

## Suicide in Allegheny County, 2002 through 2014

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In 2013, suicide was the tenth leading cause of death in America (American Foundation for Suicide Prevention, 2014) and the fourth leading cause of death for American adults. In Allegheny County, more than 2,100 suicides occurred from 2002 through 2014, for an average of 163 per year. At an average rate of 13 per 100,000 residents, Allegheny County's suicide rate is higher than the national average (11.6 per 100,000) and is increasing at a rate of about one incident per year.

Suicide has garnered significant attention as a major public health issue in the United States. The impact of suicide on the victims, survivors and society as a whole is significant. Suicide is a complex but preventable issue that requires a multi-faceted approach. This analysis is an attempt to provide data and trend information to inform the efforts of those involved in suicide prevention activities.



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This report was prepared by the Office of Data Analysis, Research and Evaluation (DARE), an office within the Allegheny County Department of Human Services (DHS) that supports policy development, quality improvement, planning and decision-making through research, analysis and engagement. DARE reports are available for viewing and download at [www.alleghenycounty.us/Human-Services/Resources/Research-and-Reports.aspx](http://www.alleghenycounty.us/Human-Services/Resources/Research-and-Reports.aspx). For more information about this publication or about DHS's research agenda, please email [dhs-research@alleghenycounty.us](mailto:dhs-research@alleghenycounty.us).

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## KEY FINDINGS

- In 2013, the suicide rate for most age groups in Allegheny County was higher than the national average; only adults 85 and older had a suicide rate lower than the national average.
- In Allegheny County and in the United States, suicide disproportionately affects white males.
- When viewed in census-defined age groupings, 35- through 54-year-olds have the highest suicide rate in Allegheny County.
- Widowed men have a disproportionately high rate of suicide when compared to their proportion of the county population.
- Firearms and asphyxiation are the two most common methods of suicide in both Allegheny County and the City of Pittsburgh.
- Consistent with national trends, firearms are the most common method of suicide among males, and drugs and/or poisoning are the most common suicide methods among females.

An analysis of individuals' involvement in publicly-funded services (human services, criminal justice system and public benefits) indicated that mental health treatment was the service most often accessed by individuals who later died by suicide. Most significantly, 10 percent of the people who died by suicide from 2007 through 2014 had received a publicly-funded mental health service within 30 days of the suicide.

## METHODOLOGY

### Data Sources

**Allegheny County Medical Examiner's Office:** Thirteen years of data obtained from the Allegheny County Medical Examiner's Office were used to examine 2,119 suicides reported by the Medical Examiner from 2002 through 2014. Deaths are classified as suicides if 1) an autopsy is performed and indicates that a suicide occurred or 2) compelling medical, scene or forensic information exists to justify a determination of suicide.

**Department of Human Services (DHS) Data Warehouse:** The DHS Data Warehouse is an electronic repository of information pertaining to publicly-funded social service utilization in Allegheny County. The Data Warehouse contains approximately 1.25 billion records representing more than one million distinct clients, and includes data from 29 sources representing social service program areas (both internal and external to DHS) ranging from behavioral health and aging to public benefits, housing and public education. It can be used to describe the service history of individuals over time across services. Human services involvement was analyzed for the five-year

period prior to suicide for the 1,303 individuals who died from suicide from 2007 through 2014. These years were selected because certain service data have only been available in the Data Warehouse since 2002, meaning that 2007 was the first year for which five years of historical data were available.

**U.S. Census:** Census data were used to report population statistics and calculate age-adjusted suicide rates per 100,000 people.

### Limitations

Identifying the risks of suicide and targeted prevention strategies are of critical importance to practitioners, communities and researchers alike. However, these efforts are beyond the scope of this report, which is intended to share descriptive data about the prevalence of suicide in Allegheny County without substantial interpretation. These data, as well as additional analysis, will serve as the foundation for future research activities and efforts related to this topic.

Suicide intent may be difficult to determine, in some cases, absent other evidence. It is possible that some suicides are classified otherwise (e.g., as an accidental overdose); while this may mean that the number of reported suicides is artificially low, an analysis of the reasons behind classification discrepancies is beyond the scope of this report.

Small populations are more vulnerable to large fluctuations in rate caused by random variation. The fewer members in a population, the more likely it is that small (and expected) changes in suicide counts from year to year will significantly impact the suicide rate for that population. While these large changes in suicide rates may seem meaningful, they may actually just be a product of random variation. For example, if the population size of a particular group is very small, a small increase in suicides can appear as a dramatic rate increase. For this reason, rates for some particularly small groups were omitted from charts.

