Center for RURAL Pennsylvania

A LEGISLATIVE AGENCY OF THE PENNSYLVANIA GENERAL ASSEMBLY

Suicide Trends and Prevention
in Rural Pennsylvania Counties and Schools

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Executive Summary

Key Findings:

- Suicide rates in Pennsylvania increased substantially from 1999 to 2018.
- In 2018, the suicide rate in rural counties was 25 percent higher than the rate in urban counties.
- Among rural and urban counties, there is substantial variation in suicide rates.
- Higher numbers of handgun sales per 1,000 residents, lower levels of education, lower incomes, larger populations over age 65, and higher levels of unemployment correlate with higher county suicide rates.
- Counties and school districts have highly diverse suicide prevention programs.
- Rural counties and school districts tend to be more dependent on outside support for their suicide prevention programs.
- Urban counties and school districts tend to offer more targeted suicide prevention programming.
- Few counties and school districts formally evaluate their suicide prevention programs for effectiveness.
- Suicide prevention programs across all counties and school districts were substantially impacted by COVID-19, but urban programs appeared more resilient.

Background

This study examined the overall trends in suicide across Pennsylvania's 67 counties from 1990 to 2018, the suicide prevention programs currently used by counties, and the programs that are used in K-12 school districts. The research used data from the Pennsylvania Department of Health and the U.S. Census Bureau to examine the trends in suicide rates, as well as which factors correlate with county rates. Data on county and school district programs were gathered using two surveys fielded in June and November 2020. A total of 46 counties (69 percent) and 134 school districts (31 percent) responded to the surveys. Data were gathered on each program's description, clients served, engagement with external partners, resources, evaluation procedures, and the impact of COVID-19 on the program's operation.

Research Findings

Suicide Trends

Suicide rates in Pennsylvania increased substantially from 1999 to 2018. The suicide rate among rural counties has been higher than that of urban counties, on average, and the gap has been increasing over the last decade. In 2018, the suicide rate in rural counties was 25 percent higher than in urban counties. That said, the overall rates mask substantial variation among rural and urban counties. For example, while rural counties had the largest increases in suicide rates from 1999 to 2018, York County, defined as an urban county by the Center, had a substantially higher rate in 2018, and a greater increase from 1999 than other urban counties. Of course, York County has large rural areas, so it is important to consider how rural and urban trends vary even within counties.

In assessing the factors that correlate with higher or lower suicide rates in Pennsylvania, the research found that higher numbers of handgun sales per 1,000 residents, lower levels of education, lower incomes, larger populations over the age of 65, and higher levels of unemployment were all correlated with higher county suicide rates from 1999 to 2018. Moreover, even when controlling for all of these other factors, the rural county suicide rate was higher than the urban rate. Many of the above factors themselves have rural-urban divides, thus compounding the risks for rural residents. It also appeared that broadband internet access limitations correlated with county suicide rates in 2015 and 2016, but broadband could be serving as a proxy for rurality.

County Prevention Programs

Rural and urban counties reported a diverse array of suicide prevention programming. In general, rural counties were more likely to form cross-county partnerships for the purpose of pooling resources and expanding their reach. Rural counties were also more reliant on non-

county funds and networks of external partners for providing their programs. Urban counties tended to be more self-sufficient. Rural counties were also more likely to provide programming for broad audiences, whereas urban counties reported more programs that focused on a specialized audience. Rural county programs were harder hit by the COVID-19 pandemic, with many having to shutter. Urban programs exhibited greater resilience in shifting to online platforms.

School Prevention Programs

Likewise, school districts varied in their suicide prevention programming, but the differences between rural and urban districts in resourcing and programming were fewer than those among rural and urban counties. Awareness and education were the most common programming provided by both rural and urban school districts. Roughly half reported their programs as being part of their Student Assistance Program (SAP). Many programs, like student clubs, were reported to have no cost to the school district. In fact, the median cost of reported programs for both rural and urban districts was nothing.

Program Evaluation

It was clear from both the county and school district surveys that neither are highly engaged in program evaluation. Reported methods of evaluation that were used occasionally included pre- and post-tests for education programs as well as other perception-based satisfaction surveys. More often, respondents reported using informal metrics like counts of individuals served. Roughly 60 percent of counties and 83 percent of school district programs did not report any program evaluation.

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Introduction

Every 11 minutes in the United States someone dies by suicide (Drapeau and McIntosh 2020). Suicide rates have increased over the past decade, with the most rapid changes occurring in rural America. Rural counties had the highest rates of suicide and the largest increases between 2005 and 2015 (Rossen et al. 2018). Suicide has long been the 10th leading cause of death in the United States, though the national suicide rate declined for the first time in a decade between 2018 and 2019 (Kochanek, Xu, and Arias 2020). Additionally, suicide rates vary substantially by age. It is the second leading cause of death among those ages 10 to 34 (National Institute of Mental Health 2018). Pennsylvania suicide rates were above the national average in 2016 for all age groups, except 65-74 and 85+ (CDC Wonder Online Database 2016).

Recognizing the prevalence of suicide, Governor Wolf created the statewide Suicide Prevention Task Force in May 2019 (Pennsylvania Governor's Office 2019) and all 67 Pennsylvania counties now have their own task forces. The purpose of these tasks forces is to coordinate county efforts to address the complexities of suicide (Pennsylvania Department of Human Services 2020b).

Suicide is a complex phenomenon; it has no single cause. There are, however, key factors that increase the risk of suicide, particularly for rural Americans. Beyond individual-level factors, like history of mental illness, lack of social support, and hopelessness, rural populations face additional risks due to limits in the "accessibility, availability, and acceptability of mental health care services" (National Advisory Committee on Rural Health and Human Services 2017, 5). Rural counties tend to have smaller ratios of mental health providers per capita. In Pennsylvania, Sullivan County has the lowest with 16 per 100,000 population compared to Montgomery County, with 333 per 100,000 (Pennsylvania Department of Health 2020). As of

December 2020, 83 million Americans lived in primary care Health Professional Shortage Areas (HPSAs), and 121 million lived in mental health HPSAs (Health Resources and Services Administration 2021). Fifty-nine percent of mental health HPSAs are in rural or partially rural locations, as are 62 percent of primary care HPSAs. In Pennsylvania, 23 of the 24 mental health and 31 of the 40 primary care HPSAs are rural (Pennsylvania Department of Health 2018b, a). Primary care access is important, as nearly 50 percent of victims contact their primary care providers one month before attempted or completed suicides (Stene-Larsen and Reneflot 2019). Thus, primary care physicians stand at the front lines of identifying patients at risk for suicide.

Access to lethal means is also a substantial concern for rural America. There is a rural-urban divide in firearm suicides, but not non-firearm methods (Nestadt et al. 2017). Rural men are especially susceptible to firearm suicide; in one study, 89 percent of firearm suicides were completed by men (Nestadt et al. 2017). In Pennsylvania, 63 percent of the 1,555 firearm deaths in 2016 were due to suicide (DePasquale 2018) and roughly half of all Pennsylvania suicides in 2017 were firearm-related (McIntosh 2018). The 10 Pennsylvania counties with the highest firearm suicide rates in 2012-2013 were all rural: Wayne, Elk, Carbon, Clarion, Schuylkill, Susquehanna, Clearfield, Somerset, Cambria, and Jefferson (DePasquale 2018).

Moreover, there are links between opioid use and suicide. Drug overdoses, diseases resulting from alcohol abuse, and suicide are referred to as "deaths of despair," and rural communities are particularly vulnerable to each (Case and Deaton 2015, 2020). Not only do risk factors overlap, so do treatment strategies (Vestal 2019). Individuals with opioid use disorder are at a higher risk of suicidal ideation and completion (Wilcox, Conner, and Caine 2004, Kuramoto et al. 2012). In fact, there are substantial misclassification problems with overdoses and suicides (Bohnert et al. 2013). One national study found that only 53 percent of adult opioid poisoning

cases were unintentional (Tadros et al. 2015). Anne Case and Angus Deaton (2020) argue that epidemic levels of deaths of despair, particularly in rural America, are the result of changing economic and social forces that have left these communities behind. This can be observed in Pennsylvania with high rates of both suicide and opioid use disorder in rural areas that have struggled with population declines, lagging education rates, and the loss of major industrial job creators (Center for Rural Pennsylvania 2018a, Behr, Christofides, and Neelakantan 2017, Behney et al. 2014).

Internet connectivity also has a complicated place in the story of rural suicide. Geographic isolation is a problem in rural areas and the lack of social integration is an important risk factor for suicide (Holt-Lunstad et al. 2015). Broadband internet connectivity not only provides a means for social connection, but internet-based cognitive behavioral therapies help overcome limitations in brick-and-mortar mental health services in rural areas (Kumar et al. 2017). Thus, the limitations in broadband access and high cost of access in rural Pennsylvania are highly relevant for suicide prevention efforts (Meinrath et al. 2019, Meinrath et al. 2020). Expansion of telehealth has long been touted as a means for linking rural populations to needed physical and mental health services, but lacking access to stable, fast, and affordable internet is an impediment (Bagchi 2019).

The global COVID-19 pandemic has further illuminated, and exacerbated, urban-rural healthcare divides. The concomitant rapid, though not systematic, expansion of telehealth services is a positive for some rural residents (Bagchi 2019), but rural health systems struggled with the virus as it affected increasingly rural areas in late 2020. The pandemic raised alarm among suicide prevention experts due to the potent mixture of increased social isolation from state mitigation efforts, ongoing deep economic crisis for low wage workers, increase in

domestic violence, and negative coping through alcohol and substance abuse (Gunnell et al. 2020, Sher 2020). Predictions of increases in deaths of despair in the United States, including suicides, that are due to COVID-19 and its social effects have ranged from more than 10,000 to more than 100,000 over the coming decade (Petterson, Westfall, and Miller 2020). Emerging results from scholarly research on the effect of COVID-19 on suicide rates in 2020 are mixed (Faust et al. 2020, Pokhrel, Sedhai, and Atreya 2020, Qin and Mehlum 2021, John et al. 2020, Leske et al. 2021, Isumi et al. 2020), but more time and research are required to understand the full effects.

