

COVID-19 Effects on Pennsylvania Crime Trends: A Rural/Urban Comparison

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Abstract

The project's primary goal was to investigate whether shocks stemming from the COVID-19 pandemic either triggered or heightened human suffering in two crime-related areas: murder and abuse. A secondary goal was to identify rural-urban differences in these outcomes both before and during the pandemic. An analysis of homicides and protection from abuse orders over time provided valuable insights regarding crime trends and rural-urban differences, but it did not suggest large, long-term effects due to the COVID-19 pandemic throughout the state. The statewide homicide rate rose 21 percent from 2019 to 2020, but the increase was specific to a certain group and location: Black, male victims in Philadelphia County, murdered with a firearm, with most of these incidents being homicides, with no known relationship between the victim and offender (Philadelphia County's murder rate increased 36 percent in 2020). In rural counties, the 2020 murder rate rose 24 percent, and in non-Philadelphia urban counties, there was a 3 percent increase. It should be noted that these upward trends came after homicides steadily rose from 2014 to 2018, before falling significantly in 2019, and then rising in 2020. The exploratory analysis on county-levels of COVID case and death rates found no statistical evidence that high COVID-rate counties were more likely to experience high levels of protection from abuse orders or homicides. However, the analysis found that counties with higher unemployment rates and Supplemental Nutrition Assistance Program (SNAP) participation also experienced higher murder rates and protection from abuse order prevalence in 2020 (a relationship that holds when tested across other years).

Keywords: COVID; Crime; Protection from Abuse; Homicide

Executive Summary

Activities

The project's primary goal was to investigate whether shocks stemming from the COVID-19 pandemic either triggered or heightened human suffering in two crime-related areas: murder and abuse. A secondary goal was to identify rural-urban differences in these outcomes both before and during the pandemic.

Data and Methods

The research team used detailed data on homicide cases from 2012 to 2020 and protection from abuse (PFA) orders from 2017 to 2020 from the Pennsylvania Commission on Crime and Delinquency. Annual county, rural-urban, and state age-standardized homicide rates were estimated for time trend and comparative analysis. Subpopulation rates and trends by gender, race, and rural-urban county group were analyzed for differences over time and pre- and post-pandemic onset. PFA prevalence was similarly calculated and studied over the time leading up to the pandemic and after its onset. County rates of these indicators were mapped using geographic information system software and combined with county-level indicators of economic distress to test for any associations between these crime rates, COVID rates, and distress.

Results

The analysis of homicides and PFA orders over time provided valuable insights on crime trends and rural-urban differences, but it did not suggest large, long-term effects due to the COVID-19 pandemic throughout the state. The statewide homicide rate rose 21 percent from 2019 to 2020, but the increase was specific to a certain group and location: Black, male victims in Philadelphia County, murdered with a firearm, with most of these incidents being homicides with no known relationship between the victim and offender. Racial and gender disparities in the homicide rate were large and persistent throughout the timeframe analyzed and grew in 2020, with Black (vs. white) and male (vs. female) subpopulations having 10-15 times the murder rates of others.

Courthouse closures during the onset of the pandemic in March and April 2020 led to a brief decline in final protection from abuse orders, with urban counties seeing the largest decreases during those months. However, temporary orders were processed at similar levels during these initial months of the pandemic. Both temporary and final PFA orders have moved back in line with historic trends since the early onset of the pandemic.

Finally, the exploratory analysis on county-levels of COVID case and death rates found no statistical evidence that high COVID-rate counties were more likely to experience high levels of PFA orders or homicides. However, the analysis found that counties with higher unemployment rates and Supplemental Nutrition Assistance Program (SNAP) participation also experienced higher murder rates and PFA order prevalence in 2020 (a relationship that holds when tested across other years).

Policy Considerations

Following are policy considerations suggested by the study results:

- As murders in Philadelphia made up 44 percent of all murders in the Commonwealth from 2012-2020 and 56 percent of murders in 2020 alone, active state support in helping the city and county address this issue is warranted. Although this study focused on rural counties, understanding the statewide context of the homicide increase in 2020 informs appropriate policy responses in rural areas. That statewide context is driven by gains in Philadelphia and allows for comparison to rural counties.
- Since the findings of this analysis are unclear as to whether the COVID pandemic influenced abuse, more research using a wider set of data should be conducted.
- Finally, more research should be conducted to see whether differences in county responses to the pandemic (i.e., differences in courthouse responses or community uptakes in mask use) are associated with differences in case rates or the indicators of distress explored above.

Table of Contents

Abstract:	10
Executive Summary	11
Activities.....	11
Data and Methods	11
Results	11
Policy Considerations	12
Introduction	13
Goals and Objectives.....	15
Methodology.....	16
Protection from Abuse (PFA) Filings	16
Homicide Cases	17
Results.....	18
Homicides in Pennsylvania from 2012 to 2020	18
Rural vs. Urban Comparisons of Homicide Trends	24
Increasing Homicide in 2020	25
Racial & Gender Differences in Homicide.....	28
Protection from Abuse in Pennsylvania from 2017 to 2021.....	32
Cross-County Analysis of Homicide, Abuse, COVID, and Economic Indicators	44
Conclusions	46
References	49

Introduction

The criminal justice system in Pennsylvania is continually evolving and improving. Meaningful system gains have been made over the past several years, including the steady decrease of crime and victimization, the increased use of diversion sentences, and the decrease of the state's prisoner population (Pennsylvania Statistical Analysis Center, 2019; Pennsylvania Department of Corrections, 2019). Collectively, these statistics represent positive trends in Pennsylvania's efforts to continually improve the criminal justice system.

However, these gains are reported out singularly by their respective agencies. Therefore, they are siloed gains, not reported within the broader scope of the state's

criminal justice system. Accordingly, without reporting an individual agency's statistical gains against other agency's statistical performance measures, it becomes increasingly difficult to understand and ascertain the impact that those gains (or failures) may have on other areas of the system.

Compounding this siloed reporting further, criminal justice agencies often report their statistics aggregated either to the state or, in some cases, to the county. Seldom, however, are these statistics analyzed and reported out as a comparison between rural and urban areas of the Commonwealth. As a result, an immediate research gap exists in coalescing and identifying criminal justice statistics in rural and urban Pennsylvania. Collation and aggregation of individualized data to county-level crime rates allows statistical analysis across the state. Aggregation of counties separating the 48 rural counties and 19 urban counties, as defined by the Center for Rural Pennsylvania, allows additional analysis of possible rural-urban differences.

Collecting and analyzing these data over time create an opportunity to study the impact of shocks, such as the COVID-19 pandemic, on the criminal justice system in the Commonwealth. That impact can be segmented and measured across rural and urban areas to examine if any differences occurred, either before or during the COVID-19 pandemic. Such an analysis can have broader policy implications within the interconnected areas of public safety and the delivery of public services in rural and urban communities.

Researchers have been debating the effects that the COVID-19 pandemic has had on crime rates. However, differences in research findings may be based on different geographical contexts. Studies have tended to focus on cities and have not analyzed rural-urban differences. Preliminary empirical research of 25 U.S. cities during the onset of COVID-19 suggests that criminal incidents and arrests fell for drug crimes, theft, and most violent crimes, but did not fall for homicides and shootings (Abrams, 2020). Boman and Gallupe (2020) argued that the pandemic may have limited the opportunities for minor offenses while creating a climate where violent crimes, such as homicide and partner battery, potentially increase. Gonzales et. al (2020) describe many instances of negligent dissemination of inaccurate research findings in the first months of COVID-19, with much of this research related to the effects of lockdown orders on domestic violence. Additionally, the Federal Bureau of Investigations (FBI) and the Centers for Disease Control and Prevention (CDC) have reported increases in the homicide rate of more than 30 percent in 2020, for both Pennsylvania and the United States (Ahmad and Cisewski, 2021; FBI Crime Data Explorer, 2021). This historically high increase may be related to the pandemic and its severe impact on physical and mental health, as well as the sudden changes to social norms that have resulted from it.

Given rural-urban differences in the access and use of victims' services (Hansen and Lory, 2020), a comparison of differences in crime rates and trends by urban vs. rural counties could shed light on the future focus of funding needs. Since most studies on crime and victims' services focus on urban settings, conclusions from such studies may

potentially bias policy and resource allocation (Hansen and Lory, 2020). Stickle and Felson (2020) argued for more analysis on specific types of crime with place-based information (i.e., disaggregated data) to better understand the effects that the COVID-19 pandemic has had on the trajectory of crime statistics.

To identify potential increases in crime rates and isolate the possible role that COVID-19 may have played in these, this study used long-term, time-trend data going through the end of 2020. Through a partnership between the Pennsylvania Commission on Crime and Delinquency (PCCD) and Indiana University of Pennsylvania (IUP), the research team was able to accumulate de-identified case data in two areas for study: 1) homicides since 2012 and 2) protection-from-abuse (PFA) orders since 2017. This study aggregated these data at the statewide level to show trends through 2020 and to show the makeup of these aggregates by various characteristics available in the case data (i.e., homicide rates by race and gender). It further differentiated the data into separate rural and urban county aggregates to study differences in trends and characteristics.

This research, and the accompanying web dashboard¹, presents county-level homicide and PFA prevalence rates to show how crime differs across the state. The possibility of expanding rate tables to other crime indicators could be the topic of future research, allowing for the tracking of various rates (by urban and rural counties separately) over time. Visually presenting the movements in rates over a longer time span, leading to the beginning of the pandemic or the implementation of containment policies, establishes a baseline for comparing rural-urban differences. Time-trend graphical analysis can illustrate whether rural-urban differences were exacerbated or minimized during the time of the pandemic. The following sections outline the goals of this project; describe the data; present analysis results of homicide and PFA order trends characteristics, and rural-urban differences; highlight time trends pre- and post-COVID onset; and present policy implications.

Goals and Objectives

The overall goal of this project was to investigate whether shocks stemming from the COVID-19 pandemic either triggered or heightened human suffering in two crime-related areas: murder and abuse. An additional goal was to identify rural-urban differences in these outcomes both before and during the onset of the pandemic.

The first objective was to accumulate case-level data on homicides and PFA orders from previous years going through 2020. In partnership with the IUP research team, PCCD worked with the Pennsylvania State Police (PSP) to source homicide data, the Pennsylvania Commission on Sentencing (PCS) to source court/sentencing data, and the Pennsylvania Coalition Against Domestic Violence (PCADV) to source PFA data. The research team analyzed the data on homicides from 2012 to 2020 and on PFA orders from 2017 through 2021.

¹ The interactive dashboard for Pennsylvania counties allows the user to view average homicide and PFA prevalence rates for the entire timeframe of the dataset along with 2020 rates. It can be accessed at the following website:

<https://iup.maps.arcgis.com/apps/webappviewer/index.html?id=4e556c6198eb48efb0d0397a703e4123>

The second objective was to aggregate data on these indicators so that county, rural-urban, and statewide trends could be analyzed. With data on homicide cases and PFA orders for the county in which they took place, the team was able to create county, rural-urban, and state totals for each. Monthly and yearly totals were calculated so that time trends could be analyzed. The third objective was to calculate prevalence rates for homicides and PFA orders. Once the data were in hand, the research team combined it with county-level U.S. Census population data, including age and racial distribution data. Homicide and PFA order totals could be estimated as prevalence rates within the county, rural-urban regions, and state population over time, allowing for better “apples-to-apples” comparisons across different geographies varying by population.

The final objective was to perform exploratory data analysis of 1) the characteristics related to homicides and PFA orders and 2) the trends in these rates. Statistical analysis of rural-urban differences and graphical comparisons over time allowed for the testing of trends moving toward the COVID-19 shutdowns starting in March 2020 and afterwards. The research team created this report to communicate potential effects of the pandemic on homicides and abuse and coded geographic information system (GIS) mapping tools for county visualization and comparison. Looking more closely at these differences, as well as analyzing changes in homicide/PFA order rates throughout the COVID pandemic, the research created a foundation for future research on rural-urban differences in crime trends.

Methodology

This section describes the data and methodology behind the three phases of the project: 1) data accumulation and creation of county-level time-series crime statistics; 2) descriptive, multivariate, and geographical analysis; and, 3) graphical presentation and report writing. Protection from abuse orders and homicide cases were analyzed for this project.

Protection from Abuse (PFA) Filings

A PFA order is a court order issued by a judge that can provide protection to a victim of abuse for up to three years. An individual who is 18 years old or older (or children with the accompanying guardian or adult household member) can file for an order requesting to make it illegal for the perpetrator to contact the victimized individual, whether criminal charges have been filed or not. In addition to PFAs, which involve an intimate or household relationship, orders can take two other forms: protection from intimidation (PFI) and protection from sexual violence (PFSV). PFI and PFSV orders are available for victims of sexual violence or are at risk of harm from a perpetrator that does not have a family, household, or intimate partner relationship with the victim. PFIs are appropriate when the victim is under age 18 and the defendant is over age 18 (PCCD, 2021). A judge can issue a temporary order if they believe that the court’s protection order is immediately needed without the defendant being present. In these cases, the judge would schedule a final hearing to be held within 10 business days, where the defendant can

consent to the PFA or request a full hearing. Conversely, the judge can deny the order at either stage if they do not feel that protection from the court is needed.

