

Firearm-Related Mortality, Louisiana 1999-2010

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This report is a purely descriptive study of firearm-related deaths occurring in Louisiana from 1999 to 2010. Mortality data were collected from death certificates from this 12-year period to describe firearm fatalities by year, race, gender, age group, and manner of death (accident, homicide, suicide). Louisiana data were also compared to national data.

Race, sex, and age were important factors influencing mortality rates and the death manner. Rates were higher in males than in females and higher in African-Americans than in Whites. The highest rates were observed for homicides among African-American males.

The ratio of Louisiana age/race-adjusted firearm mortality rates over the US rates were 1.8. Both Louisiana and the US mortality rates remained fairly constant over the 12-year period. Parish level data showed a wide variation in firearm mortality rates with some urban and some rural parishes having the highest rates. Data obtained from death certificates have limitations due to the limited number of variables available.

INTRODUCTION

Firearm-related deaths are a significant public health problem. They are the second leading cause of injury deaths after deaths due to motor vehicle accidents in the United States (US). The Center for Disease Control and Prevention (CDC) estimates that about 33,000 Americans die each year from firearms. Younger age groups are affected disproportionately.¹ One of the goals of "Healthy People 2010," an initiative from the Department of Health and Human Services to improve the health of Americans, is to reduce the current firearm annual mortality rate from 10.3 per 100,000 to 4.9 per 100,000. The goal of this study is to describe the basic epidemiologic features of firearm deaths in Louisiana, understand the pattern by age, sex, and race, evaluate the trend over a 12-year period, compare the situation of Louisiana and that of the United States as a whole, and provide a basis to future studies.

POPULATION AND METHODS

Mortality data were collected from Louisiana death certificates for the 12-year period from 1999 to 2010. The International Classification of Diseases (ICD) 10 Codes listed in Table 1 were used for data extraction. One of these codes had to be present among the first eight causes of death to be included in this study. All of the firearm deaths were listed as the first cause of death except for 18 of the 9,722 deaths included. For further analysis, the causes of death were grouped in three categories (with the descriptive "Manner of death" used on the death certificate) shown on Table 1: Accident, Suicide, and Homicide. Each manner of death was

divided in three subgroups according to the type of firearm: Handgun (H); rifle, shotgun, and larger firearm discharge (L); and other or unspecified firearm (O). Data on the type of firearm ("handgun" or "rifle, shotgun, and larger firearm discharge" were not analyzed since most were categorized as "other or unspecified firearm").

The age groups selected were increments of five-year age groups, except for the first group (ages less than nine years old), and in all, there were 17 age groups. In order to make the description of the manners of deaths (accident, homicide, and suicide) more simple, five age groups were used for that section.

The trend analysis comparing Louisiana, the United States, and the parish level rates included all races. Since the large majority of cases were among Whites (W) and African-Americans (AA), any detailed analysis by race was limited to these two race groups.

The data were extracted to a database and tabulated using SQL queries. Average age-group-specific mortality rates (per 100,000) were calculated for the entire 12-year period weighted for the population of each age group in each year. To depict the trends of mortality rates over the 12-year span between Louisiana and the United States, an age-adjusted mortality rate was calculated (US 2000 standard population, all races, both sexes).

The basic statistical tests were performed using WinPEpi downloaded in 2013.

- For comparison of each race, sex, and age group stratum, a crude rate ratio and an Upton χ^2 were used, and for all strata a Mantel-Haenszel χ^2 esti-

Code	Cause of Death	Death Manner
W32	Handgun discharge	Accident
W33	Rifle, shotgun and larger firearm discharge	Accident
W34	Discharge from other and unspecified firearms	Accident
X72	Intentional self-harm by handgun discharge	Suicide
X73	Intentional self-harm by rifle, shotgun, and larger firearm discharge	Suicide
X74	Intentional self-harm by other and unspecified firearm discharge	Suicide
X93	Assault by handgun discharge	Homicide
X94	Assault by rifle, shotgun, and larger firearm discharge	Homicide
X95	Assault by other and unspecified firearm discharge	Homicide
Y350	Legal intervention involving firearm discharge	Homicide
Y364	War operations involving firearm discharge and other forms of	Homicide