Trends in the factors contributing to suicide are highly concerning, however. Rates of depression tripled during the pandemic (Ettman et al. 2020), firearm sales grew rapidly (Mannix, Lee, and Fleegler 2020), social isolation became acute (Monteith et al. 2021), and emergency room visits for suicidal ideation increased (Hill et al. 2021). Overdose deaths were already surging by the first few months of the pandemic. Between May 2019 and May 2020, the United States saw the largest number of overdose deaths ever within a 1-year period (81,000) (Centers for Disease Control and Prevention 2020). The CDC observed a distinct surge in overdoses during the lockdown period of March to May 2020. Ultimately, mortality data from 2020 show that suicides decreased, whereas deaths from overdose increased (Ahmad and Anderson 2021). Again, untangling the effect of COVID from the trend of already increasing overdose rates is challenging.

Reports are emerging, however, of the toll of remote learning on students. For example, Clark County (Las Vegas, Nevada) schools pushed to re-open after 18 student suicides occurred between March and December 2020, which was twice the rate of the previous year (Green 2021). Schools were forced to balance the threat of the pandemic with the threat of social isolation and

disruption of school-based mental health services.

Prevention

Schools are a vital focal point for suicide prevention. The first onset of many mental health disorders occurs during adolescence or the teen years (Kessler et al. 2007). In 2019, 35 percent of Pennsylvania high schoolers reported feeling sad or hopeless and 8 percent reported attempting suicide within the past 12 months (Pennsylvania Department of Health 2020). This puts schools at the forefront of identifying the emergence of mental illness and suicidal ideation. Schools, both urban and rural, are also vital sources of internet and computer access for many students. The shortage of these resources at home has proven to be a substantial problem for learning during the pandemic (Deppen 2021), as well as for other ancillary programs that schools offer (e.g., suicide prevention). Further, suicide rates are higher in rural communities than urban, a gap that grew from 1996-2010 (Fontanella et al. 2015). School districts, however, are vastly different in how they resource mental health services. Nationally, rural schools are less likely to provide mental health counseling than suburban and urban schools (Slade 2003). Pennsylvania state government has been working to increase access to school-based counseling services by mandating the presence of Student Assistance Programs in each school. What is not clear, however, is the effort schools are undertaking to specifically address suicide, how well those programs are resourced, and whether they are effective.

Pennsylvania also has a county-based mental health system that provides community-based services. Counties are required by the Mental Health and Mental Retardation Act (MHMR) of 1966 to provide services such as short-term inpatient treatment, partial hospitalization, outpatient care, emergency services, rehabilitation training, vocational rehabilitation training, and residential arrangements. Many counties also develop their own programs and initiatives to reduce suicide rates (Walmer 2018). In addition to the formation of

the statewide Suicide Prevention Task Force in 2019[1], counties have their own task forces.[2] The purpose of these task forces is to develop a comprehensive plan for reducing suicides by linking formerly disparate providers, resources, organizations, and government agencies. County governments, for example, are not the sole providers of mental health services. There are sometimes numerous governments, non-profits, and private sector organizations involved in prevention and postvention services, but their actions are not necessarily coordinated. The task forces are a recognition that the complex causes of suicide require a multifaceted and coordinated response. The statewide task force held a series of listening sessions in fall 2019 (Pennsylvania Department of Human Services 2020b) and issued a four-year plan in 2020 (Pennsylvania Department of Human Services 2020a).

This study had two main purposes. First, it compared suicide trends in rural and urban counties in Pennsylvania from 1990 to 2018. Second, the study inventoried county and school district suicide prevention programs. This effort provides policymakers and schools with an understanding of what practices are employed across the state, how they are resourced, whether districts have a method for evaluating their impact, and if there are differences between urban and rural schools.

Goals and Objectives

Goal #1: Analyze suicide rates, patterns, and trends from 1990 to 2018.

- *Objective 1a*: Locate total deaths by suicide in each county from the Enterprise Data Dissemination Informatics Exchange (EDDIE) maintained by the Pennsylvania Department of Health.

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[1] https://www.dhs.pa.gov/Services/Assistance/Pages/Suicide-Prevention.aspx.
[2] https://www.preventsuicidepa.org/task-force-county-init/.

- *Objective 1b*: Use county populations to calculate the number of suicides per 100,000 population, a common measure of suicide rates.

- *Objective 1c*: Plot rates of change in suicides from 1990 to 2018 for rural and urban counties and create Pennsylvania county maps for the 2018 suicide rate and the percent change from 1999 to 2018.

- *Objective 1d*: Use regression analysis to examine differences in suicide rates from 1999 to 2018 across Pennsylvania counties based on county-level demographics (age, sex, race, education, percent married), economics (unemployment rate, household income), access to means (firearm sales), broadband availability, and rurality (urban-rural, as defined by the Center for Rural Pennsylvania).

Goal #2: Inventory suicide prevention and counseling programs and services in rural and urban counties in Pennsylvania.

- *Objective 2a*: Identify the common, as well as innovative, types of programs offered.

- *Objective 2b*: Identify the levels of funding, staffing, and clients served within each county.

- *Objective 2c*: Compare resourcing between rural and urban counties.

Goal #3: Inventory suicide prevention and counseling programs and services in rural and urban school districts in Pennsylvania.

- *Objective 3a*: Identify the common, as well as innovative, types of programs offered.

- *Objective 3b*: Identify the levels of funding, staffing, and clients served within each school district.

- *Objective 3c*: Compare resourcing between rural and urban school districts.

Goal #4: Assess the impact of county- and school-based suicide prevention efforts.

- *Objective 4a*: Identify how counties and schools are evaluating their programs.

- *Objective 4b*: Report any self-evaluations of impact provided by counties and school districts.

Methodology

Pennsylvania Data

To analyze suicide rates, patterns, and trends in Pennsylvania from 1990/1999 to 2018, the researchers collected county-level data about suicide deaths, firearms sales, demographics, economics, and broadband availability through several different data sources. First, the researchers collected the data about suicide death rates from the Pennsylvania Department of Health's Enterprise Data Dissemination Informatics Exchange (EDDIE) system.[3] EDDIE has the number of suicides by county from 1990 to 2018. National trends have illustrated both declines and increases across the last 20 years, so the entire time trend was included in this study to gain a better sense of whether the gap between rural and urban counties was stable or growing over time. Given that counties have a great deal of variation in their overall populations, the raw counts of suicide deaths from EDDIE were standardized based on county population per 100,000, a common measure of suicide rates. This allows for appropriate comparison between counties with different populations. Overall suicide rates for the rural and urban counties were also calculated based on the total number of annual suicides and population for each set of counties.

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[3] https://www.phaim1.health.pa.gov/EDD/.

To measure access to lethal means, the researchers collected annual firearms sales data for handguns from the Pennsylvania State Police's Firearms Annual Reports from 1999 to 2018.[4] The reports included both taxed and non-taxed firearm sales/transfers reported by county. The rates of handgun sales were standardized based on the county population per 1,000.

The Center for Rural Pennsylvania provided data on county demographics, economics, and broadband access. The demographic data, including total population, gender, race, and age, provided by the Center were based on the Estimated Population and Housing from the U.S. Census Bureau. The Center provided intercensal estimates to keep the data from the same source rather than to mix and match the decennial census with intercensal estimates. Unlike decennial census data that count the entire U.S. population every 10 years, intercensal estimates are generated each decade by adjusting the annual time series of postcensal estimates for a decade. Intercensal estimates are useful to smooth the transition in data from one decennial census to the next.

Five demographic variables were included in this analysis: sex, race, age, education, and marriage. The following were used for the variables:

- Sex - the percentage of males per county;[5]

- Race - the percentage of white residents in each county (note: in 2000, the U.S. Census Bureau changed the race categories from "white," "Black," "American Indian or Alaska Native," and "Asian or Pacific Islander" to a specific race like "white Alone" and "two or more races." For this reason, the researchers used "white" in 1999 and "white alone" since 2000);

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[4] https://www.psp.pa.gov/firearms-information/Pages/Firearms-Annual-Reports.aspx.
[5] Data on gender identification were not available for this analysis, but it is notable that the adult and adolescent transgender communities have a higher risk of suicide than the general population (Toomey, Syvertsen, and Shramko 2018, Narang et al. 2018).

- Age - the percentages for the four different age groups of below 24, 25 to 44, 45 to 64, and 65 plus. Only the 65 plus group percentage was included in the analysis, as it is a population of particular concern for suicide in Pennsylvania (Pennsylvania Department of Health 2020).

- Education - the percent of college-educated residents (bachelor's or higher degree);

- Marital status – the percent married, which included both present (not separated) and absent (separated) status.

The researchers could only access 1990 and 2000 decennial Census data and the 5-year average data for education (from 2009 to 2018) and marital status (from 2010 to 2018) from the American Community Survey. Thus, they decided to use each 5-year span to measure education and marriage for the middle year of that span. For example, the first 5-year span for education is 2005-2009. In this case, the researchers used the average value to measure 2007's education percentage. The alternative would be to fix the values across all 5 years at the average, but this would result in jumps and then plateaus every 5 years. Regardless of the method, there were gaps in measuring both variables from 1999 to 2018. The researchers used linear interpolation to fill in missing years for each county for education and marital status.

Regarding county economies, the researchers used both employment and income data. For employment status, they used the percentage of unemployed. The data source was Local Area Unemployment Statistics from the Center for Workforce Information and Analysis at the Pennsylvania Department of Labor and Industry. For income data, the researchers used both per capita income and per household income. Per capita income was based on the U.S. Bureau of Economic Analysis, and the Median Household Income was based on the Small Area Income

and Poverty Estimates from the U.S. Census Bureau. Both data were adjusted for inflation using the CPI-U with 2018 = 100.

Data on broadband access were collected from the 2017 and 2018 American Community Survey on household internet service. Both datasets provided overlapping 5-year averages (2013-2017 and 2014-2018) for the percentage of households with and without broadband internet access. A household can have multiple methods of accessing the internet, such as smartphones, free Wi-Fi, and cable modem, etc. Therefore, the researchers only calculated the percentage of households with no internet access. Similar to the above approach, the researchers used the mid-point of the 5-year averages (2015 and 2016, in this case) in the analysis.

