

Mortality Rates and Cause of Death Among Former Prison Inmates in North Carolina

Mark Jones, Gregory D. Kearney, Xiaohui Xu, Tammy Norwood, Scott K. Proescholdbell

BACKGROUND Inmates face challenges upon release from prison, including increased risk of death. We examine mortality among former inmates in North Carolina, including both violent and nonviolent deaths.

METHODS A retrospective cohort study among former North Carolina inmates released between 2008 and 2010 were linked with North Carolina mortality data to determine cause of death. Inmates were followed through December 31, 2012. Mortality rates among former inmates were compared with deaths among North Carolina residents using standardized mortality ratios (SMRs).

RESULTS Among former inmates (N = 41,495), there were 926 deaths during the study period. Compared to the North Carolina general population, SMRs were higher for all-cause mortality for total deaths (SMR = 2.10, 95% CI: 1.97-2.24), heart disease (SMR = 4.45, 95% CI: 3.64-5.34), cancer (SMR = 3.92, 95% CI: 3.34-4.62), suicide (SMR = 14.46, 95% CI: 10.28-19.76), and homicide (SMR = 7.98, 95% CI: 6.34-10.03).

DISCUSSION The death rate among former North Carolina inmates is significantly higher than that of other North Carolina residents. Although more research is needed, identifying areas for interventions is essential for reducing the risk of death among this population.

In 2012, the prisoner population among state and federal prison facilities in the United States was approximately 1.5 million, with an estimated 637,000 adult prisoners released during that year [1]. In the same time period, the North Carolina prison system admitted approximately 37,000 total prisoners and released an estimated 12,000 inmates, not including those from local jails [2].

Although previous studies report that former prisoners' release back into society can be challenging and stressful (eg, some returning to gangs, drugs, or alcohol), the health conditions of former inmates following release is less understood [3]. Studies from outside the United States have reported higher mortality among those released from prison compared with the general population [4-6]. Bird and Hutchinson found released inmates from Scottish prisons died at disproportionately higher rates within 14 days of release, with drug overdose being the leading cause of death [4]. Farrell and Marsden studied death among released inmates in England and Wales (N = 48,771) and found that drug-related deaths were the most likely cause of death, although the type of drugs involved varied by gender [5]. Zlorde and Fazel conducted a meta-analysis of released inmate mortality studies from several countries and found that being female, white, and young were associated with increased mortality risk [6].

In the United States, Spaulding et al. examined mortality among prisoners during and after incarceration in Georgia and found a much lower mortality rate while incarcerated than after release [7]. However, the picture was mixed among racial groups. White men had a higher mortality rate while in prison than when out of prison. Conversely, black men were at greater risk of death in the community than while in prison. Binswanger et al. (2007) examined released inmate mortality among the Washington state prison popu-

lation and found from 1999 to 2003, released inmates died at a rate 3.5 times higher than the general population [8]. The rate of death within the first 2 weeks after release was 12.7 times higher than the general population, with the leading causes of death being drug overdose, cardiovascular disease, homicide, and suicide. In more recent analyses, Binswanger et al. (2013) examined data on 76,208 former inmates released from Washington State prisons between 1999 and 2009, and identified 2,462 former inmates who died after release from prison. The risk for all-cause mortality was 3.61 (95% CI: 3.48-3.73) times greater for former inmates compared to the general population [9]. Drug overdose was found to be the leading cause of death among former inmates, with female former inmates at a higher risk for overdose and opioid-related deaths than males. Risk for homicide and suicide deaths were substantially higher among former inmates (SMR = 8.47; CI: 7.52-9.52), with a median age of 31.5 at death, and the SMR for suicide was 3.23 (CI: 2.86-3.63), with a median age of 36.5 at death.

Prior North Carolina Studies

Previous studies using data from the North Carolina Violent Death Reporting System have shed some light on the contexts and circumstances leading up to violent deaths (ie, homicides and suicides) among recently released pris-

Electronically published July 12, 2017.

