



# Senior Thesis: Deaths in Pennsylvania Prisons

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## **My thesis studies prison death rates, with a focus on natural death.**

### **Exploratory Analysis**

Population composition? Common causes? Age distribution? Facility-level variation?

### **Excess Deaths**

How do the prison death rates compare with the general population ones?

### **Natural Deaths**

What does the breakdown of causes look like among natural deaths?



## Data Sources

01

### Statistical Reports from PA DOC

- State-level and facility-level population data, e.g. monthly population, age, race, and gender breakdown

02

### Pennsylvania Prisons Death Register Data

- Individual-level death data from PA DOC
- Acquired through RTK Act by Abolitionist Law Center
- Includes manner and cause of death

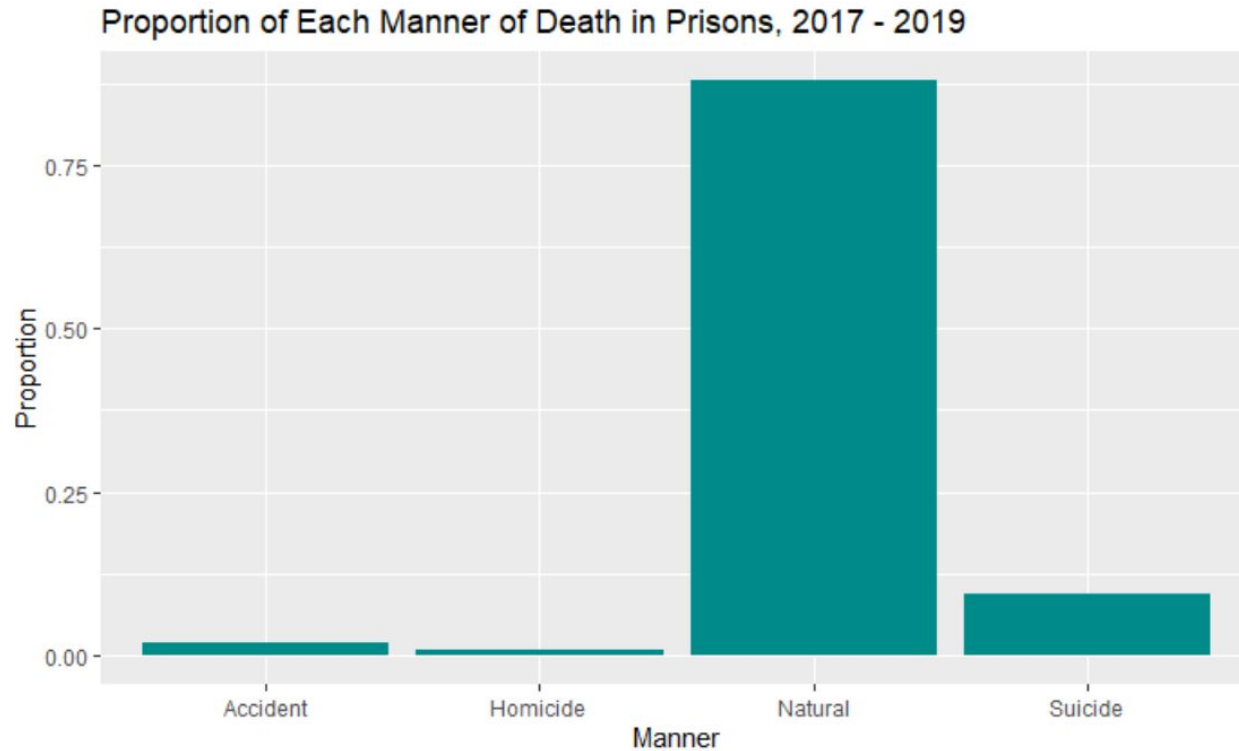
03

### CDC Wonder Data

- Death rates in general population
- Categorizes deaths by ICD-10 Standard
- Can query by demographics, cause, etc.



