

# Three Views of Hypertension and Heart Disease

Examination diagnoses of hypertension and heart disease made in the first cycle of the Health Examination Survey are compared with reports of these diseases on a self-administered medical history and on an inquiry completed by the person's own physician.

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*IN THIS REPORT comparison is made between diagnoses of hypertension and heart disease made by the Health Examination Survey and those reported on a self-administered medical history and by the personal physician.*

*During 1960-62 the U.S. Health Examination Survey examined 6,672 adults—a sample of the population of the United States between ages 18 and 79 years. This yielded careful medical diagnoses of heart disease and hypertension. For the same persons and the same diagnoses, information is also available from a self-administered medical history. In addition, for a small group of these examinees, reports were obtained from their personal physicians.*

*The examination yielded more cases of heart disease and hypertension than either the self-administered medical history or the reports by the personal physician. If a case was reported as definite by the examination or the personal physician, the likelihood that another reporting system would agree with this diagnosis was greater than if the case was reported as suspect or borderline.*

*Diagnoses reported on the self-administered medical history were likely to be corroborated by the survey examination when they indicated a physician's diagnosis but not when they indicated self-diagnosis. Hypertension symptoms reported on the medical history were found not to be associated with the subsequent hypertension diagnosis on examination.*

*Reports of heart disease and hypertension by a personal physician, while more conservative than the diagnoses by the survey examination, were likely to be corroborated by it.*

#### SYMBOLS

Data not available-----	---
Category not applicable-----	...
Quantity zero-----	-
Quantity more than 0 but less than 0.05----	0.0
Figure does not meet standards of reliability or precision-----	*

# THREE VIEWS OF HYPERTENSION AND HEART DISEASE

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Who has heart disease? Who has hypertension?

There are no unique answers to these questions. The questions themselves are complex and difficult to define. If they are phrased differently, if a different set of instruments are used, or if a different informant is approached, different answers can be expected. Where different answers are given, however, it is not ordinarily easy to explain why the variances take exactly the form they do, and agreement may be equally puzzling.

In the first cycle of the U.S. Health Examination Survey (HES), 6,672 adults—a sample of the civilian, noninstitutionalized population of the United States between ages 18 and 79 years—were given an extensive, standardized examination which included, among other things, a careful medical evaluation for heart disease and hypertension.<sup>1-7</sup> For the same persons and the same diagnoses information is also available from a self-administered medical history and, for some of these persons, from their personal physician. In this report the agreements and disagreements in diagnoses from these various sources will be considered from several points of view. Other points of view would, no doubt, be of interest to investigators and might well yield a different picture. This is inevitable, and no claim to an exhaustive analysis of the data is made.

The data themselves are limited by the nature of their collection. They were collected and processed for the purpose of characterizing the population of the United States, not for methodological uses. Some information which could have been coded and subsequently analyzed for methodolog-

ical studies cannot now be retrieved. Some information which might have been collected if the primary interest had been methodological was not collected in order to minimize interference with the conduct of the survey.

On the other hand, the data have strengths which data from conventional methodological studies do not have. For one thing they pertain not to some particular group specially chosen for the purposes of a methodological inquiry but to an actual population which has been surveyed. All of the variety, all of the complication and confusion encountered in a general population are preserved intact. Conclusions may be harder to reach, but those that can be reached are likely to be stronger and of more general utility than conclusions drawn from specially designed, artificially formulated inquiries on what are usually the peculiar groups chosen for methodological investigations.

## SOURCES OF INFORMATION

In the process of selecting the sample, an interviewer supplied by the U.S. Bureau of the Census visited a set of preselected sample homes and interviewed a responsible adult in each household. The interview was similar to the one conducted by the Health Interview Survey.<sup>8</sup>

A self-administered medical history was completed by the sample person when he came to the HES trailer for an examination. One of the questions he was asked was whether he had heart disease. He was also asked whether he had hypertension.

The sample person was then given a medical examination. Survey diagnoses of heart disease and hypertension were systematically arrived at—according to an explicit set of criteria—on the basis of the medical history, the description of findings made on the physical examination, the diagnostic impression of the examining physician, and expert interpretations of the electrocardiogram and the chest X-ray.

For a sample of the examined persons, information was obtained from the person's own physician.<sup>9</sup> The request for information was brief, simple, and categorical. No criteria were offered to, or requested from, the physician for any diagnosis. Replies were tabulated as received, with no followup to clarify obscure entries or to complete forms that were incomplete. Inquiries were sent to the physicians of 762 of the 6,672 examinees in the survey; essentially complete replies were received for 488.

The forms used for recording these different sets of information are presented in Appendix I.

## MAJOR COMPARISONS

### Total Prevalence

Different estimates of total prevalence came from the different sources. The largest number of cases of heart disease and hypertension came from the examination.

Before turning to the data it is important to emphasize that they derive from specific instruments. The survey examination was not just any examination, but the specific one used in the first cycle of the Health Examination Survey. Changes in that examination might well have altered the prevalence reported, just as a change in the method of obtaining the medical history or the physician inquiry might have altered the prevalence figures obtained by these mechanisms. It is important to remember this historical particularity in considering the data to be presented and also to remember that what is true for heart disease and hypertension is not true for all other diseases.

Some 1,600 cases of heart disease were diagnosed by the survey examination (table 1). There were 834 cases reported on the medical history. For the subgroup of examinees included in the physician inquiry, 154 cases of heart

disease were diagnosed by the survey examination, but only 92 cases were reported by the personal physician (table 2). On the same subgroup of examinees, 82 cases of heart disease were reported on the self-administered medical history.

The situation was similar for hypertension. The survey examination resulted in the diagnosis of 1,943 cases. The medical history yielded 1,175 cases (table 3). In the physician inquiry group the survey examination diagnosed 164 cases as against 98 cases reported by the personal physician, with 102 cases reported on the medical history (table 4).

The difference in levels is portrayed graphically in figure 1. Data from the physician inquiry are adjusted to the same level as the examination counts by the following procedure: Let  $r_i$  be the ratio of the number of cases reported by the personal physician to the number of cases reported by survey examination for age-sex group  $i$ . Let  $n_i$  be the number of all examinees in that age-sex group with the specified disease. Then  $\sum r_i n_i$  is the age-sex adjusted prevalence for the disease. For heart disease this yields a count of 892 cases; for hypertension, a count of 975. While this procedure does not necessarily preserve the correct relationships to the medical history reports, in this instance it works reasonably well.

### Certainty of Diagnosis

In the foregoing discussion all reported cases of heart disease and hypertension were counted. The various sources, however, distinguished between definite diagnoses and uncertain or borderline diagnoses, and this distinction will be important in subsequent analysis.

In reporting heart disease, the survey examination and the personal physician tended to divide cases about evenly between definite and suspect cases. The survey examination yielded 855 cases of definite heart disease and 745 of suspect. The physician inquiry indicated that the personal physicians of the examinees tended to divide heart disease in about the same fashion as did the examination diagnosis: On the subgroup of examinees covered by the physician inquiry, the personal physician reported 58 definite cases of heart

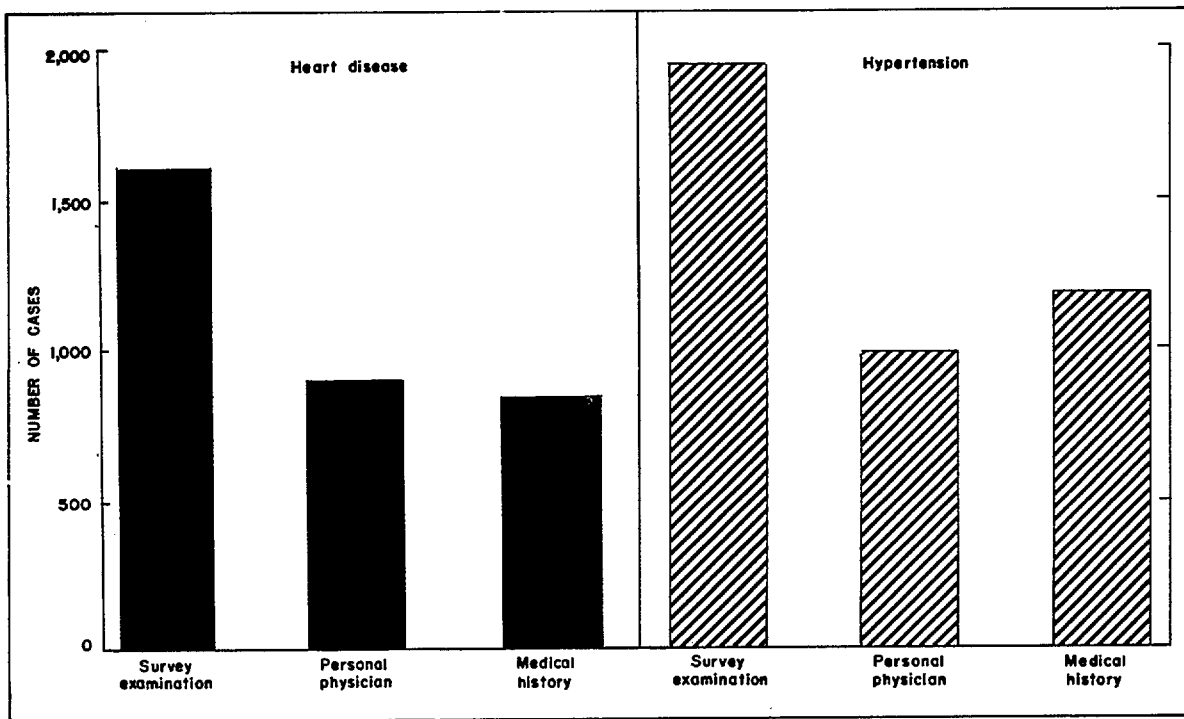


Figure 1. Number of cases of heart disease and hypertension as determined by survey examination, personal physician, and medical history.

disease and 34 suspect, as compared with 94 and 60, respectively, reported by the survey examination (table 2). In contrast with physicians, the examinees themselves almost always reported heart disease on their medical history either as present or absent, rarely indicating any uncertainty. (Of the examinees, 796 reported "yes" and 38 "?") In the physician inquiry group, 79 reported "yes" and 3 "?")

