



# Epi Research Report

New York City Department of Health and Mental Hygiene

April 2013

## Firearm Deaths and Injuries in New York City

### Background

Firearm deaths and injuries have severe and far-reaching effects on communities. The costs of firearm deaths and injuries per person have been estimated to be the highest of any injury.<sup>1</sup> Firearm deaths and injuries impose health care, judicial, and incarceration-related costs, as well as a host of social and economic costs on the communities in which they occur.

Firearm violence underlies these costs. Firearm violence drives people and businesses away from communities, placing some goods and services beyond the reach of residents.<sup>2</sup> Communities affected by violence also struggle with poverty, unemployment, disease and mental health problems among youth exposed to firearm violence.<sup>3,4</sup>

While the past two decades have shown dramatic declines in firearm injuries in New York City, firearms

### Key Findings:

- Firearm deaths in New York City declined from 524 in 2000 to 366 in 2011.
- New York City's 2011 firearm death rate (4.3 per 100,000) is less than half the national rate (10.0 per 100,000).
- New York City's firearm homicide rate ranks low among the counties containing the 25 most populous cities in the US. New York City's firearm suicide rate is the lowest among them.
- Despite significant declines, firearm violence persists at high rates in certain areas of New York City. The New York City neighborhoods with the highest firearm death and injury rates among youth aged 15 to 24 years include East New York, Crown Heights, Central Harlem and the South Bronx.
- Weapon carrying among New York City public high school students is lower than among high school students nationwide. For example, New York City public high school students report a lower prevalence of carrying a gun during the past 30 days than students nationwide (2% vs. 5%).

### Injury Terminology

The total number of **firearm deaths** includes **intentional** (firearm homicides and firearm suicides) and **unintentional firearm deaths**. The total number of **firearm injuries** includes **intentional** (firearm assaults and firearm self-inflicted injuries) and **unintentional firearm injuries**.

**Intentional** injuries result from the purposeful use of force by another person (also referred to as **violence**) or against oneself, with the intent to harm. **Unintentional** injuries are not deliberate and occur without the intent to harm.

A **firearm homicide** is a death resulting from the use of a firearm by another person through an act of violence. **Firearm suicide** is a death resulting from intentional use of a firearm against oneself with the intent to harm. A **firearm assault** is a nonfatal injury involving the use of a firearm by another person through an act of violence. A firearm self-inflicted injury is a nonfatal injury using a firearm directed at oneself with the intent to harm. **Unintentional firearm deaths and injuries** result from accidental discharge of a firearm.

- 1 Cook PJ, Lawrence BA, Ludwig J, Miller TR. The medical costs of gunshot injuries in the United States. *The Journal of the American Medical Association*. 1999; 282(5):447-454.
- 2 Ander R, Cook PJ, Ludwig J, Pollack H. Gun Violence Among School-age Youth in Chicago. Chicago, IL: University of Chicago Crime Lab; 2009. <http://crimelab.uchicago.edu/page/report>. Accessed November 18, 2011.
- 3 Farrington DP, Loeber R. Epidemiology of juvenile violence. *Child and Adolescent Psychiatric Clinics of North America*. 2000;9(4):733-748.
- 4 Fowler PJ, Tompsett CJ, Braciszewski JM, Jacques-Tiura AJ, Baltés BB. Community violence: a meta-analysis on the effect of exposure and mental health outcomes of children and adolescents. *Development and Psychopathology*. 2009; 21(1):227-259.



persist as a leading cause of premature death among young men of color.<sup>5</sup>

Using public health data sources to describe those injured by firearms, this report examines trends and patterns in firearm deaths and injuries in New York City. It highlights firearm violence, since most firearm deaths and injuries in New York City result from violence.

### Current Burden and Recent Trends in Firearm Deaths and Injuries

#### Firearm death and injury burden

According to 2011 and 2010 local public health data, the annual count of firearm deaths and injuries in New York City exceeded 2000; there were 366 firearm fatalities, 999 firearm hospitalizations, and 691 firearm injury emergency department visits. The corresponding rates were 4.3 deaths per 100,000, 11.8 hospitalizations per 100,000 and 8.1

emergency department visits per 100,000 population.

- In 2011, the overall firearm fatality rate for New York City is less than half the US rate (4.3 vs. 10.0 deaths per 100,000); the firearm suicide rate for New York City is approximately one ninth of the US rate (0.7 vs. 6.1 deaths per 100,000).
- In New York City in 2011, 84% of firearm deaths were homicides and 16% were suicides (Table 1). There were no unintentional firearm deaths.
- Nationwide in 2010 (the most current year for which data are available) suicides accounted for over half (62%) of all firearm deaths, while homicides accounted for 35% (Table 1).
- In New York City in 2010, most firearm injury hospitalizations were due to assaults (83%). Unintentional injuries (13%), injuries of undetermined intent (3%) and self-inflicted injuries (1%) accounted for the

remaining firearm hospitalizations. No comparable national data are available for nonfatal firearm injuries.

#### Firearm death burden, county and city comparison

The Centers for Disease Control and Prevention (CDC) publishes fatality data at the county level.<sup>6</sup> We compared New York City firearm homicides and suicides to counties containing the 25 most populous cities in the US.

- For firearm homicides, the highest rate was 23.8 deaths per 100,000. New York City's firearm homicide rate of 3.6 deaths per 100,000 was among the lowest, ranking 19 out of the 25 counties with the most populous cities (Figure 1).
- For firearm suicides, the highest rate was 8.1 deaths per 100,000. New York City's firearm suicide rate of 0.8 deaths per 100,000 was the lowest among the 25 counties (Figure 2).

