Use of Socioeconomic Status as a Demographic Variable

EDWARD G. STOCKWELL, Ph.D.

IN AN EARLIER article (1) I pointed out that a great deal of confusion exists concerning the precise nature and extent of the relation between socioeconomic status and mortality. A major factor behind this confusion has been the existence of substantial differences throughout the literature as to just what is meant by the term "socioeconomic status" (1, 2). In this article I have considered the issue further by examining the relation between selected socioeconomic indexes and the three basic demographic processes, fertility, mortality, and population mobility, among the 169 towns in the State of Connecticut.

While the findings of this examination certainly do not justify noteworthy conclusions concerning socioeconomic-demographic interrelations, some of the implications contained in the data may be of general interest. Specifically, although the findings indicate the need to consider socioeconomic factors when explaining variations in health and demographic behavior, the need to maintain greater clarity concerning the nature of socioeconomic status is clearly emphasized. I suggest, therefore, that investigations of the relations between

Dr. Stockwell is professor of rural sociology, University of Connecticut, Storrs. The rank correlation coefficients on which most of Dr. Stockwell's analysis was based were computed by Miss Gail A. Shea, formerly a graduate research assistant in the department of rural sociology.

socioeconomic phenomena and demographic behavior need to emphasize not only the multidimensional nature of socioeconomic status but also that the dimensions, although interrelated, may vary independently of one another in their relations to particular aspects of human behavior.

Use of Socioeconomic Status

A major trend in demographic research in the United States has been the growing emphasis on studies of the relation between selected social and economic factors and the components of population growth and change. In recent years demographers have relied a great deal on the existence of variations in socioeconomic status from one population group to another as a major factor accounting for parallel differences in levels of fertility, mortality, and migration. (References 3–10 provide a highly selective list of research dealing with socioeconomic variations in these three basic demographic processes.) The growing interest in the relation between socioeconomic factors and demographic variables is further indicated in the two contemporary large-scale studies in this country concerning the future fertility of two-child families and the growth of American families (11, 12), wherein socioeconomic status is one of the major variables. Furthermore, the major contemporary study of mortality conducted by the University of Chicago, in conjunc-

tion with the National Center for Health Statistics and the U.S. Bureau of the Census, has also incorporated the socioeconomic variable as a basic element in the research design (*13*).

A particularly significant indicator of the growing interest in socioeconomic-demographic interrelations is the development of a procedure for assigning socioeconomic status scores to all residents of the United States (*14*), undertaken by the Census Bureau in connection with the 1960 decennial census of population.

With these developments in mind, I have constructed a set of socioeconomic index scores for each of the 169 towns in the State of Connecticut, based on the 1960 occupation, education, and income composition of the population of each town. The procedure for assigning these scores, as well as a discussion of the value and limitations of using ecologic units rather than individual people as the basis for sociodemographic research, have been presented elsewhere (*15*). From my investigation of the relations between the socioeconomic scores for these towns and their patterns of fertility, mortality, and migration, I have drawn a number of implications concerning the value and limitations of the concept of socioeconomic status as a demographic variable.

Analytical Procedures

The derivation of the socioeconomic index scores for the 169 towns in Connecticut involved three basic steps for each town: (*a*) computation of scores to measure the occupation, education, and income composition of the population; (*b*) computation of standardized scores for each of these variables; and (*c*) combining the three standardized scores into a single socioeconomic index score. First, using both published and unpublished data from the 1960 census of population, the following crude socioeconomic scores were computed for each town:

OCCUPATION: The percentage of employed persons who were working at blue-collar occupations; that is, the percentage of workers in each town who were classified as craftsmen, operatives, or nonfarm laborers.

EDUCATION: The percentage of the population age 25 and over who had completed less than 5 years of formal education.

INCOME: The percentage of families in each town having an income of less than $3,000.

Second, since the same crude score for different variables could indicate substantial differences in the overall level of socioeconomic status (that is, a score of 10 percent would indicate a relatively high status position if it referred to the proportion of the labor force engaged in blue-collar occupations but would indicate low status if it referred to the percentage of families having an annual income of less than $3,000), it was necessary to convert these into more comparable "standard scores" so they could be combined into a single socioeconomic index score. This was done by a fairly simple procedure that, for each variable, assigned standardized scores between 0 and 100 to each town on the basis of that town's relative rank position with regard to the crude scores computed. The basic formula for converting these crude (absolute) scores to standard (relative) percentile scores was as follows:

$$S = X \ (R - \phi)$$

where for each of the three components (occupation, education, and income)

