

Farmer Suicides: A 9-Year Analysis in Three Southeastern States, 1990-1998

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PROJECT DESCRIPTION

The primary aim of this project was to examine the descriptive epidemiology of farmer suicides in the southeastern states of Kentucky, North Carolina, and South Carolina. Computerized death certificate data were obtained from the National Center for Health Statistics (NCHS) for the years 1990-1998 for the states of Kentucky, North Carolina, and South Carolina. Variables available from the NCHS files for the analysis included age, race, gender, county of death, marital status, usual occupation, cause of death, date of death, state of residence, and place of death. While not every state codes for the usual occupation/industry for the deceased, the three states in this study code for this necessary field in order to identify farm operators, managers, and workers (collectively referenced as “farmers” in this report). The study found increased risk of suicide mortality among white male farmers in comparison to the total white male population in these three southeastern states. Male farmers in the 75-84 age group were twice as likely to die from suicide in comparison to the total white male population, and male farmers age 85 years and older were four times more likely to die from suicide. This study underscored the importance of examining temporal and regional trends in farmer suicides, and suggested that prevention programs need to be directed toward older farmers, who consistently have higher suicide mortality rates than similar males in other occupations.

Project Start and End Dates: September 30, 2001 to September 29, 2003

ACTIVITIES / ACCOMPLISHMENTS

The case distribution of farmer suicide deaths in Kentucky, North Carolina, and South Carolina yielded 645 deaths over the nine-year period under analysis. White males (N=590) accounted for 91.5% of the reported deaths, with 6.4% of the deaths among Black male farmers, and 2.0% of the deaths among females. Consequently, the majority of the analyses were limited to white male farmers in the three states. Eighty-nine percent (89%) of the deaths were coded with the occupational title “farmers, except horticultural”, 9% of the deaths were coded as “farm workers”, and the remaining 2% were coded as “managers, supervisors, and horticultural specialty farmers”.

Among white males (N=590), 53% of the suicides occurred in Kentucky, 37.5% in North Carolina, and 9.7% in South Carolina (Table 1). Over the nine year period from 1990-1998, Kentucky had a mean of 34.6 white male farmer suicides per year, North Carolina had a mean of 24.6 white male farmer suicides per year, and South Carolina had a mean of 6.3 white male farmer suicides per year. Fifty-two percent of the suicides occurred among farmers age 65 years and older in the three states. Farmers with 11 or fewer years of education accounted for 50% of the suicide deaths. Less than 1% of the white male farmer suicides deaths were coded as an injury at work. The primary method of suicide death for white male farmers was use of a firearm (86%) compared to 74% of all white males in these three states who used a firearm in their death ($p<.0001$).

We developed a database to analyze suicide mortality rates for the farmers in these three states relative to the total white male population. We used data estimating the number of farmers by age groups in each state that were available from the Census of Agriculture reports for 1992 and 1997. For the intercensal years, we interpolated the total number of farmers using linear regression and applied the age-specific distribution of farmers from the census years to generate the age-specific estimates of farmers for each year from 1991–98. For the denominator for the total suicide rate in white males, we used state-specific population estimates from the US Census. The primary comparisons made in the study were between the white male farmer population age 25 years and older and the total white male population. Age adjusted and age-specific rates for the comparative analyses were calculated using standard methods and are presented graphically below. A Poisson regression analysis was conducted to generate incidence density ratios to evaluate the risk factors for suicide mortality in the study and evaluate the temporal trends.

Farmer suicides among white males were more likely to occur among persons age 65 years and older, those who are widowed, and those with 11 years or fewer of education in comparison to the total white male population in these states. The highest proportion of farmer suicides occurred in calendar year 1990 in this study.

Table 1 presents the crude and adjusted suicide mortality rates by state, comparing the farmers to all white males. Age-adjusted rate comparisons between farmers and total males indicate that farmer rates were higher than total male rates in all three states. The rates were significantly higher in Kentucky and North Carolina, with a rate difference of 18.6 deaths per 100,000 persons per year in North Carolina. While North Carolina had the highest farmer suicide mortality rate of

the three states in the study, the largest burden of suicide cases was in Kentucky.

Table 1. Crude and adjusted suicide mortality rates for white males compared with white male farmers for three southern States, 1990–98.

