

## BARRIERS TO THE USE OF HEALTH SURVEY DATA IN DEMOCRATIC ANALYSIS<sup>1</sup>

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**D**URING the last five years we have witnessed in this country a rather remarkable resurgence of survey research dealing with health and medical care. A number of major surveys on health matters had been undertaken during the 1930's. But, perhaps owing to the war and the immediate post-war concern with inflation and international relations, the pace of activities slackened considerably during the next decade. Health research of the non-medical variety was scarcely a major concern. In fact, during the period when the large-scale British Survey of Sickness was operating at full tilt, general population surveys dealing with a broad range of conditions were extremely rare in this country. They were practically restricted to the departments of rural sociology in five or six state universities. Recently, the picture has changed radically. A wide variety of subjects related to health and medical care have been examined with considerable thoroughness but for relatively small samples and usually for limited universes. Now that we have the long-awaited National Health Survey, we shall soon have enough cases for the study of at least a great many of the problems that might concern us.

This seems like an appropriate time to ask ourselves what the implications of all this renewed activity are for demography. One could, of course, argue that health status is itself a demographic variable and that therefore any health study is by its nature relevant to demography. But, rather than define away the issue in this manner, let us focus our attention

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on the more *conventional* demographic variables. In practice, the limits of demography seem to be defined in terms of the items appearing on the schedules administered during the preceding Decennial Census. This sort of operational definition is adequate, at least, for the present discussion.

An exploration of past research is the first step in assessing the extent to which our understanding of demographic processes has been enhanced by surveys dealing with health. This exploration reveals that by-product data from health surveys have often been subjected to demographic analysis, just as federal census data are.<sup>3</sup> But it should be noted that these demographic materials were all highly incidental to the original surveys and could just as easily have come from surveys of consumer expenditures, housing, or unemployment. The health research merely provided inexpensive access to demographic statistics. The morbidity aspects of the surveys were frequently totally disregarded in the demographic analysis.

The function served by health surveys in supplying by-product data is certainly a worthy one. Owing to the high value placed on health in our society, it is easier to finance the collection of health data than it is to finance the collection of demographic data. Nevertheless, if our goal is the assessment of the interrelationship between health and demographic variables, we are forced to conclude that the substantive contributions of past health surveys to conventional demography have been indeed slight.

<sup>3</sup> Examples of such secondary analyses are:

Karpinos, Bernard D.: School Attendance as Affected by Prevailing Socio-Economic Factors. *The School Review*, 1943, 51, pp. 39-49.

Kiser, Clyde V.: Birth Rates and Socio-Economic Attributes in 1935. *Milbank Memorial Fund Quarterly*, 1939, 17, pp. 128-151.

Sydenstricker, Edgar: Differential Fertility According to Economic Status: Live Birth and Stillbirth Rates among Married Women of Different Ages Classified According to Family Economic Condition. *Public Health Reports*, 1929, 44, pp. 2101-2106.

Luykx, H. M. C.: Family Studies in the Eastern Health District. iv. Permanence of Residence with Respect to Various Family Characteristics. *Human Biology*, 1947, 19, pp. 91-132.

For a number of such citations, see:

Federal Security Agency: *The National Health Survey 1935-36; Scope, Method, and Bibliography*. Public Health Service Bibliography Series, No. 5, Washington, 1951, pp. 57-65.

There are a number of possible explanations for this failure. The paramount difficulty lies in the form which the analysis and interpretation of health survey data characteristically take. Practically invariably, health is treated as a dependent variable, while various demographic items are treated as the independent variables. For instance, variation in income level is frequently offered as an explanation of variation in health status, but the converse form of explanation occurs only rarely.

One obvious reason for this "occupational psychosis" is that most health surveys have been financially supported by institutions primarily interested in the solution of health problems—not demographic problems. Thus, the central objectives of these studies were best served by accounting for variation in health status rather than utilizing health status as an explanatory variable.

There are, of course, many other reasons for the practically unidirectional tenor of the interpretation of health surveys. There has been, for instance, a revulsion against crude physiological determinism. In reaction to the excesses of the eugenics movement and other forms of biological determinism, attention has become centered on the socio-environmental bases of health. Notions of the influence of man's environment on his health have been sporadically propounded for centuries, but it is only during the last few decades that the concept of social medicine has received particularly avid acceptance by numerous groups in this country. Social scientists have been pre-empted into health research at a remarkable rate for the purpose of putting the "social" into social medicine. One effect of this climate has been the obsession with the impact of the social environment on health, to the exclusion of the impact of health on social characteristics.