S = the standardized score for any given town

R = the raw percentage score for any given town

ϕ = the lower limit of the raw percentage scores for all the towns

$$X = \frac{100}{\text{range of the raw percentage scores for all towns}}$$

To illustrate briefly this standardization procedure, consider the occupational variable. According to the 1960 census, the proportion of the employed population engaged in blue-collar occupations in Connecticut towns ranged from a low of 16.5 percent in New Canaan to a high of 63.5 percent in Sprague:

$$\phi = 16.5$$
$$\text{Range} = 63.5 - 16.5 = 47.0$$
$$X = \frac{100}{47.0} = 2.128$$

For the town of Norwalk, where 37.2 percent of the employed population was engaged in blue-collar occupations ($R = 37.2$), the standardized occupation score was derived as

$$S = X \ (R - \phi)$$
$$S = 2.128 \ (37.2 - 16.5)$$
$$S = 44.0$$

For the town of New Canaan, which had the smallest proportion of blue-collar workers ($R=16.5$):

$$S=2.128 \ (16.5-16.5)$$
$$S=0.0$$

And for the town of Sprague, which had the highest proportion of blue-collar workers ($R=63.5$):

$$S=2.128 \ (63.5-16.5)$$
$$S=100.0$$

This same procedure was followed in computing standardized occupation scores for the remaining towns, and also in computing town-standardized scores for the education variable ($\phi=0$; $X=3.676$) and for the income variable ($\phi=3.2$; $X=4.237$).

Finally, before combining the three standardized scores for each town into a single socioeconomic status score, I decided to introduce one more computation and subtract each standardized score from 100. The rationale for introducing this additional step is that all three component variables, as defined, are inverse indicators of socioeconomic status; that is, the lower the percentage score, the higher the relative level of socioeconomic status. However, I thought that it might be desirable, and certainly more logical, if the reverse was true and if a high score indicated a high socioeconomic status. Since all the standard scores for each variable fall between 0 and 100, it was a simple matter of subtracting these scores from 100 to make each component variable, as well as the overall socioeconomic index scores, a direct indicator of socioeconomic status. After the three standardized scores of the component variables for each town were subtracted from 100, the overall socioeconomic index score was derived as a simple arithmetic mean of these differences.

To illustrate simply, the standardized score for the town of Norwalk for occupation was 44.0, for education 17.6, and for income 21.6. Subtracting each of these from 100 gave the following:

Occupation: $100.0-44.0=56.0$
Education: $100.0-17.6=82.4$
Income: $100.0-21.6=78.4$

Therefore, the overall socioeconomic index score for the town of Norwalk was

$$\frac{56.0+82.4+78.4}{3}=\frac{216.8}{3}=72.2$$

Following this same procedure, socioeconomic index scores were derived for all the towns in Connecticut. These scores, as well as the modified standardized scores for the three components, are presented in the appendix of the Connecticut report (*15*) cited earlier.

Six measures of population change were selected for inclusion in my analysis, two for each of the three basic demographic processes, fertility, mortality, and migration. These measures, computed separately as of 1960 for each of the 169 minor civil divisions in Connecticut, were as follows:

Fertility: The 1959–61 average crude birth rate.
The average number of children ever born to women at the childbearing ages.

Mortality: The 1959–61 average death rate, adjusted for variations, by town, in age composition.
The 1959–61 average infant mortality rate.

Migration: The percentage of the 1950–60 population increase that was due to net migration.
The percentage of the population age 5 and over in 1960 living in the same house as in 1955.

Spearman rank correlation coefficients were computed to determine the nature and extent of the relations between the six demographic measures and socioeconomic status (see table). These correlations were computed not only for the summary socioeconomic index score but also for the scores of each of the three components (occupation, education, and income) to determine which component contributed most to any relation.

Discussion

Socioeconomic status and fertility. According to the rank correlation coefficients in the table, fertility in Connecticut is positively correlated with socioeconomic status. The higher the summary socioeconomic score, the higher the fertility level is likely to be. Although this direct relation is apparent for both fertility measures, it is much more pronounced for the average number of children ever born to women

at the childbearing ages $(r_s = +0.55)$ than it is for the crude birth rate $(r_s = +0.19)$. This finding, contrary to what one might have anticipated on the basis of past experience (6, 12, 16, and 17), is in line with other more recent evidence suggesting that the traditional socioeconomic fertility differential is in the process of being reversed, and that it is the higher status people who today are having the larger families. Wrong (18, 19), for example, has suggested that the postwar fertility revival in the Western nations has tended to be most pronounced among the higher status groups, thus bringing about a convergence in class fertility differentials.

