

# FAVORABLE ASPECTS OF HEART DISEASE

*with Special Reference to  
the Health Officer*

by

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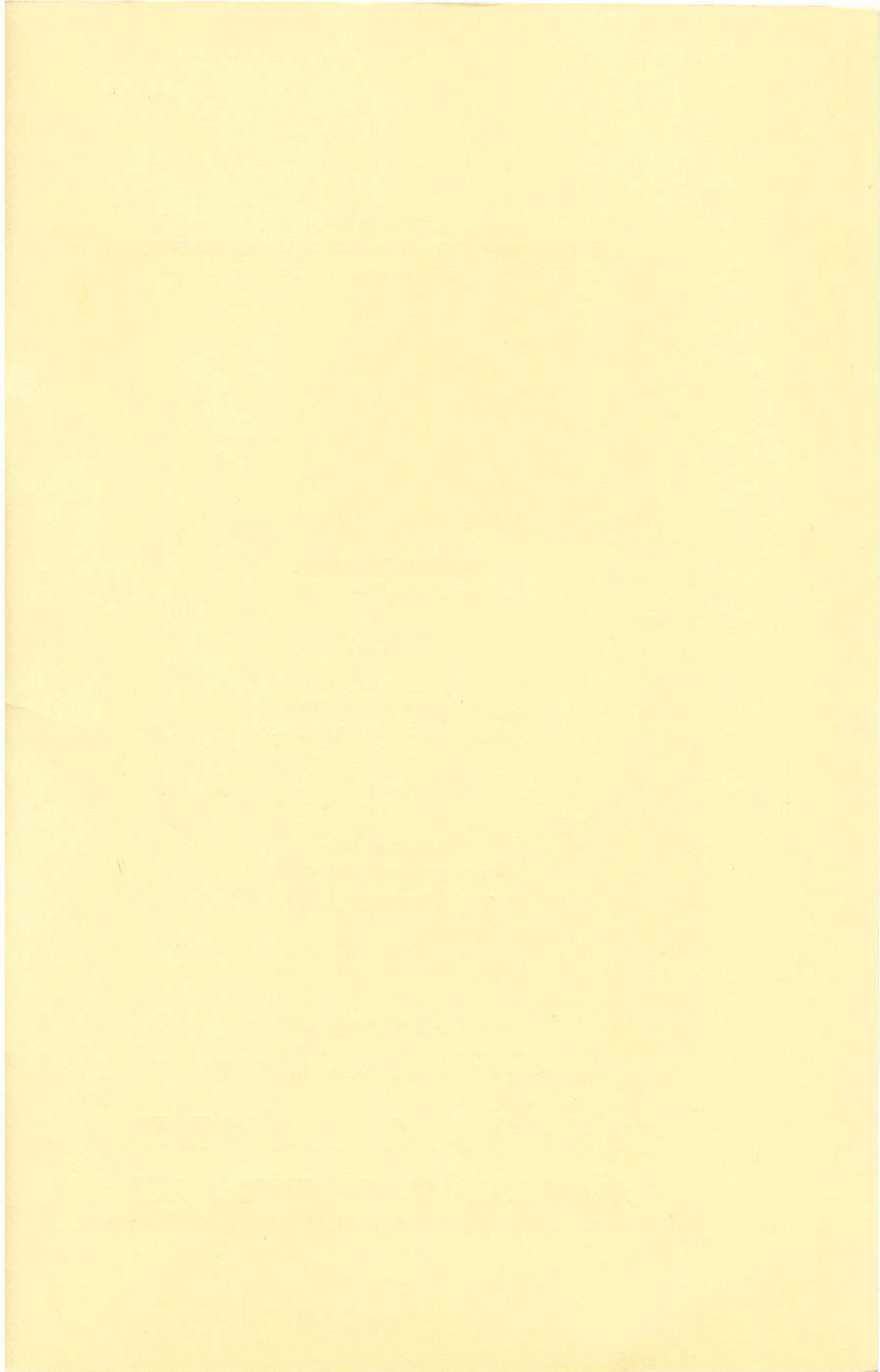
of the

METROPOLITAN LIFE  
INSURANCE COMPANY



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## FAVORABLE ASPECTS OF HEART DISEASE with Special Reference to the Health Officer\*

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### I

THE SCOPE and outlook of the public health movement have undergone great change in the last generation. In 1900, the deathrate from typhoid fever in the Registration Area was 31.3 per 100,000. Last year it was only 1.1 in the same ten states which originally constituted the Area. Today, typhoid fever is a serious problem in only a few of our cities and in certain rural areas. In 1900, the diphtheria deathrate was 40.4 per 100,000; last year it was 2.5 per 100,000 in the same states. So far as diphtheria is concerned, we are well on our way to eradicating the disease altogether. Tuberculosis, at the beginning of the century, was the leading cause of death in our population. Its deathrate then was 195.2 per 100,000, but last year it was only 58.7. The trend of mortality from this disease is still rapidly downward and by 1940 we are confident that it will have become a relatively minor item in our public health program.

