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# HEALTH STATISTICS

FROM THE U.S. NATIONAL HEALTH SURVEY

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## A Study of Special Purpose Medical-History Techniques

A methodological study of special purpose medical-history-taking procedures applicable to population surveys based on health examinations.

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The U. S. National Health Survey is a continuing program under which the Public Health Service makes studies to determine the extent of illness and disability in the population of the United States and to gather related information. It is authorized by Public Law 652, 84th Congress.

## CO-OPERATION OF THE SURVEY RESEARCH CENTER, UNIVERSITY OF MICHIGAN

Under legislation establishing the National Health Survey, the Public Health Service is authorized to use, insofar as possible, the services or facilities of other Federal, State, or private agencies. The methodological study in this report was performed under a contractual arrangement with The Survey Research Center, Institute for Social Research, The University of Michigan.

# PREFACE

## BACKGROUND OF THIS STUDY

The U. S. National Health Survey has a defined responsibility to collect survey data on the health of the population and on factors relating to health. Its survey program contemplates not a single method of data collection, but rather a variety of types of surveys, each differently designed according to the kind of data to be collected and the sources from which such data can be obtained.

Since valid and established methods do not exist for the collection of many needed types of health data the National Health Survey has additional responsibility to conduct methodological studies directed to the design and continued improvement of techniques for collecting such statistics. In carrying out this function, it is aware that the development of successful research or survey procedures is an evolutionary process and may depend on the results of a number of separate studies.

Most frequently in planning a new survey one relies largely on the literature and on readily available experience—making decisions on methods to be used on the basis of such evidence as may be obtainable. Typically a survey is organized on a tentative basis, pretested in one or more pilot studies, and then put into operation. But when feasible, it is appropriate to establish more formalized prior testing or experimentation with the proposed procedures of the projected survey. Each study may be expected to produce evidence pointing in some definite direction, and suggesting

specific actions. The strength of those indications will vary of course from one situation to another; their evidence should be weighed accordingly along with other considerations bearing on the decision to be made.

These points are emphasized, as a reminder that both this study and others which will be reported in this Series D of Health Statistics must usually be considered as steps toward an improved modus operandi rather than conclusive solutions to the methodological problems involved. They are intended to be contributions to the necessarily gradual development of survey methodology utilizing differing techniques and data sources.

Among the various types of surveys and obvious sources for health data are interviews with persons comprising samples of the population. This method is used in the Health Interview Survey and results are published in Series B and Series C of Health Statistics from the U. S. National Health Survey. While the interview method provides a wide range of adequately reliable data relating to the social, economic, and demographic aspects of health and for such topics as the amount of medical care and disability resulting from illnesses, the method is recognized as deficient in the quality of diagnostic data obtained. In addition, the interview method cannot provide population distributions of those clinical and physical measurements which must be based on actual tests.

Consideration has therefore been given to the development of a survey based not on an interview, but on a specially designed health examination given to probability samples of the population. Such an examination, for survey purposes, might include a very wide range of diagnostic and test procedures or might be restricted to more limited areas of interest. Among many other points, the question arises as to the form of the medical-history-taking procedure used as a preliminary to a physical examination. The medical-history-taking procedure to be used would depend upon its effectiveness and reliability in a survey, in contrast to a therapeutic setting.

Most medical histories are taken in a therapeutic situation. In such cases the patient has taken the initiative in seeking advice and care from a physician and the history-taking procedure can be curtailed or extended according to the judgment of the physician as pertinent facts about the patient's complaint are developed.

In a survey setting the situation is quite different. Here the examinees comprise probability samples of the populations and have not taken any initiative in seeking a survey physical examination. Furthermore, the survey objective of compiling a systematic picture of certain specified health characteristics of the surveyed population dictates that a certain degree of uniformity or standardization be imposed on the procedure.

In these circumstances a number of questions arise about the character, arrangement, effectiveness, and reliability of different methods of taking medical histories. The study reported in this publication is a research project undertaken for the National Health Survey by the Survey Research Center to investigate some of these questions.

In defining the problem to be studied the National Health Survey formulated certain boundaries or limitations to the scope of the investi-

gation. These boundaries were determined largely by considerations relating to other factors in the whole design of a survey that would be based on health examinations.

The following points determine the scope of this particular research project:

1. In general terms, the objective of this study was to investigate certain specific questions about the effectiveness and reliability of various methods and to make recommendations for a tentative questionnaire form and procedures to be used. The purpose was not to derive the full content and final form of a history-taking procedure to be used in a survey.

2. The purpose of the history-taking procedure to be developed was to obtain a maximum number of useful clues or indications, the accuracy and significance of which could be evaluated subsequently by the examining physician. It was desired to develop a procedure which would result in a saving of physician time.

3. The survey objectives relate to present morbidity with no attention to family illness or past illnesses except as they might be pertinent to current morbidity.

4. The survey objectives are directed primarily to chronic conditions rather than to all illnesses, and especially to heart disease, hypertension, diabetes, and rheumatism and arthritis. For various reasons, the population group to be sampled was limited to adults.

5. It was not expected that this preliminary investigation of history-taking procedures would necessarily yield conclusive answers to the various questions posed. The qualitative and quantitative indications resulting from this study were to be studied further in a series of pretests of the whole health examination survey procedures. The final questionnaire form and methods of the medical-history aspect of this survey were to be a resultant of all of these steps.

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# A STUDY OF SPECIAL PURPOSE MEDICAL-HISTORY TECHNIQUES

(The following research report was prepared by the Survey Research Center, Institute for Social Research, The University of Michigan, under a contract with the U. S. National Health Survey. Charles F. Cannell, Ph. D., and Morris Axelrod, Ph. D., of the Institute for Social Research, directed the project and were responsible for the analysis and the report presented here. The methodology, findings, and conclusions are those of the Survey Research Center.)

## THE RESEARCH PROBLEM

The purpose of this report is to describe a methodological study preliminary to the development of a medical-history questionnaire and appropriate interviewing techniques for use in a health examination survey of adults in general population samples. The research was conducted by the Survey Research Center of the University of Michigan under contract with the U. S. National Health Survey of the Public Health Service.

### Objectives of the Study

The questionnaire to be developed was to be used for two general purposes:

1. To obtain information about symptoms and illnesses which would assist in arriving at diagnostic conclusions in physical examinations of persons included in survey samples.
2. Together with the physical examination, to obtain certain data for statistical analysis on the frequency of symptoms and illnesses and related variables of a cross-section sample of the population.

This particular research study was not concerned with the full development, from beginning to end, of an all-purpose medical-history-questionnaire form and procedure. Certain preconditions and limitations were given in advance, and certain special purposes defined. Further, the developmental work here described was to be preliminary to additional tests under actual health examination survey conditions and the final forms and procedures that might emerge were to be the resultant of all these steps.

For the study reported here the National Health Survey posed several specific questions which served as the major objectives of the research.

1. Will a general cross-section sample of respondents discuss their symptoms and illnesses when the interview is not initiated by them and when no medical help can be expected as a result.
2. Is it possible to develop a fixed, standardized questionnaire and interviewing techniques which are applicable to and understood by all respondents? It was not intended to develop a

complete, self-contained diagnostic instrument, but rather an instrument which would save a physician time by providing consistent medical-history information. It was expected that the physician would wish to amplify the history information during the examination. The question was whether a standardized history prior to the physical examination would provide enough useful indications to justify its inclusion in a survey based primarily on physical examinations and clinical and physiological measurements. The fact that the data from the health examinations would be used to obtain statistical information on the frequency of illnesses and symptoms for the population would require the use of standardized techniques throughout the examination including the history-taking procedures.

3. If some form of medical-history-taking procedure provides a sufficient number of pathological indications to be apparently useful, are the reported symptoms and indications adequately reliable? In this context "reliable" is not used to mean accuracy but rather whether or not the responses are consistent from time to time—reflecting a stable situation or condition and not merely transitory or random answers. The significance of the responses can be subsequently judged when taken in conjunction with other data collected.

4. Can nonmedical trained interviewers obtain as much information on disorders and symptoms as nurses? It was thought that nurses, even if not in uniform, might obtain more complete information from respondents than would trained lay interviewers because the nurses' greater medical knowledge and experience would enable them to understand respondents' statements and to clarify the information reported. In addition, it was thought that uniformed nurses are perceived by the respondent as being well trained and able to understand medical problems; and that respondents, therefore, might feel freer to com-

municate personal medical problems to them than to persons who are not nurses. On the other hand, since nonmedical trained interviewers are more readily available than nurses, there could be a more advantageous use made of the nurses' time if lay interviewers could obtain adequate information.