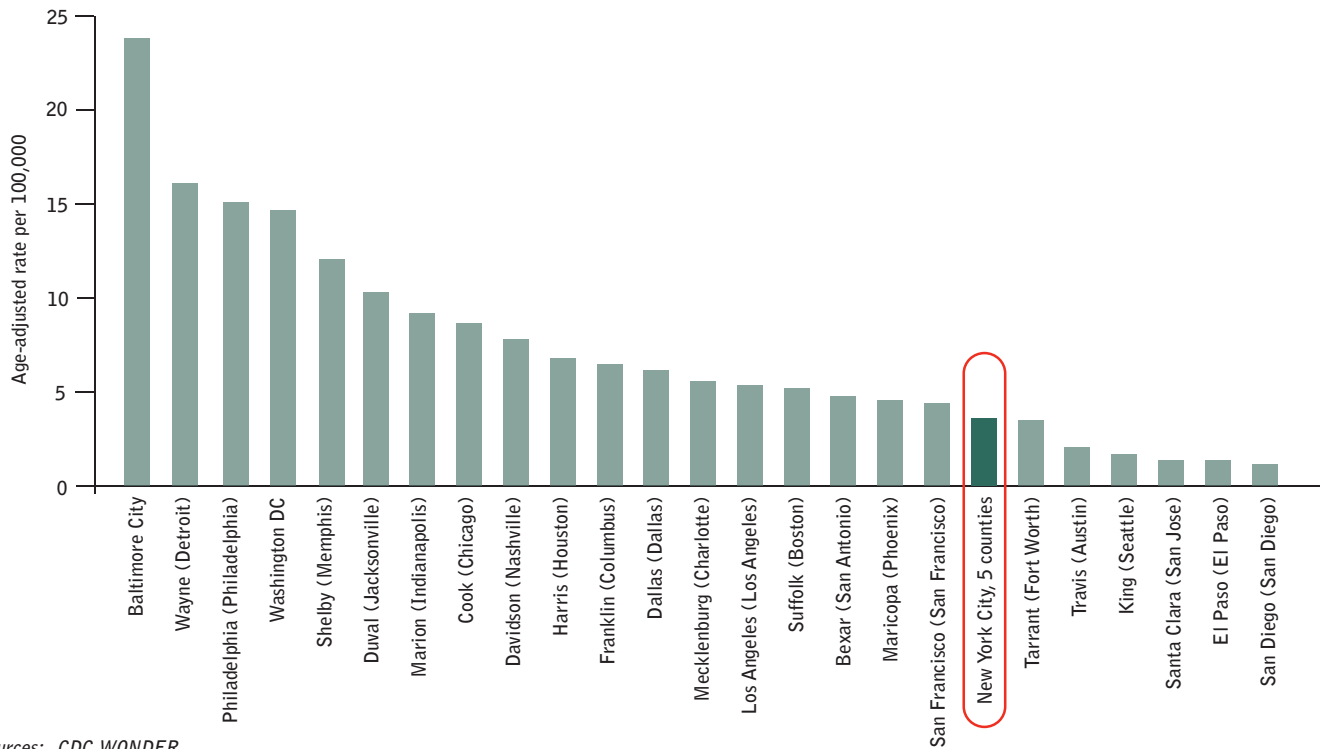
	<b>Overall firearm fatality rate per 100,000</b>	<b>Firearm homicide fatality rate per 100,000</b>	<b>Firearm suicide fatality rate per 100,000</b>	<b>% of firearm deaths homicides</b>	<b>% of firearm deaths suicides</b>
<b>New York City (n=366)</b>	<b>4.3</b>	<b>3.6</b>	<b>0.7</b>	<b>84%</b>	<b>16%</b>
<b>US (n=31,328)</b>	<b>10.0</b>	<b>3.6</b>	<b>6.1</b>	<b>35%</b>	<b>62%</b>

Sources: NYC DOHMH Bureau of Vital Statistics, 2011  
CDC WISQARS

5 Jasek J, Immerwahr S, Stayton C, Maduro G, Olson C. Men's health in New York City: Premature death due to homicide and heart disease. *NYC Vital Signs*. 2010;9(4):1-4. <http://www.nyc.gov/html/doh/downloads/pdf/survey/survey-2010menshealth.pdf>. Accessed December 1, 2011.

