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# ACCIDENTAL FIREARM FATALITIES IN A METROPOLITAN COUNTY (1958—1973)

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**Rushforth, N. B. (Dept. Biology, Case Western Reserve U., Cleveland, Ohio 44106), C. S. Hirsch, A. B. Ford and L. Adelson. Accidental firearm fatalities in a metropolitan county (1958–1973). *Am J Epidemiol* 100:499–505, 1974.—A study of accidental firearm fatalities in Cuyahoga County, Ohio, (Metropolitan Cleveland) from 1958–1973, inclusive, has shown a threefold increase in the rate of such deaths since 1967. They are more frequent in the central city than in the suburbs, show a male preponderance, are more common in nonwhites, have a peak prevalence in the 25–34-year age range and usually happen in the home. Approximately half of the adult victims had been drinking alcoholic beverages when shot. It is hypothesized that the frequency of accidental firearm fatalities is primarily related to the number of guns, particularly handguns, in civilian possession. The data indicate that a loaded firearm in the home is more likely to cause an accidental death than to be used as a lethal weapon against an intruder.**

**accidents; alcohol drinking; home accidents; wounds, gunshot**

## INTRODUCTION

We have recently reported an alarming increase in the number of homicidal deaths in the Cleveland area (1). The major portion (80 per cent) of these violent deaths was caused by firearms, especially handguns, and we concluded that a significant factor in the increase in the homicide rate was the ready availability of small arms. In order to investigate this phase of the matter further, we undertook a study to acquire additional evidence to test our hypothesis that the number of firearm incidents (nonfatal as well as fatal) is related to the number of guns in civilian hands. This report is a statistical survey of accidental firearm fatalities in Cuyahoga County (Cleveland, Ohio and suburbs) during the interval from 1958 through 1973 inclusive.

Previous studies of accidental firearm deaths have shown a preponderance of male victims, with a peak incidence in the 15–24-year age range and a higher rate in nonwhites than in whites (2, 3). From 1959–1961, 56 per cent of such fatalities occurred in the home when the place of occurrence was stated on death certificates (2).

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## METHOD

For purposes of classification and discussion, we have subdivided Cuyahoga County ("county") into two fractions: 1) the centrally located City of Cleveland ("city") and 2) the aggregate of 60 other municipalities ("suburbs"). All known and suspected violent ("unnatural") deaths in the county must be investigated by the Coroner, regardless of the fashion in which the violence arose. Reporting of violent deaths is complete because a valid death certificate cannot be signed by a person other than the Coroner when injury causes or contributes to death.

Establishing the cause of death in firearm fatalities usually offers no problem. However, determination of the manner of death, i.e. accident versus suicide or homicide, can be difficult. Two basic sets of circumstances exist: was the fatal wound self-inflicted (suicide or accident?) or was it inflicted by another (homicide or accident?). In either instance, an appropriate ruling as to the manner of death requires considered evaluation of information derived from all available sources. Useful criteria which help to substantiate or refute the statements of witnesses include the location of the fatal wound, the range and direction of fire and the presence or absence of primer or gunpowder residue on the victim's hand(s).

Data supplementing the objective anatomic and toxicologic findings of the Coroner's staff are supplied by police reports, eyewitness accounts and hospital records. In Cuyahoga County, validity of judgment as to the manner of death is enhanced by experience and has been consistent within the limits of individual variability because one man (Samuel R. Gerber, M.D., J.D.) has been Coroner since 1936. When the manner of death cannot be determined "beyond a reasonable doubt," cases are classified as "violence of undetermined origin." From 1958 through 1973, 10 firearm fatalities have been so classified.

We calculated accidental firearm fatality rates from the number of victims listed in the Coroner's records and from population figures in Census Bureau publications. The decennial censuses of 1960 and 1970 furnish city and suburban population sizes in the respective years. These data were supplemented by a Special Census for the City of Cleveland in 1965.