What makes this analytic bias noteworthy is the fact that, given the current state of socio-medical knowledge, health status could almost be considered as an exogenous variable with respect to an individual's social characteristics over time.

This view of the interrelationships has about as much justification in established fact as does the treatment of health status as being primarily a function of either dynamic or static social characteristics. At best, health status and social characteristics are both endogenous to the same system and exert considerable influence on each other.

The present exposition is not intended as a criticism of the epidemiological approach in medical research. Important etiological clues may well result from that approach. Nevertheless, social scientists can hardly afford to neglect the fact that the health of an individual can have a great effect on his family's social position. Physiological changes certainly result in corresponding changes in the family's social characteristics. It should obviously be kept in mind that the social consequences of physiological states are largely determined by the concepts and definitions which a society brings to bear on them. Yet, granting the primacy of social norms, we can still examine the role of health status within the framework of our social institutions. The discussion which follows is concerned with the relationships of several demographic variables with health and certain problems involved in assessing these relationships.

In the analysis of practically every health survey, the incidence and/or prevalence of a number of different medical conditions is related to current income or occupation. In addition, over-all illness rates are usually related to the measures of socio-economic status. Rather frequently it is found that the prevalence rate for disabling conditions is highest in the lowest income groups. Occasionally, even incidence rates and rates for non-disabling conditions are found to be strongly negatively correlated with income. There has been a tendency to interpret these correlations as reflecting the influence on susceptibility to disease exerted by the various environmental factors related to income. Thus, disease can be ascribed to poor diet, overcrowded living conditions, poor medical care, and a host of similar factors. Ill-health is taken to be the consequence of poverty.

The ascription of disease to poverty is not the only function served by such correlational analysis. In some instances health survey analysts have used the inverse relationship between illness and income only to demonstrate the fact that those people with the greatest need for medical care can least afford to pay for it. Epidemiological interpretation may be totally absent from such studies. Assuming that the measure of medical need has some validity to it, and assuming that current income is a good measure of ability to pay for medical care, then the conclusions drawn concerning the income differentials with respect to illness seem warranted enough.

But even the studies in which epidemiology is a central concern are not always as biased in their interpretation as was implied above. Occasionally, techniques are used to avoid the spurious ascription of causality to environmental factors. Sometimes the level of socio-environmental correlations for different medical conditions are contrasted, with greater weight given to evidence concerning diseases which were clearly of recent incidence. Or, greater attention can be given to illness among children or housewives than to illness among breadwinners. However, one can say with considerable justification that few studies have actually come to grips with the question of the direction of the causality underlying the correlation between health status and the level of income. The general propensity has certainly been to consider income as an independent variable resulting indirectly in certain states of health. Since ill-health obviously tends in many ways to reduce markedly the earning power of a potential labor force participant, the frequent failure to assess seriously the impact of illness on income may result in the spurious ascription of causality to low economic status. In addition, an excellent opportunity to explain some of the variation in income is overlooked.

An analysis by P. S. Lawrence (1) of Hagerstown longitudinal data is a notable exception to the foregoing generalization. Taking families with no chronic illnesses during the 1921-1925 period, and with the same economic level in 1943 as in

1923, he found the incidence of chronic illness during the subsequent twenty years to be little different for families with high economic status from the incidence for families whose economic status was low. But he did find a greater likelihood of a decline in economic circumstances among families which experienced the onset of a chronic illness during the twenty-year period than among families which remained free of chronic illness. These findings were interpreted, with a number of qualifications owing to shortcomings of the data, as indicating that low economic status is more often the result than the cause of chronic illness.