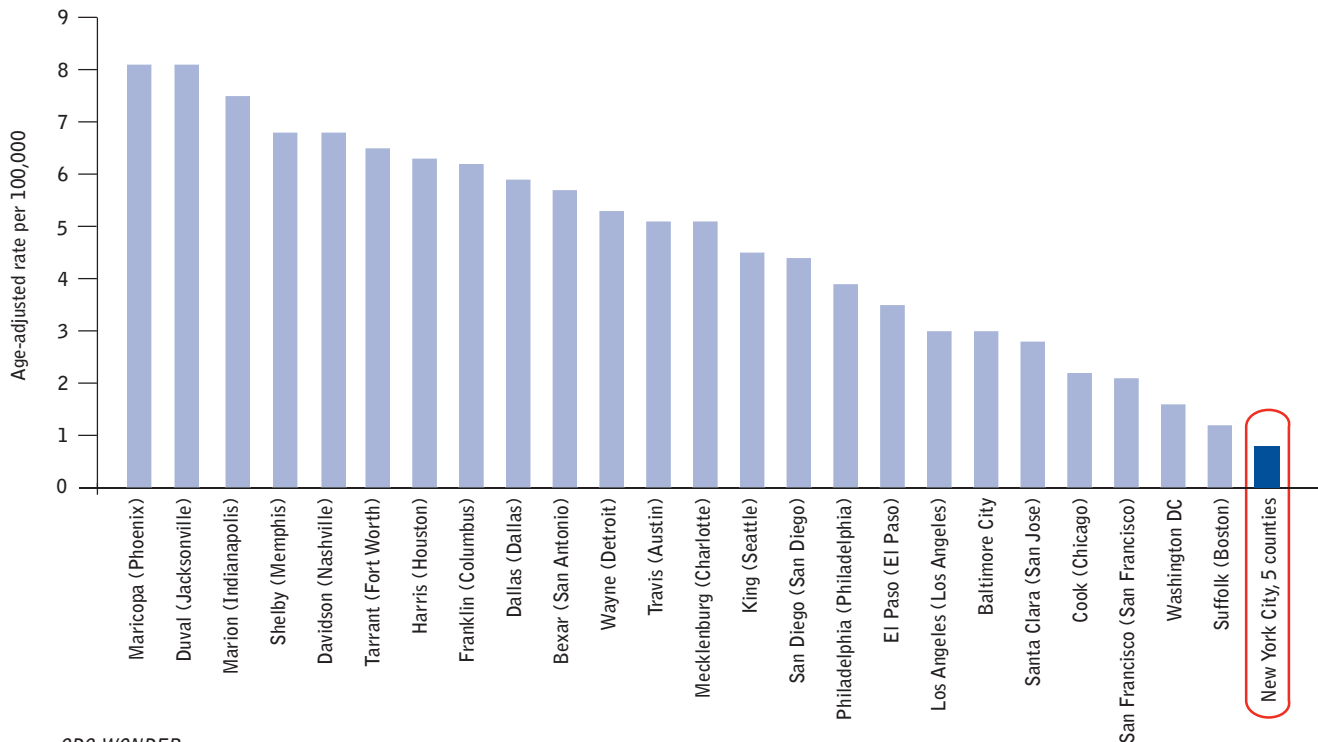
6 Centers for Disease Control and Prevention (CDC), National Center for Health Statistics' Wide-ranging OnLine Data for Epidemiologic Research (WONDER) Online Database (<http://wonder.cdc.gov/>). Accessed April 1, 2013.

**Figure 1 Rates (per 100,000) of firearm homicides by county, based on top 25 most populous US cities, 2008–2010**



Sources: CDC WONDER  
2010 US Census

**Figure 2 Rates (per 100,000) of firearm suicides by county, based on top 25 most populous US cities, 2008–2010**



Sources: CDC WONDER  
2010 US Census

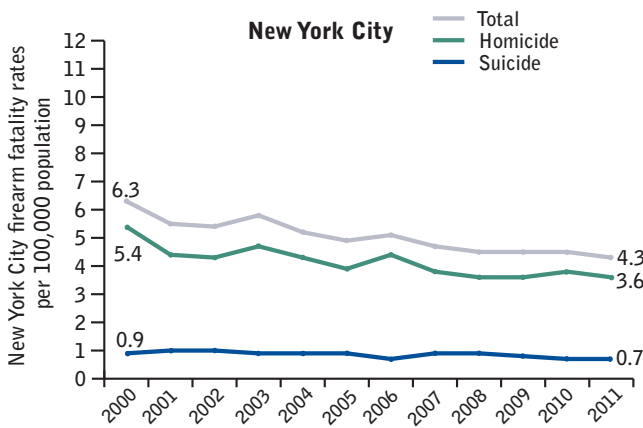
**Firearm death and injury trends**

From 2000 to 2011 in New York City, firearm fatalities have declined 32%, from 6.3 per 100,000 to 4.3 per 100,000. Driving this decline in firearm deaths was a 33% decline in firearm homicides, from 5.4 per 100,000 in 2000 to 3.6 per

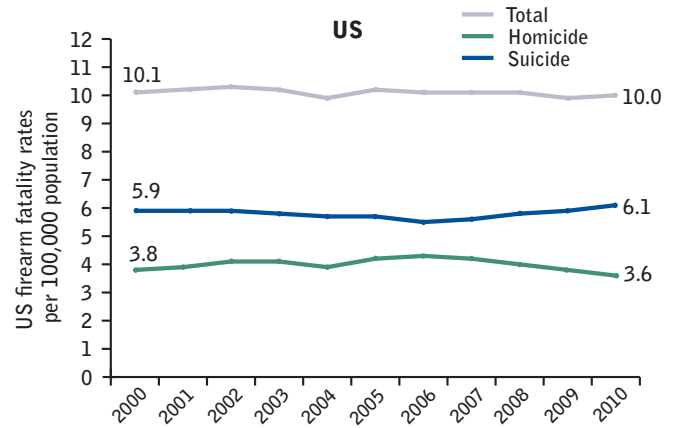
100,000 in 2011. In contrast, national rates of firearm fatalities overall and firearm homicides remained relatively stable. While both New York City and national trends in firearm suicides have declined slightly, New York City's firearm suicide rate has been consistently and markedly lower than the national rate (Figure 3).

As with fatalities, firearm injury hospitalizations declined in New York City; this decline is largely attributed to a drop in firearm assault hospitalizations. The rate of all firearm injury hospitalizations declined 21% in the past 11 years, from 15.0 per 100,000 in 2000 to 11.8 per 100,000 in 2010. Firearm assault hospitalizations also

