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Document Title: Mortality in a Multi-State Cohort of Former State Prisoners, 2010-2015

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Abstract:

This report was produced by the U.S. Census Bureau, Center for Economic Studies (CES), under award number DJO-BJS-21-RO-0005. It explores the role that race/Hispanic origin, other demographic characteristics, and custodial/criminal history factors have on post-release mortality, including on the timing of deaths. It also assesses whether conditional release to community supervision or reimprisonment may explain the higher post-release mortality found among non-Hispanic whites. In the second part of the analysis, the report estimates standardized mortality ratios by sex, age group, and race/Hispanic origin using the U.S. general population as a reference. The data come from state prison releases from the Bureau of Justice Statistics' National Corrections Reporting Program (NCRP). The NCRP records were linked to the Census Numident to identify deaths occurring within five years from prison release. NCRP records were linked to previous decennial censuses and survey responses to obtain self-reported race and Hispanic origin if available.

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Abstract

Previous studies report that individuals who have been imprisoned have higher mortality rates than their demographic counterparts in the general population, particularly non-Hispanic white former prisoners. Most of these studies have been based on a single state's prison system, and the extent to which their findings can be generalized has not been established. In this study we explore the role that race/Hispanic origin, other demographic characteristics, and custodial/criminal history factors have on post-release mortality, including on the timing of deaths. We also assess whether conditional release to community supervision or reimprisonment may explain the higher post-release mortality found among non-Hispanic whites. In the second part of the analysis, we estimate standardized mortality ratios (SMRs) by sex, age group, and race/Hispanic origin using as reference the U.S. general population. The data come from state prison releases from the Bureau of Justice Statistics' (BJS) National Corrections Reporting Program (NCRP). The NCRP records were linked to the Census Numident to identify deaths occurring within five years from prison release. We also linked NCRP records to previous decennial censuses and survey responses to obtain self-reported race and Hispanic origin if available. We found that non-Hispanic white former prisoners were more likely to die within five years after prison release and more likely to die in the initial weeks after release compared to racial minorities and Hispanics. Reimprisonment, age at release, and a history of multiple prison terms had a similar influence on the odds of dying across all race/Hispanic origin groups. Other factors, such as the type of release and the duration of the last term in prison, were associated with higher risks of mortality for some groups but not for others.

¹ The views expressed are those of the authors and not necessarily those of the U.S. Census Bureau, the Bureau of Justice Statistics, the U.S. Department of Justice, or the Department of Veterans Affairs. The statistical summaries reported in this paper have been cleared by the Census Bureau's Disclosure Review Board under release authorization numbers CBDRB-FY21-123, CBDRB-FY21-CES010-011, CBDRB-FY22-CES014-004, and CBDRB-FY22-CES010-003. We thank Mariel Alper, Renuka Bhaskar, Brad Foster, Cheryl Ann Grim, and Danielle H. Sandler for helpful comments and discussions.

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Introduction

A growing number of studies report that the experience of imprisonment may have long-lasting and significant consequences on a person's life expectancy, and that race and Hispanic origin seem to mediate the imprisonment-mortality relationship (Binswanger et al. 2013; Graham et al. 2015; Patterson 2013; Pridemore 2014; Rosen et al. 2011; Spaulding et al. 2011; Wildeman et al. 2016a; Wildeman et al. 2016b).

Overall, state prisoners have lower mortality rates than the U.S. resident population² for all causes except cancer, suicide, and homicide, when the U.S. resident population is adjusted for age, sex, and race/ethnicity (Carson 2021a). Non-Hispanic black prisoners, and to a lesser extent non-Hispanic white prisoners, tend to have lower all-cause mortality rates than individuals in the same demographic groups in the general population (Wildeman et al. 2016a, 2016b). After release from prison, however, former prisoners have higher mortality rates than their demographic counterparts in the general population, and the magnitude of these differences vary by race/Hispanic origin, sex, and age. Former prisoners who are non-black, female, or young tend to have the highest standardized mortality ratios (SMRs), suggesting that imprisonment heightens their risk of death after release more so than for former prisoners who are black, male, or released from prison at older ages (Binswanger et al. 2007; Rosen et al. 2008; Spaulding et al. 2011; Zlodre and Fazel 2012).

Additional insights about the relationship between imprisonment and mortality have been gained from studies that assess relative mortality within cohorts of former prisoners (Binswanger et al. 2013; Patterson 2013; Testa et al. 2018). While these studies provide valuable information about custodial and criminal history factors that influence mortality, most

² Except where noted, in this report, former prisoner mortality is compared to the general population, which consists of all U.S. residents, including those currently or formerly in prison. This report uses the terms "general population" and "resident population" interchangeably.

have focused on a single state's prison system, and the extent to which their findings can be generalized to other states or nationwide has not been established.

In this study, we examine post-release mortality in a large and racially diverse sample obtained from the 2010 cohort of released state prisoners as reported by states to the Bureau of Justice Statistics's (BJS) National Corrections Reporting Program (NCRP). We explore the role that demographic characteristics, selected custodial/criminal history factors, and geographic region of imprisonment have on post-release within-cohort mortality, with particular emphasis on how timing and rates of mortality vary by race and Hispanic origin. In addition, we estimate separately SMRs for Hispanics (of any race), non-Hispanic whites, non-Hispanic blacks, and a group that combines individuals of all other non-Hispanic races using two reference populations, the U.S. general population and the population from the 35 states that provided the release data in 2010 included in this study. To our knowledge, this is one of a few multi-state studies of mortality among former state prisoners. Findings from this study contribute to the growing body of research on the interrelationships among race/Hispanic origin, imprisonment, and mortality outcomes. In addition, this study serves to explore the extent to which previous findings reported by state-level studies are generalizable to the U.S. population of former prisoners.

Background

Studies of populations during imprisonment report that their mortality rates are consistently lower than groups with similar demographic characteristics in the resident population (Noonan and Ginder 2015). In particular, non-Hispanic black males in prison tend to have much lower all-cause mortality rates relative to their non-imprisoned counterparts. Although the mortality advantage is not as large for other groups, non-Hispanic black female prisoners, Hispanic male prisoners, and non-Hispanic white male and female prisoners also exhibit favorable mortality rates relative to their counterparts in the general population. Hispanic females in prison are an exception in that they may experience similar or even higher mortality rates than their counterparts in the general population (Wildeman et al. 2016a, 2016b). However, further studies are needed to confirm these findings.³

The lower mortality rates during imprisonment compared to the general population may result from the increased supervision in prisons and better access to health care while in prison, especially for individuals from the most disadvantaged backgrounds (Rosen et al. 2011; Spaulding et al. 2011). Some researchers have suggested that compassionate release policies in which moribund prisoners are released prior to death may also explain inmates' lower mortality

³ In one of these studies, the SMR relative to Hispanic females in the general population was not statistically significant (SMR=1.18, 0.93-1.43) (Wildeman et al. 2016b); and in another study, the SMRs was statistically significant only for Hispanic females in New York prisons (SMR=3.32, 1.82-4.88) but not in California prisons (SMR=1.17, 0.72-1.64) (Wildeman et al. 2016a).

rates. However, several reports find that very few prisoners are released each year due to extreme illness or impending death (HRW & FAMM 2012; Spaulding et al. 2011; USGAO 2012). The causes of death that are lower among prisoners compared to the resident population vary by race and Hispanic origin and include accidents, drug/alcohol intoxication, respiratory disease, and some chronic conditions (Carson 2021a; Noonan and Ginder 2015; Rosen et al. 2011).

In contrast, formerly imprisoned persons tend to have higher mortality rates than their demographic counterparts in the general population (see Zlodre and Fazel 2012 for a review). Studies consistently find that female, non-black, and younger former prisoners have higher SMRs relative to male, black, and those released from prison at older ages when compared to their counterparts in the general population (Binswanger et al. 2007; Rosen et al. 2008; Spaulding et al. 2011).

In addition to demographic factors, length of imprisonment, the number of times incarcerated, and the type of release (conditional or unconditional) have been linked to higher odds of post-release mortality. For example, several studies report that individuals with a history of multiple short terms in prison face higher risk of death after they are released from prison than those with longer but fewer reimprisonments (Binswanger et al. 2013; Graham et al. 2015; Jones et al. 2017; Testa et al. 2018). In contrast, the influence of community supervision on post-release mortality has yielded somewhat inconsistent findings. In a cohort of former prisoners from Washington state prisons, individuals released without community supervision had higher mortality than those released to community supervision (Binswanger et al. 2013); however, another study using Pennsylvania state prison data found that being released without community supervision was associated with lower mortality among non-Hispanic blacks and did not seem to influence mortality risks for non-Hispanic whites or Hispanics (Testa et al. 2018).

In terms of causes of death, previous studies report that among former prisoners the top three causes include drug or alcohol overdose, cardiovascular diseases, and cancer. These are followed in frequency by homicide, suicide, and motor vehicle accidents. Less frequent but also important causes are non-infectious diseases (liver disease and respiratory illnesses) and infectious diseases (viral hepatitis, HIV, and tuberculosis) (Binswanger et al. 2007, 2013; Jones et al. 2017; Kuzyk et al. 2018; Noonan and Ginder 2015; Rosen et al. 2011; Testa et al. 2018).

All studies agree, however, that the risk of death is highest for former prisoners in the first few weeks after release. In a cohort of prisoners released from Washington state prisons, the risk of death in the first two weeks was 12.7 times higher than for individuals of the same race, sex, and age in the same state's non-imprisoned population (Binswanger et al. 2007). Similarly, a study of New York parolees reported that the odds of dying declined by approximately two percent for each month an individual survived parole after release from prison; surviving the first year on parole was associated with a 24 percent decline in the odds of dying (Patterson

2013). In another study, 20.5 percent of all deaths occurring in the first year after release in a cohort of Scottish former prisoners took place in the first two weeks (Graham et al. 2015).

Researchers suggest that higher mortality in the initial weeks after prison release is associated with the multiple challenges that individuals must negotiate upon re-entering society, including finding housing, a stable job, and reestablishing or developing personal relationships (Rosen et al. 2011). Higher levels of stress during the transition from prison to reentry in a community may jeopardize the physical and emotional health of recently released former prisoners, especially if they also have a history of substance abuse, mental health issues, or both (Chang et al. 2015; Jones et al. 2017). Studies of post-release mortality from Connecticut state prisons (Kuzyk et al. 2018), Washington state prisons (Binswanger et al. 2007, 2013), New Mexico state prisons (Krinsky et al. 2009), and North Carolina state prisons (Rosen et al. 2008) consistently report that among those who die in the first couple of weeks after prison release, the leading causes of death are opioid overdose, alcohol-related causes, suicide, and homicide. Moreover, a meta-analysis based on six drug-related mortality studies among former prisoners in three countries (United States, United Kingdom, and Australia) concluded that individuals were about 4 to 8 times more likely to die of drug-related causes in the first two weeks than between weeks three to twelve after their release (Merrall et al. 2010).

Age-sex-race-specific comparisons of mortality rates between former prisoners and the general population consistently find that the former have higher mortality rates. One drawback of these SMRs is that comparisons across racial/ethnic groups is difficult given their differences in socioeconomic status and in the prevalence of former prisoners in the general population. At the end of 2020, for example, there were 1,234 non-Hispanic black prisoners sentenced to more than one year in state and federal prisons per 100,000 U.S. adult non-Hispanic black residents, compared to 639 among Hispanics, and 223 among non-Hispanic whites (Carson 2021b). That is, compared to non-Hispanic whites, non-Hispanic blacks were about 5.5 times more likely to be imprisoned for more than one year and Hispanics were about thrice as likely. This means that a higher percent of the currently non-imprisoned non-Hispanic black and Hispanic populations that are used as a reference in the computation of SMRs have been imprisoned in the past, obscuring the effects of imprisonment on mortality (Spaulding et al. 2011).