Age Group	Males					Females				
	AAM	WM	AA/W	Upton Chi	p-Value	AAF	WF	AA/W	Upton Chi	p-Value
0-9	1.8	0.9	2.0	5.3	0.020	0.7	0.5	1.50	0.9	0.350
10-14	4.2	2.4	1.8	5.4	0.020	1.2	0.9	1.27	0.3	0.580
15-20	69.2	16.8	4.1	124.7	0.000	9.0	3.3	2.69	23.3	0.000
20-24	153.6	31.6	4.9	850.7	0.000	13.3	5.2	2.55	35.7	0.000
25-29	155.0	30.3	5.1	814.9	0.000	13.4	7.2	1.85	16.2	0.000
30-34	95.9	29.2	3.3	334.2	0.000	9.2	6.5	1.43	4.4	0.030
35-39	99.7	24.6	4.0	401.4	0.000	7.9	8.3	0.95	0.1	0.770
40-44	39.4	24.1	1.6	34.5	0.000	6.0	7.9	0.76	2.2	0.134
45-49	35.8	29.5	1.2	4.7	0.020	4.2	7.1	0.59	5.8	0.010
50-54	29.4	27.5	1.1	0.4	0.510	2.9	7.0	0.41	10.1	0.002
55-59	25.8	31.5	0.8	2.3	0.120	2.8	7.2	0.39	8.4	0.004
60-64	16.2	26.4	0.6	9.1	0.003	2.7	5.6	0.48	3.8	0.050
65-69	17.3	26.0	0.7	4.4	0.030	2.8	4.5	0.63	1.3	0.250
70-74	19.8	30.0	0.7	4.5	0.040	1.3	3.8	0.36	1.3	0.070
75-79	17.2	64.4	0.3	32.8	0.000	2.9	3.5	0.83	3.1	0.710
80-84	17.9	55.6	0.3	14.6	0.000	1.7	3.9	0.44	2.1	0.260
85+	17.5	59.4	0.3	13.8	0.000	1.6	2.1	0.80	1.3	0.770
Total	52.0	23.3	2.2	1.36	0.000	5.4	5.0	1.08	0.93	0.330

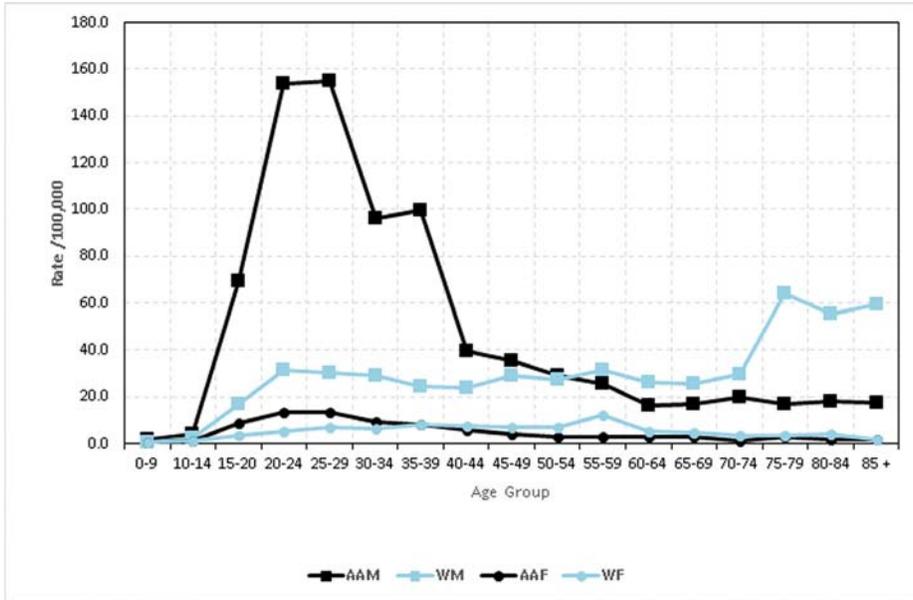


Figure 1: Annual firearm death rate by age group, sex, and race in Louisiana, 1999-2010.

