

THE RELIABILITY OF SURVEY DATA*

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The question of the reliability of surveys can be approached by means of three propositions:

1. Some data collected in some surveys have a high level of accuracy.
2. The same data collected in other surveys are highly inaccurate.
3. Some data collected in any surveys are always inaccurate.

To be symmetrical there should be a fourth proposition: Some data collected in any surveys are accurate. But this proposition is not included since even the simplest data sometimes show inaccuracies.

As the propositions indicate, the major components of survey accuracy are the type of information sought and the methods used to collect it. (I am not including in this paper any considerations of sampling since these were covered by the preceding speaker.)

The purpose of this paper is to examine some of the factors relating to characteristics of the information, and of data collection methods, and to consider some of the variables which contribute significantly to the accuracy or inaccuracy of surveys.

We turn first to a consideration of some of the characteristics of the data themselves, and the degree to which the wanted information is accessible to the person who is asked to report it. Clearly, the first requisite to accurate reporting is that the respondent have these data in his possession.

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One point is so well known that we need spend little time on it. A person is likely to have more information about himself than he has about others. For example, in a study of the validity of the reporting of hospital episodes conducted for the National Health Survey,¹ we found that when an individual was asked to report about his own hospitalization the underreporting rate was 7%. When reporting for close relatives the underreporting was somewhat worse, and rose to 22% when the person being reported for was a more distant relative. Several factors are involved in this underreporting rate, one of the most obvious being that in many cases the individual never knew the information and hence could not report it correctly.

But of more importance is the inaccessibility of information which occurs when the researcher and the respondent do not share the same concepts or even the same language. This problem is illustrated by a questionnaire administered to farmers, which contained the following question: "In planning your farming operations, do you use inductive or deductive thinking?" This is an extreme example of the lack of shared concepts, in which the objective may be perfectly clear to the researcher but incomprehensible to the respondent. Problems of this type are so apparent that we avoid them almost without thinking. But less extreme examples are not so easily avoided. Frequently we would like to ask respondents about such diseases as diabetes, hypertension, or arthritis. Take the question "Have you had rheumatic fever?" Asked of a sample of respondents, such a question will receive either "yes" and "no" responses, with only a few reporting that they do not know.

A "yes" response may have any of several meanings. It may mean, "I have been under treatment for a condition which was diagnosed by a doctor as rheumatic fever," or, "I have something like my brother had and he said he had rheumatic fever so I think I have it," or, "I guess I must have it, but I just call it plain rheumatism."

Conversely, a "no" response may mean, "I never had anything I knew to be rheumatic fever," or, "I know what rheumatic fever is and the doctor told me I didn't have it," or, "I don't know what it is so I guess I don't have it."

The lack of shared concepts between the researcher and the respondent is one of the major limitations of the survey technique as a method of providing data sought by the medical researcher. Parenthetically we might note that at times surveys have been severely criticized because the information obtained from patients in interviews did not check with diagnostic data obtained by direct medical examination. To indict surveys on this basis is fallacious. The fault lies not with the surveys but with the researchers who use the survey method improperly.

The potentialities of survey research as a method of collecting data is limited to information which the individual possesses and to concepts which he understands. Unfortunately, information which the respondent thinks he has is often incomplete or inaccurate. A study conducted by the Health Information Plan² compared diagnostic material reported by respondents with material in doctors' records. Although the comparison was restricted to information which the doctor felt certain he had reported personally to the individual, major discrepancies in many categories between the records and the reports of the respondents were revealed. Our study of hospitalization data,³ which compared hospital records with reports of patients, showed that respondents reported the diagnoses of malignant neoplasms at only 75% of the rate of the hospital records; whereas benign or unspecified neoplasms were reported at 150%. We suspect that much of this error represents both the failure of the doctor to transmit the correct diagnosis to the patient, and also represents a perceptual distortion on the part of the respondent as to his own condition.

The doctor is the major source of the respondent's information about his

physical condition. Obviously, respondents cannot report information which doctors have not given them, or information which has been given them inaccurately, or information which has been given accurately but has been misunderstood. One of the primary difficulties in getting respondents to report what physicians have told them is the esoteric language which physicians use. For example, one person reported to us that his doctor told him he had "hemorrhoids in the rectory".

Although the doctor is the main source of information which the respondent has about his physical condition, unfortunately for researchers he is not the only source. Friends, relatives, and one's own information frequently lead to self-diagnoses. These diagnoses, reported to the interviewer as readily as the more authoritative doctor's diagnosis, cannot be expected to be as accurate. Recently we discovered a new version of this problem in a health survey while interviewing an elderly Polish couple. The wife reported that she had not visited a doctor in 20 years because she was much afraid of doctors. Yet, when asked about her physical condition, she gave a couple of specific diagnoses unlike those commonly made by laymen. The puzzled interviewer asked her how she had arrived at these diagnoses, and she explained that her husband, who had a chronic condition, went to the doctor every other week. When she had a particular set of symptoms she related them to her husband, who reported them to the doctor as his own symptoms. The doctor then made a diagnosis and gave him medicine which he took home for his wife.

