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Coronary Heart Disease in Adults

United States: 1960-1962

A discussion of the criteria used for diagnosis of coronary heart disease, with data on the prevalence of CHD by age, sex, and race, and on analysis of differentials by place description, family income, education, marital status, usual activity status, occupation, and industry.

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IN THIS REPORT are presented findings on the prevalence of coronary heart disease (CHD) obtained from Cycle I of the Health Examination Survey. Cycle I consisted of examinations of a nationwide, probability sample of persons 18-79 years of age selected from the U.S. civilian, noninstitutional population.

This report describes the steps taken in diagnosing CHD, presents the data collected, and compares the information obtained in this survey with that obtained in other surveys. The relationship of the prevalence of CHD to the demographic variables of age, race, sex, family income, education, place description, marital status, usual activity status, occupation, and industry are examined.

CHD was more prevalent in men than in women in both the white and Negro populations. The likelihood of having CHD was about the same for both white and Negro adults. The prevalence of CHD also varied by certain other demographic factors. Among the differentials noted was a lower than expected CHD prevalence for persons with family incomes over $10,000 and a lower than expected prevalence for farmers.

CORONARY HEART DISEASE IN ADULTS

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BACKGROUND

The National Health Survey uses three methods for obtaining information about the health of the population of the United States. The first of these is a household interview in which persons are asked to give information relating to their health or the health of other household members. The second is the collection of data from available records, such as hospitals forms. The third is direct examination. The Health Examination Survey was organized to use the third procedure, drawing samples of the population and by medical examination and with various tests and measurements undertaking to characterize the population under study.

The first goal of the Health Examination Survey was to examine a nationwide, probability sample of the civilian, noninstitutional population aged 18-79 years to obtain information on the prevalence of cardiovascular diseases and certain other chronic diseases and on dental health and the distribution of a number of anthropometric and sensory characteristics. Altogether 6,672 of a sample of 7,710 persons were examined in the first survey, which began in October 1959 and ended in December 1962. These sample persons were given a standard examination, which lasted about 2 hours, by medical and other staff members of the Survey in specially designed mobile clinics.

This report discusses the prevalence of coronary heart disease by age, race, and sex and according to certain other demographic factors. It also compares the findings of this Survey with those of other surveys. This is one of a series of reports describing and evaluating the plan, conduct, and findings of the first cycle of the Health Examination Survey. The descriptions of the general plan and the sample population and response have been published.[1] [2] These provide general background for all the reports of findings. In addition, an introductory report on heart disease has appeared.[3] The reader may refer to that report for a summary of heart disease findings. It also includes detailed information on the cardiovascular examination and an extended account of the method of evaluating the findings related to heart disease and of the procedures used in arriving at heart disease diagnoses. A briefer account is given with this report of those parts of the examination specifically directed to the diagnosis of coronary heart disease.

Medical History

The cardiovascular examination began with a self-administered medical history which the examinee was asked to complete. The receptionist was available to provide the examinee with any necessary assistance. Included among the questions were some concerning cardiovascular symptoms or disease. These are shown in Appendix I. After the self-administered history was completed, the receptionist asked a few additional questions about physical handicaps, major health problems, and operations; these questions were designed to elicit relevant medical information which had not appeared in response to the more specific questions on the history. At the same time the receptionist reviewed the history for both completeness and consistency and queried the examinee further where any deficiencies were evident.

The examining physician reviewed the medical history before beginning the physical examination. He attempted to correct any incompleteness or inconsistency remaining in the record and to arrive at a definite "Yes" or "No" answer by further questioning when the examinee had been uncertain in his answer. In some cases this was not possible. For most of the cardiovascular questions the physician was instructed to ask a series of probe questions to obtain more information if an answer of "Yes" or "?" had been checked or if the examinee indicated that he did not know the answer. When these probes were completed, the physician was free to question the examinee further until he was satisfied that he had all the relevant information that could be obtained in a single session.

Among the cardiovascular questions two were of especial importance for the diagnosis of coronary heart disease—questions 21 and 22 (Appendix I). These dealt with chest pain and heart pain. It was on the basis of the response to these questions and the associated probes that a diagnosis of angina pectoris was made. Responses to the other cardiovascular questions on the medical history form were also of assistance in differential diagnosis.

Electrocardiogram

The electrocardiogram (ECG) was obtained by a twin viso machine (Model 60-1300). Twelve leads were recorded: I, II, III, AVR, AVL, AVF, and V_1-V_6. The tracing was read independently by three cardiologists according to criteria agreed upon in advance. These criteria are specified in Appendix II, which also contains a reproduction of the precoded form on which the findings were entered. For all major findings it was possible to designate an electrocardiographic abnormality "outside criteria" if the reader observed an "abnormality" which the criteria did not adequately describe. After the forms were completed, the three independent determinations were compared. Where they all agreed, the unanimous decision was used for subsequent diagnosis. When there was any disagreement, the three cardiologists met with Dr. Michael A. Corrado of the staff of Georgetown University Hospital, who served as coordinator for this work, and together they came to a final decision. This final decision was the one which was used in these cases.

Classification and Criteria

After extensive consultation the Health Examination Survey arrived at the following diagnostic categories and criteria for coronary heart disease (CHD). Ultimately they were derived from definitions of the New York Heart Association but were modified to fit the circumstances of population surveys in general and of the Health Examination Survey in particular.

Definite CHD— one of the following:

1. Myocardial infarction on ECG, definite angina pectoris in the judgment of the examining physician, or both. Angina pectoris was not ascribed to coronary heart disease if aortic stenosis or syphilitic heart disease were present.
2. History of myocardial infarction in the judgment of the examining physician and an ECG manifesting either left ventricular ischemia or myocardial infarction outside criteria.

Suspect CHD— one of the following:

1. History of myocardial infarction in the judgment of the examining physician with no evidence of myocardial infarction or left ventricular ischemia on the ECG.
2. Suspect angina pectoris in the judgment of the examining physician.

Because sample persons had to visit the mobile center for examination, two manifestations of coronary heart disease were automatically excluded. The first was a currently acute clinical episode of CHD which precluded a visit to the mobile center. The second was the kind of episode which runs a rapid fatal course— in particular, coronary heart disease first manifesting itself as "sudden death." Moreover, past manifestations which left only equivocal evidence were also undiagnosed.

It is recognized that CHD can manifest itself by congestive heart failure, major arrhythmias, acute coronary insufficiency, conduction defects, or other ECG abnormalities. While such equivocal or nonspecific manifestations are reasonable

clinical clues to the presence of CHD, they do not of themselves provide firm diagnoses of the disease.

Diagnosis

After all the findings were available, the final step was to arrive at a diagnosis. Even in favorable circumstances this is a difficult process to standardize. In the Health Examination Survey it was more difficult than usual. There were 62 different physicians, and to rely on their consistent use of the same diagnostic standards and criteria was impossible. What is more, they did not have the specialists' judgments on the electrocardiographic tracing or the findings from the serologic tests for syphilis. Thus, though the examining physician was requested to enter his diagnostic impressions, these were used only as indicators; the final diagnosis was made by the permanent staff of the Survey with consultant help in difficult cases.

The first step in this procedure was to supply a set of rules suitable for diagnosis by computer, which would convert the coded information from the medical record and the interpretation of the electrocardiogram into a diagnostic decision. (An example of the computer output is given in Appendix III.) Some of these decisions were then subject to review. Included in this review were

1. cases with significant murmurs;
2. cases with a diagnosis of angina pectoris;
3. cases where diagnosis depended on a history of myocardial infarction;
4. cases with electrocardiographic findings of myocardial infarction outside of criteria or of left ventricular ischemia where a diagnosis of definite coronary heart disease had not been made;
5. cases diagnosed as having heart disease by the examining physician but not by the computer.

This omitted from review those cases with a clear and definite diagnosis of heart disease on the available evidence and those cases where there was no possibility of diagnosing heart disease from the available evidence.

In most cases where the computer diagnosis was reviewed, the diagnostic decision made by the computer was unaltered. In a few instances, however, there was a diagnostic change on the basis of review. Where a review decision seemed to require a specialist's judgment, the case was referred to Dr. Abraham Kagan of the Framingham Heart Program for a final decision.

The review procedure did more than arrive at final diagnoses; it also submitted the diagnostic criteria to repeated scrutiny. In the balance these criteria appear to have been both reasonable and conservative.

Comparison With Clinical Examination

There is a distinct difference in the purpose of the standardized, single-visit examination used by the Health Examination Survey and a clinical examination, and this leads to differences in diagnostic findings. A study by Dr. Jeremiah Stamler,[4] then with the Cardiovascular Department, Medical Research Institute, Michael Reese Hospital, found that the diagnosis of angina pectoris was more common on the standardized examination than on the clinical, whereas electrocardiographic abnormalities were more likely to lead to a diagnosis of coronary heart disease on the clinical examination than on the standardized.

Diagnostic Reliability

There is no question that coronary artery disease defined as advanced atherosclerosis of the coronary arteries is very common in adults in the United States. In that context a positive diagnosis of CHD is very likely to be correct, but coronary atherosclerosis, even if advanced, will not always present clinical signs. Angina pectoris (AP) implies a definite limitation of normal function; myocardial infarction (MI) requires actual damage to the myocardium; and neither of these diagnoses is always unequivocal.

It is well-known that classical ECG evidences of MI are not always found after an infarction. They may never have developed; if they have, the passage of time may have degraded them to nonspecific abnormalities or to "normal." The opposite situation, where an ECG pattern of MI is reported without an infarction being present, is much rarer. Hence, the Survey requirement of current

ECG evidence of MI leads to an understatement of the prevalence of this condition.

Angina pectoris presents an even more complicated diagnostic problem. Often it is manifest in an atypical form. It can be mimicked by numerous noncardiac conditions. Physician differences in diagnosing the same person are not infrequent. These various facts have led to a great deal of skepticism regarding this diagnosis.

It is worth considering briefly the internal evidence on diagnostic reliability. (A more extended discussion is included in Appendix IV.)

The diagnosis of MI, based on a reading of the ECG in triplicate by a constant team of cardiologists, may be considered fairly reliable if conservative. Examinations were performed at 42 different stands (locations). The number of stands having 0, 1, 2, ... diagnoses of MI is consistent with the assumption that there is no variability in this diagnosis from stand to stand. A similar statement cannot be made with respect to AP. There were two stands with 19 cases diagnosed and five stands with only two cases each. Both of these events are exceedingly unlikely if the probability of finding AP did not vary from stand to stand. However, this stand variation is not *per se* evidence of physician variation in this diagnosis. So far as can be judged from the data, the stand differences represent differences between examinees much more than differences between examiners.

The overall impression from the internal evidence of the Survey, then, is of a relatively high level of reliability in the diagnosis of CHD. Even if this judgment is wrong and the diagnostic reliability was poor, this does not necessarily pose a serious problem in using the results of the Survey. Physician differences will, of course, add to the total variance of the estimates presented in this report, but they are unlikely to have influenced the findings in any other respect. There were 62 different examining physicians paired at each stand. It is difficult to see how differences among them could have introduced spurious differentials into the data.

MAJOR FINDINGS

In this section the major findings are presented with a minimum of comment. In the following section an effort is made to place these in perspective.

Total Prevalence

On the basis of the Survey findings it is estimated that of the 111.1 million adults in the United States aged 18-79 years 3.1 million had definite coronary heart disease and 2.4 million had suspect coronary heart disease— 2.8 and 2.2 percent of all adults, respectively (table 1). More than 1.5 million adults had definite AP; more than 2.3 million had suspect AP. Definite MI was present in an estimated 1.4 million adults. The number of persons estimated by this Survey to have a history of myocardial infarction without definite AP and without ECG findings of left ventricular ischemia or MI or with ECG findings of MI outside criteria or with a finding of left ventricular ischemia was trivial; these categories will therefore not be discussed separately in this report.

Age, Sex, and Race

While the onset of coronary heart disease may occur early in adult life [5] or before, the disease rarely manifests itself clinically before 45 years of age. Only 8 cases in 100 were found at younger ages, the other 92 being encountered in persons over 45 years.

Up to 75 years prevalence increases strictly with age. CHD is very rare under 25 years [6] (no instances of CHD were found in the HES sample at these young ages), but the prevalence rate rises steeply thereafter. The rise is abrupt for all manifestations of CHD, for infarction or angina, definite or suspect. By 65-74 years 15.4 percent of all persons have some form of CHD. This is the highest age-specific prevalence rate. In the age group 75-79 years 12.4 percent had some form of CHD. (Tables 2-5 and fig. 1.)

