# Suicide in the State of Maryland, 1970–80

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Synopsis ....................................

A univariate and multivariate analysis of factors associated with suicide for residents of the State of Maryland was conducted. The investigation was statistically oriented in its approach, examining the relationships of age, race, sex, marital status, and month of death with suicide. Besides the usual death rates, percentages, and age-specific rates, a discriminant analysis was performed to test this approach.

Data were obtained on all suicides of Maryland residents, regardless of where the deaths occurred. Univariate analysis showed that the relationships between suicide and age, race, sex, and marital status are consistent with those in the literature. No significant relationship appeared to exist between the month of death and suicide. During multivariate analysis, the discriminant function correctly predicted 80 percent of all the deaths, 74 percent of suicides, and 80 percent of all other causes, in their respective categories.

THERE IS ABUNDANT research which emphasizes the concrete, statistical relationships which exist between the demographic variables of age, race, sex, marital status, and specific month of suicidal deaths. The purpose of this investigation was twofold: first, to determine the universality of the results of these relationships in the State of Maryland; and second, to determine exactly how reliable these relationships really are in actually differentiating suicidal deaths from all other causes of death statistically; that is, to predict whether a death is a suicide or not merely by examining these five demographic variables.

A brief summary of the literature revealed the significant relationships of age, race, sex, marital status, and specific month of death with suicide. Consistent with the results reported in these studies, one would expect the following relationships in the State of Maryland data:

1. The highest rate of increase in suicide over the past 11 years occurred to those under 30 years of age (1).
2. Males have a higher frequency of suicides than females (2–5).
3. Whites have a higher frequency of suicides than nonwhites (6).
4. The rate of suicide is higher for persons who are widowed or divorced than for those married or single (3,7).
5. More suicidal deaths occur in the spring and fall months than the summer and winter months (8–10).

There have been many studies that support these "universal" relationships between suicide and the specific demographic variables used in this investigation. This study is distinguished from others in the literature by the multivariate analysis methodology used. Discriminate analysis incorporates the effects of five demographic variables—age, race, sex, marital status, and month of death—in order to determine how well the five variables predict suicide and all other causes of death.

## Method

In order to examine the relationships between suicidal deaths and the five predictor variables more closely, cross tabulations, frequencies, and

crude death rates were calculated for the different age groups, races, sexes, marital statuses, and months of death. To test statistically whether or not a suicidal death could be differentiated from all other causes of death, a discriminant analysis was performed using the "Statistical Package for the Social Sciences," (SPSS) (11).

Data for statistical analyses performed in this investigation were supplied by the Maryland Center for Health Statistics (MCHS). Researchers were given permission by MCHS to access a nonconfidential data set which contained deaths of Maryland residents for calendar years 1970 through 1980. It is important to note that the dates used in this study were those reported on the death certificate although this date and the actual date of death may differ (12).

## Results

Data elements were extracted from the death certificates, including the underlying cause of death. There were 5,040 deaths that were coded as suicides according to the Eighth and Ninth Revisions of the International Classification of Diseases (13) from 1970 to 1980; and a total of 345,137 deaths during this period.

Because the International Classification of Diseases nomenclature changed from the Eighth to the Ninth Revision, differences in rates due to these changes may be observed. The suicide deaths' comparability ratio (Ninth compared with the Eighth) is 1.0032 (95 percent confidence interval, 0.9950–1.0114) (14). In this study, increases in rates were observed only in the youngest persons. An artifactual effect on these data would operate across all population groups, and thus it was not an important factor in this analysis of Maryland suicides.

The elements of interest were age, race, sex, marital status, and month of death. When the relationships between each independent variable and suicidal deaths were examined, the results of this investigation were consistent with those in the literature. The largest rate of increase in suicide in Maryland has occurred among those under 34 years (table 1); males committed suicide about three times as often as females in each of the 11 years (table 2); the suicide rate for whites was approximately twice that of the nonwhites (table 3); and divorced and widowed persons had higher rates than the married and single (table 4).

