

POLICY AND VULNERABLE POPULATIONS[‡]

The Burgeoning Health Care Needs of Aging Prisoners[†]

By HESSAM BAVAF AND ANITA MUKHERJEE*

The US prison population is rapidly aging and bringing with it rising costs. Across state prisons, the average inmate age in 1993 was 30; this rose to 36 in 2013 (Carson and Sabol 2016). Over this same time period, the percentage of inmates aged 55 or more increased from 3 percent to 10 percent. The increased fiscal burden of caring for these inmates has contributed to the rise of private prison contracting, which offer cost savings despite grave concerns about quality. For example, the families of three diabetic inmates are currently suing CoreCivic, a major private prison operator, for failing to provide adequate and timely medications (Hale 2017). Another potential strategy is to shift costs to inmates, and 39 states already require co-pays and annual deductibles of up to \$2,000 for medical treatment (Ollove 2015).

According to a report by the Pew and McArthur foundations (2014), state correctional departments spent about \$7.7 billion on prison health care spending in 2011, comprising about a fifth

of their budgets. Costs varied significantly by state, with California, Vermont, Wyoming, and New Hampshire spending over \$10,000 in health costs per inmate. Other states such as Mississippi and Arizona are on the lower end of the spectrum but still spend over \$3,000 per inmate. Less than 20 percent of these costs are due to mental health care and substance abuse treatment, meaning that the bulk of spending is due to general chronic conditions and medical needs.

This article estimates the evolving health care needs of inmates using data on state prisoners in Mississippi.¹ We combine these data with information from nationally representative health surveys to estimate the prevalence of four major health conditions among the inmate population: diabetes, hypertension, asthma, and cancer. By focusing on age-related health conditions, our analysis sheds light on the changing health care needs—and as a result the changing budgetary needs—required to care for an aging inmate population.

Our estimates from the Mississippi data reveal that inmate health care needs are significant and growing, and that focusing on the age profile of the inmates paints only part of the picture. For context, the fraction of inmates aged above 40 increased by 49 percent between 1996 and 2004. The prevalence of medical conditions, however, increased by much larger magnitudes. We estimate that the prevalence of diabetes, hypertension, asthma, and cancer among inmates grew by 268 percent, 212 percent, 177 percent, and 234 percent, respectively.

¹This is the dataset used in Mukherjee (2017), which studies the impact of private prison contracting on inmate time served and recidivism; the study finds that inmates in private prisons serve more time, eroding nearly all the cost savings associated with private contracting. Such concerns are important if states look to private contracting to serve the health needs of aging inmates.

[‡]*Discussants:* Monica Deza, City University of New York, Hunter College and Graduate Center; Nzinga Broussard, Millennium Challenge Corporation; William J. Sabol, Georgia State University; Luisa Blanco, Pepperdine University; Dania Francis, University of Massachusetts, Amherst.

*Bavafa: Wisconsin School of Business, University of Wisconsin-Madison, 975 University Avenue, Madison, WI 53706 (email: hessam.bavafa@wisc.edu); Mukherjee: Wisconsin School of Business, University of Wisconsin-Madison, 975 University Avenue, Madison, WI 53706 (email: anita.mukherjee@wisc.edu). We are grateful to the National Economic Association for sponsoring a session at the 2019 AEA Annual Meeting, and to the Wisconsin Alumni Research Foundation for funding assistance. This analysis benefited from the work of several officials at the Mississippi Department of Corrections, especially Audrey McAfee, in providing well-documented administrative data on the state's prison population.

[†]Go to <https://doi.org/10.1257/pandp.20191089> to visit the article page for additional materials and author disclosure statement(s).

I. Background

Recent work by Porter et al. (2016) has documented the changing age profile of inmates to older ages. That paper also connects the age shift to consequences for fertility and other macroeconomic outcomes. To the best of our knowledge, however, no empirical work to date has linked these demographic changes to estimates of healthcare needs among the prison population. Yet, such estimates are needed not only for fiscal forecasts, but also for informing policy decisions ranging from private contracting to compassionate release programs.

Interestingly, the main driver of increased age is not just inmates growing older in prison—although the long sentences given particularly for violent offenses is a known contributor. Older inmates are also more likely to be among *new admissions*: the number of such inmates aged 55 or more rose over 300 percent between 1993 and 2013 (Carson and Sabol 2016). This trend, combined with increasing prison populations and falling crime rates among younger individuals, means that the challenge of caring for older inmates will continue as the country undergoes demographic transition (Luallen and Cutler 2015).

One way in which state correctional systems may feel fiscal relief is via health benefits provided via Medicaid, but social insurance is challenging in this setting. Not all states have expanded Medicaid to the childless adults that generally comprise the younger prison population; Mississippi, for example, is not (yet) an expansion state (of course, inmates may be eligible for Medicaid even without the expansion's criteria). Even when benefits are made legally available, administrative burdens and lack of knowledge prevent many people from accessing Medicaid (Herd et al. 2013); we would expect the inmate population to be even more severely impacted by these barriers. Finally, Medicare is not available to incarcerated inmates.