Regarding rural and urban, the researchers used the Center for Rural Pennsylvania's rural/urban definitions, which are based on population density. According to that definition, Pennsylvania has 48 rural counties and 19 urban counties.

Several ordinary least squares (OLS) regression models were estimated with county suicide rates per 100,000 residents as the dependent variable and the independent variables. A linear regression with multiple variables helped to demonstrate any linear relationship between each of the variables described above and county suicide rates. The research included panel corrected standard errors and accounted for autoregression (AR1) in each model (Kashin 2014). The broadband analysis was only conducted on two cross-sections in 2015 and 2016, so these corrections were not necessary.
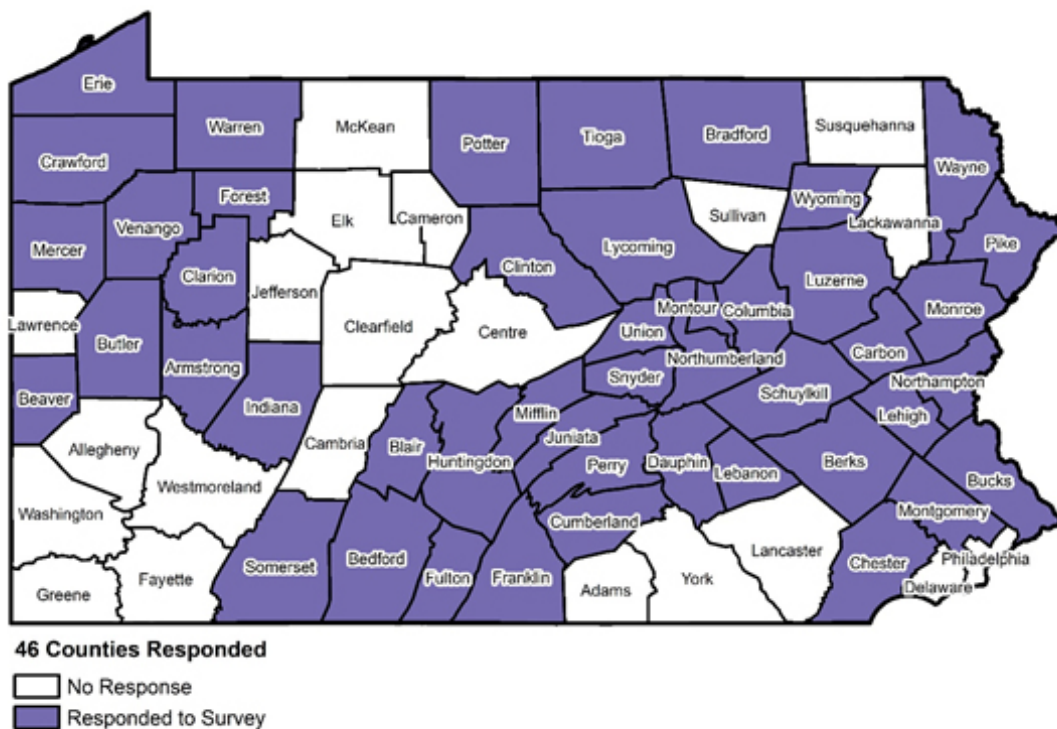
County Surveys

The first survey fielded for this study was of Pennsylvania's 67 counties. The survey received an exemption determination by the Pennsylvania State University Institutional Review Board (IRB) on March 18, 2020. A solicitation letter and link to an online Qualtrics survey were

emailed to all 67 county mental health administrators recorded by the Pennsylvania Association of County Administrators of Mental Health and Developmental Services (PACA-MHDS). The first solicitation was sent on May 27, 2020, with three subsequent follow-up contacts to non-responders on June 29, July 30, and August 20. Responses were received from 46 counties (69 percent response rate): Armstrong, Beaver, Bedford, Berks, Blair, Bradford, Bucks, Butler, Carbon, Chester, Clarion, Clinton, Columbia, Crawford, Cumberland, Dauphin, Erie, Forest, Franklin, Fulton, Huntingdon, Indiana, Juniata, Lebanon, Lehigh, Luzerne, Lycoming, Mercer, Mifflin, Monroe, Montgomery, Montour, Northampton, Northumberland, Perry, Pike, Potter, Schuylkill, Snyder, Somerset, Tioga, Union, Venango, Warren, Wayne, and Wyoming. This means that 71 percent of rural counties and 63 percent of urban counties responded to the survey (See Figure 1 for a map of responding and non-responding counties).

Figure 1. Counties That Responded to the Survey

Counties were asked to report on each separate suicide prevention program they administered in the last year. The following questions were included in the survey of county suicide prevention programs:

1. What is the name of the program?

2. Please provide a brief (2-3 sentence) description of the program.

3. Who is served by the program (veterans, students, elderly, etc.)?

4. Does the county work with partners outside of county government to conduct this program? If so, who are the outside partners?

5. What role does your office play in this program? Is it more administrative/coordinating or does your office directly provide the program?

6. Please quantify, to the best of your knowledge, the cost of the program for one fiscal year.

7. Who pays for the program?

8. Please quantify, to the best of your knowledge, the number of county employees/staff that work in this program.

9. Please quantify, to the best of your knowledge, the number of hours county employees/staff spent administering the program in the last fiscal year.

10. Please quantify, to the best of your knowledge, the number of clients who were served by this program in the most recent fiscal year.

11. Has your county or someone else formally assessed the impact of this program? If so, how was the program assessed and how was "impact" or "success" defined?

12. How many years has the county been running this program?

13. How has this program been affected by the coronavirus pandemic?

Not all counties were able to provide precise data for each question, but the researchers were able to ascertain a broad picture of the programs that counties were using.

A qualitative thematic analysis was used to describe the results from the county surveys. For each question, a summary of county answers was provided. Not all counties could be precise with their estimates of program costs and staff hours, thus precise averages of these values cannot be reported. For questions where counties were given a specific set of responses to choose from (e.g., "How long has the county been running the program?"), it was possible to provide counts of the numbers of programs for each category.

School Surveys

The school surveys also received an exemption determination by the Pennsylvania State University IRB on March 18, 2020. The first solicitation letter with the Qualtrics survey link was emailed to 477 school district superintendents with available and functional email addresses. The first round of contact occurred on October 21, 2020, with additional follow-ups sent to non-responders on November 3, November 16, and December 1. A total of 134 school districts responded (28 percent response rate).[6] Forty-eight percent of the responding districts were rural, and 52 percent were urban (See Figure 2 for a map of responding school districts).

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[6] While the Pennsylvania Department of Education's EdNA system (http://www.edna.pa.gov/Screens/wfHome.aspx) contains 499 school districts, addresses could only be located for 485 school districts and only 477 of those addresses worked. This is the denominator for the calculation of the response rate. Also, of note, one private school district responded and is not included in Figure 2.

Figure 2. School Districts That Responded to the Survey

Responding School Districts

Responding Districts = 134*

☐ No Response

▨ Responded to Survey

*Does not include private school respondent.
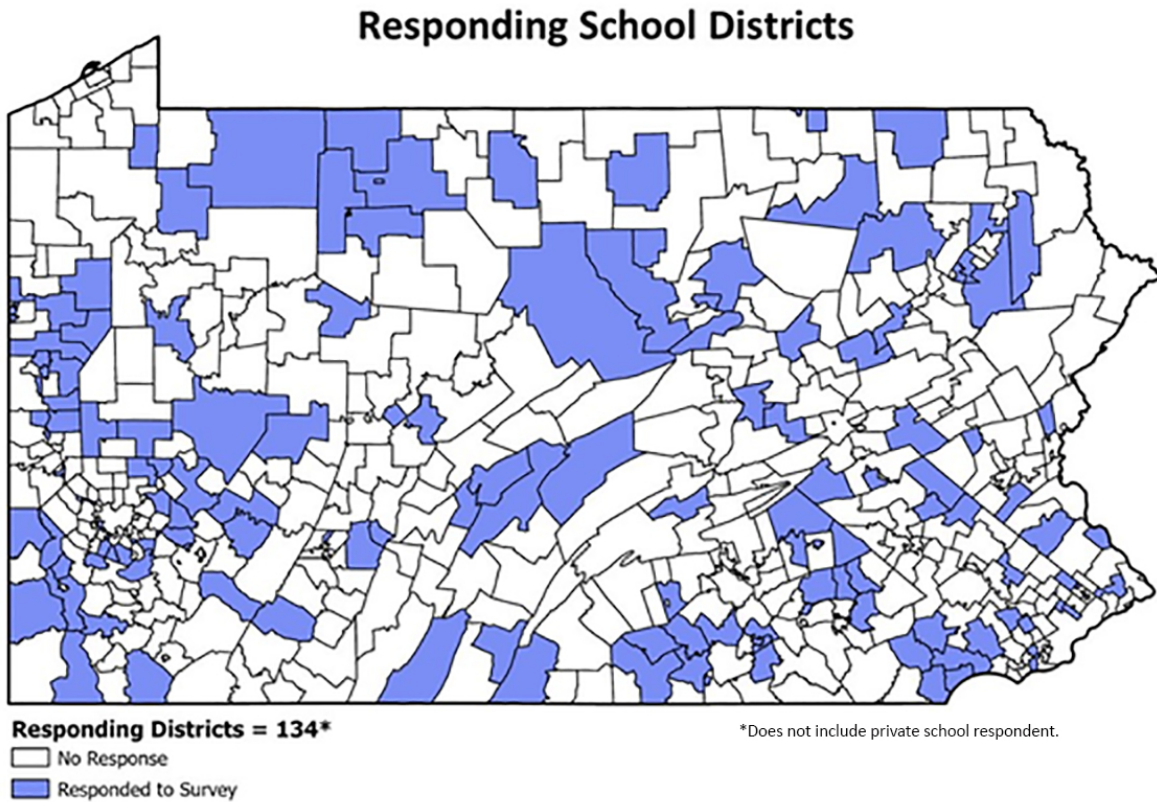
The following questions were asked of each school district:

1. What is the name of the program?

2. Please provide a brief (2-3 sentence) description of the program.

3. What is the scope of the program (district-wide, high school, middle school, elementary school)?

4. Do partners outside of the school help to lead this program? If so, who are the outside partners?

5. Does this program fall under the district's/school's Student Assistance Program?

6. Are students involved in leading this program? If so, what role do students have in conducting the program?

7. Please quantify, to the best of your knowledge, the cost of the program for one academic year.

8. Please quantify, to the best of your knowledge, the number of faculty/staff that work on this program.

9. Please provide, to the best of your knowledge, the number of hours faculty/staff spent working on this program in a single academic year.