### SUICIDE, NATIONALLY AND LOCALLY

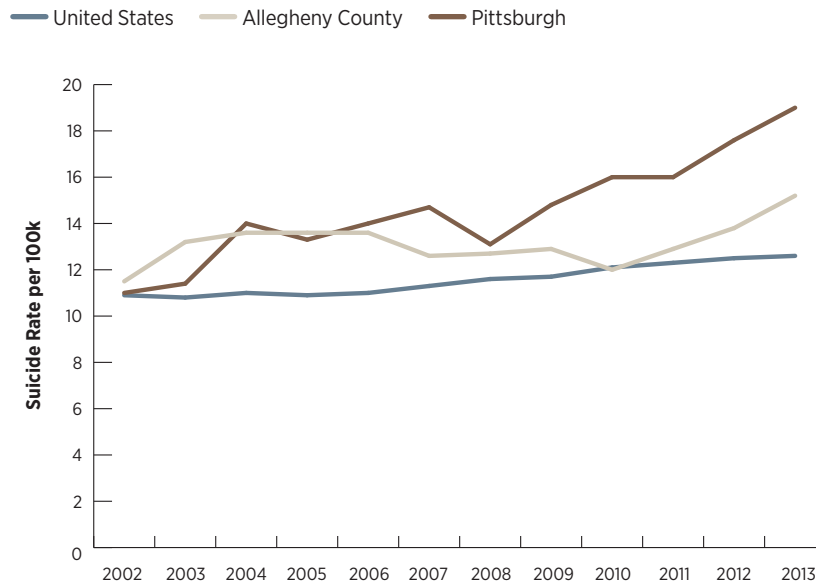
Allegheny County, which includes the City of Pittsburgh, has a population of approximately 1.2 million people, making it the second most populous county in Pennsylvania. The median age is 41 years, and approximately 17 percent of the population is over 65 years old. About 25 percent of the county's population (306,430) lives within the City of Pittsburgh, the county's urban core. The median age of City of Pittsburgh residents is 33 years.

According to the National Institute of Mental Health, the average suicide rate in the United States, from 2002 through 2014, was about 11.6 per 100,000. Pittsburgh and Allegheny County suicide rates were greater than or equal to the national suicide rate for all years between 2002 and 2014 (except 2010, when the rate for Allegheny County was slightly lower). The average suicide rate in Allegheny County between 2002 and 2014 was 13.2 per 100,000 people, and the average suicide rate in Pittsburgh for the same time frame was 14.5 per 100,000 people. While Allegheny County rates and national rates remained relatively stable over the 13-year period,

Pittsburgh suicide rates were more variable, reaching their highest level in 2013. (Statistically, however, this greater variation may be fully explained by the smaller size of the total population.) On average, there were about 163 suicide cases per year in Allegheny County from 2002 through 2014, and the number of suicides increased by about one per year during the 13-year period (Figure 1).

<sup>1</sup> National data were available only through 2013. Rates for Pittsburgh and Allegheny County were both 14 per 100,000 people annually as of May 27, 2015, the date on which data for this report were extracted from the Data Warehouse.

**FIGURE 1: Suicide Rates from 2002 through 2013<sup>1</sup>**



## DEMOGRAPHICS OF SUICIDE VICTIMS

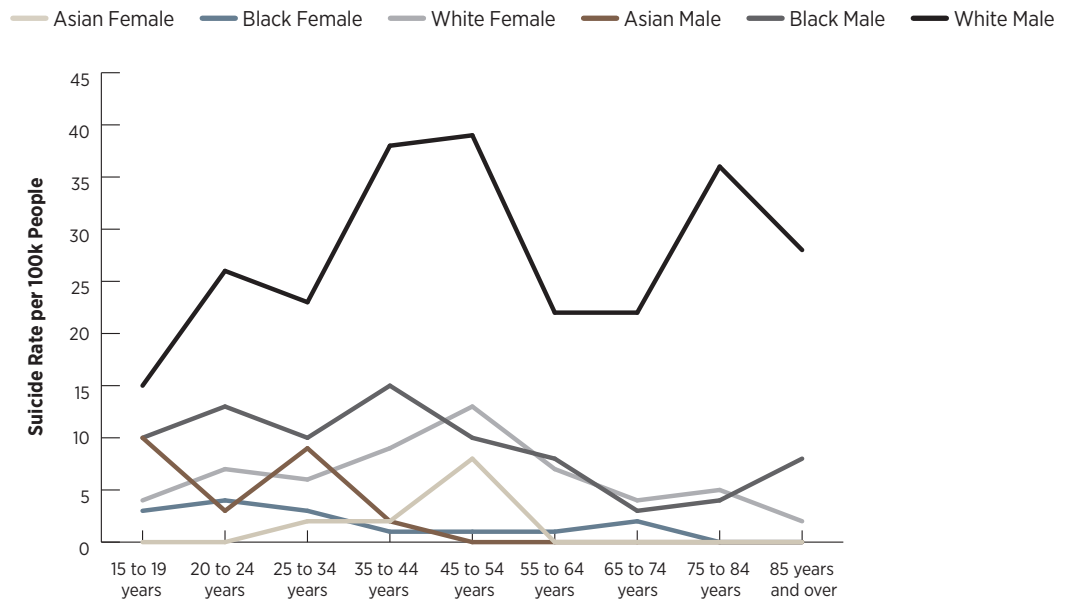
Figure 2 shows the average Allegheny County suicide rate by age, gender and race from 2002 through 2014.

In both Allegheny County and Pittsburgh, the highest suicide rates were among white males, followed by African American males and white females. Nationally, sharply increasing numbers of suicides among African American boys, age five through 11, were reported by a pediatric expert (Uchegbu, 2015). In Allegheny County, however, there were no reported suicides among children under age 11 during the study period. Of the 11 suicides reported among children age 11 through 14 during the same time period, none involved African American boys.