Accidental firearm fatalities were analyzed with respect to the following variables: 1) rates for other types of accidental death; 2) geographic location of the incident (city, suburbs); 3) agent (self-inflicted, other); 4) age, sex and race of victim; 5) presence of ethyl alcohol in adult victims; 6) types of firearms (handguns, long guns); 7) time and place of occurrence of the incident (private dwelling, other places); and 8) circumstances surrounding the occurrence (cleaning gun, handling or playing with gun, etc.).

Cuyahoga County is an almost completely urban area, and there is very little legal hunting within its boundaries. Fatalities from hunting accidents, therefore, are conspicuously absent in our study population.

## RESULTS

Table 1 shows the number of accidental fatal firearm victims in Cuyahoga County classified by race and sex for the City of Cleveland and suburbs for each year during the period 1958–1973, inclusive. In the city, accidental firearm deaths occur most frequently among nonwhite males. (Blacks constituted 97.3 per cent of the nonwhite population in 1970 as determined by the decennial census.) Conversely, in the suburbs, the majority of victims are white males. A marked increase in accidental firearm deaths in the city started in 1968 and continued unbroken through 1973, with the exception of 1972 during which there were fewer fatalities.

The increase in accidental firearm deaths in the city during the latter part of

TABLE 1

*Number of accidental firearm deaths in Cuyahoga County, Ohio, by race and sex for the City of Cleveland and suburbs over the period 1958–1973, with population figures by census*

| | No. of accidental firearm deaths* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | City of Cleveland | | | | | Suburbs | | | | | County |
| Year | WM | WF | NWM | NWF | Total | WM | WF | NWM | NWF | Total | Total |
| 1958 | 0 | 0 | 5 | 1 | 6 | 0 | 1 | 0 | 0 | 1 | 7 |
| 1959 | 1 | 0 | 1 | 0 | 2 | 2 | 1 | 0 | 0 | 3 | 5 |
| 1960 | 1 | 1 | 2 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 1961 | 1 | 0 | 1 | 1 | 3 | 2 | 1 | 0 | 0 | 3 | 6 |
| 1962 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1963 | 2 | 0 | 5 | 0 | 7 | 1 | 0 | 0 | 0 | 1 | 8 |
| 1964 | 1 | 0 | 3 | 0 | 4 | 1 | 0 | 0 | 0 | 1 | 5 |
| 1965 | 2 | 0 | 2 | 1 | 5 | 2 | 0 | 0 | 0 | 2 | 7 |
| 1966 | 2 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 0 | 1 | 4 |
| 1967 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 3 | 4 |
| 1968 | 4 | 0 | 8 | 2 | 14 | 4 | 1 | 0 | 0 | 5 | 19 |
| 1969 | 2 | 1 | 9 | 2 | 14 | 3 | 0 | 0 | 0 | 3 | 17 |
| 1970 | 2 | 0 | 11 | 1 | 14 | 2 | 0 | 1 | 0 | 3 | 17 |
| 1971 | 6 | 1 | 9 | 1 | 17 | 1 | 1 | 0 | 0 | 2 | 19 |
| 1972 | 3 | 0 | 4 | 1 | 8 | 0 | 0 | 0 | 0 | 0 | 8 |
| 1973 | 2 | 2 | 5 | 2 | 11 | 5 | 0 | 1 | 0 | 6 | 17 |
| Total | 31 | 5 | 66 | 12 | 114 | 26 | 5 | 3 | 0 | 34 | 148 |
| | Population by Census (Thousands) | | | | | | | | | | |
| 1960 | 305 | 318 | 122 | 131 | 876 | 370 | 396 | 3 | 3 | 772 | 1,648 |
| 1965 | 257 | 275 | 132 | 147 | 811 | | | | | | |
| 1970 | 219 | 239 | 137 | 156 | 751 | 444 | 482 | 21 | 23 | 970 | 1,721 |

* WM, white male; WF, white female; NWM, Nonwhite male; NWF, Non-white female.

the 16-year period occurred at a time during which there were large changes in the size and composition of the population of the county. It is, therefore, necessary to examine rates for subgroups of the population. The total population of the city decreased over these 16 years by more than 14 per cent. During this interval, the nonwhite population in the city increased by about 12 per cent for males and 19 per cent for females. At the same time, the white population underwent a reduction of approximately 28 per cent for males and 25 per cent for females.