10. Please quantify, to the best of your knowledge, the number of students who were served by this program in the most recent academic year.

11. Has your school district or school formally assessed the impact of this program? If so, how was the program formally assessed and how was "impact" or "success" defined?

12. How many years has this program been running?

13. How has this program been affected by the coronavirus pandemic?

Like the counties, not all school districts were able to provide precise information for every question. However, general patterns in the types of programs offered in schools and their resourcing could be reported.

Results

Pennsylvania Suicide Trends

Figure 3 compares the suicide rates in Pennsylvania and the U.S. from 1990 to 2018. Prior to 2008, Pennsylvania's rate remained close to the national rate. After 2008, however, Pennsylvania's rate has been consistently above the national rate with the separation increasing.

Figure 3. Suicide Rates in the United States and Pennsylvania, 1990-2018
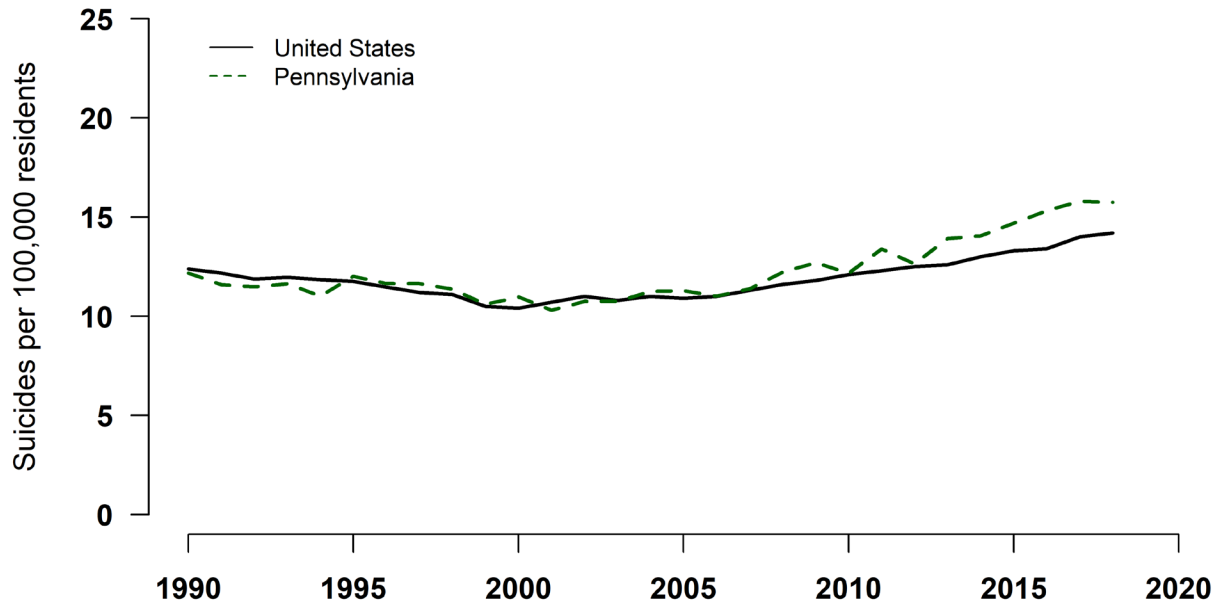
Further breaking down the Pennsylvania suicide rate over time, Figure 4 displays the suicide rates for urban and rural counties from 1990 to 2018. While rates were consistent across the 1990s and first half of the 2000s, 2005 shows the beginning of a consistent year-to-year increase in suicide rates across all counties. The overall suicide rate for rural counties has generally been higher than both the Pennsylvania rate and the overall rate for urban counties. That gap, however, widened rapidly between 2014 and 2018. In 2018, the suicide rate was 25 percent higher, on average, in rural counties than urban. Note that the data are for completed suicides, but they parallel recent increases in suicidality and other diseases of despair (Brignone et al. 2020). They also match the national pattern of higher suicide rates in rural communities (Ivey-Stephenson et al. 2017).

Figure 4. Overall Suicide Rates for Urban and Rural Counties in Pennsylvania, 1990-2018
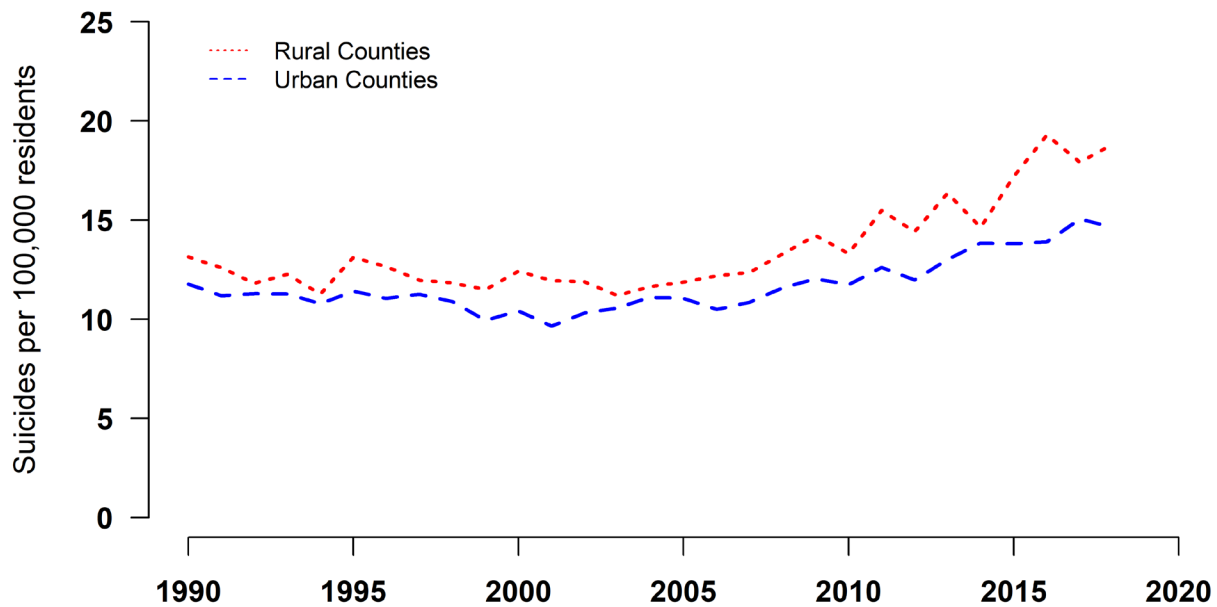
Figures 5 and 6 provide a different picture of the complexity of urban and rural suicide rates. Figure 5 depicts the 2018 suicide rate for each county and Figure 6 shows the change in county suicide rates from 1999 to 2018. Each clarifies that there is substantial variation in suicide rates and trends even within urban and rural designations. In 2018, the statewide suicide rate was 15.7 per 100,000. Many rural counties were well below the statewide rate, with Butler, McKean, Somerset, Cambria, Centre, Fulton, and Wyoming counties falling among the lowest rates. That said, most of the counties with rates higher than the overall Pennsylvania rate are rural counties. York stands out as the county that is designated urban by the Center but had a very high suicide rate in 2018. The remaining urban counties largely fall below the statewide rate.

Such disparities among rural counties also emerge when examining the change in suicide rates from 1999 to 2018 (Figure 6). Five of the six counties that saw *declines* in their suicide rates are rural: Cambria, Elk, Fulton, Greene, and Montour. It is necessary to bear in mind,

however, that suicide rates in counties with small populations can fluctuate considerably from year to year (Pennsylvania Department of Human Services 2020a). That said, 62 counties have observed increased suicide rates since 1999. Further, most of the counties with the greatest increases are rural. York County, however, stands out once again for having the largest increase in its suicide rate among urban counties, as does Lackawanna County. Both, of course, have substantial rural areas in addition to their denser cities. The general trend, however, is for greater increases in suicide rates among rural counties.

Figure 5. Suicide Rates per 100,000 for Pennsylvania Counties, 2018

Statewide Rate = 15.7

Below Statewide Rate □   Above Statewide Rate ▧
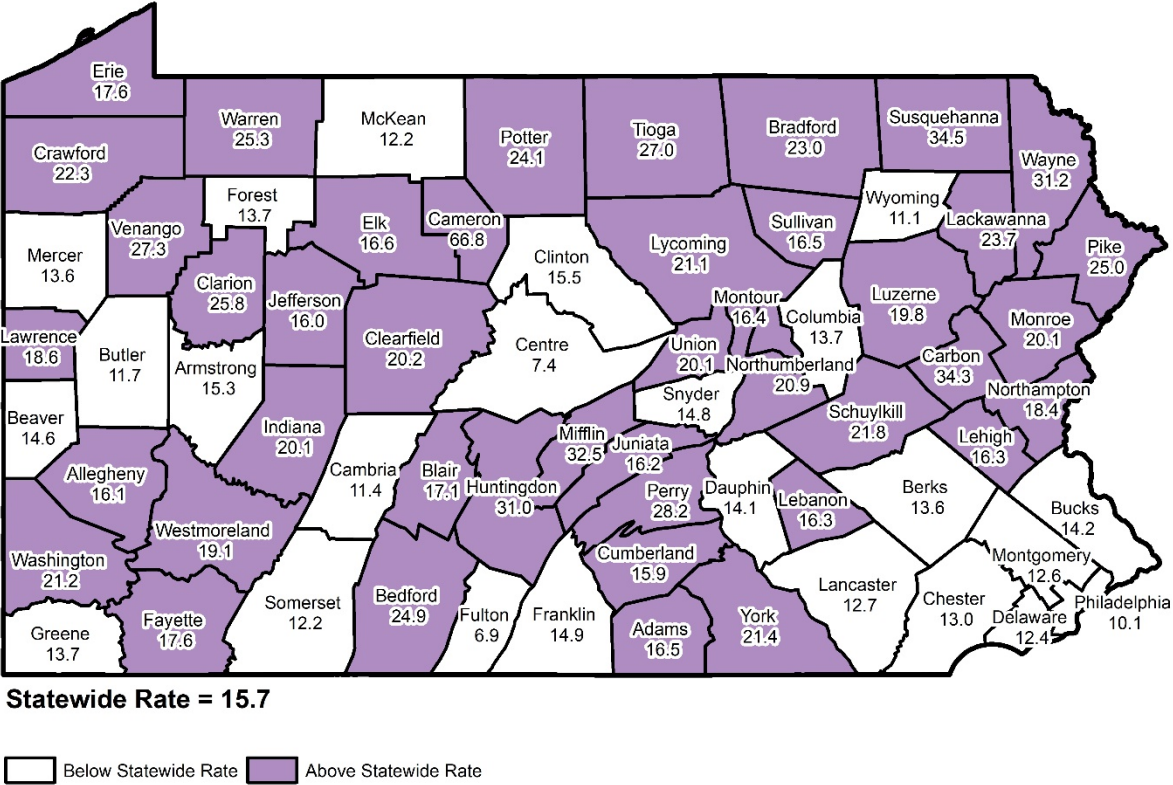
Figure 6. Change in Suicide Rates by County, 1999-2018