Consistent with national data, the suicide rate for men in Allegheny County (21.9 per 100,000) is nearly four times that of females (5.4 per 100,000). With the exception of African American women and Asian men, suicide rates were highest from age 35 through 54.

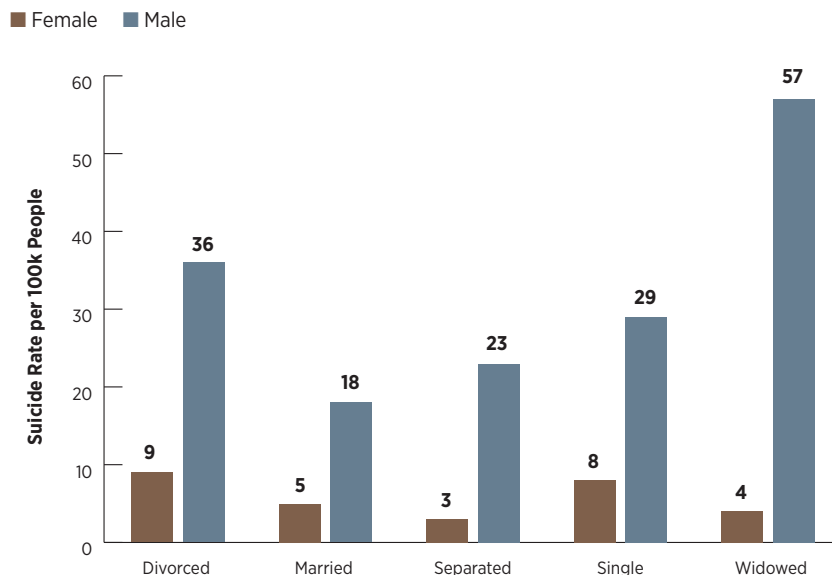
In Allegheny County, the average suicide rate for white people (14.9 per 100,000) during the 13-year period was more than triple that of African Americans (4.5 per 100,000) and five to six times higher than the suicide rate for Asians (2.8 per 100,000).

FIGURE 2: Suicide Rates by Age, Gender and Race (Allegheny County, 2002 through 2014)



For both men and women, suicide rates were lower among married individuals. Rates were exceptionally high among widowed males (14 times higher than their female counterparts) while those who were married had the lowest rate among men. Divorced women experienced the highest rates among females whereas separated women had the lowest suicide rate among females. Average suicide rates over the 13-year period by gender and marital status are shown in Figure 3.

FIGURE 3: Average Annual Suicide Rates by Gender and Marital Status (Allegheny County, 2002 through 2014)



## RESIDENCE AT TIME OF SUICIDE

**Table 1** shows Census tracts (and the neighborhood or municipality in which the tracts are located) with the highest rates of suicide. The highest rates of suicide were seen among residents within the census tracts that include McKeesport and Allegheny Center. The maps in **Figures 4 and 5** provide a visual representation of the county municipalities and city neighborhoods in which the Census tracts with the highest suicide rates are located. It should be noted that these rates apply only to the specific tract, and not to the entire municipality or neighborhood in which it is located.

The Census tracts with the highest rates of suicide were further categorized according to the Community Need Index and the Pittsburgh Need Index, two scales developed by DHS to assess community need. The Community Need Index<sup>2</sup> was developed to evaluate need outside the central city, and suburban Census tracts are ranked according to this index. Census tracts within the City of Pittsburgh are ranked according to the Pittsburgh Need Index<sup>3</sup>, which was modified to consider factors more relevant to urban communities. Eighty percent (eight of 10) of the Census tracts with the highest rates of suicide rank at moderate to distressed levels of need.

**TABLE 1: 2010 Census Tracts with the Highest Average Suicide Rates, 2002 through 2014**

CENSUS TRACT	NEIGHBORHOOD/ MUNICIPALITY	POPULATION	RATE PER 100,000	COMMUNITY NEED INDEX RANK
Census Tract 5522	McKeesport	1,100	42.0	Very High Need
Census Tract 5627	Allegheny Center (Pittsburgh)	1,395	38.6	Moderate Need
Census Tract 4710	Heidelberg	1,244	37.1	Low Need
Census Tract 4323	Avalon	2,121	36.3	Moderate Need
Census Tract 2412	Spring Hill-City View (Pittsburgh)	884	34.8	High Need
Census Tract 5632	East Allegheny (Pittsburgh)	2,439	34.7	High Need
Census Tract 2507	California-Kirkbride (Pittsburgh)	761	30.3	Very High Need
Census Tract 5606	Wilkinsburg	1,074	28.6	Very High Need
Census Tract 2704	Marshall-Shadeland (Pittsburgh)	1,079	28.5	Distressed
Census Tract 5605	Wilkinsburg	2,176	28.3	Low Need

<sup>2</sup> See *Data Brief: Suburban Poverty: Assessing Community Need Outside the Central City – 2012 Update*. The Community Need Index assesses community need as measured by percentage of households without vehicles, the percentage of vacant households, the percentage of unemployed men, the percentage of female-headed households, poverty and percentage of youth 16 through 19 not in school/without a high school diploma.