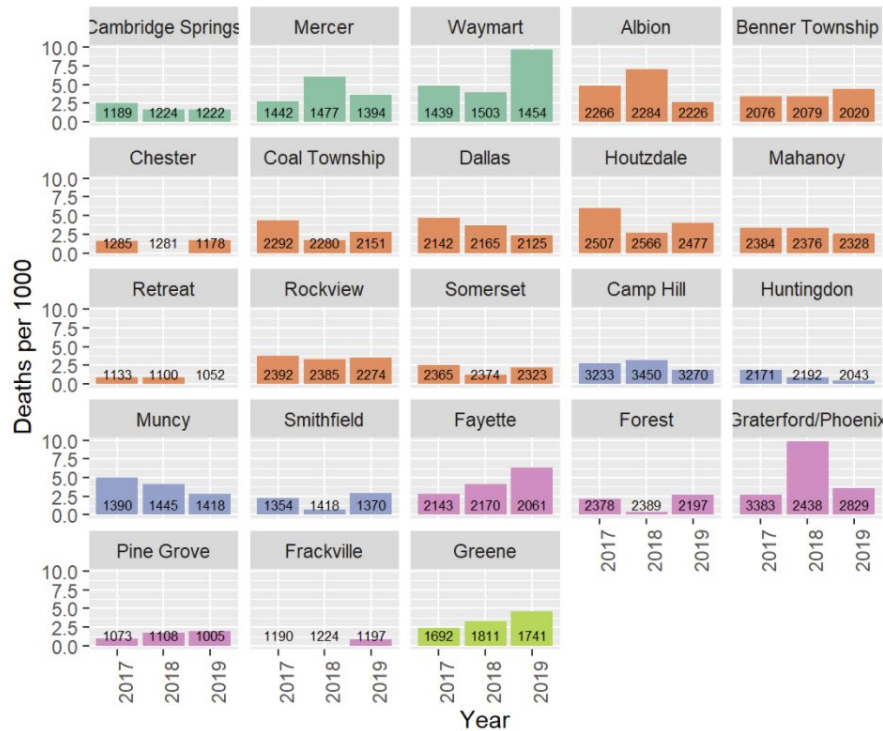
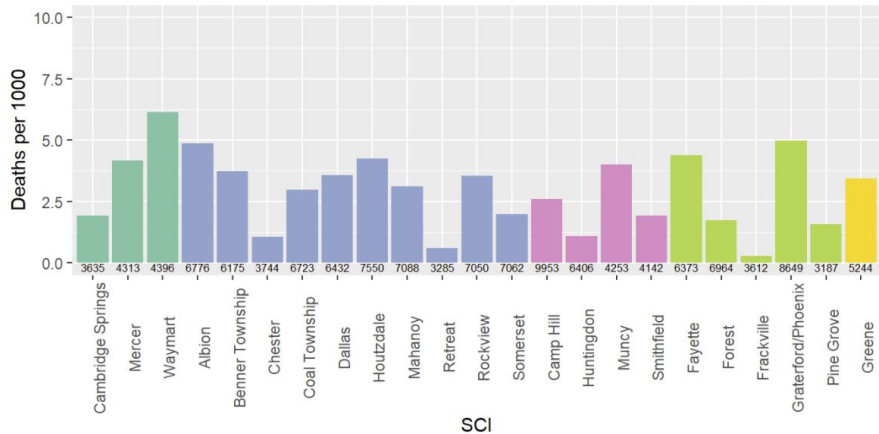
## Natural death is the most common type of deaths in prisons.





# Facility-level deaths are highly varied and do not show clear trends.

All Cause Death Rates by Facility, 2017 - 2019  
(w/o Laurel Highlands, Pittsburgh and Quehanna)





**Demographic composition is very different in the general population and prison population.**

<b>Race/Ethnicity</b>	<b>PA DOC Custody</b>	<b>General Population</b>
<b>White</b>	42.86%	76.91%
<b>Black</b>	46.54%	11.48%
<b>Hispanic</b>	9.81%	7.62%
<b>Other</b>	0.79%	3.99%
<b>Gender</b>	<b>PA DOC Custody</b>	<b>General Population</b>
<b>Male</b>	93.95%	48.99%
<b>Female</b>	6.05%	51.01%

<b>Age</b>	<b>PA DOC Custody</b>	<b>General Population</b>
<b>15-24</b>	8.65%	15.92%
<b>25-34</b>	33.80%	16.48%
<b>35-44</b>	26.19%	14.50%
<b>45-54</b>	17.48%	16.30%
<b>55-64</b>	10.29%	17.61%
<b>65-84</b>	3.59%	19.19%



**The general population are standardized to be comparable to the prison population.**

**Intuition:** What would the death rates be if the prison population have not been incarcerated?

- 1 Find the death rate of each demographic group in general population
- 2 Find the proportion of each demographic group in prison population
- 3 Multiply them together