Moreover, former prisoners are likely to differ from their demographic counterparts in the general population because they come disproportionately from economically distressed neighborhoods that may have higher mortality rates than those in the general population (Looney and Turner 2017; Rosen et al. 2008). Therefore, SMRs that use as reference the general population may overestimate the influence of imprisonment on mortality. Impoverished neighborhoods can influence mortality through several pathways, including exposure to communicable diseases, low quality housing, limited health services, and high levels of social fragmentation associated with stress and anxiety (Braveman et al. 2011). Two recent studies on

members of the general population have confirmed that living in distressed neighborhoods is associated with an increased risk of death. One of these studies found higher mortality rates among adults with unhealthy lifestyles if they were living in the most disadvantaged neighborhoods (Warren et al. 2018). The other study found higher all-cause mortality among veterans living in poor neighborhoods compared to more well-off neighborhoods, even after adjusting for individuals' demographic and socioeconomic characteristics (Nelson et al. 2016). Therefore, comparing the mortality of former prisoners to a population that is more similar in terms of socioeconomic status could potentially attenuate the imprisonment-mortality relationship (Dirkzwager et al. 2012).

There are also geographic variations in mortality rates that make cross-state differences in SMRs difficult to explain (Wildeman et al. 2016a). For example, former prisoners in Washington state have mortality rates that are 3.61 (95% CI: 3.48-3.73) times greater than those in the state non-imprisoned population (Binswanger et al. 2013). In comparison, the mortality of former prisoners from North Carolina prisons is 2.10 (95% CI: 1.95-2.24) times greater than for their state general population (Jones et al. 2017). In Georgia, former state prisoners have a mortality rate that is 1.54 (95% CI: 1.48-1.61) times greater than in their state general population (Spaulding et al. 2011). These differences do not necessarily mean that the mortality rate of former prisoners in Georgia is lower than that of former prisoners in Washington state. It could also be that mortality rates in the general Georgia population are higher than in Washington state, or that there are differences in the states' and/or the prisoners' socioeconomic or racial/Hispanic origin distributions that are associated with these disparities in SMRs (Kochanek et al. 2017).

An additional perspective comes from studies of relative mortality within cohorts of former offenders, but the findings have been somewhat inconsistent. For example, Hispanics and non-Hispanic blacks were more likely to die in a New York cohort of persons on parole compared to non-Hispanic whites (Patterson 2013). In contrast, and consistent with the studies mentioned above that use as reference the mortality rates in the general population, two studies of cohorts of former prisoners have found that non-Hispanic whites are at higher risk of death after release from prison than other racial/Hispanic origin groups in the same cohort. A study that followed released prisoners from Washington state found that Hispanics, non-Hispanic blacks, and non-Hispanic Asians had lower risks of all-cause, overdose, and opioid-related deaths compared with non-Hispanic whites (Binswanger et al. 2013). Similarly, another study of a cohort of former prisoners released from a Pennsylvania state prison found that non-Hispanic whites had a higher risk of death than did Hispanics and non-Hispanic blacks (Testa et al. 2018). Testa and colleagues (2018) speculated that the higher mortality of non-Hispanic white former prisoners may be due to their longer exposure to risks outside of prison after release, because non-Hispanic blacks and Hispanics are more likely to be reimprisoned. This is supported by findings from a recent study of prisoner recidivism in which 40.2 percent of non-Hispanic whites, 46.0 percent of non-Hispanic blacks, and 47.3 percent of Hispanics released in 2005

were reimprisoned in the first year after release (Alper et al. 2018). In addition, given that the rate of imprisonment relative to population size is generally lower for non-Hispanic whites, it may be that non-Hispanic white former prisoners are a more selective group in terms of poor physical and/or mental health conditions compared to Hispanic and non-Hispanic black former prisoners (Schnittker et al. 2011; Testa et al. 2018; Zane et al. 2018).

Findings from studies that have followed cohorts of those involved and not involved in criminal justice activities for decades and into their old age provide support to the argument that the higher mortality of chronic offenders, compared to non-offenders and to adolescence-only offenders, seems to be associated with detrimental factors that influence both criminal behavior and early mortality; namely, low self-control, substance abuse, poor self-care, and unhealthy lifestyles (Laub and Vaillant 2000; van de Weijer et al. 2016; Zane et al. 2018).

Finally, the state prison population has aged over the past 40 years, through both increased admissions of older offenders and longer lengths of stay in prison (Carson and Sabol 2016). The median age in state prison rose from 30 years in 1993 to 36 years in 2013, and releases of persons age 55 or older increased by 384 percent. Non-Hispanic whites comprised 50 percent of state prisoners age 55 or more at yearend 2013, an increase of 327 percent from 1993. In contrast, non-Hispanic blacks made up 35 percent of state prisoners in this age group in 2013 and Hispanics 15 percent, increases of 431 percent and 456 percent, respectively.

In the present study we use a large multi-state sample of released prisoners to explore the imprisonment-mortality relationship using the two approaches discussed above, SMRs and intra-cohort relative mortality comparing four groups: Hispanics (any race), non-Hispanic whites, non-Hispanic blacks, and non-Hispanic other races. To our knowledge, this is one of the first studies that uses multi-state level data to compute SMRs for Hispanic former prisoners separate from their non-Hispanics counterparts. In addition, we compare intra-cohort mortality of former prisoners separately by the type of release (conditional or unconditional) and by whether individuals were reimprisoned or not after their 2010 release to assess whether community supervision or the higher reimprisonment rates of racial minorities and Hispanics seem to explain the higher post-release mortality found among non-Hispanic whites.

In the next section, we describe the data and methods, the sample characteristics, and the results from record linkage of state prisoner data to death records from the Census Numident file. In subsequent sections, we report results from logistic regressions examining the role of demographic and imprisonment factors on the mortality and the timing of deaths occurring up to five years after release. We also discuss SMRs using two population references, the U.S. resident population and the population in the 35 states that provided the prison release data in 2010 used in this study.

Data and Methods

The data come from state prison releases from the National Corrections Reporting Program (NCRP) which is administered by the Bureau of Justice Statistics (BJS). State departments of corrections (DOCs) submit one record per prison admission and release during the calendar year, as well as a record for each prisoner in their physical custody on December 31. The NCRP data contain prisoners' demographic and criminal justice information (dates and types of admission and release, sentencing and offense details) as recorded in the DOCs' offender management information systems.

Using personal identifiers (name and date of birth) in the NCRP records, each individual was assigned a unique Protected Identification Key (PIK) internal to the Census Bureau, when available. The PIK was assigned to individuals through probabilistic matching to Census Bureau reference files (Wagner and Layne 2014). Individuals with little or no personal information on their records and those who were not found in Census Bureau reference files, including non-U.S. citizens, could not be assigned a PIK, and therefore were excluded from the analysis.

While BJS has collected NCRP data since 1983, not all states submit all types of data each year. For example, in 2010, 45 states submitted prison release records to BJS. Sixteen states were removed from our sample because either they did not provide NCRP release data for 2010, expressed privacy concerns, or because of low PIK rates due to incomplete personally identifiable information. In all, the sample of former prisoners released in 2010 that we use in this study combines information from 35 states. In this study, the PIK rates for the states included in the analysis ranged from about 59 percent to 99 percent.

In the case of persons with two or more prison release records for 2010, we chose as their release date for this study the record with the latest date in the year. We then linked NCRP data to the 2019 Census Numident file to identify deaths taking place between 2010 and 2015, within 5 years of a person's release. The Census Numident file is created from the Social Security Administration's (SSA) Numerical Identification (Numident) file. It contains information for each person ever issued a Social Security Number and includes name, date of birth, and date of death if available. The Census Numident file is updated with death information from the SSA's Death Master File.

We also linked NCRP records to previous decennial censuses and survey responses to obtain information about race and Hispanic origin if available (Census 2000, 2010 Census, and 2001-2014 single-year American Community Survey (ACS) data).

Our analysis consists of modeling the odds that an individual will die within five years after release from prison. Persons who were reimprisoned after their 2010 release and died in prison were removed from the sample. The dichotomous dependent variable is coded as dead or alive

at the end of the five-year follow up period. Table 1 shows the explanatory variables in the analysis and how they were constructed. These variables were selected because previous research has shown them to be associated with post-prison mortality.

The standardized mortality ratios (SMRs) compare mortality of released prisoners to both national mortality rates and mortality rates in the subset of states that provided data for 2010 releases. We obtained deaths and population counts to compute mortality rates at the national level and for combined states by calendar year, age group, sex, race, and Hispanic origin from the Wide-ranging Online Data for Epidemiologic Research (WONDER) system of the Centers for Disease Control and Prevention (CDC). Mortality rates in the sample were computed by dividing the number of deaths by the person-years at risk. Person-years at risk were computed from the date of release to either the date of death or the end of the five-year follow up period, whichever came first, minus any time spent in reimprisonment. The SMRs were computed by dividing the observed number of deaths in the sample by the expected number of deaths given the mortality rate for the same calendar year, age group, sex, race, and Hispanic origin in the resident population.

In order to meet the Census Bureau's Disclosure Avoidance requirements, all population counts are reported as rounded numbers. In Appendix Table A we compare the characteristics of individuals in the full 2010 released cohort (Column A) with those of individuals who received a PIK (Column B), and with those in the unduplicated PIK analytic sample (Column D). There were records for about 605,000 individuals in the national-level cohort released from prison in 2010. PIKs were assigned to about 508,000 (84 percent). Among individuals assigned a PIK, about 6 percent turned out to be duplicate records for the same individual, some involved different release dates and some had the same release date. In cases of individuals with more than one release record in 2010, only the record with the latest release date in the year was retained. The unduplicated sample in this study consists of about 478,000 individuals, which represents 79.0 percent of the full cohort of state prisoners released nationally in 2010.

For the most part, the released cohort and the two PIKed samples have similar characteristics, but some groups were less likely to receive a PIK. In particular, Hispanics released from prison were 18.5 percent of the 2010 cohort (Column A in Appendix Table A), but they were less likely to be assigned a PIK and therefore they contributed a smaller percent (15.9 percent) to the unduplicated sample. This is not surprising, given that the state prison population holds a number of non-U.S. citizens who would not have a record in the Numident file, and the majority of these prisoners are identified by the state departments of corrections as Hispanic. In contrast, 40.5 percent of the individuals in the released cohort were non-Hispanic white, and their contribution as a percent in the unduplicated sample increased to 42.7 percent. In the Appendix we provide additional discussion of similarities and differences between the 2010 cohort of released prisoners and the analytic sample used in this study.

A limitation of this and similar studies that link individual-level data from various sources is the issue of selectivity. Individuals with complete identifying information that are assigned a unique identifier for linkage across datasets tend to differ in various relevant respects from those with missing or incomplete information. Specifically, low income, racial minorities, and Hispanics tend to have lower PIK rates (Bond et al. 2014). In addition, it may not be possible to assign a unique identifier to individuals with multiple names or aliases (Kinner and Binswanger 2014). A second issue, specific to studies of mortality differentials, is that some deaths may not be reported in the case of individuals who die outside the country, or they may not be matched due to multiple names or aliases.

Findings

Racial/Ethnic Differences in Mortality

As shown in Table 2, of the 478,000 individuals in the unduplicated sample of released prisoners, about 18,000 (3.8 percent) died within five years of their release from prison. Column A in Table 2 shows the number of former prisoners in the unduplicated sample by demographic and imprisonment characteristics. Column B shows the percent of deaths within five years from release for each category.

Non-Hispanic white former prisoners were more likely to die than other racial/ethnic groups. Those released at older ages or who served longer terms were more likely to die in the 5-year period than their younger counterparts and those who served short prison terms. In addition, a history of multiple state prison terms was associated with higher mortality among former prisoners.

The rest of the columns in Table 2 show the percent distribution of the deaths that occurred in the five years after release, by month for the first 3 months, by the monthly average for the last three quarters, and by year. Note that among those who died within five years after release, the highest monthly percentage of deaths occurred in the first month (3.1 percent) compared to later months. Relative to their counterparts, non-Hispanic whites, those age 65 or older at release, those who served long terms prior to their 2010 release, and individuals with unknown release type had higher mortality within the first month as well as the first year after release.

