Suicide: Who's Counting?

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SUICIDE IS A FORM of personal behavior that has extensive social significance. It is a clearly visible and forceful signal of rejection by a member of a community of what the community has to offer for social living. In choosing death, many suicide victims accuse society of failure to provide them with the requisite satisfactions and rewards that make life worth living. Because of this social context, suicide has been considered by anthropologists to be one indicator of poor mental health of a community (*1, 2*). It has also been regarded by sociologists as one index of deviance in the community, along with other indices such as delinquency, divorce, and transiency (*3–5*). Since these indices frequently provide the basis for formulation of social policy, it is important that the data be both valid and reliable.

Suicide rates should be accurate for other reasons as well. They may be examined, for example, for shifts in the occurrence of suicide among sex, race, and age groups. Close monitoring of the suicide rates in Los Angeles first brought to light the increase in suicide among young people in the 1960s. The rate for males in the age group 10–19 years increased from 3.3 per 100,000 population in 1960 to 10.0 in 1970, and for ages 20–29 years, from 18.3 to 21.3. For females, the change was startling: for those under 19 years, the rate rose from 0.04 in 1960 to 8.0 in 1970, and for ages 20–29 years the 1960 rate of 6.3 jumped to 26.2 in 1970. Equally important, the Los Angeles rates also showed a decrease for men over age 70 for 1960–70, from about 55 per 100,000 to 41. This decrease is a phenomenon of occidental cultures, in which the rate for older men has been consistently the highest of any age group (*6*).

Evaluation of existing services and planning of future services depends on the accuracy and validity of suicide data. Comparison of States, regions, or nations requires accurate certification procedures. Yet, because of the great variability in reporting suicides, the validity of reported suicide rates may be seriously questioned.

Reasons for Variability

Certification of a death as suicide is influenced by personal, social, and cultural factors, any of which may affect the accuracy and validity of published data. One source of variability is inherent in the nature of suicide as compared with the other kinds of death—natural, accidental, or homicidal. In all other kinds of death, it is assumed that the decedent did nothing to bring about either the situation or its fatal result. In suicide, in contrast, both the situation and the lethal ending are presumed to be due to the person's own conscious, volitional actions. Thus, the intention of the victim is crucial in differentiating suicide from the other forms of death, and every authority who certifies deaths must determine that intention. Since intention is a psychological state, and most coroners and their investigators are neither equipped nor trained to examine psychological factors in death, suicide may be the kind of death most inadequately investigated and most arbitrarily determined. Even when a coroner's staff is capable of evaluating psychological factors, certification of suicide still presents problems in that many people live chaotic, disorganized lives with much risk taking and indirectly self-injurious or self-destructive behavior. For such persons it is particularly difficult to determine whether the behavior that resulted in death was initiated with conscious intent to die.

Accuracy in certifying suicide may also be questioned because this mode of death is considered a taboo. Suicide, especially in occidental countries, is

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surrounded by feelings of shame, guilt, and embarrassment. It is therefore sometimes not reported by the family or the family physician when it occurs. It may also be avoided by the certifying authority because of the prevailing mores of the community or because of such arguments as, "It only hurts the survivors" or "Why besmirch the reputation of the decedent?"

Finally, reported suicide rates may be affected by the structure and functioning of the coroner's office. Many suicides are equivocal (about 10 percent in Los Angeles County), and inadequate facilities or staff may result in arbitrary procedures. Many offices, for example, do not have toxicology facilities, or have access to them only with considerable trouble, for investigating deaths caused by ingestion of a substance. Or the offices may lack staff qualified to make such investigations, or the staff may lack the time and interest for conducting the extensive investigations sometimes required.

Previous Investigations

Several studies have investigated the accuracy and validity of coroners' certifications of suicide. Barraclough and Sainsbury (*7*) studied the question of whether personal idiosyncrasies influenced the decisions of coroners in England and Wales. Since these coroners are appointed for life and are responsible to the Crown, not to the appointing authority, local affairs and community attitudes supposedly need not influence their deliberations. The coroners are instructed that ". . . to support a verdict of suicide there should be some actual evidence pointing to the event. The verdict should not rest on survivors." The investigators examined the certification results in counties where the coroner had changed, and they found no evidence to indicate differences in either the number or the kind of suicides with the change in coroner. They found some evidence, however, that the change in coroner affected the use of open or undetermined verdicts.

Stengel and Farberow (*8*) sent questionnaires to 50 countries asking about their procedures, staff, and facilities for certifying suicide. Responses from 32 countries indicated great differences in all these aspects. They revealed, for example, that the certifying authority could be a pathologist, a jurist, an elected peace officer, an appointed physician, a family physician, a court-appointed psychiatrist, or an administrator, among others. Availability of trained personnel, use of autopsies, and capability of making toxicological determinations also varied greatly.