In terms of the specific month of death of Marylanders' suicides, there was a pattern of non-

Table 1. Age-specific percent increases in suicide rates per 100,000 population, Maryland residents [1] and the United States [2], 1970 and 1980

| Age group (years) | 1970 | | 1980 | | Percent increase | |
|---|---|---|---|---|---|---|
| | Maryland | United States | Maryland | United States | Maryland | United States |
| 5–14 ........ | 0.2 | 0.3 | 0.2 | 0.4 | (3) | (3) |
| 15–24 ....... | 8.5 | 8.8 | 12.3 | 12.3 | 44.7 | 39.8 |
| 25–34 ....... | 13.3 | 14.1 | 15.3 | 16.0 | 15.0 | 13.5 |
| 35–44 ....... | 13.5 | 16.9 | 13.4 | 15.4 | – 0.7 | – 8.9 |
| 45–54 ....... | 18.9 | 20.0 | 15.2 | 15.9 | – 19.6 | – 20.5 |
| 55–64 ....... | 24.1 | 21.4 | 18.3 | 15.9 | – 24.1 | – 25.7 |
| 65–74 ....... | 24.4 | 20.8 | 15.0 | 16.9 | – 38.5 | – 18.8 |
| 75–84 ....... | 26.5 | 21.2 | 13.8 | 19.1 | – 47.9 | – 9.9 |
| 85 and older . | 5.1 | 19.0 | 24.5 | 19.2 | (3) | 1.1 |

[1] Data from reference 16.
[2] Data from reference 17.
[3] Due to small numbers, percent increases were not calculated.

Table 2. Suicide rates per 100,000 population, by sex for Maryland [1] residents and the United States [2], 1970–80

| Year | Males | | Females | |
|---|---|---|---|---|
| | Maryland | United States | Maryland | United States |
| 1970 ................ | 16.2 | 16.8 | 6.0 | 6.6 |
| 1971 ................ | 15.5 | 16.7 | 6.4 | 6.8 |
| 1972 ................ | 16.7 | 17.5 | 7.1 | 6.8 |
| 1973 ................ | 14.9 | 17.7 | 6.7 | 6.5 |
| 1974 ................ | 16.3 | 18.1 | 6.0 | 6.5 |
| 1975 ................ | 17.5 | 18.9 | 6.2 | 6.8 |
| 1976 ................ | 18.0 | 18.7 | 5.5 | 6.7 |
| 1977 ................ | 19.9 | 20.1 | 5.9 | 6.8 |
| 1978 ................ | 17.8 | 19.0 | 5.6 | 6.3 |
| 1979 ................ | 16.9 | 18.9 | 6.3 | 6.1 |
| 1980 ................ | 17.5 | 18.6 | 5.8 | 5.5 |

[1] Data from reference 16.
[2] Data from reference 17.

Table 3. Suicide rates per 100,000 population by race for Maryland residents [1] and the United States [2], 1970–80

| Year | White | | Nonwhite | |
|---|---|---|---|---|
| | Maryland | United States | Maryland | United States |
| 1970 ................ | 12.1 | 12.4 | 5.7 | 5.6 |
| 1971 ................ | 12.1 | 12.5 | 5.2 | 5.8 |
| 1972 ................ | 12.8 | 12.8 | 7.5 | 6.6 |
| 1973 ................ | 11.9 | 12.8 | 6.1 | 6.4 |
| 1974 ................ | 12.0 | 13.0 | 7.1 | 6.5 |
| 1975 ................ | 12.8 | 13.6 | 7.7 | 6.8 |
| 1976 ................ | 12.9 | 13.3 | 6.6 | 7.0 |
| 1977 ................ | 14.2 | 14.2 | 7.4 | 7.3 |
| 1978 ................ | 13.2 | 13.4 | 6.1 | 6.9 |
| 1979 ................ | 12.5 | 13.1 | 8.3 | 7.5 |
| 1980 ................ | 13.1 | 12.7 | 6.5 | 6.4 |

[1] Data from reference 16.
[2] Data from reference 17.

**Table 4. Suicide rates per 100,000 population by marital status for Maryland residents [1], 1970–80**

| Year | Married | Single | Widowed | Divorced |
|------|---------|--------|---------|----------|
| 1970 | 14.5 | 12.8 | 17.9 | 28.3 |
| 1971 | 12.7 | 13.9 | 22.9 | 27.7 |
| 1972 | 14.3 | 15.5 | 19.8 | 41.0 |
| 1973 | 14.0 | 13.1 | 21.8 | 19.5 |
| 1974 | 12.5 | 15.0 | 20.2 | 38.3 |
| 1975 | 13.9 | 14.8 | 18.5 | 41.0 |
| 1976 | 12.2 | 17.8 | 22.8 | 30.6 |
| 1977 | 14.6 | 18.4 | 13.3 | 36.4 |
| 1978 | 12.4 | 17.5 | 19.3 | 24.7 |
| 1979 | 11.6 | 18.1 | 18.4 | 24.3 |
| 1980 | 12.7 | 14.1 | 16.7 | 32.3 |

[1] Data from reference 16.
NOTE: Rates for U.S. not available.