State	Crude rate per 100,000 (all white males/ Census denom)	Crude rate per 100,000 (White male farmers /Ag stat denom)	Age-adjusted rate (White male farmers/referent: white male population for state) 95% (CI)	Rate difference (Farmers, total per 100,000 per year)
Kentucky	31.15	39.24	39.50 (34.3-45.1)	8.35
North Carolina	29.53	47.26	48.09 (39.63-57.44)	18.56
South Carolina	32.16	30.48	35.51 (22.47-51.43)	3.35

Figure 1 (below, next page) provides a comparison of the suicide rates for white male farmers and the total white male population by calendar year. The elevated suicide mortality rate for farmers is evident over the entire period of the study compared with the white male rate. Since 1990, on average, there was a modest decline in the farmer suicide mortality, although a slight increase may be evident at the end of the decade.

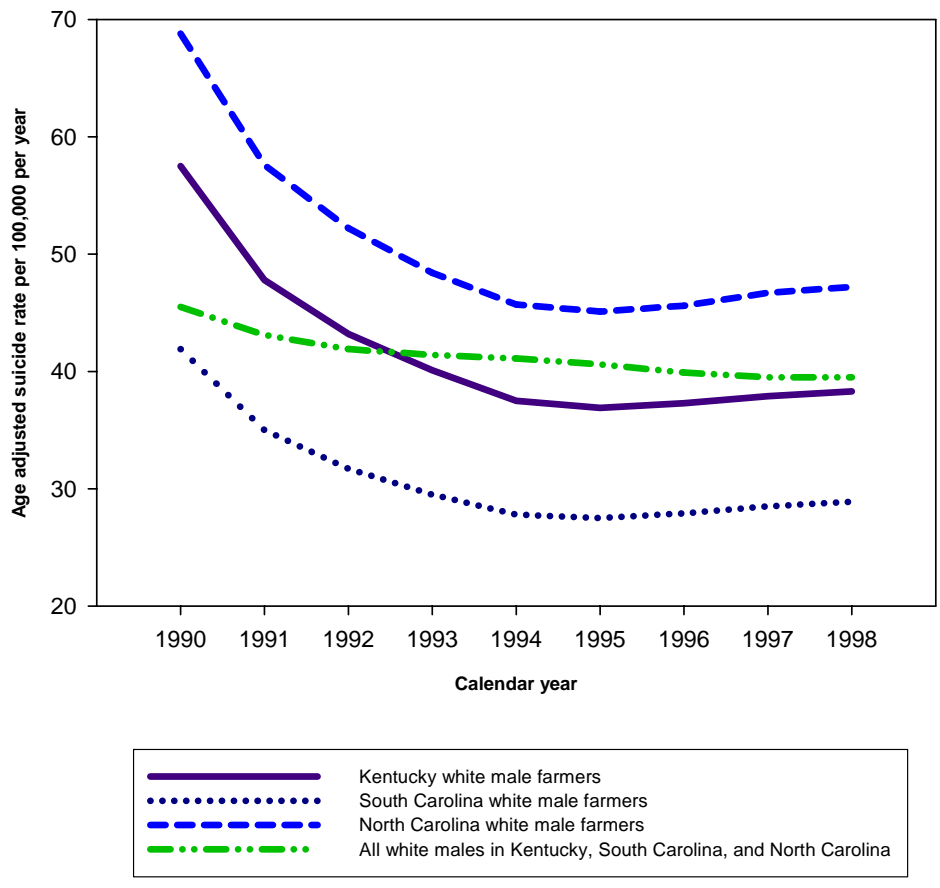


Figure 1. White male farmer suicide rates by state in comparison to total white male suicides in the three states (1990-1998).

Figure 2 below illustrates the changing pattern in suicide mortality rates over the study period in the three states. The decline in rates in the early 1990s is apparent in all three states. The white male farmer rates are consistently highest in North Carolina and lowest in South Carolina over the study period. There is some indication of an increase in the rates near the end of the decade, particularly in South Carolina, although the rates for this state are less stable given the small number of farmer suicide deaths in South Carolina, about three to four annually.

White male farmer suicide mortality rates by calendar time and state from 1990-1998.

