Articles

Trends in California Homicide, 1970 to 1993

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In addition to the need to identify homicide trends among well-documented risk groups, this investigation was conducted to expand the limited existing knowledge about the risk of homicide according to educational attainment and among 2 growing ethnic groups, Hispanics and Asians. We examined the death certificates of the 69,621 persons who died of homicide in California from 1970 through 1993. Age, sex, race and ethnicity, and education level of the victim, along with the homicide method, were abstracted from each record. Frequencies, rates, and relative risk were calculated. Substantial increases in the homicide rates occurred for 15- to 19-year-olds (4.0-fold), men (1.9-fold), Hispanics (2.5-fold), and Asians or others (1.7-fold) from 1970 to 1993. The use of firearms consistently accounted for a growing proportion of all homicides, reaching a high in 1993 of 75% for all persons and 90% for 15- to 19-year-olds. High school dropouts have the highest homicide risk of all education groups. Homicide risk differentials by ethnicity, sex, and age all increased during the study period. Persons of color and youth have been disproportionately affected by homicide for many years, and these data indicate that things are getting worse. Redoubled collaborative prevention and intervention efforts are needed to reverse this trend.

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Homicide is an increasing public health concern in the United States. It perennially ranks among the ten leading causes of death, and rates have been increasing since 1960 even as death rates from other causes have decreased.[1-5] The United States leads industrialized nations with the highest homicide numbers and rates; among 15- to 24-year-olds, the US homicide rate is more than four times the next highest rate.[6] The increased number of homicides and other intentional injuries is so alarming that violence was declared a public health emergency in 1992.[7]

Sex, race or ethnicity, and age have been associated with homicide risk, and firearms have been identified as a major external cause of homicide.[8-12] The highest homicide rates in the nation generally occur in men, African Americans, and 15- to 34-year-olds; in fact, homicide is the leading cause of death for young African-American men and women.[13] Geographic comparisons of homicide show high rates in the South and West and lowest rates occurring in the North and the Northeast.[14,15]

California is of particular interest because it has one of the highest rates in the United States, accounting for nearly one of every six homicides in the nation.[16] From 1986 to 1988, California reported homicide rates for young white men and young African-American men to be 92% and 67%, respectively, above the nation's average. Studying an ethnically diverse population such as California's will expand the knowledge about the homicide risk in groups about whom we know relatively little, specifically, Hispanics and Asians. Data on homicide trends and patterns in California will be useful in developing future studies targeting other risk factors and expanding our knowledge of homicide risk.

Methods

Study Population

The study population comprised the 69,621 persons who died of homicide in California from 1970 through 1993. California residents who died outside the state were excluded. Death certificate data were obtained through the California Master Mortality Data Tapes made available by the California Department of Health Services. Homicide deaths were identified using the eighth and ninth revisions of the *International Classification of Diseases* (ICD-8, ICD-9) external cause-of-death codes.[17,18]

Variables of Interest

The variables of interest from the death certificate data included sex, race, ethnicity, age, and education level of the victim and the method of homicide as identified through the ICD external-cause-of-death codes. Referent groups were established for each of the demographic variables for comparison and for calculating the relative risk.

Race and ethnicity were classified into four groups: non–Hispanic white, African American, Hispanic, and

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ABBREVIATIONS USED IN TEXT

CI = confidence interval
ICD = *International Classification of Diseases*
RR = relative risk

Asian and other based on three death certificate variables: race, Hispanic origin, and Spanish surname. Race categories on death certificates included black, white, Asian, American Indian, and other. California death certificates consistently used a Hispanic identifier beginning in 1987, which precluded the identification of Hispanics, a substantial portion of California's population[19] for much of the study period. For this reason, a Spanish surname file of 12,497 names from the US Bureau of the Census was compared with decedents' last names to identify Hispanic homicide victims.[20] An additional 2,064 surnames were added to the list to identify those who were missed by the original surname file but who were thought to be of Spanish descent (for example, hyphenated names such as Lopez-Garcia). African Americans and Asians were excluded from the surname linkage to reduce possible misclassification. Four ethnic-racial groups were created: black, white, Hispanic, and Asian or other.* Because of the relative stability of their homicide rate, non–Hispanic whites were used as the referent group for comparisons by ethnicity.