**Table 5. Results of the discriminant analysis**

| Actual group membership | Number | Predicted group membership | |
|-------------------------|--------|----------|------------|
| | | Suicides | All other causes |
| **Suicides:** | | | |
| Number | 5,040 | 3,729 | 1,311 |
| Percent | 100.0 | 74.0 | 26.0 |
| **All other causes:** | | | |
| Number | 340,097 | 67,169 | 272,928 |
| Percent | 100.0 | 19.7 | 80.3 |

**Table 6. Standardized canonical discriminant function coefficients**

| Variable | Coefficient |
|----------|-------------|
| 1. Month of death | −0.01374 |
| 2. Sex | 0.09753 |
| 3. Race | 0.30328 |
| 4. Marital status | −0.09718 |
| 5. Age | 1.02324 |

uniformity throughout the 11-year period. For the entire period, however, the most suicides occurred in the months of August through November, with September being the month with the largest proportion of these deaths.

A discriminant function was calculated using age, race, sex, marital status, and month of death to predict suicide or other cause of death. The resulting discriminant function (table 5) explained 29 percent of the variation (canonical correlation = 0.1712). Age, with a standardized coefficient of 1.02324, was the most potent predictor of suicides or other causes of death, with race next (table 6). Overall, the discriminant function correctly pre-

dicted 80 percent of the 345,137 deaths in the respective category.

The discriminant function had a sensitivity (predicted positives—all true positives) of 74 percent and a specificity (predicted negatives—all true negatives) of 80 percent. The low sensitivity yields a low positive predictive validity, 5.3 percent.

## Discussion

The bases of this investigation were (a) to examine the "universal" relationships between age, race, sex, marital status, and month of death and suicide for Maryland residents and (b) to determine if suicidal deaths can be statistically distinguished from all other causes of death using these five variables as discriminating factors.

When the demographic variables of age, race, sex, and marital status were examined univariately for suicidal deaths of Maryland residents, this study did not reveal novel findings.

Older persons, whites, males, and divorced and widowed persons have the highest suicide rates (number of suicides per 100,000 population). All of these relationships are highly consistent with those published in the literature. Interactions of race and sex may show differential trends by age (15), but they were not examined in this investigation. No significant relationship appears to exist between suicidal deaths and seasonal variation. However, with the diversity of results already published on this variable, such findings in this investigation are neither consistent nor inconsistent with the literature (15).

The discriminant function performed does lend some useful information regarding the ability to predict possible suicides using age, race, sex, marital status, and specific month of death as discriminating variables. By use of a set of easily obtained variables, 74 percent of suicides and 80 percent of all other causes of death were correctly categorized. However, improvements could be made in the model to make the results more practical. For example, adding other variables, such as age-squared or an interaction term of calendar year by age, may improve prediction. This step would serve to raise the sensitivity of the predicted outcomes and the specificity. A way of raising the predictive validity of the model would be to increase the proportion of suicides in the deaths analyzed. Presently, suicides account for only 1.4 percent of all deaths. Eliminating deaths due to natural causes or nonsuicidal deaths, such as homicides and accidents, from the analysis would accomplish this.

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# Factors Influencing Early Prenatal Enrollment in the WIC Program

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## Synopsis.................................

Women's access to prenatal nutrition services was explored using a nationally representative sample of pregnant participants in the Special Supplemental Food Program for Women, Infants, and Children (WIC) in 1984. The probability was examined of the participant entering the program during her first trimester, rather than the second or third trimester. Other research has suggested that length of participation in the program during pregnancy is associated with increased birth weight.

The data were adjusted for various personal and local operational factors, such as prior WIC participation, race, age, income, household size, WIC priority level, availability of prenatal or other health services, targeted outreach policies, years of local operation, and local agency size.

Previous participation in the WIC Program was the only factor significantly associated with early enrollment (adjusted odds ratio 2.1). Race was marginally significant. Neither the presence of local policies of outreach targeted to pregnant women, nor colocation of WIC services with prenatal or other health services, showed significant effects on early enrollment.

THE RATE OF LOW BIRTH WEIGHT and other adverse birth outcomes has strengthened interest in improving the accessibility of prenatal services to low-income and minority women and in improving early initiation of services.

One of the primary providers of prenatal services