Statewide rate change = 5.1

Decrease or No Change | 0.1 to 9.2 Increase | 9.3+ Increase
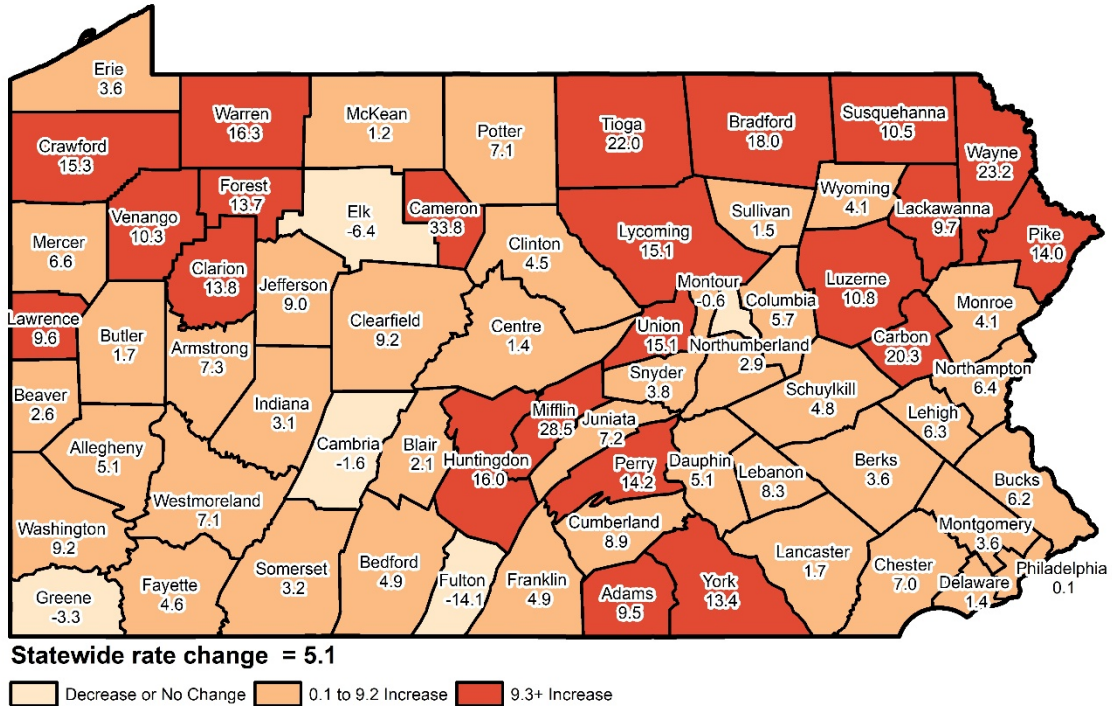
Correlates of County Suicide Rates

The researchers used the rates per 100,000 residents for each county from 1999 to 2018 to examine the different factors that correlate with county suicide rates. The period coincides with when suicide rates were rising in Pennsylvania and captures the expanding gap between rural and urban counties. Table 1 shows the high-level results of a model that included all tested correlates of suicide. Variables that had a statistically significant relationship ($p < 0.05$) with suicide rates are marked with an asterisk (*). Appendix A includes the full regression results, plus results from two simpler models. If only considering whether a county is rural, rural counties, on average, had 2.36 more suicides per 100,000 residents than urban counties between 1999 and 2018. When other possible correlates of suicide were included in the model, this

difference remained, but dropped to 1.25 additional suicides per 100,000 that were simply based on rurality. This means that, even when controlling for the other variables, rural counties still had a higher rate of suicide than urban counties simply because they are rural. Of course, this remaining urban-rural gap is likely the result of other factors not included in the model that also exhibit disparities between rural and urban areas.

Table 1. Linear Regression Results for Pennsylvania Suicide Rates, 1999-2018

	All Counties	Counties with High Rates	Counties with Low Rates
Rural County	*		
Handgun Sales per 1,000	*	*	
Percent Male			
White (pct)			
Percent Unemployed	*		*
Percent with College Degree	*	*	
Percent Married	*	*	
Median Household Income	*	*	
Percent Age 65+	*	*	*
R^2	0.13	0.15	0.10
N	1,340	860	470

* indicates a statistically significant effect

Counties with higher counts of handgun sales per 1,000 residents also had higher suicide rates (0.04 additional suicides per 100,000 for each additional handgun per 1,000). For context, handgun ownership expanded substantially between 1999 and 2018. In 1999, the state rate was 17 handgun sales per 1,000 residents. By 2018, that rate climbed to 44. This increase in 27

handgun sales per 1,000 correlates with the 1.35 additional suicides per 100,000. Unemployment, median household income, and the percentage of a county's population that is age 65 plus also correlated with higher county suicide rates. Finally, counties with higher rates of college degree completion, one measure of education, and higher rates of marriage had lower suicide rates. In the data, sex and race did not appear to correlate with suicide rates.

It is important to consider that even though each of the factors above were shown to have an independent effect on suicide rates, the factors were often compounded for rural counties. For context, Table 2 provides the averages for each predictor of county suicide rates by rural and urban designation. This gives a sense of how the specific correlates of suicide vary between urban and rural counties. For example, increased unemployment correlates with higher suicide rates in general, according to the results in Table 1, but unemployment was also higher in rural counties than in urban during the time studied (1999-2018). Rural counties also have more handgun sales, lower college completion, lower median household income, and larger populations of older adults. Each of these factors correlates with higher suicide rates. The only factor relating to suicide rates for which rural counties are better off is the higher average marriage rate.

Table 2. Averages for Predictors of Suicide Rate, by Rural and Urban

Variable	Rural Mean	Urban Mean
Handgun sales per 1,000	27.7	21.0
Percent Male	50.1	48.6
White (pct)	95.8	86.7
Percent Unemployed	6.4	5.5
Percent with College Degree	17.1	27.8
Percent Married	55.9	53.8
Median Household Income	50,194	63,225
Percent Age 65+	17.7	16.0

Note: Averages are calculated using all data from 1999-2018 used in the regression analysis above.

To gain additional insight in to how the factors that correlate with suicide rates differ across counties, the researchers split the sample into two: counties with suicide rates higher than the Pennsylvania average and those lower than the state average. The year 2018 was used to split the sample. The regression results for each sample are in the third and fourth columns of Table 1. While handgun sales, education, marriage rates, income, and age predicted suicide rates in high suicide counties, only unemployment and age predicted it in low suicide counties.

Turning to the relationship between broadband access and suicide rates, as the percentage of a county's residents without broadband access climbed, so did the suicide rate (see Appendix A). This was based on only 2 years of Pennsylvania data, meaning the sample size was small (*n* = 134). Adding other correlates to the model washed out this effect, which suggests that broadband may simply be serving as a proxy for rurality, income, etc.

A focused study on telehealth, broadband access, and mental health, suicide, and other deaths of despair is warranted given the major issues with broadband deployment in the Commonwealth (Center for Rural Pennsylvania 2018b).

County Suicide Prevention Programs

An immediate and stark difference between rural and urban counties is that, unlike urban counties with their independent programs, rural counties tended to provide coalition programs in which multiple rural counties work together. Specifically, of the 34 rural counties that responded to the survey, five operated both independent and coalition programs, and 16 provided coalition programs that serve multiple counties. On the other hand, most of the urban counties (10) offered independent programs while only two, Cumberland and Luzerne counties, provided coalition programs, and they worked with rural counties (Perry and Wyoming, respectively). In addition, counties varied in the number of programs they provided. One rural county reported providing

no programs, and 28 of the 46 counties reported a single program. Many of those single programs were task forces, which may provide programs that are not reported. The remaining rural counties reported from two to six programs, including numerous coalition programs. The remaining urban counties reported from three to 14 programs.

Types of Programs

Reported prevention programs were sorted and counted based on their characteristics. The 46 counties reported a total of 83 programs, and they were equally split between rural and urban counties, even though there are far more rural counties. Additionally, the two coalitions reported between rural and urban counties (Cumberland-Perry and Luzerne-Wyoming) were included in only the counts of urban programs. Five categories of programs were identified based on their primary purpose and characteristics: task forces, training programs, supporting programs, initiatives for increasing awareness, and other programs. Table 3 shows the counts of each type of program type in total and across rural and urban counties. Each type of program is described in turn.