Table 3 shows the results of modeling the likelihood of dying within five years after release from prison. As a reminder, only deaths outside of prison were considered in the analysis. We included interactions between race and age at release (Model B), race and reimprisonment (Model C), and race and type of prison release (Model D) to assess whether these factors influenced differently the odds of dying for non-Hispanic whites and racial/ethnic minorities after release. Consistent with earlier studies, we find that net of other factors, particularly age

at release, non-Hispanic whites were more likely to die in the five-year post release period than non-Hispanic blacks, non-Hispanic other races, and Hispanics. As mentioned earlier, racial minorities and Hispanics in the criminal justice system may spend more time in prison and subsequent reimprisonment than non-Hispanic whites (Testa et al. 2018; Wildeman et al. 2016a, 2016b). Since healthcare is constitutionally guaranteed to prisoners, prisoners may receive treatment for chronic or infectious conditions that might go untreated outside prison.

The interaction terms between race/Hispanic origin and age at release in model B show that the mortality advantage among non-Hispanic blacks and Hispanics relative to non-Hispanic whites holds for all or most age groups, except for Hispanics ages 45 to 54. In contrast, the odds of dying did not differ significantly between non-Hispanics of other races and non-Hispanic whites in the same age group at release.

The coefficients in Model C, Table 3, show that former prisoners who were reimprisoned at any time within five years of release had lower odds of dying than those who were not reimprisoned. Part of this relationship may be mechanical since individuals must be alive in order to be reimprisoned. However, some studies suggest that access to healthcare while incarcerated may improve health status and reduce post-release mortality (Rosen et al. 2008). In addition, prison provides some protection from deaths due to drug/alcohol overdose and homicide. Figure 2 shows that for each race/Hispanic origin group, former prisoners who were not reimprisoned after release had a higher probability of dying within five years than those who were reimprisoned at any point during the study window.

The coefficients in Model D, Table 3, show that in general former prisoners released unconditionally in 2010 were more likely to die than those released to community supervision (conditionally). However, the increased risks of death associated with unconditional release were lower for non-Hispanic blacks than for other racial/Hispanic origin groups.

Net of other factors, Table 3 also shows that individuals with less than a high school education, those whose last state prison term was under a year, and those with a history of multiple imprisonments were more likely to die within five years from release than were individuals with more education, those who served longer terms, and those for whom their last release was their first term in prison.

Probabilities of death within five years after release in 2010 were computed for each race/Hispanic origin by age group and reimprisonment status using models B, C, and D in Table 3. Figure 1 shows how the probability of dying increases with each age group (age at release), and that by age 25 and older, non-Hispanic blacks and Hispanics had significantly lower probabilities of death than non-Hispanic whites. Figure 2 shows that even when comparing only non-reimprisoned former prisoners, non-Hispanic whites had a significantly higher probability of dying within five years of release than non-Hispanic blacks, non-Hispanic others, and

Hispanics. In contrast, the probability of dying was similar across most racial/Hispanic origin groups that were reimprisoned after their 2010 release (within five years), and only non-Hispanic blacks had a lower probability of dying than non-Hispanic whites. That is, the relative survival advantages of racial and ethnic minorities outside of prison (or the disadvantage of non-Hispanic whites) seemed to even out for individuals who were reimprisoned, maybe because of less time spent outside of prison or because the more controlled environment in prison reduced risks across all groups. Figure 3 shows that unconditional release is associated with higher odds of dying for non-Hispanic whites and non-Hispanic other races, but type of release does not seem to be a factor in the likelihood of death for non-Hispanic blacks and Hispanics. Further research is needed to understand the mechanisms that may explain non-Hispanic blacks' significantly lower probabilities of dying than their counterparts in the same age groups, by reimprisonment status and by type of release.

To further explore whether reimprisonment or type of release are implicated in the higher mortality of non-Hispanic whites relative to other racial and ethnic groups in the study, we conducted the same analysis as shown in Table 3 separately for individuals who were not reimprisoned at any time in the five-year follow up period, and by their type of release in 2010 (not shown but available upon request). Considering only individuals who were not reimprisoned, non-Hispanic whites remained significantly more likely to die than other racial/Hispanic origin groups in the study. Similarly, regardless of type of release, non-Hispanic whites were significantly more likely to die in the 5 years of the study than the other groups. The regression coefficients in the additional analysis were similar in both magnitude and significance to those obtained using the full sample.

In Table 4 we explored separately by race and Hispanic origin whether the risk factors in our models influenced differently the odds of dying within five years from release. We found that reimprisonment, age at release, and a history of multiple prison terms had a similar influence on the odds of dying across all the race/Hispanic origin groups. Specifically, reimprisonment after their 2010 release was associated with lower odds of death; and the odds of dying were significantly higher for individuals released at older ages and for individuals who had served multiple terms prior to the imprisonment that resulted in their 2010 release, compared to their younger counterparts and those who had served only the prison term that ended in their 2010 release.

Other factors were significant for some groups and not for others. Non-Hispanic whites and Hispanics who served a short term (under a year) prior to their 2010 release had higher odds of dying within five years from release than those who served longer terms. Time served was not a significant factor in the odds of dying within five years for non-Hispanic blacks or non-Hispanic others. Confirming findings shown in Table 3 using the full sample, the analysis by race/ethnicity shows that the odds of dying within five years from release were higher for non-

Hispanic whites and non-Hispanic others if they were released unconditionally, but type of release did not influence the risk of death for non-Hispanic blacks or Hispanics.

To explore differences in the timing of death by race and Hispanic origin among the former prisoners who died within five years from their 2010 release, we ran two models, shown in Table 5. In Model 1, the three mutually exclusive categories in the dependent variable are: died within two months from release (omitted), died between three and twelve months from release, and died between thirteen months and five years from release. In Model 2, the mutually exclusive categories in the dependent variable are: died within the first year from release (omitted), died in the second year from release, and died between three and five years from release.

The coefficients in Model 1, Table 5, show that race/Hispanic origin, reimprisonment, and region of release were associated with the odds of dying within two months from release rather than surviving to the first three to twelve months after release. Non-Hispanic whites, those who were not reimprisoned, and individuals who were released from a prison in the West were more likely to die in the first two months compared to non-Hispanic blacks and Hispanics, those who were reimprisoned, and those released from prisons in the South.

Among the former prisoners who died in the five years after release, non-Hispanic blacks and Hispanics were more likely than other groups to survive through the first year. Although a history of multiple prison terms prior to their 2010 release did not increase the odds of dying within two months after release, it was associated with being less likely to survive to the second year after release compared to individuals who had served only one term, ending in 2010. In addition, individuals released at older ages were more likely to survive to the second year after release than their younger counterparts.

The coefficients in Model 2, Table 5, show that compared to individuals who died within the first year after release, those who died later were older at release, more likely to be female, less likely to have a history of multiple terms in prison prior to their 2010 release, and more likely to have been reimprisoned at some point after their 2010 release.

Standardized Mortality Ratios (SMRs) Relative to Mortality Rates in the Resident Population

In addition to examining the factors associated with differential mortality within our sample of former state prisoners, we computed standardized mortality ratios (SMRs) over the five-year period of the study to compare the mortality rates of former prisoners to those of the resident population during the same years, as well as to the mortality rates in the combined population of the 35 states that provided the NCRP with prison release data in 2010. As mentioned earlier, SMRs across studies differ substantially due to differences in mortality in the reference

populations, in the mortality of former prisoners, or both. In this study we held constant the observed mortality among former prisoners and varied the reference populations. We find essentially the same SMRs, whether we use as reference the mortality in the subsample of states or the mortality in the total U.S. population. This suggests that factors not usually considered, such as the racial/ethnic differences in mortality in each state, may be reduced by using mortality rates from aggregated populations.

Table 6 shows that the mortality rate measured over the first five years after release from prison for male former state prisoners was nearly thrice as high (SMR=2.8; 2.7-2.8) as for males in the general U.S. population. For female former prisoners, the rate was nearly five times higher than for females in the resident population (SMR=4.8; 4.6-5.0). Moreover, female former prisoners had higher SMRs than male former prisoners in every age group in the study except ages 65 and older.

Consistent with other studies, comparing mortality rates between former prisoners and the resident population for the same years, sex, age group, and race/ethnicity, we found large differences in SMRs, partly reflecting the mortality disadvantage of non-Hispanic blacks in the resident population. Non-Hispanic black males (SMR=1.7; 1.7-1.8) and non-Hispanic black females (SMR=2.8; 2.5-3.0) had the lowest SMRs in the sample, followed by non-Hispanic white males (SMR=3.6; 3.5-3.7) and Hispanic males (SMR=4.1; 3.9-4.3). The highest SMRs in the sample were among Hispanic females (SMR=7.9; 6.8-9.0) and non-Hispanic other race females (SMR=9.6; 7.8-11.5) relative to their counterparts in the general US population.

Across all age and race/Hispanic origin groups in the study, the SMRs were highest within the first few weeks after release from prison, and although they declined over time, after one year they had not reached parity with the resident population. In the first month after release, non-Hispanic whites had an SMR=13.8 (12.3-15.3); followed by SMR=13.0 (6.2-19.8) for non-Hispanic other races; and by SMR=11.7 (8.9-14.5) for Hispanics. By sex, within the first month after release, females died at much higher rates than males relative to the resident population. For the first month after release, female former prisoners had an SMR of 11.7 (8.5, 14.9), while males had an SMR of 8.9 (8.1, 9.7). The SMRs in the first month after release were high across all age groups. Former prisoners aged 18-34 had an SMR of 8.6 (7.2, 10.1); the SMR was 9.3 (8.2, 10.4) for individuals ages 35-54; and 9.2 (7.7, 10.7) for individuals ages 55 and older. In the second and later months after release, the SMRs declined faster for individuals released at ages 35 and older compared to those under age 35 at release from prison.

Discussion/Conclusions

This is the first study to leverage multi-state prison release data from the National Corrections Reporting Program (NCRP). Individual records from the NCRP data were linked to the Census Bureau Numident, decennial censuses, and survey files to explore the relationship between imprisonment and mortality. The mortality status of former prisoners released in 2010 from 35 states was followed for five years after their release.

Our analysis was three-fold. First, we modeled the odds that an individual would die within five years after release from prison. Second, among individuals who died in the five-year window, we modeled the odds that the death occurred within the first two months post release, rather than at a later time. Third, we computed SMRs to compare mortality of former prisoners to that of their counterparts in the U.S. resident population.

This study confirms at the multi-state level findings previously reported from state-level studies. Non-Hispanic white former prisoners were more likely to die within five years after release, and also more likely to die in the initial weeks after release, compared to other racial minorities and to Hispanics. In addition, as reported by state-level studies, mortality was higher among individuals with a history of multiple imprisonments prior to their 2010 release than for those with only one term in prison.

Because our large sample size allowed separate analysis by race and Hispanic origin of the role that demographic, custodial/criminal, and geographic factors play on the risk of death of former prisoners, our findings provide additional detail to what previous state-level studies have reported. In particular, we found that some factors, such as duration of the prison term served prior to release in 2010 and the type of release, influenced the odds of death only among non-Hispanic whites, but were not always significant factors in the mortality risks of other racial/Hispanic origin groups.

A contribution of this paper includes findings that the region from which individuals were released influenced both their risk and timing of mortality. The region of release may not be the same as the region where the death took place, but region is likely to serve as a marker or proxy for differences in the type of prison or the provision of services immediately after release, which may be contributing factors in the successful reintegration of former prisoner into their communities.

Importantly, age at release, sex, education, time served, having a history of multiple imprisonments, release type, and most serious offense did not influence the odds of dying within two months from release rather than surviving through the first post release year.

Throughout our analysis, and consistent with previous state-level findings, reimprisonment after the 2010 release was associated with lower odds of dying across all the racial/Hispanic origin groups in the sample; and, among those who died, with a later time of death within our five-year window. Reimprisonment has two seemingly contradictory effects on mortality. On the one hand, reimprisonment exerts a life-protective effect that may come from reduced exposure to multiple risks while in prison. On the other hand, as mentioned earlier, a history of multiple imprisonment terms prior to release was associated with higher mortality, and it is likely to signal a pattern of risk behaviors that increase the odds of death among former prisoners.