PCCD accumulated the data needed to analyze PFA filings for the months from 2017 to mid-2021. The data came to the research team in the form of de-identified PFA cases, with details on whether the order was temporary or final, whether it was granted or denied by a judge, the date of filing, and the county in which it occurred. Additionally, the data tell whether the order was a PFA, PFI, or PFSV. Since the data came from court petitions, demographic data related to PFA filings were limited. The sample included 276,375 PFA, PFI, and PFSV orders from January 2017 through June 2021.

Homicide Cases

PCCD constructed a data workflow via data analytics software to organize siloed data from various stages of the criminal justice process (e.g., arrests, sentences, victimization, etc.). This allowed PCCD to provide the research team with a database of de-identified cases for every homicide that occurred in Pennsylvania from 2012-2020. Case data included: county; date of homicide; victim age, race, and gender; type of relationship between offender and victim; and weapon type. To correspond with the standard definition of homicide used in other reports, cases of suicide, justified homicide (i.e., the killing of a felon who is in the act of committing a crime), and negligent manslaughter were dropped from the analysis. After data cleaning and removal of these cases, the sample included 6,931 murder cases from 2012 to 2020.

PCCD staff reviewed the data to ensure that there were no occurrences of personally identifiable information (PII) before transmitting to the research team, and the researcher team received IRB approval to work with data before receiving the data. The research team then analyzed the data for inconsistencies and reporting errors (e.g., duplications, missing data, radical aberrations, etc.).

Both PFA and homicide data were aggregated to county-level, rural-urban county group, and statewide monthly and yearly totals. These aggregate tables were combined with Census population data to compute prevalence rates in the population. Homicide is typically reported as a rate per 100,000 people to allow for comparisons across areas with varying population densities. The research team computed both homicides and PFA orders per 100,000 at the three levels of aggregation. Additionally, since the homicide data include gender and race data, homicide rates were also computed for these subpopulations (i.e., the male and female homicide rate separately). This allows for tests of gender or racial disparities in the homicide rate. A trend analysis of the four different rates can detect if one subpopulation's rate diverges from others. Finally, the researchers computed age-standardized homicide rates, which adjusts the raw rate to account for age differences across regions. This allows for better comparison between rural and urban areas because age differences across regions typically correlate with differences in homicide rates.

The research team conducted three different levels of analysis of this data. First, the researchers conducted an analysis of statewide time trends and characteristics to

describe the overall baseline for homicide cases and PFA orders in Pennsylvania, and to identify changes over time or in the nature of cases/orders. Second, aggregated rates for rural vs urban. county groups were presented graphically to identify differences in time trends; and rural/urban differences in mean rates were tested for statistical significance.²

Third, tables of county prevalence rates (averaged over the available data timeframes and for 2020) were created for county-level analysis. These tables were visualized as shaded county maps to communicate different homicide and PFA levels across the state.³ County-level homicide and PFA rates were also merged with COVID-19 case and death rates (per 100,000), drug overdose rates, and other indicators of economic hardship (unemployment rates and the percentage of people participating in SNAP). Multivariate analysis was conducted to test whether county-level variation in murder or PFA rates were associated with county variation in COVID rates or these other distress indicators.

Results

This section presents results of the analysis of homicide and PFA data. For each, the research team describes state totals and trends before moving to rural/urban comparisons and potential changes due to the COVID-19 pandemic. Additionally, the results are shown for a cross-county exploratory data analysis that tested for associations between these indicators for victimization and other important outcomes, including unemployment, SNAP participation, drug overdose rates, and COVID case and death rates.

Homicides in Pennsylvania from 2012 to 2020

Homicide trends over the past decade showed sharp year-to-year decreases followed by recent sharp increases, illustrated in Figure 1. The nine-year low occurred in 2014, with 669 homicides across the state, or a rate of 5.64 per 100,000 people. Since then, four of the past six years had increases in homicides, including 10 percent increases in 2015 and 2017, and a 20 percent increase in 2020. While this year-to-year change was large for the timeframe being studied, the longer time trend showed a steady increase in homicides since 2014, with a large one-year decrease occurring in 2019. For the Commonwealth as a whole, the 2020 totals of 889 murders are not surprising when considering the longer trend of increasing homicides over the past decade.⁴

² Data cleaning, merging, and analysis were conducted using STATA version 14.2 Statistical Software. All STATA code and data files are available upon request. Wald means tests were performed for rural/urban differences in population and workforce variables. Rural and urban means and standard deviations, as well as the rural-minus-urban differences, their standard deviation, and p-values are available by request to the authors.

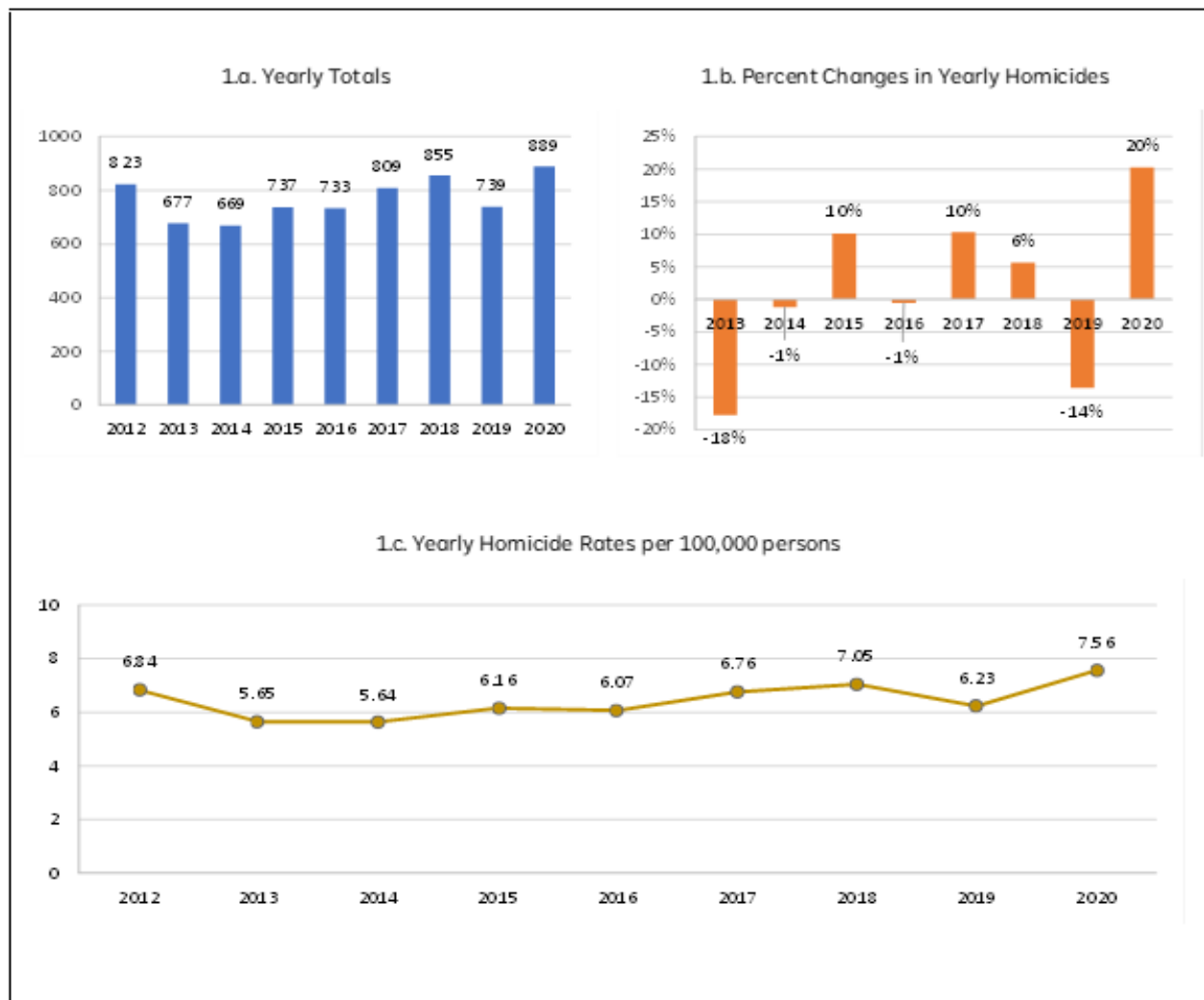
³ Maps in this report and on the website were made using QGIS software. The interactive map can be found here: <https://iup.maps.arcgis.com/apps/webappviewer/index.html?id=4e556c6198eb48efb0d0397a703e4123>

⁴ The nine-year average is 770 homicides ($SD = 73.02$). The 2020 total of 889 is 1.68 deviations from the mean.

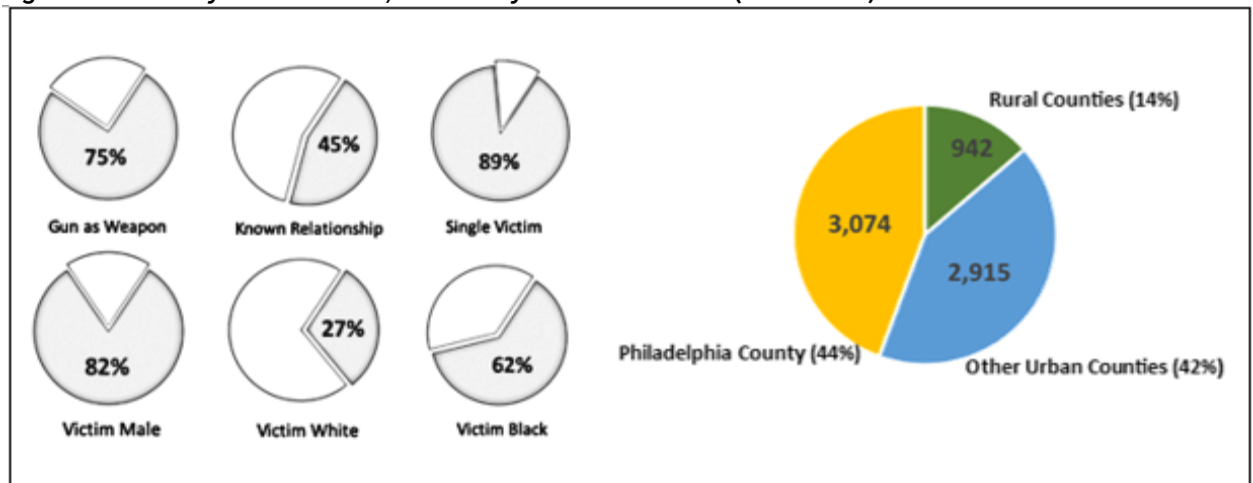
From 2019 to 2020, the homicide rate increased 21 percent (6.23 to 7.56 per 100,000). Calculated rates for the state were similar to those for the entire country. The rate for Pennsylvania in 2020 was slightly lower than the overall U.S. rate, calculated by CDC at 7.8 per 100,000 (Ahmad & Cisewski, 2021). The calculated rate for Pennsylvania in 2019 was slightly higher than the CDC's calculation for the U.S., which was 6.1 per 100,000. It should be noted here that the CDC's rate for Pennsylvania was almost one murder per 100,000 higher than the calculations in this study of 8.5 per 100,000 for 2020. One possible reason for this discrepancy was the different methods used to collect and calculate statewide statistics. The homicide data for this study included all homicides reported by all agencies across the state. Yearly reporting by national agencies (i.e., FBI) typically do not include totals from all agencies statewide and use statistical methods to estimate totals for missing areas. This can lead to estimated state totals that are biased toward agencies/regions that did report. For instance, if a high-homicide area reported its numbers while a lower-homicide area did not, estimating the latter's homicide rate based on data from the former's would lead to inflated homicide rates for the state. Instead of using data reported by law-enforcement agencies, the CDC calculates homicide rates based on data from death certificates, which may capture cases of justified homicide and/or negligent manslaughter, which are not included in this study.^{5,6}

⁵ Another possible reason for the 2020 discrepancy is that the authors used the actual Census population count for 2020 while using Census estimates from the American Community Survey (ACS) for the years 2012-2019. Since Pennsylvania's actual population was higher than ACS predictions, the population figures used in this study's calculations show a larger than normal increase between 2019 and 2020, which would reduce any homicide rate increases. However, this population jump only changes the murder rate by 0.1 percentage point, a small fraction of the 1.0 point difference from CDC estimates.

⁶ Differences in the place of the homicide and the place of the reported death may also account for differences in estimates.

Figure 1: Time Trends of Pennsylvania Homicides (2012-2020)

Notes: Author's calculations of PCCD/PSP data. All rates per 100,000 people are age standardized.

Figure 2: Summary Statistics of 6,931 Pennsylvania Homicides (2012-2020)

Notes: Author's calculations of PCCD/PSP data.

Nearly 7,000 homicides occurred in Pennsylvania from 2012 to 2020. Figure 2 describes some of the main characteristics measured in the data for homicides, illustrating where and how murder was concentrated in the state. The victims of homicide are overwhelmingly male, making up 82 percent of victims. Firearms were used as the murder weapon in 75 percent of reported cases. Fourteen percent of homicides occurred in rural counties, lower than their share of the overall population – 26 percent of the Pennsylvanians lived in a rural county in 2020. Sixty-two percent of homicide victims were Black, compared to making up only 11 percent of the state population. Additionally, 44 percent of all homicides during the timeframe occurred in Philadelphia County, so Philadelphia was separated into a third category for rural/urban comparisons in the remainder of the analysis.