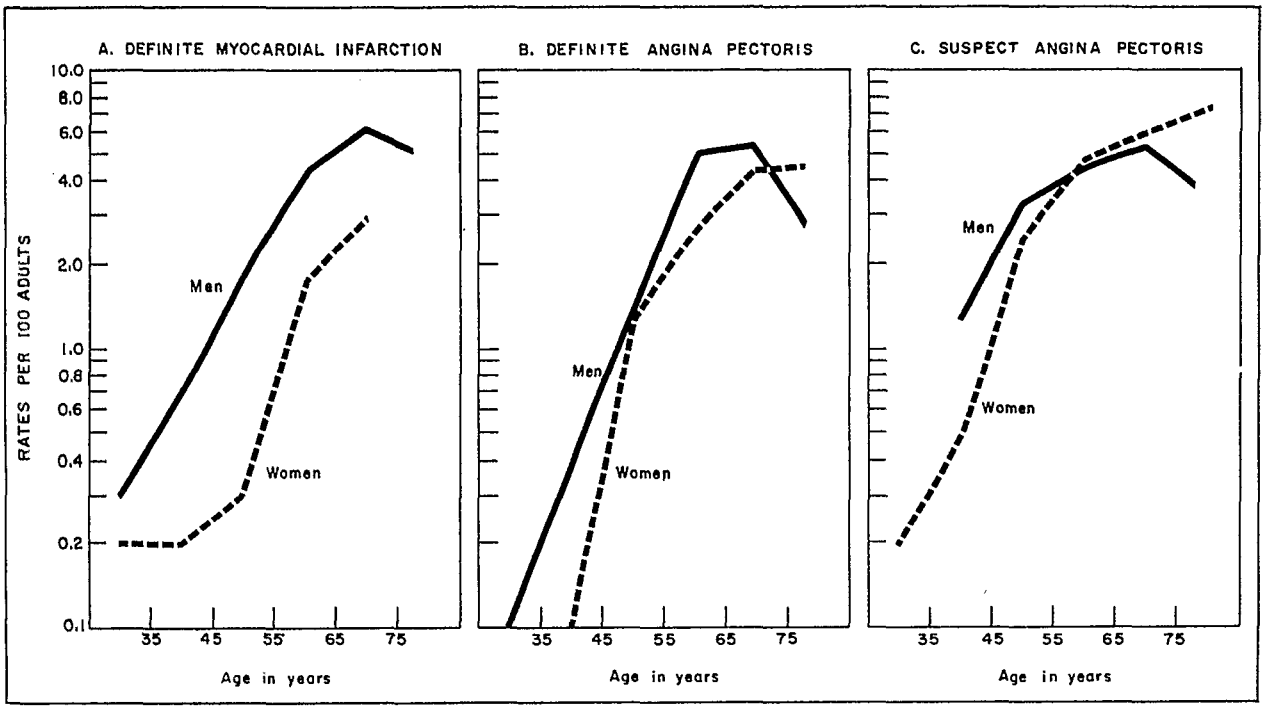

Figure 1. (a) Prevalence of definite myocardial infarction in adults, by sex and age; (b) prevalence of definite angina pectoris in adults, by sex and age; and (c) prevalence of suspect angina pectoris in adults, by sex and age.

In all age groups MI is much more common in men than in women. Definite AP is also more prevalent in men than in women until age 75 years, but the sex differential is less marked than for MI. For suspect AP there is little overall sex differential in adults, but suspect AP is more common in men until 55 years and more prevalent in women at older ages.

So far as can be judged from the data, the prevalence of CHD in its various manifestations and as a whole is the same in white and Negro adults (tables 6 and 7). The sampling error of estimates by age and sex is probably too large for comparisons between the races in such detail to be meaningful, but the available data are consistent with a conclusion that there is little, if any, difference between white and Negro adults in age-sex-specific rates except for the possibility that angina pectoris may be more prevalent in the Negro. The sample is too small to estimate prevalence for nonwhite races other than the Negro.

Manifestations of Coronary Heart Disease

Angina pectoris can occur with or without demonstrable infarction, myocardial infarction can occur with or without angina, but there are occasions when both manifestations of CHD are found in the same person (fig. 2).

Infarction is more commonly found in men than in women whether angina is present or not. Some 23.6 percent of all men with definite AP and 10.0 percent of all men with suspect AP have concurrent MI (table 1). In women the comparable percentages are 8.9 and 9.0. All these cases are assigned to MI by the classification used in this report. Thus, 41.2 percent of all cases reported as MI have either definite or suspect AP as well; the percentage is somewhat higher in women than in men— 48.0 as compared with 38.3.

While MI and AP are both manifestations of the same disease process, the relation between them is not always clear. It is probably reasonable to consider MI as the more severe form of CHD,

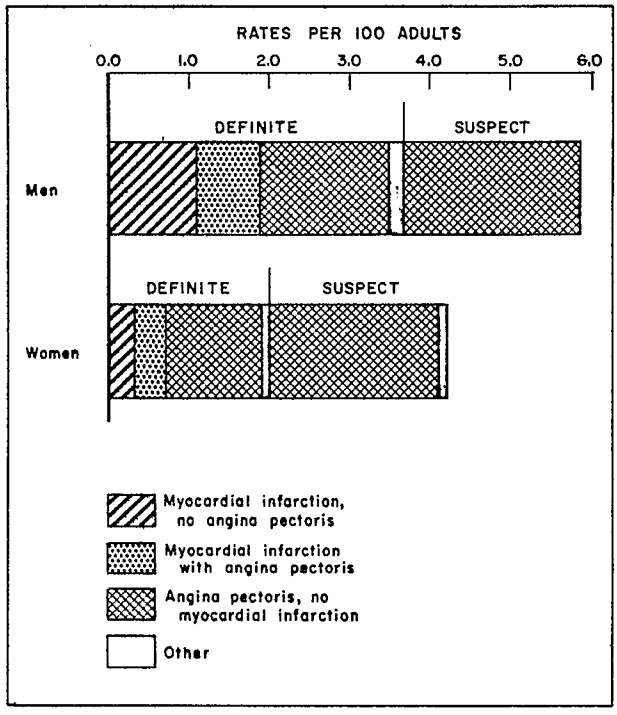

Figure 2. Prevalence of definite and suspect coronary heart disease in adults, by sex.

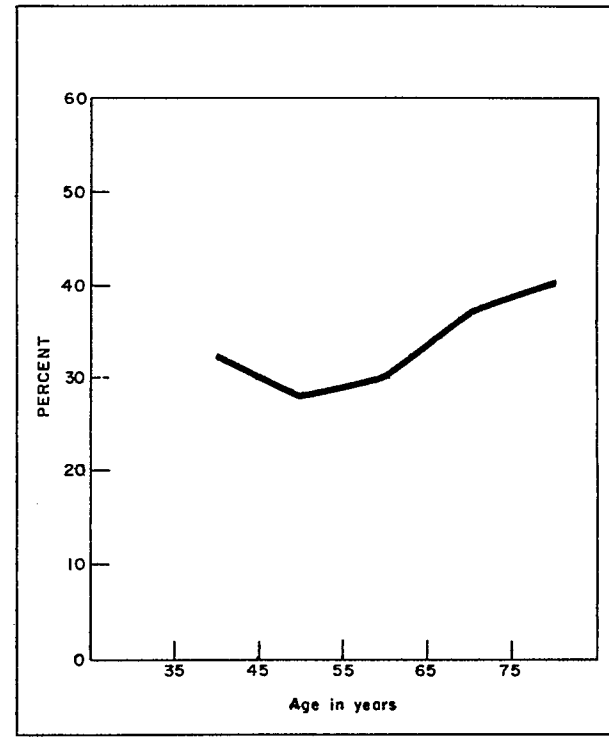

Figure 3. Percent of coronary heart disease with electrocardiographic evidence of myocardial infarction in men, by age.

certainly in the sense that it is more likely to be lethal. AP and MI, however, do not necessarily appear in that sequence although this may be more common than the HES data suggest. MI rarely appears without pain, for one thing, and it is commonly preceded by a period—often an extended period—during which the person experiences some angina. This period is often recollected only dimly, and the history obtained by the physician may not appear sufficient to sustain a diagnosis of angina pectoris.

To the extent that these generalizations are true, it is reasonable to consider MI as the end product of CHD and to regard the proportion of CHD manifest as MI to be one indicator of the severity of the disease in a given group. In those terms not only is CHD more commonly found in men than in women, but it is also found in a more severe form. Only 16.5 percent of all CHD in women exhibits ECG evidence of MI; the percentage for men is 32.9. In men the proportion of MI appears to increase with age (fig. 3).

Another index of severity is the proportion of angina pectoris diagnosed as definite. Overall this proportion for the population is estimated to be 39.7 percent. The percentage appears to be slightly higher for men than for women and slightly higher for white persons than for Negroes, but there does not appear to be any well-defined age differential. It seems reasonable to consider this percentage as essentially constant over age, race, and sex, since what differentials may exist appear to be minor.

Other Heart Disease

In a substantial number of cases a diagnosis of heart disease, while appearing under one rubric, could have been made on more than one basis. Thus, the evidence of heart disease in persons reported as having CHD is really greater than has been indicated. Of the persons with definite coronary heart disease 56.4 percent would be

considered to have heart disease even in the absence of coronary disease. About 41.1 percent of all definite cases of coronary heart disease had coexisting hypertensive heart disease or some other specific heart disease, and another 15.4 percent had some other evidence of heart disease. For suspect coronary heart disease 35.2 percent of the persons had another specific heart disease, and 10.5 percent more had some other evidence of heart disease. The association of various cardiovascular findings with CHD is considered further in Appendix V.

DEFINITE CORONARY HEART DISEASE

In the discussions that follow, the population is classified in a variety of ways— by family income, education, etc.— and the prevalence of definite coronary heart disease in different groups is compared. If the population is classified by family income, for example, the prevalence of definite CHD in different income groups is examined to determine whether or not prevalence rates vary from one income group to another. In making these comparisons, allowances must be made for the differences from one group to another in the distribution of people by age and sex, since the prevalence of definite CHD varies by age and sex. Because the sampling variability of age-sex-specific values for any group is usually very large, a summary comparison by sex was thought preferable to the presentation of prevalence rates specific by age and sex. For this reason the actual prevalence rate for each group is compared with an expected rate. The expected value of a particular group is obtained by weighting age-sex-specific rates for the total United States by the age-sex distribution for that group. The obvious meaning can be attached to differences between actual and expected rates with the understanding that differences may arise by chance. A positive difference, for example, indicates that the prevalence rate for the group is higher than expected. Alternatively the data can be presented as a ratio of actual to expected rates. If the ratio is greater than 1.0, the actual rate is higher than expected. If the ratio is less than 1.0, the actual rate is less than expected. In general, where there is no statistically significant difference between the actual and expected values for a group, differences for individual age-sex groups exhibit only random fluctuations.

Only definite disease is considered in this part of the discussion. Where a relationship really exists between CHD and some other characteristic, it should be more evident for definite diagnoses than suspect; an opposite finding would be cause for suspicion. The major CHD manifestations— myocardial infarction and angina pectoris— are considered separately. Greater weight is given to differentials in prevalence found for both manifestations than for differentials found for only one. Men and women are considered separately, not because the disease is felt to differ in the two sexes nor because their responses to similar environments may be different but chiefly because the demographic classifications used are very broad and may not have the same specific meaning for both men and women. For example, a woman living on a farm has a quite different role and quite different activities from a man in the same environment.

Residence

There is distinctly less CHD than expected among men living on farms. This is the major differential in CHD prevalence associated with residence.

No significant differentials by broad region were noted (table 8). When stands were grouped by population size, none of the groupings of urban places differed in CHD prevalence, but men and women living in predominantly rural areas had a lower than expected CHD prevalence (table 9). The deficit for women was less marked than the deficit for men and may have been a chance occurrence. Rural residents as a group did not have a CHD prevalence different from urban (table 10), but rural men resident on farms (about one-fourth of rural men) had a distinctly lower than expected CHD prevalence (table 11). These various, sometimes confusing, groupings are discussed in Appendix VI, which defines all the demographic terms used in this report.

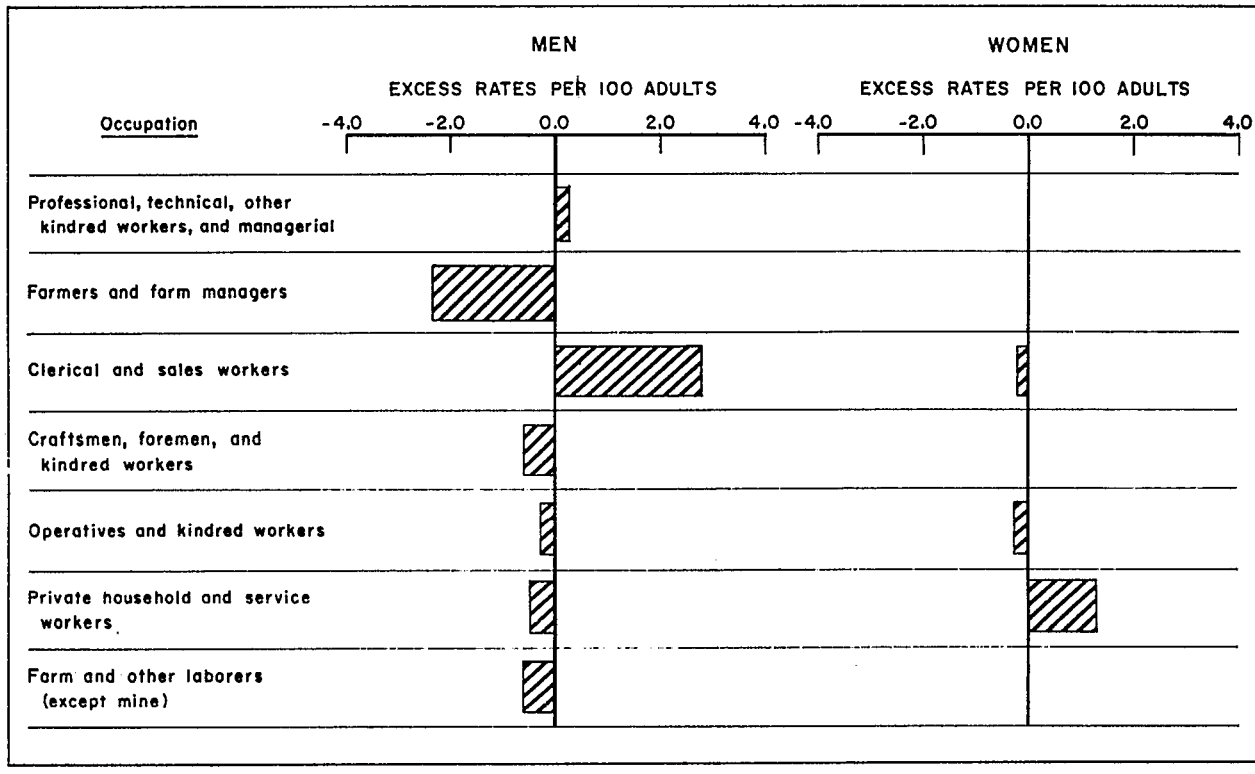

Figure 4. Excess of actual over expected prevalence of definite coronary heart disease in adults, by occupation and sex.