Address correspondence to Dr. Mark Jones, Department of Criminal Justice, Thomas Harriot College of Arts and Sciences, East Carolina University, Rivers Bldg. Mail Stop 155, Greenville, NC 27858 (jonesg@ecu.edu).

NC Med J. 2017;78(4):223-229. ©2017 by the North Carolina Institute of Medicine and The Duke Endowment. All rights reserved. 0029-2559/2017/78401

oners [10-12]. In a cohort of inmates who died after release from North Carolina prisons, circumstances associated with homicides included arguments and criminal activity. Suicides were associated with risk of reincarceration, relationship problems, depression, and other life circumstances [10]. Another study found that violent death rates among released prisoners were 7 times higher than the general population, and that the risk of being a homicide victim decreased with age and increased with being a male or a minority [11]. A decrease in suicide was associated with being a minority, release without probation or community corrections supervision, and receipt of substance abuse treatment in prison. A history of mental illness was associated with an increased risk of suicide [11]. By linking North Carolina state prisoner release records with death records, Rosen et al. evaluated cause-specific mortality rates of 15,673 former male inmates with North Carolina population data from 1980 to 2005. Overall mortality was greater among former inmates than among other male state residents, although this disparity decreased with age [12]. Former inmates experienced a greater proportion of deaths due to violent circumstances: 10.9% of deaths among former male inmates resulted from homicide and 4.8% of deaths resulted from suicide. In comparison, 2.5% of deaths among other male state residents resulted from homicide and 3.7% of deaths among other male state residents resulted from suicide. Homicide was the fourth leading cause of death among former inmates, behind cardiovascular disease, cancer, and unintentional injuries. Notably, in the first 5 years following inmates' release from prison, the crude death mortality rate for homicide declined by a factor of 3, with greater community involvement speculated as a protective factor.

The aim of this project was to identify the types of deaths experienced by former inmates in North Carolina prisons following their release, and to identify factors associated with those deaths. There has been a paucity of research in the area of prisoner release and health outcomes in the United States, and limited studies have evaluated this topic in North Carolina. This paper fills the knowledge research gap by providing findings using recent data sets and offering considerations when designing public health interventions, as well as by promoting policy decisions for helping former inmates transition back into society following prison release. Results of this study may assist medical and counseling professionals in better defining factors, trends, or target areas that contribute to former inmate mortality in North Carolina.

Methods

This was a retrospective cohort study of 41,495 persons released from the North Carolina Department of Public Safety, Division of Adult Corrections (DAC). Prisoner inmate data were obtained from the North Carolina Department of Public Safety, Office of Rehabilitative Programs and Services (ORPS). The dataset included name, date and state of birth, sex, marital status, and dates of incarceration on all released

inmates from North Carolina prison systems from January 1, 2008 through December 31, 2010 and followed through December 31, 2012. All former inmates represented in the dataset were over 20 years old at the time of release. Direct age-adjustment was used to calculate age-specific mortality rates [13]. A total of 777 former inmates were excluded from the analysis due to missing information of county or sex. We have no information on those who may have died outside North Carolina since we only had the state mortality data to match. Data on personal characteristics (eg, evidence of mental illness, evidence of gang affiliation) were obtained from the ORPS. Several variables were self-reported by inmates to ORPS in the initial diagnostic process upon entering the prison system, including marital status, socioeconomic status, and employment status.

Substance abuse, mental health, and gang affiliation were determined based on a combination of self-reporting by the inmates, court records made available to prison officials, and/or prison officials' diagnosis of such conditions. Because socioeconomic status was self-reported as either upper, middle, lower class, poverty level, or unknown, we collapsed the categories into two groups (1 = High or Medium income; 0 = Low income or Poverty). Denominator data for the population were obtained from the 2010 decennial United States Census Bureau using mid-year population estimates for individual years from 2008 to 2012. Mortality data were obtained from the North Carolina Department of Health and Human Services, Division of Public Health, State Center for Health Statistics. There was no direct or indirect contact made with family members, officials, or others to confirm death. This study was approved by the East Carolina University Institutional Review Board (#13-000378).