The same contrast between medical diagnosis and the person's own report was observed for hypertension. The survey examination assigned a diagnosis of definite hypertension to 1,016 cases and a diagnosis of borderline hypertension to 927 cases (table 3). The personal physician was much more likely to characterize a diagnosis of hypertension as definite than was the examination (65 of the 98 cases were diagnosed hypertension by the personal physician as against 84 of the 164 cases so diagnosed by the examination for the same examinees), but there was still a strong

contrast with self-reporting (table 4). Cases were seldom reported on the medical history as suspect but almost always as definite. (On the medical history, 1,140 persons reported "yes" and 35 "?") Of the persons in the physician inquiry group, 100 reported "yes" and 2 "?")

As might be anticipated, if a case of heart disease or hypertension was reported as definite by any reporting system, the likelihood that another reporting system would agree on that diagnosis was greater than if the case was reported suspect (tables 5-8). For example, of the 855 cases diagnosed as having definite heart disease on the examination, 30.1 percent (257 cases) were considered to have a definite heart disease on the medical history. On the other hand, of the 1,600 cases diagnosed on the examination as either definite or suspect heart disease, 396 (24.8 percent) reported on their medical history that they had heart disease. When more doubtful diagnoses were added, the percent of agreement

was reduced. On the other hand, of course, the absolute number of cases on which agreement was noted increased.

The tendency for greater agreement among the various reporting systems as the diagnosis became more definite was especially clear with a graded characteristic such as blood pressure (table 9). The higher the blood pressure the more likely was hypertension to be reported by any of the mechanisms under consideration; *ipso facto*, the more likely were they to be in agreement. At lower blood pressure levels disagreement is not unreasonable, especially if it is assumed that treatment has reduced the blood pressure level in some instances—a fact which the survey examination could not evaluate at all and which the personal physician could evaluate better than his patient.

### Kind of Heart Disease

Preferences among the specific heart disease diagnoses varied. The survey examination and criteria led to a heavy reporting of hypertensive heart disease. Of the three major types of heart disease—coronary, hypertensive, and rheumatic—317 cases were assigned to the first category, 881 to the second, and 75 to the third.

The physician's diagnosis of his own patient tended to differ from the survey examination diagnosis in that he specified a larger proportion of the reported heart disease as coronary than did the survey (table 10). The personal physicians reported 41 cases of coronary heart disease, 55 cases of hypertensive heart disease, and 15 cases of rheumatic heart disease, while on the same examinees the survey examination diagnosed 38, 86, and 11 cases, respectively. The comparative neglect of hypertensive heart disease is understandable; the examination diagnosis was dependent on a routine cardiovascular reading of the chest X-ray and a routine electrocardiographic reading. Even with moderate blood pressure elevations, ordinary medical practice would not routinely call for a chest X-ray or electrocardiogram.

The medical history did not distinguish among the various categories of heart disease, and while more specific information was elicited in follow-up questioning, this information was not coded.

## CONCEPTUAL BASIS OF COMPARISONS

Having given some data indicative of the scope of differences among the three sources, it may be desirable to pause here and discuss the conceptual basis for such comparisons.

The viewpoint is taken in this report that heart disease—or hypertension—means the same thing, whether it is reported by the person himself, by the person's physician, or by the survey examination.

Obviously this formulation represents a simplified picture, whether the physician's standpoint is taken or the patient's, quite aside from complexities introduced by other parties to medical experience.

It is probably true that this formulation is closer to the physician's viewpoint than the patient's. Still, it can never be strictly true that diagnoses of heart disease or hypertension made by different physicians mean exactly the same thing. Even if two physicians with similar training and outlook made the diagnosis, there would be at least some shade of difference in their findings and their interpretation of the findings. If the diagnosis were a simple one such as hypertension, their blood pressure measurements would almost surely differ, if only a trifle; their diagnostic criteria would differ, and their prognosis and proposed treatment (which are really part of a physician's diagnostic criteria) would also differ. This is, of course, the most optimistic view of diagnostic reliability. Medical literature, including reports of the Health Examination Survey, cites many instances of large variations in medical diagnosis.

In many instances, agreement on a label of heart disease or hypertension conceals differences which are far from insignificant. The findings on which the diagnosis was made may have been quite different—in one case a history or physical finding, say; in another, an X-ray finding or an electrocardiographic abnormality. If it is agreement on heart disease, the specific heart disease diagnosis may differ.

Nonetheless, it is agreement. The point where disagreements pass from trivial to substantive depends entirely on the object in view, and this



should be reflected in the fineness of the classification used. If it is important to distinguish heart disease diagnosed on the basis of X-ray from heart disease diagnosed by electrocardiogram, then the classification should reflect this distinction. If it is felt that the disease is the same whether one view or another is reported, then the distinctions in viewpoint should not be carried in the classification.

The differences between the survey examination and an examination by the person's own physician have two roots. The first is the fact that a personal physician is responsible for the medical care of the person while the survey was not. The second is the fact that a personal physician ordinarily varies the scope and content of his examination from one patient to another, whereas the survey examination was essentially the same for all persons. The first fact has consequences in diagnosis which are real enough but which for heart disease and hypertension are surprisingly small.<sup>10</sup> The second fact is by no means trivial. A person who has consulted his physician only for trauma or acute illness may never have had an evaluation for cardiovascular disease. If he has had such an evaluation it may have been superficial. On the other hand, if he has had some cardiovascular illness he may have had a more extensive medical examination than was provided by the survey. In intention and in design, however, the survey examination was planned to parallel a clinical examination and to be conceptually monistic.

When the self-administered medical history is considered, a much greater diversity is apparent. In the first place, access to medical diagnosis is highly variable from person to person. Some people receive regular, thorough medical care; some people never receive medical care; most range somewhere between. Both medical attention and diagnosis are more likely to occur if there is some medical complaint. If the person feels in good health or is inclined to minimize pain or discomfort he is less likely to receive a thorough medical examination than if the opposite is true.

In addition, not all diagnoses are made by physicians. A good deal of self-diagnosis and diagnosis by nonmedical persons takes place. This may occur even when the person routinely receives thorough medical attention. Sometimes the patient, after having received medical attention, discounts the physician's statement of illness or of health and substitutes his own or someone else's. Much self-diagnosis arises without any medical attention.

The fact that the medical history obtains the person's *own* picture of his health leads to further diversity. The complexities of communication are well recognized, and added to these are problems of individual attitude. What does the person see as the purpose of the history, its value, and its risks to him? Does he feel that only serious or severe illness should be reported? Clearly, his attitude is influenced by the knowledge that the medical history is part of a medical examination. He may feel impelled to report his fears or suspicions of disease to alert the examining physician. Alternatively, he may screen out well-defined but minor illnesses from his account. If he has a mild form of heart disease with no treatment prescribed, no limitation of function, or only minor limitation, he may not report this, or, indeed, he may doubt or disbelieve the diagnosis.

The preceding discussion is not intended as a systematic account of the problems of diagnosis and reporting, nor is it argued that the issues referred to are all substantial. What is being suggested is that there are reasons for anticipating variances between reports from different sources. It could be argued that these sources are simply reporting different phenomena. For the purposes of this paper the view is taken, instead, that they are reporting the same phenomena but at different levels of sensitivity. In a sense, of course, a statement that only heart disease with a specified impact is reported could be interchanged with a statement that heart disease is reported only if it has a specified impact. The choice between the two statements is a matter of taste. Their consequences, however, differ.

## THE MEDICAL HISTORY

This section deals with the relationship between the self-administered medical history and the examination.

It was shown that the medical history yielded 52.1 percent as many cases of heart disease as the examination and 60.5 percent as many cases of hypertension. To what extent did the survey examination corroborate these reports?

Fewer than half of the persons who declared they had heart disease on the medical history were found to have heart disease on the examination (47.5 percent—396 out of 834), and the percentage of agreement on hypertension, while better, was only 61.8 (726 of 1,175). This is not an impressive level of agreement.

On the other hand, the deficiencies of the medical history information were not as great as they might seem (tables 11 and 12). Where the person reported that the diagnosis had been made by a physician, the agreement with the examination diagnosis was better. Of the 510 cases where the examinee reported a physician-diagnosed heart disease on his medical history, there were 301 cases of heart disease (59.0 percent) diagnosed on examination, the majority of the diagnoses (216) being definite. Of the 954 persons reporting high blood pressure diagnosed by a physician on their medical history, 644 (67.5 percent) were found to be hypertensive on examination; 458 of these were definitely hypertensive. For both diseases, then, a medical history report of a physician's diagnosis was fairly reliable, although it fell far short of yielding the amount of diagnosed heart disease or hypertension obtained from the survey examination.

On the other hand, where the examinee reported heart disease or hypertension that was not medically diagnosed, agreement was much lower. In fact, the likelihood that the disease would then be found by examination was little greater than if no heart disease or hypertension had been reported on the history.

Without considering all aspects of the replies to the medical history questions on heart disease and high blood pressure, it might be noted that persons reporting that they took medicine for these diseases were more likely to be diagnosed as having the disease than persons

simply reporting a physician's diagnosis—170 of the 246 for heart disease (69.1 percent) and 310 of the 434 for hypertension (71.4 percent)—but this modest gain in corroboration was more than balanced by the substantial loss in yield.