There were a few earlier studies in which considerable concern over the relative influence of health and economic status on each other is in evidence. The 1933 Health and Depression Surveys analyzed in part by Perrott and Collins (2) and Klem's (3) similar 1934 California survey dealt with this issue to some extent. Although these analysts were inclined to interpret their results as demonstrations of the influence of changes in socio-environmental factors on health, their interpretations were nevertheless cautious. They related changes in *per capita* income between 1929 and 1932 with health status during a three-month period in 1933. They found that those families that had experienced the greatest drop in economic circumstances between 1929 and 1932 were the ones which experienced the most illness in 1933. Two explanations, aside from the socio-environmental one, were offered: first, illness *per se* might have resulted in long-term disability and thereby a loss of income; second, people who had had a general proclivity toward illness for many years were more likely to remain unemployed during the depression than were healthier people. Since both these studies were retrospective with respect to income and contained no predepression health assessments, they remained inconclusive.

It is worth noting that all three studies mentioned here were longitudinal with respect to economic status—the Hagerstown study by re-interview, the other two by retrospection. It is

not mere coincidence that the greatest concern over the alternative explanations of the income-health relationship is to be found in longitudinal studies. Following the same families over time is bound to impress one with the fact that income is itself a time series variable for the family. One notes, also, that the intercorrelations among the time series for different families are far from unity, even within a cohort which was initially homogeneous with respect to a number of variables. Conversely, in the analysis of cross-sectional data or materials pertaining to relatively short time periods, there is a tendency to view demographic variables like income and occupation as *static* characteristics.<sup>4</sup>

In recent years a number of economists have stressed the inadequacy of current income as an analytical variable. They have pointed out that a family's income is extremely variable over time owing to a number of different factors, among them the family's health status (4). The economists have been mainly concerned with the explanation of the variability of current consumption and saving behavior within a given current income group in terms of differences in past economic history—they consider current economic behavior as a function of the family's past income history and expected income in the future. While the central concern here is the relation between health status and income level rather than the explanation of current behavior, the warnings of economists concerning the fallacy of treating current income as a constant over time should be heeded.

It has been seen that a static conception of economic level militates against its analysis as a dependent variable. The con-

<sup>4</sup>Two recent studies have dealt with the economic consequences of heart disease. The samples were extremely small in both instances, and the analyses were based on retrospective data. These studies do unequivocally demonstrate the marked reduction of income which tends to result from the incidence of heart disease, but their limited scope inhibits a more precise specification of consequences. Reeder, L. G.: *The Socio-Economic Effects of Heart Disease. Social Problems*, 1956, 4, pp. 51-55. Drake, R. M.; Buechly, R. W.; and Breslow, Lester: *An Epidemiological Investigation of Coronary Heart Disease in the California Health Survey Population. In Measuring the Risk of Coronary Heart Disease in Adult Population Groups. Part 2 of the April, 1957, American Journal of Public Health*, pp. 43-57.

ventional measurement of illness constitutes a second barrier against such analysis.

There has been a tendency to compute atomistic morbidity rates. In many health studies the tabulating unit has been primarily the morbid condition or even the individual flare-up of illness rather than the person. Thus, one person can be counted a number of times in the numerator of a single rate, or he may appear in the numerator of the rates for a number of different conditions. Furthermore, in some tabulations where duplication in the numerator has been removed, an individual may be characterized by each of his discrete illnesses in succession, although by only one illness at a time.

The general utility of treating the individual medical condition or episode of illness as the tabulating unit is not being questioned here. Conceivably, for epidemiological purposes, for the evaluation of the success of a public health program, or for estimating the market for a new drug, this may be a sensible way to tabulate data. But there can be no doubt that such atomization makes it practically impossible to consider health status as an independent variable. The interpretive difficulties which arise when a single case appears in several different categories of the "sorting variable" are so great as to preclude the adoption of such an approach. The comprehensive care movement in clinical medicine, the focus on the patient as a whole person rather than as the mere locus of a series of discrete diseases, has applicability to morbidity statistics as well as to therapy.

It might be added parenthetically that even the individual person may be too atomistic a tabulating unit for the examination of the influence of health status. Merrell (5) has recommended the family as a holistic unit for health research. Recent analyses by Downes (6) of the Eastern Health District data and by Ciocco, Densen, and Horvitz (7) of the Arsenal Health District data have been steps in this direction. It may well be that for studies of the consequences of ill health, some function of the health condition of all the members of the fam-



ily is the most suitable variable. It is easy enough to imagine how the health status and medical care expenditures of dependents might affect the income of the main earner. Such illness might restrict his opportunities to attain his full income potential or induce him to earn more than he might otherwise have earned.