<sup>3</sup> The Pittsburgh Need Index is different from the Community Need Index in the following ways: removal of the “no vehicle” variable; addition of two education variables and removal of the dropout measure; addition of per capita income; and expansion of housing variables to include homeownership and residential sales prices.

<sup>4</sup> Please note that rates can change substantially when 1) the population is small and/or 2) the incident (in this case, suicide) is a relatively infrequent occurrence. A small increase or decrease in the number of suicides can make a substantial difference in the rate of a Census tract with a limited number of residents.

**FIGURE 4: Average Suicide<sup>4</sup> Rate per 100,000, Allegheny County, 2002 through 2014, by 2010 Census Tract**

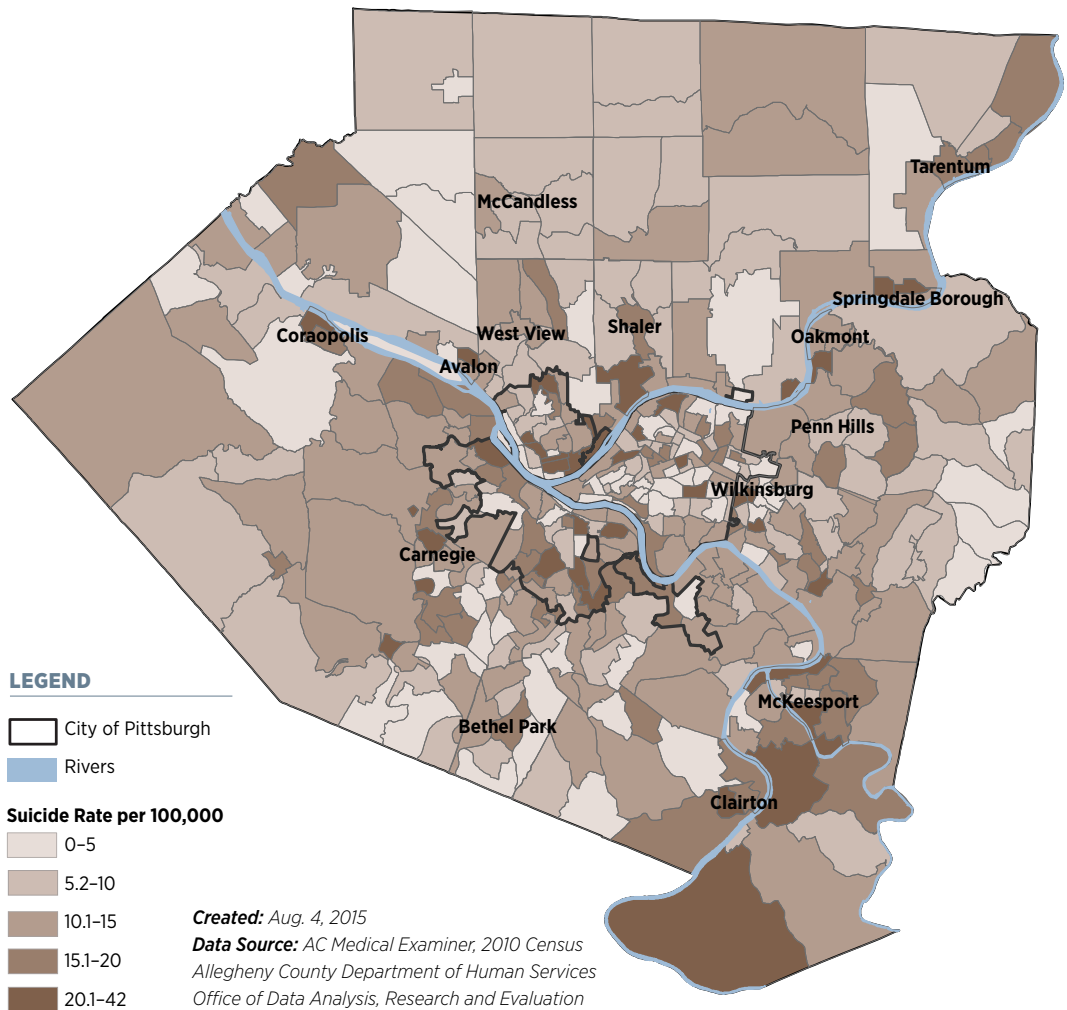




FIGURE 5: Average Suicide Rate per 100,000, City of Pittsburgh, 2002 through 2014, by 2010 Census Tract