Rates for accidental firearm deaths increased for both nonwhite and white city males. The average annual rate of accidental firearm deaths for white males rose from 0.3 per 100,000 for the period 1958–1962 to 0.6 for 1963–1967, and to 1.4 for 1968–1973, almost a fivefold increase over the initial rate (table 2). Comparable rates for nonwhite males in the city show a similar trend, rising from 1.5 for 1958–1962 to 1.7 for 1963–1967 and up to 5.6 for 1968–1973. The city annual rate in the last six-year interval is almost four times greater than it was during the period 1958–1962.

The suburban population, black as well as white, increased during the study period. For suburban white males, the rate of accidental firearm deaths per 100,000 rose from 0.2 to 0.3 and then up to 0.6 for the successive periods, a tripling of the rate during the study interval.

Table 3 lists the average annual death rates for various types of accidents in Cuyahoga County for the successive five-year periods from 1958 through 1973. Fire-

TABLE 2

*Average annual accidental firearm death rates in Cuyahoga County, Ohio for selected groups*, (1958–1973)*

| Annual rates (deaths/100,000)† | | | | |
|---|---|---|---|---|
| Years | City WM | City NWM | Suburbs WM | County Total |
| 1958–1962 | 0.3 | 1.5 | 0.2 | 0.3 |
| 1963–1967 | 0.6 | 1.7 | 0.3 | 0.3 |
| 1968–1973 | 1.4 | 5.6 | 0.6 | 0.9 |

* Rates are not calculated for groups in table 1 having fewer than 4 deaths.

† WM, white male; NWM, Nonwhite male.

TABLE 3

*Average annual rates of accidental death by various causes (1958–1973) in Cuyahoga County, Ohio*

| No. of deaths/100,000 population | | | | | |
|---|---|---|---|---|---|
| Years | Vehicular | Home accidents (Non-firearm) | Other | Industrial | Firearm |
| 1958–1962 | 10.3 | 18.0 | 13.6 | 2.0 | 0.3 |
| 1963–1967 | 12.3 | 18.0 | 13.6 | 2.1 | 0.3 |
| 1968–1973 | 15.5 | 19.4 | 14.0 | 2.2 | 0.9 |

arm death rates are smaller than those for vehicular, industrial, home and "other" accidents. However, during this period, death rates from firearms increased more than those from any other types of accident, climbing threefold. While deaths from vehicular accidents increased 50 per cent over the 16-year period, other accidental death rates rose only slightly.

We also tabulated accidental firearm deaths in the city and suburbs by month of the year, day of the week and time of the day. There were no significant differences in the number of deaths by month. However, fatalities were most numerous during weekends, being most prevalent on Saturdays. Fatal accidental shootings occurred most frequently (68 per cent) between 3:00 P.M. and midnight for children up to age 15. They were relatively high for adults during this period also, and extended in similar high frequency over the time interval from midnight to 3:00 A.M. (76 per cent of incidents occurred during the interval from 3:00 P.M. to 3:00 A.M.).

One hundred and twenty-three of the 148 accidental firearm fatalities (83 per cent) resulted from mishaps with handguns. Over three-quarters of these fatalities occurred in the home (78 per cent), and the majority of them (67 per cent) occurred when someone was handling or "playing" with a gun. Of the 100 victims whose blood was tested for ethanol, 48 per cent gave positive results. For children up to age 15, slightly less than half (41 per cent) of the accidental firearm deaths were self-inflicted as compared with 70 per cent for adults.