Not all health surveys have relied exclusively on the case of illness as the unit of tabulation. In some health surveys, in addition to the more usual type of morbidity data, tables have been presented with the person as the numerator unit. But even most of these tabulations are not entirely satisfactory from the present point of view. The main difficulty in using these illness data is that they usually refer only to a limited period of time. Even in a periodic-visit survey, we generally can view only a short span of the individual's or family's health time series. We generally know practically nothing about the individual's medical history or health time series prior to the survey period. This is a serious shortcoming of our data since we know little about the extent of autoregression of the level of an individual's health over time—that is, the extent to which an individual's health today is a function of his health in the past. We do not know the extent to which an individual who is first diagnosed as having a given illness during the survey period may have been sporadically disabled prior to the survey period by a variety of other illnesses. Or perhaps some of the individuals with recently diagnosed illnesses may have been functioning well below par for years prior to the survey, but with no specific diagnosed condition or complaint. Out of context, it becomes difficult to assess the impact of the incidence of an illness—we can't really judge the extent to which the illness made the life situation of the individual or family different from what it was in the past. Therefore we have nothing to which to relate a concomitant change (or the absence of a change) in a demographic variable like income or occupation.

Although it is hard to imagine a complete solution to this problem which would be feasible on a large-scale, systematic,

and quantitative basis, some studies have come close to providing a context for what is prevalent at a given time or what is incident during a short period. The Framingham study (8), even though the concern there is more with epidemiology than with the consequences of ill-health, apparently will give such a context both through retrospection and by following a cohort for an extended period of time. The revisit of Hagerstown (9) has led to analyses with a certain amount of historical context, but one problem there has been the large gap in the time series. Some of the analyses of the Eastern Health District (6) materials have also taken excellent advantage of the cohort design which was used, although there the cohort was followed for a rather short period of time. Similarly, a recent analysis (10) by Smiley and others of Windsor Medical Service records involves the serial correlation of illness for an extremely short time period. There is also a study (11) by Hinkle and others of absences from work due to disabling illness among certain employees of a phone company during a twenty-year period. The analysis of these data was especially concerned with the persistence through time of the tendency towards illness. Perhaps these studies will provide a rough idea of the magnitude of some of the parameters pertaining to the autoregression of the health time series and spur similarly-designed inquiries covering even longer periods of time and broader populations. It is to be hoped that the relation of demographic variables to the longitudinal illness data will also be examined.

Unfortunately, the rise in the cost of conducting surveys, a desire for disease-specific incidence and prevalence estimates subject to relatively small sampling error, and some recent methodological discoveries of the San Jose study concerning panel effect seem to have made the periodic-visit survey practically a technique of the past. Only two major general illness surveys of this type have been conducted in the United States recently: the San Jose study, where the technique was used for methodological purposes, and the Arsenal study, where the periodic visits have been infrequent. Both the British and

Danish Sickness Surveys used the single-visit approach, and the current American nationwide survey is also making use of only a single wave of interviewing for each family. To the best of the author's knowledge, the Canadian Sickness Survey is the only recent large nationwide survey making use of the panel approach.

This trend toward single-visit health surveys may well be necessary if their primary public health objectives are to be fulfilled.<sup>5</sup> But there can be no doubt that the shift away from the use of cohorts has decreased the potential usefulness of health surveys for the analysis of demographic processes.

Coupled with the foregoing loss of context through the cessation of periodic-visit surveys, the use of long periods of recall or retrospection has become highly suspect. It has been shown (12) that memories are extremely fallible over even quite short time-periods. Of course, it has been also demonstrated by the Hunterdon (13), Baltimore (14), Pittsburgh (15), and California (16) studies that there are serious reporting biases which cannot be ascribed to the length of the period of recall. Given the fundamental invalidity and unreliability of survey reports on medical conditions, it is not obvious that the severe curtailment of the reporting period is sufficiently profitable with respect to gains in validity to warrant the concomitant losses. The simultaneous use of single waves of interviewing and short reporting periods greatly limits the potential use of the resulting data for the analysis of the consequences of illness as well as for epidemiological purposes. Currently, most surveys solve this dilemma by using a short reporting period for acute ailments of only minor or moderate severity and a relatively long reporting period for serious acute ailments and chronic conditions. This is perhaps the optimal solution, but further thought should be given to techniques for handling

<sup>5</sup> Actually, it is quite likely that even the public health objectives are better met by longitudinal surveys. (See, for instance, Lawrence, P. S., and Tibbitts, Clark: Recent Long-Term Morbidity Studies in Hagerstown, Maryland. In *Methods in Public Health Research*. Part 2 of August, 1951, *American Journal of Public Health*, 41: 101-107.

the problem of repeated incidence of acute ailments and other aspects of the longitudinal context of current prevalence.