Occupation, Industry, and Usual Activity Status

The lower than expected prevalence associated with farm residence was also noted in the appropriate categories of occupation and industry (tables 12 and 13 and fig. 4). Men employed in agriculture, forestry, and fisheries had a distinctly lower than expected prevalence of CHD, and men giving their occupation as farmers and farm managers also had a lower than expected prevalence.

A number of other industries and occupations had rates suggestive of unusually low or high prevalence, but these rates had too large a sampling variability to be deemed significant. There was, for example, an apparently lower than expected prevalence of CHD in men in the mining and construction industry and a possibly higher than expected prevalence of CHD in men in the wholesale and retail trades and clerical and sales work.

Women who kept house had more CHD than women who worked (table 14). No similar comparison is available for men, but in the age group 65-74 years the prevalence of CHD was significantly higher in retired men than in working men.

Family Income and Education

There is a significantly lower prevalence of CHD in persons with annual family incomes more than $10,000 and a suggestion of lower prevalence in men with incomes less than $2,000 (table 15). When persons in agriculture, forestry, and fisheries are excluded from the tabulation by family income, there is no longer a lower prevalence of CHD at incomes less than $2,000.

Differentials in CHD prevalence by education present a contrasting picture (table 16). Persons with less than 5 years' education appear to have

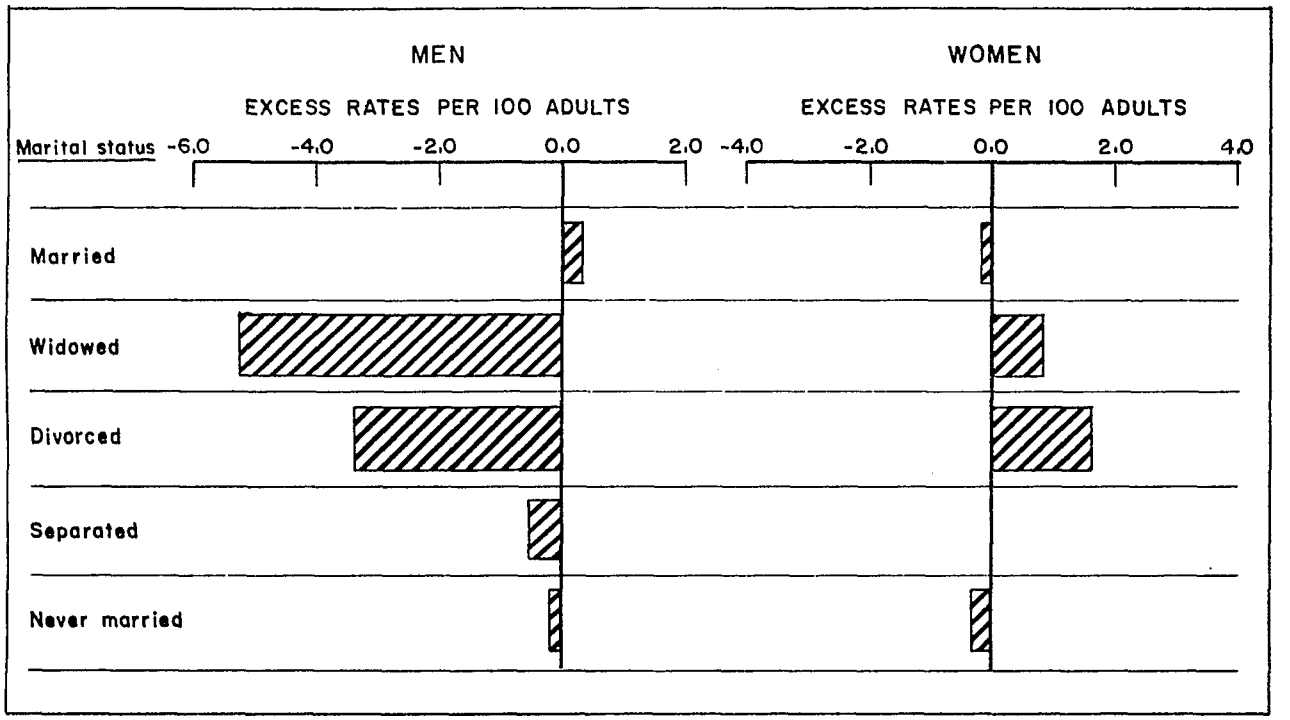

Figure 5. Excess of actual over expected prevalence of definite coronary heart disease in adults, by marital status and sex.

lower than expected CHD prevalence, while persons with at least some college education have about the expected prevalence. The sharpest contrast is between persons having less than 5 years of schooling, with lower than expected CHD rates, and persons with 5-8 years of schooling, with higher than expected prevalence rates. This contrast is evident for both men and women, being perhaps more strongly marked for women.

There is an apparent contradiction between the findings of an expected level of prevalence in persons having a college education and a lower than expected prevalence in persons having incomes of $10,000 or more. Persons having some college education and incomes more than $10,000 do have less CHD than expected, while persons who have gone to college but have incomes less than $10,000 do not. There is no indication within the data that CHD prevalence varies with the number of years spent in college.

Marital Status

Men who are widowed or divorced have significantly less CHD than expected. There is no significant variation of CHD prevalence among women of different marital status (table 17 and fig. 5).

COMPARATIVE DATA

Levels of Prevalence

The prevalence of CHD reported by this Survey is of about the same magnitude as that previously reported for American populations. For example, examination surveys of the populations of Framingham, Massachusetts, [7] and Tecumseh, Michigan, [8] found the following prevalence (in percent) of definite CHD for the age group 40-59 years (rates for Framingham and

Tecumseh are adjusted to the 1960 Census of Population):

	Men	*Women*
United States, 1960-62 (HES)	3.9	1.6
Framingham, Mass., 1949-51	2.3 (3.1[a])	1.0 (1.6[a])
Tecumseh, Mich., 1959-60	5.1	1.9

[a]Including possible MI by ECG without a history of MI.

Differences in criteria could be allowed for in a rough fashion only. Such differences, as well as differences in study procedures, make comparisons among various populations approximate at best and misleading at worst, but the Framingham, Tecumseh, and HES data appear to be roughly comparable.

In referring to the prevalence figures from these three studies as "about the same magnitude," it is necessary to indicate the scale against which this is measured. Data from Hiroshima, Japan, [9] illustrate the possible range of CHD prevalence in human populations. Recently a systematic examination survey was made of a well-defined sample of the Hiroshima population. The CHD examination and criteria used in this survey were patterned after those of the Framingham Study. In the age group 40-59 years the prevalence rate for definite CHD was 0.7 percent for men and 0.3 percent for women (0.8 and 0.5 percent, respectively, if possible MI by ECG without a history of MI is included). These rates, adjusted to the 1960 Census of Population for the United States, are about one-sixth of those found for adults in the United States in the same age group.

In comparing the results of the three studies, it was found that the division between definite CHD cases diagnosed as MI by ECG and those diagnosed on the basis of definite AP alone was very similar for men at Hiroshima, at Framingham, and in the HES. In the age group 30-59 years (30-62 years at Framingham) the number of cases of definite CHD divided as follows:

	MI	*Definite AP*
HES	21	24
Framingham[a]	17	20
Hiroshima[a]	7	5

[a]Excluding possible MI by ECG without a history of MI.

It is not argued that definite CHD for men in this age group is universally divided in this fashion; in fact, the cases at Tecumseh (for the age group 40-59 years) split between MI and definite AP 26 cases to 15. The data do tend to argue, however, for a comparability in criteria among the studies.

For women there was less agreement among the studies, the HES finding a significantly higher proportion of MI cases than were found at Framingham or Hiroshima.

	MI	*Definite AP*
HES	4	15
Framingham[a]	1	18
Hiroshima[a]	1	6

[a]Excluding possible MI by ECG without a history of MI.

The decrease in CHD prevalence after age 75 years is consistent with other available data. Prevalence figures are the resultant of new cases entering the population and old cases being withdrawn. Figures 6 and 7 exhibit CHD prevalence and mortality rates by age and sex for adults in the United States and incidence rates for the population of Framingham, Mass. Mortality rates rise continuously through the age range 18-79 years. Incidence rises to the age group 55-64 years. It is therefore not unreasonable to find a falling off of prevalence after age 75. It might be

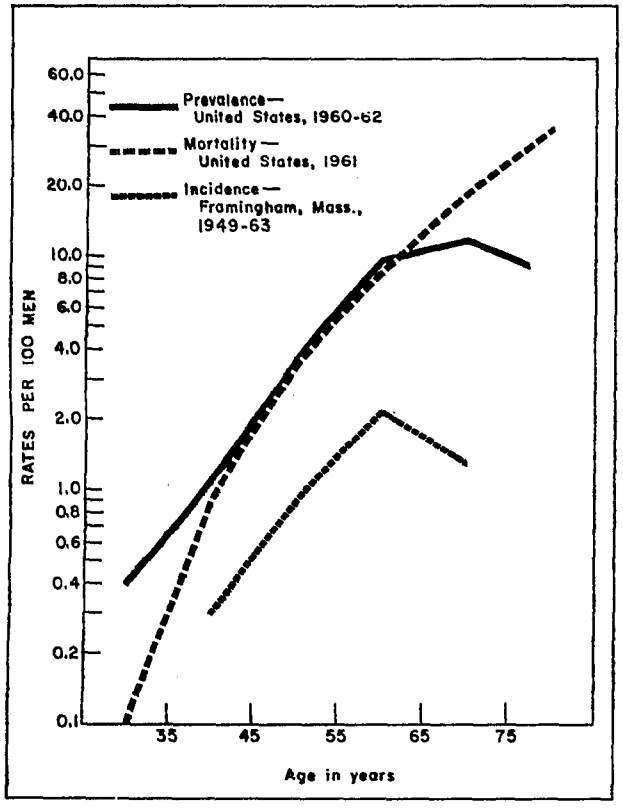

Figure 6. Definite coronary heart disease prevalence, incidence, and mortality in men.

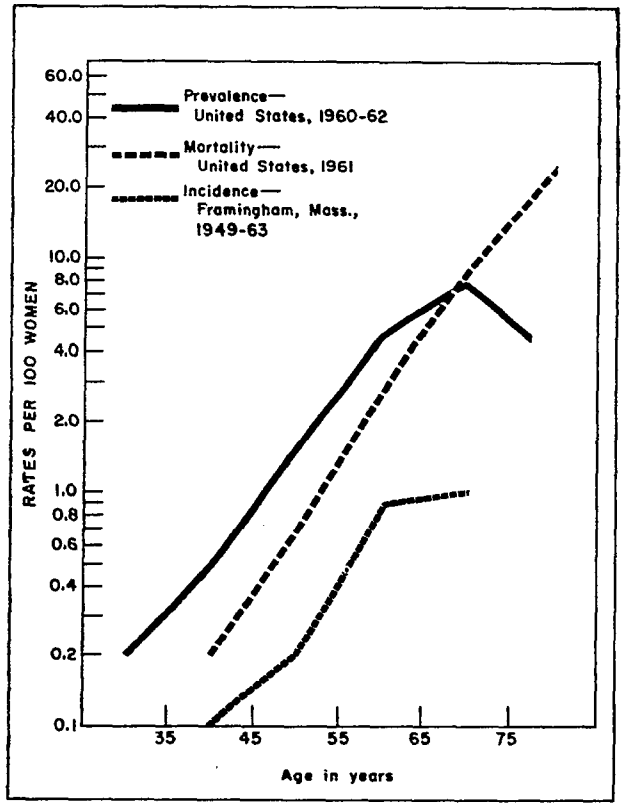

Figure 7. Definite coronary heart disease prevalence, incidence, and mortality in women.

added that CHD prevalence rates reported for Tecumseh, Mich., were lower for both men and women in the age group 70 years and older than in the age group 60-69 years.

Race differentials in CHD prevalence differ from those described by mortality data. The reported death rate for CHD (International List No. 420) in the United States is higher for white men than for Negro, the disparity increasing with age. For women the relationship varies: under 65 years of age the death rate is greater for Negro women than for white; over 65 years the opposite is true. While the large variability of HES estimates by age, race, and sex calls for some caution in interpretation and although mortality data may conceivably differ from prevalence data for CHD without necessarily reflecting on the validity of either, the HES estimates of CHD prevalence by race still seem somewhat inconsistent with reported mortality.

Other Demographic Variables

Demographic variables have, in general, been most thoroughly investigated on the basis of mortality statistics. While these need not, of course, agree strictly with prevalence data and for some factors may even differ sharply, in most cases a considerable degree of concordance should be expected.

