

# COVID-19 Reflections

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## Firearm-Related Injury and Death in North Carolina: Trends During the COVID-19 Pandemic

The COVID-19 pandemic has had far-reaching impacts on the health and well-being of North Carolinians, including injury and violence. Firearm purchases surged and, as the pandemic evolved, North Carolinians experienced increases in firearm-related deaths and injuries. This paper describes firearm injuries and deaths in the state from 2017 to 2021.

### Background

The COVID-19 pandemic has resulted in many adverse impacts to North Carolinians, including impacts other than those directly attributed to the SARS-CoV-2 virus and its variants. The pandemic resulted in widespread economic and social disruption, highlighting and intensifying inequalities across the life course. While protective for infectious diseases, mitigations like the stay-at-home orders exacerbated social isolation, a known risk factor for violence [1]. Other shared risk factors for violence were amplified during the pandemic, such as unemployment, lack of community support or cohesion, and increases in media depictions of violence as the country was deeply affected by numerous nationally publicized violent events [1, 2].

Over half (56.7%) of violent deaths in the United States and over two-thirds (68.1%) in North Carolina involve a firearm [3, 4]. During the pandemic, the US firearm homicide rate increased, and firearm suicide rates remained high; rates in 2021 were the highest recorded for both firearm homicide and suicide since the early 1990s [5-7]. Similar trends were observed in the number of firearm injury emergency department (ED) visits that occurred nationally during the pandemic, with increases coinciding with the declaration of COVID-19 as a national emergency [5].

A sharp nationwide increase in firearm purchasing also occurred during the COVID-19 pandemic. An estimated 7.5 million US adult citizens became new gun owners between January 1, 2019, and April 26,

2021 [8]. Similar shifts in firearm purchasing occurred in North Carolina. The Federal Bureau of Investigation National Instant Criminal Background Check System reports that the number of firearm permits submitted for background check increased 67.9% from 2019 to 2020 in North Carolina [9]. Data on firearm-related deaths and ED visits in North Carolina were analyzed to better understand the impacts to firearm injury morbidity and mortality in North Carolina during the COVID-19 pandemic.

### Methods

The North Carolina Violent Death Reporting System (NC-VDRS) was used to analyze firearm-related deaths during 2017-2021; 2021 NC-VDRS data are provisional and subject to change (data as of March 6, 2023). Firearm-related injury ED visits were obtained from the North Carolina Disease Event Tracking and Epidemiologic Collection Tool (NC DETECT) over the same period using the NC-FASTER (Firearm Injury Surveillance Through Emergency Rooms) CDC Firearm Injury All Intentions Version 2 syndromic surveillance definition [10]. Data were limited to North Carolina residents. Rates were calculated per 100,000 residents overall and by demographic group using National Center for Health Statistics (NCHS) bridged population estimates; 2021 rates were calculated using 2020 population estimates as a proxy due to changes in the availability of NCHS bridged estimates. Percent change was calculated to compare firearm injury and death rates before (2019-2020) and during the pandemic (2019-2021). Changes in firearm death rates are further described by intent.

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## Results

### Overall Firearm-Related Deaths

The number of firearm-related deaths increased by 19.7% from 2019 to 2020, and another 2.8% from 2020 to 2021 (N = 1379, 1651, and 1697 deaths, respectively; Table 1). Young adults aged 18–24 had

the highest firearm-related death rate across all years, though the greatest increase during the pandemic years was observed among those aged 10–17 (111.7% from 2019 to 2021).

Firearm deaths continue to disproportionately impact Non-Hispanic (NH) American Indian and NH Black residents. Firearm death rates doubled among