5. What general type of questionnaire obtains the greatest amount of information? Three general types of questionnaire were considered to be appropriate for obtaining medical histories. Two require the use of an interviewer and the third is a self-administered form. If self-administered questions could be used, it would result in saving considerable time and resources. A self-administered form can be administered in a shorter time than either of the questionnaires which require interviewers. In addition, the self-administered form does not require any particular skill and training on the part of the administrator.

Two types of interviewer-administered forms were to be developed and tested: one using mainly open questions, the other mostly closed questions. Open questions require the respondent to relate his symptoms and illnesses without specific prompting; closed questions comprise a checklist from which the respondent selects one of two or more choices which best represents his position.

The open-question form is widely used in survey research to obtain information of particular importance or relevance from the respondents' point of view. Also, when the respondent talks freely about a topic, the researcher is able to see the interrelationships of this topic with others, to see their importance to the respondent, and generally to obtain some insight into the meaning and significance of the responses. On the other hand, the analysis of the open question is frequently difficult and time consuming.

The closed question, presumably, yields a greater reported frequency of any particular

symptom since it reminds the respondent of things which he might not think to mention in the open question. The closed question gives specific yes and no answers and standardizes the procedure. Coding and analysis of the information is easier.

## Assumptions Underlying the Research

As has already been mentioned, the purpose of this research project was not to design an instrument which would by itself yield accurate medical diagnoses. It is assumed throughout this study that the objective is to obtain information which the respondent has, or thinks he has, about himself. Such information may be medically correct or incorrect, significant or unimportant. The aim was to get as complete a history as possible, leaving it to the physician to evaluate the responses. The criterion for success was the number of symptoms or the number of illnesses which the person reported. It is assumed that it is better to obtain false positives than false negatives.

Ideally, the exploration of the various problems should be carried out in such a way as to permit definitive statistical tests of significance. Such conclusive testing was not feasible because the low incidence of most symptoms and illnesses would require a sample much larger than was practical to arrive at proven conclusions. The final analysis is a compromise, combining both objective measures and subjective evaluation. The primary question, namely, whether a standardized medical-history-taking procedure can be

sufficiently useful to justify its inclusion in a health examination survey must remain largely a matter of judgment.

The subject matter of the interviews, including the general topics to be included in the history, were not variables in this research and were specified in advance by the National Health Survey staff. The topics were selected to conform to the objectives of a proposed special purpose health examination survey. The history was not meant to be complete, but to focus on certain clusters of diseases and symptoms. The primary focus was on heart disorders, hypertension, diabetes, rheumatism and arthritis, and associated symptoms.

Several separate types of investigations were conducted. The first was a series of developmental interviews to derive a preliminary form and wording of the questions. About 125 interviews were taken for this purpose. The second set of investigations consisted of experimental field trials including 224 interviews in which the various questionnaires, techniques of interviewing, and types of interviewer were tested using overlapping samples. This report covers the series of developmental interviews and the experimental field trials.

Subsequent to the work described in this report, the findings and conclusions arrived at here formed the basis of a preliminary history form and procedure to be tested under actual survey conditions in a series of pretests of a survey operation based on medical examinations. The results of these pretests are not reported here.

## THE DEVELOPMENTAL INTERVIEWS

Initially, a series of preliminary interviews were conducted for the purpose of developing three provisional questionnaires; an open-interview form, a closed-interview form, and a self-

administered questionnaire. The development of these questionnaires served to provide answers to some of the more general problems being studied and the questionnaires were then utilized in testing

some of the specific hypotheses. A relatively crude set of questions was used at first to determine whether respondents would talk about their medical problems to nonmedical interviewers and as a first step in determining whether it was possible to standardize questions about symptoms and illnesses which most respondents would understand and accept.

Six interviewers were employed in these developmental interviews. All were well trained in interviewing techniques and had had several years' experience in survey interviewing. None had had previous experience in medical interviewing. A special training session was held to instruct them in the meaning of each question, and to provide definitions of the terms used in the questions.

Following this training, a first round of 24 interviews was arranged with each of the 6 interviewers taking four interviews with respondents of varying ages and educational, occupational, and income levels. An equal number of men and women were interviewed. The interviewers were instructed to record verbatim any comments which indicated failure to understand the questions, any questions which respondents asked, or any other pertinent comments. In addition, interviewers were urged to experiment with different wording in an attempt to devise questions which better communicated the desired queries to the respondent. Whenever possible, interviewers asked the respondents to clarify their use of terms; whether the respondents understood particular words; and asked respondents who had symptoms how they would describe them, etc.

Following this first round of interviews, conferences with the interviewers were held in which each question was analyzed to determine whether respondents readily understood the question, whether they could easily respond to it, whether they were embarrassed by it, and so forth. On the basis of this first experience, it seemed clear that it would be possible to develop a standard-

ized series of special purpose medical-history-taking questions, and that survey respondents do not hesitate to answer such questions. In fact, people seemed delighted to have the opportunity to talk about their symptoms and illnesses. The answer to the first question under study—namely, would people freely discuss their medical history in a situation in which they had not taken the initiative in seeking medical care—seemed obvious. There were no apparent major barriers to obtaining medical-history data for research purposes. Subsequent interviews sustained this general conclusion.

It was also found that many of the preliminary questions were inadequate for the purpose for which they were intended. On the basis of the interviewers' comments and an analysis of the reports, a second draft of the set of questions was prepared which was used as the basis for another round of interviews. Again, interviewers' comments and a tabulation of the information which the interviewers obtained were studied, and again, questions were reworded and the order of questions changed. This sequence of interviewing and analysis continued until it was felt that each question met the objective for which it was devised, that each question was understood and accepted by virtually all respondents, and that the interviewers felt at ease in using the completed schedule. In all, about 10 separate drafts were tested.

The responses for the last three of these rounds of interviewing were tabulated to provide a frequency response for each question in order to give a clearer picture of the responses.

Several times during the evaluation procedures, the questions were checked with physicians on the staff of the National Health Survey and at the University of Michigan.\* This process was

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\*Acknowledgment is made particularly for the assistance of Thomas Francis, Jr., M.D., Frederick Epstein, M.D., Robert J.M. Horton, M.D., Horace J. Dodge, M.D., and Charles A. Metzner, Ph.D. of the School of Public Health, University of Michigan.

used to maintain an accurate medical orientation; and to be sure that the questions were obtaining the type of responses which might be of significance to an examining physician.

## Findings From the Developmental Interviews

The series of developmental interviews resulted in a number of findings relating to questionnaire formation and question sequence, possibilities of standardization of medical-history forms for research purposes, and the character of respondents' replies. In the first round of interviews the questions followed a "logical" sequence, asking first whether the respondent suffered from a particular illness and then whether he had symptoms associated with that illness. The first interviews showed that respondents had a tendency to develop a "set," so that if they reported having an illness they tended to answer "yes" to symptoms which followed it in order to appear consistent. When symptom and illness questions were placed in different sections of the questionnaire, respondents seemed to respond to them more objectively or independently. Also, it was apparently easier for respondents to report on symptoms than on more complex illnesses. For these reasons, symptoms were put first in subsequent revisions of the questionnaires.

For similar reasons, the "easy" or more common symptoms were placed at the beginning of the questionnaire. For example, headaches and nosebleeds were asked about before blood in urine or in bowel movement, since experience indicated that personal or sensitive questions should be asked only after the respondent has become used to the interviewer and the types of question which is being asked.

At this stage, also, a set of follow-up or probe questions were developed which would describe more completely the symptoms and illnesses. It

was hoped to identify the attributes which would be most meaningful to a physician and also to the respondent, but it was also important to include only attributes which respondents could report reliably. Many attributes were tested but, finally, four attributes were evolved as being most descriptive and medically significant for symptoms, and four for diseases. The symptom attributes and the probes for symptoms are shown below:

<u>Attributes of Symptoms</u>	<u>Symptom Attribute Probes</u>
1. Frequency	Do you usually get (this symptom) every few days or not as often as that?
2. Intensity	Does it bother you just a little or quite a bit?
3. Attributed cause	Do you have any idea what causes this?
4. Description	Tell me, how it feels?

In early drafts 3-point and 5-point measurement scales were used for the probes on frequency and intensity. However, a 2-point scale was found to be easy to use and meaningful to respondents; it readily differentiated "serious" from less serious symptoms for them. In most cases respondents were unable to make finer discriminations.

The probes on attributed cause and description did not always obtain revealing answers, but seemed sufficiently rewarding to be included. An example will illustrate the sequence of questions used for symptoms.

Have you had backaches or pains in your back in the past few years?

