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THE SOCIAL ECOLOGY OF PRISON INMATE MORTALITY OBSERVED BEFORE AND AFTER THE COVID-19 PANDEMIC

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Abstract

Prison population health has been a consistent challenge that was further exasperated by the COVID-19 pandemic. Studies have documented the impacts of confined prison living on the public health of the prison population and how prisoners were at significantly higher risk of infection and death from COVID-19 than the general population, but there is insufficient scholarship on the protective and risk factors that COVID-19 may have had on the mortality characteristics of prisoners. The goal of this research is to determine whether the COVID-19 period was associated with significant increases in prison inmate mortality in the California and Texas prison systems compared to the pre-pandemic period.

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Introduction: -

Background to the Problem

The early 1970s in the United States saw relatively stable incarceration rates at an average of 161 out of 100,000 people being incarcerated on any given day (Travis et al., 2014). Currently, at least 573 out of every 100,000 people in the United States are inmates, a more than 400%t increase over the last five decades. The United States leads the world with the highest rates of incarceration, detaining nearly two million people acro ss the country at any given time (Prison Policy Initiative, 2022). COVID-19 was declared a pandemic on March 12, 2020, and prison population health, an ecology already challenged by prison culture and living conditions was aggravated further by the virulence of the disease (Caputo et al., 2020; Leibowitz et al., 2021). This study provides valuable information to address the knowledge gap regarding mortality and associated trends among the prison inmate population during the pre-pandemic period as well as during the COVID-19 period.

Exploding incarceration rates led to frenzied efforts among all of the states to keep up with the prison population growth. After the 1970s it was common for space allotments previously used for single inmate celling to be modified with bunk beds and additional cots to accommodate double and often triple-celling practices (Travis et al., 2014). Efforts to understand the physical and mental health implications of overcrowding demonstrate increased risk of respiratory and infectious disease transmission among the imprisoned population, as well as high levels of unmet mental health needs (Garcia-Guererro & Marco, 2012; Molina-Coloma et al., 2021). The majority of states in the US have prison systems operating above 100% design capacity, and states like Alabama and California have been operating at 200% design capacity (Travis et al., 2014). Overcrowded prison conditions were believed to be one of

the contributing factors behind higher transmission and infection rates of COVID-19 among incarcerated populations (Leibowitz et al., 2021; Vella et al., 2022).

While prison overcrowding has been previously considered a political and or judicial problem, there are certainly other implications that warrant investigations and awareness in order to better understand prison inmate outcomes like mortality (Garcia-Guerrero & Marco, 2012; Vella et al., 2022). Most pertinent to this research are the public health implications of confined prison living conditions during the COVID-19 pandemic, as well as the potential protective and risk factors those conditions may have on inmate mortality. Social distancing and isolation were critically effective tools used in response to COVID-19 in an effort to attenuate the spread among non-cloistered populations (Cloud et al., 2020). Overextended prison systems are not equipped to engage in social distancing practices and are limited on how many inmates can be isolated at any given time due to overcrowding, putting the inmate population and staff alike at higher risk for infection than the general public (Burton et al., 2021; Smith & Glidden, 2022). Modifications were made to daily living in order to prevent the spread of disease. Prisoner contact was reduced and eliminated when possible with other inmates as well as with people from outside of the prison. All social, recreational, and educational programming was cancelled, additionally all outside visitor schedules were cancelled (Burton et al., 2021; Getaz et al., 2021).