Figures 3 and 4 show county homicide totals and rates per 100,000 people, both as yearly averages and for 2020. County averages over the entire nine-year timeframe provided a useful baseline for comparing 2020 rates and were useful for comparing counties to one another. Summarizing the map in Figure 3, 29 of 67 counties had higher homicide totals for 2020 than their yearly average for the whole study period, with 21 of these being rural. Of the 47 counties averaging at least one murder per year (28 are rural), 19 increased their totals in 2020 (11 being rural). Figure 4 shows that 30 of 67 counties had higher homicide rates in 2020 compared to their nine-year average, with 22 of these being rural.

When sorted by nine-year averages, the median county averaged two homicides per year. Two murders was also the median when sorting by 2020 totals – homicides increased in some counties in 2020, while others dropped, but the median remained the same. The median county homicide rate was three per 100,000 people, both as a nine-year average and for 2020. It should be noted that 44 percent of the state's population live in a county at or below the median rate of three murders per 100,000 and 25 of the 33 counties below the median were rural. The top quarter of counties had murder rates of five or more per 100,000 over study period, with 10 of the 17 being rural. Almost 44 percent of the state's population live in one of these counties.

Figure 3: County Homicide Totals

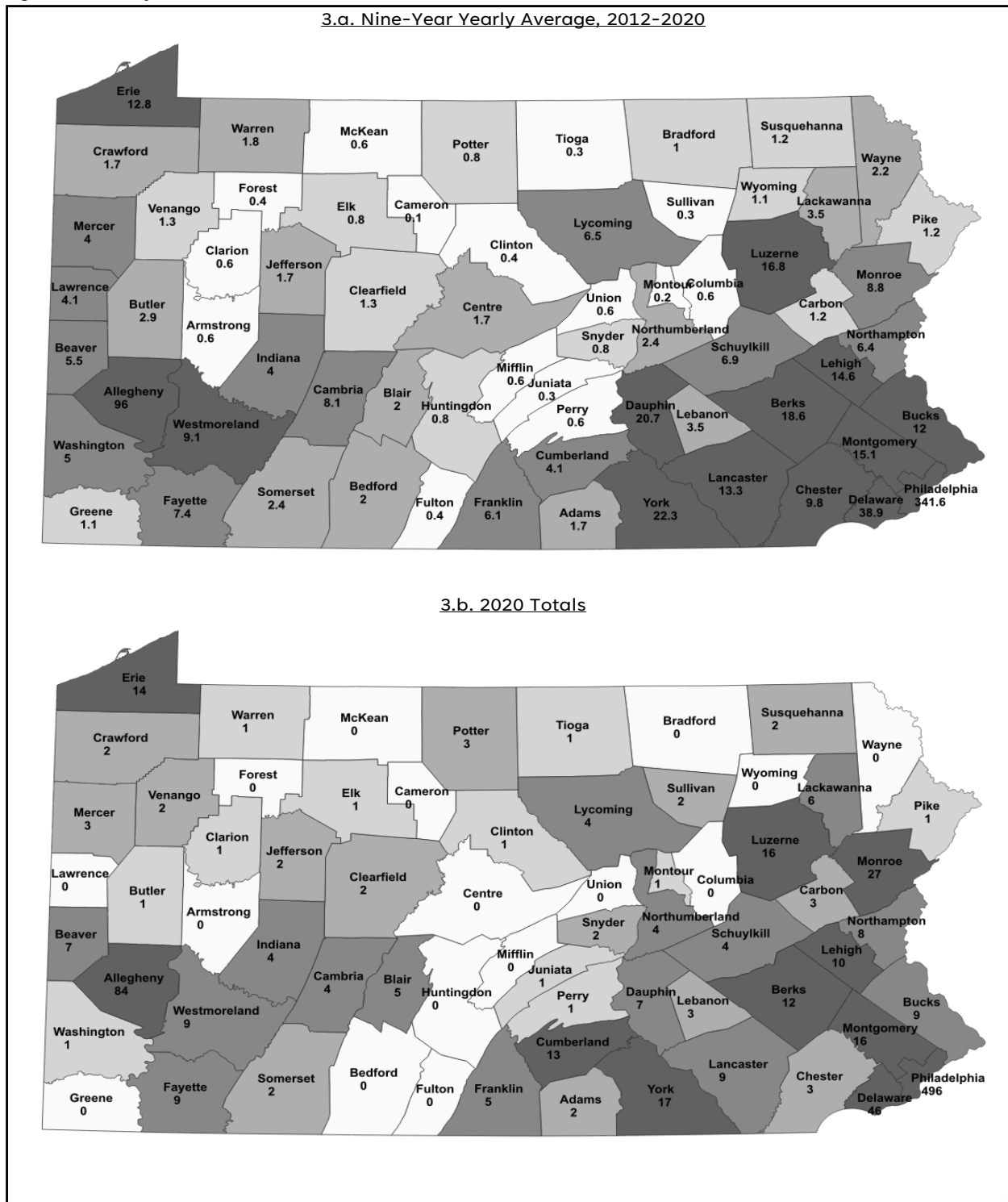
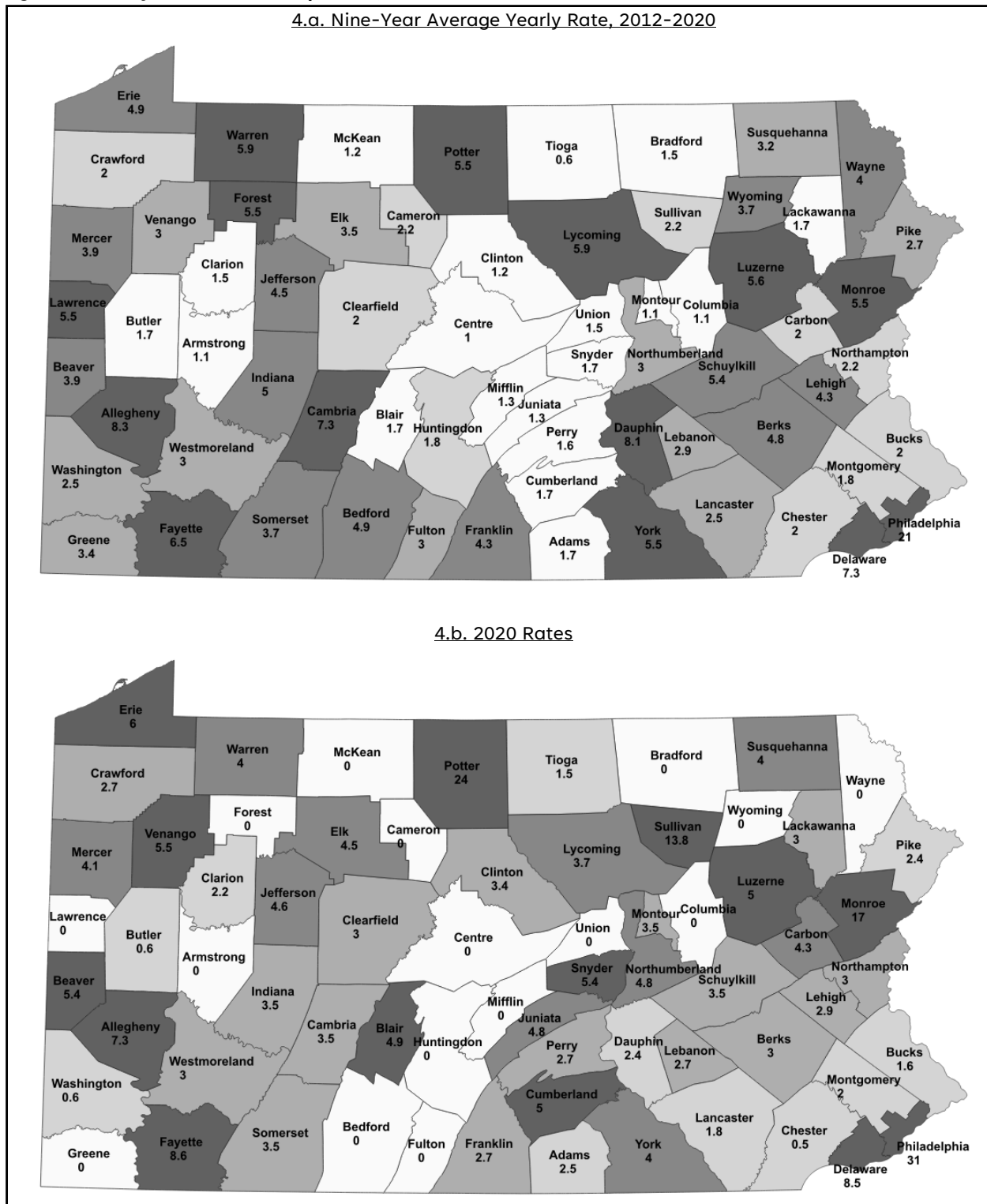


Figure 4: County Homicide Rates per 100,000 Persons

Notes: Author's calculations of PCCD/PSP data. Shading represents homicide rates, ranging from counties in the lowest fifth of rates (white) to those in the second, third, fourth, and fifth highest rates shaded with increasingly darker shades of grey.

Rural vs. Urban Comparisons of Homicide Trends

Philadelphia County was separated into its own category for rural vs. urban comparisons because it makes up such a large proportion of the state homicide total. This choice for comparative analysis proved to be useful in understanding how recent trends affected various areas differently.

Figure 5: Yearly Homicide Totals and Rates: Urban, Rural, and Philadelphia County (2012-2020)

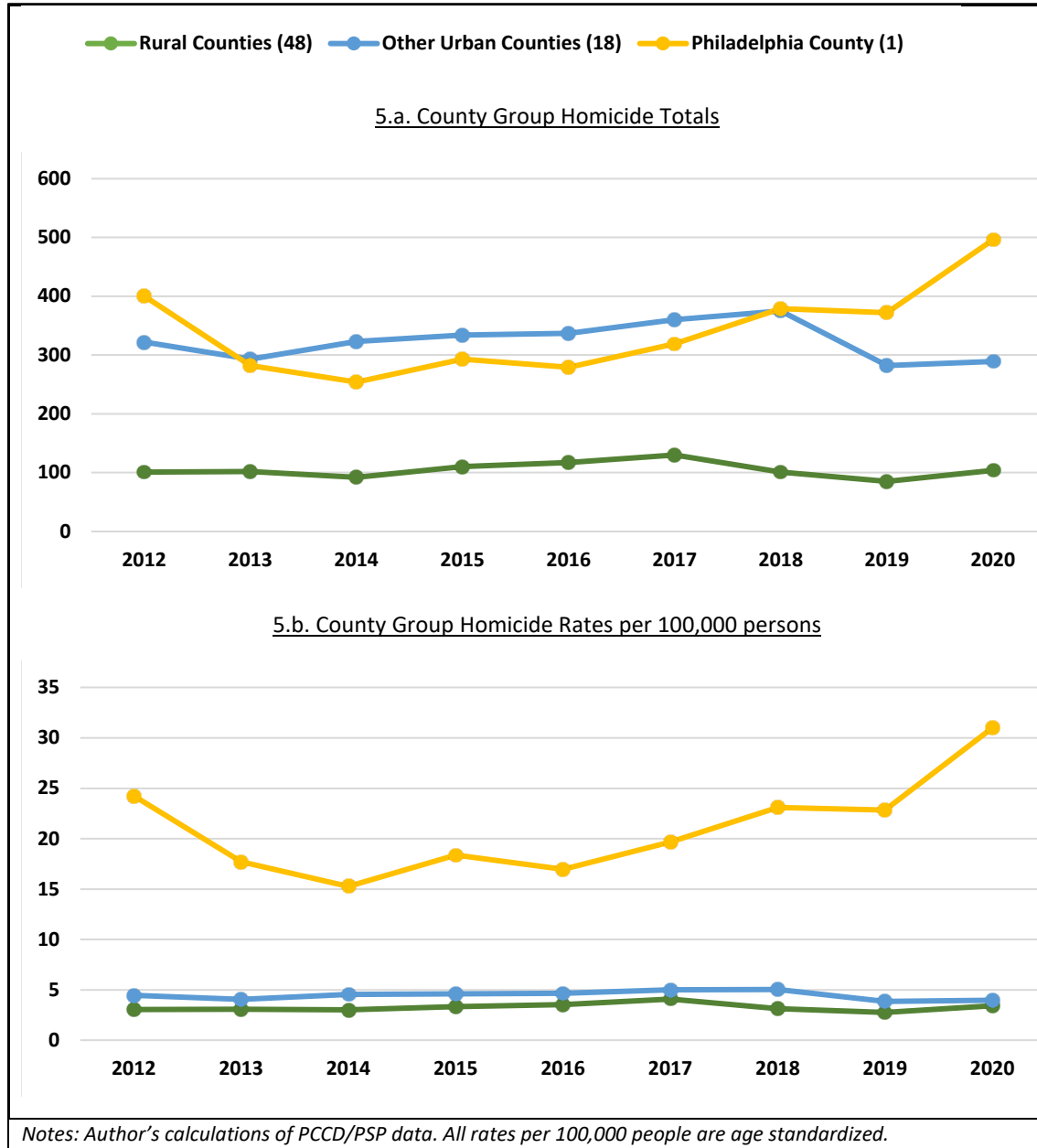


Figure 5 shows county group homicide totals and rates from 2012 to 2020. The 48 rural counties collectively experience about 100 homicides per year, with a high of 130 in 2017 and a low of 85 in 2019. Non-Philadelphia urban counties increased from 293 murders in 2013 to 375 in 2018, before falling. Philadelphia County showed the most dramatic

changes during this time, dropping by more than 100 murders between 2012 and 2013, and then almost doubling the from 2014 (254) to 2020 (496).