Data Analysis

Prisoner inmate data were linked with mortality data using a probabilistic data linkage method. Data linkage variables were based on former inmates' first and last names, date of birth, gender, and race. The linked file provided potential matches and was analyzed by underlying cause of death to determine all cause deaths and violent deaths, and to calculate rates (per 100,000). Except for the 777 former inmates with missing county or sex, we did not drop any records. If the inmates could not be matched they were assumed to be alive. After we obtained annual population estimates (mid-year estimates) for the years 2008-2012, we used the annual population estimates to generate the person-years for the reference population, which was calculated as the sum of the person-years for each of the individual years during 2008-2012. For inmates, the individual's person-years were calculated using the time difference from the individual's release date and the end of 2012 (for those still alive by the end of 2012). All calculations of person-years were stratified by county, gender, race, and age group. Personal characteristic variables were stratified to describe: age group (20-40 years, 41-60 years, more than 60 years); race

(white, black, or other); marital status; socioeconomic status; employment status; history of substance abuse; diagnosed mental health issues; documented or suspected gang affiliation; assignment to post-release supervision; and participation in the DAC reentry program.

Statistical Analysis

Standardized mortality ratios (SMRs) and 95% confidence intervals were calculated to compare whether the leading causes of death among former inmates were higher or lower than the expected number of deaths for each cause-specific death group. SMRs are commonly used to compare the mortality risk of a study population to that of a standard population. SMRs are a ratio of the actual observed number of deaths compared with the number of deaths that would be expected if the study population had the same specific

rates as the standard population. If the calculated SMR value is greater than 1.0, it is considered to have excess deaths. Following the SMR calculation, we grouped cause-specific deaths according to the primary underlying cause of death. A chi-square statistic was used to examine significant differences of the distribution of categorical variables between the groups.

All data were analyzed in SAS (version 9.3 Cary, NC). Probability values less than or equal to an alpha level of 0.05 were considered statistically significant.

Results

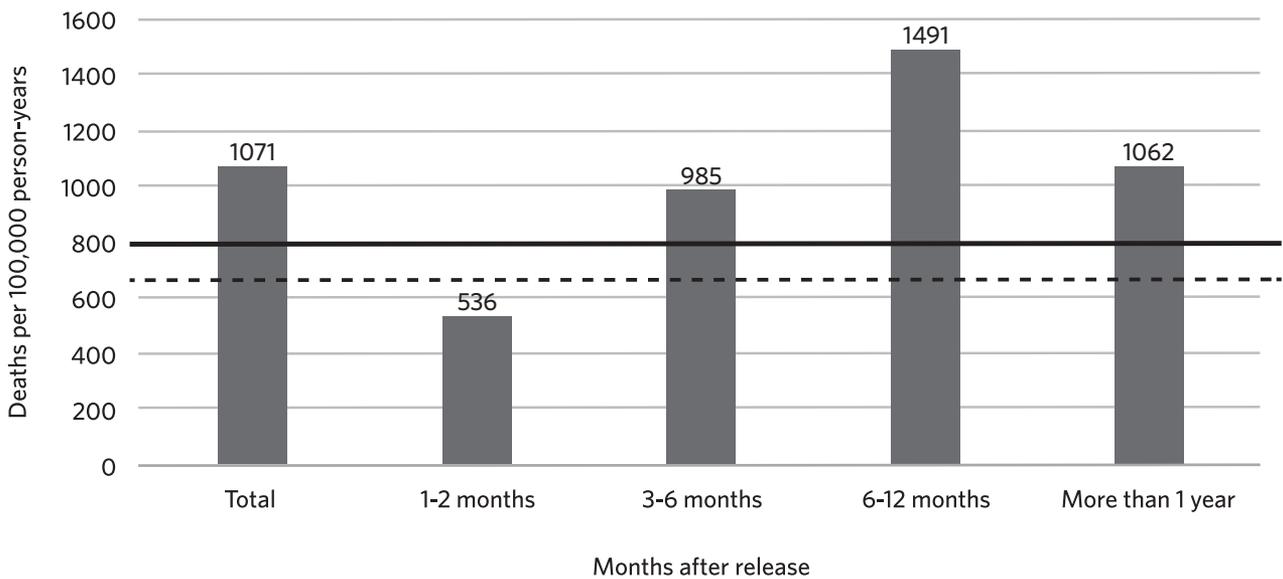
We followed 41,495 persons released from North Carolina prisons for a total of 147,782 person-years. All inmates were released between January 1, 2008–December 31, 2010, and were followed through December 31, 2012. We chose this