In a review of certification procedures in the United States, Swenson (*9*) noted (*a*) confusion about how to certify equivocal deaths; (*b*) dissembling by police, physicians, and public officials; (*c*) inaccurate recordkeeping; and (*d*) inadequate concepts of what constitutes suicide. Donovan and Nash (*10*) found that coroners varied greatly in their readiness to assign suicide as the cause of death. Litman and colleagues (*11*) found that in one city deaths were certified as suicide only if a handwritten suicide note was found. In Los Angeles, notes are found in only about 35 percent of the deaths certified as suicide. Litman noted that in several communities only 50 percent of the self-inflicted deaths by gunshot to the head were considered suicide; in Los Angeles 95 percent of such deaths were so certified.

Turkel (*12*) reported that in San Francisco all deaths in which the cause was unknown or uncertain were subjected to toxicological determinations. Primarily as a result of this practice, reported deaths from barbiturates are much higher in this city than in most other communities. Seiden (*13*) supported the importance of autopsy and toxicological procedures by noting that autopsy failed to substantiate the cause of death proposed by the attending physician in 45 percent of 5,000 medical-legal cases investigated by the coroner's office in San Francisco.

Litman (*14, 15*) discovered that in a sample of 100 possible suicides in Los Angeles, 25 percent of the police reports were useless for deciding the intention of the deceased. He also found that police often lost interest in a case once it was established that homicide was unlikely.

Johnson (*16*) became concerned that unnatural deaths in England were being missed because autopsies were not being performed. Autopsy rates vary in different parts of the country since autopsies are not mandatory. Johnson studied the records for 5,000 unnatural deaths in which autopsies were performed and found that in at least 5 percent the autopsy revealed information—most often unsuspected poisoning—which had been missed. Among this 5 percent, 27 major crimes were uncovered, a formidable number.

Probably the most extensive investigation of the sources of differences in suicide rates between and within countries was that conducted by Brooke and Atkinson (*17*) under the auspices of the World Health Organization. They sent questionnaires to 24 countries asking for such information as the title of the person responsible for deciding whether a death is a suicide; his qualifications and training;

who appoints and controls him; whether his verdict can be reversed; the methods of recording and counting probable suicides; and the number of deaths from unknown causes. They concluded that the personality of the official who makes the decision may play an important role. Physicians, they stated, may have more tolerance for doubt and less hesitation in reporting a death as suicide than legal experts, who typically have difficulty accepting less than complete certainty. In most countries the decision involves some legal considerations, and often a death is considered accidental until proved to be suicide. Brooke and Atkinson also pointed out that the Eighth Revision of the International Classification of Diseases includes categories for use when it cannot be determined whether the deaths were accidental, suicidal, or homicidal. Possible suicides may therefore be classified under these categories. Brooke and Atkinson concluded that official suicide rates are of limited value.

Study Objective

If reported suicide rates are not accurate because of the vagaries of the certification process, one would expect the variables describing the coroner's office to be significantly related to the suicide rate. Conversely, if no significant relationship is found between the characteristics of the coroner's office and the suicide rate, it can be inferred that the suicide data are accurate. Therefore, the primary question addressed in our study was whether the variability in the structure, function, and procedures of the coroner's office is related to the variation in reported suicide rates.

The generally accepted explanation for variation in suicide rates is the variability in the social aspects of the community, such as age, sex, ethnic composition, alienation, regulation, and integration. However, other sources for the variation may exist. Factors associated with the coroner's office seem a likely possibility, inasmuch as the background and training of the coroner as well as the availability of procedures and resources are the human and structural filter through which decisions about death certification are strained. Naturally, the variability in the coroner's office should account for a substantial proportion of the variance in the suicide rates if it is to be considered a potentially valuable source for further exploration of causal factors.

In the present study, we therefore compared the relative efficiency in prediction of variation in suicide rates of two separate sets of variables. The first set consisted of demographic factors generally associated with suicides, such as sex, race, and socioeconomic status, and social integration factors, such as mobility, employment, and percentage of families with a female head. The second set comprised the characteristics of the coroners' offices, including the background and training of the coroner, composition of his staff, and procedures used in identifying and defining suicide.

Methods and Procedures

The sample for this study consisted of 202 counties selected from the 411 counties in the 11 continental western States: California, Oregon, Washington, Nevada, Arizona, New Mexico, Idaho, Montana, Wyoming, Colorado, and Utah. Alaska and Hawaii were not included because their inclusion would have made the procedure used for collecting information, telephone interviews, prohibitively expensive.