**Figure 3 New York City's firearm fatality rate is declining, and is lower than the US rate**

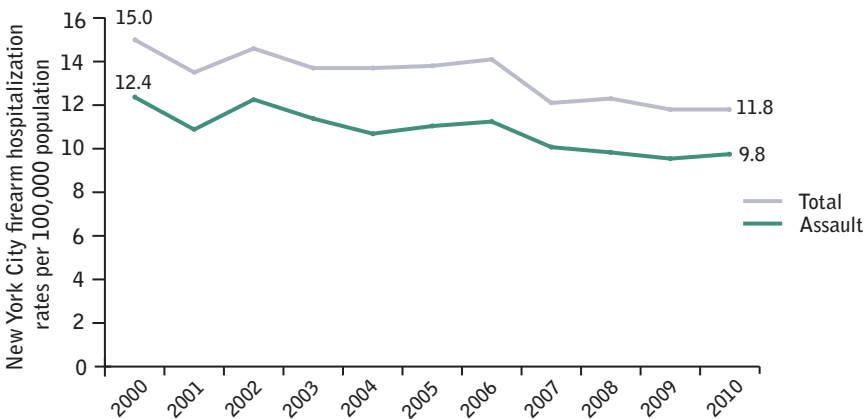


Source: NYC DOHMH Bureau of Vital Statistics



Source: CDC WISQARS

**Figure 4 Firearm hospitalization rates have declined in New York City since 2000**



Source: NYS DOH SPARCS

declined 21%, from 12.4 per 100,000 in 2000 to 9.8 per 100,000 in 2010 (Figure 4). Rates of other types of firearm injuries — that is, unintentional injuries, self-inflicted injuries, and injuries of undetermined intent — are lower than firearm assaults, and have been relatively stable during the past decade. There are no comparable data for the US.

### Who is Harmed by Firearm Violence?

Black, young men aged 15 to 24 years bear the greatest burden of violence-related firearm death and injury. Men aged 45 years and older bear the greatest burden of suicide (Table 2).

- New York City men were approximately 10 times more likely than women to die from a firearm homicide (6.7 vs. 0.7 deaths per 100,000, respectively) and approximately 12 times more likely to be hospitalized for a firearm assault injury (18.4 vs. 1.5 hospitalizations per 100,000, respectively).
- New Yorkers aged 15 to 24 and 25 to 34 years had the highest rates of firearm homicide (10.5 and 7.4 deaths per 100,000, respectively) and firearm assault hospitalizations (36.4 and 17.6 hospitalizations per 100,000, respectively) compared with other age groups.
- Bronx and Brooklyn residents had high rates of firearm homicide (5.8 and 4.4 deaths per 100,000, respectively) and firearm assault

**Table 2** Firearm homicide, assault and suicide

	Firearm homicide rates per 100,000 (n=308)	Firearm assault hospitalization rates per 100,000 (n=827)	Firearm suicide rates per 100,000 (n=58)
<b>Overall</b>	<b>3.6</b>	<b>9.8</b>	<b>0.7</b>
<b>Gender</b>			
Male	6.7	18.4	1.3
Female	0.7	1.5	0.2
<b>Age</b>			
Under 10 years	0.0	0.4	0.0
10–14 years	0.4	3.0	0.0
15–24 years	10.5	36.4	1.0
25–34 years	7.4	17.6	0.6
35–44 years	4.2	8.0	0.8
45–54 years	1.8	2.0	1.5
55–64 years	0.8	1.2	0.7
65+	0.4	1.0	0.6
<b>Borough of residence</b>			
Bronx	5.8	14.4	0.7
Brooklyn	4.4	14.0	0.6
Manhattan	2.0	6.0	0.6
Queens	2.1	4.0	0.5
Staten Island	1.6	2.7	1.2
<b>Race/ethnicity</b>			
Non-Hispanic black	11.4	-	0.6
Non-Hispanic white	0.6	-	1.1
Hispanic	2.6	-	0.5
Asian/Pacific Islander	0.3	-	0.0
Other	0.7	-	0.7

*Notes: All rates are age-adjusted, except the age-specific rates. Firearm assault hospitalization rates by race/ethnicity were not computed because of data limitations. Please see Discussion for details.*

*Sources: NYC DOHMH Bureau of Vital Statistics, 2011  
NYS DOH SPARCS, 2010*

hospitalization (14.0 and 14.4 hospitalizations per 100,000, respectively).

- Non-Hispanic blacks had the highest firearm homicide rate (11.4 deaths per 100,000); this rate was over four times higher than that for Hispanics, who had the next highest rate (2.6 deaths per 100,000).