The age-specific rates of accidental firearm deaths were calculated for the period 1968–1973, using the 1970 Census data for both nonwhite males and white males in the city. (There were insufficient numbers of deaths in other categories to compute meaningful rates.) Figure 1 shows that annual death rates for both white and nonwhite males in Cleveland rose with age to a maximum in the range 25–34 years and then decreased. However, changes in the age composition of race-specific populations for the city and suburbs between the 1960 and 1970 Census gave rise to only minor effects on accidental firearm fatality rates. Age-adjusted rates differed from the reported unadjusted rates by less than 5 per cent. Thus, increases in the fatality rates shown in this study were virtually uninfluenced by changes in the age compositions of the populations.

## DISCUSSION

The annual number of accidental firearm deaths in Cuyahoga County tripled in 1968 as compared with the average for the previous 10 years, and the increased level was sustained for four consecutive years. Since the criteria for a "Coroner's verdict" (ruling) of accidental firearm death were unchanged, and the system of reporting and recording such fatalities was consist-

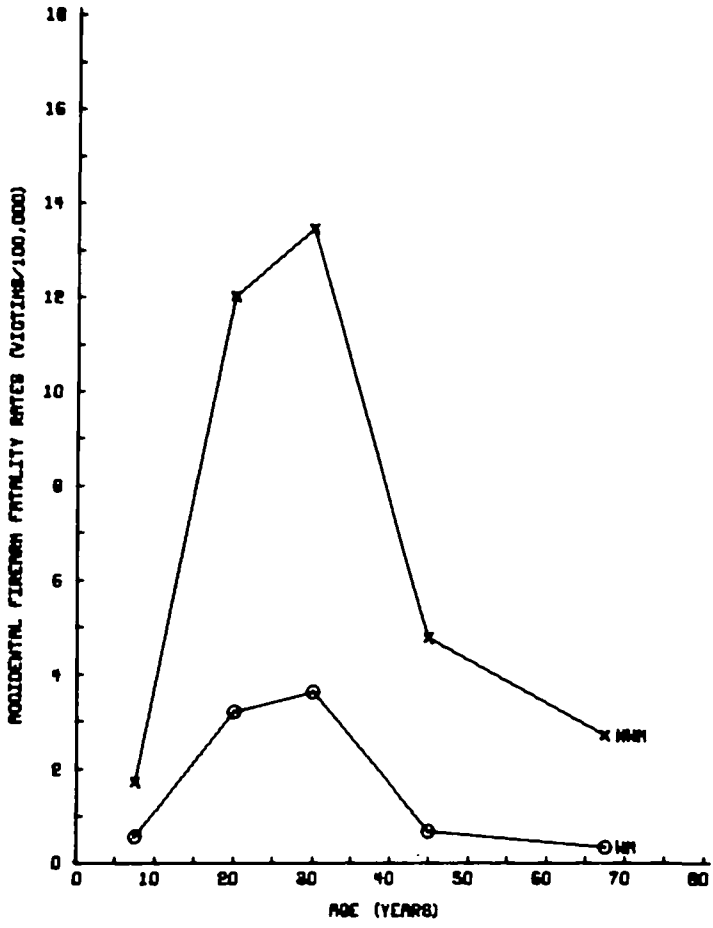


Figure 1. Average annual age specific rates of accidental firearm deaths for nonwhite males (NWM) and white males (WM) in the City of Cleveland. Rates are based on the period 1968–1973.

ent, the increase must be regarded as meaningful. In 1972, the number of these deaths in Cuyahoga County dropped to pre-1968 levels, but in 1973 the rate was high once more.

Routine reporting of accidental deaths due to firearms on a national basis shows very little change in rates over the past 20 years (4). Therefore, in an attempt to determine whether the documented upward trend in the Cleveland area is somehow unique to our jurisdiction, we queried 38 other medicolegal agencies in the United States about their 1960–1972 incidence of accidental firearm fatalities. Twenty-eight of these agencies responded to our questionnaire, but only 19 of them were able to provide the data requested. Five of these 19 have shown an increased incidence of deaths due to firearm accidents comparable to that seen in the Cleveland area. Thus, while our experience is not unique, it is not uniformly true in all urban areas.