With the decline in the acute diseases of childhood and of early adult life, new problems have come to the fore which demand attention on the part of public health workers. The chronic diseases of later life have been constantly forging ahead and today occupy a position of outstanding importance. Over 60 per cent of all deaths now occur after age 45, and of this total nearly two-thirds are accounted for by chronic diseases of the heart and arteries, Bright's disease, cerebral hemorrhage, cancer and diabetes. Of these, heart disease is responsible for far more deaths than any other cause. This new situation in heart disease is becoming more and more insistent, and for a number of reasons. It has a just claim upon the time and thought of the health officer, because any

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program of control will center about him. He can play his part well only if his attitude is based on the facts of the heart disease problem.

What are these essential facts? First, heart disease leads as a cause of death. In addition, it ranks very high as a cause of disability. Only rheumatism exceeds it in this respect. On the basis of their recent survey of chronic illness in Massachusetts, Bigelow and Lombard<sup>1</sup> estimate that there were approximately 84,000 persons ill with heart disease in that state alone. This incidence is probably higher than in most states because the population of Massachusetts has a higher average age than the country at large. In New York City, the study of chronic illness under the auspices of the Welfare Council<sup>2</sup> disclosed that at least one out of every eight of the chronically ill suffered from heart disease, and this figure did not include a large number of old persons, many of whom suffered from cardiovascular disease in some form. On a conservative estimate, the number of persons suffering from heart disease in the United States is probably close to two millions.

Another excellent measure of the current heart disease situation is the probability of dying from the disease. Under present conditions of mortality, one out of every five white males born will eventually die from the disease. The proportion is slightly larger for white females. Indeed, the chances of dying from it are not only greater than those from any other single cause, but exceed those for tuberculosis and cancer combined. These chances increase with advancing age so that one out of every four females at age 45 will, under present conditions, die ultimately from heart disease, and one out of every four males at age 50.

These figures present in bold outline the great importance of heart disease from the point of view of incidence and mortality. A great number of the cases, however, are old people who have lived out their life span. Their heart disease is, from one point of view, hardly more than a manifestation of senescent changes that are going on simultaneously throughout the body. Obviously, heart disease of this type is not a public health problem. What is a matter of concern to the health officer, however, is the frequency of heart disease that is preventable or postponable, and how much of it is premature and amenable to control through his efforts. To throw light on this problem we must consider whether or not this

disease is increasing, whether various types of the disease behave differently, and at which ages of life each type predominates.

## II

Crude figures on heart disease mortality show a very definite rise in rates. Thus, in the Registration Area, the deathrate from organic disease of the heart in 1932 was 184.3 per 100,000, whereas at the beginning of the century, the rate was only 111.2 per 100,000. An increase of over 60 per cent in the crude rates has been recorded in the space of a generation. These figures, however, do not take into account the changes in the age distribution of our population. In this interval, the population of the country has increased by 62 per cent, whereas the population at ages past 45 has more than doubled. Stated in another way, persons over 45 constituted only 17.7 per cent of our population at the beginning of the century, but in 1930 they made up 22.8 per cent. A large part of the increase in heart disease is necessarily a result of this increasing proportion of older persons in our midst.

We may correct for this factor by means of deathrates standardized in respect to age, sex and color. We have such a series of corrected deathrates available, covering the Expanding Registration Area from 1911 to 1920, and the Registration States of 1920 from 1920 to 1930. The course of the standardized deathrate from organic heart disease in that twenty-year period is shown in Chart 1. The effect of the increasing proportion of older persons is here eliminated. In the early years of this series, heart disease was increasing at a rather moderate pace. The rate for the population as a whole did not show any appreciable increase during the influenza pandemic. The first important change in the picture was the sharp decline in heart disease mortality immediately following the pandemic. The deathrate in 1919 represented a new minimum and was approximately 15 per cent below the average for the eight years preceding. The most striking feature of this curve, however, is the rapid and almost uninterrupted increase since 1919. By 1922 the pre-influenza level was reached, and in the very next year exceeded. The extent of rise has been such as to carry the heart disease rate in recent years to a level approximately 25 per cent higher than that prevailing prior to 1918. It is clear, then, that even making allowance for changes in the age and sex

composition of our people, the recorded mortality from heart disease, compiled from official data, is higher than ever before.