## Youth and Firearm Violence

### Neighborhood disparities in youth gun violence

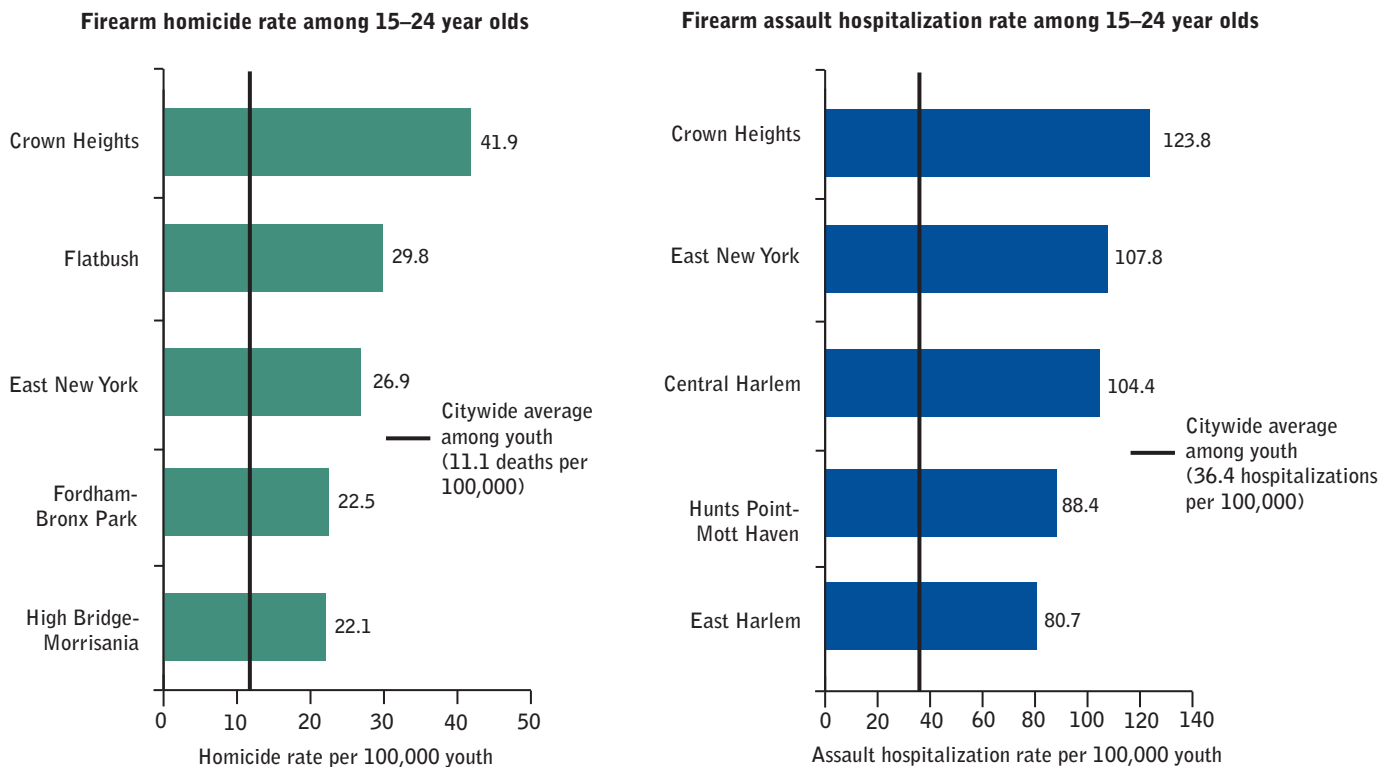
Rates of firearm violence among youth vary greatly by New York City neighborhood. The top five of 42 New York City neighborhoods where firearm violence among youth was most concentrated included Crown Heights, Central Harlem, East New York and other areas of Brooklyn and the Bronx (Figures 5 and 6). Rates in these neighborhoods were at least twice the City’s average. Consistent with research that shows neighborhoods of high violence also face economic stresses,<sup>3</sup> these

neighborhoods have some of the highest poverty rates in the City (Figure 6).

### Firearm carrying behavior and health risk among youth

The New York City Youth Risk Behavior Survey (YRBS), which is administered biennially to New York City public high school students, was used to examine trends in firearm carrying and other risk behaviors. Between 1997 and 2011, the proportion of New York City public high school students who reported carrying *any* weapon (e.g., gun, knife, or club) anywhere during

**Figure 5 New York City neighborhoods with the highest firearm homicide and assault hospitalization rates among youth have rates at least twice the City’s average**