Mortality statistics for the United States have suggested greater geographic variation than the HES findings indicate. For the age group 20-79 years death rates per 100,000 during 1961 (for

List No. 420) for the regional groupings used by the HES were as follows:

	Men	*Women*
Northeast	541.5	258.4
South	484.3	178.7
West	446.8	203.2

Data indicating large mortality differentials for CHD by State[10] cannot be paralleled with HES data, which were not designed for estimating prevalence at the State level. There appears to be some disagreement between the HES findings and mortality statistics on a regional basis, but, given the sampling variability of the HES estimates, this can be considered statistically significant only for the data on women. This is not a major discrepancy. A priori considerations would lead one to expect less correlation between CHD prevalence and mortality for women than for men.

The lower prevalence found in men living on farms is consistent with previous findings. A study made in North Dakota [11] found a low CHD prevalence there, and other data have left a similar impression. However, this does not necessarily mean that farm life confers immunity to CHD. The residence reported is current residence, and migration is very likely selective. The same reservations must be made with respect to occupational data. People change occupations, when they must or can, in response to changes in health status; health status no doubt affects the initial occupational choice. Thus, the fact that mortality statistics also show a low CHD mortality among farmers both in this country[12 13] and in England and Wales [14] does not lessen the uncertainty as to the meaning of these findings. Similarly, persons may retire or keep house because they develop CHD or develop CHD because they retire or keep house; without additional evidence it is impossible to say which is the more important vector.

The findings with respect to family income are of interest because of the once current notion that CHD was primarily an upper-class illness. If this were ever true, it certainly does not appear to be true now. A recent study of employees of one large company found that employees of the highest level had the lowest MI incidence,[15] and, while this may not be a universal phenomenon in this country, there is no good current evidence of a reverse relationship.

In England and Wales there has been a historical change in the relation of CHD mortality to social class. In 1930-32 there was a tremendous gradient of reported CHD mortality for the age group 20-64 years associated with social class, with the highest mortality found in the highest socioeconomic group. By 1949-53 the gradient had disappeared for women and was much diminished for men. Only men in the age groups 45-54 years and 55-64 years exhibited this gradient, and it was more marked in the older of these two age groups. The suggestion, then, in the data for England and Wales is of a cohort effect restricted to men born, say, before 1900.

Whether or not there has been such a trend in the United States is not known, but for men 20-64 years of age in 1950 social class was positively associated with CHD mortality only for the age group 55-64 years. For the middle age groups no trend was discernible, while for the youngest age group an inverse relationship seemed present, with the highest CHD mortality in the lowest social class.[16]

Mortality from CHD among widowed and divorced persons in 1949-51 was found to be higher than mortality among married persons.[17] This is in direct contrast with the HES data, which show widowed and divorced men to have lower than average prevalence while for women no differences by marital status were discerned. There has been some concern that the reporting of marital status on census and death certificates differed sufficiently to distort death rates for widowed, separated, and divorced persons, and the HES data would seem to reinforce this concern.

Some final caveats are in order. The sample size used for the HES leads to many statistics with high sampling variability. Thus, many of the demographic differentials indicated in this report should be regarded as suggestive rather than proved. What is more, none of them should be taken at face value. Most demographic labels are crude indexes, only the first steps to an investigation.

Furthermore, the variables on which the data have been classified are more or less correlated (family income, for example, is highly correlated with education or occupation). If the sample had been larger, more detailed cross-classification would have been appropriate.

The fact that the sample was drawn from the noninstitutional population constitutes another qualification of the data. This presumably is of importance only at older ages, where the institutional population is chiefly concentrated. However, if CHD is more common in institutional populations than in noninstitutional ones, the prevalence rates reported here would constitute an understatement of the prevalence in the total population.

Conclusions from the HES findings must therefore be qualified in a number of respects.

On the other hand, the data were collected by a mechanism that was essentially unbiased. Demographic variables were defined in the same fashion and by the same mechanism for persons with or without disease. Whatever the demographic class, disease was characterized by the same instruments. These are rarer virtues than is generally recognized and should make the HES findings in this area of special use to investigators.

SUMMARY

Coronary heart disease is rare among young adults in the United States but becomes increasingly common at older ages. The highest prevalence rate is in the age group 65-74 years.

CHD is more prevalent in men than in women and is more likely to be severe in men. Negro and white persons are about equally likely to have the disease.

No well-defined differences in prevalence are evident by place of residence except that men resident on farms have a lower than average rate of CHD. In occupational terms farmers have less CHD than expected.

The prevalence rate for CHD is less for working men than for retired men and less for working women than for women keeping house.

Persons with family incomes over $10,000 have a lower CHD prevalence than persons with incomes under $10,000. No well-defined differences in CHD prevalence are associated with amount of schooling.

CHD prevalence is less for widowed and divorced men than for other men. For women no differentials associated with differences in marital status are found in CHD prevalence.

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DETAILED TABLES

Table 1. Prevalence of definite and suspect coronary heart disease in adults, by sex: United States, 1960-62

Manifestation	Both sexes	Men	Women	Both sexes	Men	Women
	Number of adults in thousands			Rates per 100 adults		
All forms	5,535	3,081	2,454	5.0	5.8	4.2
Definite						
Total	3,125	1,945	1,180	2.8	3.7	2.0
Total myocardial infarction[1]	1,421	1,015	406	1.3	1.9	0.7
With definite angina pectoris	329	258	70	0.3	0.5	0.1
With suspect angina pectoris	256	131	125	0.2	0.2	0.2
Without angina pectoris	837	625	211	0.8	1.2	0.4
Angina pectoris, no myocardial infarction	1,548	835	713	1.4	1.6	1.2
Other[2]	156	95	61	0.1	0.2	0.1
Suspect						
Total	2,410	1,136	1,274	2.2	2.2	2.2
Angina pectoris, no myocardial infarction	2,353	1,136	1,217	2.1	2.2	2.1
Other[3]	57	-	57	0.1		0.1

[1]On electrocardiogram with or without angina pectoris or history of myocardial infarction.
[2]Myocardial infarction history with myocardial infarction outside criteria or left ventricular ischemia on electrocardiogram. (All women and all but 55,000 men have suspect AP as well.)
[3]Myocardial infarction history with electrocardiographic evidence of myocardial infarction or left ventricular ischemia.

NOTE: All categories exclusive, in descending priority.

Table 2. Prevalence of definite and suspect coronary heart disease in adults, by age and sex: United States, 1960-62

Age	Total			Definite			Suspect		
	Both sexes	Men	Women	Both sexes	Men	Women	Both sexes	Men	Women
	Number of adults in thousands								
Total-18-79 years	5,535	3,081	2,454	3,125	1,945	1,180	2,410	1,136	1,274
18-24 years	-	-	-	-	-	-	-	-	-
25-34 years	77	42	36	60	42	19	17	-	17
35-44 years	384	264	119	177	120	57	207	144	63
45-54 years	1,126	693	433	517	352	165	609	341	268
55-64 years	1,867	1,060	807	1,111	726	384	756	334	422
65-74 years	1,723	837	886	1,064	575	489	659	262	397
75-79 years	357	185	172	195	130	64	162	55	108
	Rates per 100 adults								
Total-18-79 years	5.0	5.8	4.2	2.8	3.7	2.0	2.2	2.2	2.2
18-24 years	-	-	-	-	-	-	-	-	-
25-34 years	0.4	0.4	0.3	0.3	0.4	0.2	0.1	-	0.2
35-44 years	1.6	2.3	1.0	0.7	1.1	0.5	0.9	1.3	0.5
45-54 years	5.5	6.9	4.1	2.5	3.5	1.6	3.0	3.4	2.5
55-64 years	11.9	14.1	9.9	7.1	9.7	4.7	4.8	4.4	5.2
65-74 years	15.4	16.8	14.3	9.5	11.6	7.9	5.9	5.3	6.4
75-79 years	12.4	13.0	11.9	6.8	9.1	4.5	5.7	3.8	7.5

Table 3. Prevalence rates of definite and suspect coronary heart disease in adults, by age and sex: United States, 1960-62

Age	Total			Definite			Suspect		
	Both sexes	Men	Women	Both sexes	Men	Women	Both sexes	Men	Women
	Rates per 100 adults								
Total-18-79 years-	5.0	5.8	4.2	2.8	3.7	2.0	2.2	2.2	2.2
18-24 years	-	-	-	-	-	-	-	-	-
25-29 years	0.3	0.3	0.3	0.3	0.3	0.3	-	-	-
30-34 years	0.4	0.5	0.3	0.2	0.5	-	0.1	-	0.3
35-39 years	1.7	2.7	0.8	0.7	1.3	0.3	0.9	1.4	0.5
40-44 years	1.6	2.0	1.2	0.8	0.9	0.7	0.8	1.1	0.5
45-49 years	5.1	6.8	3.6	2.2	2.8	1.6	3.0	4.0	2.0
50-54 years	5.9	7.1	4.7	2.9	4.3	1.6	2.9	2.7	3.2
55-59 years	10.5	13.2	8.2	5.9	9.5	2.7	4.6	3.6	5.4
60-64 years	13.6	15.2	12.1	8.5	9.8	7.2	5.1	5.4	4.9
65-69 years	14.5	16.4	13.0	10.4	13.6	7.9	4.0	2.8	5.0
70-74 years	16.7	17.4	16.1	8.3	8.9	7.9	8.4	8.6	8.2
75-79 years	12.4	13.0	11.9	6.8	9.1	4.5	5.7	3.8	7.5

Table 4. Prevalence of major manifestations of coronary heart disease in adults, by age and sex: United States, 1960-62

Age	Myocardial infarction[1]			Angina pectoris					
				Definite			Suspect		
	Both sexes	Men	Women	Both sexes	Men	Women	Both sexes	Men	Women
	Number of adults in thousands								
Total-18-79 years-	1,421	1,015	406	1,548	835	713	2,353	1,136	1,217
18-24 years	-	-	-	-	-	-	-	-	-
25-34 years	47	28	19	13	13	-	17	-	17
35-44 years	114	85	29	14	-	14	207	144	63
45-54 years	227	194	33	273	141	133	609	341	268
55-64 years	467	320	147	600	380	221	724	334	390
65-74 years	491	313	178	542	261	281	634	262	372
75-79 years	75	75	-	104	40	64	162	55	108
	Rates per 100 adults								
Total-18-79 years-	1.3	1.9	0.7	1.4	1.6	1.2	2.1	2.2	2.1
18-24 years	-	-	-	-	-	-	-	-	-
25-34 years	0.2	0.3	0.2	0.1	0.1	-	0.1	-	0.2
35-44 years	0.5	0.7	0.2	0.1	-	0.1	0.9	1.3	0.5
45-54 years	1.1	1.9	0.3	1.3	1.4	1.3	3.0	3.4	2.5
55-64 years	3.0	4.3	1.8	3.8	5.0	2.7	4.6	4.4	4.8
65-74 years	4.4	6.3	2.9	4.9	5.3	4.5	5.7	5.3	6.0
75-79 years	2.6	5.2	-	3.6	2.8	4.5	5.7	3.8	7.5

[1]On electrocardiogram with or without angina pectoris or history of myocardial infarction.

Table 5. Prevalence rates of major manifestations of coronary heart disease in adults, by age and sex: United States, 1960-62

Age	Myocardial infarction[1]			Angina pectoris					
				Definite			Suspect		
	Both sexes	Men	Women	Both sexes	Men	Women	Both sexes	Men	Women
	Rates per 100 adults								
Total-18-79 years	1.3	1.9	0.7	1.4	1.6	1.2	2.1	2 2	2.1
18-24 years	-	-	-	-	-	-	-	-	-
25-29 years	0.3	0.3	0.3	-	-	-	-	-	-
30-34 years	0.1	0.2	-	0.1	0.2	-	0.1	-	0.3
35-39 years	0.4	0.6	0.3	-	-	-	0.9	1.4	0.5
40-44 years	0.5	0.9	0.2	0.1	-	0.2	0.8	1.1	0.5
45-49 years	1.0	1.4	0.6	1.0	1.1	1.0	3.0	4.0	2.0
50-54 years	1.3	2.5	-	1.7	1.8	1.6	2.9	2.7	3.2
55-59 years	1.2	2.6	-	4.4	6.3	2.7	4.2	3.6	4.7
60-64 years	5.1	6.1	4.1	3.2	3.7	2.7	5.1	5.4	4.9
65-69 years	4.3	8.1	1.2	6.2	5.5	6.7	4.0	2.8	5.0
70-74 years	4.6	3.9	5.1	3.1	5.0	1.6	7.9	8.6	7.3
75-79 years	2.6	5.2	-	3.6	2.8	4.5	5.7	3.8	7.5

[1]On electrocardiogram with or without angina pectoris or history of myocardial infarction.

Table 6. Prevalence of definite and suspect coronary heart disease in adults, by sex and race: United States, 1960-62

Manifestation	Both sexes		Men		Women		Both sexes		Men		Women	
	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro
	Number of adults in thousands						Rates per 100 adults					
All forms	4,948	586	2,753	328	2,195	258	5.1	5.1	5.9	6.3	4.3	4.2
Definite												
Total	2,832	293	1,776	169	1,055	124	2.9	2.6	3.8	3.2	2.1	2.0
Myocardial infarction[1]	1,305	116	926	89	379	27	1.3	1.0	2.0	1.7	0.7	0.4
Angina pectoris	1,388	160	773	62	615	98	1.4	1.4	1.7	1.2	1.2	1.6
Other[2]	139	17	77	18	61		0.1	0.2	0.2	0.3	0.1	
Suspect												
Total	2,117	293	976	159	1,140	134	2.2	2.6	2.1	3.1	2.2	2.2
Angina pectoris	2,059	293	976	159	1,083	134	2.1	2.6	2.1	3.1	2.1	2.2
Other[3]	58	-	-	-	57	-	0.1	-	-	-	0.1	-

[1]On electrocardiogram with or without angina pectoris or history of myocardial infarction.
[2]Myocardial infarction history with myocardial infarction outside criteria or left ventricular ischemia on electrocardiogram.
[3]Myocardial infarction history with electrocardiographic evidence of myocardial infarction or left ventricular ischemia.