The data available on the relation of social and economic factors to levels of fertility, including those for Connecticut towns, are certainly inconclusive. There could be other variables, such as the religious composition of the population of the several towns in the State or variations in the farm background of the population, that may be intervening to modify the relation (20, 21). Another variable that might be influencing the relation is age. Among an "older" population one will generally find families where more children have already been born and where socioeconomic status, especially income, is higher. Thus the high correlation observed between the children-ever-born measure and the socioeconomic indexes may simply be a function of town variations in the average age of women at the childbearing ages. It must also be stressed that the present analysis is based on correlations computed from area data, and such ecologic correlations do not necessarily

yield the same results as might be obtained from an examination of the behavior of persons individually (22). The possibility that other variables may influence the relation as well as the problems in the use of ecologic correlations apply equally well to the mortality and migration socioeconomic relations subsequently discussed. However, it is not the substantive results that are significant but their implications for the value of the concept of socioeconomic status in demographic analyses.

It is interesting that the correlation between social rank and the crude birth rate is due almost entirely to the association between the birth rate and the occupational composition of the population $(r_s = +0.33)$. The small associations between the crude birth rate and both education $(r_s = +0.08)$ and income $(r_s = -0.01)$ composition are scarcely worth mentioning. On the other hand, the association with the children-ever-born measure is fairly high for all three socioeconomic components and particularly for income, which suggests that the number of children a woman bears is in large part related to the financial status of her family. In no instance was the correlation for any component as high as that observed for the summary socioeconomic index. This is the only instance where combining the separate socioeconomic variables into a single composite index produced a sharper relation than that observed for any individual component.

Socioeconomic status and mortality. Contrary to the preceding information, the data here point to the existence of a pronounced inverse relation between levels of mortality and

Spearman rank correlation coefficients between selected socioeconomic indexes and measures of fertility, mortality, and migration, Connecticut towns, 1960

Demographic measures	Socioeconomic indexes			
	Summary score	Occupation	Education	Income
Crude birth rate	+0. 19	+0. 33	+0. 08	−0. 01
Children ever born	+. 55	+. 33	+. 37	+. 53
Age-adjusted death rate	−. 40	−. 23	−. 12	−. 50
Infant mortality rate	−. 19	−. 05	+. 05	−. 30
1950–60 net migration	+. 54	+. 30	+. 51	+. 55
1955–60 percent nonmobile	−. 31	−. 14	−. 37	−. 26

socioeconomic status—a relation that appears to reflect income status more than any other socioeconomic factor. Further inspection of these data reveals that this inverse relation is much more pronounced for the age-adjusted death rate than for the infant mortality rate, not only for the summary socioeconomic score but also for each component. This smaller association between the several socioeconomic index scores and infant mortality among Connecticut towns may be considered as further evidence supporting the hypothesis that the great strides in the fields of medical science and public health, particularly in gaining control over infectious diseases, have served to reduce dramatically the historical sensitivity of infant mortality as an indicator of the level of social and economic well-being characterizing the various population groups (23, 24).

Socioeconomic status and migration. The data in the table clearly indicate a strong positive association between socioeconomic status and population mobility, the third demographic process. On the one hand, the higher the socioeconomic status score, irrespective of the particular variable, the larger is the proportion of the 1950–60 population increase due to net in-migration ($r_s = +0.54$). On the other hand, the higher the socioeconomic status score, the smaller is the proportion of nonmobile persons in the population ($r_s = -0.31$).

For the population living in the same house in 1960 as in 1955, the nonmobile population, it appears that education is by far the major contributing factor to the socioeconomic relation ($r_s = -0.37$ as compared with -0.26 for income and only -0.14 for occupation). For the measure of net migration, however, it is the income component that contributes most to the relation ($r_s = +0.55$), but here again education is also a major factor ($r_s = +0.51$). These findings would definitely suggest that broadening one's horizons with the attainment of higher levels of education is a major factor influencing the propensity to migrate (25).

Summary and Conclusions

Selected demographic correlates (fertility, mortality, migration) of socioeconomic status among the 169 towns in Connecticut have been analyzed. The statistics show that levels of fertility and migration tend to be positively associated with socioeconomic status, whereas levels of mortality are negatively correlated with all the various socioeconomic indexes. The data also clearly show that these demographic measures are not necessarily related in any consistent fashion to all the component variables (occupation, education, income) of socioeconomic status. That is, although socioeconomic differentials were found to characterize the demographic variables examined, the nature of the relation was not the same for all the various components of socioeconomic status, nor did all aspects of the several demographic variables exhibit similar patterns of association with the same components of socioeconomic status. Mortality, for example, was more related (negatively) to income than to any other variable, whereas education appeared (positively) to be the most significant factor in the migration socioeconomic differential.

Two conclusions may be drawn on the basis of these observations. First, the data certainly warrant the conclusion that social and economic factors are major determinants of demographic behavior and that there is strong justification for undertaking further research for the purpose of discovering more precisely the nature and extent of the relations between particular demographic variables and particular indexes of socioeconomic status. The second conclusion, closely related to the first, is that the findings clearly show the need to specify more precisely just what is meant by the term "socioeconomic status." The way in which socioeconomic status is defined (for example, in terms of income as opposed to education or occupation or some combination of these, or even other, variables) will largely determine the nature and extent of any resulting relations. That is, the failure to observe consistency in the various socioeconomic relations discussed stems from the many definitions of socioeconomic status.