The counties were chosen on the basis of population: all 127 with a population of 30,000 or more, 29 percent of those with a population between 10,000 and 30,000 (32 of 112), and 25 percent of those with less than 10,000 (43 of 173). All the more populous counties were included because their suicide rates were least likely to fluctuate widely as the result of a small change in the number of suicides.

Three types of data were obtained:

1. Numbers of suicides reported by the counties were obtained from the National Center for Health Statistics. Data for each of the 3 years 1969–71 were averaged to control to some degree for any unusual annual fluctuation. The computed rates were then standardized for age to control for variations due to discrepant distribution of age in any one county, by means of the following formula:

$$\frac{\text{Observed number of suicides}}{(\text{U.S. age-specific suicide rate} \times \text{age distribution})} \times \text{U.S. mean suicide rate, 1970} = \text{age-standardized suicide rate}$$

The counties were then ranked according to their indirect standardized suicides rates, and the average rate for each State was determined.

2. Sociological data were taken from the County and City Data Book published by the U.S. Bureau of the Census (*18*). The mean, standard deviation, range, and other statistics for selected characteristics of the sample of counties were obtained, and a correlation matrix was computed between the variables and between them and the standardized suicide rate. When independent variables correlated 0.75 or greater, the variable correlating the highest with the suicide rate was retained and the other

eliminated, since they were tentatively assumed to be measuring the same thing.

3. Information about the coroner's office was obtained by telephone interviews. The procedure began with a letter to the coroner explaining the study and stating that he would be telephoned to set a time for a telephone interview. All the interviews were conducted by the same investigator, who filled out a questionnaire for each coroner. The coroner was asked about his background, personal history, education, and attitudes, as well as the procedures for certifying deaths caused by gunshot and deaths with no external injuries. The steps previously outlined for the investigation of the community characteristics were then followed to determine those variables most highly correlated with the indirect standardized rate. Interviews were conducted with the coroners in 191 of the 202 counties in the sample, or 95 percent, a highly respectable response rate.

Statistical methods for analysis of the data are described subsequently in this paper.

Suicide Rates

The average suicide rates for the years 1969–71 for the 202 counties ranged from 0 to 55.6. The zero rate means that there were no suicides in any of the 3 years. Seven counties, all with less than 5,000 population, had a rate of zero.

The following reported suicide rates and indirect standardized rates (by age, weighted by percentage sampled by size of county) were determined by averaging the rates for all the counties in the interview sample in each State:

	Rate per 100,000 population	
State	*Reported*	*Standardized*
Nevada	26.88	28.78
Arizona	20.59	22.40
Wyoming	20.46	20.53
Colorado	17.68	17.98
California	17.15	17.27
New Mexico	16.72	16.16
Idaho	16.37	15.87
Oregon	13.89	15.23
Washington	12.81	13.26
Montana	12.79	12.19
Utah	11.50	11.39

In seven of the States the mean reported rate was increased through standardization, and in four it was decreased slightly. Although the mean reported rate and the mean standardized rate for each State did not differ markedly, this result does not mean that the standardization procedure had only a minor effect on the data. In fact, the variance of the standardized rates for each county was only two-thirds of the variance of the reported rates, which indicates that a significant amount of the variation was removed by standardizing for age. This was, indeed, the purpose of this procedure.

Sociological Characteristics

The sociological characteristics of the States in the study were derived from data for the 202 counties in the original sample. The data were weighted to make the description representative of the entire State.

The population in the sample counties ranged from 566 (Utah) to 7 million (California), with a mean of 81,000. From 1960 to 1970, the counties averaged an increase in population of 11 percent, and the average net migration was −1.0 percent.

The population of the counties was about evenly divided between males and females, and about 12 percent were foreign born. The white population averaged about 77,000 in each county, and the nonwhite, about 4,000. About 9 percent of the households in the counties were single-person families. The median educational level was 12.4 years. The counties averaged 35 percent urban.

The counties tended to fall toward the higher socioeconomic levels. The unemployment rate was about 6 percent but, of persons employed, about 23 percent were in professional or managerial occupations. On the other side of the scale, about 18 percent lived in poverty; that is, their incomes were below 125 percent of the "low-income" level established by the Federal Government. About 55 percent lived in housing built before 1950, and about 33 percent rented their homes. Ten percent lived in conditions classed as crowded; that is, with one or more persons per room. More than half, 53 percent, had moved into their living units between 1965 and 1970. Eighty-eight percent of the families had one or more automobiles. An average of 62 percent of the eligible voters voted in 1968 for President. Government expenditures for welfare and for health averaged about $312 per capita per year.