STANDARDIZED DEATH RATES FROM ORGANIC HEART DISEASE  
IN THE UNITED STATES \*

1911 to 1930

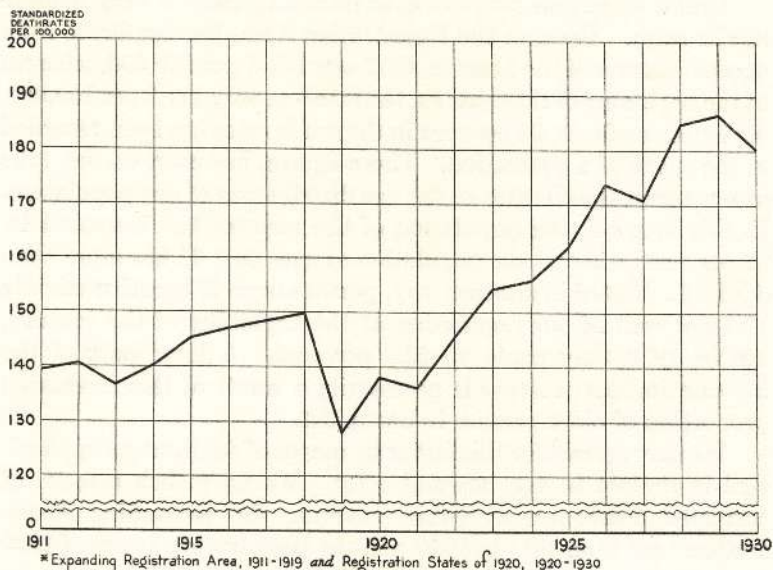


CHART 1

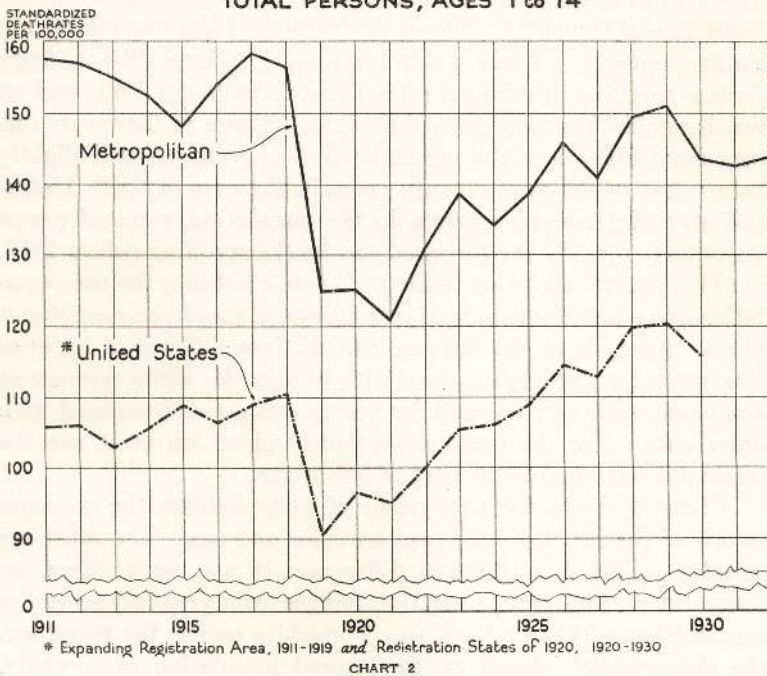
### III

There are two reasons, however, why we are somewhat uncertain regarding the validity of the comparisons of present levels of heart disease mortality with those previous to 1920, as compiled from official data. In the first place, changes in heart disease classification introduced in 1921 tended to increase somewhat the rates from this disease, especially between 45 and 60 years of age. In the second place, the Registration Area grew very considerably between 1911 and 1920, and the level of heart disease rates in the states admitted to the Area from time to time was not the same as in the states comprised in it before. Consequently, we cannot be certain that the variations in the rates from 1911 to 1920, and the comparative levels before and since, reflect much more than these changes. Another item of some importance is that earlier official

data did not segregate the facts for white and colored persons, and consequently differential changes in the rates for the two races cannot be measured.