The large multi-state sample in this study allowed for the computation of SMRs for Hispanics (any race) separately from non-Hispanic groups. Our findings confirm reports from state-level studies about the large mortality disadvantage between former prisoners relative to the U.S. resident population across all race/Hispanic origin groups. The largest differences took place in the first month after release from prison, when non-Hispanic other race, Hispanic, and non-Hispanic white former state prisoners had mortality rates that were twelve to fourteen times those found among individuals with similar characteristics in the resident population. In addition, in the first month after release from prison, the mortality rates of female former prisoners were about twelve times higher than for females in the resident population.

The large mortality differentials between former prisoners and the resident population suggest the need for interventions in the immediate weeks after release from prison. Type of release and post-release interventions could be tailored to address the needs of former prisoners found to be most at risk: females, individuals released after a short term in prison, those with a history of multiple prison terms, and those released unconditionally. Finally, in future research, cause of death information could clarify the relationship between reimprisonment, type of release, and mortality. Prisoners released conditionally can be subject to random drug tests, supervision check-ins, employment, and stable housing requirements, and even electronic monitoring, which may limit their ability to participate in risky behaviors such as drug and alcohol intoxication.

References

- Alper, Mariel, Matthew R. Durose, and Joshua Markman. 2018. 2018 Update on Prisoner Recidivism: A 9-year Follow-up Period (2005-2014). Bureau of Justice Statistics Special Report. Washington, DC: U.S. Department of Justice, Office of Justice Programs. Accessed 8/31/2018. Available: <https://bjs.ojp.gov/content/pub/pdf/18upr9yfup0514.pdf>.
- Binswanger, Ingrid A., Marc F. Stern, Richard A. Deyo, Patrick J. Heagerty, Allen Cheadle, Joann G. Elmore, and Thomas D. Koepsell. 2007. Release from Prison — A High Risk of Death for Former Inmates. *The New England Journal of Medicine*, 356(2): 157-165.
- Binswanger, Ingrid A., Patrick J. Blatchford, Shane R. Mueller, and Marc F. Stern. 2013. Mortality after Prison Release: Opioid Overdose and Other Causes of Death, Risk Factors, and Time Trends from 1999 to 2009. *Ann Intern Med*, 159(9):592-600.
- Bond, Brittany, J. David Brown, Adela Luque, and Amy O'Hara. 2014. The Nature of the Bias When Studying Only Linkable Person Records: Evidence from the American Community Survey. Working Paper CARRA-WP-2014-08. Washington, DC: U.S. Census Bureau.
- Braveman, Paula, Susan Egerter, and David R. Williams. 2011. The Social Determinants of Health: Coming of Age. *Annual Review of Public Health*, 32:381–398.
- Carson, E. Ann. 2021a. Mortality in State and Federal Prisons, 2001-2019 – Statistical Tables. Bureau of Justice Statistics Statistical Tables. Washington, DC: U.S. Department of Justice, Office of Justice Programs. Accessed 12/1/2021. Available: <https://bjs.ojp.gov/content/pub/pdf/msfp0119st.pdf>
- Carson, E. Ann. 2021b. Prisoners in 2020 -- Statistical Tables. December 2021. Bureau of Justice Statistics Bulletin NCJ 302776. Washington, DC: U.S. Department of Justice, Office of Justice Programs. Accessed 12/22/2021. Available: <https://bjs.ojp.gov/content/pub/pdf/p20st.pdf>
- Carson, E. Ann. 2018. Prisoners in 2016. Bureau of Justice Statistics Bulletin. Washington, DC: U.S. Department of Justice, Office of Justice Programs. Accessed 8/24/2018. Available: <https://bjs.ojp.gov/content/pub/pdf/p16.pdf>.
- Carson, E. Ann, and William Sabol. 2016. Aging of the State Prison Population, 1993-2013. Bureau of Justice Statistics Special Report. Washington, DC: U.S. Department of Justice, Office of Justice Programs. Accessed 11/23/2021. Available: [Aging of the State Prison Population, 1993–2013 \(ojp.gov\)](https://www.ojp.gov/bjs/publications/aging-of-the-state-prison-population-1993-2013).

- Chang, Zheng, Paul Lichtenstein, Henrik Larsson, and Seena Fazel. 2015. Substance Use Disorders, Psychiatric Disorders, and Mortality after Release from Prison: A Nationwide Longitudinal Cohort Study. *Lancet Psychiatry*, 2:422-30.
- Dirkzwager, Anja, Paul Nieuwbeerta, and Arjan Blokland. 2012. Effects of First-time Imprisonment on Postprison Mortality: A 25-year Follow-up Study with a Matched Control Group. *Journal of Research in Crime and Delinquency*, 49(3): 383-419.
- Dusch, G. and F. Meier. 2012. 2010 Census Content Reinterview Survey Evaluation Report. 2010 Census Program for Evaluations and Experiments. Washington, DC: U.S. Census Bureau.
- Graham, Lesley, Colin M. Fischbacher, Diane Stockton, Andrew Fraser, Michael Fleming, and Kevin Greig. 2015. Understanding Extreme Mortality among Prisoners: A National Cohort Study in Scotland Using Data Linkage. *European Journal of Public Health*, 25(5): 879–885.
- Human Rights Watch & Families Against Mandatory Minimums (HRW & FAMM). 2012. “The Answer Is No: Too Little Compassionate Release in US Federal Prisons.” Accessed 11/23/2021. Available: <https://famm.org/wp-content/uploads/The-Answer-is-No-compassionate-release.pdf>.
- Jones, Mark, Gregory D. Kearney, Xiaohui Xu, Tammy Norwood, and Scott K. Proescholdbell. 2017. Mortality Rates and Cause of Death among Former Prison Inmates in North Carolina. *N C Med J*, 78(4):223-229.
- Kinner, Stuart A. and Ingrid A. Binswanger. 2014. Mortality after Release from Prison. In: Bruinsma, Gerben, and David Weisburd (Eds.) *Encyclopedia of Criminology and Criminal Justice*. New York, NY: Springer.
- Kochanek, Kenneth D., Sherry L. Murphy, Jiaquan Xu, and Elizabeth Arias. 2017. Mortality in the United States, 2016. NCHS Data Brief No. 293. Hyattsville, MD: National Center for Health Statistics.
- Krinsky, Clarissa S., Sarah L. Lathrop, Pamela Brown, and Kurt B. Nolte. 2009. Drugs, Detention, and Death: A Study of the Mortality of Recently Released Prisoners. *The American Journal of Forensic Medicine and Pathology*, 30(1):6-9.
- Kuzyk, I., K. Baudoin, and K. Bobula. 2018. Mortality among ex-prisoners. CT OPM, Criminal Justice Policy & Planning Division. The Connecticut Statistical Analysis Center.
- Laub, John H. and George E. Vaillant. 2000. Delinquency and Mortality: A 50-Year Follow-Up Study of 1,000 Delinquent and Nondelinquent Boys. *Am J Psychiatry*, 157:96–102.

Looney, Adam and Nicholas Turner. 2017. *Work and Opportunity Before and After Incarceration*. Washington, DC: The Brookings Institution.

Luallen, Jeremy, Kevin Neary, Brendan Rabideau, William Rhodes, Gerald Gaes, and Tom Rich. 2014. National Corrections Reporting Program (NCRP) White Paper Series. A Description of Computing Code Used to Identify Correctional Terms and Histories. Prepared by Abt Associates, Inc., for the Bureau of Justice Statistics, Office of Justice Programs, U.S. Department of Justice. Available: <https://www.icpsr.umich.edu/files/NACJD/ncrp/white-paper-computing-code.pdf>

Merrall, Elizabeth L.C., Azar Kariminia, Ingrid A. Binswanger, Michael S. Hobbs, Michael Farrell, John Marsden, Sharon J. Hutchinson, and Sheila M. Bird. 2010. Meta-analysis of Drug-related Deaths Soon after Release from Prison. *Addiction*, 105: 1545-1554.

Murphy, P. 2014. American Community Survey 2012 Content Reinterview Survey. 2014 American Community Survey Research and Evaluation Report Memorandum Series #ACS14-RER-01. Washington, DC: U.S. Census Bureau.

Nelson, Karin, Greg Schwartz, Susan Hernandez, Joseph Simonetti, Idamay Curtis, and Stephan D. Fihn. 2016. The Association between Neighborhood Environment and Mortality: Results from a National Study of Veterans. *J Gen Intern Med*, 32(4):416–422.

Noonan, Margaret E. and Scott Ginder. 2015. Understanding Mortality in State Prison: Do Male Prisoners Have an Elevated Risk Of Death? *Justice Research and Policy*, 16(1):65-80.

Patterson, Evelyn J. 2013. The Dose-Response of Time Served in Prison on Mortality: New York State, 1989-2003. *American Journal of Public Health*, 103(3):523-528.

Pridemore, William Alex. 2014. The Mortality Penalty of Incarceration: Evidence from a Population-Based Case-Control Study of Working-Age Males. *Journal of Health and Social Behavior*, 55(2): 215-233.

Rosen, David L., Victor J. Schoenbach, and David A. Wohl. 2008. All-Cause and Cause-Specific Mortality among Men Released from State Prison, 1980-2005. *American Journal of Public Health*, 98(12): 2278-2284.

Rosen, David L., David A. Wohl, and Victor J. Schoenbach. 2011. All-Cause and Cause-Specific Mortality among Black and White North Carolina State Prisoners, 1995-2005. *Ann Epidemiology*, 21(10): 719-726.

Schnittker, Jason, Michael Massoglia, and Christopher Uggen. 2011. Incarceration and the Health of the African American Community. *Du Bois Review: Social Science Research on Race*, 8: 133-141.

Singer, Phyllis and Sharon R. Ennis. 2003. Census 2000 Content Reinterview Survey: Accuracy of Data for Selected Population and Housing Characteristics as Measured by Reinterview. Census 2000 Evaluation B.5. Washington, DC: U.S. Census Bureau.

Spaulding, Anne C., Ryan M. Seals, Victoria A. McCallum, Sebastian D. Perez, Amanda K. Brzozowski, and N. Kyle Steenland. 2011. Prisoner Survival Inside and Outside of the Institution: Implications for Health-Care Planning. *American Journal of Epidemiology*, 173(5):479-487.

Testa, Alexander, Lauren C. Porter, and Kiminori Nakamura. 2018. Examining All-Cause and Cause-Specific Mortality among Former Prisoners in Pennsylvania. *Justice Quarterly*, 35(5):782-815.

United States Government Accountability Office (USGAO). 2012. "Bureau of Prisons: Eligibility and Capacity Impact Use of Flexibilities to Reduce Inmates' Time in Prison." Report to Congressional Requestors ("GAO February BOP Report"), GAO 12-320.

van de Weijer, Steve, Catrien Bijleveld, and Doreen Huschek. 2016. Offending and Mortality. *Advances in Life Course Research*, 28: 91-99.

Wagner, Deborah and Mary Layne. 2014. The Person Identification Validation System (PVS): Applying the Center for Administrative Records Research and Applications' (CARRA) Record Linkage Software. Center for Administrative Records Research and Applications Internal Paper, Washington, DC: U.S. Census Bureau.

Warren Andersen, Shaneda, William J. Blot, Xiao-Ou Shu, Jennifer S. Sonderman, Mark Steinwandel, Margaret K. Hargreaves, and Wei Zheng. 2018. Associations Between Neighborhood Environment, Health Behaviors, and Mortality. *Am J Prev Med*, 54(1): 87-95.

Wildeman, Christopher, Margaret E. Noonan, Daniela Golinelli, E. Ann Carson, and Natalia Emanuel. 2016a. State-Level Variation in the Imprisonment-Mortality Relationship, 2001-2010. *Demographic Research*, 34(12):359-371.

Wildeman, Christopher, E. Ann Carson, Daniela Golinelli, Margaret E. Noonan, and Natalia Emanuel. 2016b. Mortality among White, Black, and Hispanic Male and Female State Prisoners, 2001-2009. *SSM - Population Health*, 2:10-13.