### Examination Cases by Medical History

No procedure can be considered to produce certain diagnoses; hence, it is reasonable to discuss disagreements without deciding which source is in error. The survey emphasis on objective and well-defined evidence for diagnosis would rule out some cases that might reasonably be regarded as disease. On the other hand, some cases of disease which have never manifested by symptom or which have never been subject to a careful medical scrutiny would be uncovered by a thorough examination such as the survey provided.

But relativity must have some boundaries. The survey examination was a more trustworthy source of diagnostic information than the medical history. That granted, it makes sense to consider the set of examination diagnoses as the real universe and the cases of heart disease and hypertension reported by the medical history as a sample from that universe.

Obviously, the medical history was not likely to select an unbiased sample of the "real" cases.

The 834 cases of heart disease reported by the medical history and the 510 reported as physician-diagnosed heart disease were assigned the following diagnoses by the survey examination:

Examination diagnosis	Number of medical history reports of heart disease	
	Total	Physician-diagnosed
Definite heart disease-----	264	216
Suspect heart disease-----	132	85
No heart disease-----	438	209

Similarly, for hypertension, the 1,175 cases reported on the medical history (954 of them re-

ported as physician-diagnosed) were assigned the following diagnoses:

Examination diagnosis	Number of medical history reports of hypertension	
	Total	Physician-diagnosed
Definite hypertension- Borderline hyper- tension-----	496	458
Normotension-----	230	186
	449	310

In short, the medical history was more likely to sample definite cases of heart disease or hypertension than suspect or borderline cases.

If the medical history is now considered as a case-finding instrument, the question can be asked, What percentage of coronary, hypertensive, and rheumatic heart disease diagnosed by the survey examination was reported as heart disease on the medical history?

Examination diagnosis	Percent reported by medical history	
	As heart disease	As physician-diagnosed heart disease
Heart disease, total-----	24.8	24.0
Coronary heart disease-----	58.9	49.2
Hypertensive heart disease---	22.4	16.9
Rheumatic heart disease-----	36.0	32.0

A person diagnosed on examination as having coronary heart disease was more likely to report that he had heart disease than a person diagnosed as having hypertensive heart disease or rheumatic heart disease. This does not necessarily mean that he reported this specific diagnosis on the medical history; only that he reported some form of heart disease.

## Demographic Fidelity

Although the number of persons reporting heart disease or hypertension on their medical history was substantially less than the number for whom these diseases were diagnosed on the survey examination and the "mix" of cases was not an unbiased one, were the proportions constant from one subgroup of the population to another? To the extent that they were, the medical history can be said to give the same picture as the survey examination but on a reduced scale. To the extent they were not, the pictures will differ, and the answers to the question Who? will diverge.

## Age and Sex

Consider the various age-sex groups, since prevalence varied markedly by age and sex. Was the reduction in scale constant from one age group to another? Was it the same for men and women?

It was not. The number of cases reported on the medical history expressed as a percentage of cases diagnosed on examination decreased with age for heart disease, while for hypertension the comparable percentages described a slightly U-shaped curve with the lowest point roughly in the middle of the age span. Percentages were generally higher for women than for men (tables 13 and 14).

## Other Demographic Variables

These age-sex differentials complicate the analysis of data for other demographic variables since these other variables are all correlated with age and sex. To allow for this we will revert to the technique used in other reports and compute actual and expected values for each population subgroup. Suppose, for example, that in the  $i^{\text{th}}$  age group, there are  $n_i$  persons with less than \$2,000 income (sum of  $n_i = n$ ). Let  $p_i = n_i/n$ . Suppose the percentage of persons with heart disease in this age group (regardless of income) is  $r_i$ . Then the expected percentage for all age groups combined is the sum of  $p_i r_i$ . We can express the actual rate as a ratio of the expected rate and compare the ratios for the various reporting systems.

In tables 15-19 the ratios are computed using population estimates derived from the sample rather than counts of examinees. (Ratios using counts alone were also calculated and are similar to those presented.)

These ratios of relative prevalence may be viewed as giving a series of cross-sectional mappings or profiles of the population. The question is, Did the medical history give the same profile as the examination? The answer is, It did not.

Figure 2 compares the profiles of heart disease prevalence by race for each sex. The medical history depressed the relative prevalence for Negro women. For Negro men this distortion was even more marked.

Figure 3 compares the profiles of hypertension prevalence by race for each sex. For men the medical history yielded a profile almost identical to the examination. For women this was not the case. The medical history exaggerated the relative prevalence of hypertension for Negro women.

Because of these race differentials the discussion of other demographic variables should be race-specific, and since the number of Negroes in the sample was small, discussion is restricted to the white population.

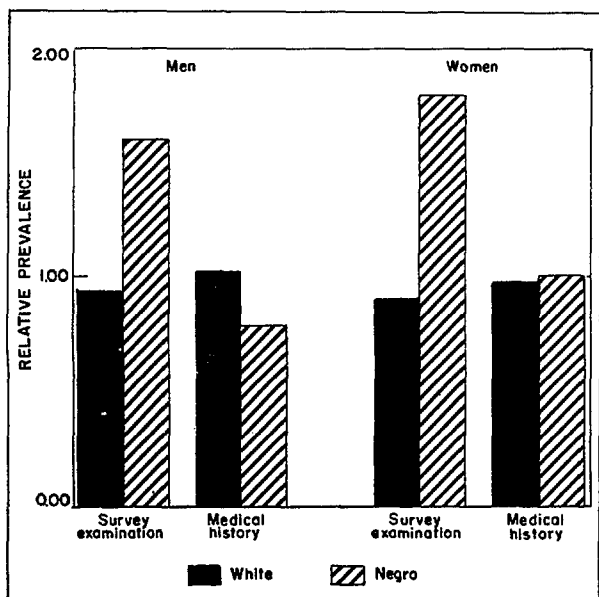


Figure 2. Ratio of actual to expected prevalence of heart disease on survey examination and medical history, by race and sex.

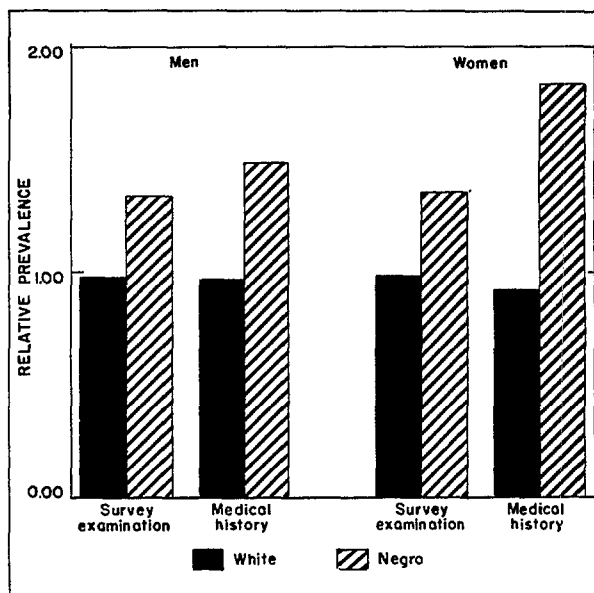


Figure 3. Ratio of actual to expected prevalence of hypertension on survey examination and medical history, by race and sex.

For nearly every major demographic variable in the white population the picture presented by examination findings emerged from the medical history only in a distorted version (tables 16-19).

Consider the profiles for hypertension. The examination showed almost no variation in hypertension prevalence by income. The medical history showed a distinctly elevated hypertension prevalence in the lowest income group. The examination showed an inverse relationship between education and hypertension prevalence. The medical history showed the same relation but exaggerated it substantially. The examination showed about the same hypertension prevalence in the South and West Regions and a higher prevalence in the Northeast, while on the basis of the medical history the Northeast appeared to have the lowest prevalence. On the examination rural farm and rural nonfarm areas had average prevalence, but on the medical history they had a greatly elevated hypertension prevalence.

Thus the medical history gave a substantially different picture of the distribution of hypertension in the U.S. population than did the examination.

For heart disease, similar differences were found between the examination and the medical history, although these differences were less marked.

The examination showed higher heart disease prevalence at lower incomes. This differential was slightly exaggerated by the medical history. An inverse relationship between education and heart disease prevalence was apparent on the examination; this, too, was slightly exaggerated by the medical history. On the basis of the examination, the South appeared to have the lowest heart disease prevalence, but it had the highest prevalence on the medical history.

## SYMPTOMS AS A DIAGNOSTIC TOOL

The exact relationship between symptoms and disease in the general population is not precisely known. It is recognized that illness may appear without pathognomic symptoms, but it is nonetheless possible that appropriate symptom complexes may constitute effective screening devices for some diseases. Certainly they provide the only hope of identifying cases of unknown disease short of an actual medical examination.

The medical history included a number of questions directed to symptoms thought to be related to the cardiovascular diseases. In this section we will consider those questions which, on a priori grounds, are believed associated with hypertension. Each question will first be treated separately; then the questions will be treated as a group. The analysis will have to take age and sex into account, but hopefully, if diagnostic symptom complexes are uncovered they will prove to be diagnostic for adults in a number of age groups.

Before examining the specific data it may be useful to explore some general issues.

By and large, diagnosis is seldom arrived at by a direct route. Rarely is a communicable disease diagnosed by isolating the known etiological agent or even by measuring some specific trace of the agent, such as a rise in antibodies. The symptoms described by the patient, the physical signs manifest on examination (seldom pathognomic in themselves), and current experience in the patient's community are ordinarily relied on

instead. In diagnosing chronic disease, similar indirect tests are used. The electrocardiogram replaces a direct examination of the heart, since direct examination is always limited and dangerous at best, and signs and symptoms are collected, assembled, and evaluated against the general background of medical experience.