Age was categorized into ten groups: 0 to 4 years, 5 to 14 years, 15 to 19 years, 20 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, 65 to 74 years, and 75 years or older. Because most homicide victims are teenagers and young adults, the 15- to 24-year age group was divided into two 5-year age groups. The 35- to 44-year age group was used as a referent because the annual average homicide rate of that group closely parallels the annual overall homicide rate; it has one of the most stable homicide rates; it can be regarded as a transition period between youth and middle age and would highlight differential risks between the two; and better comparisons to youth homicide can be made with this group (than with, for example, 65- to 74-year-olds) because of the proximity in age.

Five categories of educational attainment were established for homicide victims aged 25 years or older: eighth grade or less, high school dropouts (grades 9 to 11), high school graduates (grade 12), some college (1 to 3 years), and college graduates (≥4 years of college). Denominator data for education status were obtained from the annual Current Population Surveys from the California Department of Finance and included persons aged 25 years or older only. Data on education level were available on death certificates starting in 1989, so relative risks were calculated for the 1989 to 1993 period. High school graduates were used as a referent group because of the relative stability of their homicide rates and because it was the modal education level.

The external cause of homicide (ICD E-codes) was separated into firearm or explosive (965), cutting or stabbing (966), and other (960 to 964, 967 to 969). Firearm and explosive homicides were treated as one category until 1976, when they were assigned separate categories. The number of homicides due to explosives is negligible compared with the number of firearm homicides; explosives consistently accounted for less than 0.5% of all firearm and explosive homicides after 1976.

*Population projections—that is, denominator data—for Native Americans were not available until 1990. Thus, an "Asian and other" group was used in the analyses.

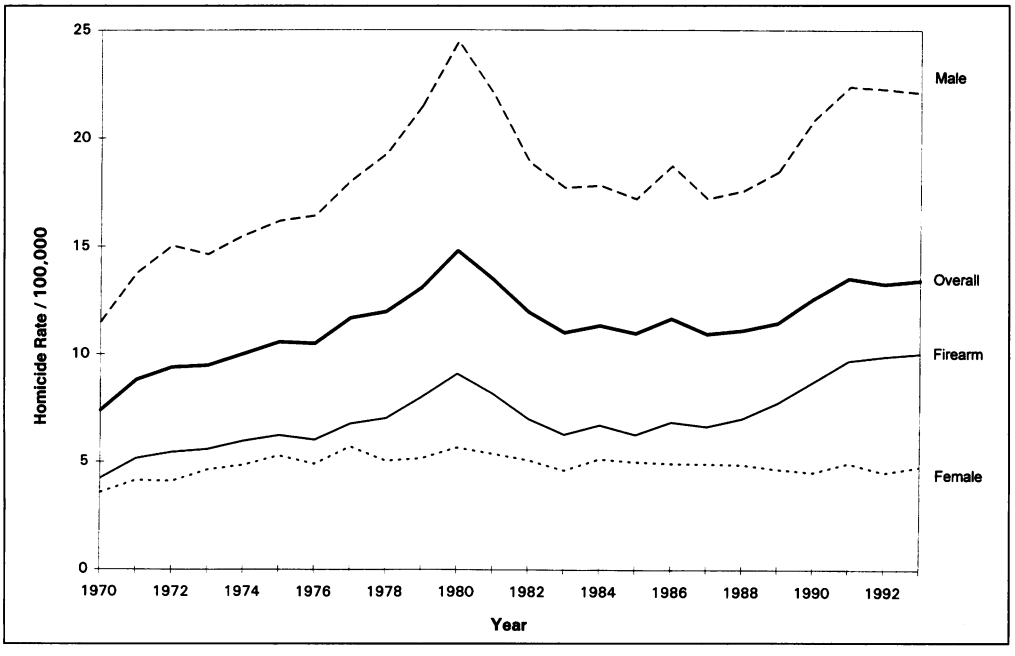

Figure 1.—The California homicide rates for 1970 to 1993 are shown.