State Structure of Coroner Services

Only two of the States, Oregon and New Mexico, have a centralized coroner system in which a medical examiner, appointed by the State, is responsible for all services throughout the State. In Oregon, physicians are appointed to serve part time as county medical examiners, and law enforcement officers serve as deputy medical examiners. Advanced coro-

ner services are provided by the State office. Training programs are frequent. In New Mexico, the State office is at the University of New Mexico and uses the facilities of the university. County medical investigators are physicians serving part time in the position, and deputy medical investigators are sent from the State office to work part time with district medical investigators. These deputies, unlike those in Oregon, come from varied backgrounds. The State office is responsible for each district's operations.

All the other States have decentralized systems. In California, most coroners are elected sheriffs, but in the larger counties, such as Los Angeles and San Francisco, the medical examiners are trained pathologists and are appointed. In a few counties, public administrators are coroners. They can consult pathologists when they need assistance. In Washington, the coroners are elected and are either full or part time, depending on the population of the county. In some small counties, the prosecuting attorney is the ex officio coroner, a responsibility not particularly welcomed.

In Arizona and Nevada, elected justices of the peace serve as coroners. They rely heavily on coroner's juries, inquests, and local hospital pathologists for assistance. In Colorado, the State administrator of health and hospitals serves as coroner for Denver. Elsewhere part-time coroners are elected, and they consult pathologists as necessary.

Utah has a chief medical examiner for the State, who provides forensic pathological and toxicological services. Each county has one or more of its own elected officials—the county attorney or the county physician, or both—to certify unattended deaths. Deputy investigators appointed by the State's chief medical examiner help in conducting investigations.

Montana, Wyoming, and Idaho have a high degree of local autonomy. Their coroners' offices are characterized by low revenue, a scarcity of pathologists, and dependence on inquests with a coroner's jury. In Wyoming, all coroners are morticians. Coroners in Idaho report confusion about *what* their province is, since local physicians frequently certify ambiguous cases. All three States turn elsewhere for training their coroners.

The Coroner and His Office

In this section salient facts are presented about the coroners and their offices obtained in the telephone interviews. The sample has been weighted to make the description representative of all the western States. The data, however, should not be considered descriptive of other States or the nation as a whole.

Persons serving as coroners have various titles and sometimes other positions: 12 percent are sheriff-coroners, 38 percent are county coroners, and 5 percent are public administrators. About 15 percent of the coroners are medical examiners, 10 percent are county health officers, and 3 percent are physicians. Nine percent are justices of the peace, and 6 percent are district attorneys.

The educational level is generally high, with 39 percent having a medical degree and 8 percent a legal or advanced scientific degree. Among those with a medical degree are 6 percent who also have a board certification in forensic pathology or anatomical and clinical pathology. Nine percent have a bachelor of arts or science degree, and 19 percent have 2 to 3 years of college or a technical degree. On the other hand, 19 percent have only a high school education, and 6 percent did not graduate from high school.

The coroners reported the following as their occupations before becoming coroners: policeman or sheriff, 16 percent; physician or pathologist, 32 percent; mortician, 23 percent. The remaining 29 percent came from a variety of occupations. Seventy-seven percent of the coroners said they were still practicing their previous occupation.

The coroner is elected in 62 percent of the counties and appointed in the other 38 percent. The office is funded entirely by the county in 71 percent of the counties and is independent of other offices in 61 percent. Twenty-nine percent of the counties use a medical examiner system. Nine percent of the coroners are also justices of the peace. Sixty-three percent indicated that training is available in their State.

The coroners' conceptions of their role in the investigation of deaths also varied. Most (52 percent) work with the appropriate police agency, but 30 percent leave the investigation entirely in the hands of the police, and 18 percent conduct an entirely independent investigation through their own office or with the State medical examiner's office.

In certifying deaths, 28 percent admitted that they require more proof for suicide than for other modes of death, 17 percent volunteering the information that they require a suicide note or history of attempted suicide. However, only 4 percent stated that they do not like to certify a death as suicide unless it is unavoidable. Asked whether the prominence and reputation of the deceased or his family influenced the decisions of coroners in other counties, 34 percent answered, "Yes." Thirty-seven percent of

the coroners reported that a member of the suicide victim's family had attempted to influence their own decisions, but only 3 percent admitted that the attempt had ever succeeded.

Seventy-six percent of the coroners indicated that an autopsy is almost always performed if homicide is suspected. If suicide is suspected, 30 percent order an autopsy, and if the death appears to be accidental, only 13 percent order an autopsy.