Yes  No

(If the response is "Yes")

Do you usually get these pains every few days or not as often as that?

Every few days  Less often

When you have these pains does it bother you just a little or quite a bit?

Just a little  Quite a bit

Do you have any idea what causes these pains?

Tell me how it feels. \_\_\_\_\_

The main question (e.g., Have you had backaches or pains in your back in the past few years?) is worded, purposely, to be broadly inclusive, both with respect to time and in severity of symptoms. This follows the assumption stated earlier that it is better to obtain false positives than false negatives. The probes which follow the main question help to describe more clearly the possible significance of the symptom.

In similar manner standard attributes for illnesses were evolved. These attributes and the probes used to investigate them are as follows:

<u>Attributes of Illnesses</u>	<u>Illnesses Attribute Probes</u>
1. Basis for response	What makes you think you have <u>(this illness)</u> ?
2. Professional or lay diagnosis	Did a doctor tell you that you had _____?
3. Symptoms	In what ways does it bother or affect you?
4. Duration	How long ago did you start having _____?

As in the symptom questions, the illness questions were asked in a very inclusive way. For example, for heart conditions there were two main questions:

Do you have any reason to think that you may have any kind of heart trouble?

Have you ever had any heart trouble?

If either of these were answered affirmatively the illness attribute probes were asked. For some illnesses other specific probes were included, such as questions on treatment, medication, or diet where it was thought that the information would be especially revealing.

On the basis of the series of developmental interviews, three history-taking procedures and forms were developed for use in subsequent field trials to investigate questions of the reliability and effectiveness of the different procedures and forms. These three questionnaires are:

1. The closed-interview form—this questionnaire comprises a series of specific ques-

tions to be used as the basis of a structured interview. Most of the questions could be answered by choosing an appropriate response from alternatives suggested. For symptoms or illnesses reported, certain probe questions are asked.

2. The self-administered form—this form is nearly identical in content to the closed-interview form and consists of a specific series of questions—the answers to which could be filled in by the respondent himself, mostly by checking boxes for indicated alternative replies. As appropriate, additional check boxes relating to probe questions are to be used whenever the existence of symptoms or illnesses are checked.

3. The open form—in the open form, instead of being asked questions about specific symptoms and illnesses the respondent is asked general questions giving him the opportunity to mention spontaneously health conditions which bother him. As further stimuli, questions are asked which focus attention on various parts of the body. For each symptom or illness reported, the interviewer asks the probe questions used in the other two history-taking procedures.

## Conclusions From the Developmental Interviews

In addition to the preparation of the three forms to be used in the studies of reliability and procedure, the developmental interviews contributed some information to the main objectives of the study. One of the first objectives was to determine if a general group of respondents would discuss their symptoms and illnesses for the purposes of co-operating in a research project as distinct from the purpose of seeking medical advice and help from a physician. The developmental interviews indicated that there seemed to

be no obvious barriers to obtaining the co-operation of respondents for such purposes.

A second objective was to determine if it seemed feasible to develop and use a standardized medical-history-taking procedure for specified and limited research purposes that would be understood by and applicable to a general cross-

section group of respondents. The developmental interviews gave favorable indications that this was possible and that satisfactory responses could be obtained.

These tentative conclusions were further substantiated in the subsequent field trials.

## DESIGN OF EXPERIMENTAL FIELD TRIALS

The three questionnaires prepared as a result of the developmental interviews were used as a basis for providing data to answer the questions stated earlier relating to (a) the reliability or consistency of the obtained information, (b) the relative advantages of nurse interviewers and trained lay interviewers, and (c) the relative effectiveness of the self-administered, and interviewer-administered open and closed forms.

It was decided that some type of experimental design would be better suited to testing the hypotheses and objectives of this study than a straight cross-section sample. It was desirable to use matched groups so that full advantage could be taken of the small samples for more adequate control. It was also clear from the developmental interviews that difficulties in interviewing, if they were to occur, would be found more frequently in particular segments of the population. Specifically it was felt that the research design should include an overrepresentation of lower socioeconomic segments of the population as well as of those segments which might present cultural, language, or literacy problems. These groups would find it most difficult to understand the questions and to find the best words to communicate their medical problems.

### The Interviewers

Eight interviewers were selected. Four were trained lay interviewers who had participated in

the developmental interviewing and had had several years of interviewing experience on cross-section sample studies. Since it was desired to compare interviews taken by nurses with those taken by trained lay interviewers, four nurses also were hired. Two of these nurses were in private duty, one was in industrial nursing, and one was a public health nurse. All had had a number of years of experience in their particular branches of nursing. As described below, for certain of the interviews the nurses were in uniform and for others they wore "civilian" dress. The nurses were given a week's intensive training in interviewing principles and techniques. The interviewing techniques will not be described here since they have appeared in other sources.\* In general the techniques are nondirective and the interviewers' probes nonbiasing. Such techniques are designed to obtain comparable data from respondent to respondent.

After training, the four nurses were assigned to work on another study (not a medical study) to give them additional interviewing work so that their experience might be comparable in some degree to that of the trained lay interviewers. At the end of several weeks of such training and ac-

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\*The techniques of interviewing used in the survey are described in the Survey Research Center's Manual for Interviewers. More intensive description of the theory and techniques appears in The Dynamics of Interviewing, by R. L. Kahn, and C. F. Cannell, John Wiley, 1947.

tual interviewing experience, all eight interviewers were brought together and given specific instructions on the medical-history questionnaires. All interviewers took approximately four practice interviews on each of the three forms prior to any actual field work. These interviews were reviewed by the research staff and were discussed with the interviewers. A final session was held in which problems of technique and question procedure were smoothed out. After this, the interviewers started on the field interviewing used in the analyses given in this report.

### The Sample

Two settlement houses\* and two housing projects provided lists of their members between the ages of 25 and 65, designated by sex. The groups chosen represented widely divergent groups of nationalities and cultures. One group was in a relatively high-income area of Detroit and was selected in order to be sure that in attempts to word questions which could be understood by the lower socioeconomic groups, rapport would not be lost with the more highly educated segments of the population.

As explained below, samples of different sizes were used for the several different experimental designs. However, table 1 describes the characteristics of the total group which was interviewed. In education and occupation the group was considerably below the national average. In age they were somewhat older than the average and a higher proportion of nonwhites was represented.

### Preliminary Steps

Before the interviewing began, a letter was sent to each of the respondents describing the

Table 1. Percent distribution and description of group, 25-64 years of age, used in experimental field interviews

Description of group	Percent distribution
<u>Race</u>	
Total-----	100
White-----	83
Negro-----	12
Other-----	5
<u>Education</u>	
Total-----	100
Some high school or less-----	85
High school graduation or more	9
Not ascertained-----	6
<u>Occupation</u>	
Total-----	100
Operatives, clerical, sales---	41
Service workers and laborers--	15
Housewives-----	19
Others-----	25
<u>Age</u>	
Total-----	100
Under 50-----	78
50 and over-----	22
<u>Sex</u>	
Total-----	100
Male-----	50
Female-----	50
<u>Marital status</u>	
Total-----	100
Single-----	2
Married-----	83
Widowed-----	7
Divorced or separated-----	8
<u>Number of children</u>	
Total-----	100
None-----	10
1 or 2-----	34
3 or more-----	56

\*The Federation of Settlement and Neighborhood Centers of Metropolitan Detroit agreed to assist in getting suitable lists of respondents. Appreciation is due to Mr. John Bartholomew, President of this organization, for his assistance in obtaining lists from which the sample respondents could be taken.

study and telling him that he was selected as a part of a random sample for this interview. When the interviewers arrived at the household, they intro-

duced themselves and stated that they were from the Survey Research Center of the University of Michigan. They informed the respondents that they were conducting a study for the U. S. Public Health Service for the purpose of finding out about the health of the population, and the types of physical problems people suffer from. They assured the respondents of anonymity, and informed them that their names were selected at random from lists of Community Center and housing project participants. Since the experimental designs called for reinterviewing, respondents were told at the conclusion of the first interview that the interviewer would like to return in about a week and ask some more questions. It was explained that there were other points the Public Health Service wanted to investigate.

At the beginning of the second interview respondents were told that some of the questions would be something like ones he had answered in the previous interview and some would be different. Most respondents were very co-operative and appeared to enjoy the interview. Only one respondent who gave the first interview refused to co-operate in the second although other second interviews were lost for other reasons.