Statement of the Problem

An estimated 59% of the world's prisons are exceeding their occupancy levels, with twenty-seven countries reporting operating prisons at 150% to 200% capacity (Baggio et al., 2020; Simpson & Butler, 2020). Overcrowding is considered an independent health care risk for prisoners, specifically as it relates to disease and mental health (Baggio et al., 2018; Rabe, 2012). Increased person to person contact buttressed by inadequate ventilation and decreased time outdoors leads to the spread of diseases like tuberculosis, bacterial meningitis, MRSA, and pneumonia (Garcia-Guerrero & Marco, 2012; Vella et al., 2022). The spread of COVID-19 has also been linked to confined spaces and the inability to socially distance, dormitory style housing, poor prison ventilation, and overall cell structure (Leibowitz et al., 2021; Burton et al., 2021). Individuals with comorbid conditions are at a high risk for infection and mortality from COVID-19 (Carethers, 2021). This is of particular concern among prison populations as inmates are more likely than the general population to have increased comorbidities. Approximately half of all prison inmates have at least one chronic condition (Smith & Glidden, 2022; Hawks et al., 2020). In addition to physical health, the Department of Justice reports that 50% of all incarcerated persons in the United States have mental health problems (Horne & Newman, 2015). Overall, prison crowding enhances unacceptable living conditions and negatively impacts the welfare index of prisoners (Garcia-Guerrero & Marco, 2012; Vella et al., 2022).

Populations worldwide were at high risk for negative physical and mental health impacts and outcomes as a result of COVID-19. This is particularly true for vulnerable populations, including disadvantaged populations, minority populations, those living in group home settings, and those living in carceral settings (Leibowitz et al., 2021; Getaz et al., 2021). At the start of the pandemic, the United States had approximately 2.3 million individuals incarcerated across 7,000 facilities nationwide (Barnett et al., 2021). The prison population experienced an incidence of COVID-19 that was five times higher than the general population, with COVID-19 mortality rates up to three times higher for the prison population when compared to the free world (Saloner et al., 2020; Schnepel 2022).There is paucity of information available on comprehensive prison inmate mortality during the COVID-19 period compared to the pre-pandemic period. The goal of this study is to determine if there was a trend shift in mortality during the COVID-19 period when compared to the pre-pandemic period by understanding if the

COVID-19 period was associated with significant increases in prison inmate mortality in California and Texas compared to the pre-pandemic period.

Methods

Research Design and Methodology

Quantitative research methods are utilized when data to be analyzed are both structured and able to be represented numerically in order to highlight relationships between variables (Goertzen, 2017 & Queiros et al., 2017). The data analyzed for this quantitative study was publicly available archival data reporting inmate deaths that occurred while in custody in California and Texas's correctional systems. Department of Justice websites were reviewed for all fifty states, and the findings were that California and Texas are the only states that publicly share comprehensive detailed data on deaths in custody by way of archived datasets in CSV excel files available online. A cumulative list of state-by-state listing availability can be found in Table 1.All death in custody data is required to be transmitted to California's Department of Justice Criminal Justice Statistics Center by the reporting law enforcement agency within

ten days of the death to remain in compliance with California Government Code section 12525 and to the Texas Office of the Attorney General within thirty days of the death (California Department of Justice, 2023; Texas Justice Initiative, 2023).The prison inmate death information archive is publicly available via website access at https://openjustice.doj.ca.gov/data, and https://texasjusticeinitiative.org/datasets/custodial-deaths and are updated annually (California Department of Justice, 2023; Texas Justice Initiative, 2023).

The quantitative approach chosen to achieve the research aims was interrupted time series analysis (ITS).

An interrupted time series analysis is an effective way of identifying a trend that "interrupts" a time series observed for a population (Lopez-Bernal et al., 2013). This is done by comparing data points for an observed population over time during at least two time points, unexposed period, and exposure period (Lopez-Bernal et al., 2013). Oftentimes population research is conducted retrospectively, specifically prison inmate research, and the quasi-experimental ITS research design is extremely valuable to identify trends prior to exposure and during the exposure time (Traviz-Lumer et al., 2021). For this research COVID-19 is considered the exposure. Interrupted time series analysis was to be used to explore the mortality impacts on the investigated prison populations during the pandemic period. Descriptive statistics were calculated for all demographic variables of interest for this research study including; sex, race, and age as well as manner of death, means of death, date of death, and state where death occurred. Statistical Package for the Social Sciences (SPSS) version 25.0 was used to calculate statistics.