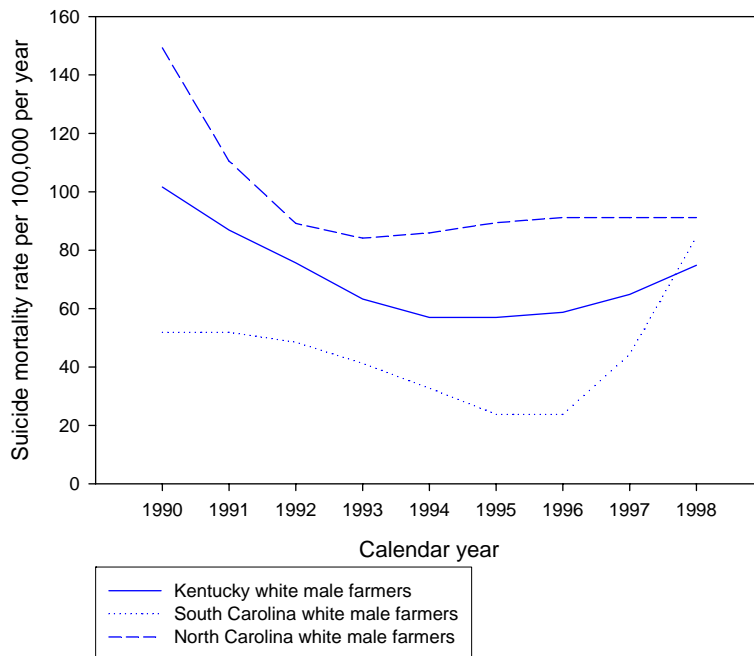


Figure 2.

In confirmation with other work in the farmer suicide literature, the finding that older white male farmers (>75years) are at an increased risk of suicide compared with the total white male population is apparent from the data in Figure 3 (below). Farmers in the 75-84 age group are approximately twice as likely to die from suicide than the total white male population and farmers age 85+ are four times more likely to die from suicide. The adjusted incidence density ratios, which confirm the graphical finding, are given in Table 2 below. Suicide mortality rates for white male farmers in North Carolina are significantly higher than either Kentucky or South Carolina, after adjustment for age, and calendar year (Table 2).

White male suicide mortality rates in three Southern States by Age Group.
 Comparison of total population to farmers 1990-1998.
 (Rates adjusted for calendar year)

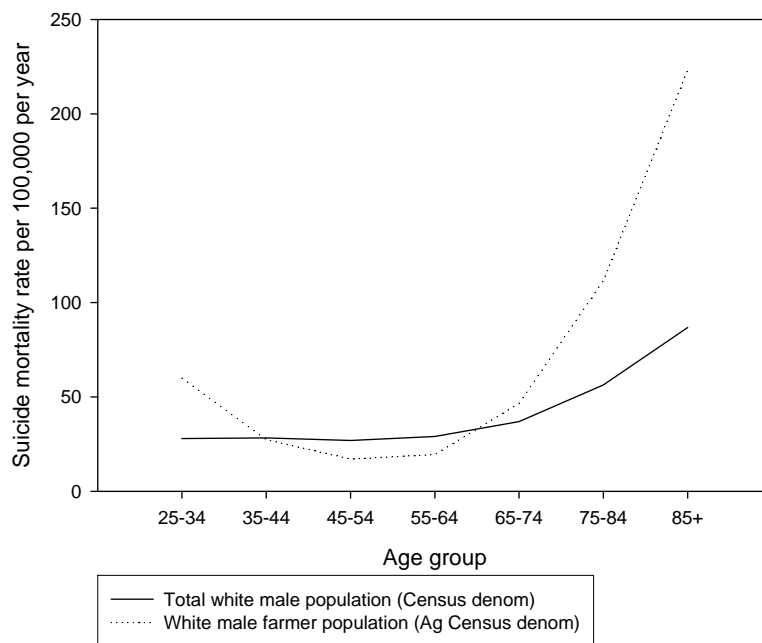


Figure 3.

Table 2. Poisson Regression Analysis for White Male Farmer Suicides in Kentucky, North Carolina, and South Carolina, 1990–98.

Variable	Incidence density ratio	95% confidence limits
State		
Kentucky	0.82	.64–0.99
North Carolina	1.00	-----
South Carolina	0.62	0.32–0.91
Age group		
25-34	1.0	-----
35-44	0.51	0.17–0.85
45-54	0.32	0.04–0.67
55-64	0.38	0.03–0.72
65-74	0.86	0.55–1.17
75-84	2.06	1.76–2.36
85+	4.01	3.66–4.36

Poisson regression analysis, controlling for age group, state, and calendar year.