Zane, Steven N., Brandon C. Welsh, and Gregory M. Zimmerman. 2018. Criminal Offending and Mortality over the Full Life-Course: A 70-Year Follow-up of the Cambridge–Somerville Youth Study. *Journal of Quantitative Criminology*, 34: 1-23.

Zlodre, Jakov and Seena Fazel. 2012. All-Cause and External Mortality in Released Prisoners: Systematic Review and Meta-Analysis. *Am J Public Health*, 102:e67–e75.

Table 1. Construction of Independent Variables from the National Corrections Reporting Program (NCRP) Linked to Census Bureau Data

<i>Demographic Factors</i>	
Age at release	= age of the person in 2010 when released from prison, coded in seven categories (under 25, 25-34, 35-44, 45-54, 55-64, and 65 and older, and missing)
Sex	= sex of prisoner, male, female, or missing
Hispanic origin & Race	= coded as Hispanic (any race), non-Hispanic white, non-Hispanic black, non-Hispanic other (combines Asian, American Indian or Alaska Native, Native Hawaiian and Other Pacific Islander, and multiracial individuals), and a missing category. Race and Hispanic origin information in NCRP records rely on different methods of collection across the states, and BJS has found that Hispanic and multiracial individuals are underrepresented in these data (Carson 2018). In contrast, race and Hispanic origin responses in decennial censuses and the ACS have been found to be of high quality (Singer and Ennis 2003; Dusch and Meier 2012; Murphy 2014). Comparing NCRP race and Hispanic origin responses with those in Census data, we found that 75.3 percent of the records had the same race and Hispanic origin; 4.3 percent were assigned the race and Hispanic origin from census records because they differed or were missing in NCRP; 20.2 percent retained race and Hispanic origin data from the NCRP due to missing census data, and 0.2 percent were missing these data in both files. Individuals in the non-Hispanic other category were more likely to have missing information in Census and NCRP records (disclosure of racial/ethnic differences between NCRP and Census was approved by CBDRB-FY2022-CES010-003).
Education	= as reported in NCRP, coded into five categories (less than high school, high school or GED, some college, college or higher, and missing).
<i>Custodial Factors</i>	
Time served	= time served in last imprisonment prior to 2010 release, coded as mutually exclusive categories (less than 1 year, 1 year to less than 2 years, 2 years to less than 3 years, 3 years to less than 5 years, 5 years to less than 7 years, 7 years to less than 10 years, and 10 or more years).
Additional terms served prior to 2010	= the number of imprisonment terms served between 2005 and 2010 in addition to the one that ended with their release in 2010. Coded as 0 additional terms, one additional term, two or more additional terms. We only go back to 2005 because that is when the records contain more complete information across all states. A caveat is that for 2005-2010 terms of imprisonment, the NCRP data are better at capturing within state prior prison terms than out-of-state prior prison terms. Therefore, our estimates of additional terms served prior to the one ending in 2010 release are likely to be incomplete. Linking individual terms of imprisonment over time within a state in the NCRP is dependent on the quality of identifiers. In some cases, states have submitted data with unique and consistent identifiers back to the 1970s, while other states have only recently adopted consistent numbers to capture individuals who come back to prison in that

(Continued) Table 1. Construction of independent variables from the National Corrections Reporting Program (NCRP) linked to Census Bureau Data

(Continued) Additional terms served prior to 2010	same state. Identifying individuals who are imprisoned in two different states is achieved by the use of the FBI number, a biometric identification number that is unique to the entire country. BJS began collecting this number as part of NCRP in 2012, although multiple states have resubmitted prior years' data with this identifier. For more details on the construction of NCRP term records, please see the NCRP white paper by Luallen et al. (2014) available at: (https://www.icpsr.umich.edu/icpsrweb/content/NACJD/guides/ncrp.html).
Release type	= criminal offenders may be conditionally released from prison to serve the remaining portion of their sentence in the community. Individuals under conditional release may or may not be required to fulfill certain conditions and adhere to specific rules of conduct while in the community, including regularly reporting to a community supervisor in person, by mail, or by telephone. Failure to comply with any of the conditions can result in reimprisonment. Unconditional releases do not have any requirements after release and are the result of a prisoner serving the duration of his/her sentence, being pardoned, or having the sentence commuted. Releases due to transfers, escapes, and death were excluded from the analyses. Coded as conditional, unconditional or missing.
Reimprisonment	= whether the individual was reimprisoned after their 2010 release and within our five-year follow up window ending 2015 (yes, no).
<i>Criminal History</i>	
Most serious offense	= most serious offense for which an individual was serving time during the term ending in release from prison in 2010. The categories are coded as: <ul style="list-style-type: none"> • violent (murder, manslaughter, sexual assault, robbery, assault, other violent crimes), • property (burglary, larceny, motor vehicle theft, fraud, possession of stolen property, and other property crimes), • drugs (sale, manufacturing, possession), • public order (disorderly conduct, obstruction of justice, driving while intoxicated, weapons, commercialized vice, immigration offenses), • other/unspecified (juvenile offenses, unspecified felonies or misdemeanors), and • missing information.
<i>Geographic location</i>	
Region	= region from where individuals were released (South, Midwest, Northeast or West).

Table 2. Time between Release and Death by Selected Characteristics, 2010 Release Cohort

Characteristics	Number released in 2010 (with PIK, no duplicates)	Percent deceased within 5 years of release	Monthly Percent of Total Deaths in Year 1 after Release						Annual Percent of Total Deaths in the First 5 Years after Release				
			Month 1	Month 2	Month 3	Avg for Months 4-6	Avg for Months 7-9	Avg for Months 10-12	Year 1	Year 2	Year 3	Year 4	Year 5
A	B												
Total	478,000	3.8	3.1	1.4	1.7	1.7	1.4	1.4	20.1	18.4	19.0	20.7	21.8
Hispanic origin and race													
Non-Hispanic white	204,000	4.7	3.7	1.6	1.6	1.6	1.6	1.6	20.0	19.0	19.0	20.0	22.1
Non-Hispanic black	179,000	3.0	2.8	1.5	1.5	1.7	1.7	1.5	19.1	18.1	19.1	21.0	22.9
Non-Hispanic all other	18,000	3.6	(D)	(D)	(D)	(D)	(D)	(D)	23.1	15.4	15.4	23.1	23.1
Hispanic	76,000	3.2	3.0	1.7	2.1	1.7	1.7	1.3	20.8	18.8	18.8	20.8	20.8
Missing	1,100	3.6	(D)	0.0	(D)	(D)	0.0	(D)	(D)	(D)	(D)	(D)	(D)
Age at release¹													
Less than 25 years	82,500	1.8	2.6	2.0	2.0	2.0	2.0	2.0	22.6	19.4	19.4	16.1	22.6
25-34 years	173,000	2.3	2.3	1.6	1.8	1.8	1.8	1.8	21.8	19.2	19.2	19.2	20.5
35-44 years	120,000	3.3	3.8	1.8	1.5	1.5	1.5	1.5	20.3	17.7	19.0	20.3	22.8
45-54 years	80,500	6.6	2.9	1.2	1.3	1.5	1.3	1.3	18.3	18.3	19.2	21.2	23.1
55-64 years	19,000	13.7	4.0	1.2	1.5	1.5	1.5	1.5	19.6	17.7	19.6	21.6	21.6
65 years and older	3,000	23.3	5.5	(D)	(D)	(D)	2.9	(D)	26.7	13.3	20.0	20.0	20.0
Missing	(D)	0.0											
Sex													
Male	421,000	3.8	3.2	1.6	1.6	1.6	1.6	1.6	20.9	18.4	19.0	20.3	21.5
Female	57,000	3.5	2.5	1.5	1.5	1.0	1.5	1.5	17.1	17.1	19.5	22.0	24.4
Missing	<15	0.0											

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123 and CBDRB-FY21-CES010-011.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

¹ Age at release was calculated using date of birth and release date.

² Persons who died in prison, were transferred, or escaped from prison were removed from analyses.

(D) indicates that a cell has been suppressed for disclosure avoidance purposes.

(Continued) Table 2. Time between Release and Death by Selected Characteristics, 2010 Release Cohort

Characteristics	Number released in 2010 (with PIK, no duplicates)	Percent deceased within 5 years of release	Monthly Percent of Total Deaths in Year 1 after Release						Annual Percent of Total Deaths in the First 5 Years after Release				
			Month 1	Month 2	Month 3	Avg for Months 4-6	Avg for Months 7-9	Avg for Months 10-12	Year 1	Year 2	Year 3	Year 4	Year 5
			A	B									
Education reported in NCRP													
Less than high school	142,000	3.5	3.0	1.8	1.8	1.8	1.6	1.6	20.2	18.2	19.2	20.2	22.2
High school or GED	119,000	3.8	2.2	1.4	1.3	1.3	1.6	1.6	18.9	18.9	20.0	20.0	22.2
Some college	16,500	4.6	2.6	(D)	(D)	(D)	(D)	2.7	20.0	20.0	20.0	20.0	20.0
College or higher	2,700	5.6	(D)	(D)	0.0	(D)	(D)	(D)	25.0	18.8	18.8	18.8	18.8
Missing	198,000	3.8	4.0	1.3	2.0	2.0	1.3	1.3	20.0	17.3	18.7	21.3	22.7
Time served													
Less than 1 year	271,000	3.9	2.9	1.5	1.4	1.4	1.4	1.4	19.4	18.5	19.4	20.4	22.3
1-1.9 years	96,000	3.7	2.9	1.2	1.4	1.7	1.7	1.4	20.3	17.4	20.3	20.3	21.7
2-2.9 years	42,500	3.5	2.7	2.0	2.0	1.3	1.3	1.3	20.7	17.2	20.7	20.7	20.7
3-4.9 years	35,000	3.7	3.1	1.6	(D)	1.5	1.5	1.5	19.2	19.2	19.2	19.2	23.1
5-6.9 years	13,000	3.5	4.4	(D)	(D)	(D)	(D)	(D)	21.7	19.6	17.4	21.7	19.6
7-9.9 years	9,600	4.2	(D)	(D)	(D)	(D)	(D)	(D)	22.5	17.5	17.5	20.0	22.5
10 or more years	11,500	5.2	7.4	(D)	(D)	(D)	(D)	(D)	27.3	18.2	18.2	18.2	18.2
Additional terms served between 2005 and 2010													
0 terms	340,000	3.7	2.8	1.6	1.6	1.6	1.6	1.6	20.5	18.1	18.9	20.5	22.1
1 term	82,000	3.7	3.4	1.7	1.7	1.7	1.3	1.3	20.3	18.6	18.6	20.3	22.0
2 or more terms	56,000	4.3	3.3	1.2	2.1	1.3	1.7	1.3	18.8	18.8	18.8	20.8	22.9

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123 and CBDRB-FY21-CES010-011.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

¹ Age at release was calculated using date of birth and release date.

² Persons who died in prison, were transferred, or escaped from prison were removed from analyses.

(D) indicates that a cell has been suppressed for disclosure avoidance purposes.