Table 3. Types of Suicide Prevention Programs Reported by Pennsylvania Counties

Program Type	Total Reported	Rural Programs	Urban Programs
Task forces	23	13	10
Training programs	23	14	9
Supporting programs and services	22	9	13
Initiatives for increasing awareness	12	4	8
Other programs	3	2	1
Total	83	42	41

Suicide Prevention Task Forces

Both rural and urban counties reported having task forces or other advisory groups and coalitions (e.g., the Forest-Warren Suicide Prevention Coalition). Three quarters of urban counties reported having a task force, whereas only a little over half of rural counties reported having them. Of the 13 rural task forces, 10 were independent and operated by individual counties and three were coalition programs where two counties work together (Forest-Warren Suicide Prevention Coalition, Somerset-Bedford County Suicide Prevention Taskforce, and Union-Snyder Youth Mental Task Force). Among the urban task forces, two were urban-rural county coalitions programs noted above: Preventing Unnecessary Loss through Suicide Education in Cumberland and Perry counties, and Luzerne-Wyoming Counties Mental Health and Developmental Services.

These task forces typically oversee suicide prevention programing in the county or counties. Task force members were usually composed of community representatives, government agencies, nonprofit organizations, and healthcare providers. Some counties, such as the Lycoming-Clinton Suicide Prevention Task Force and Luzerne-Wyoming Mental Health and Developmental Services, reported that they regularly meet bi-monthly or monthly. The task forces served to connect diverse stakeholders, including residents, and providers by sharing information, providing education and training programs, and creating initiatives for increasing awareness about suicide and mental health issues.

Training programs

Training programs reported by counties include Question, Persuade, Refer (QPR) training, and Mental Health First Aid (MHFA). Rural counties offered 14 training programs including seven QPR, five MHFA, the Columbia Suicide Severity Rating Scale (Posner et al.

2011) training, and More Than Sad. In urban counties, nine training programs were reported: six QPR, one MHFA, Ending the Silence, and Signs of Suicide (SOS).

QPR is a nationally certified evidence-based program. It focuses on training individuals to recognize a crisis and the warning signs that someone may be contemplating suicide. MHFA also helps an individual to assist someone experiencing a mental health crisis to learn to identify, understand and respond to signs of mental illness and substance use disorders. In addition to the QPR and MHFA, Columbia County uses the Columbia Suicide Severity Rating Scale (Posner et al. 2011) training to determine when someone is at risk for suicide and how to help. Lastly, some counties provide training and education programs only for youth groups. For example, More Than Sad offered in Blair County is a program for educators, including teachers, parents, and youth. More Than Sad was developed by the American Foundation for Suicide Prevention (https://afsp.org/more-than-sad). The Signs of Suicide program provided in Montgomery County is an evidence-based, youth prevention program (https://sossignsofsuicide.org/parent/spot-signs). Ending the Silence was developed by the National Alliance on Mental Illness (https://www.nami.org/Support-Education/Mental-Health-Education/NAMI-Ending-the-Silence).

Supporting Programs and Services

Counties provided diverse supporting programs and services, including comprehensive suicide prevention services, support groups, and crisis intervention. Rural counties reported nine programs provided by government agencies and nonprofit organizations like the Northeast Suicide Prevention Initiative and Potter County Human Services. Such programs provide information, resources, and education around suicide awareness and prevention to respond to residents' needs and crisis intervention. In addition to these comprehensive programs, some

programs supported specific groups such as veterans (e.g., the Together with Veterans) and youth.

Supporting programs accounted for the predominant suicide prevention programs in urban counties. The 13 reported programs included crisis intervention, support groups, and programs for first responders. Five crisis intervention programs, such as Dauphin County Crisis Intervention, and UPMC-Beaver County crisis services, provide 24/7 services to individuals through telephone, mobile, and walk-in crisis centers. The five support groups and talk line services are offered in Bucks and Montgomery counties and each supports a different constituency. For example, the Suicide LOSS Survivor Group, is for individuals who lost loved ones to suicide. Loss survivors meet in person quarterly to connect with others with similar experiences, offering connections and healing. Three programs, like Bucks County's First Responders Peer Line, provide prevention resources and peer support specifically for first responders. A notable rural-urban difference in supporting programs was that rural programs tend to offer comprehensive suicide prevention services, whereas urban counties offered more programs that target specific groups and suicide prevention tools.

Initiatives for Increasing Awareness

Counties provided diverse initiatives and events for increasing awareness and sharing information. Four were reported in rural counties, and eight were reported in urban counties. Different approaches used included a conference, a billboard campaign, and school events such as poster contests. Many of these programs are conducted annually and local nonprofit organizations and coalitions participate in organizing and delivering several of these campaigns. Some counties, though, offered regular programs for increasing awareness. For example, the Youth Ambassadors program is a youth-centered, youth-driven program operating in Beaver

County schools. This program aims to increase awareness, decrease stigma associated with mental illness, and promote leadership and self-advocacy among youth. Bucks County reported a unique program, the Gun Lock Initiative, for increasing awareness of the importance of securing lethal means. Counties also reported that one of the roles of their task forces is to provide educational programming, meaning there is more awareness work happening than was specifically reported by many counties.

Other Programs

There were several other programs reported by counties that did not easily fit into the categories presented above. For example, Juniata Valley Behavioral and Development Services is an oversight agency that monitors programs, assesses unmet needs, and provides programming to meet the needs of individuals in Huntington, Mifflin, and Juniata counties. In addition, Carbon, Monroe, and Pike counties participate in System of Care, which is based on the Garrett Lee Smith Memorial Grant program (Goldston et al. 2010). The program aims to enhance aftercare planning for youth hospitalized for suicidal thoughts and behaviors by collecting contact information and identifying needs to inform implementation planning. This is an important aspect of postvention, which is suicide prevention work that occurs once a person has attempted suicide.

Clients

Counties were asked to report the clients served by each of their programs. Many programs reported serving large audiences, but urban programs were more likely than rural programs to report a specific target group (over 50 percent in urban versus 25 percent in rural). Reported clients of the urban programs included older adults, younger adults, students, suicide loss survivors, law enforcement, and first responders. Rural programs reported serving students

in schools, youth, veterans, Medicaid recipients, and first responders. The results reflect the different characteristics of the suicide prevention programs in rural and urban counties. Unlike rural areas that offer general and comprehensive services and programs through several government agencies and nonprofit organizations, urban counties provide more specialized programs.

Partnerships

Both rural and urban counties report working with numerous outside organizations to provide their suicide prevention programming. Nonprofits include the American Foundation for Suicide Prevention, the National Alliance on Mental Illness, Survivors of Suicide, United Way, and local places of worship. Schools, including K-12, community college, and 4-year colleges and universities, were the next most reported partners in county suicide prevention programming. Police were partners in fewer than half of reported programs in both rural and urban counties, but they were largely *clients* of county programs like Question, Persuade, Refer (QPR) training, not partners in *providing* programs. Schools were also common targets for QPR training, likely school faculty and staff. Such training is important for helping front-line workers identify mental health crises and link students and citizens to the resources they need. Counties also report that some programs require coordination between their mental health agencies and other arms of county and municipality government, including district attorneys, drug and alcohol offices, public health offices, correctional divisions, and coroner's offices. Given the significant impact of suicide on veterans (McCarthy et al. 2015), it is fitting that several counties, both rural and urban, reported having representatives from the Veterans Administration on their county suicide prevention task forces. Again, the complex nature of suicide warrants a multifaceted prevention strategy, but there is variation in the counties as to their formal links to outside partners.

Rural and urban counties reported taking very different roles in these partnerships. Among rural county programs that reported their role, 69 percent had the county taking an administrative or coordination role while 31 percent had counties directly providing the reported service. Among urban counties reporting their role, 93 percent had the county in an administrative role, not a direct service provision role. Thus, rural counties appeared to rely more on county resources for providing services than for managing outside partnerships.

Program Resources

Counties were inconsistent in how they reported the financial resources provided to their programs. Reports ranged from specific program fees (e.g., $50 for program training) to entire county health program budgets. For the 33 rural programs with funding sources reported, more than half (59 percent) were paid for, at least in part, by county funds. Other sources of funding included Pennsylvania (15 percent), outside organizations, like the American Foundation for Suicide Prevention (18 percent), and other entities, including the federal government, donor fundraising, and fees (35 percent). For the 28 urban programs for which funding sources were reported, most were paid for by county funds (75 percent), with only 10 percent receiving grant funding from outside organizations, 7 percent reporting funding from Pennsylvania, and 50 percent reporting funding from a variety of other sources, such as school districts, private donations, program fees, and health networks. Thus, rural counties were far more dependent on external funds for their suicide prevention programs.

In terms of county staffing, most programs were attended by more than two staff members in both rural (68 percent) and urban (85 percent) programs. It is notable, however, that there were a larger percentage of smaller staffed programs in rural areas than urban (32 percent versus 15 percent). Further, urban counties sometimes reported substantially sized programs,

including crisis call centers with dozens of staff. There was also substantial variation in the reported staff hours spent on these programs. The range of hours reported was quite large, representing the variation in the types of programs being offered. For example, a one-hour-a-week support group results in far fewer staff hours than a 24/7 support hotline. Rural program staff hours ranged from 10 to 17,550 for the most recent fiscal year. The median number of hours reported, however, was 36. Urban programs ranged from 6 to 8,736, but the median of 70 hours was substantially higher than for rural counties.

Served Population

Counties were asked to approximate how many clients their programs served in the last fiscal year. Clients served in rural programs ranged from 30 to 3,741, whereas the range for urban programs was five to 7,000. The medians were relatively close (297 rural and 226 urban), but urban programs had a much higher average number of clients (1,969) than rural (579). This is because there were more high-volume programs reported by urban counties. Of course, this is also because urban counties have larger populations. Thus, such a disparity in the total number of clients served was expected.

Counties were also asked how long they had offered each program. Response options included 1, 2, or 3 or more years. A larger portion of rural programs (83 percent) than urban programs (68 percent) had been in operation for 3 years or more. In fact, some of the counties that submitted additional open-ended answers reported offering programs like QPR training for well over a decade.

While not included in the original scope of work, a question was added to the survey asking counties how they navigated providing each program during the COVID-19 pandemic.