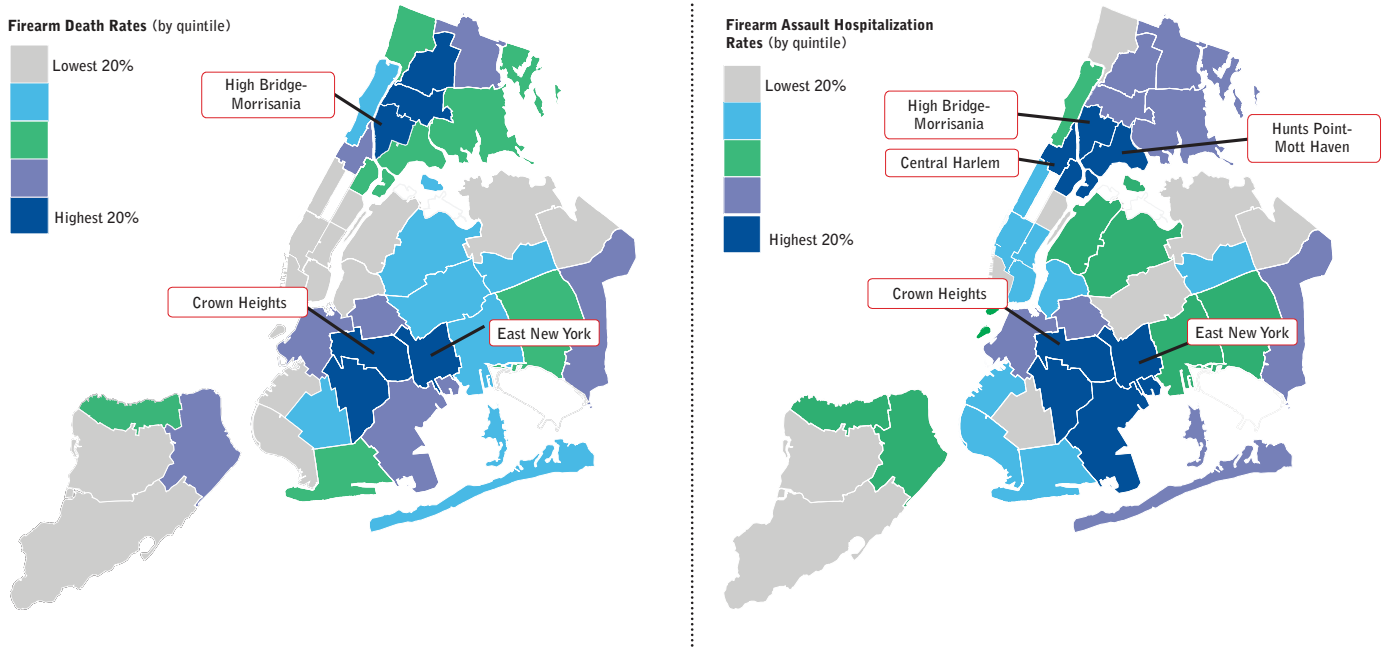


Source: NYC DOHMH Bureau of Vital Statistics, 2010

Source: NYS DOH SPARCS, 2010

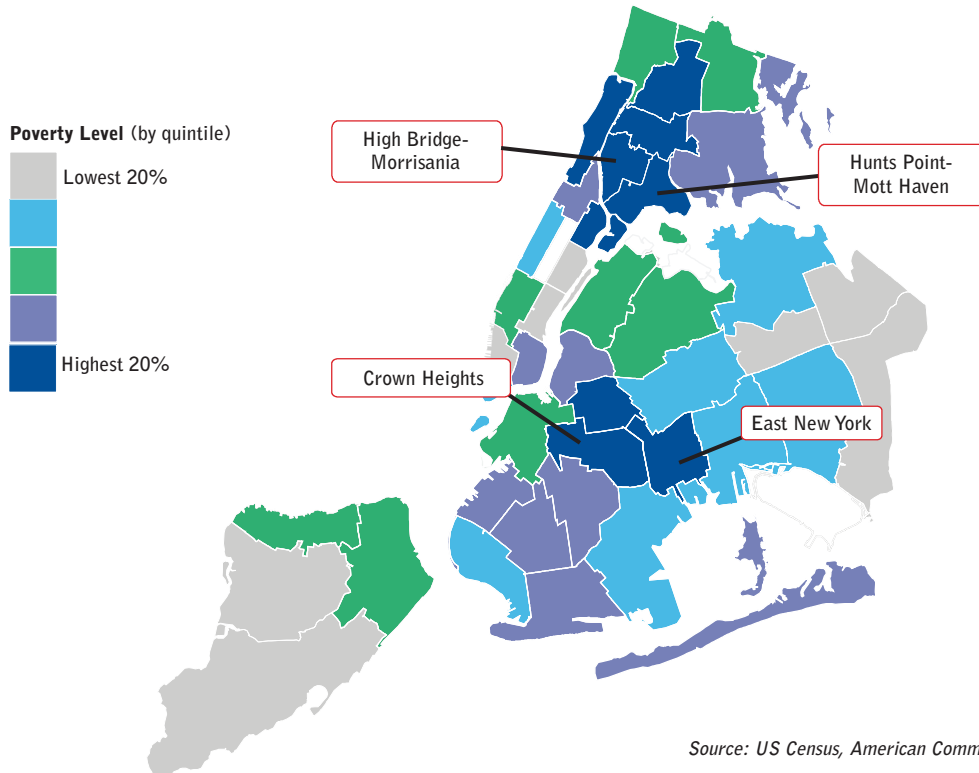
**Figure 6** New York City neighborhoods with the highest firearm homicide and assault hospitalization rates among youth are among the City's highest poverty neighborhoods

**Firearm homicide and assault hospitalizations rates among 15- to 24-year-olds, New York City**



Sources: NYC DOHMH Bureau of Vital Statistics, 2010 and NYS DOH SPARCS, 2010

**Neighborhood poverty in New York City**



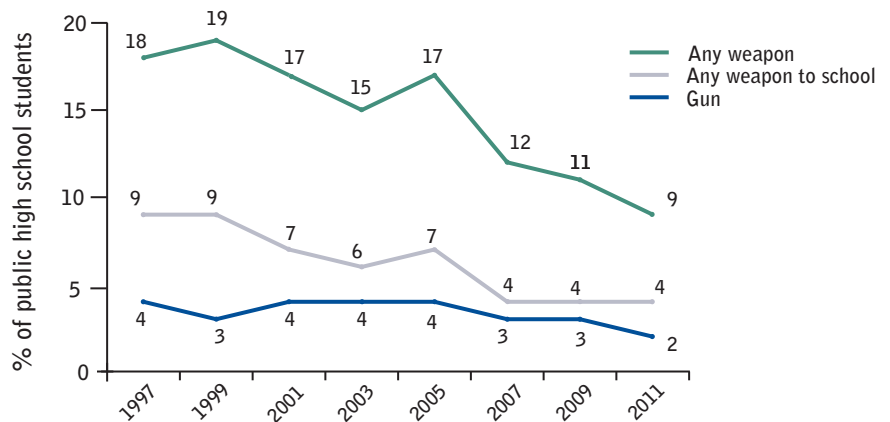
Source: US Census, American Community Survey, 2010

the past 30 days declined from 18% to 9%. The proportion reporting carrying *any* weapon to school declined from 9% to 4%. The proportion of New York City public high school students who reported carrying a gun anywhere during the past 30 days declined from 4% to 2% (Figure 7).

The current prevalence of weapon carrying among New York City public high school students is markedly lower than among high school students nationwide. When compared with public high school students nationwide, New York City students reported lower proportions of carrying any weapon (9% vs. 17%), carrying any weapon to school (4% vs. 5%), and carrying a gun (2% vs. 5%) (Figure 8). In addition, the prevalence of gun-carrying in New York City was the lowest among 26 other cities included in this survey. The highest prevalence of gun-carrying in these cities was 8%.