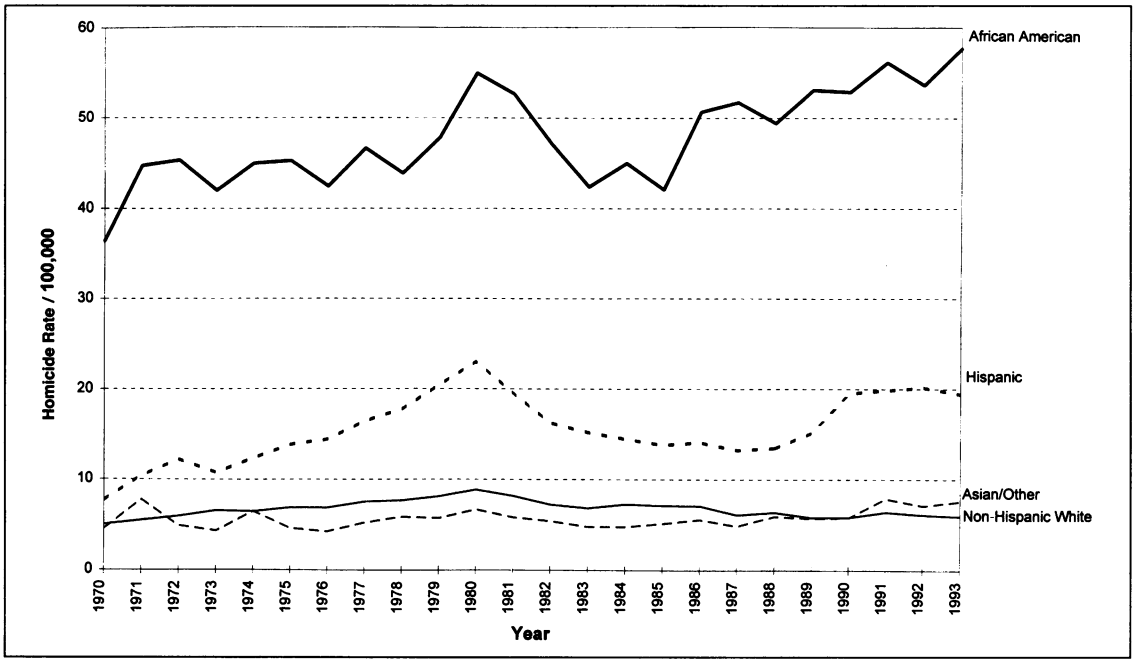

Figure 2.—The California homicide rates by race or ethnicity—African American, Hispanic, Asian or other, and non-Hispanic white—for 1970 to 1993 are shown.

Temporal variations in homicide frequency were examined by month and season: winter (January through March), spring (April through June), summer (July through September), and fall (October through December).

Denominator data for sex, race or ethnicity, age, and education level were based on estimates provided by the California Department of Finance.

Statistical Analysis

Frequencies were tabulated to compare homicide methods across time and to assess seasonal variations. Homicide rates per 100,000 persons and relative risks (RR; and their 95% confidence intervals [CI]) were calculated to examine homicide risk by sex, race and ethnicity, age, and education. Five time periods—1970 to 1974, 1975 to 1979, 1980 to 1984, 1985 to 1989, and 1990 to 1993—were used to facilitate comparisons across time.

Results

California's 1993 homicide rate of 13.4 per 100,000 is an 81% increase from the 1970 rate of 7.4, but is less than the 1980 peak of 14.8. The nation's homicide rate follows a similar trend observed in California data: increasing during the 1970s, peaking in 1980, decreasing in the early 1980s, and increasing again after 1985. California and US homicide rates by sex, race and ethnicity, and age groups also are relatively similar.

Homicide rates are higher among men than women, and the gender disparity is growing (Figure 1). The 1993 male homicide rate of 22.1 per 100,000 is 1.9 times the 1970 rate of 11.5 per 100,000. Although the annual rate change was relatively small, the 1993 female homicide rate was 1.3 times the 1970 rate, increasing from 3.6 to 4.7 per 100,000. The rate increase was not consistent; as can be seen in Figure 1, rates increased throughout the 1970s, decreased in the early 1980s, and increased relatively steadily to the end of the study period.