Key: AAM=African-American Male; WM=White Male; AAF=African-American Female; WF= White Female

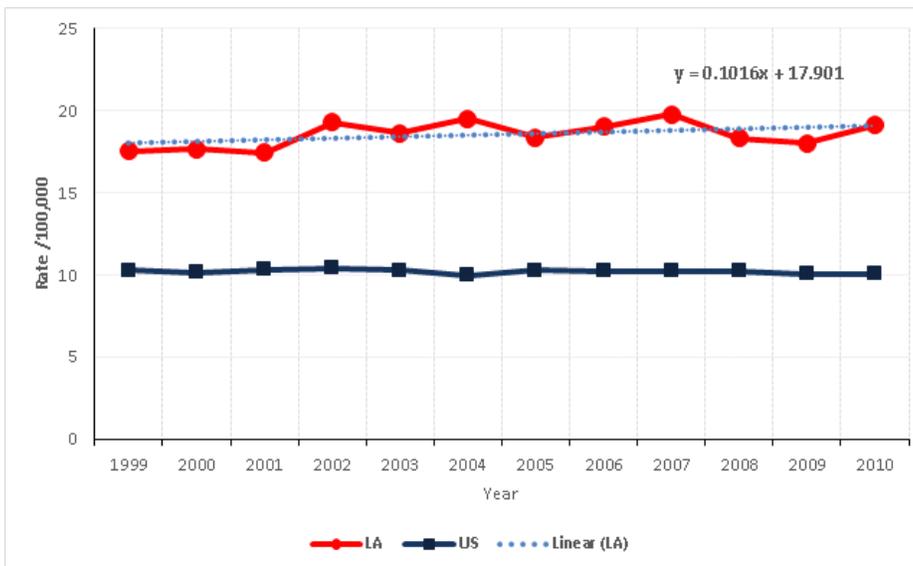


Figure 2: Age-adjusted* firearm death rate (per 100,000 population) United States (US) and Louisiana (LA), 1999-2010.

*US 2000 Standard Population, all races, both sexes

mator of the ratio was used,

- For the trend analysis, a Cochran-Armitage trend was calculated.

RESULTS

Number and rates of deaths by race, sex, and age groups

During the 12-year period, there were a total of 9,722 firearm-related deaths. There were large discrepancies by race, sex, and age group. Whites (W) and African-Americans (AA) represented the large majority of deaths (9,632 deaths out of a total of 9,722 deaths, i.e. 99% of all cases). There were only 91 other deaths, including 52 Asian males, 16 Asian females, 10 American/Indian males, 3 American/Indian females, and 9 males and 1 female of unspecified race.

Mortality rates are presented in Table 2 and Figure 1. There were major differences by age group, race, and sex. Overall, the annual mortality rates per 100,000 were 52.0 for AA males, 23.3 for W males, 5.4 for AA females, and 5.1 for W females.

The comparison between AA females and W females shows a crude rate ratio of 1.08 (Upton $\chi^2 = 0.938$, $p = 0.33$). A comparison for each age group shows that rates are significantly higher among AA females up to age 34, then show no significant difference from 35 to 44 and, from age 45 onward, rates are higher among white females (overall stratified Mantel-Haenszel estimator of the ratio 1.11, $MH\chi^2 = 3.42$, $p = 0.06$).

There are important differences between rates observed in AA males (overall rate 52.0) and W males (23.3). The crude rate ratio is 2.22, (Upton $\chi^2 = 1,368$; $p < 0.0001$). A pattern similar as that observed between females is observed among the two male groups, but with a wider difference. Up to age 44, the rates among AA males are two to five times higher than for W; then from age 45 to 54, the rates are practically equal between AA and W; finally above age 55 the W males

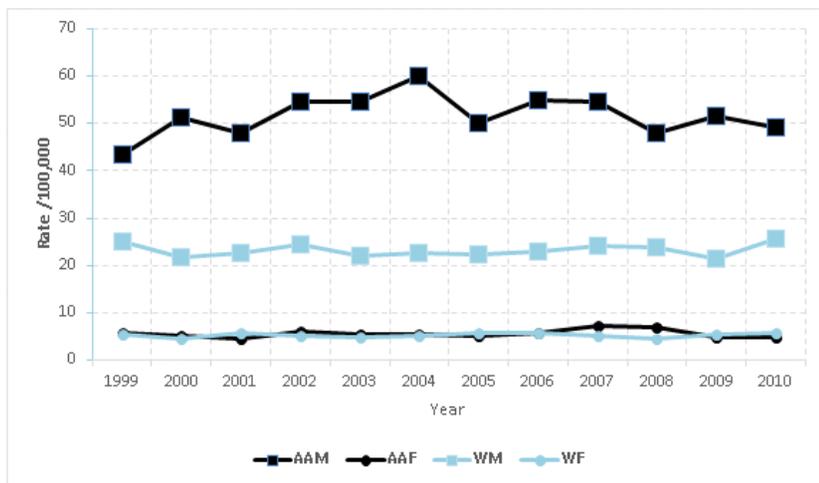


Figure 3: Age-adjusted* firearm death rate (per 100,000 population) by race and sex.