**TABLE 1.**  
Overall Firearm-Related Violent Deaths and Emergency Department (ED) Visits, 2017–2021<sup>a</sup>

	2017		2018		2019		2020		2019 to 2020		2021 <sup>a</sup>		2019 to 2021 <sup>a</sup>	
	Counts	Rates <sup>b</sup>	Counts	Rates <sup>b</sup>	Counts	Rates <sup>b</sup>	Counts	Rates <sup>b</sup>	Rate % Change	Counts	Rates <sup>b</sup>	Rate % Change		
<b>Overall Firearm-Related Deaths</b>														
<b>Sex</b>														
Male	1198	24.0	1167	23.1	1177	23.1	1402	27.2	17.9%	1455	28.2	22.4%		
Female	204	3.9	222	4.2	202	3.7	249	4.6	21.9%	242	4.4	18.5%		
<b>Race/ Ethnicity</b>														
Hispanic	60	6.2	48	4.8	63	6.1	76	7.2	17.6%	106	10.1	64.0%		
White NH	869	13.2	901	13.6	802	12.0	926	13.8	14.7%	886	13.2	9.8%		
Black NH	441	19.4	398	17.3	481	20.7	597	25.5	22.8%	644	27.5	32.5%		
American Indian NH	18	14.6	28	22.7	18	14.4	28	22.5	55.9%	37	29.8	106.1%		
Asian NH	11	3.2	11	3.2	10	2.9	22	6.0	108.3%	16	4.3	51.5%		
Other/Unknown	3	-	3	-	5	-	2	-	-	8	-	-		
<b>Age</b>														
0–9	4	<sup>a</sup>	5	0.4	7	0.6	13	1.0	85.7%	11	0.9	57.1%		
10–17	39	3.7	57	5.4	47	4.4	91	8.5	92.6%	100	9.4	111.7%		
18–24	202	20.8	213	21.6	233	23.5	303	30.4	29.4%	304	30.5	29.8%		
25–44	516	19.4	481	17.9	499	18.3	609	22.1	20.5%	607	22.0	20.1%		
45–64	376	13.9	392	14.4	366	13.4	401	14.7	9.4%	395	14.5	7.7%		
65 and older	265	16.3	241	14.3	227	13.0	234	12.9	-0.5%	280	15.4	19.0%		
Total	1402	13.6	1389	13.4	1379	13.1	1651	15.6	18.5%	1697	16.0	21.8%		
<b>Firearm-Related Emergency Department (ED) Visits</b>														
<b>Sex</b>														
Male	3908	78.1	3643	72.1	3719	72.9	4752	92.2	26.5%	3950	76.7	5.1%		
Female	514	9.7	599	11.2	615	11.4	779	14.3	25.3%	717	13.2	15.3%		
<b>Race/ Ethnicity</b>														
Hispanic	211	21.7	199	20.0	200	19.5	226	21.5	10.1%	222	21.1	8.2%		
White NH	1432	21.8	1350	20.4	1268	19.0	1442	21.5	13.0%	1338	19.9	4.9%		
Black NH	2484	109.4	2456	107.0	2560	110.3	3414	145.6	32.0%	3414	145.6	32.0%		
American Indian NH	145	118.1	84	68.1	78	62.6	153	123.1	96.6%	120	96.5	54.2%		
Asian NH	10	3.1	18	5.3	15	4.3	11	3.0	-30.6%	14	3.8	-11.6%		
Other/Unknown	312	-	345	-	305	-	397	-	-	534	-	-		
<b>Age</b>														
0–9	31	2.5	61	4.9	61	4.9	78	6.3	27.8%	81	6.5	32.8%		
10–17	356	33.6	402	37.8	376	35.4	533	49.9	41.0%	439	41.1	16.2%		
18–24	1353	139.1	1273	129.4	1273	128.5	1628	163.5	27.3%	1377	138.3	7.6%		
25–44	1979	74.4	1841	68.5	1927	70.9	2453	89.1	25.7%	2118	76.9	8.6%		
45–64	561	20.7	530	19.5	542	19.9	701	25.7	29.1%	561	20.5	3.3%		
65 and older	228	14.0	240	14.2	201	11.5	194	10.7	-6.9%	194	10.7	-6.9%		
Total	4508	43.9	4347	41.9	4380	47.4	5587	59.7	26.0%	4770	51.0	7.6%		

<sup>a</sup>2021 NC-VDRS data are provisional and subject to change, data as of March 6, 2023

<sup>b</sup>Rates per 100,000 North Carolina residents, 2021 rates calculated with 2020 population estimates as proxy

NH: non-Hispanic

Source: NC-VDRS, 2017–2021a, NC DETECT Emergency Department Visits, NC-FASTER CDC Firearm Injury All Intents V2, 2017–2021

NH American Indians from 2019 to 2021 (14.4 to 29.8 per 100,000); rates also increased among Hispanic residents by 64.0% (6.1 to 10.1 per 100,000). NH Black residents experienced a 32.5% increase, and NH Asian residents a 51.5% increase from 2019 to

2021 (20.7 to 27.5 per 100,000 and 2.9 to 4.3 per 100,000, respectively; Table 1).