As shown in Figure 2, homicide rates differ substantially by ethnic group, and the difference between non–Hispanic whites and the three minority groups is also growing. African-American homicide rates are consistently higher than those of other groups; the 1993 rate of 57.7 per 100,000 is 1.6 times the 1970 rate of 36.4 per 100,000. Non–Hispanic whites had a 1.2 times increase in homicide rates from 1970 to 1993 (from 5.0 to 5.9 per 100,000). Hispanic homicide rates rose 2.5 times (from 7.7 to 19.4 per 100,000), and homicide rates for Asians and others increased 1.7 times (from 4.5 to 7.6 per 100,000) from the 1970 rate during the same period. Thus, the greatest change in homicide rates by ethnicity is in two traditionally understudied groups, Hispanics and Asians.

The greatest increase in homicide rates was not for a certain sex or a specific ethnic group but for youth. Homicide rates for 15- to 19-year-olds increased 4.0-fold from 8.4 to 33.7 per 100,000 from 1970 to 1993 (Figure 3). The 5- to 14-year-old group had the second largest increase—3.2 times from 0.76 to 2.4 per 100,000—followed by 20- to 24-year-olds with a 2.6 times increase of 13.7 to 35.3 per 100,000. While the youth homicide rate climbed, the risk remained relatively stable or dropped for other age groups.

Changing patterns of relative risk are documented in Table 1. Whereas men consistently had significantly

higher homicide rates than women, their risk relative to women increased from 3.27 in 1970 to 1974 to 4.70 in 1990 to 1993. African Americans and Hispanics are at a substantially higher risk than non–Hispanic whites. Moreover, the differential increased over time, ending with a 9.00-fold risk for African Americans and a 3.26-fold risk for Hispanics in 1990 to 1993. Asians and others had lower relative risks during the early time periods (0.96, 0.71, 0.72, 0.86), indicating a protective factor until 1990 to 1993, when the relative risk changed direction and rose to 1.17, a statistically significant difference.

A pronounced change is noted for the 15- to 19-year age group. From 1970 to 1984, the risk of homicide for 15- to 19-year-olds was not significantly different from that for 35- to 44-year-olds. In the latter half of the 1980s, their relative risk increased substantially to a 2.26-fold risk in 1990 to 1993. Across each of the five time periods, 20- to 24-year-olds had the highest risk, and 5- to 14-year-olds had the lowest risk relative to the 35- to 44-year age group. The 20- to 24-year and 25- to 34-year age groups have consistently high relative risks for homicide, ending with a 2.41- and 1.50-fold risk of homicide, respectively, in 1990 to 1993. Persons younger than 15 years and older than 44 years were consistently at a lower risk of homicide than 35- to 44-year-olds.

For persons aged 25 and older during 1989 to 1993 (the years for which education level information is available), high school dropouts had a 1.63 (95% CI = 1.46, 1.83) times greater risk than high school graduates of being a homicide victim (data not tabled). Those with an eighth grade education or less did not differ significantly from those with a high school diploma (RR = 1.07; 95% CI = 0.95, 1.20). In comparison, persons with some college or who are college graduates have a substantially lower risk (RR = 0.44, 95% CI = 0.39, 0.50; and, RR = 0.23, 95% CI = 0.19, 0.27, respectively) of being a homicide victim.

As shown in Figure 1, the firearm homicide rate parallels the overall homicide rate, which can be explained by the large proportion of homicides involving firearms (see Figure 4). Firearms and explosives consistently accounted for about 60% of all homicides from 1970 until the mid–1980s, when the percentage began to climb. The percentage of homicides due to cuttings and stabbings dropped from 20% to 11%, and other methods have dropped from 24% to 14% of all homicides. In 1993, firearms and explosives accounted for 75% of all homicides.

Temporal variations (data not tabled) indicate that most homicides occur in the summer months (July through September), with the most homicides occurring in August. The average annual percentage of homicides adjusted by month varied from a low of 8.2% in February to a high of 8.9% in July and 9.1% in August. No significant seasonal differences were detected across the time periods, aside from the overall increase in the number of homicides each year.