In principle, indirect diagnosis can be carried beyond current practice. Any characteristics may be examined for their relation with any specified disease, and there is something to be said for expanding the range of formal inquiry beyond the characteristics traditionally associated with the disease. However, as the number of characteristics under study increases, the number of permutations rapidly multiplies, pressing on the total available information and the computational resources.

It therefore seems the better part of wisdom, in investigating hypertension, to begin with the traditionally suspect symptoms. After all, the relevant queries were included in the medical history questionnaire to test their relation to this disease. What is more, the symptoms are suspect because a large body of observation has attested to their relevance.

The symptoms discussed are headaches, nosebleeds, tinnitus, dizziness, and fainting. The specific questions are reproduced in Appendix I.

The results are easily summarized: There was no association whatever between any of these symptoms individually and the occurrence of hypertension, no matter how frequently the symptom occurred or how severe it was. Selected data are shown for the age group 45-64 (table 20).

It is nonetheless possible that some combination of these symptoms is indicative of hypertension. To test this, two approaches were used. The first was to categorize responses to each of the symptom questions (except the question on fainting) into one of four categories.

1. Yes, I had the symptom as often as every few days, and it bothered me quite a bit.
2. Yes, I had the symptom as often as every few days, but it bothered me just a little.
3. Yes, I had the symptom less often than every few days, but it bothered me quite a bit.
4. All other replies (essentially negative).

Answers to the question on fainting were placed in one of two categories, "yes" or "other" (essentially negative).

All combinations of these symptoms were considered separately for each age-sex group. For each combination a count was obtained of the total number of cases as well as the proportion of these cases reporting hypertension. Hypertension was first defined as definite or borderline, and then it was redefined as definite only. The results were the same using either definition. For each age-sex group a cutoff was made using the percentage of cases that were hypertensive of those negative on all five symptoms. It was felt that any symptom combination that did not identify a larger proportion of hypertensives than was found in completely asymptomatic individuals was not worth consideration.

The next step was to look at successive age-sex groups to see if the same "discriminatory" combination appeared in a succession of age-sex groups. No such combinations of symptoms with a persistently higher than expected prevalence of hypertension were found. The specific tables were not included here, since they were rather bulky.

The second approach was to count the number of positive symptoms reported and to determine whether hypertension prevalence varied with the number of such symptoms. For this purpose all responses except essentially negative ones were counted as positive. One would expect that as the number of positive symptoms increased from none to five the prevalence of hypertension would rise. It did not. Table 21 presents tabulations for the age groups 35-64 years.

The failure of any combination of symptoms to predict hypertension is not unexpected, given the negative results for the individual symptoms. Clearly if one wishes to obtain information about hypertension by use of a questionnaire, the direct question, inadequate as it is, is the only usable procedure. Symptom information is totally non-contributory.

## THE PHYSICIAN INQUIRY

The purpose of the physician inquiry was to evaluate possible differences in medical status between sample persons who came in for exam-

ination and sample persons who did not. The results of the comparison of physicians' reports for examined and nonexamined persons have already been described,<sup>9</sup> and it is unnecessary to restate them here.

In addition to serving its primary purpose the physician inquiry yielded information on examined persons as such. Inquiries were sent to the personal physicians of 762 examined persons. Essentially complete reports were received for 488 persons. What we propose to consider now is the relationship between medical information for examined persons reported by their own physicians and medical information for the same persons available from other sources. Because the viewpoint here is different from that in the earlier report on the physician inquiry, the data are tabulated differently and will vary slightly from those previously published.

A number of possible insights are available from such comparisons, but only two will be considered.

### The Physician Inquiry as a Survey Instrument

If the diagnostic information given by the personal physician and by the standardized, uniformly applied examination performed by the Health Examination Survey are in reasonable accord, it is conceivable that an examination survey could be rendered more efficient by a supplementary physician inquiry, using available medical records. The design of such a program will not be proposed in specific terms, but in general it might take the following form. A large sample would be drawn and an inquiry would be sent to the individuals' physicians. The sample would then be divided into two parts, persons for whom a usable physician reply was received and those for whom a usable reply was not received. A sample from each group would be examined.

The utility of such a procedure would depend on the degree of correspondence between information from these two sources. How closely did the survey examination and the personal physician agree?

It has already been shown that the personal physician reported 6 cases of heart disease or of hypertension for every 10 cases diagnosed in the

same persons by the survey examination. Agreement on specific individuals was relatively high (table 10).

Diagnosis	Examination	Physician inquiry	Both
Heart disease, total-----	154	92	70
Coronary heart disease-----	38	41	17
Hypertensive heart disease----	86	55	34
Rheumatic heart disease-----	10	15	6
Hypertension-----	164	98	73

Thus 76.1 percent of all cases reported by the personal physician as having heart disease were similarly diagnosed by the survey examination, although agreement on specific heart disease diagnoses was at a lower level. In addition, 74.5 percent of all cases reported as hypertensive were so diagnosed by the survey.

Agreement, however, varied with age and sex (tables 22 and 23). Generally speaking, the ratio of cases reported by the personal physician to cases diagnosed by the survey increased with age and was higher for women than men.

### Nonresponse

Up to this point we have been discussing the physician inquiries which yielded a usable reply. What about the one inquiry in three for which a usable reply was not received? How did non-response distort the picture?

The first thing to notice is that response to the inquiry was not unbiased. Replies for women were more likely to be usable than replies for men. Among men the likelihood of a usable reply was less if the man was under 45 than if he was over 45; among women there were no strong age differentials in response rate. These age and sex differentials (table 24) somewhat complicate comparisons between usable and nonusable inquiries. There was a strong

gradient in the probability of a usable reply with income. The lower the family income the less likely it was that a usable reply would be received from the personal physician (table 25). The percentage of usable replies rose from 56.6 for persons with family incomes under \$2,000 to 71.6 for persons with family incomes over \$10,000. There was also a distinction between replies for persons with a college education and persons without a college education, the response to physician inquiry being greater for those with a college education. Apparently there were no response differences associated with urban and rural residence or with residence in the central city of standard metropolitan statistical areas (SMSA's), outside the central city, or in urban areas outside SMSA's. On the other hand, slight regional differences did exist, with the percentage of usable replies being greatest in the Northeast Region and least in the West; however, this differential was not strongly marked.

There was some indication that the probability of receiving a usable reply from the physician was related to the medical status of the individual (table 26). The amount of heart disease and hypertension found on examination was less among persons for whom no usable reply was received than among the group for whom a usable reply was received. This seems to be true in general for all age-sex groups with the exception of women under 45 years.

(Why this group should be an exception is difficult to say, but we may speculate on it. Let us assume that for other age-sex groups the likelihood that a person will regularly visit a physician or have a thorough physical examination is related to his health status; if he has an illness he is more likely to have a physician who knows him well than if he does not have an illness. On the other hand, for women in the childbearing ages let us suppose the likelihood of having medical care on a routine basis is unrelated to illness unless pregnancy and minor irregularities related to the reproductive system are to be designated as illness. Hence the likelihood of a physician's knowing their medical status would be largely unrelated to their health.)

All in all, the large proportion of nonusable replies to physician inquiry and the differences between the population subgroups in this pro-

portion make it hazardous to rely exclusively on a physician inquiry to define the medical status of the population. However, as an adjunct to an examination survey, this is a promising resource.

### Other Variables

The sample chosen for the physician inquiry was both qualitatively and quantitatively too limited to make analysis by other demographic variables worthwhile. For that matter, it is possible that a more extensive investigation would present a somewhat different picture than has been presented by the data collected.

While the discussion has considered the possible utility of a physician inquiry in defining the prevalence of heart disease and hypertension, this instrument may also be applicable for other purposes. For example, the physicians were also asked to report the examinees' blood pressure, height, and weight. These measurements were less frequently reported than the information on disease, but when they were reported there was close average agreement with the examination findings.

Measurement	Physician inquiry	Examination
Blood pressure-----	134/80	134/80
Height (in inches)---	65.4	64.7
Weight (in pounds)---	153.3	153.8

Distributions of blood pressure, height, and weight as reported by the personal physician and the examination on the same persons are given in tables 27-29.

### The Medical History From the Viewpoint of the Physician Inquiry

Presumably, some cases where the physician had diagnosed the disease were not reported on the self-administered medical history—either because the physician had not adequately conveyed this information to his patient or because

the patient simply did not report it. The physician inquiry bore out this possibility.

	Heart disease	Hypertension
Number reported by physician-----	92	98
Number reported on medical history as physician-diagnosed--	60	93
Number reported by both-----	40	60

In short, the medical history reports of physician-diagnosed heart disease or hypertension understated the amount of physician-diagnosed disease. Where the examinee indicated a physician-diagnosed disease and the physician did not report this, it cannot be concluded that the examinee was misstating the facts, since the diagnosis may have been made by another physician. The true level of reporting should be approximated by the positive replies which were in agreement with the report by the personal physician—for heart disease 43 percent and for hypertension 61 percent.

## CONCLUSION

### Some Qualifications of the Data

While the sources of information have already been described briefly, some special considerations might be noted at this point.

The survey examination was designed to place special emphasis on the findings made at the time of examination. With two significant exceptions, the diagnosis of heart disease was almost entirely independent of the medical history information. The two exceptions were angina pectoris, which required an appropriate description by the examinee as well as the judgment of the examining physician, and hypertensive heart disease, which (in a small proportion of cases) relied on a history of treated hypertension when the examination blood pressures were normal but the heart findings were not. Except for angina pectoris, how-



ever, a heart disease diagnosis always required an abnormal finding on the chest X-ray or the electrocardiogram, each of which was interpreted without access to any other information about the examinee. Hypertension as such was always defined on the basis of blood pressure as measured on the examination.