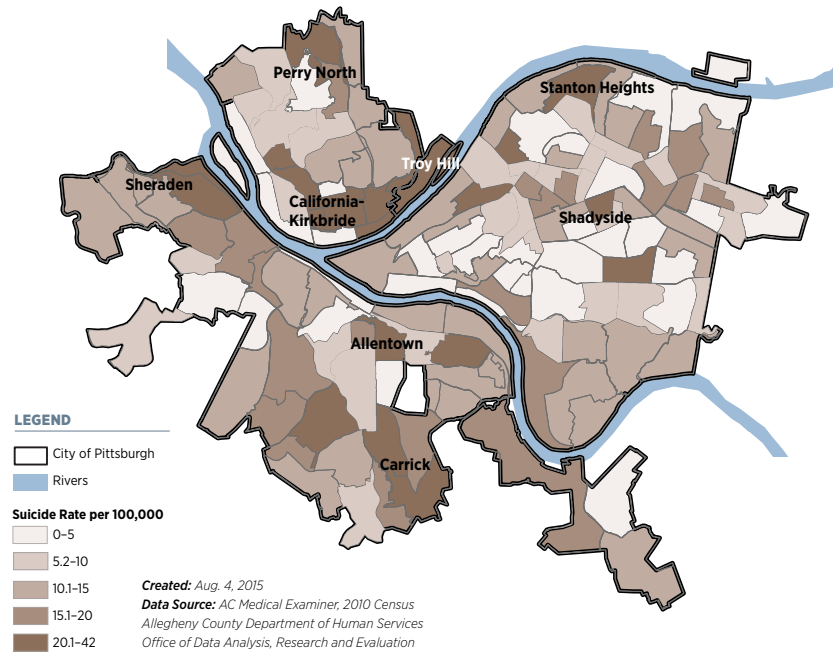
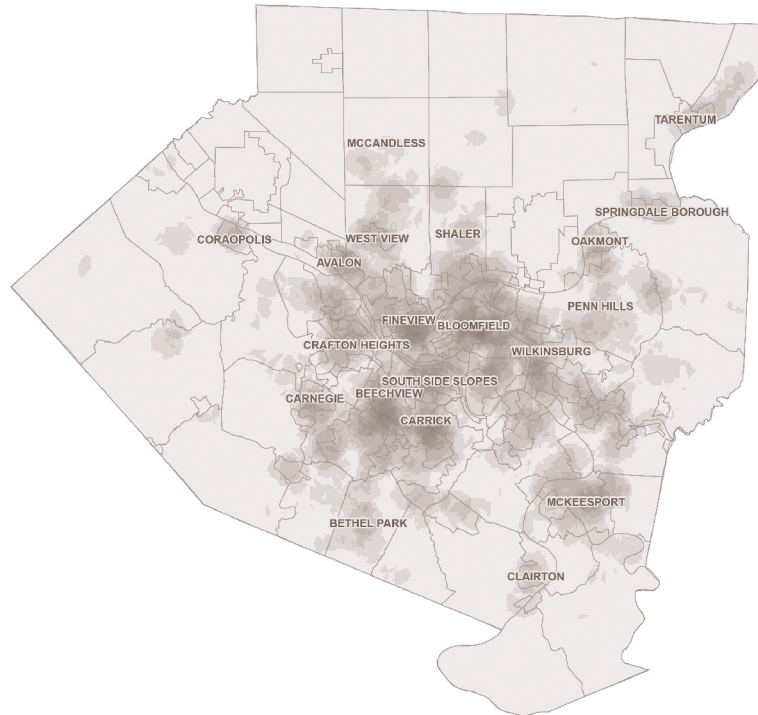


Figure 6 shows countywide suicide density, with the darkest areas indicating.

FIGURE 6: Suicide Density by Residence at Time of Suicide, Allegheny County, 2002 through 2014

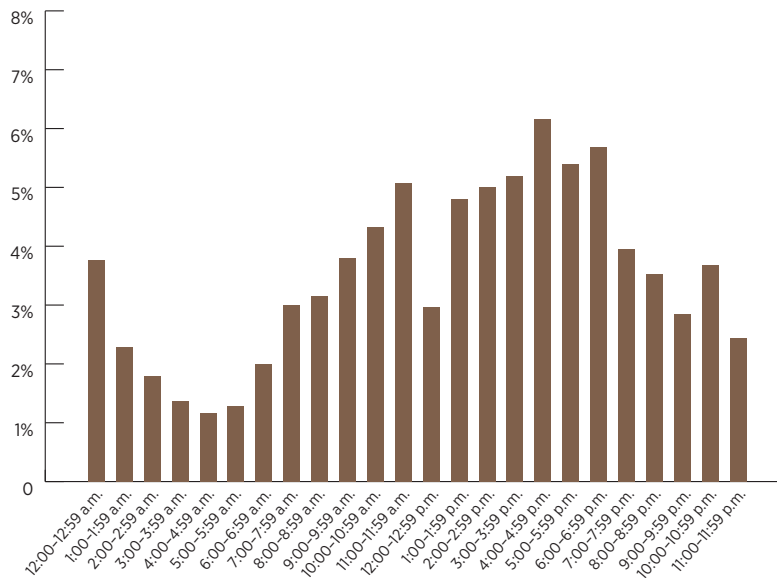


### MONTH, DAY AND TIME OF SUICIDE

In Allegheny County, there was an average of 14 reported suicides per month during the period studied. Although the suicide cases were relatively evenly distributed over the course of the year during that period, slightly more suicides were reported in December and August (15, on average) and fewer suicides were reported in February (11, on average). Suicide cases were fairly evenly distributed over the days of the week, with a slightly larger proportion of incidents occurring on Tuesday (16%).

About 40 percent of suicides occurred between 1 p.m. and 7 p.m., with the highest number occurring between 4 p.m. and 5 p.m. The time period in which the fewest suicides occurred was the early morning; the lowest number occurred between 4 a.m. and 5 a.m. Only 12 percent of suicides occurred between 1 a.m. and 7 a.m. Individuals 65 and older experienced the highest suicide rates from 11 a.m. to 12 p.m. and 5 p.m. to 6 p.m. For youth 18 and under, the highest number of suicides happened between 5 p.m. and 6 p.m., at nearly twice the rate of any other time of day for that age group.