### Firearm-Related Deaths by Intent

Changes in firearm-related death rates varied by

**TABLE 2.**  
**Firearm-Related Deaths by Intent in North Carolina, 2017–2021<sup>a</sup>**

	2017		2018		2019		2020		2019 to 2020		2021 <sup>a</sup>		2019 to 2021 <sup>a</sup>	
	Counts	Rates <sup>b</sup>	Counts	Rates <sup>b</sup>	Counts	Rates <sup>b</sup>	Counts	Rates <sup>b</sup>	Rate % Change	Counts	Rates <sup>b</sup>	Rate % Change		
<b>Firearm-Related Suicides (limited to ages 10 and older)</b>														
<b>Sex</b>														
Male	712	16.3	728	16.5	661	14.8	757	16.7	13.2%	767	17.0	14.7%		
Female	128	2.7	133	2.8	117	2.4	114	2.4	-3.8%	124	2.6	4.7%		
<b>Race/ Ethnicity</b>														
Hispanic	22	2.9	23	3.0	17	2.1	31	3.7	76.7%	47	5.6	167.9%		
White NH	721	12.2	757	12.7	667	11.1	729	12.0	8.4%	704	11.6	4.7%		
Black NH	81	4.1	64	3.2	83	4.1	88	4.3	4.8%	116	5.7	38.1%		
American Indian NH	9	8.4	6	5.6	5	4.6	8	7.3	58.8%	9	8.2	78.6%		
Asian NH	6	2.1	8	2.7	6	2.0	14	4.4	123.2%	12	3.8	91.3%		
Other/Unknown	1	-	3	-	0	-	1	-	-	3	-	-		
<b>Age</b>														
10–17	18	1.7	26	2.4	13	1.2	31	2.9	137.3%	37	3.5	183.2%		
18–24	71	7.3	78	7.9	82	8.3	105	10.5	27.4%	124	12.5	50.5%		
25–44	238	8.9	233	8.7	223	8.2	245	8.9	8.5%	230	8.4	1.9%		
45–64	280	10.3	309	11.4	257	9.4	286	10.5	11.1%	249	9.1	-3.3%		
65 and older	233	14.3	215	12.7	203	11.6	204	11.2	-3.0%	251	13.8	19.3%		
Total	840	9.3	861	9.4	778	8.4	871	9.3	10.6%	891	9.5	13.1%		
<b>Firearm-Related Homicides</b>														
<b>Sex</b>														
Male	454	9.1	388	7.7	463	9.1	588	11.4	25.7%	631	12.2	34.9%		
Female	74	1.4	83	1.6	80	1.5	127	2.3	57.0%	110	2.0	36.0%		
<b>Race/ Ethnicity</b>														
Hispanic	34	3.5	22	2.2	40	3.9	44	4.2	7.2%	55	5.2	34.0%		
White NH	132	2.0	113	1.7	103	1.5	153	2.3	47.6%	151	2.2	45.7%		
Black NH	346	15.2	312	13.6	379	16.3	489	20.9	27.7%	505	21.5	31.9%		
American Indian NH	9	7.3	22	17.8	13	10.4	20	16.1	54.2%	24	19.3	85.1%		
Asian NH	5	1.5	2	c	4	c	8	2.2	c	2	c	c		
Other/Unknown	2	-	0	-	4	-	1	-	-	4	-	-		
<b>Age</b>														
0–9	2	c	4	c	6	0.5	7	0.6	16.6%	4	c	c		
10–17	20	1.9	22	2.1	31	2.9	57	5.3	82.9%	56	5.2	79.7%		
18–24	124	12.8	126	12.8	143	14.4	189	19.0	31.5%	174	17.5	21.1%		
25–44	261	9.8	228	8.5	251	9.2	337	12.2	32.6%	353	12.8	38.9%		
45–64	89	3.3	68	2.5	92	3.4	98	3.6	6.3%	130	4.8	41.1%		
65 and older	32	2.0	23	1.4	20	1.1	27	1.5	30.3%	24	1.3	15.8%		
Total	528	5.1	471	4.5	543	5.2	715	6.7	30.3%	741	7.0	35.0%		
<b>Unintentional Firearm Deaths<sup>d</sup></b>														
Total	11	0.1	24	0.2	15	0.1	23	0.2	51.7%	34	0.3	124.3%		