Homicide rates per 100,000, shown in Figure 5.b., provide a better metric for comparison between the country groupings, as it adjusts for population differences. For rural and non-Philadelphia urban counties, the homicide rate was fairly stable over the nine years studied, with the average for rural counties being about one murder per 100,000 lower than the other urban counties (3.3 vs. 4.5 per 100,000). Philadelphia County has a much larger variation in the murder rate, with a low of 15 per 100,000 in 2014 rising to a high of 31 murders in 2020. Between the relatively low rates of other counties, their relative stability over the past nine years, and the dramatic increases in the Philadelphia rate over this timespan, Figure 5.b. illustrates that the steady increase in the overall state murder rate was driven by increases in Philadelphia County.

The increases from 2019 to 2020, depicted in Figure 5.b., correspond to a 24 percent increase in the murder rate for rural counties, a 3 percent increase for other urban counties, and a 36 percent increase for Philadelphia County. It should be noted that these increases come after large declines in the homicide rate from 2018 to 2019 (-12 percent rural; -23 percent other urban; and -1 percent Philadelphia). Since any one year may be an outlier in terms of historical homicide trends, choosing the base year in calculating growth rates must be done carefully. Large percentage increases in 2020 were caused by the combination of relatively low rates in 2019 and relatively high ones in 2020. In summary, homicides steadily rose across county groups from 2014 to 2018, before falling in all groups in 2019, and rising again across all groups in 2020.

Increasing Homicide in 2020

To further analyze the increase in homicides in 2020, the research team used the 2017-2019 average as a base for comparison, rather than the 2019 total.⁷ The state averaged 801 homicides per year from 2017-2019, compared to 889 homicides in 2020, resulting in an increase of 88 murders from 2017-2019. Figure 6 breaks down this increase by county group across several factors related to the crimes. Figure 6.a. shows that the increase in 2020 took place in Philadelphia County, whereas rural and other urban counties actually experienced decreases in murders when compared against the previous three years. The remaining figures in Figure 6 further show that 2020 homicide increases had the following characteristics:

- Increases in male victims (number of female victims actually fell in 2020),
- Increases in Black victims (number of victims of other races fell),
- Increases in murders with firearms as the weapon type (other murders fell),
- For 2020, most of the increases were murders where there was no known relationship between the offender and the victim, although murders where there is a known relationship also increased.

⁷ Other bases were used in a robustness check, such as the eight-year average from 2012-2019, leading to similar results.

Using monthly homicide totals, the research team isolated the months that homicides increased in 2020. Figure 7 compares the change between each month in 2020 vs. the average number of homicides in that same month over the three previous years. For instance, Philadelphia County had a monthly increase of 35 murders in October 2020 vs. the average number in October from the previous three years. While rural and other urban counties hovered around no change from the previous year, Philadelphia County started the year with an increase of 13 homicides in January, eight more in March, and a string of double-digit increases from June to October 2020, for a total increase of 139 homicides for 2020.

Figure 6: Homicide Changes 2020 vs. 2017-2019 Average

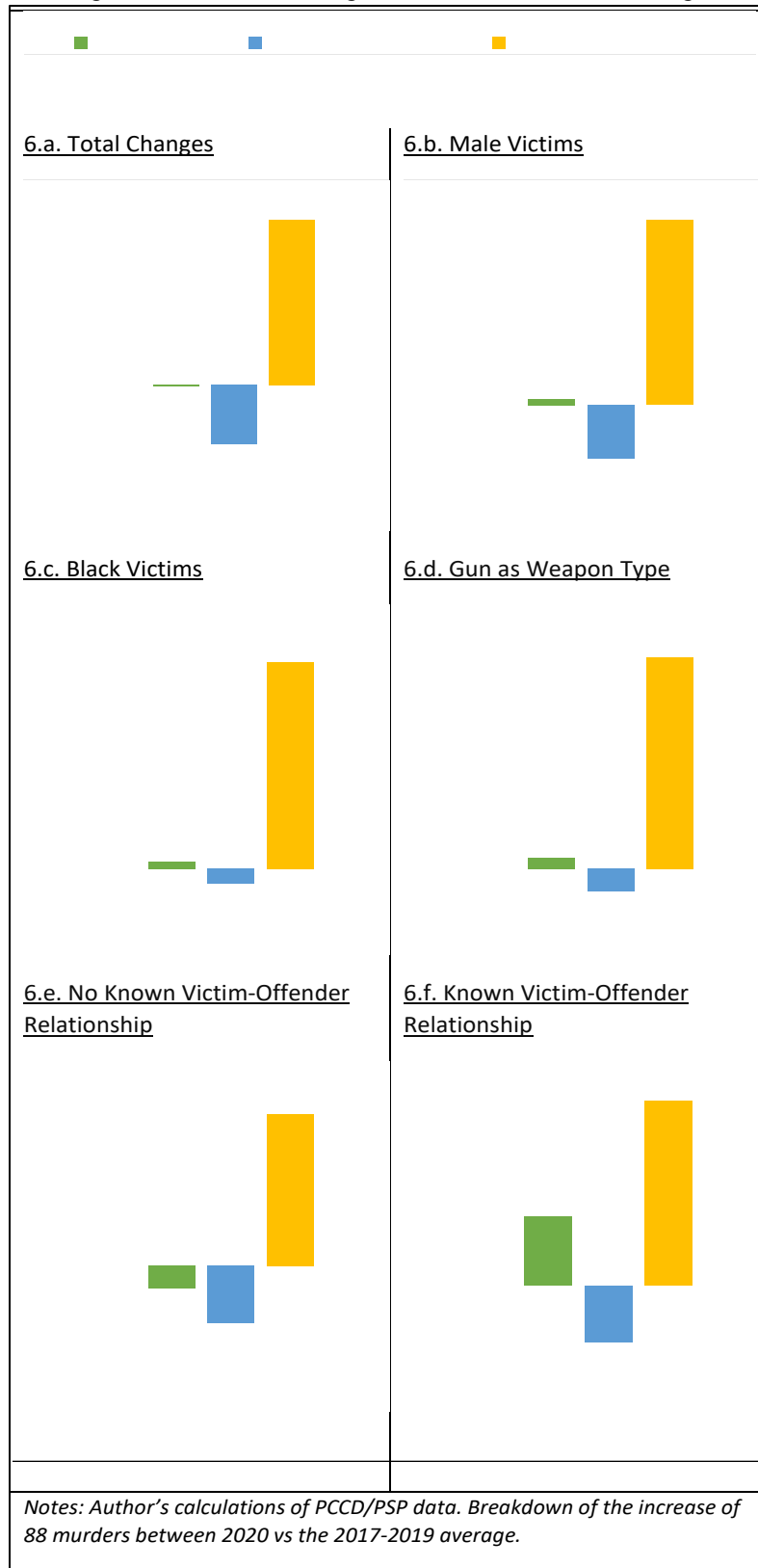
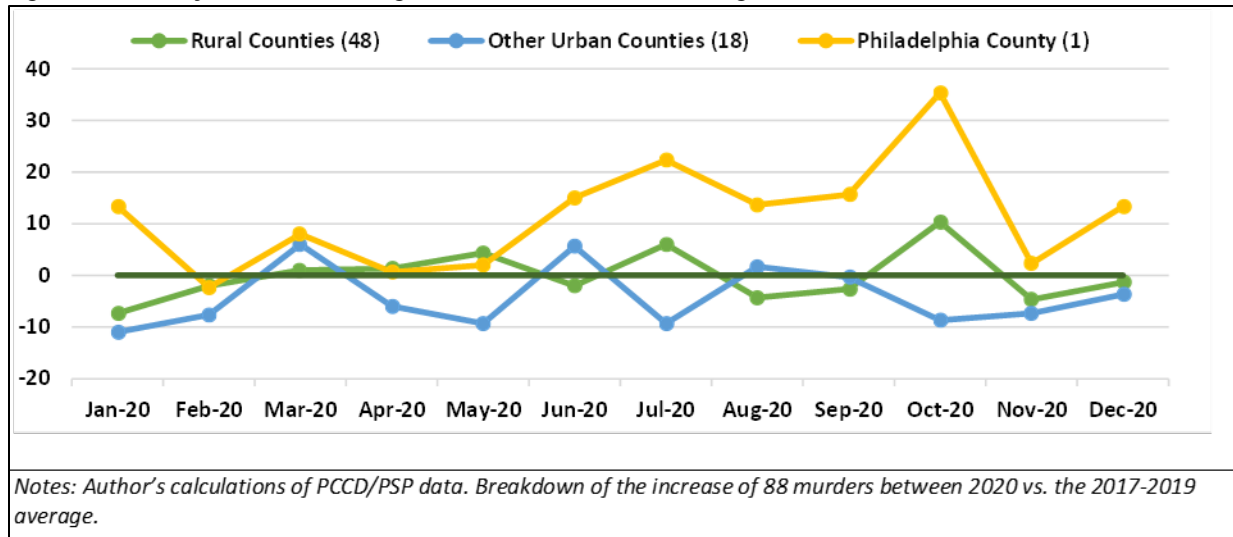


Figure 7: Monthly Homicide Changes 2020 vs 2017-2019 Average

Racial & Gender Differences in Homicide

As mentioned above, Pennsylvania homicide victims in 2020 were increasingly Black and male. This section more fully analyzes the racial and gender discrepancies in homicides since 2012. Since about 90 percent of homicides over the timeframe involved either Black (4,314) or white (1,850) victims, the rates were segmented into these two subpopulations for comparison.

From 2012 to 2020, the average homicide rate among the Black population was almost 20 times higher than that of the white population (2.1 vs. 37 per 100,000 people). The rate accounts for changing population demographics over time (i.e. relative growth of the Black population in Pennsylvania) and was age-standardized to account for age differences in the two subgroups. Figure 8 compares white and Black homicide rates across county groups separately. White homicide rates were about two deaths per 100,000 higher in Philadelphia County than other counties over the timeframe. The white death rate in rural counties averaged about one death per 100,000 more than other urban areas. Figure 8.b. shows that the Black homicide rate converged across the state from 2014 to 2017 before diverging afterwards, with the Black homicide rate for Philadelphia County doubling over the next three years.