(Continued) Table 2. Time between Release and Death by Selected Characteristics, 2010 Release Cohort

Characteristics	Number released in 2010 (with PIK, no duplicates)	Percent deceased within 5 years of release	Monthly Percent of Total Deaths in Year 1 after Release						Annual Percent of Total Deaths in the First 5 Years after Release					
			Month 1	Month 2	Month 3	Avg for Months 4-6	Avg for Months 7-9	Avg for Months 10-12	Year 1	Year 2	Year 3	Year 4	Year 5	
														A
Release type²														
Conditional	311,000	3.7	3.1	1.3	1.7	1.7	1.3	1.3	18.6	18.6	19.5	21.2	22.1	
Unconditional	145,000	3.9	2.6	1.7	1.4	1.8	1.6	1.8	21.1	19.3	19.3	19.3	21.1	
Missing	22,000	4.1	7.9	2.3	2.2	2.2	2.2	(D)	23.5	17.7	17.7	17.7	23.5	
Reimprisoned after 2010 release														
No	262,000	5.2	4.0	1.8	2.2	2.2	1.9	1.9	25.6	19.7	18.3	18.3	18.3	
Yes	216,000	2.0	(D)	(D)	(D)	(D)	0.5	0.5	3.5	13.8	20.7	27.6	34.5	
Most serious offense														
Violent	116,000	3.7	3.5	1.9	1.6	1.6	1.6	1.4	21.2	18.8	18.8	20.0	21.2	
Property	139,000	3.6	3.0	1.2	1.6	1.8	1.6	1.4	20.0	18.0	20.0	20.0	22.0	
Drugs	128,000	3.6	3.3	1.5	1.5	1.7	1.5	1.5	19.6	18.5	19.6	20.7	21.7	
Public order	89,000	4.4	2.6	1.5	1.8	1.5	1.5	1.5	19.2	18.0	19.2	20.5	23.1	
Other/unspecified	3,000	3.3	(D)	(D)	(D)	(D)	(D)	(D)	20.0	20.0	20.0	20.0	20.0	
Missing	3,000	3.3	(D)	(D)	(D)	(D)	(D)	(D)	18.2	18.2	18.2	27.3	18.2	
Region														
South	192,000	3.8	3.4	1.4	1.4	2.1	1.4	1.4	20.6	17.8	19.2	20.6	21.9	
Midwest	97,000	3.7	2.7	1.4	1.4	1.7	1.4	1.4	19.2	19.2	19.2	21.9	20.6	
Northeast	53,000	3.4	2.8	1.1	1.7	1.7	1.7	1.7	19.4	19.4	19.4	19.4	22.2	
West	136,000	3.8	3.8	1.5	1.7	1.5	1.4	1.4	19.1	18.1	19.1	21.0	22.9	

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123 and CBDRB-FY21-CES010-011.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

¹ Age at release was calculated using date of birth and release date.

² Persons who died in prison, were transferred, or escaped from prison were removed from analyses.

(D) indicates that a cell has been suppressed for disclosure avoidance purposes.

Table 3. Logistic Regression with Full Sample Predicting the Mortality of Prisoners Released in 2010, Odds Ratios				
Characteristics	Deceased within 5 years of release			
	(Alive is omitted category)			
	Model A	Model B	Model C	Model D
Hispanic origin and race				
Non-Hispanic white (omitted)				
Non-Hispanic black	0.65***	1.10	0.66***	0.69***
Non-Hispanic all others	0.88***	0.96	0.86**	0.83***
Hispanic	0.76***	0.92	0.69***	0.78***
Age at release				
Less than 25 years (omitted)				
25-34 years	1.14***	1.44***	1.14***	1.14***
35-44 years	1.61***	2.11***	1.62***	1.61***
45-54 years	3.20***	4.07***	3.20***	3.20***
55 years and older	7.66***	9.75***	7.66***	7.65***
Sex				
Male (omitted)				
Female	0.83***	0.84***	0.83***	0.83***
Education reported in NCRP				
Less than high school (omitted)				
High school or GED	0.94**	0.95**	0.94**	0.94**
Some college	0.92*	0.92*	0.91*	0.92*
College or higher	0.83*	0.83*	0.82*	0.83*
Missing	0.96	0.97	0.96	0.97
Time served				
Less than 1 year (omitted)				
1-1.9 years	0.94**	0.94**	0.94**	0.94**
2-4.9 years	0.91***	0.90***	0.91***	0.91***
5 or more years	0.81***	0.81***	0.81***	0.80***
Additional terms served between 2005 and 2010				
0 terms (omitted)				
1 term	1.18***	1.18***	1.18***	1.18***
2 or more terms	1.50***	1.50***	1.49***	1.50***
Release type				
Conditional (omitted)				
Unconditional	1.06**	1.06**	1.06**	1.11***
Reimprisoned after 2010 release				
No (omitted)				
Yes	0.41***	0.41***	0.39***	0.41***

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123 and CBDRB-FY22-CES014-004.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

*p<.05, **p<.01, ***p<.001

(Continued) Table 3. Logistic Regression with Full Sample Predicting the Mortality of Prisoners Released in 2010, Odds Ratios

Characteristics	Deceased within 5 years of release			
	(Alive is omitted category)			
	Model A	Model B	Model C	Model D
Most serious offense				
Violent (omitted)				
Property	1.04	1.05*	1.04	1.04
Drugs	0.98	0.98	0.98	0.98
Public order	1.05*	1.05*	1.05*	1.05*
Region				
South (omitted)				
Midwest	1.02	1.02	1.02	1.02
Northeast	0.94	0.95	0.95	0.94*
West	0.94*	0.94*	0.94*	0.94**
Race * Age at release				
Non-Hispanic black * 25-34.9 years		0.61***		
Non-Hispanic black * 35-44.9 years		0.53***		
Non-Hispanic black * 45-54.9 years		0.54***		
Non-Hispanic black * ≥ 55 years		0.59***		
Non-Hispanic all others * 25-34.9 years		0.91		
Non-Hispanic all others * 35-44.9 years		0.94		
Non-Hispanic all others * 45-54.9 years		0.99		
Non-Hispanic all others * ≥ 55 years		0.78		
Hispanic * 25-34.9 years		0.77**		
Hispanic * 35-44.9 years		0.80**		
Hispanic * 45-54.9 years		0.92		
Hispanic * ≥ 55 years		0.79*		
Race * Reimprisonment				
Non-Hispanic black * reimprisoned			0.97	
Non-Hispanic all others * reimprisoned			1.12	
Hispanic * reimprisoned			1.45***	
Race * Release type				
Non-Hispanic black * unconditional release				0.86***
Non-Hispanic all others * unconditional release				1.15
Hispanic * unconditional release				0.90
Sample size	451,000	451,000	451,000	451,000
Deceased within 5 years of release	17,000	17,000	17,000	17,000
Pseudo R-Square	0.0766	0.0773	0.0770	0.0767

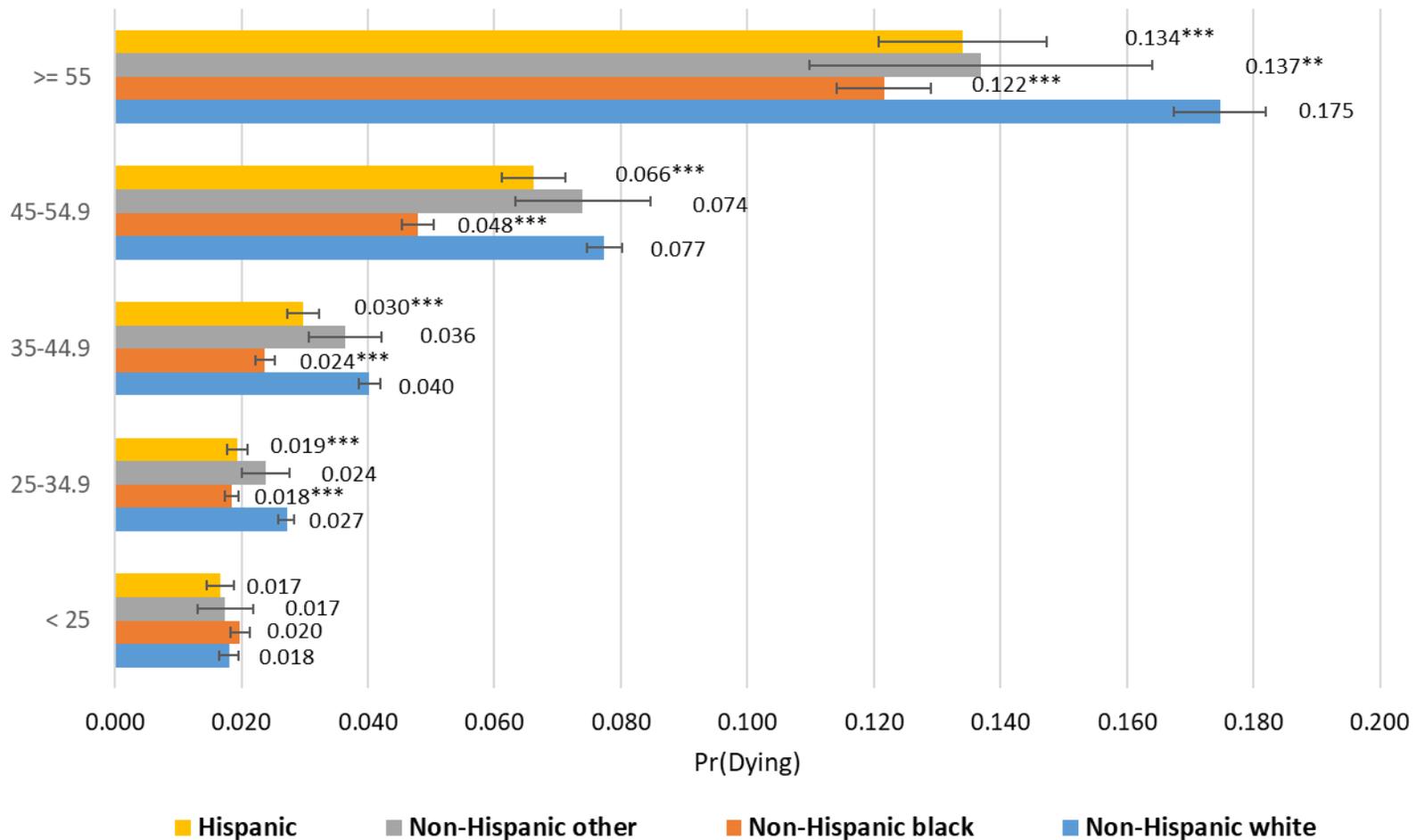
Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123 and CBDRB-FY22-CES014-004.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

*p<.05, **p<.01, ***p<.001

Figure 1. Probability of Dying Within Five Years from State Prison Release by Race and Age at Release

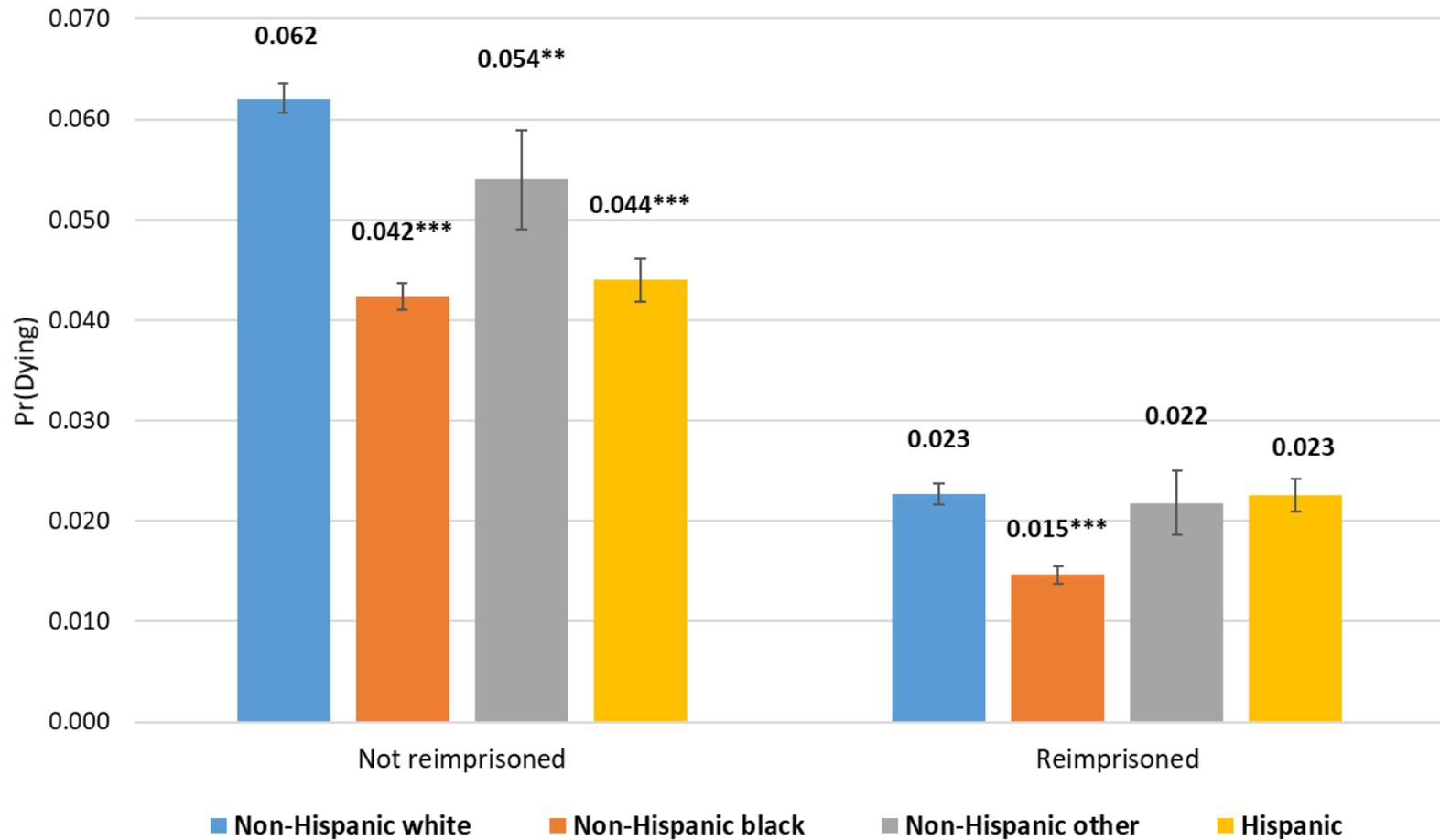


Approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Asterisks indicate significant difference in comparison to non-Hispanic white in the same age group *p<.05, **p<.01, ***p<.001