TABLE 1.
Characteristics and Mortality Status among Released Inmates in North Carolina, 2008-2010^a

Characteristic	Living at end of follow-up period n=40,569	Died during follow-up period n=926 n (%)	Total n=41,495	P-value
Age				
20-40 years	23,231 (57.3)	283 (30.6)	23,514 (56.7)	<0.0001
41-60 years	16,687 (41.1)	561 (60.6)	17,248 (41.6)	
> 60 years	651 (1.6)	82 (8.9)	733 (1.8)	
Gender				
Male	36,192 (89.2)	861 (93.0)	37,053 (89.3)	0.0002
Female	4,377 (10.8)	65 (7.0)	4,442 (10.7)	
Race				
White	15,440 (38.1)	588 (63.5)	16,028 (38.6)	<0.0001
Black	23,741 (58.5)	311 (33.6)	24,052 (58.0)	
Others	1,388 (3.4)	27 (2.9)	1,415 (3.4)	
Marital status				
Unmarried	34,842 (85.9)	782 (84.7)	25,624 (85.9)	0.2960
Married	5,703 (14.1)	141 (15.3)	5,844 (14.1)	
Socioeconomic status				
Under average	18,177 (46.1)	431 (47.6)	18,608 (46.1)	0.3466
Above average	21,298 (54.0)	474 (52.4)	21,772 (53.9)	
Employment				
Unemployed	17,022 (42.1)	460 (49.8)	17,482 (42.2)	<0.0001
Employed	23,462 (58.0)	463 (50.2)	23,925 (57.8)	
Substance abuse				
No	17,685 (43.6)	391 (42.2)	18,076 (43.6)	0.4065
Yes	22,884 (56.4)	535 (57.8)	23,419 (56.4)	
Mental health issues				
No	38,073 (93.9)	825 (89.1)	38,898 (93.7)	<0.0001
Yes	2,496 (6.2)	101 (10.9)	2,597 (6.3)	
Gang affiliation				
No	39,837 (98.2)	915 (98.8)	40,752 (98.2)	0.1619
Yes	732 (1.8)	11 (1.2)	743 (1.8)	
Post release supervision				
No	31,867 (78.6)	728 (78.6)	32,595 (78.6)	0.9605
Yes	8,702 (21.5)	198 (21.4)	8,900 (21.5)	
Reentry				
No	37,794 (93.2)	871 (94.1)	38,665 (93.2)	0.2824
Yes	2,775 (6.8)	55 (5.9)	2,830 (6.8)	

^aFormer inmates were followed through December 31, 2012.

FIGURE 1.
Age-Adjusted Mortality Rates Among Former Inmates of the North Carolina Prison System, 2008-2010^a



^aFormer inmates were followed through December 31, 2012.

Note. The solid line represents the adjusted mortality rate for North Carolina residents (800.6 deaths per 100,000 person years). The dashed line represents the crude mortality rate among former inmates following release from prison (626.6 per 100,000 person years).

time frame because we wanted to insure a sufficient follow up period for all of the released inmates. We began analyzing this data in 2014.

As shown in Table 1, descriptive characteristics of 926 former inmate deaths at the end of the follow up period identified that the majority of former inmates who died were between 41 and 60 years of age (60.6%), male (93.0%), white (63.5%), and unmarried (84.7%).