The information from the personal physician was also qualified in some respects. For an inquiry to be sent, a personal physician must have been designated by the examinee and his address given. Permission to consult the physician had to be obtained. What is more, there had to be indication on the household interview that a personal physician (not necessarily the specific physician reported) had been consulted by the examinee within the past 2 years. However, almost all persons examined gave a physician's name and a current address, and relatively few replacements had to be made either because the person had not seen a physician within the last 2 years or because he failed to give permission to consult his physician. On the other hand, the physician was more accurately identified on the medical history than he would ordinarily have been in a household interview. This no doubt improved the chances of obtaining usable information from the physician. It might be noted that unwillingness to sign a permission form is one of the best indicators of reluctance to be examined, so this unwillingness would not constitute a special disadvantage to the use of a physician inquiry as compared with an examination survey.

The plan and execution of the physician inquiry led to including in the inquiry an examinee group that had more women, more older persons, and fewer nonwhite persons than the Health Examination Survey sample as a whole. The age and sex biases occurred because the examinees included in the inquiry were matched to the non-examined group on the basis of age and sex, and the nonexamined group had those biases. The bias with respect to race arose despite an effort to match on race because in attempting to match unexamined nonwhite persons on sex and age (the more important variables) it was often impossible to find examined nonwhite persons of the same

sex and nearly the same age. These biases, while they should be noted, do not produce any difficulties in comparing reports by the various instruments. They do, however, lead to prevalence rates for the inquiry group which are higher than those for the sample as a whole.

### **Last Thoughts**

This paper includes a wide variety of topics and, perhaps, some variation in viewpoint. It would probably be unwise to attempt to summarize it; however, some final observations may be in place.

The analysis was largely impressionistic; that is, the conclusions are not to be taken as "statistically significant" in any formal sense. While statistical tests were sometimes applied to help decide what the data meant, the tests were never rigorous in the sense that they were based on exact probabilities concerning population estimates obtainable by the different techniques.

Repeated measurement always tends to variant results. Where the measurements are repeated with different instruments, the variation is likely to be greater. Hence there is nothing surprising in the fact that the medical examination given by the HES yielded different results from the medical evaluation supplied by the examinee's physician and from the self-administered medical history.

The magnitude of these discrepancies, however, was so great as to raise the question whether, in fact, these various instruments were measuring the same thing. This is an entirely reasonable query. In this report, however, the question is put this way: Assuming that the instruments were measuring the same thing, how great was the disagreement among them? From this relatively simple point of view the final test for these various mechanisms for counting cases of heart disease or hypertension is how well they count and whether they count the same way in every population subgroup. These questions have not been finally answered here, but a number of facts and viewpoints leading to an answer have been presented. If nothing else these may be useful as a touchstone of opinion.

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Table 1. Number of persons reported as having heart disease, by examination and medical history: Health Examination Survey, 1960-62

Diagnosis	Examination	Medical history
Number of persons		
Total-----	6,672	6,672
Definite-----	855	796
Suspect-----	745	38
Negative-----	5,072	5,838

Table 2. Number of persons in physician inquiry group reported as having heart disease, by personal physician, examination, and medical history: Health Examination Survey, 1960-62

Diagnosis	Personal physician	Examination	Medical history
Number of persons			
Total----	488	488	488
Definite-----	58	94	79
Suspect-----	34	60	3
Negative-----	396	334	406

Table 3. Number of persons reported as having hypertension, by examination and medical history: Health Examination Survey, 1960-62

Diagnosis	Examination	Medical history
Number of persons		
Total-----	6,672	6,672
Definite-----	1,016	1,140
Borderline-----	927	35
Negative-----	4,729	5,497

Table 4. Number of persons in physician inquiry group reported as having hypertension, by personal physician, examination, and medical history: Health Examination Survey, 1960-62

Diagnosis	Personal physician	Examination	Medical history
Number of persons			
Total---	488	488	488
Definite-----	65	84	100
Borderline-----	33	80	2
Negative-----	390	324	386

Table 5. Number of persons reported as having heart disease, cross-classified by examination and medical history: Health Examination Survey, 1960-62

Medical history	Examination			
	Total	Definite	Suspect	Negative
Number of persons				
Total--	6,672	855	745	5,072
Definite-	796	257	127	412
Suspect--	38	7	5	26
Negative-	5,838	591	613	4,634

Table 6. Number of persons reported as having hypertension, cross-classified by examination and medical history: Health Examination Survey, 1960-62

Medical history	Examination			
	Total	Definite	Suspect	Negative
Number of persons				
Total--	6,672	1,016	927	4,729
Definite-	1,140	485	226	429
Suspect--	35	11	4	20
Negative-	5,497	520	697	4,280

Table 7. Number of persons in physician inquiry group reported as having heart disease, cross-classified by personal physician and medical history: Health Examination Survey, 1960-62

Medical history	Personal physician			
	Total	Definite	Suspect	Negative
	Number of persons			
Total--	488	58	34	396
Definite--	79	35	8	36
Suspect--	3	1	1	1
Negative--	406	22	25	359

Table 8. Number of persons in physician inquiry group reported as having hypertension, cross-classified by personal physician and medical history: Health Examination Survey, 1960-62

Medical history	Personal physician			
	Total	Definite	Border-line	Negative
	Number of persons			
Total----	488	65	33	390
Definite---	100	50	12	38
Suspect----	2	-	-	2
Negative---	386	15	21	350

Table 9. Percent of persons reported as having hypertension on examination, medical history, and physician inquiry, by examination blood pressure level: Health Examination Survey, 1960-62

Systolic pressure (mm. hg.)	Examination	Medical history	Physician inquiry	Diastolic pressure (mm. hg.)	Examination	Medical history	Physician inquiry
	Percent of persons				Percent of persons		
Less than 90-----	-	-	-	Less than 50-----	8.8	10.5	0.0
90-----	-	4.9	-	50-----	1.4	5.5	0.0
100-----	-	6.2	1.7	55-----	2.5	1.3	9.1
110-----	0.5	6.6	-	60-----	3.3	7.8	0.0
120-----	4.7	9.6	8.9	65-----	5.3	8.9	9.8
130-----	16.8	15.1	25.4	70-----	6.6	7.6	4.6
140-----	95.6	23.6	13.0	75-----	12.2	11.7	12.2
150-----	95.3	33.7	46.3	80-----	20.4	14.9	21.8
160-----	95.8	42.6	44.0	85-----	36.7	22.8	25.0
170-----	96.6	56.7	57.1	90-----	100.0	32.5	43.6
180-----	93.6	65.5	88.9	95-----	100.0	34.6	41.7
190-----	98.7	74.0	75.0	100-----	100.0	44.7	57.1
200-----	100.0	59.1	80.0	105-----	100.0	59.5	57.1
210-----	91.3	69.6	100.0	110-----	100.0	50.0	100.0
220-----	100.0	80.0	-	115-----	100.0	74.4	-
230-----	100.0	66.7	100.0	120-----	100.0	68.4	66.7
240-----	100.0	100.0	-	125-----	100.0	55.6	100.0
250-----	100.0	66.7	-	130-----	100.0	83.3	-
260 and over-----	100.0	100.0	-	135 and over-----	100.0	90.0	100.0

**Table 10.** Number of persons in physician inquiry group reported as having hypertension or specified heart disease, cross-classified by personal physician and examination: Health Examination Survey, 1960-62

Personal physician's diagnosis	Examination diagnosis	Hypertension	Heart disease	Coronary heart disease	Hypertensive heart disease
		Number of persons			
Total-----	Total-	488	488	488	488
	Definite----	84	94	22	65
	Suspect or borderline-	80	60	16	21
	Negative----	324	334	450	402
Definite-----	Total-	65	58	18	33
	Definite----	38	36	6	17
	Suspect or borderline-	14	10	4	3
	Negative----	13	12	8	13
Suspect or borderline-----	Total-	33	34	23	22
	Definite----	12	20	6	12
	Suspect or borderline-	9	4	1	2
	Negative----	12	10	16	8
Negative-----	Total-	390	396	447	433
	Definite----	34	38	10	36
	Suspect or borderline-	57	46	11	16
	Negative----	299	312	426	381

Table 11. Responses to medical history questions on heart disease, by final examination diagnosis of heart disease: Health Examination Survey, 1960-62

Medical history question and response	Number of responses			Percent of responses with examination diagnosis of heart disease
	All responses	With examination diagnosis of heart disease		
		Definite	Suspect	
Have you ever had any reason to think you may have heart trouble?				
Yes-----	796	257	127	48.2
No-----	5,838	591	613	20.6
?-----	38	7	5	*
If "yes" or "?" did a doctor tell you that you had heart trouble?				
Yes, total-----	510	216	85	59.0
Yes, diagnosis specified-----	393	155	64	55.7
No-----	286	41	42	29.0
How long ago did you first start having it?				
1 year-----	125	35	16	40.8
1-5 years-----	267	85	43	47.9
More than 5 years-----	397	135	68	51.1
Have you had it in the past 12 months?				
Yes-----	538	184	80	49.1
No-----	235	66	48	48.5
Do you take any pills or medicine for it?				
Yes, total-----	246	130	40	69.1
Yes, medicine named-----	133	72	23	71.4
No-----	541	121	86	38.3

NOTE: Various subtotals are not reconciled.