FIGURE 7: Allegheny County Suicides by Time of Death (2002 through 2014)



**METHOD OF SUICIDE**

The most common methods of suicide in Allegheny County during the 13-year period were firearm or explosion, asphyxiation<sup>5</sup>, and drugs and/or poisoning. There were 75 suicides per year involving firearms from 2002 through 2014, and firearms were the number-one cause of death for all years except 2007. Firearms were indicated in approximately 46 percent of all cases (less than the 51 percent national rate reported by the American Foundation of Suicide Prevention).

Asphyxiation was the second leading cause of death for suicides from 2002 through 2014 for all years except 2007, when it was the leading cause of death. Hanging was the most common mechanism of asphyxiation death.

Drugs and/or poisoning were the third leading method of suicide in Allegheny County from 2002 through 2014. In most cases, a combination of drugs was indicated on the report. Suicides due to drugs may be under-reported or over-reported, as some suicides may be classified as overdose deaths and some overdose deaths may be classified as suicides.

Among Pittsburgh residents, the most common method of suicide alternated between firearms and asphyxiation until 2014, when suicide by drugs and/or poisoning reached its height at 12 deaths, making it (along with asphyxiation) the second most common method of suicide that year. Blunt force trauma was the third leading cause of death in Pittsburgh for most years. An analysis of the frequency of suicides associated with murder/suicides was considered for this report; however, these data are not readily available and will be considered for future analysis.

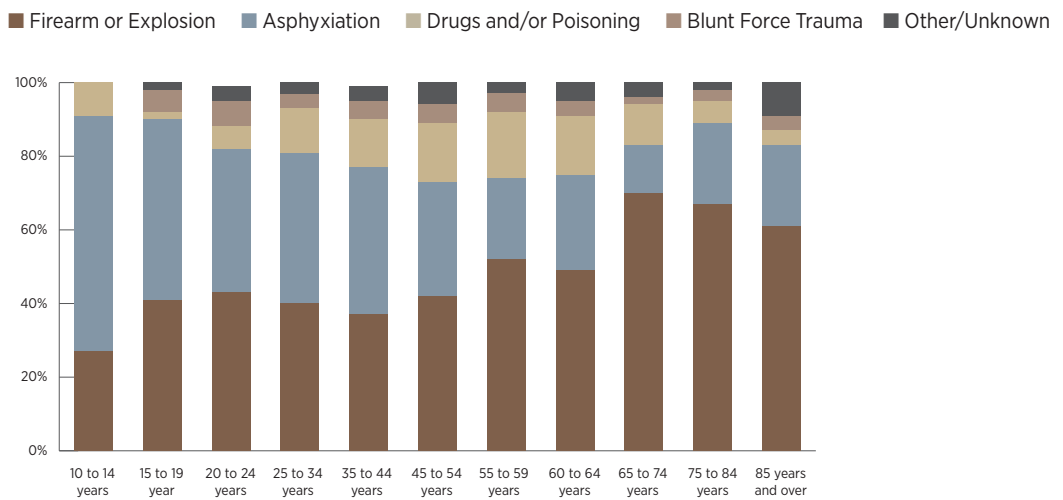
<sup>5</sup> Asphyxiation may include strangulation, hanging, drowning, and carbon monoxide or smoke inhalation.

### Suicide Method by Age

Firearms were the most common suicide mechanism for individuals age 45 and older and those 20 through 34 years of age. For all other age groups, the most common method of suicide was asphyxiation. These two methods accounted for the vast majority of suicides for all age groups. Drugs and blunt force trauma (including falls) alternated as the third most common method of suicide among all age groups.

As shown in **Figure 8**, there is some variation in suicide method by age. Firearm-assisted suicides occurred at the highest proportions among 65- through 74-year-olds, whereas asphyxiation occurred at the highest proportions among 10- through 14-year-olds. As a result, the median age for suicide by asphyxiation was 40 whereas the median age for firearm deaths was 49.

**FIGURE 8: Suicide Method by Age Group (2002 through 2014 Average)**



### Suicide Method by Gender

Consistent with national statistics (Centers for Disease Control and Prevention, 2014), the most common suicide method for men in Allegheny County was firearms, while the most common method for women was drugs and/or poisoning. Firearms were used in more than half of all male suicides in Allegheny County but accounted for less than a quarter of female suicides, while drugs and/or poisoning were indicated in 30 percent of Allegheny County suicide cases involving women but accounted for only eight percent of all male suicides. There appeared to be minimal differences between men and women in other categories.