## Demographics composition has a large impact on death rates.

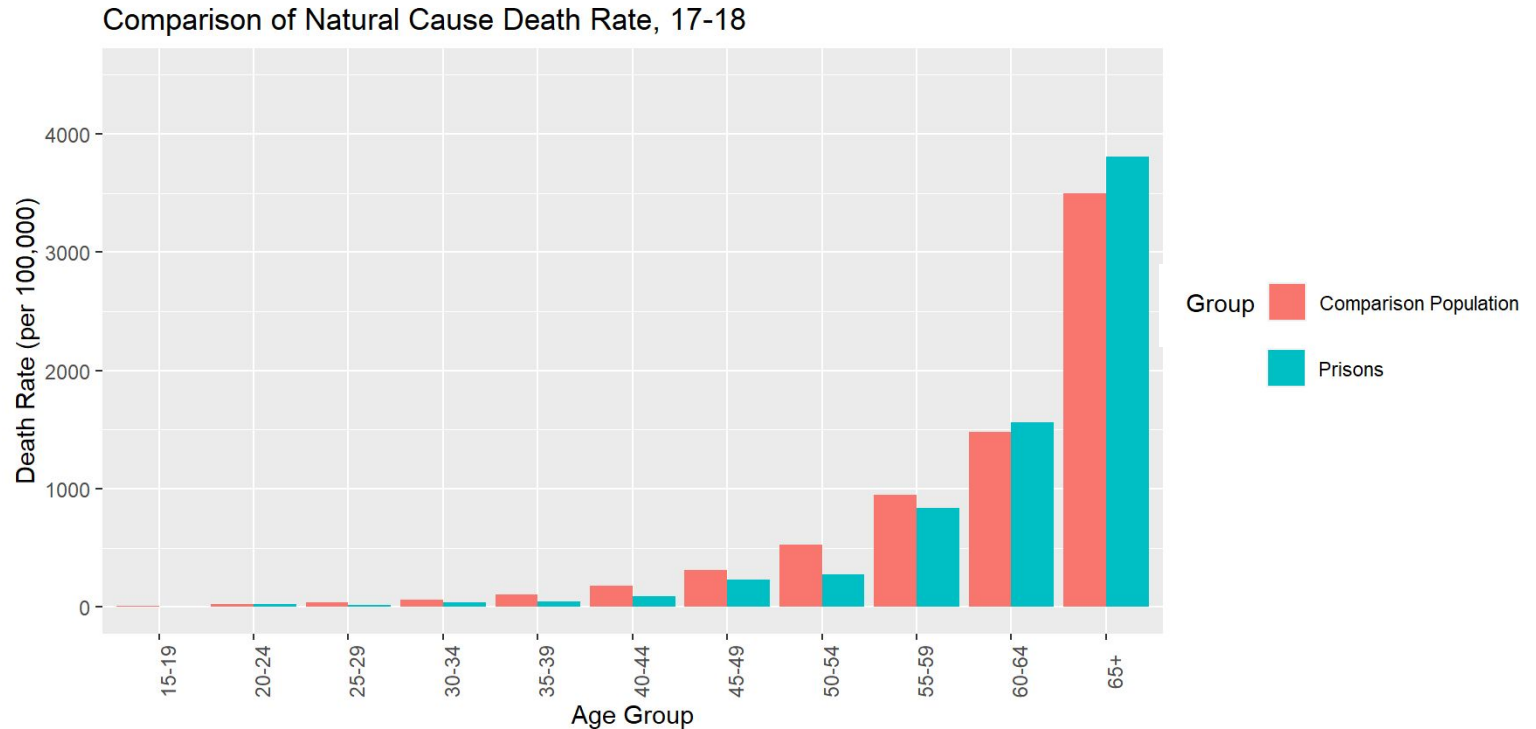
Manners of Death	State-level Prison Population	General Population	Age Standardized General Population	Comparison Population
All Causes	3.59	10.56	3.85	5.57
Natural	3.24	9.59	2.66	3.72
Suicide	0.30	0.16	0.19	0.23
Accident	0.04	0.70	0.84	1.15
Homicide	0.01	0.06	0.09	0.38

Deaths per 1000





# The prison population appear to die older than the general population.





## Natural deaths will be studied in 20 fine-grained categories.



- ❑ How common are they in the prison deaths data?
- ❑ How can they reflect the quality of medical care?
  - Screenable vs. non-screenable cancer
  - Stroke vs. other HASCVD
  - ... ..



## Natural deaths will be studied in 20 fine-grained categories.

- Cancer
  - Screenable Cancer
  - Unscreenable GI Cancer
  - Other Unscreenable Cancer
  - Hematogenous Malignancies
- Hypertensive Arteriosclerotic Cardiovascular Diseases (HASCVD)
  - Stroke
  - Other HASCVD
- Chronic Obstructive Pulmonary diseases (COPD)
- Immunologic diseases
- Neurologic diseases
- Kidney diseases
- Liver diseases
- Lung diseases
- GI diseases
- Renal diseases
- Infectious Diseases
  - Pneumonia
  - Hepatitis C
  - Other Infectious Diseases
- Diabetes
- Failure to Thrive
- Other



## Next Steps

**1**

**EDA and Excess Death Evaluations by the 20 Death Categories**

**2**

**Uncertainty estimation for the death rates**

**3**

**Evaluating the quality of death register data by linking with National Death index records**