Key: AAM=African-American Male; WM=White Male; AAF=African-American Female; WF= White Female

*US 2000 Standard Population, all races, both sexes

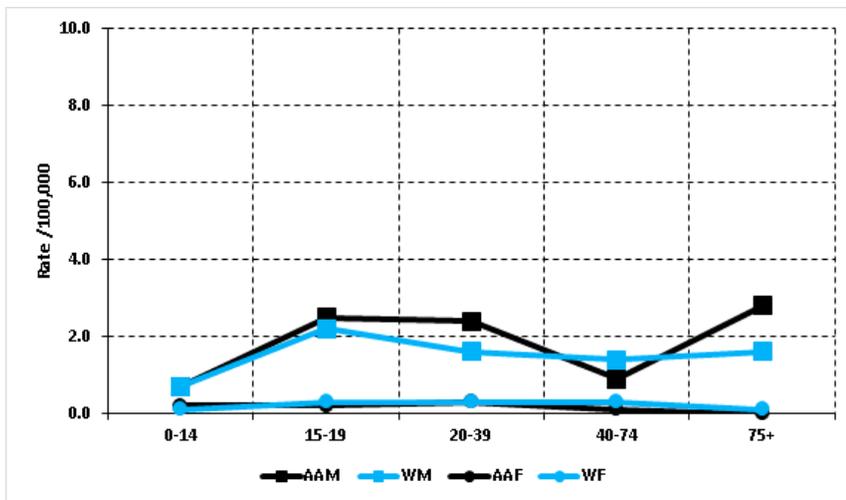


Figure 4: Mortality rates for accidental firearm deaths by race, sex, and age group in Louisiana, 1999-2010.

Key: AAM=African-American Male; WM=White Male; AAF=African-American Female; WF= White Female

have higher rates than AA (overall stratified Mantel-Haenszel estimator of the ratio 2.09, $MH\chi^2=1,111.9$, $p=0.000$).

Trends over the 12-year period

The average number of deaths per year was 810, with a range from 599 to 915 (Figure 2). The average age-adjusted rate is 18.6 per 100,000 in Louisiana versus 10.2 for the United States, a ratio of 1.8 with a narrow range of 1.7 to 1.9. While the age-adjusted mortality rate for the United States is fairly constant at 10.3 per 100,000, the trend for the Louisiana population is very slightly increasing over this 12-year period ($y=0.1016x + 17.901$ (Cochrane-Armitage test for linear trend: $\chi^2 = 0.00$ [DF: 1] $P = 0.985$).

Trends by sex and race are presented in Figure 3. There was no significant increase over time that could be detected in any of these groups. The Cochrane-Armitage test for linear trends are for African-American males $\chi^2=0.48$, $p=0.49$; for African-American females $\chi^2=0.06$, $p=0.81$; for White males $\chi^2=0.14$, $p=0.71$; and for White females $\chi^2=0.0$, $p=0.98$.

Distribution of manners of death by race, sex, and age group

There were 5,176 deaths by homicide, 4,112 by suicide, and 416 by accident. There were also 44 deaths due to "legal intervention involving firearm discharge," and there were no deaths due to "war operations involving firearm discharge and other forms." Rates per 100,000 population are presented in Table 3.

Over the 12-year span, there were differences in mortality rates among accidental (0.8/100,000), suicidal (8.0), and homicidal (18.9) deaths. The rate ratio suicide/accident = 9.84 (Upton $\chi^2=3008$, $p<0.0001$), homicide/accident = 12.2 (Upton $\chi^2=3981$, $p<0.0001$), and homicide/suicide = 1.24 (Upton $\chi^2=108$, $p<0.0001$).