When the deceased has no external injury, the evidence the coroners most frequently use in deciding whether the death is a suicide is as follows: suicide note (78 percent), personal history of the victim (76 percent), recent prescription and an empty bottle (48 percent), and history of attempted suicide (47 percent). These items are usually considered in combination, not singly.

In certifying a death caused by a gunshot wound as a suicide, the coroners most frequently base their decision on personal history of the victim (79 percent), suicide note (65 percent), history of attempted suicide (49 percent), shot within arm's length (47 percent), and location of the wound (40 percent). Again most coroners stressed that they generally use evidence in patterns or combinations, not singly.

Eighty percent of the coroners saw little or no change in their jobs since 1969, but 20 percent believed that moderate or great changes had taken place. Eighty-five percent said that changes in social, economic, or political conditions never or rarely affected their work.

Among the changes the coroners would like to see in the present system or in their own offices, the most frequently mentioned were more money, a State medical examiner system, revised or standardized death-reporting forms or certificates and procedures, and a greater degree of professionalism. Other factors mentioned frequently pertained to the operation of their offices, such as more money for additional autopsies, establishment of formal requirements for training and background of coroners (a medical degree, for example), increased quality control over staff performance, and greater availability of services in small counties.

Multiple Regression Analysis

Before we proceeded with the multivariate analysis, it was necessary to weight the data to control for two conditions: stratified random sampling (unequal sampling within strata) and the unequal variances of the suicide rate among different-sized counties.

To reflect the disproportionate random sampling, the data for the counties in each population stratum were weighted by the inverse of the sampling probability. If we assume no systematic nonresponse, this analysis estimated within known probability limits the characteristics of the 11 western States.

The second weighting scheme added the fact that, since suicide is a relatively rare event, any reported rate derived from a small population would probably fluctuate radically over time. In our study we would expect the rates for the small counties to vary considerably more than the rates for the large counties, both from county to county and from year to year. For example, in our data the variance of the 3-year age-standardized rates exceeded 180 for counties with populations less than 10,000 but was only about 20 for counties with populations of 50,000 or more. To reflect these differences in stability, a weighted least squares analysis was performed.

The adjusted data obtained from the first weighting procedure were further modified with weights obtained from the variances of the indirect standardized suicide rates for specified ranges of population size: under 10,000, 10-000–20,000, 20,000–50,000, and 50,000 and over. These ranges were established by plotting the rates against county size, inspecting the scatter, and determining appropriate ranges to reflect the systematic clustering of variances. The resulting corrections minimized the residual errors for the larger counties more heavily than for the smaller counties and thus made the variance across all counties more nearly equivalent.

The multiple regressions shown in this paper are based on data calculated by the second weighting procedure. Multiple regressions were computed with the sociological characteristics of the counties and the characteristics of the coroners' offices as independent variables for all counties, for those with a population of 30,000 or more, and for those with less than 30,000 population. Each regression used the variables that had zero-order correlations with the suicide rates significant at the 0.10 level. Goodman's maximum R^2 technique with listwise deletion was used as the regression algorithm, with the following restrictions: total regression significant at the 0.01 level and each regressor in the equation significant at approximately the 0.01 level. (The 0.05 level was used for counties with less than 30,000 population.)

A notion frequently expressed in the social sciences is that large communities differ qualitatively from small communities; for instance, that large counties tend to be dominated by one or more large cities, whereas small counties tend to reflect smaller cities and towns. The sample of counties was therefore divided into those characterized as large (30,000

or more) and those characterized as small (less than 30,000). Selection of 30,000 as the dividing point was somewhat arbitrary, but this figure is consistent with the composition of our sample, which included all counties with a population of 30,000 or more.

All counties. On the basis of the established criteria, 12 sociological variables were entered into the equation as potential regressors. The multiple regression analysis for all 191 counties in the interview sample yielded 4 variables that together accounted for approximately 24 percent of the variation in the indirect standardized suicide rate (ISSR). The results were as follows (numbers in parentheses in the equation represent t values):

Rank and characteristic	*B*	*Beta*	*r*
1. Percentage of families with one or more automobiles (X_1).	−0.058	−0.368	−0.238
2. Per capita income (X_2).....	0.004	0.261	0.274
3. Percentage in homes built before 1950 (X_3).....	−0.099	−0.225	−0.163
4. Percentage of government expenditures for health (X_4)..	0.262	0.183	0.220

$$\text{ISSR} = 60.180 - \underset{(-5.28)}{0.058\,X_1} + \underset{(3.86)}{0.004\,X_2} - \underset{(-3.15)}{0.099\,X_3} + \underset{(2.83)}{0.262\,X_4}$$
$$(R^2 = 0.24;\ F = 14.37)$$

This analysis suggests that a county that has a small proportion of families with one or more automobiles, a high per capita income, a small proportion of families living in older homes, and a high percentage of the county government's expenditures allocated to health would be expected to have a high suicide rate. The variables are ranked by beta weights according to those contributing the largest relative effect. Comparison of the beta weights and their respective zero-order correlations shows few differences and thus suggests that suppressor effects are minimal in this regression.