## **Design to Test the Effectiveness of the Questionnaires**

One important purpose of the field trial was to test the effectiveness of the three questionnaire forms (open-interview, closed-interview, and self-administered) which resulted from the developmental interviews. The experimental design should allow tests of the reliability or consistency of the results as well as the relative efficiency of the different types of forms in eliciting diagnostic clues. It was considered to be inefficient to assign each of the three forms to independent samples and then to attempt to compare the results to assay the differences. Many symptoms and illnesses occur with such small fre-

quencies that there would be very few cases of each. Instead, a design was made in which each respondent was interviewed twice, using different types of questionnaires. In this kind of design possible learning effects or boredom effects of reinterviews covering essentially the same information present a potential difficulty. Accordingly, although it was necessary to test three questionnaire forms, it was considered not feasible to interview the same people three times. Accordingly, the design provided that each respondent be interviewed twice with varying combinations of two of the three forms. In this way, a direct comparison of the results of two questionnaire forms used with the same people was possible.

The first and second interviews were administered a week to 10 days apart. In order to control any educational or boredom effect which might exist, half of the respondents for each pair of questionnaires were given interviews using the two questionnaire forms in one order and the other half in the reverse order. For example, one group of respondents was given the open-interview form and then a week later the closed-interview form; while another group was given the closed-interview form and a week later the open-interview form, and so forth.

The lists of respondents were stratified by sex. Within each stratum respondents were selected at random. Each selected respondent was then randomly assigned a pair of two different forms. Since the design required the same number of interviews for each interviewer in each subgroup, interviewers were provided with alternate names in case the original person could not be interviewed. Also, if a person was interviewed once and could not be interviewed a second time, the first interview was discarded and a new name was selected for both a first and second interview. Of the original selections, 22 respondents were not interviewed, either because they could not be located or because they refused to be in-

interviewed. The patterns of questionnaire assignment are shown in table 2.

As table 2 indicates, the three combinations of paired forms and the same three combinations in reverse order were used in the interviews for

a total of six patterns of questionnaire assignments. This design permitted a comparison of the information given by a respondent at two different times on two different questionnaire forms.

**Table 2. Number of pairs of interview assignments by type of questionnaire\* and interviewer**

(Each pair consists of an interview with one type of questionnaire followed by another interview with the same respondent using another type of questionnaire)

**A. Nonmedical trained interviewers**

Interviewer number	Total interviews	Number of pairs of interviews					
		Type of questionnaire and order of use*					
		A then B	B then A	A then C	C then A	B then C	C then B
1-----	24	2	2	2	2	2	2
2-----	24	2	2	2	2	2	2
3-----	24	2	2	2	2	2	2
4-----	24	2	2	2	2	2	2
Total----	96	8	8	8	8	8	8

**B. Nurse interviewers**

Nurse number	Total interviews	Number of pairs of interviews - not in uniform						Inter-views with nurses in uniform
		Type of questionnaire and order of use*						
		A then B	B then A	A then C	C then A	B then C	C then B	A
1-----	24	2	2	2	2	2	2	8
2-----	24	2	2	2	2	2	2	8
3-----	24	2	2	2	2	2	2	8
4-----	24	2	2	2	2	2	2	8
Total	96	8	8	8	8	8	8	32

\*Type of questionnaire:  
(A) closed interview, (B) self-administered, (C) open interview

**Design to Compare Interviews of Nonmedical Trained Interviewers and Nurses**

Another major objective of this study was to compare the results of interviews taken by nurses

not in uniform and by nonmedical trained interviewers. To make this comparison the design just described was extended to include the two types of interviewers. The sample of names from each settlement house was divided into random halves, one half being assigned to the trained lay

interviewers and the other half to the nurses. Thus a balanced design, permitting both the comparison of type of questionnaire and type of interviewer was obtained. Table 2 shows this design in detail.

A third comparison was made between nurses not in uniform and nurses wearing uniforms. The effects of the uniform would not be relevant to the self-administered form, and since item by item comparisons cannot be made with the open-interview form, this comparison was made for only one questionnaire form—the closed interview. For this test 32 additional respondents were drawn in the same way as were the previous two groups, using the same lists. These 32 respondents were interviewed once.

It was felt that the surest and most economical way to maintain the co-operation of the sample of respondents once it had been selected was to interview them in their own homes and all interviews except those taken by nurses in uniform were taken in the homes of respondents. In the case of nurses in uniform, this procedure was not feasible. The nurses themselves felt that it would be incongruous to go to a respondent's home in a white uniform and cap to take an interview. For this part of the study, the respondents were approached by the trained lay interviewers who asked

them to come to the settlement house nearest their home. At the settlement house, interviews were conducted in a private room by a nurse in uniform.

The total number of interviews taken for each type of questionnaire form and given by each type of interviewer are summarized in tables 3 and 4.

Table 3. Number of interviews for each questionnaire form

	A	B	C
Number of forms to be taken			
1st-----	32	32	32
Number of forms to be taken			
2nd-----	32	32	32
Nurse-uniform interviews----	32	-	-
Total interviews-----	96	64	64

NOTE: A closed-interview questionnaire.  
 B self-administered questionnaire.  
 C open-interview questionnaire.

Table 4. Total number of interviews by type of interviewer

By lay interviewers-----	96
By nurses not in uniform-----	96
By nurses in uniform-----	32
Total-----	224

## RELIABILITY OF RESPONSES

An acceptable medical history-taking procedure must have a sufficiently high level of reliability. In this context, "reliability" implies consistency of reporting so that there can be confidence that the responses reflect a stable situation or condition and are not merely fleeting, transitory, or random answers. If the same response is given twice over a period of time, there can be some assurance that the questions were considered seriously, that they were understood, and they invoke stable responses.

While an adequate degree of reliability is the first required condition for a satisfactory procedure, it should be distinguished from accuracy or validity of the reported information. A response may be given consistently, but still be inaccurate. This investigation of medical-history-taking procedures is not, however, concerned with questions of accuracy. It is assumed that the function of a medical history prior to a physical examination is to provide a number of medical clues and indicators, the accuracy and significance of which

are subsequently evaluated. This second step cannot be taken, however, unless the clues provided to the physician have a satisfactory degree of consistency or reliability.

Questions of reliability can be examined in this study in several ways. In the first place since the self-administered and the closed-interview forms have similar questions, comparisons can be made between the results of these two forms after successive use with the same group of people. A different and more rigorous type of evaluation can be made by comparing the reports contained in two forms, item by item, for the same individual.

### Comparison of First Questionnaire Administration With Second Administration

The first analysis made was a comparison of the results of the first and second reports of symptoms and disorders. Each respondent reported twice, the interviews being administered about a week apart.

This section deals with interviews using both the self-administered and the closed-interview form. The questions in the two forms were identical for most items. In half of the cases reported, the self-administered form was administered first, followed by the closed-interview procedure. In the other half, the closed interview came first, and the self-administered form second.

There were two questions to be answered by this analysis. The first question was, is there evidence of a general educational or "interview" effect in the second report? It is sometimes found in survey research that panel studies develop biases because of repeated interviews. One reason for this bias seems to be that respondents learn from the first interviews, or at least are sensitized by the first exposure, and report differently in the second interview. It was expected

that in later analyses all of the data could be combined from all self-administered and all closed-interview forms regardless of whether they were administered first or second in the series. This could be done only if there were no evidence that the first response seriously affected the second. The second question to be answered by this analysis relates to the general reliability, or consistency of reports.

Table 5 shows the number of types of symptoms and illnesses reported by 64 respondents for the first administration and by the same 64 respondents for the second administration. Although both first and second reports are from the same respondents, each administration is based half on self-administered forms and half on closed-interview forms. Symptoms are grouped according to the illness to which they are possibly related according to medical judgment. Grouping in broad

Table 5. Comparison of average number of reported symptoms or diseases per respondent obtained in first and second administration\*

Symptom or disease	Average number of reported symptoms or diseases per respondent	
	First administration	Second administration
Possible heart disease symptoms----	1.7	1.5
Possible hypertension symptoms----	0.9	1.0
Possible rheumatism and arthritis symptoms-----	1.6	1.5
Miscellaneous symptoms-----	1.1	1.0
Childhood diseases-	2.8	3.0
Miscellaneous diseases-----	1.2	1.2

\* Sixty-four respondents in each administration; one half of both administrations were self administered, the other half were closed interviews.

categories was necessary because of the low incidence of any single symptom or disease.

The results indicate that there was no important interview or educational effect as a result of the two questionnaire administrations. The differences in the number of symptoms and illnesses reported in the two administrations were small and not consistently in one direction. The group seems to have been stable in reporting these items.

### Comparison of Results of Two Different Forms With Same Respondents

In the preceding section comparing the results of the first and second administrations, the apparent stability of report may result from compensating errors which would lead to a spuriously high agreement. If 10 persons report the existence of heart symptoms each time, these may not be the same people.