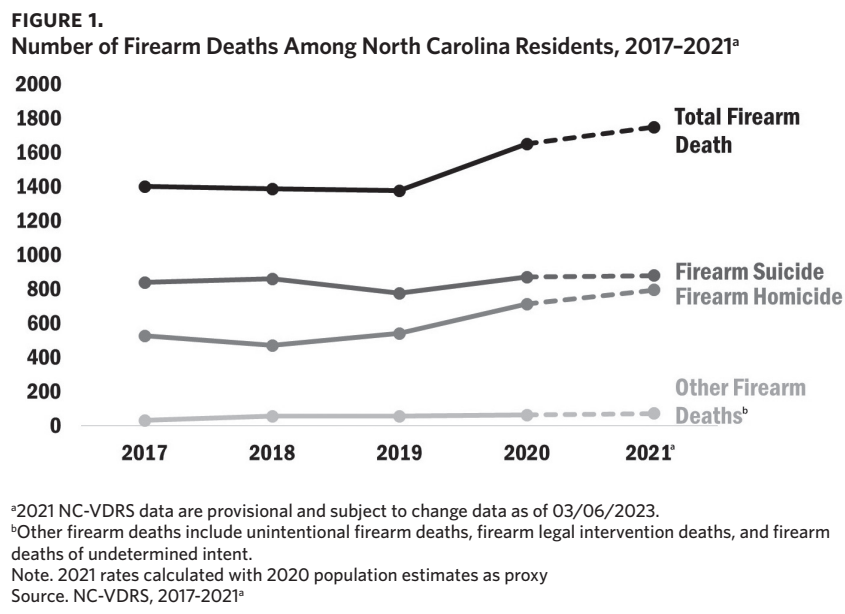
<sup>a</sup>2021 NC-VDRS data are provisional and subject to change, data as of March 6, 2023

<sup>b</sup>Rates per 100,000 North Carolina residents, 2021 rates calculated with 2020 population estimates as proxy

<sup>c</sup>Count < 5, rate suppressed; 2021 rates calculated with 2020 population estimates as proxy

<sup>d</sup>Unintentional firearm death counts by demographic groups not included due to small numbers/suppression rules

NH: non-Hispanic Source. NC-VDRS, 2017–2021<sup>a</sup>



intent. Unintentional firearm death rates increased 51.7% in 2020 and another 47.8% in 2021, while homicides increased 30.3% from 2019 to 2020 and 3.6% from 2020 to 2021. Firearm suicides increased 13.1% from 2019 to 2021. These differences varied further by demographic group. NH White victims continued to experience the highest firearm suicide rate in 2021 (11.6 per 100,000) yet had the lowest firearm suicide rate increase during the pandemic (4.7% from 2019 to 2021). Hispanic victims experienced the greatest firearm suicide rate increase from 2019 to 2021 (167.9%). Increases were also observed among NH Asian, NH American Indian, and NH Black victims (91.3%, 78.6%, and 38.1%, respectively; Table 2).

While firearm homicides increased across all racial and ethnic groups, NH American Indians had the largest increase in rates from 2019 to 2021 (85.1%; 10.4 and 19.3 per 100,000, respectively); rates remained highest for NH Black victims in 2021 (21.5 per 100,000). Despite persons aged 18-24 having the highest firearm homicide rate throughout the pandemic years (19.0 and 17.5 per 100,000 in 2020 and 2021, respectively), youth aged 10-17 experienced the largest increase from 2019 to 2021 (79.7%; 2.9 and 5.2 per 100,000, respectively; Table 2).

#### **Firearm-Related Injury Emergency Department (ED) Visits**

In addition to the spike in fatal firearm injuries, increases were also seen in firearm-related ED visits

in North Carolina during the pandemic. Firearm-related ED visit rates increased 26.0% from 2019 to 2020 and 7.6% between 2019 and 2021 despite an overall decrease in ED utilization during this time period. Males have historically had much higher rates of firearm-related ED visits than females (76.7 and 13.2 per 100,000 in 2021, respectively); however, females experienced larger increases during the pandemic years (15.3% versus 5.1% increase, 2019 compared to 2021; Figure 2). Children under age 10 were the only age group that saw an increase in firearm-related ED visits in both 2020 and 2021 and had the highest rate change (32.8% from 2019 to 2021). The rate for NH American Indian firearm-related ED visits doubled from 2019 to 2020 (96.6%), the largest increase among any racial/ethnic group. The second-highest increase occurred among NH Black residents (32.0%, 2019 compared to 2020; Table 1). NH Asian residents were the only racial/ethnic group to experience a decrease in firearm-related ED visit rates (-30.6%, 2019 compared to 2020; Table 1).