Table 12. Responses to medical history questions on high blood pressure, by final examination diagnosis of hypertension: Health Examination Survey, 1960-62

Medical history question and response	Number of responses			Percent of responses with examination diagnosis of hypertension
	All responses	With examination diagnosis of hypertension		
		Definite	Borderline	
Have you ever had any reason to think you may have high blood pressure?				
Yes-----	3,140	485	226	62.3
No-----	5,497	520	697	22.1
?-----	35	11	4	*
If "yes" or "?" did a doctor tell you it was high blood pressure?				
Yes-----	954	458	186	67.5
No-----	187	27	40	35.8
How long ago did you first start having it?				
1 year-----	233	81	47	54.9
1-5 years-----	420	166	87	60.2
More than 5 years-----	468	228	89	67.7
Have you had it in the past 12 months?				
Yes-----	704	331	136	66.3
No-----	349	116	70	53.3
Do you take any pills or medicine for it?				
Yes, total-----	434	236	74	71.4
Yes, medicine named-----	149	88	20	72.5
No-----	701	244	151	56.3

NOTE: Various subtotals are not reconciled.

Table 13. Number of persons reported as having heart disease on examination and medical history, by sex and age: Health Examination Survey, 1960-62

Age	Men		Women	
	Examination	Medical history	Examination	Medical history
	Number of persons			
Total, 18-79 years-----	806	355	794	441
18-24 years-----	36	19	20	26
25-34 years-----	64	43	40	42
35-44 years-----	139	69	105	79
45-54 years-----	177	73	183	112
55-64 years-----	187	81	205	79
65-74 years-----	154	53	192	83
75-79 years-----	49	17	49	20

NOTE: Medical history counts omit 38 cases reported as ? heart disease.

Table 14. Number of persons reported as having hypertension on examination and medical history, by sex and age: Health Examination Survey, 1960-62

Age	Men		Women	
	Examination	Medical history	Examination	Medical history
	Number of persons			
Total, 18-79 years-----	966	431	977	709
18-24 years-----	41	25	16	38
25-34 years-----	120	58	51	81
35-44 years-----	201	84	145	109
45-54 years-----	208	86	251	150
55-64 years-----	212	84	247	152
65-74 years-----	139	76	216	148
75-79 years-----	45	18	51	31

NOTE: Medical history counts omit 35 cases reported as ? high blood pressure.

Table 15. Ratio of actual to expected prevalence of hypertension and heart disease on examination and medical history, by sex and race: Health Examination Survey, 1960-62

Sex and race	Hypertension				Heart disease			
	Number of cases reported		Ratio of actual to expected		Number of cases reported		Ratio of actual to expected	
	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history
<u>Men</u>								
White-----	804	355	0.97	0.97	646	319	0.94	1.03
Negro-----	148	72	1.34	1.36	149	33	1.60	0.79
<u>Women</u>								
White-----	791	541	0.96	0.91	608	376	0.92	0.99
Negro-----	178	160	1.49	1.83	177	65	1.81	1.02

Table 16. Ratio of actual to expected prevalence of hypertension and heart disease on examination and medical history, by income for the white population: Health Examination Survey, 1960-62

Income	Hypertension				Heart disease			
	Number of cases reported		Ratio of actual to expected		Number of cases reported		Ratio of actual to expected	
	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history
Less than \$2,000-----	291	192	1.00	1.21	264	129	1.07	1.12
\$2,000-\$3,999-----	298	187	1.01	1.03	254	143	1.07	1.07
\$4,000-\$6,999-----	425	235	1.00	0.99	317	174	0.95	0.92
\$7,000-\$9,999-----	214	105	0.95	0.83	147	94	0.92	0.92
\$10,000 and over-----	206	101	1.00	0.99	153	100	0.99	1.12

Table 17. Ratio of actual to expected prevalence of hypertension and heart disease on examination and medical history, by education for the white population: Health Examination Survey, 1960-62

Education	Hypertension				Heart disease			
	Number of cases reported		Ratio of actual to expected		Number of cases reported		Ratio of actual to expected	
	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history
Less than 5 years-----	131	83	1.16	1.29	112	54	1.12	1.16
5-8 years-----	545	312	1.06	1.13	466	226	1.07	1.06
9-12 years-----	631	351	0.96	0.92	469	300	0.98	1.02
13 years and over-----	233	127	0.87	0.85	159	94	0.84	0.77

Table 18. Ratio of actual to expected prevalence of hypertension and heart disease on examination and medical history, by geographic region for the white population: Health Examination Survey, 1960-62

Region	Hypertension				Heart disease			
	Number of cases reported		Ratio of actual to expected		Number of cases reported		Ratio of actual to expected	
	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history
Northeast-----	627	277	1.13	0.92	443	207	1.03	0.86
South-----	426	282	0.91	1.04	345	208	0.94	1.10
West-----	542	337	0.93	1.06	466	280	1.01	1.08

Table 19. Ratio of actual to expected prevalence of hypertension and heart disease on examination and medical history, by place description for the white population: Health Examination Survey, 1960-62

Place description	Hypertension				Heart disease			
	Number of cases reported		Ratio of actual to expected		Number of cases reported		Ratio of actual to expected	
	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history	Exami- nation	Medical history
SMSA-in central city-----	459	255	0.98	0.98	391	194	1.05	0.97
SMSA-outside central city---	510	228	1.04	0.86	352	196	0.96	0.94
Urban-not SMSA-----	214	148	0.92	1.08	175	103	0.97	1.04
Rural farm-----	139	90	1.03	1.33	125	70	1.22	1.19
Rural nonfarm-----	273	175	1.00	1.15	211	132	0.92	1.09

Table 20. Number of men and women aged 45-64 years, by hypertensive status and symptoms on medical history: Health Examination Survey, 1960-62

Symptoms on medical history	Men			Women		
	All persons	Hypertension		All persons	Hypertension	
		Definite	Border-line		Definite	Border-line
<u>HEADACHES</u>						
Number of persons						
In the past few years, have you had any headaches?-----	965	210	210	1,148	285	213
<u>Yes</u>						
Every few days, bothers quite a bit-----	61	12	14	136	41	19
Every few days, bothers just a little-----	48	14	6	52	9	7
Less often, bothers quite a bit-----	51	8	13	145	33	28
<u>Essentially negative</u>						
Yes, less often, bothers just a little-----	401	78	75	539	134	103
No-----	401	98	101	271	68	56
Other-----	3	-	1	5	-	-
<u>NOSEBLEEDS</u>						
Number of persons						
In the past few years have you had any nosebleeds?-----	965	210	210	1,148	285	213
<u>Yes</u>						
Every few days, bothers quite a bit-----	4	1	2	1	1	-
Every few days, bothers just a little-----	2	-	1	3	2	-
Less often, bothers quite a bit-----	10	5	3	8	2	2
<u>Essentially negative</u>						
Yes, less often, bothers just a little-----	89	26	16	100	19	23
No-----	857	178	188	1,034	261	186
Other-----	3	-	-	2	-	2
<u>TINNITUS</u>						
Number of persons						
At any time in over the past few years, have you ever noticed ringing in your ears or have you been bothered by other funny noises in your ears?-----	965	210	210	1,148	285	213
<u>Yes</u>						
Every few days, bothers quite a bit-----	49	8	8	68	15	14
Every few days, bothers just a little-----	48	13	10	50	5	11
Less often, bothers quite a bit-----	20	3	6	23	6	4
<u>Essentially negative</u>						
Yes, less often, bothers just a little-----	206	40	42	292	70	47
No-----	637	146	144	710	188	136
Other-----	5	-	-	5	1	1

Table 20. Number of men and women aged 45-64 years, by hypertensive status and symptoms on medical history: Health Examination Survey, 1960-62—Con.

Symptoms on medical history	Men			Women		
	All persons	Hypertension		All persons	Hypertension	
		Definite	Borderline		Definite	Borderline
<u>DIZZINESS</u>						
Number of persons						
Have you ever had spells of dizziness?-----	965	210	210	1,148	285	213
<u>Yes</u>						
Every few days, bothers quite a bit-----	36	10	10	62	21	14
Every few days, bothers just a little-----	25	5	4	19	3	1
Less often, bothers quite a bit-----	31	4	9	71	13	18
<u>Essentially negative</u>						
Yes, less often, bothers just a little-----	280	59	58	490	126	84
No-----	587	129	128	496	121	93
Other-----	6	3	1	10	1	3
<u>FAINTING</u>						
Have you ever fainted or blacked out?-----	965	210	210	1,148	285	213
Yes-----	168	29	34	314	74	51
No-----	797	181	176	832	210	162
Other-----	-	-	-	2	1	-

Table 21. Prevalence of hypertension according to the number of hypertension symptoms reported, by sex for specified age groups: Health Examination Survey, 1960-62

Age group and number of positive symptoms	Men			Women		
	Number of persons	Percent with:		Number of persons	Percent with:	
		Definite hypertension	Definite or borderline hypertension		Definite hypertension	Definite or borderline hypertension
<u>35-44 years</u>						
0 symptoms-----	456	13.6	28.7	367	11.2	18.5
1 symptom-----	188	13.8	27.1	263	7.2	16.7
2 symptoms-----	48	16.7	33.3	120	6.7	22.5
3 symptoms and over-----	11	9.1	27.3	34	8.8	17.6
<u>45-54 years</u>						
0 symptoms-----	344	22.4	40.7	333	21.3	36.9
1 symptom-----	139	14.4	30.2	220	20.5	35.0
2 symptoms-----	45	13.3	40.0	107	19.6	34.6
3 symptoms and over-----	19	15.8	42.1	45	17.8	31.1
<u>55-64 years</u>						
0 symptoms-----	250	23.2	51.6	215	33.5	58.6
1 symptom-----	105	27.6	50.5	130	30.8	55.4
2 symptoms-----	38	28.9	47.4	68	26.5	47.1
3 symptoms and over-----	25	24.0	48.0	30	33.3	56.7

NOTE: The 5 symptoms being counted are specified in the text section "Symptoms as a Diagnostic Tool."