A more stringent test of reliability is a comparison of the reports of the same individual on the same item from one time to another. Tables 6 and 7 make this comparison. Actually the test is not perfect since half of the respondents were given the self-administered form followed by the closed-interview form and the other half had the order reversed. Therefore, differences will reflect both the effects of the two administrations and the two forms.

The illnesses and symptoms selected were those of primary interest to the National Health Survey for use in survey health examinations, and some others which showed relatively high incidence.

An "index of agreement\* between the two forms" was calculated. Thus perfect agreement

would yield an "agreement index" of 10 and a lack of any agreement, zero. Table 6 shows that reliability of report as indicated by the index of agreement of the replies on the two forms administered to each person was very high for these illnesses. All indexes but one were above 9.0. The exception was an index of 8.1 for rheumatism or arthritis. It is not surprising that this item should

Table 6. Index of agreement of closed-interview and self-administered form for disease conditions by the same respondents

(Number of persons = 32)

Condition	Total number of persons reporting disorder on either form	Index of agreement between the two forms
Allergy-----	3	9.1
Chest trouble-----	4	9.1
Heart trouble-----	2	9.7
High blood pressure	2	9.1
Hemorrhoids-----	10	9.1
Hernia-----	7	9.1
Kidney or bladder trouble-----	5	9.7
Nervous breakdown--	3	9.7
Rheumatism or arthritis-----	11	8.1
Varicose veins-----	6	9.4

NOTE: The following illustrate the type of questions which were asked on the closed questionnaire and on the self-administered form about illnesses.

Do you have any reason to think that you may have high blood pressure?

(If no) Have you ever had high blood pressure?

Do you have any reason to think that you have any kind of heart trouble?

(If no) Have you ever had heart trouble?

$$* \text{Index of agreement} = \frac{\text{Number of persons giving the same response on both forms}}{\text{Total number of respondents}} \times 10$$

be one to show the lowest reliability. Probably for the layman this illness is not well defined. Respondents, being unsure of their own condition, tend to show greater variation in reports from one time to another.

Table 7 shows the comparisons according to the same type of index computed for reported symptoms. In this table there is a greater variability in agreement between the two reports than for illnesses. At one extreme, for swollen ankles, the agreement is perfect; while at the other extreme, for backaches, the index of agreement is 6.2 or only about 60 percent.

There are various possible explanations for the differences. With the exception of headaches, there appears to be direct relationship between the level of reported frequencies of the symptom and the stability of the report as indicated by the index of agreement. Swollen ankles and trouble in breathing show the greatest stability and the lowest incidences. Backaches and joint pains have the largest variability and the highest incidence. Since the index used takes account of consistent negative responses as well as consistent positive responses, the numerical value of the index is partly dependent on the prevalence of the symptom or disease. Accordingly, the differences may partially reflect merely the differences in prevalence. However, other reasons may explain some of the variability. The symptoms which showed greatest variability tend to be transitory and minor. Either they may not be painful or they may not be psychologically disturbing because of the respondents' perceptions that they do not imply serious medical problems. In these questionnaires, respondents were told to report a symptom no matter how slight or infrequent. As a result if a person had had a mild backache just before one interview he may have reported it, but he may have forgotten it by the next interview. It is also characteristic that the symptoms reported with higher reliability were more clearly defined.

Table 7. Index of agreement of closed-interview and self-administered form for symptoms for the same respondents

(Number of persons = 32)

Symptom	Total number of persons reporting symptom on either forms	Index of agreement between the two forms
Swollen ankles-----	5	10.0
Headaches-----	29	9.1
Trouble breathing--	4	9.1
Nosebleeds-----	8	8.8
Chest or heart pains-----	9	8.8
Joints swelling----	5	8.8
Heart acts funny---	13	8.1
Noises in ears-----	12	7.8
Leg cramps and pains-----	18	7.5
Joint stiffness----	13	6.9
Joint pains-----	21	6.9
Backaches-----	25	6.2

NOTE: The following illustrate the type of questions which were asked on the self administered and closed questionnaire regarding symptoms.

At any time over the past years have you had any pains or soreness in your joints?

[yes] [no] [?]

Do you ever have pains or cramps in your legs?

[yes] [no] [?]

In the past few years have you had any pains, discomfort, or trouble in or around your heart?

[yes] [no] [?]

Each positive response is followed with the following probes.

How often? [Every few days] [less often]

Do they bother you? [Quite a bit] [just a little]

One can observe swollen ankles and nosebleeds, whereas joint pains or backaches are more subjective.

## Reliability of Reported Severity of Symptoms

Up to this point only the reliability of the respondent's report of the presence or absence of a disease condition or symptom has been considered. Each person reporting a symptom was asked also about the frequency of occurrence and the degree to which the symptom bothered him. The probe questions were: "Do you have this every few days or not as often as that?" and, "Does it bother you just a little or quite a bit?"

Table 8 shows the agreement index for the severity of the symptom. Four common symptoms are used in this comparison. The index is a measure of the degree of consistency with which people place themselves in the same category from one interview to the next. To be consistent the respondent had to give the same response twice; either he did not have the symptom, he had it and it bothered him only a little, or he had it and it bothered him a good deal. It could be expected that this index of agreement would be lower than that reported in table 7 since there is the possibility of one more degree of inconsistency. In general this turns out to be the case. For noises in the ears the agreement remains essentially the same; for the other symptoms it is substantially lower.

The last column of table 8 shows the same computations for three levels of frequency of symptoms. The respondent does not have the symptom, he has the symptom only occasionally, or he has the symptom frequently. The level of agreement is generally consistent with information on the severity just reported.

One further computation was made for these same symptoms. Since respondents were encouraged to report the presence of a symptom no matter how minor, it is not surprising that the reliability of report was lower than for illnesses which may be expected to be more clearly defined.

Table 8. Index of agreement of severity and frequency of four common symptoms using three degrees of severity\* and three degrees of frequency\*\*

Symptom	Severity of symptom	Frequency of symptom
Backaches-----	5.0	6.2
Headaches-----	6.6	7.2
Joint pains-----	5.6	5.9
Noises in ears-----	7.5	7.2

\* (1) Symptom bothers quite a bit, (2) just a little, (3) never.

\*\* (1) Symptom occurs every few days, (2) less often, (3) never.

Table 9. Index of agreement of severity and frequency of four common symptoms using two degrees of severity\* and two degrees of frequency\*\*

Symptom	Severity of symptom	Frequency of symptom
Backaches-----	7.5	9.4
Headaches-----	7.2	7.8
Joint pains-----	8.1	8.4
Noises in ears-----	9.4	9.1

\* (1) Symptom bothers quite a bit, (2) just a little or never.

\*\* (1) Symptom occurs every few days, (2) less often or never.

Therefore the index of agreement was computed for only those symptoms which the respondent reported as occurring frequently or which caused considerable bother. Those reported as occurring infrequently and as bothering only slightly were combined with the "no" responses. Table 9, based on this computation, shows that the levels of agreement are generally higher than those seen in table 7, which reported merely the presence or absence of the symptom. The reliability compares favorably with the reliability of illnesses seen in table 6.

The significance of these findings for a health survey is primarily a medical one. The reliability of report on symptoms can be increased by asking only for serious or frequent symptoms. On the other hand, by thus limiting the questions many symptoms will not be reported, and these may have important medical meanings. It may be concluded that information on symptoms should be asked in a general way, using the information gained by the probes to assist the physician in determining their significance.

## Conclusions on Reliability

Respondents' reports made one to two weeks apart showed a relatively high degree of reliability, even with different techniques of data collection. Reports on illnesses were quite reliable. For symptoms, reliability showed greater variability, with some symptoms showing quite low reliability. There is evidence that serious symptoms and symptoms with physical signs were reported with a higher degree of reliability than others.

## COMPARISON OF INTERVIEWS TAKEN BY NURSES AND NONMEDICAL TRAINED INTERVIEWERS

One of the objectives of this research study was to find out whether the medical history could be obtained more adequately by nurses than by non-medical trained interviewers. The test was important for the practical reason that nonmedical trained interviewers would presumably be more available in the field situations throughout the country if surveys involving health examinations were to be conducted at a large number of sites. In addition, in an examining situation there could be a saving of the nurses' time if the history taking could be done by persons other than the nurses. A subsidiary question was whether nurses, dressed in their professional uniforms, would constitute more effective interviewers than nurses not in uniform.

It was felt that nurses might obtain more complete information for the following reasons:

1. Nurses, because of their medical training, might be able to understand better the respondent's description of his medical problems. If so, the result would be more complete information reported in the medical history record.

