal Bureau of Prisons than in the U.S. Testing and other mitigation strategies, including reducing the population, have likely prevented further transmission and mortality in the Federal Bureau of Prisons.

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### INTRODUCTION

People living in correctional facilities are at high risk for contracting the novel coronavirus disease 2019 (COVID-19),<sup>1,2</sup> but the risk for federal inmates has not been specifically examined. Before the pandemic, the Federal Bureau of Prisons (BOP) managed approximately 146,000 inmates in 122 institutions in 36 states, the District of Columbia, and Puerto Rico. To characterize the burden of COVID-19 in the BOP (Federal Bureau of Prisons) inmate testing, case, and mortality rates are calculated and compared with those of the U.S. population.

### METHODS

Data for the BOP population census, including age and sex distributions, were ascertained from the BOP's inmate management system, SENTRY, as of February 29, 2020, before BOP's first known COVID-19 cases. U.S. population data were ascertained from the U.S. Census.

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The COVID-19 case (laboratory confirmed and probable) and testing data in the BOP and U.S. population (inclusive of BOP) were aggregated from February 29 through September 23, 2020 using a COVID-19–specific data set for BOP and Centers for Disease Control and Prevention (CDC) data, respectively. BOP deaths were also aggregated through September 23; CDC mortality data were aggregated through September 26 (the week including September 23).<sup>3,4</sup> Data were accessed on September 24, 2020 except for U.S. deaths, which were accessed on November 25, 2020. BOP's IRB deemed this study as exempt and reviewed this paper.

BOP and U.S. COVID-19 testing rates were calculated to account for disease burden from asymptomatic cases and provide context for case rates. BOP testing rates were calculated overall and by institution as the proportion of inmates with a returned test. BOP tests inmates with signs and symptoms of COVID-19; tests close contacts of case patients; and tests inmates upon intake, transfer, or release; some institutions have performed mass testing.<sup>5</sup> U.S. testing rates include multiple tests for some individuals; thus, the exact number of individuals tested is unknown.

To compare the crude case rates between BOP, which only houses adults, and the U.S., the proportion of case patients aged 0–17 years (8.4%)<sup>3</sup> were subtracted from U.S. case patients. The overall BOP infection fatality rate (IFR) was calculated as the number of deaths among patients with COVID-19 and was compared with a meta-analysis of the U.S. IFR that included children.<sup>6</sup> To account for BOP's asymptomatic cases,<sup>5</sup> the IFR was also calculated collectively and individually for institutions that tested >85% of inmates relative to its February 29, 2020 census.

To account for substantial differences in age and sex distributions in the BOP and U.S. adult populations (variables associated with differential COVID-19 mortality), an age- and sex-adjusted standardized mortality ratio (SMR) was calculated by comparing BOP deaths with CDC COVID-19 mortality counts by age and sex<sup>4</sup> referenced against U.S. Census counts. Analyses were conducted in Excel 2016.

## RESULTS

Most BOP inmates were male (92.5%), U.S. citizens (87.5%), and young (3.7% were aged ≥65 years relative to 17.0% in the U.S.) with a greater proportion of racial/ethnic minorities compared with the U.S. population (Table 1). As of September 23, 2020, in total, 50.3% of BOP inmates and 32.5% of the U.S. population (assuming 1 test per person) had been tested for COVID-19. The crude case rates for BOP and U.S. adults were 11,710.1 and 2,484.4 cases per 100,000 people, respectively, a ratio of 4.7. The crude mortality rates were 77.4 and 80.5 per 100,000 people, a ratio of 1.0 (Appendix Table 1, available online). The crude IFR for both the BOP and U.S.<sup>6</sup> was 0.7%. Deaths occurred in 23.8% of BOP institutions. Appendix Table 2 (available online) displays institution-specific COVID-19 cases and deaths for the 25 institutions that tested ≥85% of inmates relative to their February 29 census. These institutions represented 19.9% of the overall BOP population

**Table 1.** Demographic Characteristics of BOP and the U.S.

Characteristics <sup>a</sup>	BOP, %	U.S., <sup>b</sup> %
U.S. citizenship	87.5	92.2 <sup>c</sup>
Male sex	92.5	48.7
Aged ≥65 years	3.5	17.0
Race/ethnicity <sup>d</sup>		
Hispanic	26.1	18.3
Non-Hispanic Asian American	1.5	5.6
Non-Hispanic Black	38.9	12.3
Non-Hispanic American Indian, Alaska Native, Hawaiian Native or Pacific Islander	2.5	0.9
Non-Hispanic White	31.1	60.2

<sup>a</sup>BOP data were from February 29, 2020 before any COVID-19 cases or related inmate releases; U.S. data were from the U.S. Census 2018 American Community Survey.

<sup>b</sup>Among adults only to compare with BOP, which only houses adults; U.S. race/ethnicity data were only available for all ages.

<sup>c</sup>Derived by dividing the total number of citizens aged 18 years and over population table by the total number in the 18 years and over section within the age- and sex-stratified tables of the total U.S. population.

<sup>d</sup>Census data included an option for ≥2 races, whereas BOP did not, so the U.S. data do not total to 100%.

BOP, Federal Bureau of Prisons.

and had a case rate of 33,189.8 per 100,000 people, 2.8 times that of the overall BOP. For these institutions, the combined IFR was 0.8% (range=0.0%–3.0%, median=0.3%, IQR=0.0%–1.0%).

Table 2 shows the age- and sex-specific SMRs for the BOP. BOP inmates were 2.6 times as likely to die from COVID-19 as U.S. adults (male SMR=2.5, female SMR=4.6).