Thus far we have concentrated on what one cannot expect from surveys. Returning to a positive approach, we may ask what a respondent can report and report accurately. First of all, the respondent can tell us how he feels. He can tell us any degree of disability he may have, whether he is able to work, whether he has been confined to bed because of illness, whether his work has been restricted, and so forth. He can report specific symptoms and can describe these

symptoms in detail. He can report the frequency or duration of symptoms, their intensity, and what he does to relieve them. He can report what he considers to be the cause of the symptoms, that is, what he considers to be the diagnosis. He can go further and relate the facts surrounding the diagnosis, whether it was made by himself, by his friends, or by a medical authority. He can give us the history of his conditions, illnesses, and injuries. The respondent can report these types of information plus many other types he has about himself, and under certain conditions he will report accurately. It is relevant to point out that many of these data cannot be obtained from any records whatever but must come from the respondent himself.

To recapitulate: Surveys are potentially accurate or inaccurate depending upon the uses to which they are put. A major obstacle to accurate information is that the respondent may not have the data which the researcher wishes to obtain. Surveys cannot be expected to replicate data from medical records any more than medical records can be expected to provide data on undiagnosed conditions for people who have never sought medical aid. For example, if one wanted to know how many people have been hospitalized for particular diseases, surveys would be of little use. It would be better to obtain the information from hospital records. But on the other hand, if one wanted to know how many people had respiratory infections during a particular week, records would not help. A survey approach asking about symptoms and degree of disability would be the only source of information, since only a small proportion of those persons would have been to a doctor. If one wanted to know how many people have hypertension, the only accurate procedure would probably be to examine a cross-section sample of the population, a technique which the Household Examination Survey of the National Health Survey is using currently.

Assuming that the survey approach is used, and that the respondent has access to the information wanted, the important question then arises: Will the information be reported accurately? There are two main obstacles to accurate reporting: memory--the ability to recall accurately--and motivation--the willingness of the respondent to report accurately. The problem of memory is a familiar one. In the study of hospitalization referred to earlier, it was found that the rate of reporting was high for episodes which occurred close to the date of the interview, but dropped consistently and with increasing rapidity the longer the elapsed time between the interview and the date of the hospitalization. For episodes occurring a year prior to the interview, the rate of underreporting of episodes was several times the rate for the first few weeks immediately preceding the interview. If the event in which the researcher is interested is both recent and from the respondent's point of view significant, a simple question may be enough to bring the episode fully into his memory. But if much time has elapsed since the event, the problem is more difficult. The gradual decay of information is manifested in many ways. Events of trivial significance for the respondent may be forgotten almost as quickly as they occur. Even experiences which were once prominent are likely to be forgotten if they have little relevance to the individual's current life. The adult is unlikely to remember the age at which he developed chicken pox, even though the event may have had dramatic importance for him as a child. For such routine matters as one's breakfast menu or the content of the previous evening's television programs, recollection may be gone within a matter of hours.

Memory is a complex function of elapsed time since the event, current cues or relevance for present affairs, and the original significance of the event to the individual. The usual effect of these processes is a reduction in the amount and accuracy of information available to the researcher. In the extreme case, the

reduction is complete--the respondent is unable to recall the event. More often, however, the reduction is partial--the respondent can recall that he had a particular experience but is unable to describe it in accurate detail. Thus Goddard, Broder, and Wenar⁴ have found that, although mothers' evaluations of difficulty of labor and delivery agreed with the physicians' records, information on the length of gestation period, feeding problems of the infant, and illnesses during infancy showed marked distortions.

Unfortunately for the researcher, the process of memory decay is not uniform and orderly. The events of the past do not fade gradually from view while retaining their original dimensions. On the contrary, the process of forgetting and remembering involves considerable distortion. Certain aspects drop from view, others are elevated to prominence, and the entire past is recalled in a way that makes it plausible and consistent in terms of the individual's present experience. Related to this selective process of memory is the distortion of previous experience in the general directions of social acceptability or preservation of one's self-image. Wenar, for example, reports that when a mother distorts developmental facts about her child she tends to do so in a way that makes her child appear more precocious; and that when she distorts child-training practices, she tends to bring them in line with Dr. Spock.⁵

Frequently, such distortions are not conscious falsification of information but result from unconscious repression of facts which are intolerable to the self. Studies of political behavior provide an interesting example of this process. In national samples voters have been asked repeatedly to name the candidate for whom they voted in the previous presidential elections. The longer the election recedes into the past, the greater the proportion of people who report that they voted for the winning candidate.