Another problem of context results from the previously-mentioned fact that data produced by health surveys are generally classified primarily in terms of disease entities. The diagnostic categories of medicine are used to characterize the persons or episodes of illness which are the units of analysis. The advances of modern medicine were made possible by the sharp delineation between the various diseases and advances in differential diagnosis. But the fact that a person can be diagnosed as suffering from a specific pathological condition does not necessarily tell us as much as we need to know about his health. This is particularly the case when we consider the fact that in the analysis of survey material, there is seldom a cross-classification of illnesses—in a sense, tabulations are set up as if no one were ever afflicted by more than one disease at a time. Of course, there are seldom sufficient numbers of cases to allow for such cross-tabulation. Still, the fragmentation of the individual is harmful when we are concerned with dependent variables that pertain to the person or family as a whole rather than to particular organ systems or diseases.

In a somewhat different connection, Spiegelman (17) has recently cited the utility of the cross-classification of conditions in the analysis of mortality data. Also, several analyses of Eastern Health District (18) material have been multi-dimensional, both with respect to the individual and the family. The purpose of these cross-classifications was primarily epidemiological, but they do demonstrate the need for such an approach when characterizing the health status of individuals or families.

Actually, even the cross-classification of medical conditions does not provide as meaningful a characterization of over-all health as one might like. The variability in terms of severity, disability, prognosis, etc. is extremely great even within a single four-digit international list category. In addition, a person may have no codable condition and still, in a sense, be in bad health. Lowell Reed and Margaret Merrell (19) have elo-

quently pointed out the inadequacy of our conventional measures of health, and so it is hardly necessary to dwell on that point here. A partial solution to this problem may be found in the current attempts by the National Health Survey staff to categorize individuals in terms of the "limitation on activity" and the "limitation on mobility" resulting from chronic conditions. For the study of the consequences of ill-health, the use of these more functional dimensions is certainly promising.

Thus far, this discussion has dealt primarily with general barriers to the assessment of the impact of changes in health status on demographic variables on the basis of health surveys. Income has been the only demographic variable mentioned, and this only illustratively. Other demographic variables could also have been considered.

Labor force participation is an obvious example. From the Current Population Survey we already have a rather clear idea of the extent to which, at a given time, long-term disabling illnesses or conditions keep men in the middle age ranges out of the labor market. Still, there are many gaps in our knowledge. For instance, there is only limited knowledge (11) concerning the extent to which some individuals tend to suffer recurrent periods of disability, while other individuals never become disabled during their working years. In the entire area of the relationship between health status and labor force participation, as with respect to income and occupation, what knowledge there is tends to be cross-sectional rather than longitudinal. In addition, little is known about how the health of other family members affects an individual's work status. For instance, the illness of a main earner may cause some other family member to enter the labor force. Or, large medical expenses incurred in connection with a dependent's illness may cause a secondary earner to enter the labor force or the main earner to work longer hours or take a second job. While it is doubtful that such mechanisms account for a major part of labor force behavior, they are still probably important enough to be examined.

Another relatively unexplored area is the relation between health and migration. Freedman (20), in his analysis of the National Health Survey data, refers to the likelihood that ill-health is a reason for migration. But Freedman's central concern was the comparison of the health status of rural-urban migrants with that of the receiving populations. Owing to a number of shortcomings of his data, he could not concern himself with the consequences of ill-health for migration.

There have been several studies (21) (22) dealing with the relation between migration status and particular illnesses. But even in these studies health is hardly considered as the independent variable. There is good presumptive evidence that ill-health can often be a major stimulus to migration, but we know little of why this is the case, the length of the time-span between the incidence of illness and the move, the differential consequence of illness in various family members, and so on.