Accidental mortality rates were low in male children <15 years old at 0.7 for AAM and for WM (rate ratio = 1.1, Upton $\chi^2=0.08$, $p=0.77$) and even lower in female children at 0.2 for AAF and 0.1 for WF (rate ratio = 1.4, Upton $\chi^2=0.24$, $p=0.62$). But the rate ratio between M and F was 4.8 (rate ratio = 4.8, Upton $\chi^2=19.9$, $p<0.0001$). The rates remained low for females throughout the age group. For males, the rates increased in the older age groups to stay around 2.0 with

Table 3: Mortality Rates Per 100,000 Persons by Race, Sex, and Age Group and Manner of Deaths, Louisiana, 1999-2010

	Accidents					Homicide					Suicide				
	AAM	WM	AAF	WF	All	AAM	WM	AAF	WF	All	AAM	WM	AAF	WF	All
0-14	0.7	0.7	0.2	0.1	0.4	1.8	0.4	0.7	0.4	0.8	0.2	0.4	0.0	0.1	0.2
15-19	2.5	2.2	0.2	0.3	1.4	65.9	4.0	7.0	1.1	17.6	3.7	14.5	0.5	1.9	5.8
20-39	2.4	1.6	0.3	0.3	1.1	117.8	7.7	10.3	2.7	22.9	12.5	20.4	1.0	4.0	10.2
40-74	0.9	1.4	0.1	0.3	0.8	21.7	4.3	3.2	1.6	5.4	8.0	22.6	0.6	4.9	10.8
75+	2.8	1.6	0.0	0.1	0.8	5.5	0.9	1.9	1.3	1.5	9.6	29.3	0.0	2.0	12.4
Total	1.5	1.4	0.2	0.3	0.8	45.3	4.3	4.9	1.6	10.0	6.4	17.7	0.5	3.3	8.0

minor variations (see Figure 4). For ages above 15 years, the rate ratio AAM/WM =1.17 (Upton $\chi^2=1.17$, $p=0.19$).

Homicide rates are presented in Figures 5A and 5B. The extremely high rates among the AAM 20-39 age group mortality rate at 117.8 dwarfed all other rates. To better display the differences between other rates, Table 5B displays them with a logarithmic scale on the y axis. The rate ratio between AAF (4.9) and WF (1.6) were 3.0 (Upton $\chi^2=226$, $p<0.0001$). For males, the rate ratio between AAM (45.3) and WM (4.3) was obviously very significant (rate ratio 10.6, Upton $\chi^2=5,218$, $p<0.0001$).

Suicide rates per 100,000 among children <15 years old were very low (less than 0.5). For all females, rates increased slowly to reach their highest in the 40 to 74 age group and then decreased. Suicide rates were much higher among WF than among AAF (rate ratio 6.4, Upton $\chi^2=194$, $p<0.0001$). For AAM they remained low, with a high at 12.5 in the 20-39 age group. For WM, the peak was reached in the 75+ age group at 29.3. Suicide rates were also much higher among WM than among AAM (rate ratio 2.8, Upton $\chi^2=501$, $p<0.0001$).

There were only 44 deaths in the category "Legal intervention involving firearm discharge." Only one WM in the age group 15 to 19 years, 12 AAM and 17 WM in the age group 20-39, 6AAM and 8 WM in the age group 40-74, and none among females.

Parish level data

Parish firearm mortality rates reflect the influence of the important variables already identified: composition of the population by race, sex, and age group and other variables (poverty, crime levels...) that could not be identified from the limited data included in the death certificates.

Parish mean annual mortality rates from firearms ranged from 6.9 to 38.8/100,000. The distribution of parish mean annual rates are displayed in Figure 7. Orleans Parish had the highest annual firearm related death rate at 38.8 per