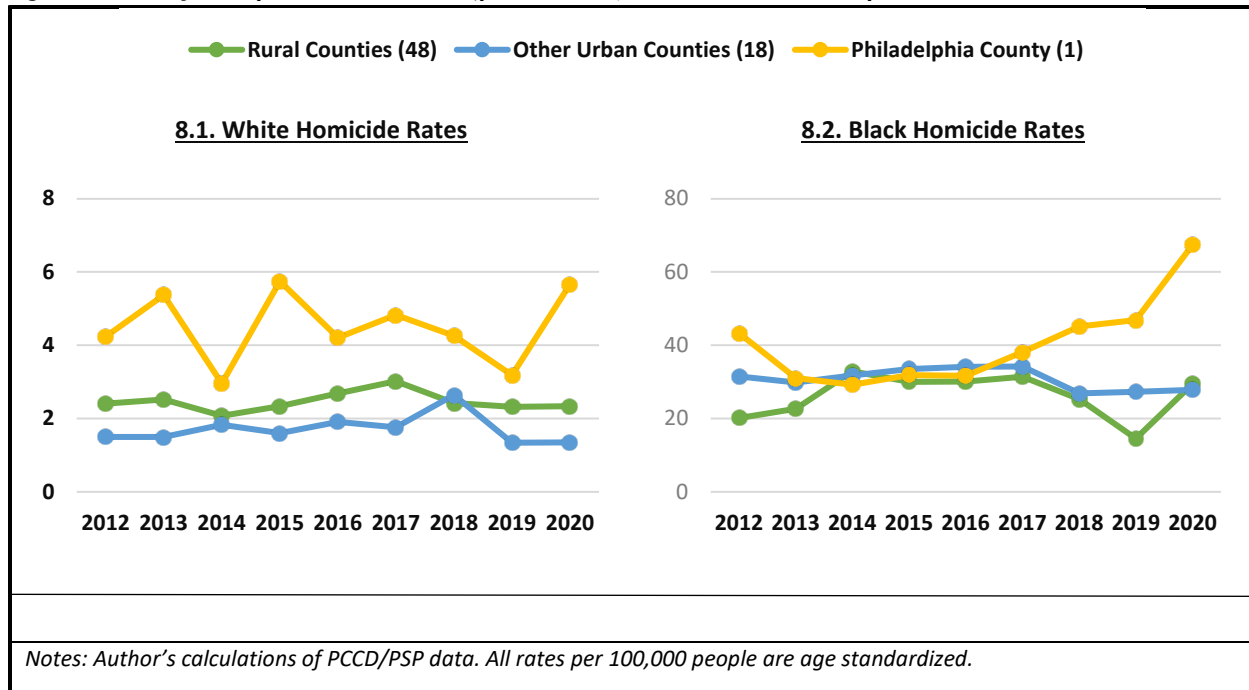
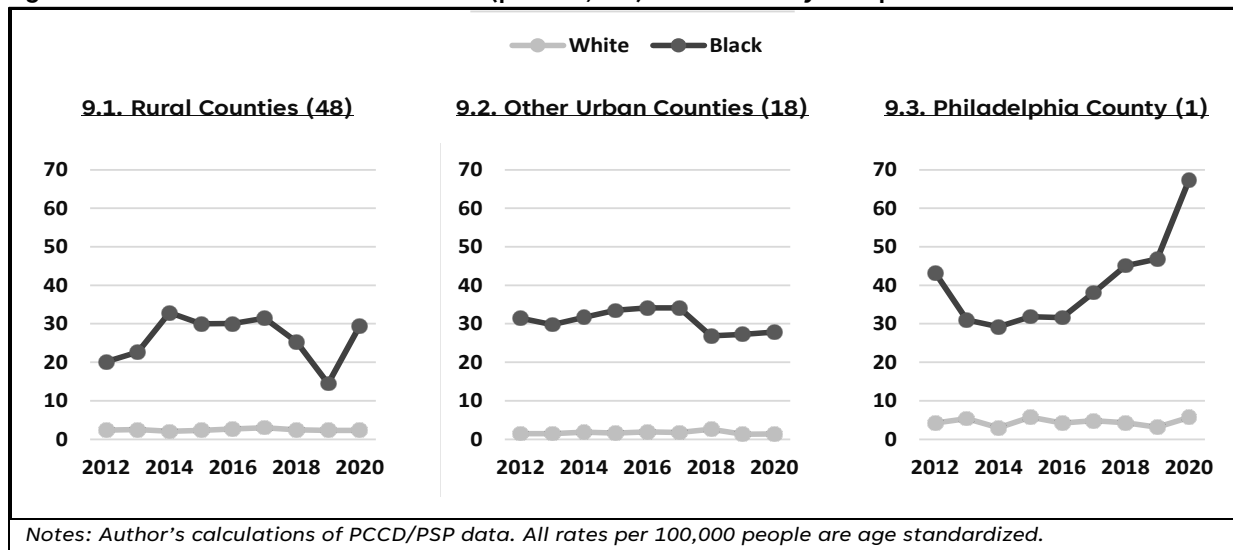
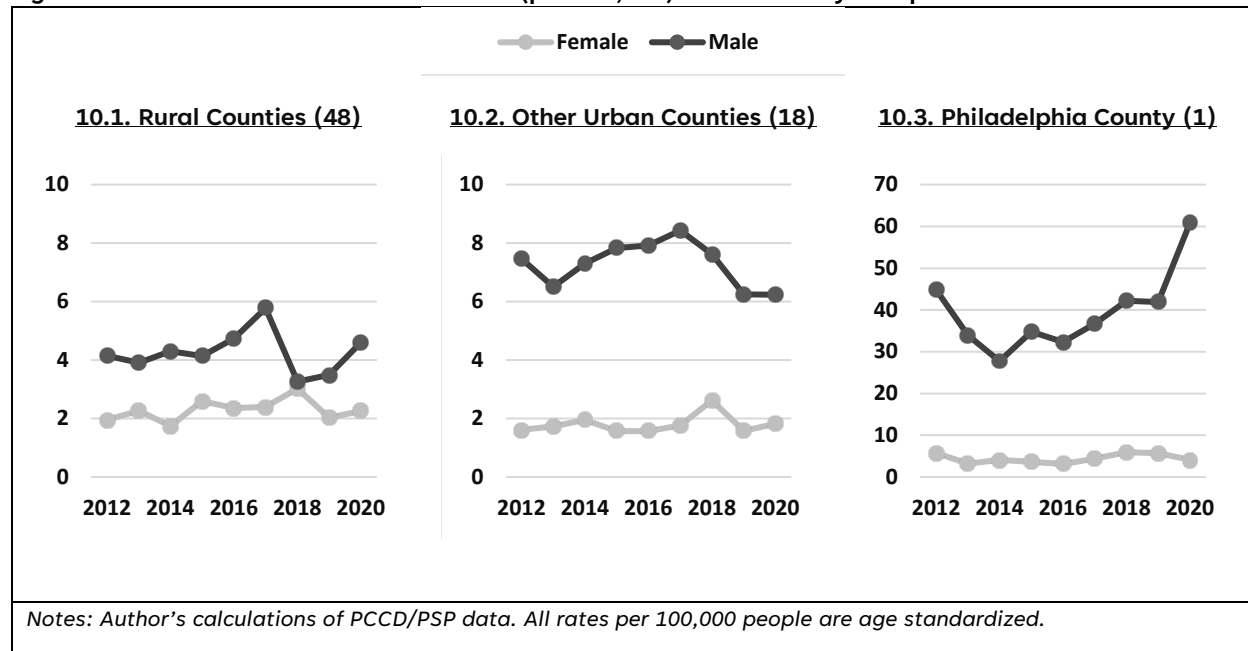
Figure 8: County Group Homicide Rates (per 100,000), Black and White Populations

Figure 9 further illustrates the racial disparity in homicide rates over time showing that the racial gap existed across all three county groupings. From 2013 to 2016, the gap was similar across the state, with the Black homicide rate hovering around 30-35 murders per 100,000 and the white rate between 1.5 and six murders. After 2017, the Black homicide rate diverged across county groups, with rural and other urban counties falling under 30 per 100,000 while Philadelphia County was rising to 45 in 2018, 47 in 2019, and 67 in 2020.

Figure 9: White vs. Black Homicide Rates (per 100,000) Across County Groups

Gender disparities differ across county groups in ways that racial disparities do not (see Figure 10). Across the state, male homicide rates were higher than female rates. Rural county gaps were smaller than those in other urban counties, with female homicide rates being slightly higher in rural areas (2.3 vs. 1.8 per 100,000, on average) and male rates being lower (4.3 vs. 7.3) than other urban areas. Philadelphia county had higher female and male rates than the other county groups (4.4 and 39.5, on average), with a much larger gender disparity. Black men were victims in 81 percent of Philadelphia County homicides in 2020 compared to 72 percent across the previous three years.

Figure 10: Female vs. Male Homicide Rates (per 100,000) Across County Groups



In a final analysis of homicide trends, the research team checked rural trends across a number of characteristics to detect any possible changes due to the COVID-19 pandemic. Figure 11 shows the percentage of homicides occurring in rural counties compared to the rural share of the population. In 2020, 12 percent of Pennsylvania homicides were in rural counties, the lowest rate since 2012.

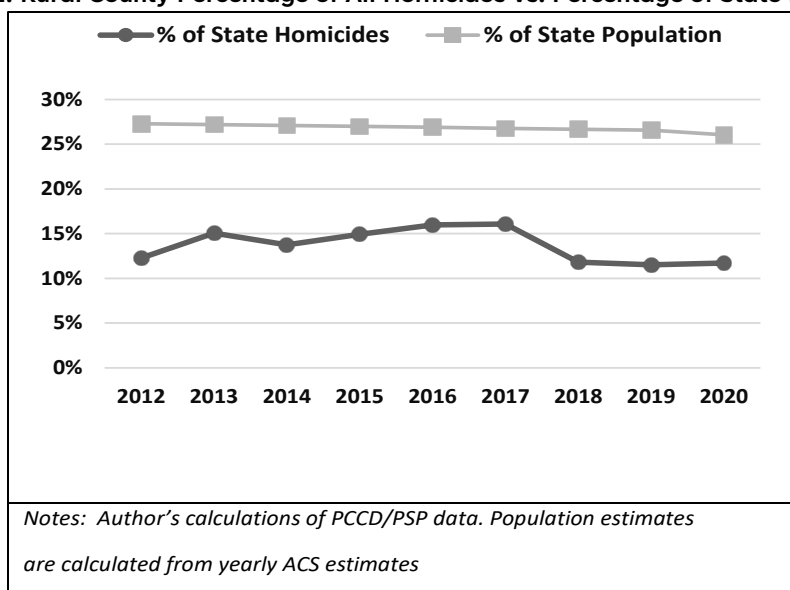
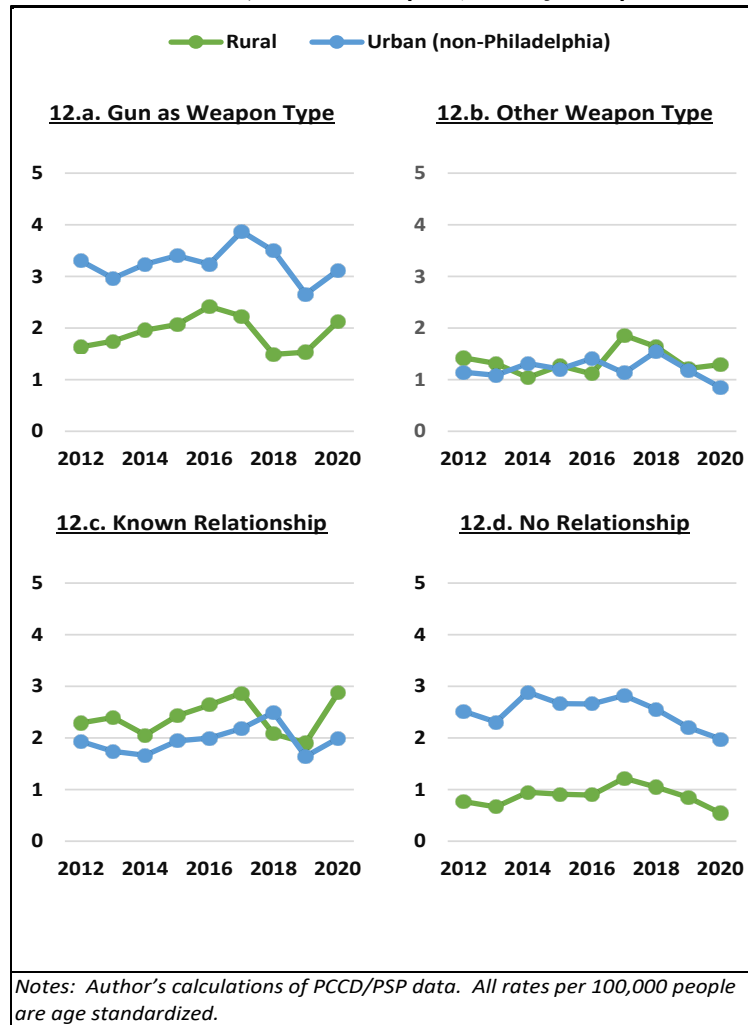
Figure 11: Rural County Percentage of All Homicides vs. Percentage of State Population

Figure 12 breaks down rural county homicide rates by various characteristics of the crime and compares them with other, non-Philadelphia counties. The use of firearms in homicides increased in both county groups from 2013 to 2017, falling in 2018 and 2019, then rising in 2020. The rural-urban difference was mainly driven by the difference in firearm-specific homicides, as the difference in non-firearm homicides is small.

A large difference between rural and urban homicides relates to the relationship between the offender and the victim. In rural counties, murders typically occurred between people who knew each other. Between 2014 and 2017, this rate rose almost one murder per 100,000 in rural areas, before falling and rising again in 2020. Urban areas had higher rates of murders where the victim did not know the offender, making up approximately half of all murders in these counties. These types of homicides accounted for a much smaller percentage in rural areas.

Figure 12: Comparative Homicide Rates (per 100,000), Rural vs. Urban (Non-Philadelphia) County Groups



Protection from Abuse in Pennsylvania from 2017 to 2021

Data on PFA, PFI, and PFSV orders can serve as a proxy for levels of abuse that occur in the state. This section analyzed protection order data to identify trends and test for changes that possibly occurred because of the COVID-19 pandemic.

Figure 13 summarizes statewide protection orders (including both those declined and granted) since 2017. Overall, orders were down about 3 percent from the 2017 total of 70,115. The prevalence of an order occurring in 2020 was 521 for every 100,000 people in the population. Few studies report protection order prevalence making it difficult to put Pennsylvania statistics into context. One study found that there were 882 orders in the California state system for every 100,000 people in 2003 (Sorenson & Shen, 2005). However, these numbers cannot be compared as that study may have counted multiple temporary orders differently than this study.