TABLE 2: Method of Suicide by Gender (2002 through 2014)

GENDER	ASPHYXIATION	BLUNT FORCE TRAUMA	DRUGS AND/OR POISONING	FIREARM OR EXPLOSION	OTHER/ UNKNOWN	GRAND TOTAL
Female	36%	5%	30%	24%	5%	100%
Male	32%	4%	8%	52%	4%	100%
<b>Grand Total</b>	<b>33%</b>	<b>5%</b>	<b>12%</b>	<b>46%</b>	<b>4%</b>	<b>100%</b>

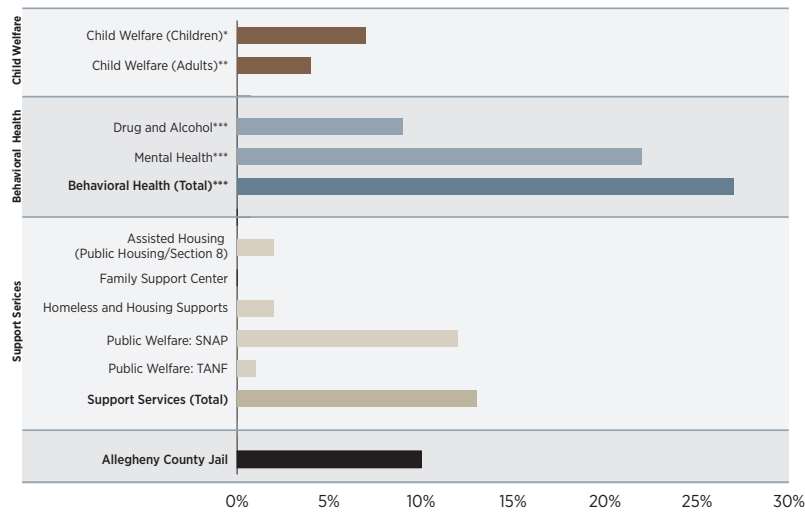
### HUMAN SERVICES INVOLVEMENT OF SUICIDE VICTIMS

According to the National Violent Death Reporting System (NVDRS), which tracks data on violent deaths in 16 states, 45 percent of 2012 suicide victims had a current mental health problem identified on either a police or a medical examiner's report. About 34 percent had been undergoing mental health treatment (as evidenced by a current prescription for a psychiatric medication or an appointment with a mental health professional in the past two months). Alcohol dependence was reported in 18 percent of cases, and other substance abuse issues were noted in 16 percent of cases. Around nine percent of the individuals had recent involvement in the criminal justice system, and approximately 19 percent had a documented history of previous suicide attempts.

#### Human Services Involvement in Allegheny County, 2007 through 2014

Involvement in a variety of publicly-funded human services (e.g., income support, child welfare and behavioral health services) was analyzed for all Allegheny County suicide victims from 2007 through 2014 (Figure 9). The analysis shows that, of the 1,303 suicides in Allegheny County from 2007 through 2014, approximately 27 percent had at least one encounter with the publicly-funded behavioral health (mental health and substance use disorder) treatment system in the past five years, 12 percent had received Supplemental Nutrition Assistance Program (SNAP) aid, and 10 percent had been incarcerated in the Allegheny County Jail.

**FIGURE 9: Involvement in Social Services, Allegheny County Suicide Victims, 2007 through 2014**



\*Individuals age 42 and younger who have been involved with Children, Youth and Families in the last 15 years

\*\*Adults age 18 and older

\*\*\*Individuals receiving services within five years of death

As seen in the preceding figure, the most significant involvement was in the area of behavioral health (mental health and substance use disorder) treatment. Therefore, additional analysis was conducted on these two areas of behavioral health involvement.

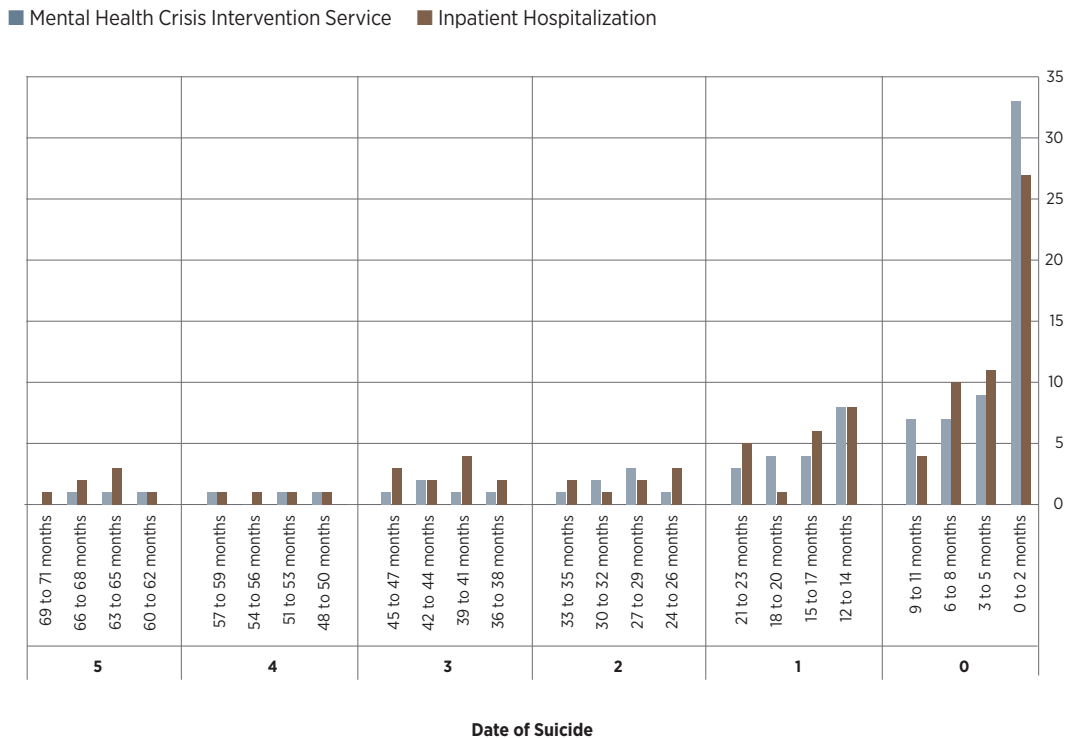
Community-wide utilization of behavioral health services is difficult to estimate due to the separation of data across different service providers/payers and the fact that services covered by private insurance and Medicare are not available in the DHS Data Warehouse. As a result, it is not possible to compare the rate of behavioral health utilization by individuals who died by suicide to the rate of utilization by county residents as a whole. Thus, consideration of relative risk was excluded from this analysis.