2. Respondents might feel freer to talk about their medical problems with nurses than with persons who were not nurses.

The experimental design to test these questions has been described earlier, and as has been mentioned, four nurses were trained in interviewing techniques and in the administration of medical-history questionnaires. The comparisons reported below are for first interviews taken with the closed-interview form by lay interviewers, by nurses in civilian dress, and by nurses in uniform. The questions were not explored with reference to the open-interview and the self-administered forms.

Table 10 is based on the reported symptoms which showed the highest over-all frequencies. Respondents were asked whether they ever had the symptom; those who reported that they did have it were asked whether they had the symptom every few days or not as frequently. This table summarizes the results obtained from these two questions for four symptoms of greatest over-all frequency.

Since the same number of respondents (32) were interviewed by each type of interviewer, the data can be reported in frequencies rather than in percentages.

The data in table 10 show no evidence that nurses, either in uniform or not, obtained higher

Table 10. Comparison of frequency of specific symptoms of interviewers, nurses, and nurses in uniform on closed-interviewer form

	Number of interviews	Never has symptom	Has symptom less often than every few days	Has symptom every few days
<u>Joints stiff</u>				
Interviewers-----	32	24	5	3
Nurses-----	32	22	6	4
Nurses in uniform-----	32	28	2	2
<u>Joint pains</u>				
Interviewers-----	32	18	13	1
Nurses-----	32	15	15	2
Nurses in uniform-----	32	18	9	5
<u>Joint swelling</u>				
Interviewers-----	32	25	6	1
Nurses-----	32	28	2	2
Nurses in uniform-----	32	29	2	1
<u>Backaches</u>				
Interviewers-----	32	10	19	3
Nurses-----	32	15	15	2
Nurses in uniform-----	32	14	15	3

frequencies of symptoms than did lay interviewers. There is a slight indication that the reverse is true.

If the four symptom reported are added together, the numbers reporting positive symptoms are greatest for the lay interviewers, next for nurses not in uniform, and least for nurses in uniform. The numbers are not large enough to exclude the possibility that the observed differences are a result of chance. In any event, there is no evidence that nurses, or nurses in uniform obtain better results than lay interviewers. As may be seen by adding the figures for the different symptoms in table 10, a total of 51 symptoms were reported to interviewers, 48 to nurses, and 39 to nurses in uniform.

Table 11 is a summary of the number of all reported symptoms grouped into four main types.

The body of the table gives the frequency distribution of interviews by the number of symptoms of each type reported for the three classifications of interviewers. The last column shows the average number of each type of symptom obtained. As in table 10, nurses did not obtain a greater frequency of symptoms than did the lay interviewers. Again it is seen that the data indicate that there is a tendency for lay interviewers to obtain the greatest number of symptoms, and for nurses in uniform to obtain the smallest number. The average frequency for all four types of symptoms together is as follows:

Lay interviewers	5.0
Nurses	4.7
Nurses in uniform	3.8

Table 11. Comparison of lay interviewers, nurses, and nurses in uniform according to number of reported symptoms by type

	Number of interviews	Frequency distribution of interviews by number of symptoms reported						Average number of symptoms per interview	
		0	1	2	3	4	5		6
<u>Rheumatic and arthritic symptoms</u>									
Interviewers-----	32	5	11	10	4	2		1.6	
Nurses-----	32	6	12	7	5	2		1.5	
Nurses in uniform-----	32	9	12	7	3	1		1.2	
<u>Hypertension symptoms</u>									
Interviewers-----	32	19	8	4	1			0.6	
Nurses-----	32	13	16	3				0.6	
Nurses in uniform-----	32	22	10					0.3	
<u>Heart symptoms</u>									
Interviewers-----	32	9	7	6	7	2	-	1	1.7
Nurses-----	32	11	7	3	8	3			1.5
Nurses in uniform-----	32	9	11	9	2	-	1		1.2
<u>Miscellaneous symptoms</u>									
Interviewers-----	32	11	12	6	2	1			1.1
Nurses-----	32	13	9	4	5	1			1.1
Nurses in uniform-----	32	14	9	5	4				1.0

Table 12 shows the respondents' reports on questions relating to various selected illnesses which would be of importance in health surveys based on medical examinations. Because the frequency of these illnesses is very low in the small number of interviews available no definite conclusions can be drawn. They are presented, however, to show that there is no evidence that nurses obtained reports of higher frequency of illnesses than did the interviewers who were not nurses.

### Conclusions on Comparison of Nurses and Nonmedical Trained Interviewers

The hypothesis that nurses would obtain fuller reports of symptoms and illnesses than would non-medical trained interviewers was not supported.

On the contrary, the evidence although not definitive, suggests that lay interviewers may have obtained a greater volume of reported conditions than did nurses.

There is no evidence that the medical training of the nurses was important in obtaining more meaningful reports. Respondents tended to talk about their symptoms and illnesses in nonmedical terms readily understood by the nonmedical trained interviewers. The occasional exception occurred when the respondent reported a diagnosis using the technical name given his illness by his physician. This use of technical terms was more evident in reporting prescribed medications. Interviewers had more difficulty spelling the names of drugs, operations, and illnesses than did nurses. This problem was particularly apparent since respondents frequently misremembered these tech-

Table 12. Comparison of lay interviewers, nurses, and nurses in uniform on reported incidence of specific illness history

	Number of interviews	Yes	No	Don't know
<u>Have rheumatism or arthritis?</u>				
Interviewers----	32	15	16	1
Nurses-----	32	6	24	2
Nurses in uniform-----	32	6	26	-
<u>Have diabetes?</u>				
Interviewers----	32	2	28	2
Nurses-----	32	-	32	-
Nurses in uniform-----	32	1	30	1
<u>Have hypertension?</u>				
Interviewers----	32	-	31	1
Nurses-----	32	3	29	-
Nurses in uniform-----	32	5	27	-
<u>Had hypertension?</u>				
Interviewers----	32	2	30	-
Nurses-----	32	2	30	-
Nurses in uniform-----	32	3	29	-
<u>Have heart trouble?</u>				
Interviewers----	32	1	31	-
Nurses-----	32	1	31	-
Nurses in uniform-----	32	2	30	-
<u>Had heart trouble?</u>				
Interviewers----	32	1	31	-
Nurses-----	32	1	31	-
Nurses in uniform-----	32	1	31	-

nical terms and could not report accurately. The nurses were more likely to know the correct name.

One other difference relevant to a decision as to whether or not to use medical trained interviewers was evident in the training period. It was found that persons who were not medically trained could be trained as interviewers in a shorter time than could nurses. The reason lies in the particular attitude or "set" with which the two groups approached the interview. The non-medical trained interviewers were easily trained to accept the objective of obtaining the best report which the respondent could give of his medical situation, without concern as to whether the report was medically significant or correct. The nurses, because of their greater medical sophistication, found it difficult at first to accept this limited objective. Presumably they felt under pressure to interpret the responses, to look for the medical significance. It may be that the nurses were concerned that merely reporting what the respondents said, in the naive terminology used, would imply a lack of medical sophistication on the nurses' part. In general, then, whereas interviewers were content to report merely what the respondent said, and could keep their attention focused on the techniques required to obtain the data, the nurses had greater need to attend to the medical content of the interview. For this type of interview, training in interviewing technique, particularly in probing for complete responses, is more important than medical training.

The somewhat higher frequencies obtained by the lay interviewer may reflect longer experience in this type of interviewing and does not imply that nurses could not, with more training and experience, do as satisfactory a job.

The tendency for nurses in uniform to obtain a lower frequency of symptoms and illnesses than

nonuniformed nurses could not be interpreted in the same way since the same nurses took interviews in uniform and in civilian dress. The training and experience was therefore the same for both sets of interviews.

The "nurses in uniform" part of the design was included to test the hypothesis that respon-

ents would feel freer to discuss their medical problems with persons who were obviously identified as nurses. Clearly the data indicate that the nurses in uniform did not obtain more information, and, although the differences are small and may be due to sampling error, there is some indication that they obtained less.

## EFFECTIVENESS OF THE OPEN INTERVIEW

There are basically two kinds of questions which are used to obtain information. One is the "closed question" in which the respondent is asked about one specific item of information and responds simply with a "yes" or "no" answer, or along some dimension specified in the question. The second type is the "open question" in which the respondent is asked a question requiring him to frame his own response. An example of each type will clarify the difference.