Compared with former inmates who did not die, those who died had no statistical difference in substance abuse history (57.8% vs. 56.4%), gang affiliation (1.2% vs. 1.8%), post-release supervision (21.4% vs. 21.5%), and/or involvement with the reentry program (5.9% vs. 6.8%). However, those that died had statistically significantly more mental health issues (10.9% vs. 6.2%) than living former inmates.

Overall, the adjusted SMR among former inmates (see Figure 1) was 1,071 deaths from all causes (per 100,000 person years). By contrast, the age standardized mortality rate for North Carolina residents of the same age, sex, and race as the former inmates was 800.6 (per 100,000 person-years). Overall, the mortality rate among former inmates in the 6 months following release from prison was more than one-third times higher than the death rates of North Carolina residents of the same age, sex, and race.

As shown in Table 2, the leading cause of mortality among former inmates (N = 926) was other unintentional injuries (N = 205 deaths), which represented nearly one-quarter of all deaths. Unintentional injuries have been broken into 2 categories using the World Health Organization's International Classification of Diseases (ICD 10) system. The 2 categories

are motor vehicle fatalities (the single largest category within unintentional injuries) and other unintentional injuries, such as poisonings, falls, fires, burns, drownings, and all other unintentional type injuries combined. Intentional fatalities such as homicide and suicide are categorized separately using ICD 10 coding.

The second leading cause of death was cancer (N = 151), followed by diseases of the heart (N = 110). The fourth leading cause of death was unintentional motor vehicle injuries (N = 99). The fifth and sixth leading causes of death were homicide (N = 77) and suicide (N = 37). It could not be determined from this data how many former inmates were released due to terminal, threatening health conditions, since compassionate releases are not documented by the DAC. Similarly, data on prior health conditions of individuals before they entered the prison system were not available.

When we calculated the overall SMR cause(s) of death, the former inmate group mortality was 2.10 times higher than that of North Carolina residents' deaths (SMR = 2.10, 95% CI: 1.97-2.24). When calculating death-specific SMRs for each health outcome, former inmate deaths were significantly greater compared to deaths among the general state population for the following causes: heart disease (SMR = 4.42, 95% CI: 3.64-5.34), cancer (SMR = 3.93, 95% CI: 3.34-4.62), suicide (SMR = 14.47, 95% CI: 10.28-19.76), homicide (SMR = 7.98, 95% CI: 6.34-10.03), unintentional motor vehicle injuries (SMR = 14.35, 95% CI: 11.73-17.54), and other unintentional injuries (SMR = 11.76, 95% CI: 10.23-13.52).

When we grouped cause of death into major categories (total deaths, heart disease, cancer, unintentional motor

vehicle injury, and other unintentional injuries), those 60 years and older had the highest risk of dying from heart disease and cancer. Other significant risk factors for total deaths included being unemployed prior to incarceration, or having a mental health issue. Males between 41 and 60 years diagnosed with mental health issues and gang affiliation had an increased risk for other unintentional injuries, but the risk was not statistically significant.

Discussion

The findings here are mostly consistent with several past studies relative to overall mortality and more specifically with injury and violence-related deaths both in North Carolina and elsewhere. In Washington, Binswanger et al. (2013) found all-cause mortality was 3.61 (95% CI: 3.48-3.73) times greater for former inmates compared to the general population [9]. This finding is slightly higher, but consistent with what was found in North Carolina at 2.10 (95% CI: 1.97-2.24)

times higher than expected. Both studies found differences in the time periods from release to death. In North Carolina, the mortality of former inmates was 19% higher from 3 to 6 months, and increased to 46% higher from 6 months to a year after release compared to the general population. After a year the mortality rate started to decrease, but not to the general population level. Surprisingly, North Carolina found a decrease in overall mortality following the first 2 months after release. This is somewhat puzzling as compared with other similar studies, and may suggest that there may be a protective factor associated with initial reentry. In contrast, Binswanger et al. (2007) found the rate of death within the first 2 weeks after release was 12.7 times higher than the general population in Washington, with the leading causes of death being drug overdose, cardiovascular disease, homicide, and suicide [8]. The overall mortality rate was lower in North Carolina during this same time period; however, we did not specifically examine sub-injury categories within unin-