Claims data were examined for the 406 people who died from suicide and had utilized publicly-funded behavioral health services in the five years prior to death to determine the most frequently-indicated diagnoses. These diagnoses, in order of frequency, were Episodic Mood Disorders, Depressive Disorders Not Otherwise Specified, Substance Use Disorders and Schizophrenic Disorders. The order of frequency was not affected by reviewing either the most recent service and diagnosis or all known services and diagnoses. Alcohol use disorders were the most commonly reported substance use disorders, followed by opioid use disorders.

**Mental Health Service Involvement**

There were 1,303 suicides in Allegheny County from 2007 through 2014, and approximately 22 percent of those individuals (n = 290) had received at least one publicly-funded mental health service in the preceding five years; 150 had received services in the previous two months. Nearly one-third of services received were mental health crisis services, and 35 percent were an inpatient hospitalization. As shown in **Figure 10**, of those people who had received an inpatient or crisis mental health service prior to suicide, the majority received that service within a year of their death. The median number of years between the last service and death was 1.2 years.

**FIGURE 10: Time between Last Inpatient or Crisis Service and Death (2007 through 2014)**



**TABLE 3: Five Year Mental Health Service Involvement Prior to Suicide (2007 through 2014; N = 1,303)**

		TOTAL	PERCENT OF COHORT	PERCENT OF ALL N = 1,303
FIVE YEARS OR LESS*	<b>All</b>	<b>290</b>	<b>100%</b>	<b>22%</b>
	Crisis Services	93	32%	7%
	Inpatient Hospitalization	102	35%	8%
THIRTY DAYS OR LESS	<b>All</b>	<b>132</b>	<b>100%</b>	<b>10%</b>
	Crisis Services	21	16%	2%
	Inpatient Hospitalization	13	10%	1%

\*Includes all individuals counted in "Thirty Days or Less"

Medication checks and outpatient services were the most frequently-utilized mental health services overall, and the median time between those services and death was 2.5 years and three years, respectively.

#### Substance Use Disorder Service Involvement

Approximately nine percent of individuals (n = 116) who died by suicide from 2007 through 2014 had received publicly-funded substance use disorder (SUD) services in the five years preceding their suicide; 21 percent of those 116 individuals had drugs and/or poisoning indicated as the cause of death. On average, SUD services, when they were noted, were much further from the date of suicide than were mental health services, as around 22 percent of individuals with a SUD service in the last five years had a service in the last thirty days. (The rate was around 46 percent for mental health service recipients.) The median time between the last SUD service and death was slightly more than six years, suggesting no connection between suicide and last SUD service.

**TABLE 4: SUD Service Involvement Prior to Suicide (2007 through 2014 Suicide Cases), N = 1,303**

	TOTAL	PERCENT
Five Years or Less	116	9%
Two Months or Less	39	3%
Thirty Days or Less	26	2%

Outpatient services and service coordination were the most frequently-utilized substance abuse services, and the median time between those services and death was 2.2 years and 2.6 years, respectively.



### **Psychotherapeutic Prescription Utilization**

Seventy-one individuals were found to have filled a prescription for psychotherapeutic drugs within two months of their death (approximately five percent of all cases, based on Medicaid-paid pharmacy claims). This is likely a low estimate, both because it does not include Medicare or private insurance data and because non-psychotherapeutic drugs (such as anticonvulsants) are sometimes used to treat mental disorders. Anticonvulsants were, in fact, the most commonly-filled drug for those who died by suicide from 2007 through 2014. Narcotic analgesics were the second most frequently-filled prescription type.

### **IMPLICATIONS FOR DHS'S WORK**

- The data provided in this report can provide a starting point for identifying a population, geographic area or other criteria where targeted interventions may have the greatest potential for impact.
- These data may also be a starting point for identification of predictive factors related to suicide.
- DHS is unable to access data about involvement in treatment services that are funded through sources other than DHS or Medicaid (e.g., private insurance, self-pay), which limits our ability to conduct comprehensive analyses about risk or protective factors.

### **POTENTIAL NEXT STEPS**

- Conduct additional analysis in the following areas:
  - Determine what information is available about the two-thirds of individuals who die from suicide and have no involvement with the publicly-funded human services system.
  - Murder/suicide
  - Impact of mental health first aid
- Within the context of available data, identify evidence-based programs to target highest-risk populations.

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