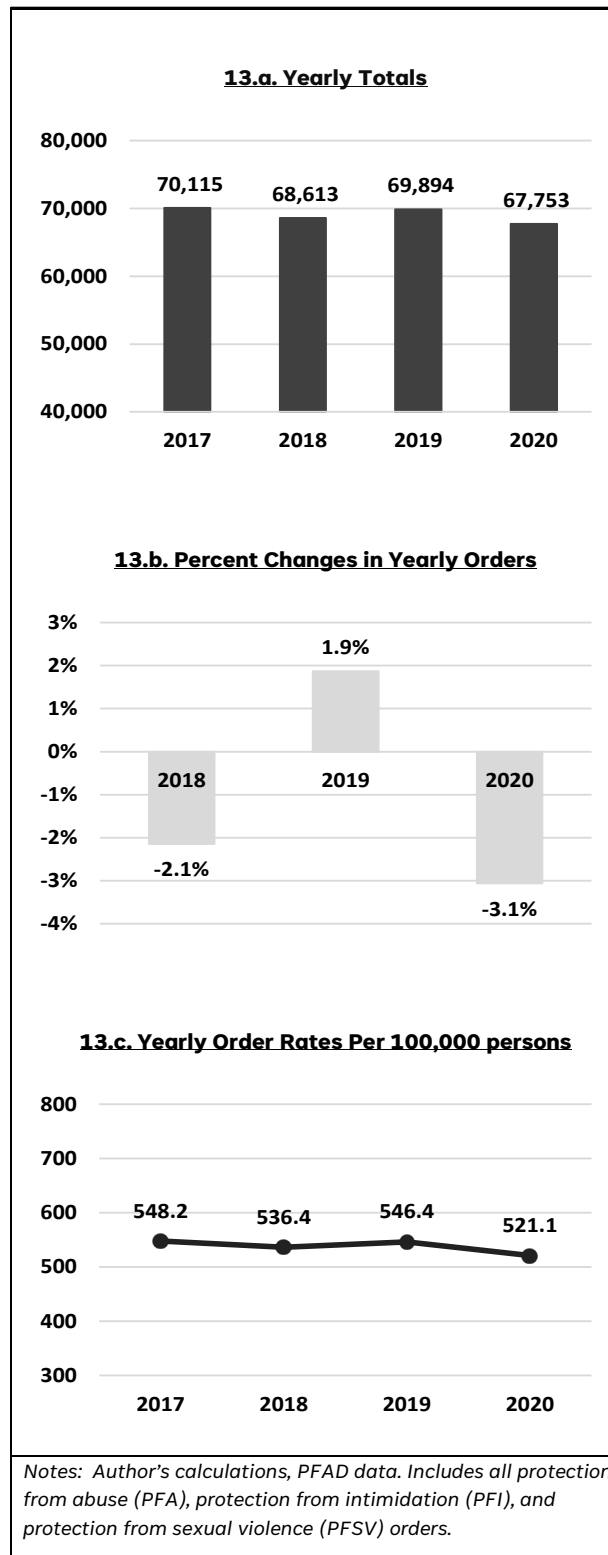
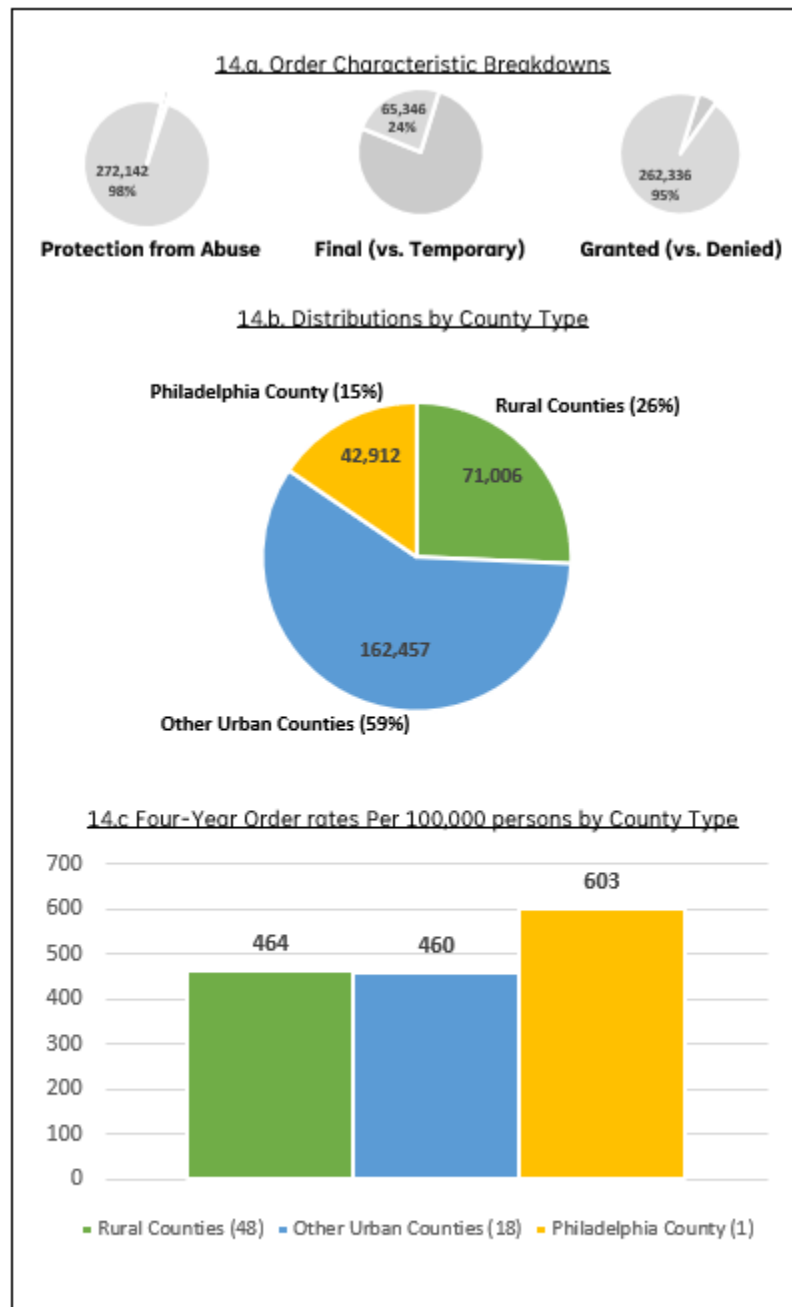
Figure 13: Time Trends of Pennsylvania PFA, PFI, and PFSV Orders (2017-2020)

Figure 14 breaks down protection orders across other characteristics. For instance, 98 percent of all orders were entered as protection from abuse. Due to differences in how counties categorize their orders (i.e., some counties appear to use only the PFA category), the following results include an analysis of PFAs only. Twenty-four percent of orders were final, with a victim of abuse typically receiving a temporary order before a final order was granted. Ninety-five percent of all orders from 2017 were granted, including both temporary and final orders. Protection orders were distributed across rural and urban counties similar to the population distribution, with approximately 26 percent of orders being filed in rural counties. Rural and other urban counties had similar prevalence rates over the four-year timeframe (approximately 460 per 100,000) while Philadelphia County had a higher prevalence at 603.⁸

⁸ Philadelphia County was separated from other urban counties in the analysis of PFA orders. Philadelphia's data showed a couple of distinct differences from other counties, likely due to differences in the filing, recording, and/or reporting of PFA orders. First, Philadelphia records almost no denials. Second, all orders were listed as PFA (with no PFI or PFSV).

Figure 14: Summary Statistics of 276,375 Pennsylvania PFA, PFI, and PFSV Orders (2017-2020)



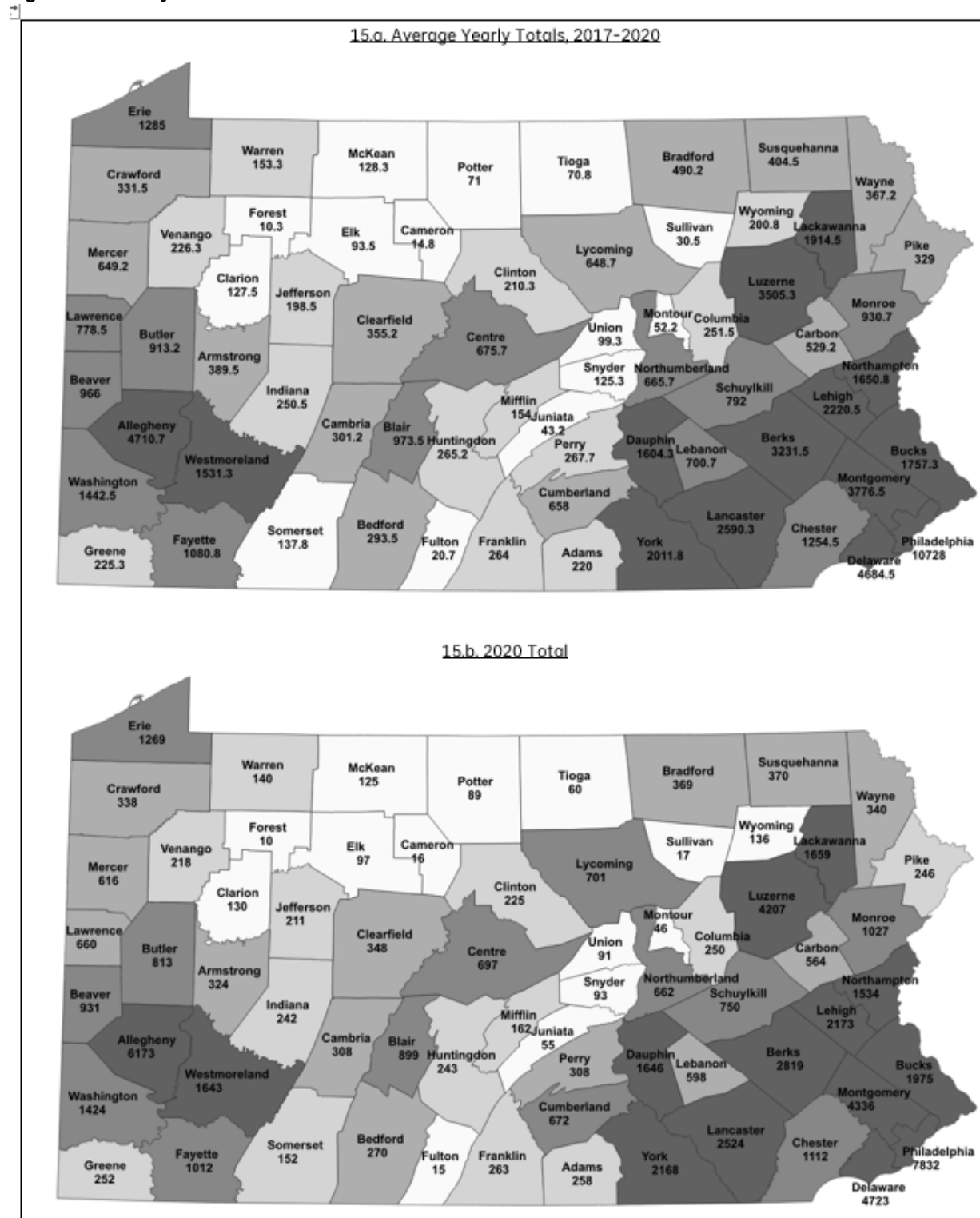
Notes: Author's calculations, PFAD data. Includes all protection from abuse (PFA), protection from intimidation (PFI), and protection from sexual violence (PFSV) orders.

Figures 15 and 16 map out PFA totals and rates by county. PFA orders per 100,000 increased in 28 counties in 2020 compared to the four-year average, with 21 of the 28 counties being rural. The median PFA rate among counties was 474 per 100,000 in 2020. The highest PFA prevalence rates occurred among a quartile of counties (17), with rates of 610 per 100,000 and over, with 13 of the 17 counties being rural.

Comparisons across county groups showed significant variation in PFA filings across the state and across the four years of data available. Figures 17.a. and 17.b. show PFA order totals and rates for the three county groups. While non-Philadelphia urban counties had a 5 percent increase in the number of PFA orders in 2020, Philadelphia County had a dramatic drop of 26 percent and rural counties had a drop of 8 percent. For Philadelphia, this drop continued a three-year trend of falling PFA order prevalence, converging to levels for the rest of the state.⁹ Thus, it was difficult to ascertain whether part of the decline in PFA orders was due to the COVID-19 pandemic, as opposed to being a continuation of the three-year decrease in orders (a 37 percent drop since 2017).

⁹ Rather than capturing a true decline in abuse, the decline of PFA order prevalence in Philadelphia County to a level comparable with the rest of the state might have been due to changes in the filing and/or recording of PFA orders in that county.

Figure 15: County PFA Order Totals



Notes: Author's calculations, PFAD data. Totals were not adjusted for population. Shading represents PFA order totals, ranging from counties in the lowest fifth of totals (white) to those in the second, third, fourth, and fifth highest shaded with increasingly darker shades of grey.