Discussion

California data from 1970 to 1993 document a growing disparity in traditional patterns of homicide risk and a substantial shift in others. Homicide risk differences are increasing between men and women and between persons of color and non–Hispanic whites. Two tradi-

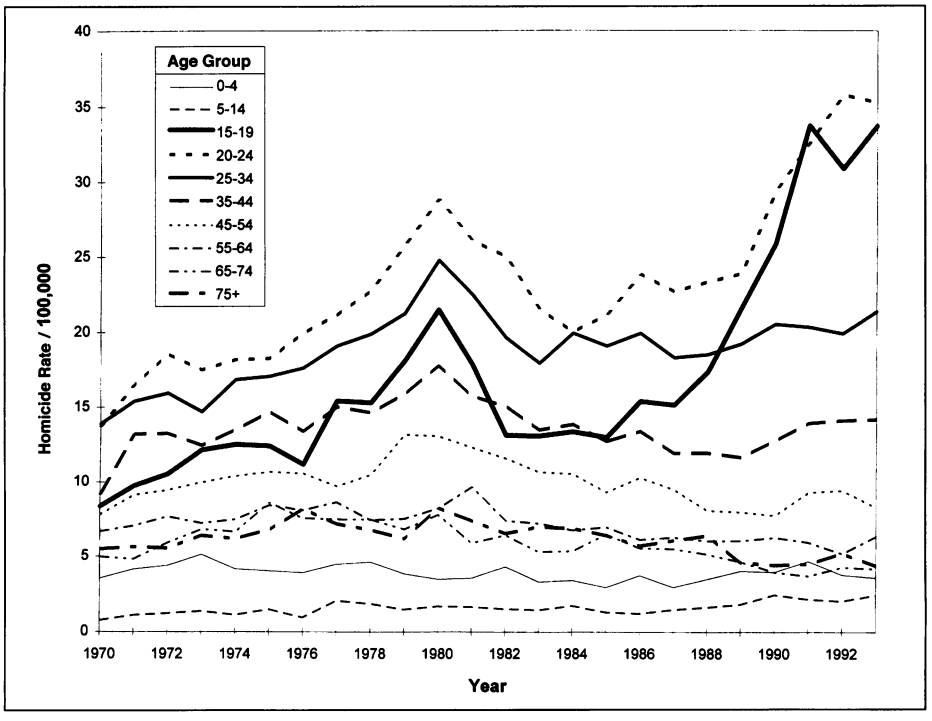

Figure 3.—The California homicide rates by age groups for 1970 to 1993 are shown.