TABLE 2.
Standard Mortality Ratios of Leading Causes of Death after Release from Prison in North Carolina, 2008-2010^a

Cause of death	Deaths		SMR	CI (95%)	
	Observed	Expected			
Total deaths-all causes	926	440.71	2.10	1.97	2.24
Other unintentional injuries	205	17.43	11.76	10.23	13.52
Cancer	151	38.45	3.93	3.34	4.62
Lip, oral, pharynx	5	0.04	117.46	38.06	273.67
Stomach	1	0.01	16.70	0.42	93.03
Colon, rectum, anus	11	0.56	19.76	9.86	35.37
Liver	25	1.45	17.19	11.12	25.45
Pancreas	6	0.23	26.24	9.63	57.20
Larynx	6	0.119	50.50	18.53	110.09
Trachea, bronchus, lung	56	5.62	9.96	7.56	13.03
Malignant melanoma of skin	1	0.03	34.17	0.86	190.31
Prostate	3	0.16	19.37	3.99	56.55
Bladder	3	0.10	31.53	6.50	92.07
Brain tumor	3	0.03	117.23	24.15	342.30
Non-Hodgkins lymphoma	2	0.03	67.48	8.17	243.61
Leukemia	3	0.02	147.03	30.29	429.33
Diseases of the heart	110	24.92	4.42	3.64	5.34
Acute myocardial infarction	19	1.68	11.31	6.81	17.65
Other ischemic heart disease	56	5.31	10.54	8.00	13.79
Hypertension	3	0.08	38.06	7.84	111.13
Cerebrovascular disease	17	1.20	14.20	8.28	22.73
Atherosclerosis	1	0.01	193.27	4.89	1076.53
Unintentional motor vehicle injuries	99	6.90	14.35	11.73	17.54
Homicide	77	9.65	7.98	6.34	10.03
Suicide	39	2.70	14.47	10.28	19.76
Liver disease/cirrhosis	37	2.139	17.30	12.17	23.83
Diabetes mellitus	17	0.82	20.76	12.10	33.21
HIV disease	17	2.09	8.12	4.73	12.99
Lower respiratory disease	15	0.36	41.49	23.24	68.46
Nephritis, nephrosis	6	0.15	40.62	14.91	88.55
Pneumonia/influenza	5	0.26	19.17	6.21	44.68
Septicemia	4	0.10	40.68	11.06	104.13
Alzheimer's disease	1	0.021	61.53	1.56	342.74

^aFormer inmates followed through December 31, 2012.

tentional injuries such as drug overdoses.

For violent deaths, these findings dovetail with the work from Lize et al. that found released inmates in North Carolina were more likely to experience a violent death than the general population [11]. Suicide and homicide were 14 times and 7 times greater than expected (respectively). However, Binswanger et al. (2013) found the risk for homicide and suicide deaths were substantially higher among former inmates in Washington. Homicides were 8 times higher (SMR = 8.47, 95% CI: 7.52-9.52) and suicides were 3 times higher (SMR = 3.23, 95% CI: 2.86-3.63) than expected [9]. Our study found North Carolina former inmates were at increased risk of homicide and suicide as well; however, the SMRs were higher for suicides than homicides compared to Washington. It is unclear if there are regional or other factors that would account for these differences. A greater recognition of these risk factors for all violent deaths could result in prevention opportunities and reduced mortality.

In terms of racial differences, we found that white former inmates in North Carolina had a greater mortality rate than black former inmates. The finding was somewhat surprising given that in the general population, blacks have an overall shorter life expectancy than whites. However, these findings are consistent with those pointed out by Zlorde and Fasel [6] and Rosen [12]. Again, specific intervention opportunities might exist to decrease rates among and within various racial groups.

Many of these former inmate deaths in North Carolina were injury or violence-related, including homicides, suicides, motor vehicle injuries, or other unintentional injuries, which are acute and happen among younger populations, whereas chronic disease deaths generally occur later in life and have long latency periods. Addressing this dichotomy is critical, but also needs further research.