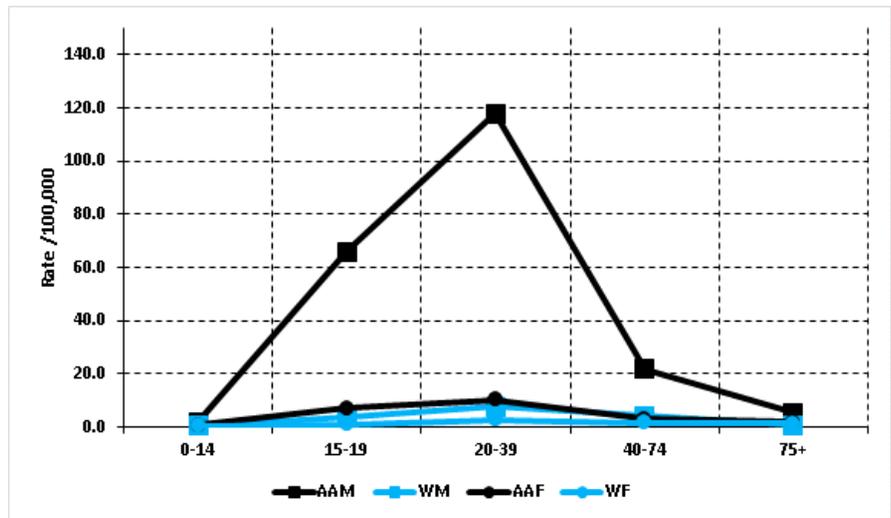


Figure 5A: Mortality rates for homicidal firearm deaths by race, sex, and age group in Louisiana, 1999-2010.

Key: AAM=African-American Male; WM=White Male; AAF=African-American Female; WF= White Female

100,000. Other parishes with rates higher than 16/100,000 were either large urban parishes (Caddo 8.9, East Baton Rouge 18.2, Jefferson 16.7) or small rural parishes (East Carroll 24.9, Washington 19.4, Evangeline 19.0, St. Helena 18.0, Madison 17.1, Claiborne 16.6).

DISCUSSION

The data have shown that race, sex, age, and whether deaths were due to accident, suicide, or homicide were important variables when describing mortality rates by firearms in Louisiana. Because this descriptive study was done from death certificates only, no other risk factors were available for exploring the specific reasons for these distribution patterns. The literature shows that another risk factor for firearm-related homicide is living in a poor urban area. Getting involved in gang-related urban violence partially explains the high mortality rates among juveniles and young adult males.³⁻⁵ Availability of unsecured guns in the home is also a risk factor to be considered.

Large discrepancies were also observed among Loui-

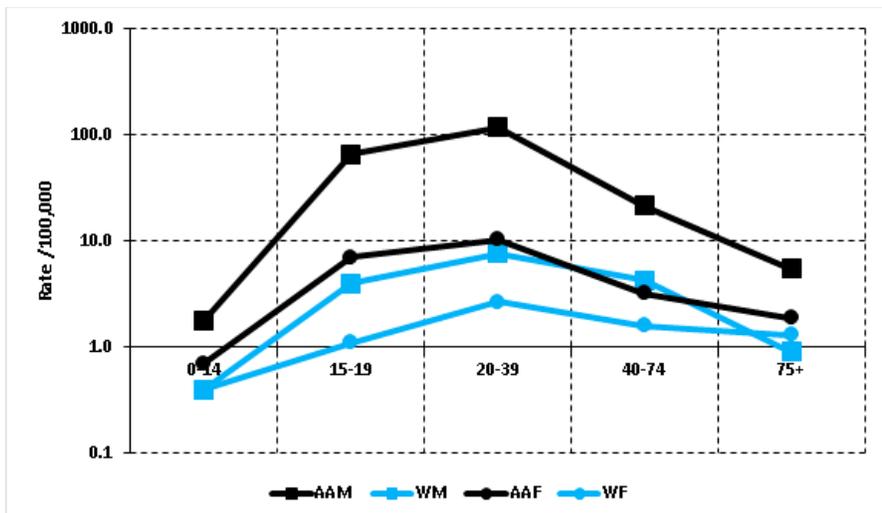


Figure 5B: Mortality rates for homicidal firearm deaths by race, sex, and age group in Louisiana, 1999-2010, logarithmic scale.