In such a rapidly changing society as ours, scientific theories must constantly be revised to encompass changes occurring in the social order. Based on the materials presented in this article, it would appear that one of the needs in this respect is to dispense with the sociological myth that a person or a family is charac-

terized by some magical something called socio-economic status—a something that is easily identifiable; that can easily be measured by various objective criteria such as occupation, income, or education, or some combination of variables; and that will be reflected, in a consistent manner, in the many aspects of his behavior. What is needed is a research approach which recognizes that socioeconomic status is many things: that it is composed of a number of different variables; that each of these variables may act independently of one another in specific situations; and that each does not necessarily have to bear the same relation to any given behavioral phenomena such as levels of fertility, mortality, or migration.

REFERENCES

(1) Stockwell, E. G.: Socioeconomic status and mortality in the United States: Review of the literature. Public Health Rep 76: 1081–1086, December 1961.

(2) Stockwell, E. G.: A critical examination of the relationship between socioeconomic status and mortality. Amer J Public Health 53: 956–964, June 1963.

(3) Kiser, C. V., and Whelpton, P. K.: Fertility planning and fertility rates by socioeconomic status. Milbank Mem Fund Quart 28: 359–415, October 1949.

(4) Berent, J.: Fertility and social mobility. Population Studies 5: 244–260, March 1952.

(5) Pasamanick, B., Dinitz, S., and Knobloch, H.: Socioeconomic and seasonal variations in birth rates. Milbank Mem Fund Quart 38: 248–254, July 1960.

(6) Duncan, O. D.: Residential areas and differential fertility. Eugenics Quart 11: 82–89, June 1964.

(7) Sheps, C., and Watkins, J. H.: Mortality in the socioeconomic districts of New Haven. Yale J Biol Med 20: 51–80, October 1947.

(8) Moriyama, I. M., and Guralnick, L.: Occupational and social class differences in mortality. Milbank Memorial Fund, New York, 1955, pp. 61–73.

(9) Freedman, R., and Hawley, A. H.: Migration and occupational mobility in the depression. Amer J Soc 55: 171–177, September 1949.

(10) Hamilton, C. H.: Educational selectivity of net migration from the south. Social Forces 38: 33–42, March 1959.

(11) Freedman, R., Whelpton, P. K., and Campbell, A. A.: Family planning, sterility, and population growth. McGraw-Hill Book Co., Inc., New York, 1959.

(12) Westoff, C. F., et al.: Family growth in metropolitan America. Princeton University Press, Princeton, N.J., 1961.

(13) Hauser, P. M., and Kitagawa, E. M.: Social and economic mortality differentials in the United States, 1960; an outline of a research project. In Proceedings of the social statistics section, 1960. American Statistical Association, Washington, D.C., 1960, pp. 116–120.

(14) U.S. Bureau of the Census: Methodology and scores of socioeconomic status. Working Paper No. 15. U.S. Government Printing Office, Washington, D.C., 1960.

(15) Stockwell, E. G., and Shea, G. A.: Socioeconomic index scores for Connecticut towns, 1960. Storrs Agricultural Experiment Station Research Report No. 1. Storrs, Conn., December 1964.

(16) Wrong, D. H.: Trends in class fertility in Western nations. Canad J Econ Polit Sci 24: 216–229, May 1958.

(17) Johnson, G. Z.: Differential fertility in European countries. In Demographic and economic change in developed countries. Princeton University Press, Princeton, N.J., 1960.

(18) Wrong, D. H.: Population and society. Random House, New York, 1963, ch. 5.

(19) Wrong, D. H.: Class fertility differentials in England and Wales. Milbank Mem Fund Quart 38: 37–47, January 1960.

(20) Freedman, R., et al.: Socioeconomic factors in religious differentials in fertility. Amer Sociol Rev 26: 608–614, August 1961.

(21) Goldberg, D.: Another look at the Indianapolis fertility data. Milbank Mem Fund Quart 38: 23–36, January 1960.

(22) Robinson, W. S.: Ecological correlation and the behavior of individuals. Amer Sociol Rev 15: 351–357, June 1950.

(23) Willie, C. V.: A research note on the changing association between infant mortality and socioeconomic status. Social Forces 37: 221–227, March 1959.

(24) Stockwell, E. G.: Infant mortality and socioeconomic status: A changing relationship. Milbank Mem Fund Quart 40: 101–111, January 1962.

(25) Beshers, J. M., and Nishiura, E. N.: A theory of internal migration differentials. Social Forces 39: 214–218, March 1961.