In the analysis of the coroner's office characteristics, 4 variables of 16 that were available as potential regressors accounted for approximately 14 percent of the variation in the ISSR. All four were positively related to the suicide rate. With data for 187 counties, the following results were obtained:

Rank and characteristic	*B*	*Beta*	*r*
1. Loss of loved one important in determining suicide intent (A_1).....	1.471	0.224	0.241
2. Percentage of cases autopsied (A_2).....	0.044	0.176	0.220
3. Presence of weapon important in establishing suicide (A_3).....	1.768	0.172	0.188
4. Statements of others important in establishing suicide (A_4).....	1.258	0.143	0.157

$$\text{ISSR} = 7.671 + \underset{(3.24)}{1.471\,A_1} + \underset{(2.55)}{0.044\,A_2} + \underset{(2.49)}{1.768\,A_3} + \underset{(2.07)}{1.258\,A_4}$$
$$(R^2 = 0.14;\ F = 7.60)$$

Thus, counties with coroners who stress loss of a loved one as a criterion in establishing intent, who order autopsies for a large proportion of their cases, who are concerned about whether the means of death are present, and who emphasize the importance of statements of others in arriving at their conclusion as to the mode of death tend to report higher suicide rates than other counties. Comparison of beta weights and their respective zero-order correlations again suggests minimal suppressor effects.

Large counties. For the counties with 30,000 or more population, the regression analysis of the community characteristics selected from among 12 variables, 4 accounted for about 41 percent of the variation in the ISSR (N = 122):

Rank and characteristic	*B*	*Beta*	*r*
1. Percentage of families with one or more automobiles (Y_1).	−0.053	−0.482	−0.379
2. Percentage of families living in homes built before 1950 (Y_2).....	−0.147	−0.397	−0.162
3. Percentage of population living in one-person households (Y_3).....	0.421	0.300	0.325
4. Percentage employed as professionals and managers (Y_4)..	0.290	0.249	0.273

$$\text{ISSR} = 58.642 - \underset{(-5.81)}{0.053\,Y_1} - \underset{(-4.62)}{0.147\,Y_2} + \underset{(3.77)}{0.421\,Y_1} + \underset{(3.26)}{0.290\,Y_4}$$
$$(R^2 = 0.41;\ F = 20.61)$$

These results suggest that, among the more populous counties, those that have a small proportion of families with one or more automobiles, a small percentage of families living in older homes, a large proportion of households with only one person, and a large percentage of its work force employed as professionals and managers would be expected to have higher suicide rates than counties that do not have these characteristics. Except for the percentage of families in older homes, the zero-order correlations generally agree with the beta weights. This item is, at least to some extent, removing error contributed by one or more of the other variables.

Of 24 variables entered into the equation as potential regressors in the analysis of the coroner's office characteristics, 6 were selected as the optimum set of predictors. They accounted for approximately 37 percent of the variation in the ISSR in the counties with 30,000 or more population (N = 119):

Rank and characteristic	*B*	*Beta*	*r*
1. Percentage of cases autopsied (B_1)	0.050	0.280	0.285
2. Condition of gun important, if gun is involved (B_2)	1.781	0.266	0.277
3. Degree of doubt allowed in certification (B_3)	0.822	0.270	0.169
4. Loss of loved one important in determining suicide intent (B_4)	1.227	0.255	0.288
5. Routine autopsy in homicide cases (B_5)	3.346	0.231	0.254
6. Certification of suicide avoided if possible (B_6)	−1.272	−0.210	−0.180

$$\text{ISSR} = 4.240 + \underset{(3.61)}{0.050}\,B_1 + \underset{(3.36)}{1.781}\,B_2 + \underset{(3.31)}{0.822}\,B_3 + \underset{(3.29)}{1.227}\,B_4 + \underset{(3.00)}{3.346}\,B_5 - \underset{(-2.63)}{1.272}\,B_6 \quad (R^2 = 0.37;\ F = 10.52)$$

The results suggest that counties with coroners who order autopsies on a large proportion of their cases, who stress the importance of the working condition of any weapon present, who allow greater doubt in determining the appropriate mode, who consider the loss of a loved one important in establishing suicide intent, who routinely order an autopsy if homicide is suspected, and who do not indicate that they avoid suicide as an appropriate mode would be expected to report the highest suicide rates. Again, comparison of the beta weights and their respective r values indicates that the item "degree of doubt" may be playing a minor suppressor role.