Conclusions

The results of this study confirm the increased risk of suicide mortality among white male farmers in comparison to the total white male population in these three southern states. The increased risk of suicide death is significantly elevated among the farmers age 75 years and older. The use of a firearm is the primary means of death for the majority of the cases. White male, farmer suicide mortality rates vary substantially by state and over time. The finding that older white male farmers (> 75years) are at an increased risk of suicide in comparison to the total white male population was apparent in our study and supports other published work addressing farmer suicides (Pickett, Davidson, and Brison 1993; Stallones 1990). Male farmers in the 75-84 age group were twice as likely to die from suicide in comparison to the total white male population and whereas male farmers age 85 years and older were four times more likely to die from suicide. The explanation for the increased suicide death rates among the oldest farmers cannot be assessed from mortality data. However, authors have speculated that increased risk may be related to chronic pain, depression, financial problems, disrupted marital status (e.g. loss of a spouse), or other stressful life events. It has been suggested that farmers may be more likely to present with physical problems when they are depressed, given the “stigma” associated with mental illness, thereby preventing appropriate treatment of their depression, which is associated with an increased risk for suicide (Booth, Briscoe, and Powell 2000).

Suicide rates for white male farmers in North Carolina were significantly higher than either Kentucky or South Carolina after adjustment for age and calendar year. The elevated rate of white male farmer suicides in North Carolina requires further explanation and is likely associated with a complex interplay of social, economic, cultural, and temporal factors. One explanation for this elevation may be related to the methodology of the study. The proportion of full time farmers is higher in North Carolina than in Kentucky and South Carolina. Consequently, the occupational code on the death certificate may be a more accurate reflection of farm employment in populations with a higher proportion of full-time farmers since the numerator data would be more accurate on death certificates. The temporal trend indicated that the North Carolina male farmer suicide rate declined in the early 1990s and stabilized. This may reflect, in part, complex stressors associated with the “farm crisis” of the mid-1980s. The patterns were similar in the three states although the rates were highest in North Carolina in 1990. These data demonstrate the importance of examining regional patterns in farmer suicide mortality rates.

It is evident that interventions in the prevention of suicide need to be directed to older male farmers who consistently have higher suicide mortality rates than similar males in other occupations. These interventions need to address mental health services for rural farmers, as well as their access to firearms as the primary mechanism of suicide. For male farmers in the three southern states in this study, the primary mechanism for committing suicide was the use of a firearm (86% of deaths) followed by hanging (7%). There is ecological evidence suggesting that a restriction in use of guns through registration, etc., may lead to a decline in firearm death rates (Hawton et al., 1998). During the study period examined by Hawton, there was a reduction in firearm death rates, particularly after 1989 when there was national legislation on firearm ownership, registration, and storage. Since farmers, as an occupational group, are perhaps more likely to have access to firearms, the use of a firearm, as opposed to a less lethal method (e.g.,

hanging), may account for farmers' increased suicide mortality. A case control study of farmer suicides by Booth et al (2000) confirmed that farmers were more likely to use firearms to kill themselves compared with controls (nonfarmers). It has been suggested that some consideration be given to removing firearms from the household for those with depression and suicidal behaviors (Booth, Briscoe, and Powell 2000).

PRODUCTS:

Browning S. Farmer Suicide Deaths in Kentucky, North Carolina, and South Carolina: 1990–1998. Research seminar, College of Nursing, University of Kentucky. 2004 Nov 19.

McKnight RH, Browning S, Westneat S. Suicide among older farmers in Kentucky, USA: 1990-98. Second International Conference on Work Ability; Verona, Italy; 2004 Oct 18-20.

McKnight RH, Browning SR, Westneat SC. Suicide among older farmers in Kentucky, 1990-1998. Poster. Inaugural Research Symposium of the University of Kentucky College of Public Health; Lexington, KY; 2004 Oct 25.

Browning SR, Westneat SC, McKnight RH, Christian A. Suicides among farmers in three southeastern states, 1990-1998, in Final 5-year Report of the Southeast Center for Agricultural Health and Injury Prevention, 2001-2006 (CDC/NIOSH Cooperative Agreement U50 OH007547). Lexington: University of Kentucky, 2007.