Study Design

This was a retrospective, quantitative, quasi-experimental study involving a secondary analysis using publicly available data on deaths in custody in the state of California and Texas archives from January 1, 2005 through December 31, 2021 for California, and January 1, 2005 through December 31, 2022 for Texas (California Department of Justice, 2023; Texas Justice Initiative, 2023). The years 2005 through 2022 were chosen as a representation of the pre-pandemic period (unexposed) and the COVID-19 period (exposure).

Rationale

A comprehensive understanding of population mortality characteristics is a key component for managing public health. This is particularly important for prison populations as there are additional environmental challenges presented by cloistered living conditions as well as certain imposed limitations that would need to be considered when determining feasibility of implementations or interventions most efficacious for this group. Increases in COVID-19 related mortality in prisons have been associated with a four-year decline in life expectancy of prisoners during the pandemic period (Marquez et al., 2022). The literature supports that access to healthcare is a critical factor of life expectancy and is associated with both decreases in the absence of care and increases when care is available (Patterson, 2010).An educated understanding of the impact of COVID-19 on mortality during the COVID-19 period when compared to the pre-pandemic period is essential for prudent public health decision making and planning for the future. The COVID-19 pandemic foisted strains on prison healthcare resources, and any trend shifts in prison population mortality should be explored in order to fully inform prison policy making and implementation decisions that could effectively mitigate mortality risk and encourage protections.

Strengths and Weaknesses of Design

The results from this study address gaps in the literature and bring awareness to new areas for investigation. A strength of this research study design is the utilization of publicly available datasets from state sponsored websites that operate under purposive and transparent reporting requirements for inmate deaths. The state archives being included in this research (California and Texas) are two of the largest states in the country. A weakness of this research study relates to the nature of the dataset being analyzed. Using retrospectively collected data for secondary analysis provides the investigator with a set of variables that are limited to what was included at the time of collection by the originators of the data collection. This dataset was not collected for previous research; it was collected as part of governmental reporting requirements. As a result there was no description of the standards data collectors were held to or the strength and methodology of their collection practices.

There is a paucity of research on trend shifts in prison inmate mortality during the COVID-19 period compared to the pre-pandemic period. Research work with prison population data is difficult to conduct. There is variability with which researchers have access to comprehensive mortality data for cloistered populations, as there are inconsistent transparency requirements across the United States and throughout the world. Prison funding, specifically in the United States has further elevated the incongruent reporting policies among private and publicly funded prisons. This

arbitrariness has complicated reporting potentials statewide in some instances, really contributing to a very sporadic understanding of prison mortality outcomes. Using the archival datasets available on inmate mortality for California and Texas over the span of seventeen and eighteen years respectively allows for the analysis of critical variables to examine of the impact of COVID-19 on prison inmate mortality.

Subjects

Inclusion Criteria

All archived prison inmate deaths that occurred in California and Texas from January 1, 2005 through December 31, 2022 were included in this study.

Exclusion Criteria

All archived deaths in custody occurring outside of prison (e.g., process of arrest, county jail, city jail, juvenile detention) were excluded from analysis. All prison deaths for prisoners under the age of 18 were excluded.

Characteristics

The characteristics evaluated were limited to the data required to meet the research objective of the study. Descriptive statistics included all variables; manner of death, means of death, date of death, custody offense, and state location characteristics where death occurred along with the demographic variables of sex, race, and age for each prison inmate from January 1, 2005 through December 31, 2022 in the state of California and Texas archives.