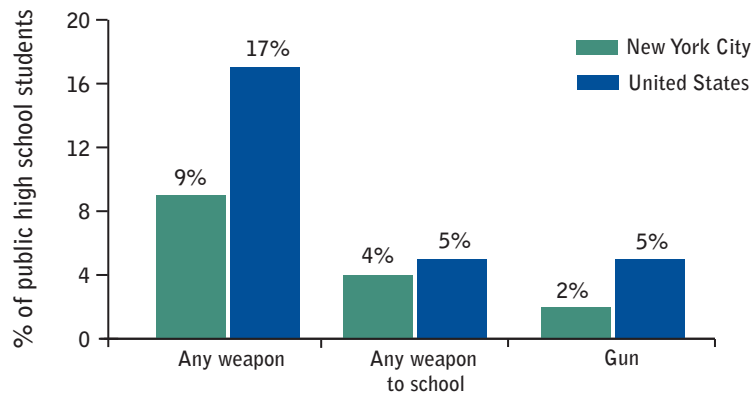
New York City students who reported carrying a gun also reported higher prevalence of other health risks. Compared with other students, those who reported carrying a gun had a higher prevalence of missing school due to feeling unsafe in the past 30 days (33% vs. 7%), binge drinking (consuming five or more alcoholic drinks within a couple of hours in the past 30 days) (57% vs. 12%), smoking 10 or more cigarettes in the past 30 days (37% vs. 5%), suicide attempt in the past year (33% vs. 7%), and feeling sad every day for two weeks or more in the past year (42% vs. 26%) (Figure 9).

**Figure 7 Self-reported weapon carrying and gun carrying among New York City public high school students has declined**



Source: NYC YRBS

**Figure 8 The proportion of public high school students reporting carrying a weapon is lower in New York City than in the United States**



Source: NYC YRBS, 2011  
US YRBS, 2011

## Summary and Discussion

During the past decade, New York City experienced significant declines in firearm deaths and injuries. From 2000 to 2011, firearm fatalities declined 32%, in

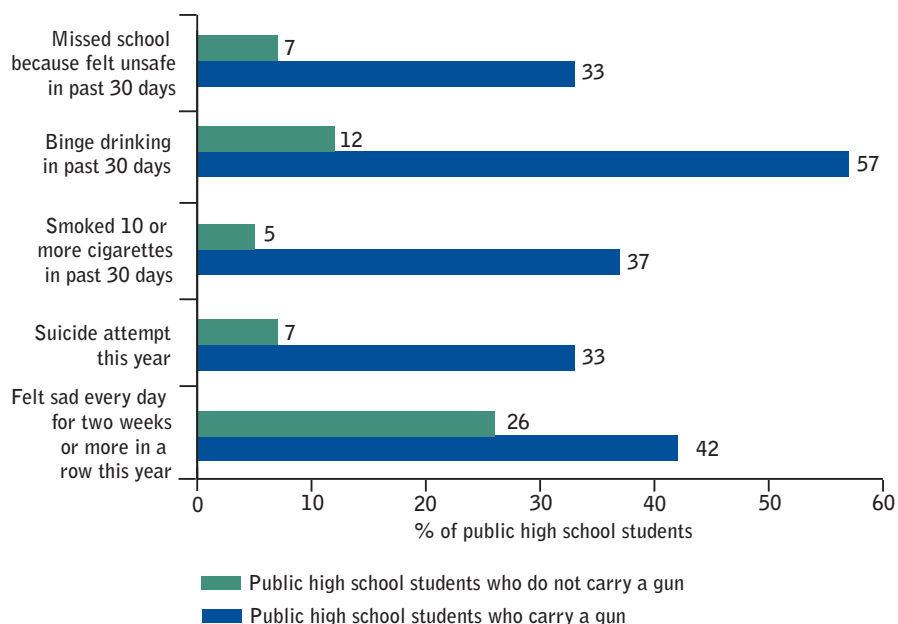


contrast to the stable trend seen nationwide. Likewise, firearm hospitalizations have declined 21% in New York City in the past decade. Currently, the firearm fatality rate in New York City is less than half that of the US and is markedly lower than other counties with populous cities. The majority of firearm deaths and hospitalizations in New York City have resulted from violence. The firearm suicide rate in New York City is approximately one ninth of the firearm suicide rate nationwide and is the lowest among counties containing the most populous US cities.

New York City has some of the strongest guns laws in the United States. The City rigorously reviews applications for firearms permits and New York State law carries one of the nation's highest penalties for illegal possession of handguns. In 2011, 2.2% of New York City adults reported keeping firearms in or around their home.<sup>7</sup> The most comparable data for the nation was 31.7%.<sup>8</sup> Places with weaker guns laws in other parts of the country have higher homicide and suicide rates.<sup>9</sup>

Despite recent declines in rates of firearm deaths and injuries, firearms remain a prominent public

**Figure 9** Mental and behavioral health risks are elevated among New York City public high school students carrying a gun



Source: NYC YRBS, 2011

health concern. Firearm homicides persist as the leading cause of death among New York City's youth (aged 15 to 24 years).<sup>10,11</sup> Teens who report carrying guns disproportionately report other behaviors that put them at high risk for poor health in adolescence and in adulthood.<sup>12</sup> Firearm deaths and injuries among youth are especially prevalent in certain New York City communities, with death and hospitalization rates that far

7 New York City Department of Health and Mental Hygiene. *EpiQuery: NYC Interactive Health Data System – Community Health Survey 2011* (<http://nyc.gov/health/epiquery>). Accessed March 29, 2013.

8 Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System (BRFSS), 2001*. <http://www.schs.state.nc.us/schs/brfss/2001/us/firearm3.html>. Accessed March 29, 2013.

9 Papadopoulos FC, Skalkidou A, Sergeantanis T, Ekselius L, Petridou ET. Preventing suicide and homicide in the United States: the potential benefit in human lives. *Psychiatry Research*. 2009;169:154-158.

10 New York City Department of Health and Mental Hygiene. Summary of Vital Statistics 2009. <http://www.nyc.gov/html/doh/downloads/pdf/vs/2009sum.pdf>. Accessed December 1, 2011.

11 New York City Department of Health and Mental Hygiene. Injury Surveillance and Prevention Program. Ten leading causes of injury death. <http://www.nyc.gov/html/doh/downloads/pdf/ip-death-inj-rank.pdf>. Accessed December 8, 2011.

exceed the citywide average. Public health approaches to violence prevention among high-risk youth focus on individual behavior change and shifting community norms away from accepting violence.