School attendance and educational attainment are also undoubtedly to some extent a function of health. In an analysis of Eastern Health District data, Marguerite Keller (23) has shown illness in children to be a rather major factor in inhibiting school progress. The extent to which this retardation in school simply leads to later graduation or the extent to which it may result in a lower final attainment is not known. While, obviously, health status as a child must account for a relatively minor part of the over-all variance in educational attainment, such analysis is crucial for the interpretation of differences in illness rates among adults in different educational classes. And here, again, it seems quite possible that illness of other family members may have a substantial influence on an individual's level of education.

A similar case could be made for the possible utility of considering health status as an independent variable with respect to a number of other demographic variables, like occupation, fertility, home-ownership, housing characteristics, and so on. The *a priori* arguments for the possible fruitfulness of such

analyses are so obvious, they hardly need to be treated here.

In this paper both health and the demographic variables have been treated as time series characteristics of individuals or families rather than of larger aggregates. Yet the primary concern of demographic analysis is frequently the explanation of the secular trends of aggregates or fluctuations from those trends over fairly broad time intervals. For instance, in the study of marriage rates, there is probably as much concern with the general movement of the aggregate as with sub-group differentials at a given point in time. Conceivably, the long-term movements in the aggregate state of health, brought about largely by the adoption of public health measures and by medical advances, can be used in the analysis of aggregate demographic time series.

Another bias in the present discussion has been the pre-eminence accorded relationships involving changes in health status. Obviously, health status may have an impact even if it is essentially invariant over time. A person born with congenital defects or a person who becomes afflicted with a permanent disability during childhood certainly finds his future life course severely affected by his health, even though there are no concomitant changes in health and demographic variables to which one can point. If data are available concerning other variables, like parental socio-economic status, locale of rearing, education, etc., which also affect the life course of an individual, the analysis of the impact on adult life of prior health conditions appears feasible.

In a similar vein, if a positive partial correlation between health status and income were found with education, age, parental occupation, locality of residence, and similar relevant background variables held constant, this would constitute presumptive evidence concerning the effect of ill-health on income. This type of analysis with cross-sectional data could conceivably act as a surrogate for longitudinal data, in the absence of the latter. Still, extreme caution would have to be exercised in imputing the direction of causality on the basis of even such

extensive cross-sectional data. It has been hypothesized that extreme social mobility or inconsistency in the level of different elements of social status (e.g., low income relative to educational attainment) may lead to tension and anxiety concerning status. In turn, the tension and anxiety ostensibly become manifested in psychosomatic conditions. Thus, the ill-health resulting from downward mobility or status disequilibrium would be confounded with the effects on status of ill-health. Although there is essentially no sound evidence whatsoever that independently-induced status strains result, with any appreciable frequency, directly in ill-health, the analyst working with data from which the time dimension was totally absent would have to face the fact that both of the aforementioned processes could result in the same cross-sectional correlation. A partial solution might lie in making an analytical distinction between medical conditions which might reasonably be attributed to psychogenic factors and illnesses which are rather unlikely to be of psychogenic etiology. Knotty problems of this sort, though, point up the relative superiority of longitudinal data, where at least some impression can be gained of the time sequence of the several relevant events.

The practically exclusive concern in this paper with the consequences of ill-health obviously conveys a distorted notion of the relative importance of different variables as exogenous influences on the social order. Health is certainly influenced to some extent by socio-environmental factors. Variation in health status certainly does not account for the bulk of the variation in most demographic variables. Demographic variables are governed primarily by forces other than health. Nevertheless, it is unfortunate that social scientists working in the field of health should devote all their energies in trying to explain medical phenomena in terms of social processes, when so little is actually known about these social processes. It might benefit both social science and medicine if more frequently the orientation were reversed and attention were paid to the physiological factors bearing on the social environment. This



paper has dealt with some of the barriers to this latter type of analysis imposed by the primary public health objectives of health surveys. The main shortcoming of health survey data is the absence of time perspective in the measurements of both the health and the demographic variables. There is also the problem of the atomisation of the individual through the use of the discrete attack of illness as the primary tabulation unit. Attention should be given to the derivation of data-collection and analytical procedures which would provide information susceptible to social scientific analysis, as well as to use for public health purposes.

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