Figure 16: County PFA Order Rates per 100,000 persons

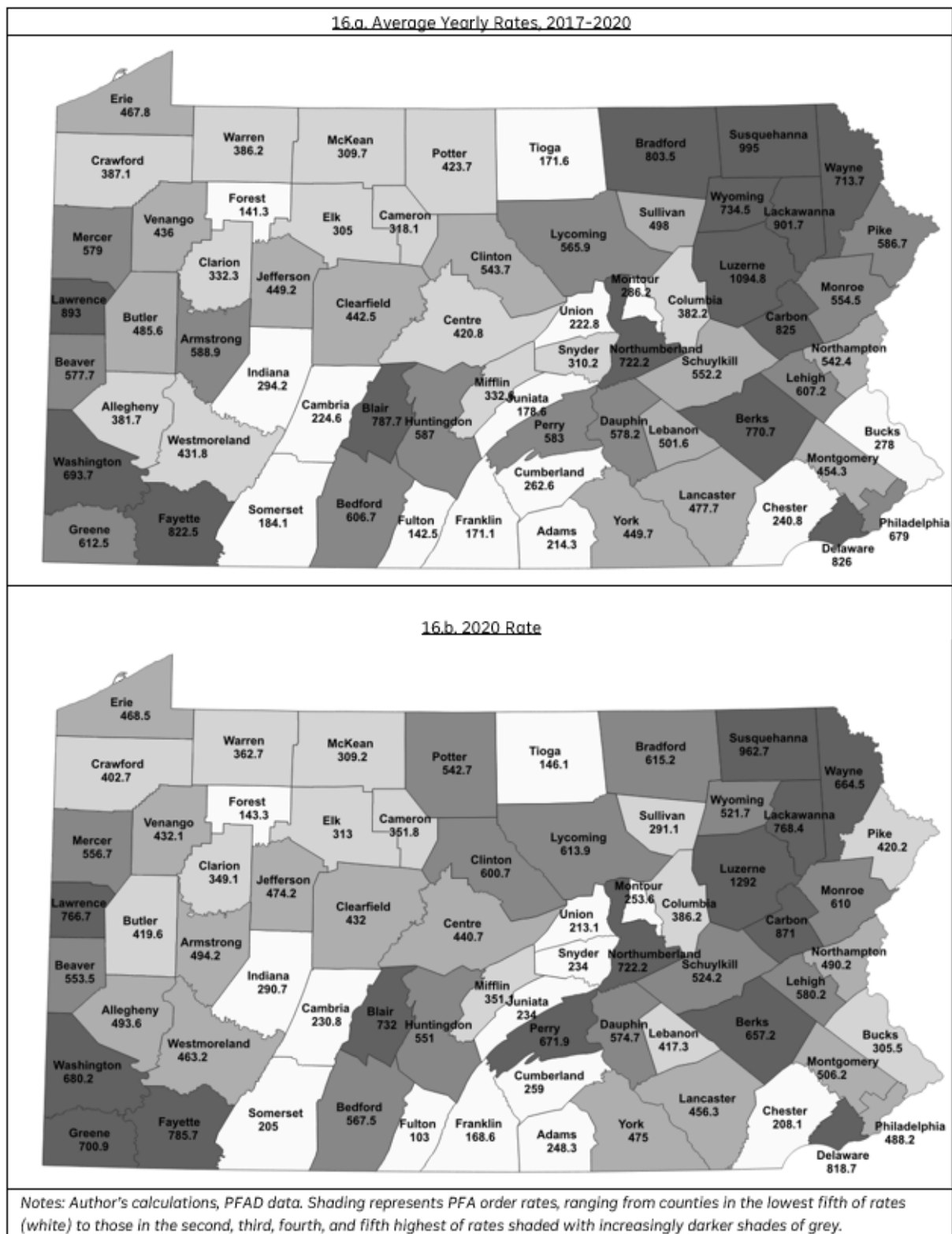
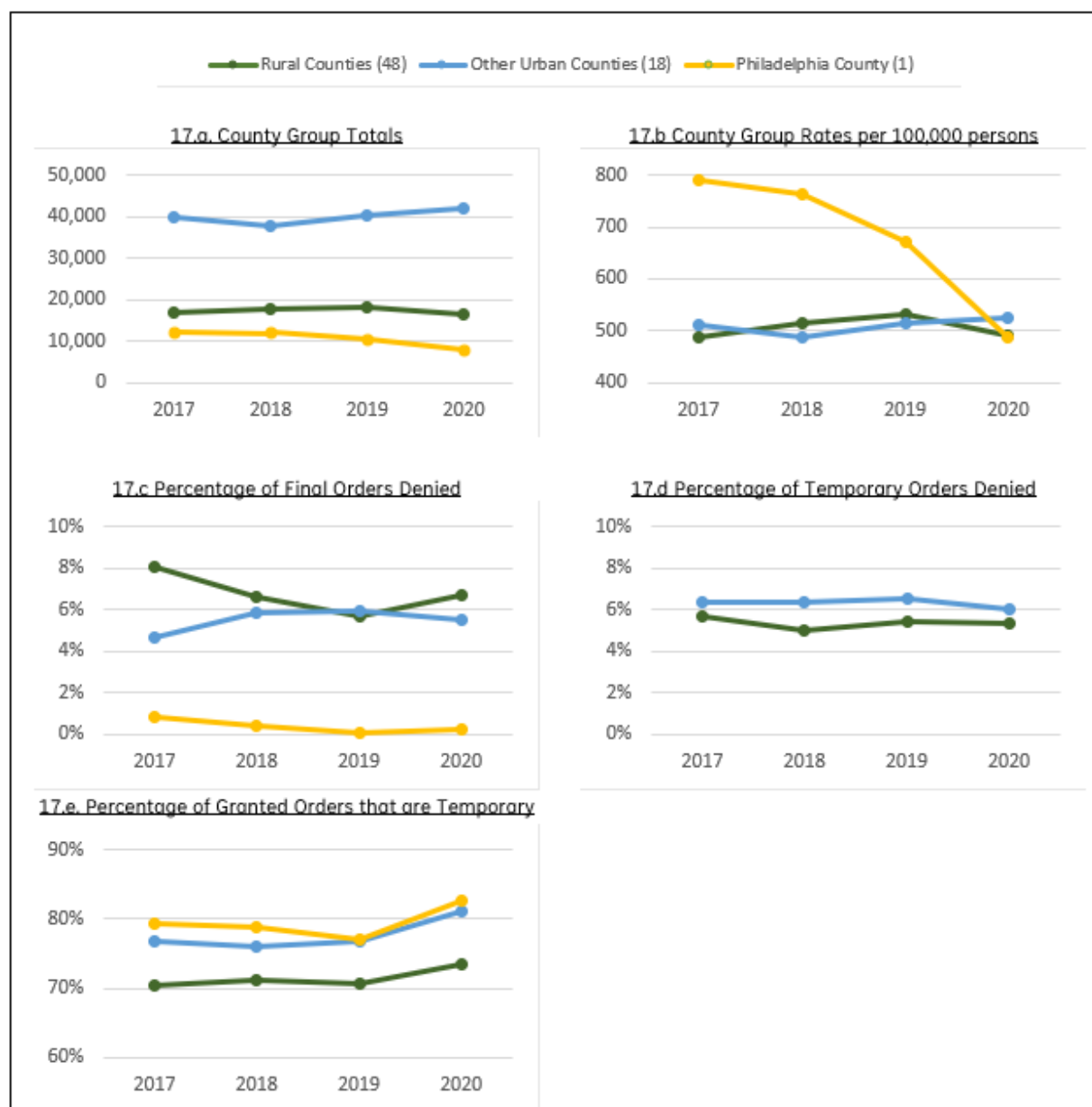


Figure 17: Yearly PFA Order Totals and Rates, Urban, Rural, and Philadelphia Counties

Notes: Author's calculations, PFAD data. Philadelphia County is not shown in the last graph because it lists zero denied across the four years.

The research team also analyzed the rate of PFA temporary and final orders that were denied and the percentage of orders that were temporary. This analysis allowed for testing of whether stress on the court system from the pandemic, leading to closures or additional restrictions, led to more or less orders being denied or on courts relying more or less on temporary orders. Trends shown in Figures 17.c. and 17.d do not suggest that yearly denial rates varied from previous years. One metric that shows both similarity across the state and variation in 2020 versus other years was the percent of granted

orders that were temporary, shown in Figure 17.e. After showing relative stability over three years, with each county group only varying by 1 percentage point from year to year, Philadelphia's proportion of total granted orders being temporary increased 6 percentage points in 2020, rural counties 2 percentage points, and other urban counties 4 percentage points. Overall, the state increased from an average of 75 percent of granted orders being temporary to 79 percent in 2020, the highest rate over the timeframe.

Monthly data shed further light on potential effects of COVID-19 on PFA orders. Figure 18.a. breaks down PFA filings (both granted and denied) into those final, temporary, and totals. Month-to-month, from 2017 to 2019, statewide final orders were steady, ranging from a low of 1,188 to a high of 1,771. In March 2020, final PFA orders fell to 662, then to 442 the next month before beginning to rise to 1,005 in May 2020 – three consecutive months that were lower than the three-year minimum suggests that the onset of the pandemic affected the ability of either courts to process final PFAs or for victims of abuse to file them. It should be noted that by June 2020, final orders had returned to historic levels.

Monthly temporary orders varied much more than final ones, and much of this variation was seasonal – regression analysis shows that PFAs increase in summer months.¹⁰ From 2017 to 2019, the highest number of temporary filings was 5,088 in August 2017, with only one other month reaching 5,000 orders. Since the beginning of the pandemic and the conclusion of this research, three months broke this mark: June 2020 (5,465), July 2020 (5,217), and June 2021 (5,021). While these 2020 increases may have been due to summer seasonality, they might have been heightened to the four-year maximum by the pandemic and/or policy responses, such as stay-at-home orders. Unlike final orders, temporary orders did not fall below the three-year minimums of 2017 to 2019.

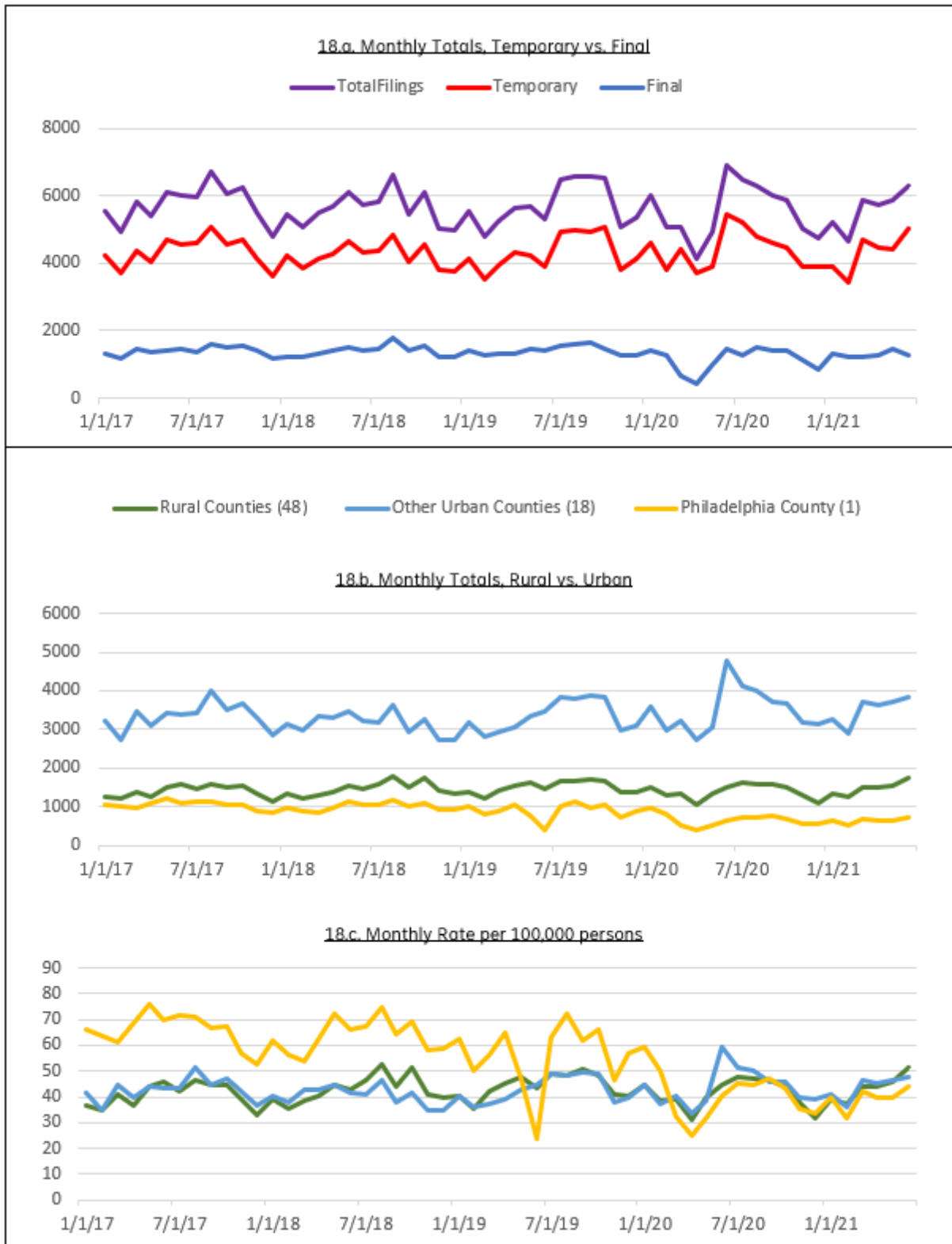
Figures 18.b. and 18.c. further show monthly dynamics across county groups in terms of PFA totals and prevalence rates. In April 2020, all three groups fell near or below the minimum monthly rate from the previous three years.¹¹ Interestingly, only other urban counties rebounded from this minimum by increasing over their previous maximum rates. For other urban counties, June 2020 (4,764) and July 2020 (4,139) had the highest monthly totals over the four-year span. Other than this outlier, other urban and rural counties tracked similar paths in terms of population-adjusted prevalence rates (Figure 18.c.). While Philadelphia County has had higher prevalence historically, it has converged to the rates of other county groups since 2020.