Key: AAM=African-American Male; WM=White Male; AAF=African-American Female; WF= White Female

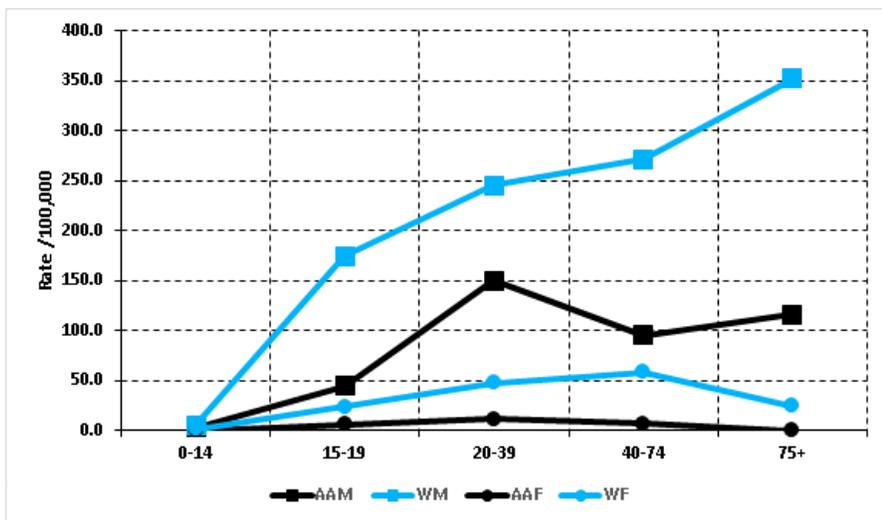


Figure 6: Mortality rates for suicidal firearm deaths by race, sex, and age group in Louisiana, 1999-2010.

Key: AAM=African-American Male; WM=White Male; AAF=African-American Female; WF= White Female

siana parishes. There seems to be two patterns for high firearm mortality rates. The first pattern includes urban areas with a concentration of poor living conditions such as in Orleans, East Baton Rouge, and Caddo parishes. Orleans Parish firearm-related death rate is the highest in Louisiana, more than twice as high as in East Baton Rouge and Caddo Parishes. According to census data, more than 25% of Orleans Parish residents live below the poverty level compared to 18.4% in Louisiana as a whole.⁶ The second pattern includes rural areas which have been much less studied than urban areas. Firearm mortality rates observed in Louisiana are consistently higher than those observed in the United States, even after adjusting for race, sex, and age distribution.

Mortality data are easily accessible and very useful for the purpose of describing the magnitude of a public health problem in specified populations and trends over time. However, firearm-related mortality data have some serious limitations. Data on homicides might be underreported since at time of filling out the death certificate, the criminal investigation often is still ongoing. Data on suicide death might be underreported because of stigma of this manner of death.⁷ Another limitation is that mortality data only describe the tip of the iceberg. Data based on emergency department visits estimate that about two-thirds of firearm-related injuries are non-fatal and make up the majority of firearm violence.⁸ The likelihood of dying from a gunshot wound also depends on the intent of the person using the weapon; case fatality rates for firearm injuries range from 20% for homicides and to 80% for suicides.²

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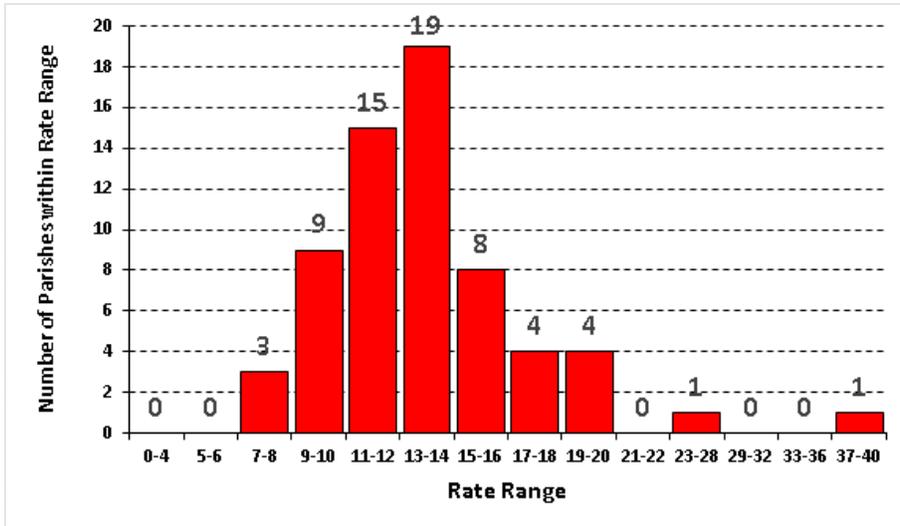


Figure 7: Distribution of firearm mortality rates per 100,000 by parish in Louisiana, 1999-2010.

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