Small counties. For the analysis of sociological characteristics in the counties with less than 30,000 population, eight variables met the criteria for inclusion. The procedure selected one variable that allowed a reduction in error of approximately 13 percent: per capita income. With 69 counties in the sample, the values were: $B = 0.008$; $beta = 0.360$; and $r = 0.360$. The estimating equation was as follows:

$$\text{ISSR} = 5.755 + \underset{(3.16)}{0.008}\,\mathcal{Z} \quad (R^2 = 0.13;\ F = 9.96)$$

Thus for small counties the highest suicide rates would be expected among those with the highest per capita income.

Six variables were available for admission into the equation for the coroner's office data. Three of these met the necessary criteria and together accounted for approximately 24 percent of the error in predicting the suicide rate (N = 68):

Rank and characteristic	*B*	*Beta*	*r*
1. Relies on autopsy report in gun deaths (C_1)	6.008	0.332	0.230
2. Rules out homicide before considering suicide (C_2)	3.865	0.292	0.308
3. Location of death important (C_3)	3.790	0.246	0.218

$$\text{ISSR} = 11.976 + \underset{(3.02)}{6.008}\,C_1 + \underset{(2.68)}{3.865}\,C_2 + \underset{(2.23)}{3.790}\,C_3 \quad (R_2 = 0.24;\ F = 6.82)$$

This analysis suggests that a coroner who relies on autopsy reports in gun deaths, rules out homicide before considering suicide, and considers the place of death important in determining the cause would be expected to report the highest suicide rates. Comparing beta weights and correlation values indicates that reliance on autopsy reports may be removing error contributed by the other two variables.

Discussion and Conclusions

The average reported suicide rate for the 11 western States was 16.1 per 100,000 population, well above the average for the United States in 1970 of 11.6 (*19*). All but one of the western States had a rate higher than the U.S. average, and three States had a rate approximately twice as high.

Standardizing the rates for age, moreover, increased the rate slightly for 7 of the 11 States. Since the older age groups usually have the highest rates, this effect indicates that the age distribution in these seven States was skewed toward the younger ages.

The sociological characteristics of the States in this study seem consistent with what Durkheim (*20*) has called low social integration: high mobility and high transiency. This inference is substantiated by the finding that more than half (53 percent) of the population had moved into their homes within the last 5 years. Further support is found in the fact that about one-quarter (23 percent) of the employed were in the professional and managerial categories, traditionally groups with high mobility.

The coroners' offices in the western States are characterized mainly by diversity. The backgrounds of the coroners are so different, for example, that many of the coroners themselves recommended greater uniformity in the requirements and qualifications for the office. Those interviewed included physicians, sheriffs, prosecuting attorneys, justices of the peace, public administrators, and morticians. About one-fourth of the coroners have only a high school education or less.

Some coroners were elected, winning their position politically; others were appointed, presumably on the basis of their ability. Many were part time, as indicated by the fact that 77 percent were practicing their profession while they held office. A great many avoided the responsibility of certifying deaths by using the quasi-judicial procedure of holding an inquest. Since jurors for the inquests are drawn from the general public, frequently from among prospec-

tive court jurors, they have no particular expertise for determining the cause of death; instead they are subject to all the prejudices and pressures of their community. However, contrary to expectations, counties that relied on inquests tended to have higher suicide rates than those that did not.

That suicide is considered taboo was evident in the frank admission by as many as one-third of the coroners that they either try to avoid certifying a death as suicide (4 percent) or seek more proof in certifying suicide than in other types of death (28 percent). For most of the coroners, homicide ranks first in importance; 76 percent reported that autopsies are usually performed if homicide is suspected, compared with 30 percent if suicide appears to be the mode. Indeed, some coroners stated that when homicide is ruled out, investigation of a death becomes much more casual.

Assessment of the multiple regression analyses suggests that the coroner's office variables are capable of a substantial reduction in error in predicting suicide rates. Among all counties, the coroner's office variables performed about half as well as the sociological characteristics (14 percent compared with 24 percent of the variance explained). However, when we divided our sample of counties according to population, we found that the coroner's office variables in the counties with 30,000 or more population did essentially as well (37 percent) as the community characteristics (41 percent). However, only four sociological variables were required, whereas it took six of the coroner's office characteristics to reach this level. In the smaller counties, coroner's office characteristics outperformed the community characteristics (24 percent and 13 percent, respectively).