Based on the open-ended responses from counties, suicide prevention programming was severely hampered by the pandemic in rural areas, but less so in urban. Most often, rural

programming was reported to have been canceled (63 percent). Some counties did indicate using Zoom or another web-based video platform to hold support meetings and trainings, but rarely were reporting counties able to transition all of their programs online. One rural county response summarized the reality well:

> "COVID-19 has not allowed for us to plan and attend outreach events or in-person meetings. We have had some video conference or teleconference communications and will continue to practice in this manner as a direct result of the coronavirus pandemic. The virus has taken away the chance for community involvement because we cannot just post Zoom code [for fear of Zoom bombing]. COVID-19 has greatly impacted the coalition by limiting options to host community events, holding an Out of the Darkness Walk for the fall, inviting community members to open sessions, among others."

Another response from a rural county highlighted the connection between internet availability and suicide prevention: "The impact of not having internet capacity in rural areas made accessing telehealth difficult for some individuals."

Urban counties also had to cancel programming, but fewer of the responses (48 percent) noted total cancellation of programs. Many were either moved to online platforms or counties were in the process of doing so. Though one county also noted that its crisis services had "an influx of calls from individuals struggling with anxiety." One also noted the drawbacks of providing suicide prevention training online: "There is concern, however, regarding providing QPR 'online' as this training can be emotional and difficult for many participants." It is notable that the county survey was fielded during the summer of 2020, amid the re-opening of many parts of Pennsylvania's government and economy after springtime shutdowns. While telework still dominates many government offices, some of these cancelled programs may have recovered, at least in an online space, in the fall. Nonetheless, COVID has been a significant disrupter of county-level suicide prevention programs in the commonwealth. Additionally, there was overlap here between the county-level programs and schools. Counties reported on the educational

programming they provided to schools, and much of that was reported to be cancelled when schools closed in spring 2020.

School Suicide Prevention Programs

Types of Programs

School district administrators reported and described 179 suicide prevention programs across the 134 responding districts. A variety of programs were reported by districts, but they can be categorized into four types: (1) student awareness, (2) faculty trainings, (3) counselor/resource matching, or (4) student-led programming. Table 4 provides an overview of the number of each type reported. Note that these types are not mutually exclusive, meaning some programs were counted in more than one category. For example, a school reported a training program offered across students, faculty, and staff. This would be included in both the student awareness and faculty training categories. These programs were a mix of novel efforts by the school, established networks of initiatives (such as Aevidum and QPR), and local partnerships. Differentiation between urban and rural suicide prevention programs at the school district level was not clear. The number of programs of each category (except student-led efforts) were split in roughly equal proportions across rural and urban districts. Some features of the programs also differed depending on the student age level for which they were intended. Early education programs mostly focused on life skills and awareness training for students, whereas middle and high school programs focused more on providing resources to students (counselors, groups, etc.) and trainings for faculty. Each of the program types are further explained below.

Table 4. Types of Suicide Prevention Programs Reported by Pennsylvania School Districts

Program Type	Total Reported	Rural Programs	Urban Programs
Student Awareness	97	47	50
Faculty Training	31	11	20
Counselor/Resource Matching	34	14	20
Student-Led	17	4	13
Total	179	76	103

Student Awareness

The most common approach to suicide prevention at the school district level was to focus on generating awareness among students about mental illness, signs of at-risk students, and other related topics. Programs that had elements of generating awareness made up 57 percent of those reported. While seen at all levels, programs that began in elementary and middle school tended to focus on suicide awareness rather than direct interventions. These efforts often emphasized students' understanding of emotions and how to handle them effectively. Engaging with students to incentivize positive behaviors, with reinforcement from faculty, was also common. These types of awareness efforts were not exclusive to younger groups. As the age of the target group increased, programs tended to include different subject matters. For instance, suicide awareness programs that introduced substance abuse as a topic were almost exclusive to middle schools and high schools.

Faculty Training

Rural and urban districts alike had a significant number of programs that aimed at generating a culture of awareness in their faculty and staff. Of the programs that reported, 18 percent used faculty training in their suicide prevention strategy. While these types of programs were not as prominent as other programs, administrators emphasized their importance in the whole of their suicide prevention efforts. Often these programs introduced outside professionals

to perform periodic or one-time presentations to employees. These sessions commonly gave employees resources to identify signs of at-risk students and to be aware of strategies for approaching students in crisis.

Counselor/Resource Matching

Programs in both rural and urban districts sought to provide direct intervention via access to a counselor internally or with external mental health partners. Such external engagement is a common element of Pennsylvania's Student Assistance Programs (SAP). Of the programs that reported, 20 percent included counselor/resource matching elements. Often these programs relied more heavily on established external mental health providers than on their own internal resources. This may be more advantageous in rural districts or those districts where fewer staff limits the district's ability to provide its own mental health support services. Some more established and tenured programs even had special 24/7 crisis lines that are available during and after school hours. In this category of programs, school districts reported using various screening methods to identify at-risk students and procedures to link students in crisis to appropriate resources. Some used voluntary screening, which may limit the school's capacity to identify at-risk students.

Student Groups

Prevention programs that relied on student involvement were the most varied in approach. Student led groups were fewer in number than other categories, representing only 10 percent of reported programs. Networks of national student initiatives, like Aevidum, were reported widespread across the commonwealth. Clubs like Aevidum and Rachel's Challenge leverage student leadership to spread awareness. These organizations benefit from a national organization, while allowing individual chapters to orchestrate programming. In the case of

Aevidum, the organization provides training and out-of-the-box programming that can be implemented quickly in schools.[7] Aevidum colloquially means "I've got your back" (derived from the Latin "vid," which means life). The program originated in Lancaster, Pennsylvania, but is now national in scope. Clubs are student-run and their curricula are tailored for elementary, middle, and high school students, as well as college students. The national organization provides curricula and training on stigma reduction and peer support around depression, suicide, and other student challenges. Because of the national-level support, this program can be readily implemented in any school with few resources. In fact, all the school districts that reported having this program also reported that it was either low-cost or free.

Many school districts with no other reported programs had at least one of these student clubs. This may be because of the minimal administrative burden that it takes to initiate such efforts. Administrative burdens may be one of the most significant barriers to proliferating suicide prevention programming. Granted, there is a trade-off in this approach. Relying on student-driven efforts can result in inconsistent availability of awareness and training programs as energy among student participants fluctuates over time. This is different than having a committed staff member provide programming consistently each year.

Partnerships

Both rural and urban school districts tend to partner with outside organizations in providing their suicide prevention programs, but only by a slim margin. For rural districts, 57 percent of reported programs had outside partners, whereas for urban programs it was an even split (50 percent yes, 50 percent no). Thus, for the responding districts, rural programs were more reliant on outside partnerships than urban, but there are also many programs that are

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[7] http://aevidum.com/cms/.

completely internal. Of the 40 rural programs with outside partners, nonprofits were the most common partner (21), followed distantly by board of advisors/task force/coalition (6), the police (2) and one local municipality (1). Other outside partners (17 reported) included private companies, contractors, local health systems, county officials, like the coroner, and an institution of higher education. The 44 urban district programs followed a similar pattern, with their most common partner being a non-profit (25), followed by the police (6), and a local municipality (1). The collection of other outside partners (20 reported) included counseling centers, behavioral health providers and health networks, county officials, and academia.

Districts were also asked whether the programs reported were part of their SAP. The Pennsylvania SAP:

"is a team process used to mobilize school resources to remove barriers to learning. SAP is designed to assist in identifying issues including alcohol, tobacco, other drugs, and mental health issues which pose a barrier to a student's success. The primary goal of the Student Assistance Program is to help students overcome these barriers so that they may achieve, advance, and remain in school" (PNSAS 2019).

The state SAP is a multi-level partnership between state agencies (Department of Drug and Alcohol Programs, Department of Education, and Department of Human Services), county mental health and drug abuse staff, and school districts. Within a district, SAP is meant to serve as a bridge and collaboration between a school and community behavioral health resources. Schools are not identical, however, in how they implement their SAPs, though every school district is required to have one. Only 31 percent of rural and 45 percent of urban district suicide prevention programs, however, were part of SAP. The Pennsylvania Network for Student Assistance Services is currently evaluating SAPs statewide, which should provide additional insight into how these programs are implemented.

School districts also reported the extent to which students are partners in implementing suicide prevention programs in their schools. As noted above, there are explicitly student-led programs, but even the other programs could have student involvement. For both rural and urban district programs, students were overwhelmingly *not* involved in leadership. Programs that did report student leadership include clubs, peer support groups, positive culture-building programs, assistance with QPR training, and peer educators in anti-bullying programs.

Program Resources

School districts were more consistent than counties in reporting program costs, but many were still unable to provide precise estimates. Unlike counties, rural and urban school districts were comparable in their overall spending for reported programs. Programs ranged from free to $95,000 per year in rural districts and from free to $75,000 in urban. It is notable that half had program costs of $0. This is because many of the programs reported are either provided by outside organizations, paid for by grants or other levels of government, are provided by student clubs, or were considered simply part of normal staff activities (e.g., guidance counselors). Of course, each of these has a cost, but it is not always borne by the district. When removing the programs that reported $0 in cost,[8] the average program cost was $13,939 for rural programs and $13,161 for urban. The medians were also similar, with $2,250 for rural programs and $3,000 for urban.

There was a greater disparity in the reported commitment of staff resources. While the majority of reported programs had more than two attached staff, this was the case for 65 percent of rural programs versus 83 percent of urban. The proportion of rural programs relying on a single staff member (16 percent) was double that of urban programs (8 percent). In terms of

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[8] This is different than programs that simply left the cost portion of the survey blank. Those were not included in this analysis.

estimated staff work hours, the average was higher for rural programs (280 for rural vs. 222 for urban), but the median was higher for urban (20 for rural, 40 for urban).

Served Population

The size of student populations served by school programs were vastly different. They ranged from intimate peer-to-peer student support groups with only a handful of participants, to school-wide education programs. Unsurprisingly, the maximum number of students served by suicide prevention programs was far larger in urban districts (12,000) than rural (3,100). That is because the district sizes themselves are much larger. The gap between the median number of students served by rural programs (400) and urban programs (525) was not nearly as drastic. In fact, both types of schools reported a similar array of programs, as described above.