TABLE 1.—*Relative Risks for California Homicides, 1970 to 1993**

Variable	*1970 to 1993*	*1970 to 1974*	*1975 to 1979*	*1980 to 1984*	*1985 to 1989*	*1990 to 1993*
Sex†						
Male	**3.83** (3.50, 4.19)	**3.28** (2.94, 3.65)	**3.51** (3.20, 3.85)	**3.87** (3.54, 4.23)	**3.67** (3.37, 4.00)	**4.71** (4.34, 5.10)
Race and Ethnicity‡						
African American	**7.26** (6.63, 7.94)	**7.33** (6.61, 8.12)	**6.17** (5.62, 6.77)	**6.42** (5.88, 7.01)	**7.64** (7.00, 8.34)	**9.01** (8.29, 9.79)
Hispanic	**2.55** (2.33, 2.79)	**1.96** (1.72, 2.23)	**2.43** (2.21, 2.67)	**2.48** (2.27, 2.70)	**2.27** (2.08, 2.48)	**3.26** (3.02, 3.53)
Asian and other	0.89 (0.73, 1.08)	0.96 (0.71, 1.30)	**0.71** (0.56, 0.92)	**0.72** (0.59, 0.89)	0.86 (0.72, 1.02)	**1.17** (1.02, 1.36)
Age, yr§						
0 to 4	**0.28** (0.22, 0.36)	**0.35** (0.27, 0.45)	**0.28** (0.22, 0.37)	**0.24** (0.19, 0.31)	**0.28** (0.22, 0.36)	**0.29** (0.24, 0.36)
5 to 14	**0.12** (0.09, 0.15)	**0.09** (0.07, 0.13)	**0.11** (0.08, 0.14)	**0.11** (0.08, 0.14)	**0.12** (0.09, 0.16)	**0.17** (0.13, 0.20)
15 to 19	**1.26** (1.10, 1.45)	0.87 (0.73, 1.04)	0.98 (0.85, 1.14)	1.05 (0.91, 1.21)	**1.34** (1.17, 1.54)	**2.26** (2.03, 2.52)
20 to 24	**1.75** (1.55, 1.98)	**1.38** (1.18, 1.61)	**1.47** (1.29, 1.68)	**1.61** (1.42, 1.82)	**1.88** (1.66, 2.12)	**2.42** (2.18, 2.68)
25 to 34	**1.42** (1.27, 1.59)	**1.25** (1.08, 1.45)	**1.29** (1.14, 1.47)	**1.39** (1.24, 1.55)	**1.55** (1.39, 1.73)	**1.50** (1.36, 1.64)
45 to 54	**0.73** (0.62, 0.85)	**0.76** (0.64, 0.91)	**0.740** (0.63, 0.87)	**0.77** (0.66, 0.89)	**0.73** (0.63, 0.86)	**0.63** (0.55, 0.73)
55 to 64	**0.52** (0.43, 0.63)	**0.59** (0.48, 0.73)	**0.54** (0.45, 0.65)	**0.52** (0.44, 0.62)	**0.51** (0.42, 0.62)	**0.43** (0.36, 0.52)
65 to 74	**0.42** (0.34, 0.53)	**0.48** (0.36, 0.62)	**0.51** (0.41, 0.64)	**0.41** (0.33, 0.51)	**0.44** (0.35, 0.55)	**0.29** (0.23, 0.37)
≥75	**0.45** (0.34, 0.58)	**0.48** (0.35, 0.66)	**0.48** (0.36, 0.62)	**0.48** (0.37, 0.61)	**0.47** (0.37, 0.61)	**0.34** (0.26, 0.44)

*Relative risks in bold-faced type are statistically significant at $P < .05$.
†Referent = female.
‡Referent = non-Hispanic white.
§Referent = 35- to 44-year olds.

tionally understudied population groups illustrate this trend well: Hispanics are at a consistently higher risk of homicide than non–Hispanic whites, whereas Asians and others were at a lower or similar risk until the 1990s, when their risk of homicide became significantly greater than that of non–Hispanic whites. African Americans are at an extremely high risk of homicide, a fact that has been widely documented and is corroborated herein. Thus, minority group status is associated with higher homicide rates, albeit not uniformly higher.

Young people are at a dramatically increasing risk of homicide. If existing trends continue, 15- to 19-year-olds will soon overtake 20- to 24-year-olds as the leading category in age-specific homicide rates. This is due, in no small part, to the fact that the homicide rate for 15- to 19-year-olds has more than quadrupled since 1970. Moreover, the homicide rate for persons aged 45 or older has remained stable or decreased. Thus, there is a pronounced trend toward younger victims of homicide.

High school dropouts are at the highest risk of homicide among all education groups. Persons with eight or fewer years of schooling are at a risk similar to that of high school graduates. By contrast, persons with some college or a college degree are at a substantially lower risk of homicide. Given that the education level was added recently to death certificate forms, the association between educational level and homicide risk is just beginning to be explored.[21]

Firearms play a central role in homicide; three of every four homicides in California in 1993 were committed with a firearm. Firearm homicide risk is even higher for youth: in the same year, 90% of the murdered 15- to 19-year-olds in California were killed with a gun. The increase in the number of firearm homicides has been related to an increase in firearm sales,[12] and keeping a gun in the home has been associated with an

