

AGE-ADJUSTED RATES OF SUICIDE AND HOMICIDE AND FLUORIDE¹

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Summary.—Using state data from 1992 and 2000 instead of 1975, the author both confirmed and extended Lester's 1987 study. Like Lester's study, the present replication showed for 1992 (but not 2000) that the more people drinking fluoridated water, the lower the rates of crude and age-adjusted suicide (partial r s: $-.25$ and $-.25$, respectively). Crude and age-adjusted rates of homicide in 1992 and 2000 did not change with the fluoridation of public water. Effective interpretation requires more study.

Lester (1987) correlated the percentages of each state's population drinking fluoridated water in 1975 with rates of suicide and homicide for each of the 48 contiguous states of America. Inspection of Lester's raw data showed he used crude, but not age-adjusted, rates of suicide and homicide for all 48 states so the present study was done to confirm Lester's findings (1987) by using 1992 and 2000 crude rates of suicide and homicide, with controls for the longitude of the state capital and to extend his study by also using age-adjusted rates.

Several studies have reported adverse health effects other than dental fluorosis from water fluoridation. For example, Kuznetsova (1969) reported a correlation between occupational exposure to fluoride and menstrual problems. Also, Freni (1994) reported in an ecological study that exposure to high fluoride concentrations in drinking water, using county means, was associated with lower mean fertility rates for women across U.S. counties in selected states. Lastly, Grandjean, Juell, and Jensen reported that workers receiving high doses of fluoride had a higher rate of suicide in a follow-up study which was completed in 1981 but reported in 1985. Like Lester (1987) using 1975 data, the present ecological study explored the effect of exposure to optimally fluoridated drinking water through public water systems on the crude and age-adjusted suicide and homicide rates in 1992 and 2000.

Previous U.S. research has shown a variation of rates of suicide and homicide by longitude and latitude of the state capital (Lester, 1980, 1994). Among the 48 continental states, suicides were much higher in western states than in eastern states (Lester, 1980, 1994), and homicide rates had a tenden-

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cy to be higher in western than in eastern states (Lester, 1973) and especially in western than in eastern states for those 75 to 84 years of age (Lester, 1980).

METHOD

The Centers for Disease Control and Prevention (2002) reported the percentages of the population in 1992 and 2000 who received optimally both naturally occurring and adjusted fluoridated water through public water systems. Miniño, Arias, Kochanek, Murphy, and Smith, (2002) provided for the year 2000 age-adjusted rates per 100,000 population (2000 Standard) of suicide and homicide (ICD-10 codes). Web-based Injury Statistics Query and Reporting System, an online application provided by the National Center for Injury Prevention and Control, provided the 1992 age-adjusted rates per 100,000 population (1940 Standard) of suicide and homicide (ICD-9 codes) and the 2000 crude and age-adjusted rates per 100,000 population (2000 Standard) of suicide and homicide for several states, i.e., Maine, New Hampshire, North Dakota, South Dakota, Vermont, and Wyoming, which were not provided in Table 33 by Miniño, *et al.* (2002). This was because crude and age-adjusted rates for these six states did not meet the standards of reliability or precision (Miniño, *et al.*, 2002). This website indicated for each state that, when crude and age-adjusted rates were based on 20 or fewer deaths, they should be considered unreliable and used with caution.

Of the 48 continental states studied by Lester (1987), three of these had crude rates of homicide in 1975 based on 20 or fewer deaths, i.e., 12 deaths in North Dakota, 20 in New Hampshire, and 8 in Vermont). Lester included these three states when he analyzed data for 48 states. However, rates of age-adjusted homicide did not include those states, whose rates were based upon 20 or fewer deaths in 1992, i.e., North Dakota, South Dakota, Vermont, and Wyoming, and also in 2000, i.e., Maine, New Hampshire, North Dakota, South Dakota, Vermont, and Wyoming.

The longitudes of 48 state capitals were obtained using an interactive Internet tool at the United States Census Bureau. This data access tool is called the U.S. Gazetteer or the 1990 Census Gazetteer Place Search [United States Census Bureau, Data Access Tools, Interactive Internet Tools, 1990 Census Gazetteer Place Search (<http://www.census.gov/cgi-bin/gazetteer>). 7-1-03].

RESULTS

The percentage of people drinking fluoridated water varied significantly with the longitude of the state capital, with fewer people drinking fluoridated water from public water systems in the western states than the eastern states in both 1992 and 2000 [Pearson $r_s = -.43$ ($p = .002$) and $-.40$ ($p = .004$), respectively]. For 1992, the partial correlations between the percent-

age of people drinking fluoridated public water and the crude and age-adjusted rates of suicide controlling for longitude in 48 states were $-.26$ ($p = .04$) and $-.25$ ($p = .05$), respectively. For 2000, the partial correlations between drinking fluoridated water and the crude and age-adjusted rates of suicide controlling for longitude in the 48 continental states were not significant, i.e., $r_s = .05$ and $.03$. Like Lester (1987), these findings indicate that for 1992, but not 2000, the more people drinking fluoridated water, the lower the crude and age-adjusted rates of suicide. In 1992 and 2000, 65.5% and 69.5%, respectively, of people were receiving optimally fluoridated water through public water systems. The reason for this 4% net difference was because 27 of the 48 continental states reported an incremental change, i.e., an increase in the percentage of people drinking fluoridated water while 21 states reported a decrease. Although the findings in 2000 differ from those in 1992, neither of these values show that the fluoridated water increases were associated with rates of suicide in states.

For the years 1992 and 2000, crude rates of homicide for 48 states did not vary with the fluoridation of public water (partial $r_s = .03$ and $.19$, respectively). Age-adjusted rates of homicide for the years 1992 (excluding North and South Dakota, Vermont, and Wyoming) and 2000 (excluding Maine, New Hampshire, North Dakota, South Dakota, Vermont, and Wyoming) did not vary with the fluoridation of public water (partial $r_s = .10$ and $.14$, respectively).

Finally, the present results for the years 1992 and 2000 confirm Lester's previous finding for 1975 (1987) that fluoridated public water is not associated with increased crude rate of suicide in 48 continental states.² In addition, these results extend Lester's research by indicating that fluoridated water is not associated with increased age-adjusted rate of suicide in 48 contiguous U.S. states. Age-adjusted rates of homicide did not change with the fluoridation of water in 1992 (44 states) and in 2000 (42 states). Lastly, the present findings for homicide matched those of Lester, in that crude homicide rates among 48 continental states in 1992 and in 2000 did not deviate with the fluoridation of water. Additional information is required for clear interpretation.

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²Incidentally, 1992 and 2000 age-adjusted rates of homicide using data from all 48 states was not associated with the fluoridation of the water (partial $r_s = .03$ and $.19$, respectively); nor were 1992 and 2000 crude rates of homicide using data from 44 and 42 states (partial $r_s = .10$ and $.15$), respectively.

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