The longevity of rural and urban suicide prevention programs was also similar. The proportion of programs operating for 3 years or more was the same for rural and urban districts (66 percent). Urban schools had a slightly higher proportion of new programs that have been operating for 1 year or less (21 percent in urban programs vs. 15 percent in rural). Both rural and urban programs have been negatively impacted by the COVID-19 pandemic. Roughly 50 percent of both rural and urban programs experienced cancellation or substantial limitations in spring 2020, with many of those remaining closed or limited during the survey period (late fall 2020). Many programs that survived the pandemic-related school closures did so because of telehealth options. Some programs reported fewer referrals due to the difficulties in accessing students and identifying mental health crises from a distance, while others noted increased referrals.

Several respondents reported that, while they felt virtual programming was a better-than-nothing approach, it did not afford them the advantages of meeting with students in-person. Not only is it more difficult for teachers and counselors to identify mental health crises at a distance

("Virtual is hard to identify red flags"), but it is also challenging to make students aware of the services available to them and to provide group support programming. As a rural district noted, "If we are concerned about a student that is not physically in our building, it is more difficult to make sure the student is safe and to investigate potential concerns." Even partial returns to the classroom have not solved these problems. One urban district reported:

> "Now that the students are back in hybrid, we have the opportunity to see some of the students more often, however, there is concern that there are students we may be missing. We have done email blasts, messages on our website, and have outreached to families to try to address all students, even those who are participating in our cyber program."

Another urban district stated, "We believe that we would reach even more students if we were not limited by hybrid and virtual scheduling." The creative approaches taken to salvage some suicide prevention programming shows the resilience of many districts in the face of trying circumstances, but it is near impossible to avoid the intersecting challenges of program limitations and pandemic-related mental health problems.

Program Evaluation

Both counties and school districts were asked whether and, if so, how they formally assess the success of their suicide prevention programs. Most programs in both rural (53 percent) and urban (62 percent) counties have not undergone any formal assessment. For those that did, post-program surveys and some pre-post surveys were used to evaluate client satisfaction and achievement of program learning outcomes (e.g., for QPR training). Counties also used informal metrics, such as reports from family members of program participants and observing participants returning to future programs, as markers of success. A handful of counties reported that they do track suicide rates as a means of assessing program success. This is, of course, a loose metric as suicide rates fluctuate for many reasons, but it does show a connection between programs and

outcomes. Most of the other reported metrics were based on participant perceptions and knowledge, not a documented change in suicidal ideation, attempts, or completion.

Schools reported even lower rates of program evaluation than counties, as 83 percent of both rural and urban district programs had no formal evaluation for program success. For those that did report evaluation, a handful noted using pre- and post-test surveys, but many used participation as their marker of success. Meaning, the more students that participated, the more successful the program was perceived to be. There were a few districts that reported monitoring rates of bullying, student conflicts, discipline, and referrals to see if there were declines after the implementation of prevention programs.

Limitations

The primary limitation of this study was the incomplete response from both counties and schools. While the response rate for counties was relatively high, data from 21 counties were still missing. For school districts, 70 percent were not represented in this research. It is impossible to know if the results are representative of all counties and schools, but it is useful that both rural and urban counties and schools are represented in this research. The results provided a broad, yet incomplete, picture of suicide prevention programming in the commonwealth.

An additional limitation, that was undoubtedly related to the issue of response rates, was fielding the surveys amid the COVID-19 pandemic. The benefit of the project's timing was the snapshot of how counties and school districts responded to COVID-19 in their prevention programming, but fewer likely participated than would have otherwise if their resources were not stretched by the circumstances. The final major limitation was the challenge of linking suicide rates and programming. Given the response rate and inconsistencies in how counties and schools

reported their programming, it was difficult to draw firm conclusions about the link between county suicide rates and county prevention programming. Further, given the low rates of program evaluation, it was not evident that counties and schools know if their work is effective.

Conclusions

Suicide and other deaths of despair are a substantial concern in the United States: one that grew with the COVID-19 pandemic. The increase in suicides over the past decade, especially among young people, has put suicide prevention at the forefront of the public health agenda. That said, not all individuals and not all geographic locations are at equal risk for suicide. Rural areas, including those in Pennsylvania, have seen their rates of suicide grow faster than urban areas. Further, rural locales have fewer resources to address pressing problems like suicide. This research provided a snapshot of the suicide prevention efforts at work in 2020 in 46 of Pennsylvania's 67 counties and 134 of the nearly 500 school districts.

Aggregate suicide rates over the last 20 years revealed that suicides are not only increasing in Pennsylvania but increasing at a faster rate in rural counties. Even when controlling for suicide predictors, like access to lethal means (firearms), education, marital status, unemployment, and income, there is still a statistically significant difference in rural and urban suicide rates. Further, many of those explanations also exhibited their own rural-urban gaps. For example, there are more handgun sales per 1,000 residents in rural counties than urban, unemployment is higher (on average), college completion is substantially lower in rural counties, household income is substantially lower, and there is a larger population of residents aged 65 and older in rural areas. All of these were predictors of higher suicide rates. The only factor that reduced suicide rates and showed an advantage for rural counties was the marriage rate.

The results of this study also showed that rural and urban counties are not uniform. For example, urban York County had a much higher suicide rate than other urban counties in 2018 and saw a greater increase in its suicide rate from 1999 to 2018 than other urban counties. However, significant portions of York County are rural, at least when compared to counties like Allegheny or Philadelphia. Thus, the factors driving suicide rates in rural areas were likely equally important in urban counties, like York and Lackawanna, as they are in any other rural county.

The survey of counties showed substantial variation in how county governments are addressing suicide. A major difference was the preponderance of rural counties that pooled their resources to provide suicide prevention programing. These were also the counties with relatively higher suicide rates. Lower levels of staffing and resourcing of rural programs, on one hand, makes sense because these counties are serving smaller populations. However, on the other hand, the threat of suicide was greater in rural counties and dispersed populations are harder to reach with prevention efforts. The creation of the statewide suicide prevention task force is promising for bringing greater attention, resourcing, and coordination to the commonwealth's suicide prevention efforts, but its success will likely depend on how coordination and resources filter down to counties, particularly rural counties.

School districts showed greater similarities across the rural-urban divide. They tended to have similar types of programs with similar audiences. Awareness programs are the overwhelming favorite strategy of school districts. Other approaches appeared promising, but resources and administrative will are likely barriers to their expansion. Many programs combine awareness and prevention with other topics, which may dilute their effectiveness at addressing suicides. Additionally, many schools relied on one-time-a-year presentations by outside speakers

as a prevention method. Outside organizations like Aevidum can offer resource-constrained districts the option of evidence-based and student-led suicide prevention programming.

Both rural and urban schools were also heavily impacted by the COVID-19 pandemic. Roughly half of each reported significant disruptions or cancellations of their programming in 2020. Some were hopeful that those programs could launch virtually in spring 2021. Given the pivotal role that schools play in providing and connecting students with mental health support, there is much to be concerned about regarding student mental health.

Another important finding and conclusion from this study was that both counties and schools lack strong evaluation methods for their suicide prevention programs. This is not to say that the programs reported do not have an evidential basis, but providers were largely not evaluating their effectiveness. Additionally, many of the evaluation methods were based on participant satisfaction or total counts of participants. Much work remains in understanding the effectiveness of micro-level programs, like those reported for this study, in preventing suicides. In the scholarly literature, structural prevention methods (e.g., nets under bridges, reduced access to firearms) are highly effective, but school-based and other behavioral programs are supported by weaker evidence (Platt and Niederkrotenthaler 2020). Further, multi-faceted and coordinated programs are more effective than a single approach (Bertolote 2004). Though, it is notable that the same program is not equally effective in every place it is used (Bertolote 2004). Thus, counties and schools should implement evidence-based prevention programs,[9] but that does not obviate the need to effectively evaluate the programs they use.

This study focused on prevention efforts, but a core aspect of preventing successful suicides is not only preventing initial attempts, but also caring for those who have attempted to

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[9] For a good place to start: https://www.sprc.org/keys-success/evidence-based-prevention.

take their own life. This is referred to as postvention. While neither counties nor schools were directly asked about postvention programs, some of the programs they reported (e.g., support groups), may include postvention. Effective postvention, and prevention for young people identified as at-risk for suicide or suicidal ideation require more intimate settings (McCauley et al. 2018, Asarnow et al. 2017, King et al. 2019) and greater resources than broad educational programs that raise awareness about the signs of suicide and how to access help. Increasing these resources in both schools and counties, as well as ensuring that prevention efforts are evidence-based and evaluated, will be important for reversing the troubling trends in rural suicide.

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Acknowledgements

Appendix A: Full Regression Results
Table A5. Linear Regression Results for Pennsylvania Suicide Rates, 1999-2018

	Rurality Only	Full Panel Model	Counties with High Rates	Counties with Low Rates	Broadband
Rural County	2.36**	1.25**	1.45*	0.79	
	(0.41)	(0.41)	(0.76)	(0.98)	
Handgun Sales per 1,000		0.04**	0.04**	0.05	
		(0.01)	(0.02)	(0.03)	
Percent Male		-0.00	0.13	0.07	
		(0.27)	(0.20)	(0.35)	
White (pct)		0.01	-0.00	-0.02	
		(0.04)	(0.11)	(0.08)	
Percent Unemployed		0.30*	0.08	0.65*	
		(0.18)	(0.23)	(0.32)	
Percent with College Degree		-0.14**	-0.22*	-0.06	
		(0.06)	(0.08)	(0.12)	
Percent Married		-0.19*	-0.36*	-0.03	
		(0.11)	(0.16)	(0.25)	
Median Household Income (Logged)		9.88**	13.62*	5.07	
		(2.95)	(3.52)	(7.37)	
Percent Age 65+		0.91**	0.99*	0.55*	
		(0.15)	(0.23)	(0.21)	
Percent No Broadband					0.32*
					(0.14)
Intercept	12.46**	-99.81**	-135.0*	-55.98*	11.04*
	(0.48)	(29.21)	(36.16)	(68.33)	(3.02)
R^2	0.01	0.13	0.15	0.10	0.04
N	1,340	1,340	860	480	134

*$p < 0.10$, ** $p < 0.05$; panel corrected or typical standard errors in parentheses.