Another way forward for states is to engage in further private contracting of health services or prison operations, since they may offer cost savings and specialized health services (though as shown in Mukherjee 2017, this strategy warrants caution). Or, states could consider expanding the use of compassionate release, at least for older inmates (these individuals have a low likelihood of re-offending, as shown in Bindler

and Hjalmarsson 2017) or those with severe health needs—but then the state should ensure that the released individual has access to care. For example, in a review of the literature, Doleac (2018) discusses how health care access is critical for re-integrating inmates released with substance abuse disorders and mental health needs. Alternatively, states could experiment with new technologies such as telemedicine to provide lower cost care.

Yet other ways to deal with the growing health and aging concerns among the inmate population are discussed in recent articles urging greater attention to these topics as a public policy concern. We point interested readers to Joynt and Bishop (2018), Skarupski et al. (2018), and Williams et al. (2012) for further information on potential policy solutions.

II. Data and Empirical Approach

We use two sources of data for our analysis. First, we use inmate data extracts obtained from the Mississippi Department of Corrections for information on inmate demographics by admission year. The state's prison system had 20,827 inmates in 2004, and we use eight years of data from 1996 to 2004 for our analysis. These data contain information on all inmates, including females and juveniles, in the state's prison system. The critical variables from this dataset are the stock of inmates in each year (so that we can empirically map out the demographic transitions), which involves knowing the inmates' sentence start dates and actual release dates, and predictors of inmate health care needs such as age, cohort, race, and gender. In the data, we observe these covariates for nearly every inmate though there is a caveat that these are typically self-reported information.

The inmate's age is known by date of birth for nearly all inmates, as only 2.7 percent have missing information. After some minor sample restrictions due to missing covariates, our sample contains 75,362 inmates. (Note that this is essentially the *population* of Mississippi state prisoners over the years studied.)

Second, we use the matching eight waves of data from the National Health Interview Survey (NHIS) from 1996 to 2004 to estimate the impact of demographics on various health conditions (Blewett et al. 2018). These data come from annual cross-sectional surveys administered by

the US Census Bureau; weights are available to make inferences about the US population. The data include information on the prevalence of chronic conditions such as diabetes, hypertension, and asthma, along with other health diagnoses such as cancer. We use these data to establish the relationships between these medical conditions and age, cohort, race, and gender.

The reason for focusing on these selected medical conditions is because they are prevalent and likely to occur in comparable proportions among the general and inmate populations (unlike, for example, mental health or substance abuse disorders). All of these medical conditions also require ongoing care. That being said, the analysis can easily be extended to other medical conditions.

The empirical strategy has two steps. First, we use the NHIS data to predict the propensity of each individual having a specific health condition for each year in the data, based on that individual's age, cohort, race (black or other), and gender. We thus estimate four separate logistic regressions, one for each health condition. The estimation equation is as follows:

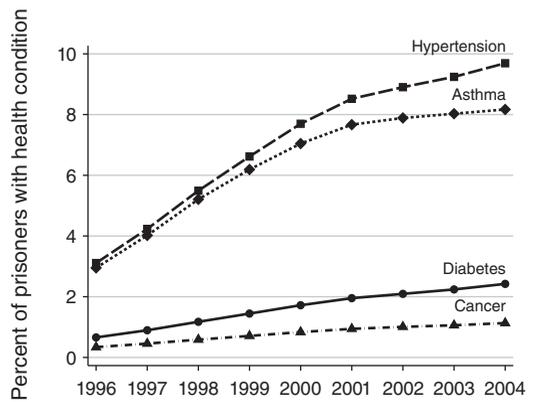
$$Y_{it} = \alpha + \beta Age_{it} + \gamma Black_{it} + \eta Male_{it} + \lambda_t + \epsilon_{it}$$

where i represents an individual and t is the survey year. The outcome Y_{it} indicates four possible health conditions: diabetes, hypertension, asthma, and cancer.² The vector β includes coefficients for age, age squared, and age cubed; γ is the coefficient for black; and λ includes coefficients for linear, squared, and cubed time trends. The regression is weighted to represent the US population (unfortunately, the data do not allow state-specific analyses or we would have examined only Mississippi).

We then collect the coefficients β , γ , η , and λ from these analyses to use them in the second step. For that step, we use the data on Mississippi inmates to predict the propensity of each inmate to have a health condition using the estimated coefficients from the NHIS data. We use data from inmates who were in prison on December

²The NHIS survey questions relating to these health conditions ask, "Have you ever been told by a doctor or health professional that you have [medical condition]?"