Closed question: Did you have measles when you were a child?  Yes  No  
(Repeat for other childhood illnesses)

Open question: What illnesses or diseases did you have when you were a child? \_\_\_\_\_

Generally it is believed that the open-question approach has the advantage of obtaining information which is salient and which is important to the respondent. Further, as the respondent discusses the question he provides the interviewer (and indirectly the researcher) with greater insight into the implications of the topic. So, for example, it could be predicted that an open question on symptoms would elicit those symptoms which were more painful or worrisome, or which bothered the respondent most frequently. It could also be anticipated that the open form might yield a greater variety of symptoms, since the closed

form is limited to the symptoms listed. The open form could be expected to yield a better understanding of the origin and history of the symptom and more insight into its significance for the respondent. In spite of this, however, the over-all frequency of reported symptoms would be expected to be lower in the open form than in the closed form.

The open form of the questionnaire developed for this study started with a general question about symptoms. To assist the respondent to recall his symptoms, the general question is followed by subquestions focusing on various parts of the body. For each symptom reported standard probes were used to determine intensity, duration, and attributed cause. Similar series of open questions were asked about illnesses.

The results of the interviews generally confirmed the hypothesis that the total frequency would be lower for the open form. Every symptom asked about on the closed form was reported with greatly reduced frequency in the open form. For example, taking four common symptoms from the closed questionnaire the findings were as follows:

Joint pains—frequency on open question one half of frequency on closed question

Joint stiffness—frequency on open question one fourth of frequency on closed question

Headaches—frequency on open question one half of frequency on closed question

Noises in ears—frequency on open question one fifth of frequency on closed question

In the open form, a considerably higher proportion of persons reported that the symptoms bothered them frequently and with greater intensity than in the closed form. It appears from these data that respondents reported the symptoms and illnesses which caused them most concern in terms of intensity or frequency of occurrence. Even though the questions in both forms were intended to obtain the same level of symptoms, the respondents' interpretation of the questions was different. It appears that the open question elicited information not about all symptoms but about symptoms which "bothered" respondents at the time.

The form of the question should then be guided by the type of information desired. For obtaining information about the medical problems which are of most importance to the respondent, or which bother him, the open question is preferable. If information about the frequency of all symptoms, even those which are infrequent or only mildly troublesome, is to be obtained, a question specifically asking about the symptom seems necessary.

It is interesting to note that symptoms which bother the respondent most may not be those which are most significant from a medical standpoint. For example, one respondent who had a diagnosed heart condition of some gravity reported this only after some probing. His first concern was a persistent case of athlete's foot which caused him considerable annoyance and discomfort.

Many symptoms and disorders were reported on the open form which were not asked about in the closed form. For example, a higher incidence of digestive and respiratory symptoms was re-

ported in the open form. This finding is explained partly because the history forms being tested were not intended to be a complete review of all symptoms.

There was great variation in the number of symptoms and disorders reported in the open form. Some respondents reported almost no problems on the open form and several on the closed. Others reported nearly the same number on both forms. In addition to the analysis of the interview protocol, studies were made of recorded interviews. From these recordings, one other characteristic seemed to stand out. People tended to perceive themselves as being healthy or sickly. This self-perception appeared to be reflected in the number of things which people reported as being wrong with them. Some respondents made such comments as: "I'm never sick." "I haven't been to a doctor in 16 years." "I have a few things but nothing to complain about. I'm really very healthy." Others said, "I have a lot of things wrong with me. Seems like I'm bad off most of the time," or "Well, if you've got an hour I'll tell you some of my troubles—I've got plenty!" or "I haven't had a day without something wrong with me for 10 years. My doctor says I'm neurotic and probably I am, but I've got pains just the same."

It would appear that the self-perception of being healthy or sickly provided the basis for the respondent's report. If he perceived himself as healthy and took pride in this health, he tended to underreport his problems. If he perceived himself as sick he tended to report more fully, or perhaps overreport. Characteristically, the person who reported being very healthy and having no problems did report some symptoms or illnesses in response to added probing by the interviewer. It is impossible to say whether all conditions were reported.

One of the major advantages of the open question was that as the respondent told the story of his problems in his own way he gave more infor-

mation about his problems than he could communicate by means of the closed questionnaire alone. For example, he frequently gave the history of the problem, told how various symptoms seemed to be related, how they affected him, and what type of treatment he used. This background information provided a better basis for understanding the problem than a simple report of its presence. A few examples from interviews will illustrate this:

"I get pains in my abdomen once in a while that bother me quite a bit. A couple years ago I had a job where I had to carry a big heavy tool box. Now I have an ache down there. Think maybe I got a little rupture and one of these days I'll take sick leave and go have a checkup and see what ails me."

"Sometimes I get a tightness and pain around the heart. In the past four months I've had it quite often, every day or two. It's a real sharp pain in the middle of my back. In fact it will actually kink up and I have to wriggle to get straightened out. I think it's caused by standing over a table. I'm a draftsman and stand at a table all day long."

### **Conclusions on the Effectiveness of the Open Interview**

The open questionnaire obtained considerably fewer reports of symptoms and disorders than did the closed questionnaire. In the open questionnaire, problems which seemed to bother the respondent most were reported with greatest frequency but such problems were not necessarily the only ones of major concern in a general health

survey. Greater information on the background of the problem was obtained from the open questionnaire. On the other hand, to obtain quantitative measures of frequency specific questions calling for positive or negative replies have definite advantages.

It may be concluded that the major instrument for data collection for scientific survey purposes should be some type of form consisting of closed questions. However, the inclusion of two or more open questions should be considered seriously. At times the information resulting from the open response will provide a general framework for the examining physician to understand other information in the medical history. This may save considerable time which might otherwise be wasted in following up fruitless leads of specific symptoms. Further, the open question provides a general perception of how the respondent sees himself. This kind of information can at times be very useful in interpreting more specific responses on the questionnaire.

A final reason for including open questions is more relevant to the public relations aspects of a survey than to its research aspects, but is a serious consideration. If the respondent has something bothering him which is not covered in the general history he wants to report it. For example in the field interviews several times after the interview the respondent said, often with some indignation, "But you never asked me about my . . . . That's what really troubles me. Don't you want to know about that?"

## **EFFECTIVENESS OF THE SELF-ADMINISTERED AND THE CLOSED-INTERVIEW PROCEDURES**

Another major objective of this study was to determine whether it is feasible to use a self-administered-questionnaire form to obtain reports

of symptoms and illnesses. In this section the self-administered and the closed interview are compared as to the amount of information ob-

tained. Since the self-administered form used is also of the closed-question type this comparison is between two different closed question procedures—one self-administered and one interviewer-administered. The questions are virtually identical on the two forms and a direct comparison can be made.

The research design was such that 64 respondents were given both the closed-interview and the self-administered questionnaire. Half of them took the self-administered form first, followed by the closed interview one to two weeks later. The other half were given the two forms in

reverse order; the interview first, and then the self-administered form.

By cross tabulating the reports for each respondent, it is possible to find the number who reported a particular symptom or illness on one or both forms. These tabulations give a picture of the efficiency of the two forms in obtaining information. An index number (which may be called an index of efficiency<sup>1</sup>) was computed for each item.

Table 13 gives the data from the two forms for the 12 major symptoms under investigation. The information in table 13 indicates that both

Table 13. Comparison of symptoms on the closed-interview and self-administered form for the same respondents\*

Symptom	Total number of persons reporting symptoms on either form	Number reported in interview	Number reported on self-administered form	Index of efficiency	
				Interviewer form	Self-administered form
Swollen ankles-----	5	5	5	10.0	10.0
Backaches-----	25	18	19	7.2	7.6
Trouble breathing-----	4	2	3	5.0	7.5
Chest or heart pains-----	9	8	6	8.9	6.7
Heart acts funny-----	13	12	9	9.2	7.0
Headaches-----	29	29	27	10.0	9.3
Noises in ears-----	9	9	7	10.0	7.8
Joint pains-----	21	13	20	6.2	9.5
Joint stiffness-----	13	8	9	6.2	7.0
Joint swelling-----	5	4	3	8.0	6.0
Nosebleeds-----	8	5	7	6.2	8.8
Leg cramps or pains-----	18	15	13	8.3	7.2

\* NOTE: Each row is based on 64 interviews with 32 persons. Each respondent received both the self-administered questionnaire and the interview. One half had the self-administered form first and the other half had the interview first.

$$\text{Index of efficiency of interview} = \frac{\text{Number of reports of symptom on interview}}{\left( \frac{\text{Number reported on both forms}}{2} \right) + \left( \frac{\text{Number reported on self-admin. only}}{2} \right) + \left( \frac{\text{Number reported on inter. only}}{2} \right)} \times 10$$

$$\text{Index of efficiency of self-admin. form} = \frac{\text{Number of reports of symptom on self-administered form}}{\left( \frac{\text{Number reported on both forms}}{2} \right) + \left( \frac{\text{Number reported on self-admin. only}}{2} \right) + \left( \frac{\text{Number reported on inter. only}}{2} \right)} \times 10$$

forms were about equally efficient in obtaining reports of symptoms. The over-all average index of efficiency for the 12 symptoms in the table was 7.9 for the interview and 7.8 for the self-administered questionnaire.