Given that we found no significant association between community supervision after release and mortality, the question remains as to whether post-release supervision could have an impact on former inmate mortality. Probation and parole officers are primarily tasked with enforcing conditions of supervision. All of these conditions, it is assumed, should reduce, but not necessarily eliminate, the likelihood of offender involvement in crime. These conditions do not necessarily address the former inmate's health issues. Whether health risks could be identified and addressed more specifically during supervision is an open question given the current training, roles, and responsibilities of officers.

Strengths and Limitations

As one of the few studies that has examined the issue of prisoners and mortality following incarceration, this study offers several strengths. We identified that middle-age and older former inmates are considerably more likely than the general population to die from chronic conditions, including heart disease and cancer, as well as injury and violence-related deaths. How these chronic diseases relate to prison

behavioral lifestyle creates additional research questions for more in depth evaluation; for example, what are the impacts of smoking, diet, and exercise while in prison on health? Nevertheless, because of the limitations of the data, the results should be interpreted with caution. For example, unlike Binswanger's earlier studies, this study did not include specific data on the methods used for homicide or suicide events (eg, firearm, strangulation, stabbing) [8, 9]. Also, a question raised by this study is whether some inmates were suffering sickness or terminal illness prior to release. Compassion release or deaths from chronic diseases with long latency periods are likely attributable to etiological factors that originated prior to incarceration and could not be determined by these data, such as cancer and heart disease. However, the results from the current study and other mentioned studies leave little doubt that released inmates are more likely than the general population to be victims of acute deaths such as homicides, unintentional injuries, and motor vehicle crashes. Another limitation of the study, as mentioned previously, was self-reporting bias of socioeconomic status upon entry into the prison system. The lack of information on these variables, including income and education, raises more questions of how social determinants influence death upon release from prison.

Conclusion

While public safety is understandably of paramount concern to correctional officials and lawmakers, offender safety and health should also be an area of concern. Some prior research suggests that there is an association between poor health and the likelihood of committing crimes [14]. The exact nature of this association, whether poor health leads to crime, committing crime leads to poor health, or some combination, is not clear. However, it is clear that substance abuse leads to both poor health and the commission of various forms of crime. Therefore, it behooves courts and correctional officials to take measures to insure offender health while simultaneously hoping that good offender health will translate into increased public safety. Supervision conditions such as mandatory substance abuse or mental health treatment and drug testing serve as examples, but other causes of death examined in this study are unlikely to fall under the purview of community corrections officers.

Because many former inmates have regular contact with the community corrections system—and it is now mandatory that all North Carolina inmates be supervised upon release—opportunities for early prevention and intervention are feasible. Those subject to post-release supervision are required to report once per month, and must be visited at home or work by their officer at least once every 60 days. However, probation and parole officers are not trained health practitioners, and even with training it is unrealistic to think that these officers can be expected to recognize health problems among their clientele, beyond what any other non-clinician professional could recognize, especially given their high caseloads

and limited contact with offenders. The only services probation and parole officers are trained to provide are referrals for public health assistance such as Medicaid; they will also make arrangements to have an offender transported to a health care or treatment facility if necessary. Typically, judicial or correctional authorities impose conditions on offenders that are designed to preclude them from engaging in risky or dangerous behaviors. Examples include house arrest (in some cases), maintaining suitable employment, avoiding known criminals, using illegal drugs, and others. Whether imposition of such conditions contributes to the offender's safety is beyond the scope and range of this paper, and may serve as the basis for future exploration.

Identifying target areas where further counseling or interventions may be incorporated is essential to reducing the risk of death among North Carolina's former inmates after their release from prison. These risks could be mitigated to reduce the risk of death among this vulnerable population. **NCMJ**

Mark Jones, PhD professor, Department of Criminal Justice, Thomas Harriot College of Arts and Sciences, East Carolina University, Greenville, North Carolina.