Reliability and Validity

This research study is anticipated to have acceptable internal and external validity.[31] The archival data utilized in this research study is from publicly available datasets from https://openjustice.doj.ca.gov/dataand https://texasjusticeinitiative.org/datasets/custodial-deaths on deaths in custody in the states of California and Texas archives during 2005 through 2022. If data on manner of death is unavailable at the time of death submission California law requires a placeholder category of 'Pending Investigation' is assigned and the updates are made when information is available and provided at one of the two annual update periods requested by the California Department of Justice (California Department of Justice, 2023). Texas law requires that all deaths in custody be reported to the Texas Office of the Attorney General within thirty days of the death (Texas Justice Initiative, 2023). There is a chance that manners of death could be miscoded providing a potential threat to internal validity. Additionally, there is a chance that deaths were inadvertently not reported and therefore not included. There is also a potential threat to external validity based on the study population included in this research study being from two state archives (California & Texas) and one timeframe (2005-2022).

All available data from two state archives during a seventeen year period for California and an eighteen year period for Texas were used to mitigate the external validity threat as most representative of both the pre-pandemic period (2005-2019, unexposed) and COVID-19 period (2020-2022, exposed) for prison populations across the United States (Travis et al., 2014; Baggio et al, 2020; Heale & Twycross, 2015; Toblin & Hagan, 2021). Potential threats to external validity are anticipated to have been successfully mitigated by selecting the years 2005 through 2022 for analysis. T Data on deaths in custody has been a collection and reporting requirement for all divisions of both California and Texas law enforcement agencies that have contact with detainees at any level of custody for decades (California Department of Justice, 2023; Texas Justice Initiative, 2023). It is anticipated that the research results are reliable and could be replicated if a similar prison inmate population was used for analysis.

Results:-

Demographic Characteristics

The study sample consisted of 14,865 total prison inmate deaths, with 6,562 prison inmate deaths in California and 8,303 prison inmate deaths from Texas. Demographic characteristics and manner of death are displayed in Table 2. Male prison inmate deaths exceed female prison inmate deaths proportionately in both California and Texas accounting for 96.8% and 96% of all prison inmate deaths respectively during the study period. The overall mean age of death for female prison inmates in California and Texas was 52.9 and 50.5 years respectively. The overall mean age of death for male prison inmates in California and Texas was 55.7 and 56.0 years respectively. The majority of prison inmate deaths were among Whites in both states (41.4% in California and 42.5% in Texas). Both states shared the leading three manners of death, natural, suicide, and accidental. 78.7% of California and 88.4% of Texas prison inmate deaths were reported as being due to natural causes. 7.4% of California and 7.2% of Texas prison inmate deaths

were reported as being due to suicide. 4.7% of California and 1.6% of Texas prison inmate deaths were reported as being accidental.

Annual Prison Inmate Death Change

A detailed listing of the annual prison inmate death change for California and Texas can be seen in Tables 3 and 4. For both states the highest increases in prison inmate deaths were during 2020, with California reporting an inmate death increase from the prior year of 23.6% (95 deaths), and Texas reporting an increase of 57.3% (254 deaths). Both states also shared the highest decreases in prison inmate deaths during 2021, with California reporting an inmate death decrease from the prior year of 18.3% (91 deaths), and Texas reporting an inmate death decrease of 16.9% (118 deaths). In 2022 there is an additional death decrease reported for Texas of 4.3% (25 deaths).

The descriptive statistics have detailed the established patterns for this time series before and during the pandemic period for both California (2005-2021) and Texas (2005-2022). The states shared similarities in average age of inmate death, racial distribution, and manner and means of death. Both states also shared highest increases in prison inmate deaths during 2020, the first year of the pandemic period, with decreases following in the subsequent year(s).