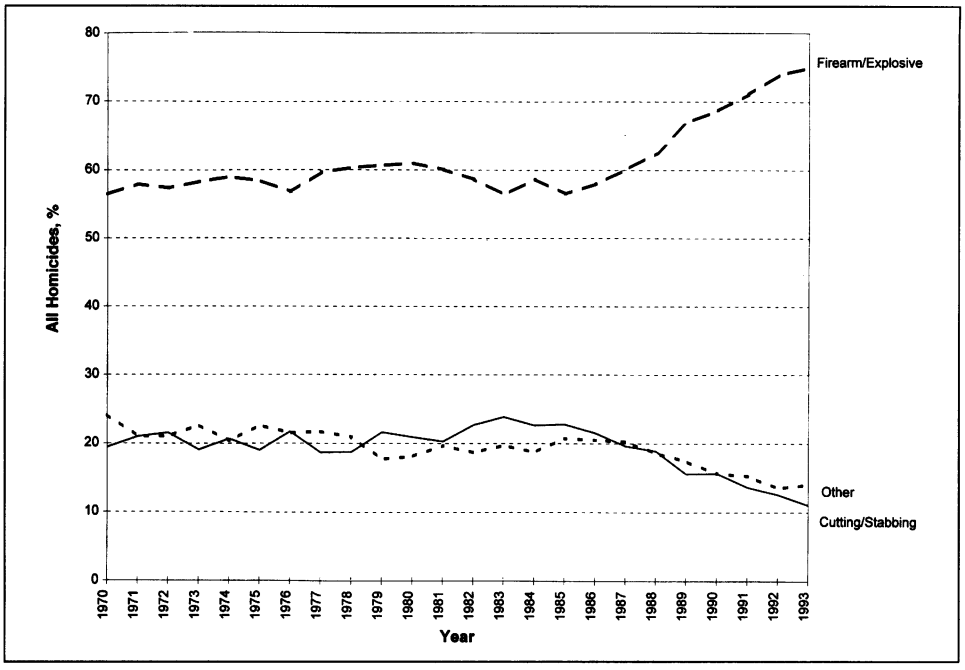

Figure 4.—The graph shows percentages of the methods of homicide—firearms or explosives, cutting or stabbing, or other—for 1970 to 1993.

increased risk of in-home homicide.[10] This is a disturbing outcome of the ease of obtaining a firearm in the United States, where "buying a handgun is as easy as buying a toothbrush."[22 (p1375)] Firearm deaths currently are the leading cause of injury death in California, surpassing even motor vehicle crashes; this change is mostly a result of an increase in the number of firearm deaths rather than a decrease in motor vehicle fatalities.[23]

A few cautions about these data should be noted. Because of the unique minority population distribution of California and the traditionally more violent aspect of the western United States,[15] these results may not generalize to other states or to the nation. Second, education data are relevant for persons aged 25 or older; therefore, associations between education and homicide risk are not valid for the bulk of homicide victims—15- to 24-year-olds—who are excluded from education analyses. Third, although we expect the numbers to be low, there may be some misclassification of Hispanics using the Spanish surname list when non–Hispanic women change their last names when they marry Hispanic men. Fourth, the Asian and other group contains Native Americans who have extremely high homicide rates,[24] which may strongly influence the overall Asian-and-other homicide rate. Last, homicide rates may be affected by the substantial increase in California's foreign-born population in the 1980s, a group that appears to be at a higher risk of homicide.[25]

Conclusion

Homicide is a growing problem among the populations traditionally served by public health agencies. Persons of color are at a substantially higher risk than non–Hispanic whites, and the differences between the groups are growing. Of particular concern is the rapidly escalating homicide risk for 15- to 19-year-olds and an accompanying increase among 20- to 24-year-olds. Furthermore, using recently available education data, these findings indicate that high school dropouts have the highest homicide risk of all educational groups. And, relative to that of women, men's risk of homicide is growing. In essence, even as we assess the role of previously undocumented factors such as education, long-established discrepancies in homicide risk are expanding.

Law enforcement efforts are crucial but singularly insufficient in reducing violence perpetration and victimization. Although the Centers for Disease Control and Prevention has exercised considerable leadership in the field, many state and local health departments still do not define violence and injury prevention as part of their mission. Public health departments need to develop the capacity to be an effective partner in collaborative interagency efforts to meet the thriving public health challenge of homicide.

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