NOTE: All categories exclusive, in descending priority.

Table 7. Prevalence rates of definite and suspect coronary heart disease in adults, by age, sex, and race: United States, 1960-62

Age	Total				Definite				Suspect			
	Men		Women		Men		Women		Men		Women	
	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro	White	Negro
	Rates per 100 adults											
Total-18-79 years-	5.5	6.3	4.3	4.2	3.8	3.2	2.1	2.0	2.1	3.1	2.2	2.2
18-24 years-	-	-	-	-	-	-	-	-	-	-	-	-
25-34 years-	0.1	3.1	0.4	-	0.1	3.1	0.2	-	-	-	0.2	-
35-44 years-	2.2	3.5	0.9	1.9	1.2	-	0.4	1.0	1.0	3.5	0.5	0.9
45-54 years-	6.6	10.2	3.7	8.0	3.0	7.4	1.3	3.9	3.5	2.8	2.4	4.1
55-64 years-	14.4	13.4	10.0	9.8	10.3	5.7	4.7	5.5	4.2	7.7	5.3	4.3
65-74 years-	17.3	10.9	14.4	14.2	12.2	3.4	8.2	5.1	5.1	7.5	6.2	9.0
75-79 years-	14.0	-	13.5	-	9.8	-	5.1	-	4.1	-	8.5	-

Table 8. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and geographic region: United States, 1960-62

Sex and region	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Northeast	3.5	3.6	2.4	1.9	0.8	1.5	1.6	2.1
South	3.6	3.6	1.8	1.8	1.7	1.5	3.0	2.1
West	3.9	3.9	1.5	2.0	2.2	1.7	2.0	2.2
Women								
Northeast	1.5	2.1	0.6	0.7	0.7	1.2	1.6	2.1
South	2.4	1.9	0.8	0.7	1.6	1.1	2.0	2.0
West	2.3	2.1	0.6	0.7	1.4	1.3	2.6	2.2

Table 9. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and population-size group: United States, 1960-62

Sex and population-size group	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Giant metropolitan areas	3.7	3.8	2.3	2.0	1.2	1.6	1.3	2.2
Other very large metropolitan areas	4.2	3.6	2.7	1.9	1.2	1.5	1.8	2.1
Other standard metropolitan statistical areas	3.6	3.4	1.3	1.8	2.1	1.4	1.9	2.0
Other urban areas	4.9	3.5	2.3	1.8	2.4	1.5	2.1	2.1
Rural areas	2.4	4.1	1.3	2.1	1.1	1.8	3.8	2.3
Women								
Giant metropolitan areas	1.4	2.1	1.0	0.7	0.3	1.3	1.6	2.1
Other very large metropolitan areas	2.1	2.0	0.9	0.7	1.2	1.2	0.9	2.1
Other standard metropolitan statistical areas	2.9	2.0	0.4	0.7	2.2	1.2	2.8	2.0
Other urban areas	2.4	1.8	0.8	0.6	1.6	1.1	2.1	1.9
Rural areas	1.3	2.2	0.4	0.7	0.9	1.3	2.8	2.3

Table 10. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and residence: United States, 1960-62

Sex and residence	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Urban	4.0	3.6	2.3	1.9	1.6	1.6	2.1	2.2
Rural	3.0	3.6	1.2	1.9	1.6	1.5	2.2	2.1
Women								
Urban	2.1	2.1	0.8	0.7	1.1	1.2	1.9	2.1
Rural	1.9	1.9	0.5	0.6	1.4	1.1	2.6	2.0

Table 11. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and place description: United States, 1960-62

Sex and place description	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
SMSA-in central city	4.4	4.0	2.5	2.1	1.7	1.7	2.4	2.3
SMSA-outside central city	3.2	3.2	1.7	1.7	1.3	1.3	1.0	1.9
Urban, not SMSA	3.7	3.4	2.3	1.8	1.3	1.5	3.2	2.0
Rural, farm	2.8	4.9	0.7	2.5	1.9	2.2	3.9	2.7
Rural, nonfarm	3.7	3.8	1.7	2.0	1.8	1.6	2.5	2.2
Women								
SMSA-in central city	2.1	2.1	0.7	0.7	1.3	1.3	1.8	2.2
SMSA-outside central city	2.3	1.9	0.9	0.7	1.2	1.1	2.0	1.9
Urban, not SMSA	1.6	1.9	0.9	0.6	0.8	1.1	1.9	2.0
Rural, farm	2.2	2.1	-	0.7	2.2	1.2	3.9	2.1
Rural, nonfarm	1.6	2.1	0.3	0.7	1.3	1.3	2.5	2.2

Table 12. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and occupation: United States, 1960-62

Sex and occupation	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Professional, technical, other kindred workers, and managerial	3.2	2.9	2.5	1.5	0.8	1.2	1.8	1.9
Farmers and farm managers	2.9	5.2	0.4	2.6	1.4	2.4	4.7	2.9
Clerical and sales workers	5.5	2.7	3.1	1.4	2.4	1.1	1.3	1.7
Craftsmen, foremen, and kindred workers	2.3	2.9	0.6	1.5	1.7	1.1	2.4	1.8
Operatives and kindred workers	1.6	1.9	1.0	1.0	0.2	0.7	1.0	1.5
Private household and service workers	3.1	3.5	1.8	1.8	0.8	1.4	1.2	2.0
Farm and other laborers (except mine)	2.1	2.7	0.5	1.4	1.3	1.1	1.5	1.8
Women								
Professional, technical, other kindred workers, and managerial	-	0.8	-	0.3	-	0.5	2.1	1.8
Clerical and sales workers	0.4	0.6	-	0.2	0.2	0.4	1.1	1.3
Operatives	0.5	0.8	-	0.2	0.5	0.5	1.9	1.8
Private household and service workers	2.2	0.9	0.9	0.2	1.3	0.6	2.2	2.1

Table 13. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and industry: United States, 1960-62

Sex and industry	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Agriculture, forestry, and fisheries	1.9	4.2	0.3	2.1	0.9	1.9	4.1	2.4
Mining and construction	1.9	2.8	0.5	1.5	1.2	1.1	2.7	1.9
Manufacturing	2.3	2.4	1.7	1.3	0.6	0.9	1.1	1.8
Transportation, communications, and other public utilities	3.0	2.6	0.6	1.4	2.4	1.1	1.3	1.7
Wholesale and retail trade	4.5	2.9	2.6	1.5	1.4	1.0	1.9	1.7
Finance, insurance, and real estate	2.4	3.0	-	1.5	2.4	1.3	1.5	1.7
Service and miscellaneous	3.3	3.2	2.4	1.6	0.6	1.3	1.7	1.9
Public administration	3.2	2.1	1.4	1.1	1.8	0.8	1.3	1.6
Women								
Agriculture, forestry, and fisheries	-	0.9	-	0.3	-	0.5	1.5	1.8
Manufacturing	0.4	0.7	-	0.2	0.4	0.4	1.5	1.5
Wholesale and retail trade	0.6	0.8	-	0.3	0.4	0.5	1.8	1.7
Finance, insurance, and real estate	-	0.7	-	0.2	-	0.4	1.3	1.7
Service and miscellaneous	1.3	0.8	0.6	0.2	0.8	0.5	2.1	1.9

Table 14. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and usual activity status: United States, 1960-62

Sex and usual activity status	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Usually working	2.5	3.0	1.4	1.5	0.9	1.3	1.6	1.9
Retired	14.6	10.5	7.1	5.7	7.5	4.5	6.5	4.8
Other	2.7	2.6	1.0	1.3	1.5	1.2	2.5	1.4
Women								
Usually working	0.9	1.6	0.3	0.5	0.5	1.0	1.6	1.8
Keeping house	2.7	2.3	0.9	0.8	1.7	1.4	2.3	2.3
Other	-	0.9	-	0.3	-	0.5	2.0	0.9

Table 15. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and family income: United States, 1960-62

Sex and family income	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Under $2,000	5.1	5.9	2.6	3.1	2.4	2.6	5.3	3.0
$2,000-$3,999	4.5	4.3	2.1	2.3	2.2	1.9	1.1	2.3
$4,000-$6,999	3.8	2.9	1.9	1.5	1.7	1.2	2.1	1.8
$7,000-$9,999	2.8	2.6	1.5	1.4	1.4	1.1	1.3	1.7
$10,000+	1.8	3.5	1.1	1.8	0.8	1.5	2.0	2.2
Unknown	4.0	4.1	2.8	2.1	0.4	1.8	1.6	2.3
Women								
Under $2,000	3.8	3.2	0.8	1.1	2.9	2.0	2.8	3.1
$2,000-$3,999	2.5	2.2	0.7	0.8	1.8	1.3	3.0	2.2
$4,000-$6,999	1.7	1.5	1.0	0.5	0.5	0.8	1.6	1.5
$7,000-$9,999	1.7	1.5	1.1	0.5	0.4	0.9	0.5	1.6
$10,000+	0.5	1.7		0.6	0.5	1.0	2.0	1.8
Unknown	1.6	2.4		0.8	1.6	1.5	2.9	2.6

Table 16. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and education: United States, 1960-62

Sex and education	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
None or under 5 years	4.0	6.7	0.3	3.4	3.2	3.0	4.3	3.5
5-8 years	6.0	5.6	3.1	2.9	2.8	2.5	3.9	3.1
9-12 years	2.6	2.5	1.5	1.3	1.0	1.0	1.3	1.6
13+ years	2.8	2.6	1.7	1.4	0.9	1.1	0.9	1.6
Women								
None or under 5 years	2.6	3.8	0.8	1.1	1.0	2.4	3.1	3.8
5-8 years	3.9	3.1	1.0	1.0	2.8	1.9	3.9	3.2
9-12 years	1.2	1.3	0.4	0.4	0.7	0.8	1.5	1.5
13+ years	1.2	1.6	0.7	0.5	0.5	0.9	1.0	1.7

Table 17. Actual and expected prevalence rates of major manifestations of coronary heart disease in adults, by sex and marital status: United States, 1960-62

Sex and marital status	Definite coronary heart disease		Myocardial infarction		Angina pectoris			
					Definite		Suspect	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
	Rates per 100 adults							
Men								
Married	4.2	3.8	2.1	2.0	1.8	1.6	1.9	2.3
Widowed	4.4	9.6	2.6	5.1	1.1	4.2	7.6	4.5
Divorced	1.6	4.9	0.6	2.5	0.9	2.2	5.9	2.7
Separated	3.1	3.6	1.5	1.9	1.7	1.5	1.8	2.3
Never married	1.6	1.7	1.1	0.9	0.4	0.8	1.8	1.0
Women								
Married	1.5	1.7	0.5	0.6	0.9	1.0	2.0	1.8
Widowed	6.1	5.3	2.9	1.7	3.3	3.3	4.3	5.0
Divorced	3.7	2.0	-	0.7	3.7	1.3	1.1	2.3
Separated	-	1.2	-	0.4	-	0.7	2.0	1.4
Never married	0.6	0.9	-	0.3	0.6	0.5	0.5	0.9

APPENDIX I

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
   c. Do they bother you quite a bit just a little
   Probes A,B

2. a. In the past few years have you had any nosebleeds? YES NO ?
   If YES b. How often? Every few days Less often
   c. Do they bother you quite a bit just a little
   Probe A

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 in your ears? YES NO ?
   Probes A,B
   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] [?]

Probe A

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] [?]

Probe A

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] [?]

Probes A,B

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] Probes A,B

[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] [?]

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] [?] Probes A,B

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

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

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

If YES b. How often? [Every few days] [Less often] Probes A,B

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

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] Probe A

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

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 "?"

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APPENDIX II

ELECTROCARDIOGRAPHIC READINGS

Criteria and Classification

The following are the criteria and classifications used in electrocardiographic (ECG) reading by the Health Examination Survey. They were developed by the cardiologists who read the ECG's. The draft version of these criteria was submitted to cardiologists experienced in reading electrocardiograms for survey purposes, and their criticisms and suggestions were taken into account in this working version.