#### **Discussion**

The COVID-19 pandemic not only affected people's physical, emotional, and mental health, but also may have impacted the increase in firearm injury and death in North Carolina. During the first year of the pandemic, North Carolina experienced an 18.2% decrease in the overall number of ED visits for any cause [11]. Despite this reduction in ED utilization, there was a 27.6% increase in the number

of firearm-related visits in 2020 (Table 1). Similar changes were observed in the number of firearm deaths (19.7% increase in 2020), with alarming increases among youth (Table 1). Known risk factors for violence were exacerbated during the pandemic, including social isolation, lack of community support, economic stress, and media depictions of violence [1, 2]. Social inequities among communities were amplified, resulting in disproportionate increases in both firearm-related deaths and ED visits among vulnerable and other historically marginalized populations (Table 1) [4]. Generations of social, economic, and environmental inequities contribute to these disparities; it is crucial to recognize and acknowledge these systemic, avoidable, and often unjust factors that contribute to firearm-related injury and death.

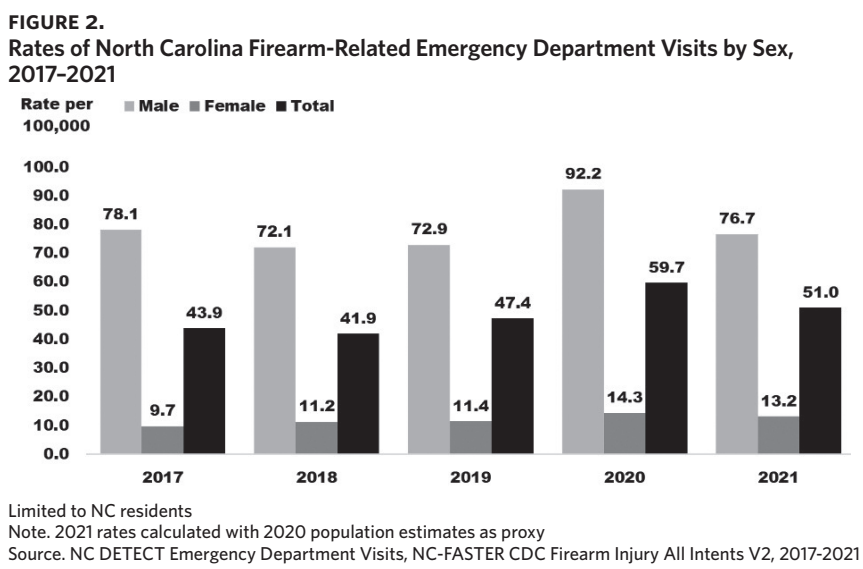
Prevention of firearm violence and misuse is vital to bettering the lives of North Carolinians. Firearm ownership is deeply embedded in the culture of North Carolina, with almost half (42.1%) of North Carolina adults reporting having a firearm in or around the home [12]. With increases in firearm purchases during COVID-19, ensuring that firearms are safely stored and that those handling firearms have adequate training and knowledge of firearm safety becomes increasingly important to helping mitigate firearm injuries [9, 13, 14]. Ideally, firearms should be stored securely, locked and unloaded, to prevent injury.

The 2021 North Carolina Behavioral Risk Surveillance Survey estimated that 45.4% of firearm owners store firearms loaded; among those who keep firearms loaded in their homes, 53.0% also

store their firearms unlocked [12]. Three out of four children who live in a household with a firearm know where it is stored, including those under age 10 [15]. Additionally, the 2021 North Carolina Youth Risk Behavioral Surveillance Survey estimated that 29.5% of high schoolers could acquire and be ready to fire a loaded firearm without a parent or other adult's permission in less than an hour [16]. Unauthorized youth access can have fatal consequences [13]. Safely storing firearms prevents accidental injuries among children, gun theft, and other unauthorized access from individuals who may wish to cause harm. Nine out of 10 people who survive a suicide attempt do not go on to die by suicide [17]. Safe firearm storage provides a barrier to access and life-saving time when someone is experiencing suicidal ideation [10, 11].

The North Carolina Department of Health and Human Services (NCDHHS) has taken a public health approach to reducing firearm violence and misuse [10]. This approach uses data and implementation of multilayered, evidence-based strategies to reduce firearm injury. North Carolina has defined resources for firearm-injury prevention and is working to expand adoption of these strategies statewide [10]. Efforts to improve availability and access to timely, local data through NC-FASTER, NC-VDRS, and other systems will be imperative in planning and evaluating prevention strategies aimed at addressing these increasing firearm injury trends [18, 19]. NCMJ

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