The effectiveness of the coroner's office variables as predictors is particularly notable when we consider that these data were predominantly dichotomies, trichotomies, and fourfold breaks, which are subject to greater measurement error than the ratio and intervally measured community variables. Such error usually alternates relationships. Thus, the fact that the coroner's office variables, despite the probably attenuated relationships, perform essentially as well as the community characteristics suggests that they have greater potential as explanations of variability in reported suicide rates than the community characteristics.

In the more populous counties, which we can assume have the most stable suicide rates, the characteristics of the coroners most predictive of high suicide rates were a nonrejecting attitude toward suicide and interest in the personal aspects of the decedent as well as the physical characteristics of the death. In the less populous counties, with their smaller staffs, fewer facilities, and less accessibility to refined investigative procedures, the coroners relied more heavily on the physical aspects of the death. In gun deaths, for example, the autopsy report and the place of death, as well as the fact that homicide had been ruled out, were most important.

In their study of certification procedures in 24 selected countries, Brooke and Atkinson (*17*) hypothesized that coroners with medical training report suicide more readily than those with legal training. To test this hypothesis with data from our study, we grouped the coroners according to their training and previous occupation and computed the mean suicide rate reported by each group.

Pathologists working in the coroners' offices (N = 12) had the highest mean rate, 19.8. However, pathologists employed elsewhere, such as universities or hospitals (N = 11), had a mean rate of 16.0; other physicians (N = 21) had a mean rate of 15.7; and paramedics (N = 5), a mean rate of 15.4, all below the average rate for the western States. The mean rate for lawyers (N = 8) was the lowest rate of all the groups, 11.4. The average rate for law enforcement officers (N = 41), however, was 16.6. The other two main groups, morticians (N = 33) and public health officers (N = 7), had mean rates below the average, 15.3 and 15.2 respectively.

Thus if we consider the rates for the two most representative groups, pathologists working in the coroners' offices and lawyers, our study would support Brooke and Atkinson's hypothesis. However, when we add physicians and those with other medical backgrounds to the pathologists, the rate is under the average. On the other hand, if we add law enforcement officers, who presumably have legal attitudes, to the lawyers, the rate is above the mean for the western States. With such contradictory data, we must conclude that our study does not support the hypothesis.

Future Research

Analysis of the data collected in our study of the western States is continuing. The next step will be to evaluate the relationship of the sociological characteristics to the coroner's office characteristics, and after that, the relationship of both types of characteristics to the reported suicide rate.

Future research should include similar studies of other regions of the United States so that comparisons can be made. Why, for example, do the southeastern States report generally lower suicide rates

than other regions? As was done in the World Health Organization study (*17*), sample cases might be sent to selected coroners with instructions to certify the death and indicate their degree of certainty.

The results of such research on certification of suicide will, we hope, serve as one step toward realization of a long-sought goal: the development of uniform methods of recording the modes of death so that the reported data will be reliable and valid. Greater accuracy in suicide data will, in turn, permit better understanding of suicide and will help us develop more effective ways of preventing it.

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SYNOPSIS

FARBEROW, NORMAN L., MacKINNON, DOUGLAS R., and NELSON, FRANKLYN L.: *Suicide: who's counting? Public Health Reports, Vol. 92, May–June 1977, pp. 223–232.*

A study of suicide certifications explored their accuracy in the light of the difficulties inherent in the certification of death. The primary question addressed was whether the variation in reported suicide rates was significantly related to the structure, function, and procedures of coroners' offices, in comparison with traditional social aspects of the community, such as demographic factors, socioeconomic status, and residential mobility.

A stratified sample of 202 counties in the 11 continental western States was selected, and data on coroners' offices were obtained from 191 of these counties. These data were analyzed by means of weighted least squares, which separately related coroner's office variables and community variables to indirectly age-standardized suicide rates. Data for counties with populations of 30,000 or more and those with less than 30,000 were also separately analyzed.

Assessment of the multiple regression analyses suggests that the coroner's office variables compare favorably with the community variables in predicting suicide rates, provided a distinction is made between large and small counties. The coroner's office variables in counties with 30,000 or more population explained 37 percent of the variation in reported suicide rates, whereas the community characteristics explained 41 percent. In the counties with less than 30,000, coroner's office variables explained 24 percent of the variation, while community variables explained 13 percent. In the more populous counties, the characteristics of the coroners most predictive of the suicide rates were a nonrejecting attitude toward suicide, an interest in the personal aspects of the deceased, and concern with the physical circumstances of the death. In the less populous counties, the variables most predictive of the suicide rates were related to the physical aspects of the death.