We postulate that a major factor in the rise in accidental firearm fatalities in the Cleveland area is the increase in the availability of handguns. Indirect evidence in support of this hypothesis comes from data for Wayne County, Michigan, obtained by the National Commission on the Causes and Prevention of Violence (3). Over the period 1965 to 1968, for which data are

available, the rise in accidental firearm fatalities in Wayne County parallels the number of new handgun permits issued to Detroit. In addition, in a study covering the period 1962 to 1971, Heins et al. found that the number of gunshot wounds in children in the Detroit area increased dramatically after 1967. They concluded that the increase in gunshot wounds seems to be related to an increase in the number of guns in the Detroit area (5).

Estimates of accidental firearm deaths and gun ownership for various regions in the United States indicate that fluctuations in fatality rates are positively associated with patterns of firearm ownership (3). Other data obtained by the National Commision (3) indicate a surge of domestic firearm production and importation of guns for sale in the United States in the Middle 1960's (3).

We have attempted to obtain estimates of the number of guns in civilian hands in the Cleveland area from two sources. First, we contacted the Alcohol, Tobacco and Firearms Bureau of the Treasury Department, which is responsible for enforcement of the provisions of the Gun Control Act of 1968. Gun sales are not tabulated by this (or any other) bureau, and they are unable to estimate reliably the number of guns either sold or in circulation. Therefore, we sought information from the Cleveland Police Department. This information is worth describing because it typifies the frustration of attempting to obtain quantitative data about gun sales.

To purchase a handgun in the City of Cleveland, an individual must complete an application provided by the police department. This form must be endorsed by two persons who live in the City of Cleveland and who own property in this city. Next, verification of property ownership by the endorsers must be obtained from a bureau at the County Administration Building and from the Office of the County Auditor. In addition, if the applicant lives outside the City of Cleveland, he must obtain a letter of recommendation from the Chief of Police in the community in which he resides. Lastly, the applicant is instructed to "return to the Chief's office with the form and with the letter from your Chief of Police and you will receive further instructions."

From 1967 to 1973 inclusive, only 33 legitimate permits for purchase of a handgun were filed with the Cleveland Police Department. Meanwhile, gun dealers in adjacent suburbs sell hundreds of handguns daily. Indeed, one retail outlet for firearms in the environs of Cleveland is said to sell between 30 and 40 handguns daily, seven days a week. Short of obtaining subpoena authority to inspect the business records of such dealers, we do not know how to determine the number and type of guns sold. Furthermore, prior to embarking upon such an ambitious venture, we should point out that there are 4099 registered firearm dealers in the northern half of Ohio.

Our data also suggest that guns in the home are more dangerous than useful to the homeowner and his family who keep them to protect their persons and property. During the period surveyed in this study, only 23 burglars, robbers or intruders who were not relatives or acquaintances were killed by guns in the hands of persons who were protecting their homes. During this same interval, six times as many fatal firearm accidents occurred in the home. We conclude that a loaded firearm in the home is more likely to cause an accidental death than to be used as a lethal weapon against an intruder.

The total impact of accidental shootings includes disability, suffering and expense resulting from these needless injuries in addition to the mortality. The ratio of fatal to nonfatal accidental gunshot injuries admitted to hospitals in the Cleveland area is

approximately 1:13 (6). (We do not know how many individuals are treated for accidental gunshot wounds in emergency rooms and released.) Extrapolating from the number of fatal accidental shootings in Cuyahoga County, a minimum of 1000–2000 serious, nonfatal, accidental shootings occurred during the 16 years, 1958 through 1973.

In summary, we have previously documented a dramatic rise in homicides over the past six years in a large metropolitan community. During this period there has been a parallel increase in accidental firearm fatalities in this jurisdiction. The possession of firearms by civilians appears to be a dangerous and ineffective means of self-protection.

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