Category	Leads	Impressions	
1. Q & QS patterns (Q must be 1 mm. or more)			
a. Q duration = 0.04 second or more	I, II, V_1-V_6 (any)	Anterior myocardial infarction	Anterior myocardial infarction
b. Q duration = 0.04 second or more	AVL	Anterior or lateral myocardial infarction	
c. QS pattern when R wave is present in adjacent precordial lead to the right	V_2-V_6 (any)	Anterior myocardial infarction	
d. QS pattern	V_1-V_4 (all)	Anteroseptal myocardial infarction	
	V_1-V_5 (all)	Anterior myocardial infarction	
	V_1-V_6 (all)	Anterolateral myocardial infarction	
e. Q duration = 0.05 second or more and a Q wave in A'F	III	Posterodiaphragmatic myocardial infarction	Posterior myocardial infarction
f. Q duration = 0.05 second or more and R = +3 mm. or more	AVF	Posterodiaphragmatic myocardial infarction	
g. Q duration = 0.04 second	II, III, and AVF (all)	Posterodiaphragmatic myocardial infarction	
2. QRS axis deviation			
a. QRS axis = -30° or more	I, II, and III	Left axis deviation	
b. QRS axis = $+120^{\circ}$ or more	I, II, and III	Right axis deviation	
3. Ventricular preponderance (hypertrophy)			
a. S (+) R = 35 mm. or more NOTE: Record associated ST- or T-wave abnormalities separately	"S" in V_1 or V_2, and "R" in V_5 or V_6	Left ventricular hypertrophy	
b. QRS duration less than 0.12 second and R = 5 mm. or more and R/S = 1.0 or more and transition zone (decreasing R/S) left of V_1	V_1	Right ventricular hypertrophy	
4. ST junction and segment (T-P interval is baseline)			
a. ST junction depression 1 mm. or more	I, II, AVL, AVF, V_1-V_6 (any)	Subendocardial ischemia	
b. ST-J depression 0.5-0.9 mm. and ST segment horizontal or downward	I, II, AVL, AVF, V_1-V_6 (any)	Subendocardial ischemia and/or digitalis effect	
c. No ST-J depression as much as 0.5 mm. but ST segment sloping down and reaching 0.5 mm. or more below baseline	I, II, AVL, AVF, V_1-V_6 (any)		

Category	Leads	Impressions
4. ST junction and segment—Continued		
d. ST segment elevation, any of		
2 mm. or more	I,II,III, V_5, V_6 (any)	
3 mm. or more	V_1-V_4 (any)	
e. ST segment elevation and ST contour upward (convex), with elevation		
2 mm. or more	I, II, III, V_5, V_6 (any)	Current of injury
3 mm. or more	V_1-V_4 (any)	
f. ST segment elevation and concave, with elevation		
2 mm. or more	I, II, III, V_5, V_6 (any)	
3 mm. or more	V_1-V_4 (any)	
5. T wave		
a. T = -.5 mm. or more and QRS mainly upright	I, II, III, AVL, AVF, V_2-V_6 (any)	
b. T wave flat or small diphasic (± 1 mm.) and when QRS mainly upright	I, II, V_4-V_6 (any)	Nonspecific T-wave abnormality
and R = + 5 mm. or more	AVL, AVF (either)	
c. T = -1 to -5 mm.	I, II, AVL, V_2-V_6 (any)	Left ventricular ischemia
when R = (+) 5 mm. or more	AVL	
when QRS mainly upright	AVF	
6. A-V conduction		
a. Complete A-V block (permanent or intermittent)	Any	Complete heart block
b. Partial (varying) A-V block	Any	Partial A-V block
c. P-R interval over 0.21 second (any heart rate)	I, II, III (any)	First degree heart block
d. Accelerated conduction	Any	Wolff-Parkinson-White syndrome
7. Ventricular conduction		
a. QRS duration 0.12 second or more and R peak duration 0.06 second or more (in absence of infarct criteria, category 1, above)	I, II, III (any) I, AVL, V_5, V_6 (any)	Left bundle branch block
b. R prime greater than R and QRS duration over 0.12 second	V_1	Right bundle branch block
c. R prime greater than R and QRS duration not over 0.12 second and not less than 0.10 second	V_1	Incomplete right bundle branch block
d. QRS of 0.10 second or more, but without LBBB or RBBB	I, II, III (any)	Intraventricular block

Category	Leads	Impressic..
8. Arrhythmias		
a. 3 or more premature ventricular contractions in sequence	Any	Ventricular tachycardia
b. Atrial fibrillation or flutter	Any	Atrial fibrillation or flutter
c. Atrial (over 120/minute), nodal or supraventricular (over 100/minute) tachycardia	Any	Atrial, nodal, or supraventricular tachycardia
d. Nodal rhythm (up to 100/minute)	Any	Nodal rhythm
PR interval less than 0.11 second with either a positive or negative P wave or absent P or P following QRS		
9. Low QRS, high T		
a. Total R or S amplitude in leads I plus II plus III equals less than 15 mm.	I, II, III (all)	Low QRS voltage
b. T wave over 12 mm.	Any	High T voltage
10. Premature beats and miscellaneous		
a. Premature atrial, nodal, or ventricular systoles	Any	Premature atrial, nodal, or ventricular systoles
Rare (up to 3 in 40 complexes)		
Frequent (4 or more in 40 complexes)		
b. Miscellaneous items not mentioned elsewhere		
1. QT interval >0.42, at any rate	Any	Prolonged QT
2. P waves notched, or peaked (3 mm.), or prolonged (>0.12 second)	Any	P-wave abnormality
3. Q duration of 0.03-0.04 second (but not diagnostic of posterior myocardial infarction)	III and AVF (both)	Other Q-wave abnormality

NOTE: In each category the ECG readers were allowed to designate abnormalities outside of criteria. For some categories such findings were fairly common.

The general ECG reading procedure is described in the main body of this report.

Three exceptions to this procedure were accepted. (1) When a case was reviewed the full documentation was considered. If the ECG was found to have an abnormality which had been overlooked in the routine reading, this abnormality was taken into account in the diagnosis; similarly ECG readings that were found not to meet the criteria were discounted on review. This led to very few changes. (2) All cases of MI outside criteria were reviewed by Dr. Abraham Kagan of the Framingham Heart Study. One was found to meet the criteria and the diagnosis was changed accordingly. A number of other cases were found to nearly meet the criteria. In ordinary usage they would be considered diagnostic of MI but it was decided not to alter the criteria to include them. (3) The voltage criteria used in the finding of LVH (S in V_1 or V_2 plus R in V_5 or V_6, whichever is greater) made it possible to obtain this finding by having clerks measure the ECG's. S in V_1 and R in V_5 were measured on all ECG's. It was found on the basis of a sample of electrocardiograms that the S wave was almost always greater in lead V_1 than lead V_2 and the R wave was almost always greater in lead V_5 than lead V_6, so measurements were confined to leads V_1 and V_5. If their sum was 35 mm. or more and the person was 35 years or older, this was considered evidence of LVH for purposes of diagnosing hypertensive heart disease.

The level of agreement between readers in designating major electrocardiographic findings was generally very high. Some examples are given below. Needless to say, agreement is no assurance of validity, LVH being a case in point. For most findings, however, it seems reasonable to assume that relatively few cases were missed in the ECG reading.

Final determination	Number of readers agreeing with final determination on their original reading			
	Total	3	2	1
Myocardial infarction[1]	100	67	13	20
Left ventricular hypertrophy	397	342	29	26
Right ventricular hypertrophy[1]	7	5	2	-
Subendocardial ischemia[1,2]	135	102	23	10
Nonspecific T wave[1]	207	147	39	21
Left ventricular ischemia[1]	83	67	5	11
Left bundle branch block	25	25	-	-
Right bundle branch block	29	26	2	1
I-V block	50	26	10	14
Atrial fibrillation	20	20	-	-
Abnormal nodal rhythm	14	11	1	2

[1] Inside or outside criteria.
[2] With or without digitalis effect.

Some of these categories are fairly broad and if they were broken into their specific components the level of agreement would be less than indicated here. For example, all three readers might agree that the electrocardiogram showed evidence of a myocardial infarction but disagree on the location of the infarct or on whether the finding was inside or outside the criteria.

In addition, there were instances where one or more of the readers reported a finding which was not agreed to in the final review. The number of such cases of "false positives" was as follows:

Myocardial infarction	25
Left ventricular hypertrophy	33
Right ventricular hypertrophy	1
Subendocardial ischemia	46
Nonspecific T wave	41
Left ventricular ischemia	28
Left bundle branch block	3
Right bundle branch block	6
I-V block	19
Atrial fibrillation	-
Abnormal nodal rhythm	1

ECG Code Sheet

PHS-3762 ECG CODE SHEET (Clinical)
REV. 12-61 HES-212 Deck 30

CASE NUMBER (1-5) | READER (6)

RATE (7-9) | PR (10-11) | QRS (12-13)

CODE: 1--Abnormal
2--Abnormal--Outside criteria
X--All normal
Y--Unsatisfactory ECG } Column 14
9--No ECG

14	15	16	17	18	19
Ant MI	Post MI	LAD	RAD	LVH	RVH

ST S or J: 20 Sub. Isch. | 21 Sub. Isch. / digitalis | 22 Current of Injury

T Wave: 23 Non-Specific | 24 LV Isch.

AV Cond.: 25 Complete Block | 26 Partial Block | 27 1st degree Block | 28 WPW

Vent. Cond.: 29 LBBB | 30 RBBB | 31 Inc. RBBB | 32 I-V Block

Arrhyth-mias: 33 Vent. Tach. | 34 Aur. Fib. | 35 Aur., Nod., Supra-Vent. Tach. | 36 Vent. Rhythm | 37 Nodal Rythm

38 Low QRS | 39 High T | 40 Rare Premature | 41 Frequent Systole | 42 *(Circle one)* A1 V2 N3

43 Misc. | REMARKS

APPENDIX III

DIAGNOSTIC REVIEW

The procedure used in case review has been described in the text. Briefly, every case was first diagnosed by the computer. The key information was then printed out, and this machine record served as a convenient summary of the case record as well as a place for entering decisions made in a subsequent review, if there were such a review.

Findings of angina pectoris were reviewed chiefly to verify the coding of the physician's judgment. Coding changes were relatively rare, and in no instance was it felt that an examining physician was using diagnostic standards vastly different from those used by other physicians.

At one stand both examining physicians reported an unusually large number of cases of angina pectoris. Since both physicians had conducted examinations at other stands and at these had found an average amount of angina pectoris, it was felt that their judgments had to be accepted where they found an unusual amount. Their descriptions of angina pectoris were reviewed as usual, and where the wording indicated less certainty than had appeared in the coded diagnosis, the coding was altered to conform. It is likely that the review of cases from this stand was more critical than usual, but in principle it was the same as the review of similar cases from other stands. Having admitted most of the cases from this stand, it is nevertheless suspected that the chest pain described for these cases was frequently not due to coronary heart disease but instead arose from some other cause.

DIAGNOSTIC REVIEW FOR HEART DISEASE

CASE NO. 15010

AGE-RACE-SEX 73 MW

DIAGNOSIS FHC /2
CHC /2

MD IMPRESSION
H. D. DEFINITE
A. P. DEFINITE

AVERAGE BLOOD PRESSURE 186/109/102

EKG NORMAL

CHEST X-RAY
ENLARGEMENT YES
AORTIC ANEURYSM NO

HISTORY H. D. NO HYP. YES R. F. NO

PHYSICAL EXAM
THRILL NO
SIGNIFICANT MURMUR DIASTOLIC /0 SYSTOLIC /0
HEART SOUND NORMAL.
VENOUS ENGORGEMENT NO

LAB. STS NORMAL

—ooo—

APPENDIX IV

DIAGNOSTIC RELIABILITY

Diagnostic reliability is difficult to measure during an ongoing survey, and most of the gauges used are indirect. The problem is compounded by statistical difficulties. What emerges in this report is rough at best.

With respect to the prevalence of electrocardiographic evidence of myocardial infarction (MI) the assumption is made that the probability of such a finding is constant and independent from person to person and that variations from stand to stand are those that might be expected by chance alone. As noted in the report, the actual distribution of MI stand by stand is consistent with this hypothesis. Examinations were performed at 42 different stands (locations) with an average of 159 examinations at each. At the average stand there were 1.8 cases of MI by electrocardiogram (ECG). The distribution of stands according to the number of MI diagnoses was

Number of MI diagnoses	*Number of stands*
0	6
1	13
2	13
3	7
4	2
5	0
6	1

Given the same probability of MI at every stand, this is about what one would expect by chance.

This statistical assumption (of a fixed probability) is untenable on its face. The risk of MI varies with age and sex. It apparently varies according to certain demographic variables. Thus, the assumption of a constant probability is not strictly warranted. Similarly, because of the sampling scheme used, the assumption of independence is not strictly warranted either. Therefore, some distribution other than the binomial might well be more appropriate for describing these data; however, any specific alternative would probably have some theoretical difficulty to it, and the binomial model may be reasonable enough.

With respect to angina pectoris (AP) the statistical tests applied to the data all involve some version of a binomial assumption. There was an average of 6.4 AP diagnoses per stand (definite or suspect, with or without coexisting MI). On the same general assumptions as were made for MI, the distribution of stands according to the number of AP diagnoses was

Number of AP diagnoses	*Number of stands*
0	1
2	5
3	3
4	2
5	6
6	9
7	5
8	3
9	3
10	1
11	2
19	2

A fixed probability of AP at every stand is most unlikely to have produced this distribution. The two stands with 19 cases are statistically different from the others, although part of their excess AP is accounted for by an older-than-average population. The stand with no cases of AP is a statistical artifact, but the chances of as many as five stands with only two cases of AP is very slight if the probability of AP being found is the same in all five of these stands as in the others.

To what extent these stand differences in the number of cases diagnosed as AP reflect real place differences rather than physician differences is difficult to judge. However, the differences between the number of AP diagnoses by different physicians at the same stand may give some clue to physician variability.

If one physician examined p proportion of the persons at a stand and there were n cases of AP diagnosed at the stand, it is assumed that the probability of that physician diagnosing 0, 1, ..., n of these cases followed a binomial distribution with probability p. In effect, this assumes that the probability is fixed at any one stand but may vary from stand to stand. This corresponds to a distribution of differences between physicians. For example, if one physician examined half the cases at a stand and two cases of AP were diagnosed by both physicians, one physician could have diagnosed 0, 1, or 2 of these cases with probabilities of 0.25, 0.50, and 0.25, respectively. If he diagnosed 0 cases, the other physician diagnosed 2; therefore, the difference between the two physicians was 2, etc. Thus, for differences of 0 the probability was 0.5, while for differences of 2 the probability was also 0.5.

This was done separately for each stand, and the probability for differences of 0, 1, 2, ... was summed over all the stands to yield the expected values appearing below. Comparisons were restricted to physician pairs, since at most stands there were only two physicians.