Gregory D. Kearney, DrPH, MPH assistant professor, Department of Public Health, Brody School of Medicine, East Carolina University, Greenville, North Carolina.

Xiaohui Xu, MD, PhD associate professor, Department of Epidemiology & Biostatistics, School of Public Health, Texas A&M Health Science Center, Texas A&M University, College Station, Texas.

Tammy Norwood program manager, North Carolina Violent Death Reporting System, Injury Epidemiology and Surveillance Unit, Injury and Violence Prevention Branch, Chronic Disease and Injury Section, Division of Public Health, North Carolina Department of Health and Human Services, Raleigh, North Carolina.

Scott K. Proescholdbell, MPH program director, North Carolina Violent Death Reporting System, Injury Epidemiology and Surveillance Unit, Injury and Violence Prevention Branch, Chronic Disease and Injury Section, Division of Public Health, North Carolina Department of Health and Human Services, Raleigh, North Carolina.

Acknowledgments

Potential conflicts of interest. All authors have no relevant conflicts of interest.

References

1. Carson EA, Golinelli D. Prisoners in 2012: trends in admissions and releases, 1991-2012. US Department of Justice website. <https://www.bjs.gov/content/pub/pdf/p12tar9112.pdf>. Revised September 2, 2014. Accessed October 27, 2016.
2. Department of Public Safety Statistics. North Carolina Department of Public Safety website. <https://www.ncdps.gov/About-DPS/departments-public-safety-statistics>. Accessed October 27, 2016.
3. Petersilia J. When prisoners come home: parole and prisoner reentry. New York: Oxford University Press, 2003. Morris N, Tonry M. eds. Studies in Crime and Public Policy.
4. Bird SM, Hutchinson SJ. Male drugs-related deaths in the fortnight after release from prison: Scotland, 1996-99. *Addiction*. 2003;98(2):185-190.
5. Farrell M, Marsden J. Acute risk of drug-related death among newly released prisoners in England and Wales. *Addiction*. 2008;103(2):251-255.
6. Zlodre J, Fazekas S. All-cause and external mortality in released prisoners: systematic review and meta-analysis. *Am J Public Health*. 2012;102(12):e67-e75.
7. Spaulding AC, Seals RM, McCallum VA, Perez SD, Brzozowski AK, Steenland NK. Prisoner survival inside and outside of the institution: implications for health-care planning. *Am J Epidemiol*. 2011;173(5):479-487.
8. Binswanger IA, Stern MF, Deyo RA, et al. Release from prison—a high risk of death for former inmates. *N Engl J Med*. 2007;356(2):157-165.
9. Binswanger IA, Blatchford PJ, Mueller SR, Stern MF. Mortality after prison release: opioid overdose and other causes of death, risk factors, and time trends from 1999 to 2009. *Ann Intern Med*. 2013;159(9):592-600.
10. Scheyett AM, Morgan C, Lize SE, Proescholdbell S, Norwood T, Edwards D. Violent death among recently released prison inmates: stories behind the numbers. *J Forensic Soc Work*. 2013;3(1):69-86.
11. Lize SE, Scheyett AM, Morgan CR, Proescholdbell SK, Norwood T, Edwards D. Violent death rates and risk for released prisoners in North Carolina. *Violence Vict*. 2015;30(6):1019-1036.
12. Rosen DL, Schoenbach VJ, Wohl DA. All-cause and cause-specific mortality among men released from state prison, 1980-2005. *Am J Public Health*. 2008;98(12):2278-2284.
13. Klein RJ, Schoenborn CA. Age-Adjustment Using the 2000 Projected U.S. Population. Healthy People 2010 Statistical Notes, No. 20. Centers for Disease Control and Prevention website. <https://www.cdc.gov/nchs/data/statnt/statnt20.pdf>. Published January 2001. Accessed April 11, 2017.
14. Farrington, DP. Crime and physical health: illnesses, injuries, accidents and offending in the Cambridge Study. *Crim Behav Ment Health*. 1995;5(4):261-278.