Interrupted Time Series Analysis

In order to evaluate whether the impact of the COVID-19 pandemic period was associated with a significant increase in prison inmate mortality in California and Texas above the expected underlying trend from previous years dating back to 2005, an interrupted time series analysis was conducted. Sequential measures of the outcome of prison inmate deaths were available in aggregate from 2005 through 2021 for California, a total of seventeen time points, and for 2022 for Texas, a total of eighteen time points allowing for sufficient time prior to the interruption of the COVID-19 pandemic period to establish pre-interruption trends. Autocorrelation is a known challenge when using interrupted time series analysis and if left uncorrected can lead to overestimations of the interruption impact. To prevent this, autoregressive integrated moving average (ARIMA) modeling was used for the interrupted time series analysis which identifies and corrects for detected autocorrelation in the dataset. The ARIMA model is especially effective when used with complex data that may not have an exact linear trend. The outcome when using the ARIMA model is not regressed on time itself, but rather on the outcome measured at previous time points which accounts for variable patterns in potentially unclear data. Figure 1 displays the time series of annual prison inmate mortality from both California and Texas archives with the interruption of COVID-19 indicated onset in 2020.

The interrupted time series analysis conducted was of annual prison inmate deaths in aggregate from 2005 through 2021 in California using the interruption of the COVID-19 pandemic period starting in 2020. The descriptive statistics detail the mean annual prison inmate deaths for California prior to the interruption of the COVID-19 pandemic as 377. Following the interruption of the COVID-19 pandemic period California saw a rise in mean annual prison inmate deaths to 452. ARIMA modeling was used to run the time series for California using the SPSS selected 0,0,0 model which is representative of a white noise model indicating that the data in the model are all identically distributed and independent. There was a stationary R^2 of .31 with a t value of 2.6 indicating that 31% of the variability was accounted for by the model. The ARIMA model parameter of estimate was significant at 74.23 indicating that the onset of the COVID-19 pandemic period is significantly associated with an increase of approximately 74 prison inmate deaths a year. None of the spikes in the residual ACF or residual PACF pass the 95% confidence interval indicating that there is no residual auto-correlation in the series. The values predicted by the model in blue (Figure 2) do not align with the observed trend prior to the COVID-19 pandemic period onset. The fit plot does align more closely with observed trend during the COVID-19 pandemic period but is still not very predictive.

The interrupted time series analysis conducted was of annual prison inmate deaths in aggregate from 2005 through 2022 in Texas using the interruption of the COVID-19 pandemic period starting in 2020. The descriptive statistics detail the mean annual prison inmate deaths for Texas prior to the interruption of the COVID-19 pandemic as 432. Following the interruption of the COVID-19 pandemic period Texas saw a rise in mean annual prison inmate deaths to 638. ARIMA modeling was used to run the time series for Texas using the SPSS selected 0,1,0 model which is representative of a first differencing model indicating that each observation is predicted by subtracting it from the one prior to remove a linear trend. There was a stationary R^2 of .59 with a t value of 4.9 indicating that 59% of the variability was accounted for by the model. The ARIMA model parameter of estimate was significant at 254 indicating that the onset of the COVID-19 pandemic period is significantly associated with an increase of approximately 254 prison inmate deaths a year in Texas. None of the spikes in the residual ACF or residual PACF pass the 95% confidence interval indicating that there is no residual auto-correlation in the series. The values predicted by the model in blue

(Figure 3) do align with the observed trend but are shifted by one unit due to differencing in order to remove linear trend.

Discussion:-

Vulnerable populations are at risk for adverse outcomes in the absence of advocacy as seen during the COVID-19 pandemic period. The prison inmate population of focus in this dataset sported outcomes that would never be acceptable for any other vulnerable population in this country. Would we accept children or pregnant women dying at rates three times higher than anyone else? The answer is – absolutely not. Along with the power to confine an individual and strip away their ability to care for themselves comes the distinct responsibility of maintaining access to health and safety while they pay their societal debt. We know much less than we should about the social ecology of a prison, and what a sentence really means for the whole system, for the individual and the environment within which they exist. The hard truth to accompany that fact is that we may not have this understanding any time soon as prisons are such closed systems. However, this research did deliver a hopeful prospect. Using the information available in the California and Texas archives helped to describe the impact of COVID-19 on prison inmate mortality trends. In the absence of transparencies or the abundance of non-public health focused reports, researchers can be agile and practical by using the available tools to understand more about outcomes of interest.

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