Difference between physicians in number of AP diagnoses	*Number of stands*	
	Actual	*Expected*
0	1	4.8
1	13	11.7
2	11	7.2
3	8	7.4
4	4	3.4
5	0	2.7
6	2	1.3
7	1	0.9
8+	0	0.6

The chief discrepancy is in the number of cases where no difference between examiners was found. Otherwise, the actual distribution is surprisingly close to expected.

Another indicator of consistency in diagnosis is the proportion of AP diagnoses considered definite. It is reasonable to expect that this proportion would remain essentially constant from stand to stand. Grouping the stands by level of prevalence yields the following distribution:

Number of AP cases at a stand	*Number of stands*	*Total number of AP cases*	
		All forms	*Definite*
2-3	8	19	11
4-5	8	38	9
6	9	54	23
7-8	8	59	21
9-11	6	59	22
19	2	38	21

(One stand had no AP.)

The x-square for this table is larger than would be expected by chance (at a level of 0.05). If the two stands with 19 cases of AP are omitted, however, this is no longer true, and the distribution of definite and suspect cases of AP could have arisen by chance.

An alternative method of evaluating the distribution of definite AP is to compute for each stand the probability of 0, 1, 2, ..., r cases of definite AP given n total cases of AP at that stand. In this case p, the probability of a case of definite AP, is considered fixed for all stands, but n varies from stand to stand. The probability of 0, 1, 2, ... definite cases is summed over all stands.

Again if the actual distribution of stands by number of cases of definite AP is compared with the expected number, the distribution is similar to that expected by chance.

Number of cases of definite AP	*Number of stands*	
	Actual	*Expected*
0	5	4.1
1	10	8.8
2	10	9.9
3	4	8.1
4	6	5.2
5+	6	5.4

All in all, the data from the Survey suggest that there were some differences between the examining physicians in diagnostic sensitivity to AP but that these were not very substantial.

APPENDIX V

CARDIOVASCULAR FINDINGS ASSOCIATED WITH CORONARY HEART DISEASE

The table in this section shows the frequency with which certain cardiovascular findings were encountered in CHD cases and compares these frequencies with what would have been found in all examinees if they had had the same age distribution as the CHD cases.

Without attempting to examine all the specific findings, some general observations can be made. A large number of cardiovascular abnormalities are encountered more frequently in persons with CHD than in persons without. This reinforces the judgment that these are really sick people and that many of them would be so described even in the absence of a CHD diagnosis. It is particularly interesting to note that such cardiovascular abnormalities were more frequently found in connection with angina pectoris than myocardial infarction diagnoses. This tends to reinforce the Survey evidence that this is a valid diagnosis.

Actual and expected number of specified cardiovascular abnor-

Cardiovascular abnormalities	Both sexes	
	Actual	Expected
Total	317	317
Definite hypertension	118	85.5
Borderline hypertension	68	66.6
Definite hypertensive heart disease	88	58.8
Suspect hypertensive heart disease	28	23.4
Rheumatic, congenital, and syphilitic heart disease	7	6.6
Stroke	18	6.3
Significant systolic murmur	59	39.9
Heart enlargement	135	102.6
Complete AV block	1	0.0
Left bundle branch block	8	2.8
Auricular fibrillation	3	2.4
Partial AV block	-	0.3
Right bundle branch block	6	3.0
Right ventricular hypertrophy	-	0.4
Left ventricular ischemia	17	7.6
MI outside criteria	5	2.3
Right axis deviation	-	0.0
Left ventricular hypertrophy	33	23.8
ST abnormalities	34	15.2
Nonspecific T-wave abnormalities	23	15.2
Incomplete right bundle branch block	14	5.0
Miscellaneous arrhythmias	1	0.2

malities found in coronary heart disease cases: United States, 1960-62

Men						Women					
Myocardial infarction		Angina pectoris				Myocardial infarction		Angina pectoris			
		Definite		Suspect				Definite		Suspect	
Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
55	55	49	49	69	69	19	19	41	41	73	73
11	12.5	18	11.7	22	15.0	8	6.0	20	14.6	35	22.7
13	12.0	9	11.1	12	14.7	3	3.6	8	8.6	16	14.3
7	8.0	14	7.4	9	9.2	9	4.5	18	11.1	27	16.6
6	4.4	3	4.0	4	5.1	1	1.2	6	3.1	6	4.8
1	1.3	-	1.1	1	1.5	-	0.3	1	0.8	4	1.4
4	1.1	1	1.0	6	1.2	-	0.4	2	1.0	4	1.4
7	6.3	7	5.7	10	7.1	5	2.8	13	6.6	16	10.0
18	16.0	19	14.7	18	18.5	12	6.9	28	16.8	34	26.1
-	0.0	-	0.0	1	0.0	-	0.0	-	0.0	-	0.0
1	0.5	-	0.5	2	0.5	-	0.2	2	0.4	3	0.6
-	0.3	-	0.3	-	0.3	-	0.2	2	0.5	1	0.7
-	0.1	-	0.1	-	0.1	-	0.0	-	0.0	-	0.0
1	0.8	3	0.7	-	0.9	1	0.1	-	0.2	-	0.2
-	0.1	-	0.1	-	0.1	-	0.0	-	0.0	-	0.1
1	1.3	4	1.2	2	1.5	-	0.5	1	1.1	3	1.7
-	0.7	2	0.6	1	0.7	-	0.0	-	0.1	-	0.1
-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
8	5.0	4	4.2	7	6.0	1	1.1	5	2.7	8	4.0
5	1.8	2	1.7	5	2.0	1	1.3	11	3.3	10	4.6
1	2.3	5	2.1	4	2.7	-	1.0	3	2.5	9	4.1
5	1.2	2	1.0	1	1.4	1	0.2	1	0.4	3	0.6
-	0.0	-	0.0	-	0.1	-	0.0	-	0.0	1	0.1

APPENDIX VI

DEMOGRAPHIC TERMS

Age.—The age recorded for each person is the age at last birthday. Age is recorded in single years.

Race.—Race is recorded as "White," "Negro," or "Other." "Other" includes American Indian, Chinese, Japanese, and so forth. Mexican persons are included with "White" unless definitely known to be Indian or of another nonwhite race.

Population size.—The five classes comprising this characteristic were derived from the design of the sample, which accomplished a stratification of the primary sampling units by population size in each of three broad geographic locations. Because the survey was started in 1960, the primary sampling units within each of the five population-size classes were necessarily based on populations and definitions of the 1950 census. The name of each selected primary sampling unit within each population-size class and geographic location along with other selected sample data are presented in an earlier report.[2]

The definitions for each of the five population-size classes are as follows:

Giant metropolitan areas.—This class includes nine primary sampling units defined in the 1950 census as standard metropolitan statistical areas (SMSA's) and having populations of 3,000,000 or more persons.

Other very large metropolitan areas.— Included in this class are six standard metropolitan statistical areas with populations of 500,000 to 3,000,000 as defined by the 1950 census.

Other standard metropolitan statistical areas.— This class includes nine other SMSA's selected as primary sampling units. With one exception—Providence, R.I.—all had less than 500,000 population.

Other urban.— This includes eight primary sampling units which were highly urban in composition but were not defined in 1950 as SMSA's.

Rural.—This includes 10 primary sampling units which were primarily rural in composition according to 1950 census definitions.

Region.—For the purpose of classifying the population by geographic area, the United States was divided into three major regions. This division was especially made for the design of the HES sample. The regions and the States included are as follows:

Region	*States Included*
Northeast------	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Ohio, and Michigan
South----------	Delaware, Maryland, District of Columbia, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas
West----------	Washington, Oregon, California, Idaho, Nevada, Montana, Utah, Arizona, Wyoming, Colorado, New Mexico, North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Illinois, and Indiana

Location of residence.—This term refers to urban or rural place of residence of the sample persons. For the first six primary sampling units at which examinations were conducted, the definition of urban and rural was the same as that used in the 1950 census. These locations were Philadelphia, Pa., Valdosta, Ga., Akron, Ohio, Muskegon, Mich., Chicago, Ill., and Butler, Mo. For the remainder of the sampling units the 1960 census definitions were used.

The change from 1950 to 1960 definitions is of small consequence in the Survey, since only six locations were affected, and the major difference is the designation in 1960 of urban towns in New England and of urban townships in New Jersey and Pennsylvania.

According to the 1960 definition, the urban population comprises all persons living in (a) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New

England, New York, and Wisconsin); (b) the densely settled urban fringe, whether incorporated or unincorporated, of urbanized areas; (c) towns in New England and townships in New Jersey and Pennsylvania which contain no incorporated municipalities as subdivisions and have either 25,000 inhabitants or more or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile; (d) counties in States other than the New England States, New Jersey, and Pennsylvania that have no incorporated municipalities within their boundaries and have a density of 1,500 persons or more per square mile; and (e) unincorporated places of 2,500 inhabitants or more not included in any urban fringe. The remaining population is classified as rural.

Place description.—In this Survey the urban population is classified as living "in the central city" or "outside the central city" of an SMSA. The remaining urban population is classified as "not in SMSA."

The definitions and titles of standard metropolitan statistical areas are established by the U.S. Bureau of the Budget with the advice of the Federal Committee on Standard Metropolitan Statistical Areas.

The definition of an individual standard metropolitan statistical area involves two considerations: first, a city or cities of specified population to constitute the central city and identify the county in which it is located as the central county; and, second, economic and social relationships with contiguous counties which are metropolitan in character so that the periphery of the specific metropolitan area may be determined.

Persons "in the central city" of an SMSA are therefore defined as those whose residency is in the city appearing in the stand and metropolitan statistical area title. Persons residing in an SMSA but not in the city appearing in the SMSA title are considered to reside "outside the central city."

The remaining population is allocated into rural-farm and rural-nonfarm groups. The farm population includes all persons living in rural territory on places of 10 or more acres from which sales of farm products amounted to $50 or more during the previous 12 months or on places of less than 10 acres from which sales of farm products amounted to $250 or more during the preceding 12 months. Other persons living in rural territory were classified as nonfarm. Persons were also classified as nonfarm if their household paid rent for the house but their rent did not include any land used for farming.

Employment status.—This term applies to the employment status of persons during the 2-week period prior to the week of interview. It is not intended that this term define the labor force or provide estimates of the employed or unemployed population at the time of the survey.

Persons who reported that they either worked at or had a job or business at any time during the 2-week period prior to the week of interview were considered employed. This includes paid work as an employee of someone else, self-employment in business, farming, or professional practice, and unpaid work in a family business or farm. Persons on layoff from a job and those who were absent from their job or business because of temporary illness, vacation, strike, or bad weather are considered as employed if they expected to work as soon as the particular event causing their absence no longer existed. Freelance workers are considered as currently employed if they had a definite arrangement with one or more employers to work for pay according to a weekly or monthly schedule, either full- or part-time. Excluded are such persons who have no definite employment schedule but who work only when their services are needed. Also excluded are (1) persons receiving revenue from an enterprise in whose operation they do not participate, (2) persons doing housework or charity work for which they receive no pay, and (3) seasonal workers during the portion of the year they were not working. (It should be noted that these data were not collected for Philadelphia.)

Occupational Title	*Census Code*
Professional, technical, other kindred workers, and managerial	R, 000-195, 250-285
Farmers and farm managers	N, 222
Clerical and sales workers	S, Y, Z, 301-395
Craftsmen, foremen, and kindred workers	Q, 401-545
Operatives and kindred workers	T, W, 601-721
Private household and service workers	P, 801-803, 810-890
Farm and other laborers (except mine)	U, V, X, 901, 905, 960-973
Unknown (including new workers)	995 and all other codes

Occupation.—A person's occupation may be defined as his principal job or business. For the purposes of this Survey the principal job or business of a respondent is defined in one of the following ways. If the person worked during the 2-week-reference period of the interview or had a job or business, the question concerning his occupation (or what kind of work he was doing) applies to his job during that period. If the respondent held more than one job, the question is directed to the one at which he spent the most time. It refers to the one he considers most important when equal time is spent at each job. A person who has not begun work at a new job, is looking for work, or is on layoff from work is questioned about his last full-time civilian job. A full-time job is defined as one at which the person spent 35 or more hours per week and one which lasted 2 or more consecutive weeks. A person who has a job to which he has not yet reported and has never had a previous job or business is classified as a "new worker."

The occupational groups are shown below with the appropriate census code categories.

(U.S. Bureau of Census: 1960 Census of Population, Classified Index of Occupation and Industries. U.S. Government Printing Office, Washington, D.C., 1960). This information was not collected for Philadelphia and Valdosta.

Industry.—The industry in which a person was reportedly working was classified by the major activity of the establishment in which he worked.

The only exceptions to the above are those few establishments classified according to the major activity of the parent organization, and they are as follows: laboratories, warehouses, repair shops, and places for storage.

The industry groupings are shown below. (Data on industry were not collected for Valdosta and Philadelphia.) The census code (the Classified Index of Occupation and Industries) and the Standard Industrial Classification (SIC) code components are also listed.

Industry Title	*Census Code*	*SIC Code*
Agriculture, forestry, and fisheries	A, 017, 018	01, 02, 07, exc. 0713, 08, 09
Mining and construction	C, 126-156	10-14, 15-17
Manufacturing	B, M, 206-459	19-39, 0713
Transportation, communication, and other public utilities	L, 507-579	40-49
Wholesale and retail trade	D, F, G, 606-696	50, 52-59
Finance, insurance, and real estate	706-736	60-67
Service and miscellaneous	E, H, K, 806-898	70, 72, 73, 75, 76, 78, 82, 84, 86, 88, 89
Public administration	J, 906-936	91-94
Unknown (including new workers)	999	99

The industry "public administration" differs somewhat from the usual industrial classification of government, since it is limited to the postal service and Federal, State, and local public administrations. This category includes only uniquely governmental functions and excludes those activities which may also be carried out by private enterprise. For example, teachers in public educational facilities and nurses engaged in medical services of governmental agencies are included with the "service and miscellaneous" group.