The two methods yielded remarkably similar distributions of reported symptoms. However, neither form was successful in picking up all the positive responses. Both obtained approximately 80 percent of the total number reported. In other words, if it can be assumed that a report on either form indicated the actual existence of a symptom, then if 100 people had a certain symptom, an average of 80 people would report it on one form and an average of 80 on the other. Neither form would obtain a positive response from all 100.

For each major symptom two probe questions were asked: "Does this usually happen every few days or not as often as that?" and "When this happens does it bother you just a little or quite a bit?" In cases where a symptom was reported on one form and not on the other, it was usually reported as occurring infrequently and to "bother just a little." This result suggests that the probes should be included in any efficient medical-history-taking procedure, and that the severity and frequency indications should be taken into consideration in the evaluation of the symptom report.

Table 14 shows a comparison of clusters of symptoms of particular diseases reported on the closed-interview and on the self-administered form. The results are similar to those seen in table 13; neither form obtained a complete report, and neither was particularly more successful than the other. The number of symptoms of all types reported was 4.5 per person for the closed-interview and 5.1 for the self-administered form.

Table 15 gives comparable information for illnesses. The indices of efficiency show greater variability, probably because of the low prevalence of each illness. Because of the small numbers reported for each illness, these data must

be interpreted with caution. About the only conclusion one can make is that there is no evidence that the closed-interview had substantially greater success in obtaining reports of illnesses than the self-administered form.

However, for the common childhood diseases with a large volume of reported conditions there is a noticeable superiority of the interview. The average number of childhood diseases reported on the self-administered form was 3.0 and on the interview, 3.5. The interviewer's presence was apparently helpful in obtaining full answers to these questions. Interviewers found that questions on childhood diseases gave the respondents trouble because they could not remember accurately, or because they did not know how to report the information they possessed. The interviewer was able to use his skills in probing to clarify the information to obtain a more complete report.

## Conclusions on Use of Self-Administered and the Closed-Interview Procedures

It may be concluded that there is no marked evidence that the interviewer-administered form shows superiority in obtaining reports on the number of present symptoms and illnesses, but there is some slight evidence that the interviewer-administered form is more successful than the self-administered form in investigating childhood illnesses, particularly minor ones. It might be concluded that a self-administered form can be used effectively for symptoms and illnesses, with the exception of the common diseases of childhood.

For each symptom and illness, several probe or follow-up questions were asked in the interview. These probes were described earlier and were included to provide some evaluation of and insight into the reports. Two of the probes, on frequency and duration, could be formulated so that they could be included in the self-adminis-

Table 14. Comparison of clusters of symptoms reported on the closed-interview and on the self-administered forms

Symptom	Total number of persons reporting symptoms on either form	Number reported in interview	Number reported on self-administered form	Index of efficiency		Average number of reported symptoms per person	
				Interviewer form	Self-administered form	Interviewer form	Self-administered form
Heart-----	51	46	40	9.0	7.8	1.4	1.2
Rheumatism and arthritis----	61	44	51	7.2	8.4	1.4	1.6
High blood pressure-----	43	21	40	4.9	9.3	0.7	1.2
Miscellaneous--	41	34	32	8.3	7.8	1.0	1.1

NOTE: Each row is based on 64 interviews with 32 persons. Each respondent received both the self-administered questionnaire and the interview. One half had the self-administered form first and the other half had the interview first.

Table 15. Comparison of number of reported disorders on closed-interview and self-administered forms

Disorder	Total number of persons reporting disorders on either form	Number reported in interview	Number reported on self-administered form	Index of efficiency	
				Interviewer form	Self-administered form
Allergy-----	3	1	2	3.3	6.7
Chest trouble-----	4	4	1	10.0	2.5
Heart trouble-----	2	1	2	5.0	10.0
High blood pressure-----	2	1	1	5.0	5.0
Hemorrhoids-----	10	10	7	10.0	7.0
Hernia-----	7	7	4	10.0	5.7
Kidney or bladder trouble-----	5	4	5	8.0	10.0
Nervous breakdown-----	3	2	3	6.7	10.0
Rheumatism or arthritis-----	11	8	9	7.3	8.2
Varicose veins-----	6	5	5	8.3	8.3

NOTE: Each row is based on 64 interviews with 32 persons. Each respondent received both the self-administered questionnaire and the interview. One half had the self-administered form first and the other half had the interview first.

tered form. Other probes, however, could not practically be phrased so that they could be answered with checkmarks. For example the probes, "Tell me how it feels," or "What do you think causes this?" require the presence of the interviewer to record the responses and to do additional probing where necessary.

For this reason it is not feasible to make the questionnaire completely self-administered. The positive responses should be followed up by an interviewer, using the specified probes.

## Respondents' Report of Causes of Symptoms

For each major symptom which the respondent reported, he was asked what he thought caused the symptom. This probe was included because symptoms have different medical significance depending upon the origin of the symptom. While it was not expected that the respondent could be an expert diagnostician, it was possible that he might have information which would provide added insight into the reported condition or symptom. Statistical tabulations of the reported causes, on this small number of cases, are not meaningful. However, a listing of some of the types of reasons given for symptoms of high incidence is interesting. In the list below, the order of listing of the causes gives a rough index of frequency of mention with 1 meaning 10 or more mentions; 2 meaning 5 to 9 mentions; and 3 meaning 3 to 5 mentions. Respondents frequently reported more than one "cause."

### Reported causes of headaches

1. Worry, tension, "nerves"  
Associated with eye strain, not wearing glasses, etc.  
Sinus infection
2. "Female troubles"  
Stomach disorders

3. Irregular meals  
Overindulgence in alcohol

### Reported causes of backaches

1. "Female troubles"
2. Associated with rheumatism or arthritis  
Physical strains, due to working conditions or overactivity  
Underactivity, "not enough exercise," "just sit around all day," etc.
3. Caused by a specific accident or injury  
Pregnancy

### Reported causes of nosebleeds

2. Associated with upper respiratory disorders

### Reported causes of noises in ears

2. No idea what causes it
3. Respiratory disorders

### Reported causes of chest or heart pains

1. Associated with stomach and other digestive troubles
2. Respiratory disorders
3. "Nerves," tension or worry

### Reported causes of heart acting funny

1. Nerves, tension, or worry
2. Don't know the cause
3. Heart trouble  
Overexertion

### Reported causes of joint pains or soreness

1. Associated with rheumatism or arthritis
2. Due to climate  
Respiratory disorders

Many of the causes attributed to the symptoms may not be particularly meaningful or helpful to the physician as an aid to diagnosis. In some cases, however, responses were sufficiently specific to be useful in helping to understand the import of the symptom. As a time-saving aid to the examining physician, this probe could be included for selected symptoms or conditions.

# SUMMARY OF CONCLUSIONS

After both qualitative and quantitative analysis of the data, the following conclusions may be stated in regard to the major objectives of this research project:

1. People generally were found to be most willing to discuss their symptoms and illnesses with either nurses or nonmedical trained interviewers.

2. It is feasible to construct a standard set of questions and probes to be administered with standardized techniques to elicit information about symptoms and illnesses.

3. On most items the reliability of two reports taken a week or two apart was high, although for some symptoms, such as stiffness in joints and backaches, reliability dropped considerably.

4. Trained lay interviewers were as successful as nurses who were trained in interviewing in getting respondents to talk about their medical problems; they obtained reports of equally high frequency of symptoms and disorders. There was

some evidence that trained lay interviewers obtained greater frequency of responses to symptoms than did nurses in uniform.

5. The self-administered form of the questionnaire obtained about the same frequency of symptoms as did the closed-interview form. It also obtained about the same reported frequency of illnesses. However, the interview was necessary for follow-up probes as to the perceived cause of the symptom. Interviewer participation was particularly important in probing some of the details of illnesses. The open-interview questionnaire obtained considerably lower frequencies for the symptoms which were asked about specifically in the closed-interview questionnaire. The evidence is that the symptoms reported in responses to the open questions were those which bothered or concerned the respondent most. Open questions also permitted the respondent to give information on the background of the symptom. His fuller description might give greater insight into the significance and importance of the symptom.

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