Table 22. Number of persons in physician inquiry group reported as having heart disease on examination and by personal physician, by sex and age: Health Examination Survey, 1960-62

Age	Men		Women	
	Examination	Personal physician	Examination	Personal physician
Number of persons				
Total, 18-79 years-----	55	31	99	61
18-44 years-----	11	3	14	5
45-64 years-----	29	18	46	27
65-79 years-----	15	10	39	29

Table 23. Number of persons in physician inquiry group reported as having hypertension on examination and by personal physician, by sex and age: Health Examination Survey, 1960-62

Age	Men		Women	
	Examination	Personal physician	Examination	Personal physician
	Number of persons			
Total, 18-79 years-----	60	24	104	74
18-44 years-----	12	1	12	7
45-64 years-----	32	13	53	30
65-79 years-----	16	10	39	37

Table 24. Response to physician inquiry, by sex and age: Health Examination Survey, 1960-62

Sex and age	Number of responses			Percent of inquiries yielding usable responses
	All responses	Usable responses	No usable responses	
Total-----	762	488	274	64.0
<u>Men</u>				
18-44 years-----	110	58	52	52.7
45-64 years-----	120	74	46	61.7
65-79 years-----	40	25	15	62.5
<u>Women</u>				
18-44 years-----	225	153	72	68.0
45-64 years-----	186	123	63	66.1
65-79 years-----	81	55	26	67.9



Table 25. Response to physician inquiry, by specified demographic characteristics: Health Examination Survey, 1960-62

Characteristic	Number of responses			Percent of inquiries yielding usable responses
	All responses	Usable responses	No usable responses	
<u>Income</u>				
Less than \$2,000-----	99	56	43	56.6
\$2,000-\$3,999-----	144	88	56	61.1
\$4,000-\$6,999-----	250	164	86	65.6
\$7,000-\$9,999-----	115	76	39	66.1
\$10,000 and over-----	88	63	25	71.6
Unknown-----	66	41	25	62.1
<u>Education</u>				
Less than 5 years-----	45	28	17	62.2
5-8 years-----	193	119	74	61.7
9-12 years-----	378	240	138	63.5
13 years and over-----	124	88	36	71.0
Unknown-----	22	13	9	59.1
<u>Place description</u>				
SMSA-in central city-----	301	188	113	62.5
SMSA-outside central city-----	278	183	95	65.8
Urban-not SMSA-----	79	54	25	68.4
Rural farm-----	24	14	10	58.3
Rural nonfarm-----	80	49	31	61.3
<u>Geographic region</u>				
Northeast-----	338	234	104	69.2
South-----	173	110	63	63.6
West-----	251	144	107	57.4

Table 26. Number of persons with examination diagnosis of heart disease, by whether response to physician inquiry was usable or not usable: Health Examination Survey, 1960-62

Response	Examination				
	All persons	Heart disease		Hypertension	
		Definite	Suspect	Definite	Borderline
Number of persons					
All responses-----	762	133	87	128	122
Usable response-----	488	94	60	84	80
No usable response-----	274	39	27	44	42

Table 27. Number of persons according to their blood pressure as determined on examination and as reported by personal physician: Health Examination Survey, 1960-62

Systolic blood pressure (mm. hg.)	Exami- nation	Personal physician	Diastolic blood pressure (mm. hg.)	Exami- nation	Personal physician
	Number of persons			Number of persons	
Total-----	448	448	Total-----	448	448
Less than 90-----	1	1	50-54-----	5	1
90-99-----	13	1	55-59-----	11	3
100-109-----	56	24	60-64-----	18	26
110-119-----	67	74	65-69-----	58	12
120-129-----	88	116	70-74-----	59	93
130-139-----	63	82	75-79-----	80	39
140-149-----	53	41	80-84-----	80	156
150-159-----	39	38	85-89-----	50	24
160-169-----	23	28	90-94-----	39	44
170-179-----	20	20	95-99-----	23	9
180-189-----	9	10	100-104-----	12	30
190-199-----	8	3	105-109-----	7	2
200-209-----	5	5	110-114-----	1	5
210-219-----	2	3	115-119-----	-	1
220-229-----	-	1	120-124-----	2	2
230-239-----	1	-	125-129-----	2	-
240-----	-	1	130-134-----	-	1
			135-139-----	1	-

**Table 28.** Number of persons, by sex according to their height as determined on examination and as reported by personal physician: Health Examination Survey, 1960-62

Height	Men		Women	
	Exami- nation	Personal physician	Exami- nation	Personal physician
	Number of persons			
All persons-----	77	77	158	158
Less than 150 centimeters-----	-	-	6	5
150-154 centimeters-----	1	1	25	20
155-159 centimeters-----	2	2	47	22
160-164 centimeters-----	8	2	45	51
165-169 centimeters-----	13	13	18	36
170-174 centimeters-----	23	20	14	21
175-179 centimeters-----	19	20	3	1
180-184 centimeters-----	6	14	-	2
185 centimeters and over-----	5	5	-	-

**Table 29.** Number of persons, by sex according to their weight as determined on examination and as reported by personal physician: Health Examination Survey, 1960-62

Weight	Men		Women	
	Exami- nation	Personal physician	Exami- nation	Personal physician
	Number of persons			
All persons-----	98	98	249	249
Less than 100 pounds-----	-	-	3	5
100-109 pounds-----	-	-	19	18
110-119 pounds-----	1	2	22	21
120-129 pounds-----	4	2	37	33
130-139 pounds-----	7	5	32	32
140-149 pounds-----	9	10	36	30
150-159 pounds-----	13	20	21	33
160-169 pounds-----	16	16	25	26
170-179 pounds-----	15	11	17	19
180-189 pounds-----	13	10	15	10
190-199 pounds-----	6	6	10	10
200 pounds and over-----	14	16	12	12

## APPENDIX I

### A. MEDICAL HISTORY QUESTIONS RELATED TO CARDIOVASCULAR DISEASE

(Excerpts From HES-204, Medical History-Self Administered)

1. a. In the past few years have you had any headaches?  YES  NO  ?
- If YES b. How often?  Every few days  Less often Probes A,B
- c. Do they bother you  quite a bit  just a little
- 
2. a. In the past few years have you had any nosebleeds?  YES  NO  ?
- If YES b. How often?  Every few days  Less often Probe A
- c. Do they bother you  quite a bit  just a little
- 
3. a. At any time over the past few years, have you ever noticed ringing  
in your ears or have you been bothered by other funny noises  YES  NO  ? Probes A,B  
In your ears?
- If YES b. How often?  Every few days  Less often
- c. Do they bother you  quite a bit  just a little
- 
4. a. Have you ever had spells of dizziness?  YES  NO  ? Probe A
- If YES b. How often?  Every few days  Less often
- c. Do they bother you  quite a bit  just a little
- 
5. Have you ever fainted or blacked out?  YES  NO  ?
- 
6. a. Have you ever had a stroke?  YES  NO  ?
- If YES b. Have you had a stroke in the past 12 months?  YES  NO  ?
- c. Have you ever seen a doctor about it?  YES  NO  ?
- 
7. Has any part of your body ever been paralyzed?  YES  NO  ?
- 
9. Was there anytime in your life when you had a lot of bad sore  
throats?  YES  NO  ?
- 
16. a. Have you ever been bothered by shortness of breath when climbing  
stairs?  YES  NO  ? Probes A,D
- If YES b. How often?  Almost everytime  Less often
- c. Does it bother you  quite a bit  just a little

17. a. Have you ever been bothered by shortness of breath when doing physical work or exercising?  YES  NO  ?

If YES b. How often?  Almost everytime  Less often

c. Does it bother you  quite a bit  just a little

18. a. Have you ever been bothered by shortness of breath when you were not doing physical work or exercising?  YES  NO  ?

If YES b. How often?  Every few days  Less often

c. Does it bother you  quite a bit  just a little

19. a. Have you ever been bothered by shortness of breath when you are excited or upset about something?  YES  NO  ?

If YES b. How often?  Almost everytime  Less often

c. Does it bother you  quite a bit  just a little

20. a. Have you ever waked up at night because you were short of breath?  YES  NO  ?

If YES b. How often?  Every few nights  Less often

c. Does it bother you  quite a bit  just a little

21. a. In the past few years, have you ever had any pain, discomfort, or tightness in your chest?  YES  NO  ?

If YES, please answer questions b through j below.

b. How often?  Every few days  Less often

c. Does it bother you  quite a bit  just a little

d. Where does it bother you? (Check every place it bothers you.)

Front  Back  Right side  Middle  Left side

Somewhere else State where \_\_\_\_\_

e. Does it usually  stay in one place  move around  ?

f. How long does the pain usually last?

Just a few minutes  Few minutes to an hour  More than an hour

g. Does it usually come  When you take a lot of exercise or

when you are quiet or

is there no difference

h. Does it usually come  when you are upset or

doesn't this make any difference

j. Do you take any pills or medicine for it?  YES  NO  ?

22. a. In the past few years, have you ever had any pain, discomfort,  
or trouble in or around your heart?  YES  NO  ?

If YES, please answer questions b through j below.

b. How often?  Every few days  Less often

c. Does it bother you  quite a bit  just a little

d. Where does it bother you? (Check every place it bothers you.)

Front  Back  Right side  Middle  Left side

Somewhere else State where \_\_\_\_\_

e. Does it usually  stay in one place  move around  ?

f. How long does the pain usually last?

Just a few minutes  Few minutes to an hour  More than an hour

g. Does it usually come  When you take a lot of exercise or

when you are quiet or

is there no difference

h. Does it usually come  when you are upset or

doesn't this make any difference

j. Do you take any pills or medicine for it?  YES  NO  ?

Probes A, B

23. a. Sometimes, our hearts "act funny" (odd) like missing a beat,  
or beating real fast, or seem to turn over. Have you ever  
noticed your heart do anything like that?  YES  NO  ?