Panel A. Estimated prevalence of health conditions



Panel B. Percentage of inmates aged 40+

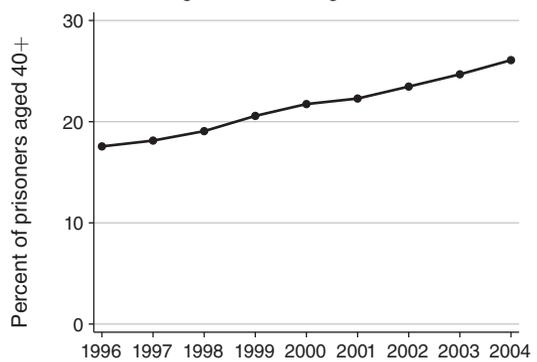


FIGURE 1. PERCENTAGE OF INMATES WITH HEALTH CONDITIONS AND OLDER AGES, BY YEAR

Note: Panel A shows the estimated percentage of inmates with four specific medical conditions by year; panel B shows the calculated percentage of inmates aged 40 or more by year.

Sources: Mississippi Department of Corrections Inmate File Extract and NHIS, 1996–2004.

31 each year to obtain an annual snapshot of inmates in the system. The covariates we use to make these predictions for the inmate population are the same as those used in the first step (age, cohort, race, and gender). Through this process, we calculate the expected percentage of inmates who suffer from the specified medical conditions each year.

III. Results

We begin by describing our estimates of the prevalence of health conditions in the inmate population. Panel A of Figure 1 presents these

TABLE 1—INMATE DEMOGRAPHIC AND HEALTH SHIFTS

	1996 (1)	2004 (2)	CAGR % (3)	% Change (4)
<i>Demographics</i>				
Age in years	31.28	33.15	0.7	6
Age 40+ years	0.18	0.26	5.1	49
Black	0.75	0.68	-1.3	-10
Male	0.93	0.91	-0.4	-3
<i>Health condition</i>				
Hypertension	0.031	0.097	15.3	212
Diabetes	0.007	0.024	17.7	268
Asthma	0.030	0.082	13.6	177
Cancer	0.003	0.011	16.3	234
Inmates	14,690	20,827	4.5	42

Notes: Table shows inmate demographics (calculated) and percentage of inmates with specific medical conditions (estimated). Column 4 shows the percent change from 1996 to 2004, and column 3 converts this to a compound annual growth rate (CAGR). The means of all variables except age in years are presented in proportions. Data sources: Mississippi Department of Corrections Inmate File Extract and NHIS, 1996–2004.

results: the percentage of inmates with certain health conditions in each year between 1996 and 2004. We observe that the percentage with hypertension (abnormally high blood pressure) increases from about 3 percent in 1996 to nearly 10 percent in 2006. For context of these numbers, we look to panel B, which shows the percentage of inmates aged 40 or more in each year; here, we see that age category increases from 18 percent of the inmate population in 1996 to 26 percent in 2004. Thus, the total change in the percentage of inmates with hypertension rose by 212 percent, while the percentage aged 40 or more rose by only 49 percent.

Every health condition we study rises by much more than predicted simply by the age distribution of inmates. The prevalence of diabetes rises by 268 percent, asthma by 177 percent, and cancer by 234 percent. These findings reveal that it is not only the age profiles but also time trends and other shifting demographics that explain the increased medical needs. For example, the medical needs of women are generally greater, and they comprise an increasing portion of inmates in the state we study.

We condense the information from the plots in Table 1, which displays the absolute change as well as the (implied) compound annual

growth rates for each of the demographic and medical condition outputs. We observe that over an eight-year period, the average inmate age increased by 6 percent from about 31 to 33, consistent with the 49 percent increase in inmates aged 40 or more. There is a 10 percent decline in the proportion of inmates identifying as black, though part of this is likely attributable to a rise in the Hispanic population. There is also a 3 percent decline in the proportion of male inmates.

Table 1 also shows the rise in the total prison population for Mississippi, which was 42 percent between 1996 and 2004. More broadly, the country's large number of inmates (despite a decline in recent years) means that the total costs of caring for inmates will be large if these estimates serve as reliable approximations of medical needs in that population. Of particular interest may be the growth in costly-to-treat but rare diseases such as cancer, since even a small proportion of inmates with these conditions can create health costs.

IV. Discussion

The United States is home to 4.4 percent of the world's population but 22 percent of its prison population. The country's historically harsh punishments, combined with an aging population, have created an unprecedented problem: large numbers of middle-aged and graying inmates. The prevalence of chronic disease and other health conditions among these individuals—without even taking into account the higher rates of HIV, substance abuse, and other disorders among those incarcerated—spells a fiscal problem for many states struggling to care for their prison populations.

While the solutions are not yet apparent, state agencies should prepare for the rising health care needs in the prison population as these trends are likely to persist in the coming decades.

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