The following limitations to public health data sources and analyses warrant mention. County-level data are used as a proxy for city comparisons. City-level data are not routinely and systematically available. The data source for nonfatal firearm injuries (i.e., hospitalization data) does not allow for the reliable examination of the patient's race/ethnicity. While the YRBS is population-based, it is not representative of the entire population of young people in New York City. The survey does not reach homeless youth, those who are chronically

absent from school, dropouts, or students in private schools. Youth not reached by the survey may face different levels of injury and behavioral health risks than public high school students.

Finally, this examination of firearm injuries offers limited information on the injury incident. Specifically, perpetrator information, relationship between victim and perpetrator, place of incident, and details about the firearm used are not available in public health data sets. Research from other jurisdictions suggest most firearms used in violence — particularly among youth — are illegally acquired, but we cannot know this from data sets used in this report.<sup>13</sup> Combining law enforcement data with public health data would enrich analyses in New York City.

<sup>12</sup> Schilling EA, Aseltine RH Jr, Gore S. Adverse childhood experiences and mental health in young adults: a longitudinal survey. *BMC Public Health*. 2007 Mar 7;7:30.

<sup>13</sup> Meares T, Papachristos AV and Fagan J (2009). *Homicide and Gun Violence in Chicago: Evaluation and Summary of the Project Safe Neighborhoods Program*. Review of Research. [http://www.psnchicago.org/PDFs/2009-PSN-Research-Brief\\_v2.pdf](http://www.psnchicago.org/PDFs/2009-PSN-Research-Brief_v2.pdf). Accessed March 20, 2012.

## Technical Notes

### Data Definitions

New York Police Department (NYPD) and the New York City Department of Health and Mental Hygiene (DOHMH) both monitor homicides and assaults. The agencies' respective monitoring systems are based on distinct reporting definitions and regulations. As a result, homicide and assault counts may differ between agencies.

DOHMH reports a death as a homicide based on the *International Classification of Diseases, 10th Revision* coding system. Specific disease codes for homicides are X85–Y09. Sometimes death results from a crime many years after the crime was committed; the DOHMH may determine the death a homicide in the calendar year the death occurred. DOHMH designates homicides occurring in New York City by location of decedent at the time of death. NYPD reports homicides as counts of Murder and Non-Negligent Manslaughter using rules and definitions from the New York State Penal Law and the Federal Bureau of Investigation's Uniform Crime Reporting System. In its annual count NYPD includes homicides known to have occurred within that calendar year or cases from prior year that have been designated a Murder in the current year as a result of investigation or Medical Examiner determination or both. NYPD designates homicides occurring in New York City by location of the violent incident within the City.

DOHMH designates an assault according to the *International Classification of Diseases, 9th Revision, Clinical Modifications (CM)* coding system. Specific disease codes for assaults are E960–E969. DOHMH designates assaults in New York City by victims who are treated at New York City hospitals; the health data do not provide information on incident location. NYPD reports assaults using rules and definitions from the New York State Penal Law and the Federal Bureau of Investigation's Uniform Crime Reporting System. NYPD designates assaults occurring in New York City by location of the violent incident within the City.

### Data Sources

National firearm fatality data come from the Centers for Disease Control and Prevention's (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS), an interactive database system that provides customized reports of injury-related data (<http://www.cdc.gov/injury/wisqars>). Death counts for New York City are computed by NYC DOHMH's Injury Surveillance and Prevention Program using mortality data from the NYC DOHMH Bureau of Vital Statistics, 2000–2011. The New York State (NYS) Department of Health (DOH) Statewide Planning and Research Cooperative System (SPARCS) hospitalization data are based on administrative claims, which provide retrospective data on all discharges from hospitals, including patient-level data on demographics, diagnoses, treatment and services from 2000 to 2010. Data presented are from the January 2012 update file; live discharges were analyzed to assess patterns in firearm hospitalizations.

County firearm homicide and suicide rates come from the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics' Wide-ranging OnLine Data for Epidemiologic Research (WONDER) Online Database (<http://wonder.cdc.gov/>). Deaths are reported separately for Baltimore City and Baltimore County. Data are from the Multiple Cause of Death Files as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Most recent years (2008–2010) of data are pooled for rate computation to stabilize small counts in some jurisdictions. Rates per 100,000 are age-adjusted to the 2000 US Standard Population and subset by ICD-10 Codes X93, X94, X95 for homicide and X72, X73, X74 for suicide.

The New York City Youth Risk Behavior Survey (YRBS) is a biennial, self-administered, anonymous questionnaire adapted for New York City from protocols developed by the CDC. The survey has been conducted every other year since 1997 by the NYC DOHMH and the NYC Department of Education. National YRBS data and data for other major cities are available at <http://www.cdc.gov/HealthyYouth/yrbs/>.

Population figures for rate computations are based on New York City Health Department population estimates from 2000 to 2011 (as of March 2013). Neighborhood level rate computations are based on 2010 Census data. For full details on all data sources and codes, see the "My Community's Health" section at [nyc.gov/health](http://nyc.gov/health).

**Adjustments:** All death and hospitalization rates, except age-specific rates, were age-adjusted to the year 2000 US population. Percentages have been rounded to the nearest whole numbers, and rates have been rounded to the nearest tenth.

**Maps:** Firearm homicide and firearm assault hospitalizations were computed for each of New York City's 42 United Hospital Fund neighborhoods (zip-code aggregations) and ranked. The ranked list of 42 neighborhoods was divided into quintiles. Neighborhood poverty level was calculated by ranking the 42 New York City neighborhoods by poverty level (US Census, American Community Survey, 2010). Neighborhood poverty is defined as the percent of residents in an area living below the federal poverty level and is divided into quintiles.

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