Figure 2. Probability of Dying Within Five Years From State Prison Release by Race and Reimprisonment



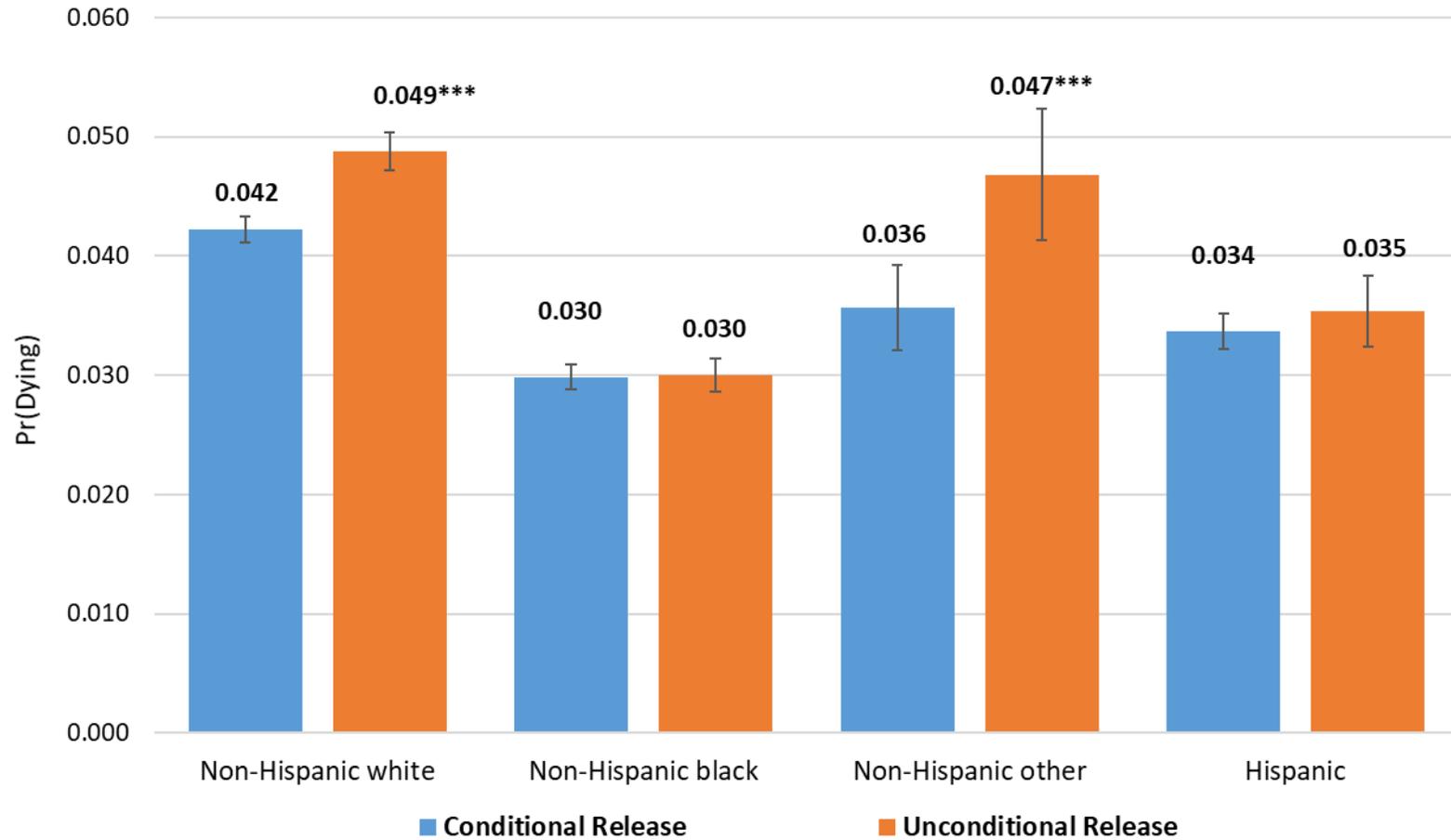
Approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Asterisks indicate significant difference in comparison to non-Hispanic white in the same reimprisonment category

*p<.05, **p<.01, ***p<.001

Figure 3. Probability of Dying Within Five Years From State Prison Release by Race and Type of Release in 2010



Approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY22-CES014-004.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Asterisks indicate significant differences in comparison between conditional and unconditional release for each race/Hispanic origin category * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. Logistic Regression Predicting the Mortality of Prisoners Released in 2010 by Race, Odds Ratios				
Characteristics	Deceased within 5 years of release			
	(Alive is omitted category)			
	Model A			
	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Other	Hispanic
Age at release				
Less than 25 years (omitted)				
25-34 years	1.46***	0.86**	1.35	1.10
35-44 years	2.14***	1.08	2.04***	1.70***
45-54 years	4.12***	2.15***	4.14***	3.87***
55 years and older	9.86***	5.52***	8.02***	8.46***
Sex				
Male (omitted)				
Female	0.81***	0.87**	0.85	0.83*
Education reported in NCRP				
Less than high school (omitted)				
High school or GED	0.94*	0.91*	0.85	1.06
Some college	0.95	0.86*	1.07	0.70
College or higher	0.89	0.65*	0.35	0.79
Missing	0.96	0.98	0.60***	1.00
Time served				
Less than 1 year (omitted)				
1-1.9 years	0.92**	0.97	1.08	0.89*
2-4.9 years	0.88***	0.95	0.89	0.90
5 or more years	0.77***	0.89	0.70	0.78**
Additional terms served between 2005 and 2010				
0 terms (omitted)				
1 term	1.20***	1.10*	1.16	1.25***
2 or more terms	1.44***	1.39***	1.42**	1.75***
Release type				
Conditional (omitted)				
Unconditional	1.08***	0.98	1.22*	1.09
Reimprisoned after 2010 release				
No (omitted)				
Yes	0.39***	0.37***	0.42***	0.54***

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

*p<.05, **p<.01, ***p<.001

(Continued) Table 4. Logistic Regression Predicting the Mortality of Prisoners Released in 2010 by Race, Odds Ratios

Characteristics	Deceased within 5 years of release (Alive is omitted category)			
	Model A			
	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Other	Hispanic
	Most serious offense			
Violent (omitted)				
Property	1.05	0.99	1.13	1.16**
Drugs	0.97	1.00	0.92	0.99
Public order	1.06	1.03	1.13	0.97
Region				
South (omitted)				
Midwest	1.02	1.05	1.00	0.82
Northeast	0.98	0.96	1.04	0.82*
West	0.85***	1.08	1.32*	0.96
Sample size	193,000	166,000	17,000	75,000
Deceased within 5 years of release	9,000	4,900	600	2,300
Pseudo R-Square	0.0812	0.0655	0.0716	0.0651

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

*p<.05, **p<.01, ***p<.001

Table 5. Multinomial Logistic Regression Predicting Time between Release and Death for Prisoners Released in 2010 who Died within Five Years from Release, Odds Ratios

Characteristics	Time between Release and Death			
	Model 1		Model 2	
	3-12 months	13-60 months	13-24 months	25-60 months
	(< 3 months is omitted category)		(< 13 months is omitted category)	
Hispanic origin and race				
Non-Hispanic white (omitted)				
Non-Hispanic black	1.35**	1.33**	0.97	1.08
Non-Hispanic all others	1.38	1.08	0.71**	0.89
Hispanic	1.37*	1.27*	0.96	1.01
Age at release				
Less than 25 years (omitted)				
25-34 years	1.25	1.35*	1.06	1.16
35-44 years	0.88	1.21	1.12	1.42***
45-54 years	1.10	1.89***	1.45***	1.89***
55 years and older	0.97	1.57**	1.27*	1.76***
Sex				
Male (omitted)				
Female	0.93	1.30*	1.23**	1.44***
Education reported in NCRP				
Less than high school (omitted)				
High school or GED	1.04	1.15	1.13	1.11
Some college	1.27	1.13	0.98	0.92
College or higher	0.62	0.59	0.75	0.87
Missing	0.95	0.93	0.87	1.00
Time served				
Less than 1 year (omitted)				
1-1.9 years	1.11	1.00	0.89	0.93
2-4.9 years	0.91	0.83	0.86	0.91
5 years or more	0.97	0.78	0.81*	0.81**
Additional terms served between 2005 and 2010				
0 terms (omitted)				
1 term	0.82	0.69***	0.88	0.78***
2 or more terms	0.79	0.54***	0.77**	0.61***
Release type				
Conditional (omitted)				
Unconditional	1.09	1.08	1.01	1.01
Reimprisoned after 2010 release				
No (omitted)				
Yes	21.81***	187.6***	5.46***	13.59***

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

*p<.05, **p<.01, ***p<.001

(Continued) Table 5. Multinomial Logistic Regression Predicting Time between Release and Death for Prisoners Released in 2010 who Died within Five Years from Release, Odds Ratios

Characteristics	Time between Release and Death			
	Model 1		Model 2	
	3-12 months	13-60 months	13-24 months	25-60 months
	(< 3 months is omitted category)		(< 13 months is omitted category)	
Most serious offense				
Violent (omitted)				
Property	1.08	1.02	0.94	0.97
Drugs	1.14	1.16	1.01	1.07
Public order	1.23	1.24	0.98	1.09
Region				
South (omitted)				
Midwest	0.97	1.05	1.13	1.06
Northeast	1.00	1.10	1.32**	1.04
West	0.74*	0.78*	1.12	0.94
Deceased within 5 years of release		17,000		17,000
Pseudo R-Square		0.0723		0.0544

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

*p<.05, **p<.01, ***p<.001

Table 6. Standardized Mortality Ratios (SMRs) among Former Prisoners in the Five Years after Release, Adjusted for Age Group, Sex, Race/Ethnicity and Year of Death[^]

Characteristics	SMRs with Total US as Reference	95%CI
All deaths in the sample, 2010-2015	2.9	2.9 , 2.9
By sex		
Males	2.8	2.7 , 2.8
Females	4.8	4.6 , 5.0
By age at release and sex		
18-24 years, males	3.5	3.3 , 3.7
25-34 years, males	3.2	3.1 , 3.3
35-44 years, males	3.1	2.9 , 3.2
45-55 years, males	2.7	2.6 , 2.8
55-64 years, males	2.5	2.4 , 2.6
65 and older, males	1.3	1.2 , 1.4
18-24 years, females	5.9	4.7 , 7.2
25-34 years, females	6.7	6.1 , 7.3
35-44 years, females	5.6	5.1 , 6.0
45-55 years, females	4.0	3.7 , 4.3
55-64 years, females	4.2	3.6 , 4.8
65 and older, females	1.1	0.7 , 1.6
By race/Hispanic origin and sex		
Non-Hispanic white, males	3.6	3.5 , 3.7
Non-Hispanic black, males	1.7	1.7 , 1.8
Non-Hispanic other, males	5.5	5.0 , 6.0
Hispanic, males (any race)	4.1	3.9 , 4.3
Non-Hispanic white, females	5.7	5.4 , 6.0
Non-Hispanic black, females	2.8	2.5 , 3.0
Non-Hispanic other, females	9.6	7.8 , 11.5
Hispanic, females (any race)	7.9	6.8 , 9.0