When the individual is asked to report some past event, a number of complex processes occur simultaneously, and in combination they affect and even determine the availability of the information. These processes have to do with the initial importance of the event and its meaning for the respondent; they have to do with the tendency toward congruence and plausibility of previous experience; and they relate to various ego defense mechanisms.

We now come to respondent motivation, that is, the willingness of the respondent to report those things which are accessible to him and are not subject to the distortion of memory. Respondent motivation is coming to be recognized as perhaps the most important factor in determining the amount and the accuracy of the data available to the researcher. Thus, hospital episodes involving arthritis, deliveries, hernias, appendicitis, and gall bladder disease have shown less than 5% underreporting, while episodes involving mental or personality disorders have shown underreporting of 32%.² In general, episodes classified as nonthreatening; that is, as not embarrassing or detrimental to the individual's self-image, showed an underreporting rate of 10% while episodes rated as threatening were underreported 21%. Further, for the episodes classified as threatening which were reported, the report of the diagnosis was altered to make it more palatable or more acceptable.

Other fields are replete with examples of this type. In economic studies, individuals with small savings accounts tend to overstate their size, while people with particularly large accounts tend to understate them. Men in high income groups are less likely to admit having borrowed from a cash lender than those in the lower income groups.⁶

All of these data indicate that obtaining accurate responses requires more than merely approaching a respondent with a set of questions. The researcher, recognizing the great value of his research, somehow expects the respondent to be

equally eager to make the study a success. Yet, for many studies there is little reason apparent to the respondent for divulging information to the interviewer. The interviewer's request for information does not mean that the respondent shares the researcher's goals even to the extent of being willing to think carefully about each question.

The interview is a complex interaction of forces. The respondent has an image of himself as a particular kind of person; he has a set of social norms which tell him what behavior is appropriate and what is inappropriate. Thus, the mother may be reluctant to admit to particular kinds of illnesses on the part of her child because, to her, it implies that she has been a poor mother. The husband may not be willing to report that he has been sick or has had to stay home in bed, because his image of himself is that of a healthy, self-reliant individual. Any admission of illness may be to him a sign of weakness or dependency. A person may be quite willing to report his appendectomy but, because of his social norms, most reluctant to talk about his venereal disease.

In some cases, however, the problem of motivation is simpler than this. The individual can report recent conditions which he has suffered but may still be unwilling to expend the effort to ensure the accuracy of dates and other relevant information. The reason for such inaccuracy is that the respondent may not share the researcher's goals or appreciate the relevance of his participation in the interview. This problem can be solved by generating forces strong enough to overcome the negative factors.

Fortunately, much of the information in which the epidemiologist is interested does not involve forces which are so negative that the task of establishing strong positive motives is impossible. In a recent study⁷ we found that the reporting of hospitalizations was significantly improved by adequately preparing the

respondent (telling him some of the goals of the study, and helping him to see that his own goals would be best served by accurate reporting) and by making some changes in the questionnaire. Not only did we obtain better reporting of threatening episodes, but many episodes which had been thought to be inaccessible because of memory were reported with adequate motivation.

You may feel that I have presented a dismal picture of the potentialities of surveys as a useful device in epidemiological studies. You may think further that this is an odd point of view for a person whose main activity during the past several years has been in survey research. I took this approach because survey research techniques are deceptively simple. Too many people have criticized surveys because they have used them improperly. All too often they have decided to do a study, sat down and thought up a few questions, sent out a couple of laboratory assistants to take interviews, and then have been surprised that the data they collect are not accurate. Then they tend to condemn survey research in general. My purpose has been to point out the importance of understanding the variables of reporting, and to stress the importance of using adequate techniques. Survey research is a method of measurement. As such it has the strengths and weaknesses of most measuring instruments. It also has appropriate and inappropriate applications. One can expect to get some things but not others from it. Since survey research is a relatively new technique, there is much about the methodology which we do not know as yet.

In conclusion, I would like to emphasize the need for studies of methods and techniques designed to make survey research more valuable to epidemiology. The National Health Survey of the Public Health Service has an active program of methodological investigations, and is to be commended for this attention. But more is needed.

There is need also for a facility for collating and evaluating the experience of researchers who have used survey methods so that others may have the benefit of their successes and failures. Minimally this means that each research report based on survey data should contain the questions and instruments used, as well as information on the types of interviewers employed and the techniques they used. Eventually, and hopefully not too far in the future, one can envisage a facility for data retrieval to which researchers can turn for information on the methods and questions found most successful in obtaining data needed for a particular objective.

It is through research on methods and sharing of experience that survey research methods will become more accurate and will become more useful in epidemiological studies.

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