Usual activity status.— All persons are classified according to their usual activity status during the 12-month period prior to the week of interview. The "usual" activity status, in case more than one is reported, is the one at which the person spent the most time during the 12-month period.

The categories of usual activity status used are usually working, usually keeping house, retired, and other. For several reasons these categories are not comparable with somewhat similarly named categories in official Federal labor force statistics. First, the responses concerning usual activity status are accepted without detailed questioning, since the objective of the question is not to estimate the numbers of persons in labor force categories but to identify crudely certain population groups which may have differing health problems. Second, the figures represent the usual activity status over the period of an entire year, whereas official labor force statistics relate to a much shorter period, usually 1 week. Finally in the definitions of specific categories which follow, certain marginal groups are classified differently to simplify procedures.

Usually working includes persons who are paid employees; self-employed in their own business, profession, or in farming; or unpaid employees in a family business or farm. Work around the house or volunteer or unpaid work, such as for a church, etc., is not counted as working.

Usually keeping house includes women whose major activity is described as "keeping house" and who cannot be classified as "working."

Retired includes persons 45 years of age and older who consider themselves to be retired. In case of doubt a person 45 years of age or older is counted as retired if he or she has either voluntarily or involuntarily stopped working, is not looking for work, and is not described as "keeping house." A retired person may or may not be unable to work.

Other in this report includes men not classified as "working" or "retired" and women not classified as "working," "keeping house," or "retired." Persons who are going to school are included in this group.

Education.—Each person is classified by education in terms of the highest grade of school completed. Only grades completed in regular schools, where persons are given a formal education, are included. A regular school is one which advances a person toward an elementary or high school diploma or a college, university, or professional school degree. Thus, education in vocational, trade, or business schools outside the regular school system is not counted in determining the highest grade of school completed.

Income of family or unrelated individuals.—Each member of a family is classified according to the total income of the family of which he is a member. Within the household all persons related to each other by blood, marriage, or adoption constitute a family. Unrelated individuals are classified according to their own income.

The income recorded is the total of all income received by members of the family in the 12-month period prior to the week of interview. Income from all sources is included, e.g., wages, salaries, rents from properties, pensions, help from relatives, and so forth.

Marital status.—The categories of marital status are *married, widowed, divorced, separated,* and *never married.* Persons with common-law marriages are considered to be married. *Separated* refers to married persons who have a legal separation, those living apart with intentions of obtaining a divorce, and other persons permanently or temporarily estranged from their spouse because of marital discord.

APPENDIX VII

STATISTICAL NOTES

Survey Design

The Health Examination Survey is designed as a highly stratified multistage sampling of the civilian, noninstitutional population, aged 18-79 years, of the conterminous United States. The first stage of the plan is a sample of the 42 primary sampling units (PSU's) from 1,900 geographic units into which the United States has been divided. A PSU is a county, two or three contiguous counties, or a standard metropolitan statistical area. Later stages result in the random selection of clusters of about four persons from a small neighborhood within the PSU. The total sample included 7,710 persons in the 42 PSU's in 29 different States. The detailed structure of the design and the conduct of the Survey have been described in previous reports.[1,2]

Reliability in Probability Surveys

The methodological strength of the Survey derives especially from its use of scientific probability sampling techniques and highly standardized and closely controlled measurement processes. This does not imply that statistics from the Survey are exact or without error. Data presented are imperfect for three important reasons: (1) results are subject to sampling error, (2) the actual conduct of a survey never agrees perfectly with the design, and (3) the measurement process itself is inexact even when standardized and controlled. The faithfulness with which the study design was carried out has been analyzed in a previous report.[2]

Of the total of 7,710 sample persons 86 percent or 6,672 were examined. Analysis indicates that the examined persons are a highly representative sample of the adult civilian, noninstitutional population of the United States. Imputation for the nonrespondents was accomplished by attributing to nonexamined persons the characteristics of comparable examined persons. The specific procedure used[2] consisted of inflating the sampling weight for each examined person to compensate for nonexamined sample persons at the same stand and of the same age-sex group.

While it is impossible to be certain that the CHD prevalence is the same in the examined and the nonexamined groups, the available evidence indicates that they do not differ greatly. A special inquiry was sent to the physicians of nonexamined persons and to the physicians of a matching set of examined persons. The CHD prevalence reported for the examined and nonexamined groups was about the same.[2]

Sampling and Measurement Error

In this report and its appendices several references have been made to efforts to evaluate both bias and variability of the measurement techniques. The probability design of the Survey makes possible the calculation of sampling errors. Traditionally the role of the sampling error has been the determination of how imprecise the survey results may be because they come from a sample rather than from the measurement of all elements in the universe.

The task of presenting sampling errors for a study of the type of the Health Examination Survey is complicated by at least three factors: (1) Measurement error and "pure" sampling error are confounded in the data; it is not easy to find a procedure which will either completely include both or treat one or the other separately. (2) The survey design and estimation procedure are complex and accordingly require computationally involved techniques for calculation of variances. (3) Thousands of statistics come from the survey, many for subclasses of the population for which there are small numbers of sample cases. Estimates of sampling error are obtained from the sample data and are themselves subject to sampling error, which may be large when the number of cases in a cell is small or even occasionally when the number of cases is substantial.

In the present report, estimates of approximate sampling variability for selected statistics are presented in tables I-III. These estimates have been prepared by a replication technique which yields overall variability through observation of variability among random subsamples of the total sample. The method reflects both "pure" sampling variance and a part of measurement variance.

In accordance with the usual practice the interval estimate for any statistic may be considered to be the range within one standard error of the tabulated sta-

Table I. Standard errors in prevalence rates for definite coronary heart disease in adults, by age and sex: United States, 1960-62

Age	Coronary heart disease		Myocardial infarction		Angina pectoris	
	Men	Women	Men	Women	Men	Women
	Rates per 100 adults					
Total-18-79 years	0.5	0.2	0.2	0.2	0.3	0.2
18-24 years	-	-	-	-	-	-
25-34 years	0.3	0.1	0.2	0.1	0.1	-
35-44 years	0.3	0.2	0.3	0.1	-	0.1
45-54 years	0.8	0.5	0.6	0.2	0.4	0.4
55-64 years	1.7	1.1	1.4	0.7	1.1	0.9
65-74 years	3.1	1.4	1.4	1.1	1.7	1.4
75-79 years	3.4	1.7	1.6	-	1.8	1.7

Table II. Standard errors in prevalence rates for definite coronary heart disease in adults, by race and sex: United States, 1960-62

Race	Coronary heart disease		Myocardial infarction		Angina pectoris	
	Men	Women	Men	Women	Men	Women
	Rates per 100 adults					
White	0.5	0.2	0.2	0.2	0.3	0.2
Negro	1.3	1.0	0.9	0.4	0.8	0.8

tistic with 68 percent confidence or the range within two standard errors of the tabulated statistic with 95 percent confidence.

Expected Values

In tables 8-17 the actual prevalence rates for the various demographic variables are compared with the expected. The computation of expected rates was done as follows:

Suppose that in an area (say, the Northeast) the Health Examination Survey estimates that there are N_i persons in the i^{th} age group ($i = 1,2 \ldots, 7$; sum of $N_i = N$).

Suppose the Health Examination Survey estimates that the CHD prevalence rate for the United States in the i^{th} age group is X_i.

Then the expected CHD rate for the area is

$$\frac{I}{N} \sum_i N_i \bar{X}_i$$

Comparison of an actual value for, say, a region, with the expected value for that region is undertaken on the assumption that a meaningful statement can be made which holds, in some average way, for all persons in the region. This may or may not be true. The specified region may have higher values for young persons and lower values for old persons than are found in other regions. In that case an average comparison will obliterate one or both of these differentials. A similar remark may be made with respect to values computed for all races together, since relationships found in one race may not be found in another. In arriving at the general conclusions expressed in the text, an effort was made to consider all the specific data, including data not included in this report; but it must be recognized that balancing such evidence is a qualitative rather than a quantitative exercise. The standard error of the difference between an actual and an expected value may be approximated by the standard error of the actual value (table III).

Small Numbers

In some tables magnitudes are shown for cells for which the sample size is so small that the sampling error may be several times as great as the statistic itself. Obviously in such instances the statistic has no

Table III. Standard errors in prevalence rates for definite coronary heart disease in adults, by sex and selected characteristics: United States, 1960-62

Characteristic	Coronary heart disease (codes 1-3)		Myocardial infarction (code 1)		Angina pectoris (code 2)	
	Men	Women	Men	Women	Men	Women
	Rates per 100 adults					
Region						
Northeast	0.8	0.5	0.8	0.3	0.4	0.3
South	0.8	0.8	0.6	0.4	0.5	0.5
West	0.9	0.7	0.5	0.3	0.7	0.5
Population-size group						
Giant metropolitan areas	0.8	0.4	0.7	0.3	0.4	0.2
Other very large metropolitan areas	1.3	0.8	0.9	0.5	0.7	0.7
Other standard metropolitan statistical areas	0.8	0.7	0.4	0.3	0.7	0.7
Other urban areas	1.1	0.8	0.9	0.3	0.9	0.5
Rural areas	0.8	0.4	0.4	0.3	0.3	0.4
Place description						
SMSA-in central city	1.0	0.7	0.8	0.3	0.6	0.4
SMSA-outside central city	0.7	0.7	0.5	0.4	0.4	0.4
Urban, not SMSA	1.2	0.6	0.9	0.5	0.7	0.4
Rural, farm	1.8	1.4	0.6	-	1.6	1.4
Rural, nonfarm	1.2	0.6	0.7	0.3	0.7	0.7
Usual activity status						
Usually working	0.4	0.4	0.3	0.2	0.2	0.2
Keeping house	*	0.4	*	0.2	*	0.3
Retired	2.6	*	1.3	*	2.0	*
Other	1.0	-	0.7	-	0.8	-
Industry						
Agriculture, forestry, and fisheries	1.6	-	0.3	-	0.9	-
Mining and construction	1.0	*	0.4	*	0.8	*
Manufacturing	0.7	0.4	0.5	-	0.3	0.4
Transportation, communications, and other public utilities	1.9	*	0.5	*	1.5	*
Wholesale and retail trade	1.0	0.5	0.8	-	0.8	0.3
Finance, insurance, and real estate	1.5	-	-	-	1.5	-
Service and miscellaneous	1.3	0.7	1.1	0.3	0.4	0.4
Public administrative	1.6	*	1.2	*	1.5	*
Residence						
Urban	0.9	0.5	0.5	0.3	0.4	0.3
Rural	0.7	0.6	0.4	0.2	0.5	0.4
Occupation						
Professional, technical, other kindred workers, and managerial	0.7	-	0.8	-	0.3	-
Farmers and farm managers	1.8	*	0.4	*	1.2	*
Clerical and sales workers	1.7	0.4	1.2	-	1.1	0.2
Craftsmen, foremen, and kindred workers	0.9	*	0.3	*	0.7	*
Operatives and kindred workers	0.6	0.5	0.6	-	0.2	0.5
Private household and service workers	1.5	1.0	1.5	0.7	0.7	0.9
Farm and other laborers (except mine)	1.0	*	0.4	*	0.8	*
Education						
Under 5 years	1.8	1.7	0.3	0.8	1.6	0.9
5-8 years	1.3	0.9	0.7	0.3	0.6	0.6
9-12 years	0.6	0.3	0.5	0.2	0.4	0.2
13+ years	0.6	0.7	0.5	0.4	0.4	0.3
Family income						
Under $2,000	1.6	1.2	1.0	0.5	1.1	0.9
$2,000-$3,999	1.0	0.8	0.8	0.3	0.9	0.6
$4,000-$6,999	0.9	0.5	0.6	0.3	0.5	0.3
$7,000-$9,999	0.9	0.6	0.8	0.6	0.7	0.4
$10,000+	0.7	0.4	0.6	-	0.4	0.4
Unknown	1.5	0.8	1.1	-	0.4	0.8
Marital status						
Married	0.5	0.2	0.3	0.1	0.4	0.2
Widowed	1.7	1.4	1.7	0.9	0.9	1.0
Divorced	1.3	1.6	0.6	-	0.9	1.6
Separated	1.6	-	1.2	-	1.4	-
Never married	0.6	0.4	0.6	-	0.4	0.4

meaning in itself except to indicate that the true quantity is small. Such numbers, if shown, have been included to convey an impression of the overall story of the table.

Tests of Significance

Tests of significance for the demographic variables were performed in two ways. The first was to divide the difference between the actual and expected values by the standard error of the actual value. For example, for widowed men the actual value was 5.2 percent lower than expected, and the standard error was 1.7 percent. Since the difference was more than three times its standard error, it may be deemed statistically significant.

The second method was to examine the age-specific differences (not published) between the prevalence for the specified group and the prevalence for all persons. Thus, for men who were employed as farmers or farm managers, the CHD prevalence for all five age groups under 65 years was less than the overall prevalence for these age groups. The probability of such an occurrence is 0.03, and the difference is considered statistically significant. In this instance the difference between the actual and expected values (which is really a weighted average of the age-specific differences) is 1.28 times its standard error which (using tables of the normal distribution) has a probability of 0.10 and is not statistically significant.

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