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

[^] Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, Previous Census Data and national and state mortality rates obtained from the CDC Wide-Ranging Online Data for Epidemiologic Research (CDC-WONDER) for years 2010-2015

(Continued) Table 6. Standardized Mortality Ratios (SMRs) among Former Prisoners in the Five Years after Release, Adjusted for Age Group, Sex, Race/Ethnicity and Year of Death[^]

Characteristics	SMRs with Total US as Reference	95%CI
Deaths within the first few months post-release		
By months since release and race/Hispanic origin		
1 month, non-Hispanic white	13.8	12.3 , 15.3
2 months, non-Hispanic white	5.5	4.6 , 6.4
3-6 months, non-Hispanic white	5.0	4.6 , 5.4
7-12 months, non-Hispanic white	3.4	3.2 , 3.6
1 month, non-Hispanic black	4.6	3.9 , 5.4
2 months, non-Hispanic black	2.4	1.8 , 2.9
3-6 months, non-Hispanic black	2.3	2.0 , 2.5
7-12 months, non-Hispanic black	1.8	1.6 , 1.9
1 month, non-Hispanic other	13.0	6.2 , 19.8
2 months, non-Hispanic other	12.5	5.7 , 19.3
3-6 months, non-Hispanic other	8.6	6.2 , 11.0
7-12 months, non-Hispanic other	6.7	5.1 , 8.3
1 month, Hispanic	11.7	8.9 , 14.5
2 months, Hispanic	5.7	3.8 , 7.6
3-6 months, Hispanic	5.8	4.9 , 6.7
7-12 months, Hispanic	4.2	3.7 , 4.8
By months since released and sex		
1 month, females	11.7	8.5 , 14.9
2 months, females	7.0	4.5 , 9.5
3-6 months, females	4.7	3.8 , 5.7
7-12 months, females	4.1	3.4 , 4.7
1 month, males	8.9	8.1 , 9.7
2 months, males	3.9	3.4 , 4.4
3-6 months, males	3.7	3.5 , 4.0
7-12 months, males	2.7	2.5 , 2.8

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

[^] Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, Previous Census Data and national and state mortality rates obtained from the CDC Wide-Ranging Online Data for Epidemiologic Research (CDC-WONDER) for years 2010-2015

(Continued) Table 6. Standardized Mortality Ratios (SMRs) among Former Prisoners in the Five Years after Release, Adjusted for Age Group, Sex, Race/Ethnicity and Year of Death[^]

Characteristics	SMRs with Total US as Reference	95%CI
Deaths within the first few months post-release		
By months since release and age at release		
1 month, ages 18-34 at release	8.6	7.2 , 10.1
2 months, ages 18-34 at release	5.7	4.6 , 6.9
3-6 months, ages 18-34 at release	5.2	4.7 , 5.7
7-12 months, ages 18-34 at release	3.7	3.4 , 4.0
1 month, ages 35-54 at release	9.3	8.2 , 10.4
2 months, ages 35-54 at release	3.9	3.2 , 4.6
3-6 months, ages 35-54 at release	3.8	3.5 , 4.1
7-12 months, ages 35-54 at release	2.6	2.4 , 2.8
1 month, ages 55+ at release	9.2	7.7 , 10.7
2 months, ages 55+ at release	2.7	1.9 , 3.5
3-6 months, ages 55+ at release	2.6	2.2 , 2.9
7-12 months, ages 55+ at release	2.1	1.9 , 2.3

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

[^] Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, Previous Census Data and national and state mortality rates obtained from the CDC Wide-Ranging Online Data for Epidemiologic Research (CDC-WONDER) for years 2010-2015

APPENDIX – Comparison of Unduplicated Analytic Sample with Original 2010 Release Cohort

As shown in Appendix Table A, across the 2010 cohort and the two PIK samples (with duplicates and unduplicated), most individuals (about 60 percent) were between the ages of 25 and 44 at the time of release, most (about 88 percent) were males, and about half had high school or lower levels of education at admission to prison. Over half served terms of less than one year in their last imprisonment, and for most individuals (about 70 percent) that was their first term in prison. About two thirds of the individuals received a conditional release, and about 45 percent were reimprisoned at some point between their 2010 release and 2015, the five-year window of this study.

The percent of duplicate records that were removed varied across the variables as shown in Appendix Table A (Column E). Compared to their counterparts, higher duplicate rates were observed among former prisoners who were non-Hispanic of all other races, Hispanics, or had missing race information. Males, individuals with missing education information, and those serving terms of less than a year were also more likely to have multiple records than their counterparts. Individuals with multiple terms in prison, those released conditionally or with missing release type information, and those who were reimprisoned after their 2010 release were more likely to have duplicate records compared to individuals with fewer prison terms, those released unconditionally, and those not reimprisoned between their 2010 release and the end of our five-year window.

Appendix Table A. Selected Characteristics of Persons Released from State Prisons in 2010 and PIK Rates										
Characteristics	Released in 2010								Total Deceased within 5 Years from Release	
	Total		With PIK		PIK rate	With PIK (no duplicates)		% Duplicates		
	A	Col %	B	Col %	C = B / A	D	Col %	E	F	Col %
Total	605,000	100.0	508,000	100.0	84.0	478,000	100.0	5.9	18,000	100.0
Hispanic origin and race										
Non-Hispanic white	245,000	40.5	215,000	42.3	87.8	204,000	42.7	5.1	9,500	52.8
Non-Hispanic black	224,000	37.0	188,000	37.0	83.9	179,000	37.5	4.8	5,300	29.4
Non-Hispanic all others	22,000	3.6	20,500	4.0	93.2	18,000	3.8	12.2	650	3.6
Hispanic	112,000	18.5	82,500	16.2	73.7	76,000	15.9	7.9	2,400	13.3
Missing	2,000	0.3	1,200	0.2	60.0	1,100	0.2	8.3	40	0.2
Age at release¹										
Less than 25 years	103,000	17.0	87,500	17.2	85.0	82,500	17.3	5.7	1,500	8.3
25-34 years	217,000	35.9	183,000	36.0	84.3	173,000	36.2	5.5	3,900	21.7
35-44 years	152,000	25.1	128,000	25.2	84.2	120,000	25.1	6.3	3,900	21.7
45-54 years	103,000	17.0	86,000	16.9	83.5	80,500	16.8	6.4	5,300	29.4
55-64 years	25,000	4.1	20,000	3.9	80.0	19,000	4.0	5.0	2,600	14.4
65 years and older	3,900	0.6	3,100	0.6	79.5	3,000	0.6	3.2	700	3.9
Missing	250	0.0	(D)	(D)	(D)	(D)	(D)	(D)	0	0.0
Sex										
Male	534,000	88.3	448,000	88.2	83.9	421,000	88.1	6.0	16,000	88.9
Female	71,000	11.7	59,500	11.7	83.8	57,000	11.9	4.2	2,000	11.1
Missing	200	0.0	<15	(D)	(D)	<15	(D)	(D)	0	0.0
Education reported in NCRP										
Less than high school	174,000	28.8	146,000	28.7	83.9	142,000	29.7	2.7	5,000	27.8
High school or GED	143,000	23.6	123,000	24.2	86.0	119,000	24.9	3.3	4,500	25.0
Some college	19,000	3.1	17,000	3.4	89.5	16,500	3.5	2.9	750	4.2
College or higher	3,200	0.5	2,800	0.6	87.5	2,700	0.6	3.6	150	0.8
Missing	266,000	44.0	219,000	43.1	82.3	198,000	41.4	9.6	7,500	41.7
Time served²										
Less than 1 year	358,000	59.2	295,000	58.1	82.4	271,000	56.7	8.1	10,500	58.3
1-1.9 years	113,000	18.7	99,000	19.5	87.6	96,000	20.1	3.0	3,500	19.4
2-2.9 years	51,000	8.4	43,500	8.6	85.3	42,500	8.9	2.3	1,500	8.3
3-4.9 years	42,000	6.9	36,000	7.1	85.7	35,000	7.3	2.8	1,300	7.2
5-6.9 years	15,500	2.6	13,000	2.6	83.9	13,000	2.7	0.0	450	2.5
7-9.9 years	11,500	1.9	9,800	1.9	85.2	9,600	2.0	2.0	400	2.2
10 or more years	13,500	2.2	11,500	2.3	85.2	11,500	2.4	0.0	600	3.3
Additional terms served between 2005 and 2010										
0 terms	N/A	N/A	340,000	66.9	N/A	340,000	71.1	0.0	12,500	69.4
1 term	N/A	N/A	91,000	17.9	N/A	82,000	17.2	9.9	3,000	16.7
2 or more terms	N/A	N/A	76,000	15.0	N/A	56,000	11.7	26.3	2,400	13.3

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

¹ Age at release was calculated using date of birth and release date.

² Time served was calculated using dates of admission and release.

³ Persons who died in prison, were transferred, or escaped from prison were removed from analyses.

(Continued) Appendix Table A. Selected Characteristics of Persons Released from State Prisons in 2010 and PIK Rates

Characteristics	Released in 2010								Total Deceased within 5 Years from Release	
	Total		With PIK		PIK rate	With PIK (no duplicates)		% Duplicates		
	A	Col %	B	Col %	C = B / A	D	Col %	E	F	Col %
Release type³										
Conditional	399,000	66.0	336,000	66.1	84.2	311,000	65.1	7.4	11,500	63.9
Unconditional	178,000	29.4	147,000	28.9	82.6	145,000	30.3	1.4	5,700	31.7
Missing	28,000	4.6	24,000	4.7	85.7	22,000	4.6	8.3	900	5.0
Reimprisoned after 2010 release										
No	N/A	N/A	271,000	53.4	N/A	262,000	54.8	3.3	13,500	75.0
Yes	N/A	N/A	237,000	46.7	N/A	216,000	45.2	8.9	4,300	23.9
Most serious offense										
Violent	145,000	24.0	123,000	24.2	84.8	116,000	24.3	5.7	4,300	23.9
Property	177,000	29.3	149,000	29.3	84.2	139,000	29.1	6.7	5,000	27.8
Drugs	164,000	27.1	135,000	26.6	82.3	128,000	26.8	5.2	4,600	25.6
Public order	112,000	18.5	95,000	18.7	84.8	89,000	18.6	6.3	3,900	21.7
Other/unspecified	3,600	0.6	3,200	0.6	88.9	3,000	0.6	6.3	100	0.6
Missing	3,900	0.6	3,200	0.6	82.1	3,000	0.6	6.3	100	0.6
Region										
South	243,000	40.2	195,000	38.4	80.3	192,000	40.2	1.5	7,300	40.6
Midwest	119,000	19.7	101,000	19.9	84.9	97,000	20.3	4.0	3,600	20.0
Northeast	62,000	10.3	55,500	10.9	89.5	53,000	11.1	4.5	1,800	10.0
West	180,000	29.8	156,000	30.7	86.7	136,000	28.5	12.8	5,200	28.9

Table approved for release by the Census Bureau's Disclosure Review Board, CBDRB-FY21-123.

Source: 1983-2016 National Corrections Reporting Program, 2019 Census Numident, and Previous Census Data.

Note: All counts are rounded to be in compliance with the Census Bureau's disclosure avoidance policies.

¹ Age at release was calculated using date of birth and release date.

² Time served was calculated using dates of admission and release.

³ Persons who died in prison, were transferred, or escaped from prison were removed from analyses.

(D) indicates that a cell has been suppressed for disclosure avoidance purposes.