Final PFA orders require a court hearing, unlike temporary ones. Due to closures due to the COVID-19 pandemic in March and April 2020, we see final PFAs drop significantly during these months. Figure 19 shows that many counties severely decreased final PFA orders in April 2020, with Philadelphia County falling to zero, compared to 229 final orders

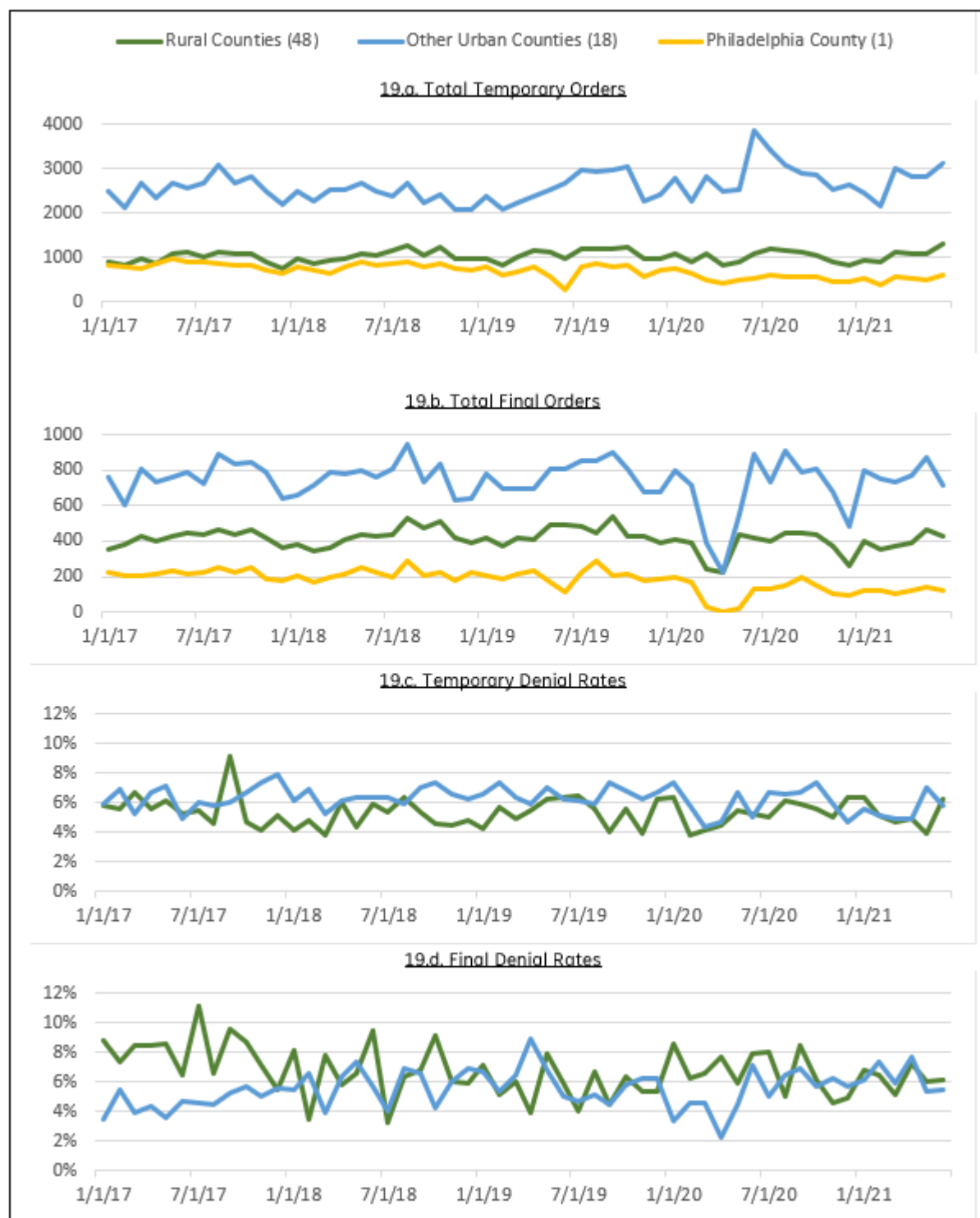
¹⁰ June, July, and August all increase by at least 400 orders, on average, compared to January ($p < 0.05$).

¹¹ Only Philadelphia had one lower month, June 2019, possibly due to changes in reporting requirements due to the passage of Act 79 earlier in the year.

granted in April 2019. Other urban counties' processing of final orders dropped 68 percent from April 2019, compared to a drop of 46 percent in rural counties, although prevalence of PFA orders per 100,000 was slightly higher in other urban counties (34 vs. 31 per 100,000). The fall in granted PFAs during this time was not due to denials. Figures 19.c. and 19.d. show that temporary denial rates fell in both county groups in March and April 2020 (Philadelphia County is near zero in denial rates throughout the period), and other urban counties' denial rates of final orders also dropped during these months, compared to the previous year.

Figure 18: Monthly PFA Order Totals and Rates, by Urban, Rural, and Philadelphia Counties

Notes: Author's calculations, PFAD data, January 2017 to June 2021.

Figure 19: Monthly PFA Temporary and Final Orders and Denial Rates, by Urban, Rural, and Philadelphia Counties

Notes: Author's calculations, PFAD data.

Cross-County Analysis of Homicide, Abuse, COVID, and Economic Indicators

A final set of analyses were conducted on county-level outcomes in 2020 to statistically test for any associations between variations in homicide and PFA order rates, COVID case and death rates, and economic distress indicators. Table 1 compares the mean county rates of rural vs. urban counties, showing that none of the calculated differences were statistically significant.¹² Philadelphia County was included in the group of urban counties for this analysis, a change that simplifies the presentation but does not affect the results.

Table 1: 2020 Economic, Crime and Health Outcomes, Rural vs. Urban County Means

	Urban	Rural
Unemployment Rate	8.9 (0.3)	9.0 (0.2)
Percentage of Population on SNAP	13.2 (1.3)	13.1 (0.5)
Homicide Rate per 100,000	5.2 (1.5)	3.3 (0.7)
PFA Order Prevalence (per 100,000)	540.8 (54.1)	457.5 (30.0)
COVID Cases per 100,000	7,289 (208.8)	7,618 (335.6)
COVID Deaths per 100,000	186.4 (6.0)	202.8 (10.8)
Overdoses per 100,000	46.8 (8.4)	45.2 (4.7)

*Notes: Authors calculations on outcomes across 67 Pennsylvania counties. All rates were for the year 2020 except for COVID cases and deaths, which were from March 2020 to February 2021. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$*

Taking account of population and rural/urban differences across counties, the research team tested whether higher COVID rates were related to higher homicide, PFA, unemployment and SNAP participation rates. Table 2 presents results of statistical tests

¹² It should be noted that these estimates are of county-level rates, not rates aggregated for all rural and urban counties, as done in the previous sections.

that checked for relationships between these outcome rates.¹³ Columns 1 and 2 suggest that there was no statistical relationship between differences in COVID case and death rates and differences in PFA order prevalence or homicide rates (coefficients near 0 suggest no relationship). In other words, counties with higher COVID rates did not also experience higher rates in PFAs or homicides. Columns 3 and 4 also suggest that variation in COVID rates were not associated with the two economic outcome indicators tested for: county-level unemployment rates and the percentage of people in the county participating in SNAP. Cross-county differences in COVID-19 rates were not related to cross-county differences in PFA orders, homicides, unemployment, or SNAP participation.

On the other hand, economic outcomes related to distress showed a strong relationship with homicide and PFA rates. Table 2 Columns 5-8 illustrate these relationships. A higher unemployment rate of 1-percentage-point was associated with a higher PFA prevalence of 41.72 orders per 100,000 ($p < 0.05$) and a higher homicide rate of 1.15 murders per 100,000 ($p < 0.01$). Counties with higher unemployment rates tended to also have higher murder and PFA rates. Similarly, a one point higher percentage of the population using SNAP associated 20.02 more PFA orders and 0.488 more homicides per 100,000 ($p < 0.01$ for both). Higher economic distress in a county was related to greater suffering in terms of murder and abuse.

¹³ Regression models control for population differences across the counties and include a rural-urban binary variable to further test for differences.

Table 2: Regressions of 2020 Economic, Crime and Health Outcomes

Dependent Variables	(1) PFA Rate	(2) Homicide Rate	(3) UE Rate	(4) % on SNAP	(5) PFA Rate	(6) Homicide Rate	(7) PFA Rate	(8) Homicide Rate
Independent Variables								
COVID Cases per 100,000	-0.020 (0.01)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)				
Unemployment Rate					41.72** (17.47)	1.151*** (0.423)		
Percentage of Population on SNAP							20.02*** (5.762)	0.488*** (0.141)
Rural County	26.32 (88.08)	-0.927 (2.166)	-0.169 (0.620)	0.687 (1.793)	41.72 (85.79)	-0.548 (2.077)	19.60 (82.13)	-1.111 (2.015)
<i>R-squared</i>	0.107	0.060	0.011	0.010	0.151	0.134	0.223	0.186

Notes: Authors calculations on outcomes across 67 Pennsylvania counties. Standard errors in parentheses. Control variables for county population were included in regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Conclusions

An analysis of homicides and protection from abuse orders over time sheds important insights on crime trends and on rural-urban differences, but it does not suggest large, long-term effects due to the COVID-19 pandemic throughout the state.

First, the statewide homicide rate rose 21 percent from 2019 to 2020, an increase that was relatively large for the past few decades and has attracted attention in the media. However, the trend analysis here suggests that the 2020 increase was not out of line from increases occurring since 2014 and was exaggerated by a relatively large decrease in homicides the year before. When compared to the three-year average from 2017-2019, the homicide rate increase was 13 percent – still large but in line with changes over the past decade. Additionally, this analysis showed that homicide increases in 2020 were specific to a certain group and location, rather than being widespread throughout the state: Black, male victims in Philadelphia County, murdered with a firearm, and most with no known relationship between the victim and offender. Trend analysis suggested that the growth in the homicide rate since 2014 (and accelerated in the latter half of 2020) has largely been driven by increases in Philadelphia County, with relative stability in the rates for other urban and rural counties.

Second, racial and gender disparities in the homicide rate were large and persistent throughout the timeframe analyzed (2012-2020), with the rate among the Black

population being about 10-15 times higher than that of the white population. This large disparity existed across all county groupings, rural and urban, but it has increased dramatically in Philadelphia County since 2017, with the homicide rate for the Black population reaching 67.4 per 100,000 in 2020 (compared to 5.7 for the white population in Philadelphia, 29.5 for the Black population in rural counties, and 27.8 for the Black population in other urban areas). Similar disparities were found between male and female rates, with higher homicide rates for males in all counties (with a somewhat lower gap in rural counties); these disparities have been rising only in Philadelphia County since 2016. While it might have been exacerbated by COVID-19, the trend of rising homicides against Black males was well established before the pandemic.

Third, courthouse closures during the onset of the pandemic in March and April 2020 led to a brief fall in final protection from abuse orders, with urban counties seeing the largest decreases during those months. Temporary orders were processed at similar levels during these initial months of the pandemic. The processing of final orders was back to pre-COVID levels by May and June 2020. The findings suggest that an increase of temporary orders came in the summer of 2020, but only in non-Philadelphia urban counties, possibly reflecting the need for those courts to catch up to the earlier decrease in orders. It should be noted that the lack of long-term changes in PFAs totals and rates, compared to the previous three years, is not evidence that the pandemic has had little or no effect on the prevalence or intensity of abuse. One should be careful in drawing conclusions from this finding – an alternate hypothesis that the pandemic increased barriers for victims filing PFA orders should also be considered, as incidences of abuse can rise despite PFA orders not increasing.

Finally, the exploratory analysis on county-levels of COVID case and death rates found no statistical evidence of an association between county differences in COVID rates, homicide rates, and PFA prevalence rates. In other words, high COVID-rate counties were also not more likely to experience high levels of PFAs or homicides. The same analysis does suggest that indicators of economic distress (unemployment rates and the percentage of the population on SNAP) are associated with PFA and homicide rates. County differences in unemployment and SNAP accounted for about one-third of the differences in homicides and PFA rates for most counties in the Commonwealth – counties with higher unemployment rates and SNAP participation also experienced higher murder rates and PFA prevalence. This finding holds when considering either 2020 rates or average rates across the timeframes studied.

The most dramatic finding of this research – that the increase in the state homicide rate was driven by the murders of Black men in Philadelphia County (with firearms as the murder weapon) – necessitates a policy response. However, studying the causes of this sharp increase in homicides in Philadelphia was beyond the scope of this report. As murders in Philadelphia made up 44 percent of all murders in the Commonwealth from 2012-2020 and 56 percent of murders in 2020 alone, active state support in helping the city and county address this issue is necessary. Using detailed data for the county, more

research can be done to investigate the specific factors related to the large, recent increases in gun violence and murder among Black men in Philadelphia.

Since the findings of this analysis are unclear as to whether the COVID pandemic had an effect on abuse, more research using a wider set of data should be conducted. Pairing data from call centers, victim compensation claims, and victims abuse services with PFA data can help test whether abuse, proxied by various variables, increased due to COVID. Additionally, expanding the dataset on homicides to include non-violent and property crimes can help policymakers better understand the effects of COVID on crime rates in Pennsylvania. Finally, more research should be conducted to see whether differences in county responses to the pandemic (i.e., differences in courthouse responses or community uptakes in mask usage) are associated with differences in case rates or the indicators of distress explored above. More detailed data on these differences across counties, as well as data on the ages of people contracting and dying from COVID in each county over time, would allow for further analysis of links between COVID and other variables related to socio-economic distress.

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