If YES b. How often?  Every few days  Less often

c. Does it bother you  quite a bit  just a little

Probes A, B

24. a. Have you ever been bothered by your heart beating hard?  YES  NO  ?

If YES b. How often?  Every few days  Less often

c. Does this bother you  quite a bit  just a little

Probes A, B

25. a. Are your ankles ever swollen at bedtime?  YES  NO  ?

If YES b. Is the swelling gone by morning?  YES  NO  ?

Probe A

26. a. When you walk, do you have pains or cramps in your legs?  YES  NO  ?

If YES b. How often?  Every few days  Less often

c. Does it bother you  quite a bit  just a little

Probe A

62. a. Has a doctor ever said you had rheumatic fever (inflammatory  
rheumatism)  YES  NO

If YES b. Have you had it in the past 12 months?  YES  NO  ?

c. Are you taking any pills or medicine for it?  YES  NO

If YES d. What is it? \_\_\_\_\_

63. Has a doctor ever said you had chorea or St. Vitus' Dance?  YES  NO

Probe C

65. a. Has a doctor ever told you that you have hardening of the arteries?  YES  NO

If YES b. Have you had this condition in the past 12 months?  YES  NO  ?

66. a. Have you ever had any reason to think you may have high blood pressure?  YES  NO  ?

If YES or ? b. Did a doctor tell you it was high blood pressure?  YES  NO

Probe C

c. How long ago did you first start having it?

1 year  1-5 years  over 5 years

d. Have you had it in the past 12 months?  YES  NO  ?

e. Do you take any pills or medicine for it?  YES  NO  ?

If YES f. Give name of the medicine \_\_\_\_\_

67. a. Have you ever had any reason to think you may have heart trouble?  YES  NO  ?

If YES or ? b. Did a doctor tell you that you had heart trouble?  YES  NO

Probe C

If YES, what did he call it? \_\_\_\_\_

c. How long ago did you first start having it?

1 year  1-5 years  over 5 years

d. Have you had it in the past 12 months?  YES  NO  ?

e. Do you take any pills or medicine for it?  YES  NO  ?

If YES f. Give name of the medicine \_\_\_\_\_

- Probes: A. Do you have any idea what causes your \_\_\_\_\_?  
B. Tell me how it feels.  
C. In what way does it bother or affect you?  
D. How many flights?

These questions were used, where indicated, if the examinee answered either "yes" or "?"

## B. FORMS USED IN RECORDING FINDINGS ON THE PHYSICAL EXAMINATION

Confidentiality has been assured the individual as set forth in 22 FR 1687

PMS-3034  
REV. 4-61

### Health Examination Survey PHYSICAL EXAMINATION HES-205

BLOOD PRESSURE - LEFT ARM			
TIME	SYSTOLIC	DIASTOLIC 1	DIASTOLIC 2
1.			
2.			
3.			

OCULAR FUNDI	RIGHT	LEFT	REMARKS	CODE			
4. Normal				<input checked="" type="checkbox"/>			
5. Fundus not Visualized				<input checked="" type="checkbox"/>			
6. Globe Absent							
7. Increased Light Reflex							
8. Narrow Arterioles							
9. Tortuous Arterioles							
10. AV Compression							
11. Hemorrhage							
12. Exudate							
13. Venous Engorgement							
14. Papilledema							
15. Disc Abnormal							
16. Lens Opacities							
17. Iritis							
18. Other (Specify)							
19. K-W Grade	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	



EARS	RIGHT	LEFT	REMARKS	CODE
20. Normal				X
21. Drum not Visualized				
22. Malformation				
23. Exudate				
24. Perforated Drum				
25. Scarred Drum				

NECK	
26. Venous Engorgement (Upright) <input type="checkbox"/> YES <input type="checkbox"/> NO	

PERIPHERAL ARTERIES - Inspection and Palpation					
27. All Normal <input type="checkbox"/>					
RIGHT SIDE	NORMAL	SCLEROTIC	TORTUOUS	NOT DONE*	CODE
28. Superficial Temporal					
29. Brachial					
30. Radial					
LEFT SIDE	NORMAL	SCLEROTIC	TORTUOUS	NOT DONE*	CODE
31. Superficial Temporal					
32. Brachial					
33. Radial					
* NOT DONE (Specify which item number and why not done) _____					

QUALITY OF ARTERIAL PULSATIIONS						
34. All Normal <input type="checkbox"/>						
RIGHT SIDE	NORMAL	BOUNDING	DIMINISHED	NOT PALPABLE	NOT DONE*	CODE
35. Radial						
36. Dorsalis Pedis						
37. Post-tibial						
LEFT SIDE	NORMAL	BOUNDING	DIMINISHED	NOT PALPABLE	NOT DONE*	CODE
38. Radial						
39. Dorsalis Pedis						
40. Post-tibial						

LOWER EXTREMITIES	RIGHT	LEFT	REMARKS	CODE
41. Normal				
42. Not Done*				
43. Varicosities				
44. Dependent Edema				
45. Ulcers				

\* NOT DONE (Specify which item number and why not done)

---



---



---

HEART

46. Thrills

None

IF present, specify: Location \_\_\_\_\_

Timing \_\_\_\_\_

47. Apical Impulse

Not Felt

MCL

At or inside

Outside

Interspace

3

4

5

6

7

48. Heart Sounds

Normal

Accentuated

Diminished

A<sub>2</sub>

P<sub>2</sub>

M<sub>1</sub>

Third Heart Sound  Splitting of second sound abnormal

other (Specify) \_\_\_\_\_

49. Murmurs

If present, specify (in order): location, intensity (grades I through V), pitch, quality, duration, timing, transmission, and whether significant or non-significant.

Systolic None

Diastolic None

MUSCULOSKELETAL SYSTEM

50. Arthritis and Rheumatism

No Positive Findings

If positive findings are present, fill out Summary of Joint Involvement on next page.

**SUMMARY OF JOINT INVOLVEMENT**

Joints	MANIFESTATIONS					
	Tender	Swelling	Deformity	Limitation	Other <sup>1</sup>	Code
51. Shoulder						
52. Elbow						
53. Wrist						
54. Metacarpo-phalangeal						
55. Proximal-inter-phalangeal						
56. Distal-inter-phalangeal						
57. Hip						
58. Knee						
59. Ankle						
60. Feet						
61. Cervical spine						
62. Lumbar spine						
63. Other*						

Record positive findings as R for right, L for left, RL for both, except for spine (items 61 and 62) which should be check marked.

Fingers (items 54, 55, and 56): Record total number of joints involved on right or left.

<sup>1</sup>"Other" manifestations include Heberden's nodes, subcutaneous nodules, ulnar deviation, pain on motion, heat, atrophy, and funnel fist.

\*"Other" joints include temporomandibular, sternoclavicular, sacroiliac, and specific joints of the feet.

**ADDITIONAL FINDINGS IN THE PHYSICAL EXAMINATION**

NONE

CODE

64. Head

65. Neck

66. Chest

67. Extremities

Neuromuscular System

68. Gait

69. Coordination

70. Strength

71. Tremor

**IMPAIRMENTS**

NONE

**ETIOLOGY**

Birth

Later illness  
or injury

CODE

72. Cleft palate

73. Club foot

74. Paralysis (Specify site)

75. Missing digits (Specify)

76. other (Specify)

77. Additional Remarks

---

**EXAMINING PHYSICIAN'S IMPRESSION**

<u>Cardiovascular Diseases</u>	NEGATIVE	POSITIVE	SUSPECT
Hypertension .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peripheral arteriosclerosis .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organic heart disease .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Angina pectoris .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

if positive or suspect,

Etiology \_\_\_\_\_

Anatomy \_\_\_\_\_

Physiology \_\_\_\_\_

Functional capacity \_\_\_\_\_

Other \_\_\_\_\_

Comments \_\_\_\_\_

Arthritis and Rheumatism

No arthritis

Classical arthritis (give specific diagnosis) \_\_\_\_\_

Definite arthritis \_\_\_\_\_

Rheumatic complaints \_\_\_\_\_

Questionable complaints \_\_\_\_\_

Other Diseases and Conditions

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

M.D.

\_\_\_\_\_  
*Signature*

# C. PHYSICIAN INQUIRY FORM

Confidentiality has been assured the individual as set forth in 22 FR 1687

PHS-3504  
8-60

## PHYSICIAN INQUIRY

HES-211

Form Approved Bureau of the  
Budget No. 68-R620-S4  
Expires 6-30-63

SERIAL NUMBER

PATIENT'S NAME, ADDRESS, AGE, AND SEX

1. When did you last see this patient? \_\_\_\_\_
2. What did you treat him for at that time? \_\_\_\_\_
3. In general, would you describe the patient's health at that time as:
 

Excellent
 Good
 Fair
 Poor

4. Did the patient have any of the following conditions? (Please check the appropriate block)

CONDITION	Yes, definite	Yes, possible or tentative	No	Don't know (Have no information bearing on this condition)
a. Hypertension				
b. Peripheral vascular disease				
c. Coronary heart disease				
d. Hypertensive heart disease				
e. Rheumatic heart disease				
f. Other heart disease (Please specify) _____				
g. Diabetes				
h. Arthritis or rheumatism				

5. If in your record, please specify the following measurements and the date latest measurement was taken:

- a. Blood pressure \_\_\_\_\_ (Date) \_\_\_\_\_
- b. Height \_\_\_\_\_ (Date) \_\_\_\_\_
- c. Weight \_\_\_\_\_ (Date) \_\_\_\_\_

\_\_\_\_\_  
(Signature of physician)

\_\_\_\_\_  
(Date)

**Note:** Please use other side for additional information or comments

## VITAL AND HEALTH STATISTICS PUBLICATION SERIES

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