## DISCUSSION

These findings update and augment an earlier study that presented aggregated COVID-19 cases and deaths in state and federal prisons<sup>2</sup>; this study uses more recent federal data and includes testing data, IFRs, and institution-specific information. The high BOP case rate relative to that of U.S. adults may be attributed to close contact within congregate living environments, combined with numerous opportunities for COVID-19 introduction from staff with community-acquired infections, new intakes from other jurisdictions, and inmates with hospital-acquired infections.<sup>1</sup> BOP's high testing rate (>50%) may also contribute to the high case rate.<sup>5</sup> Testing as a mitigation strategy has allowed BOP to identify and isolate cases and quarantine their close contacts as recommended by CDC,<sup>7</sup> likely preventing further transmission and mortality.

At 0.7%, the overall BOP IFR is the same as that in the U.S.<sup>6</sup> The IFR among BOP institutions with the highest

**Table 2.** Age- and Sex-Adjusted BOP Standardized Mortality Ratio Relative to That of the U.S. for COVID-19 Deaths

Age group, years	U.S. COVID-19 deaths <sup>a</sup>	U.S. age distribution <sup>b</sup>	BOP age distribution <sup>c</sup>	Expected BOP COVID-19 deaths	Observed BOP COVID-19 deaths <sup>a</sup>	Standardized mortality ratio
Male						
18–24	227	15,546,666	5,891	0.1	0	0.0
25–34	1,071	23,162,842	37,116	1.7	0	0.0
35–44	2,850	20,554,443	46,367	6.4	6	0.9
45–54	7,474	20,514,573	28,092	10.2	14	1.4
55–64	16,990	20,377,611	12,251	10.2	39	3.8
65–74	27,077	14,225,362	4,672	8.9	26	2.9
≥75	54,689	9,055,733	689	4.2	21	5.0
Total	110,378	123,437,230	135,078	41.7	106	2.5
Female						
18–24	139	14,826,812	625	0.0	0	0.0
25–34	556	22,447,268	3,232	0.1	1	12.5
35–44	1,342	20,659,031	3,608	0.2	2	8.5
45–54	3,524	21,063,133	2,186	0.3	1	2.7
55–64	9,250	21,846,638	977	0.4	2	4.8
65–74	17,104	16,223,821	311	0.3	1	3.0
≥75	61,680	12,864,423	19	0.1	0	0.0
Total	93,595	129,931,126	10,958	1.4	7	4.6
All sexes						
Total	203,973	253,368,356	146,036	43.3	113	2.6

<sup>a</sup>BOP deaths were through September 23, 2020; U.S. data were through the closest weekly update, which was posted on September 23, 2020 and ended on September 26, 2020.

<sup>b</sup>U.S. Census data were from July 1, 2018, the same date CDC uses for population estimates.

<sup>c</sup>BOP data were from February 29, 2020 before any BOP COVID-19 cases or related inmate releases.

BOP, Federal Bureau of Prisons; CDC, Centers for Disease Control and Prevention.

testing rates (i.e.,  $\geq 85\%$ ) was 0.8%. BOP's higher testing rate overall, and especially in these institutions, may account for more asymptomatic cases than that seen in U.S. testing, potentially resulting in a more accurate estimate of total infections than in the U.S. In addition, BOP's standardized death reporting system likely results in less under-reporting of COVID-19–related deaths than the U.S. mortality systems that are not standardized.<sup>8</sup> Both factors could result in a higher degree of accuracy in the BOP IFR than in the U.S. IFR.

After adjusting for age and sex differences, the overall BOP SMR of 2.6 is consistent with the findings of a previous study of prisons nationwide.<sup>2</sup> All female deaths but one occurred during an outbreak in a single institution housing female inmates with medical comorbidities, potentially contributing to the higher female-specific SMR; the small numbers make interpretation challenging. Higher age- and sex-adjusted mortality from COVID-19 in BOP likely reflects the high rates of underlying health conditions, especially at younger ages,<sup>1</sup> which increase the risk of severe illness from COVID-19. One way BOP addressed this was by decreasing its

population by 13.4% through reduced intakes and releases to the community, residential re-entry centers, and home confinement to protect inmates at the highest risk for COVID-19 if deemed to be a low risk to public safety.

### Limitations

This study has 4 limitations. First, institution-specific testing rates relied on pre-pandemic censuses, although censuses shifted throughout the pandemic owing to releases and inmate movement to reduce institution density. Second, tests given to inmates in hospitals were excluded. Third, U.S. testing rates and the IFR include children. Taken together, these measurement biases could underestimate BOP testing rates (and overestimate BOP's IFR) and overestimate U.S. adult testing rates (and underestimate the U.S. adult IFR). Fourth, the calculation of BOP's SMR did not control for the high rates of underlying health conditions or racial and ethnic differences in correctional populations relative to those in the U.S. population,<sup>1</sup> which are associated with differential COVID-19 mortality.

## CONCLUSIONS

The COVID-19 case rates and SMR for inmates were approximately 5 and 2.5 times those in U.S. adults, respectively, consistent with those of prisons nationwide.<sup>2</sup> Mitigation strategies, including increased testing, cleaning and disinfecting, personal protective equipment and facial coverings, social distancing, reducing the population, and movement of inmates to reduce institution density, have likely prevented further transmission and mortality. Continued enhanced surveillance and adherence to updated infection control and testing guidance specific to correctional populations, vaccine distribution planning, and consideration of other mitigation strategies could further reduce the impact of COVID-19 in the BOP population.

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## SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2021.01.019>.

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