Fortunately, in the Metropolitan Life Insurance Company, we have kept mortality records of the many million Industrial policyholders in such manner that the difficulties arising from classification changes have been avoided, and we have a separate record for the white and colored races from the very beginning of our series in 1911. In regard to geographical spread, the area covered

**DEATH RATES FROM ORGANIC HEART DISEASE  
IN THE GENERAL POPULATION  
AND AMONG METROPOLITAN INDUSTRIAL POLICYHOLDERS  
1911 - 1932  
TOTAL PERSONS, AGES 1 to 74**



by the Company has changed little and the growth in the number of Industrial policyholders is simply in the nature of an increasing proportion of persons living in the same communities. These policyholders reside, for the most part, in cities and towns of the United States and Canada, and the facts on heart disease relating

to them, must therefore, be construed as more typical of the urban population of the two countries than of the total population. They do constitute a sizeable fraction of this urban population, however, nearly one-fourth of the total—and the greatest single sample for which a record of heart disease mortality consistent in definition is available. This insured group, it should be pointed out, is deficient in its proportion of persons over age 75, and the rates for the insured group past this age are not reliable. Consequently, the experience is limited to ages 1 to 74. That the experience is dependable over this range of life is seen by comparing the general course of the heart disease rates, adjusted for age, sex and color, among these insured persons—the upper line in Chart 2—with the trend for ages 1 to 74 in the general population. The latter is shown in the lower line of the chart. The main features of the two curves are similar, namely, a fairly stable level from 1911 to 1918, a sharp decline resulting in minimal rates between 1919 and 1921, and an unmistakable increase since that time. There is, however, one important difference: the recent level of mortality is still slightly below that of the pre-influenza years in the case of these Metropolitan policyholders, whereas in the population, rates of recent years have already far exceeded the level prevailing before 1918.

This general situation in heart disease mortality for the population as a whole does not hold true, however, for all the constituent parts. Analysis of the data reveals distinct differences between the trends for men as compared with women; for white persons, as compared with negroes; and for young persons as compared with older ones. For the reasons previously given we must use the insurance records for this part of our study.

Chart 3 shows for this group of policyholders the separate trends of the heart disease rate by color and sex. The rates are suitably adjusted to discount differences in age composition between the various groups and the changes from year to year in the composition within each group. For white males, the trend has the characteristic detail of the insured population as a whole, namely, a level trend from 1911 to 1918, an upward trend since 1919 and a sharp break between the two periods. The rise since 1919 has been so great that the rates in some recent years have reached or exceeded the level prevailing before the pandemic. Among white females, the course of the heart disease rate shows somewhat similar tendencies, but there are two important differ-



ences. First, heart disease rates among women began to fall after 1918, a year later than in the case of men; the decline was by no means so sharp, and the rebound has been very slight. As a result, heart disease deathrates among white females in recent years have remained appreciably lower than fifteen to twenty years ago. Among colored persons, pre-influenza rates fluctuated markedly, with no definite trend. This group likewise experienced a sharp fall in heart disease mortality, following upon the influenza pandemic, and a return towards pre-pandemic levels since. This is true for both sexes, but as among whites, the rebound has been sharper among colored males than among colored females. There is, then, a distinct difference between males and females in the trends of heart disease mortality over the last twenty-two years.

**TRENDS IN HEART DISEASE MORTALITY BY COLOR & SEX, AGES 1-74**  
 Metropolitan Life Insurance Company, Industrial Department  
 1911-1932

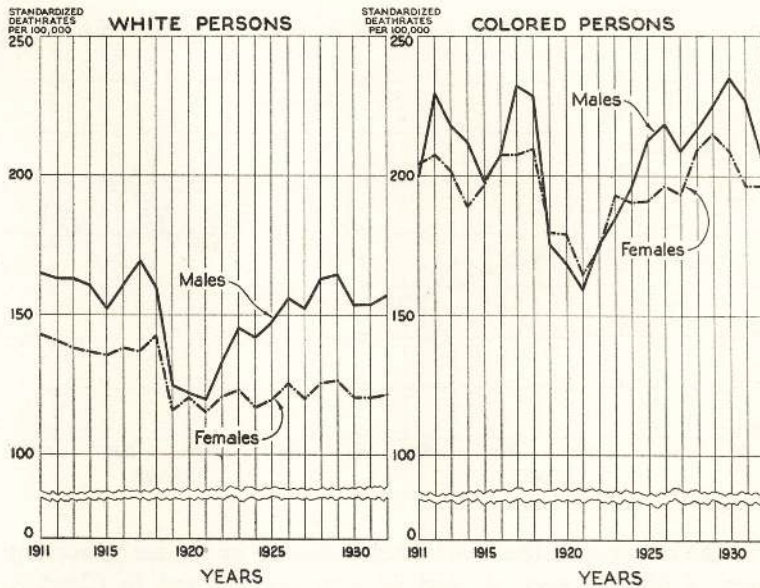


CHART 3

Even more significant departures from the general trend are found at the various ages of life. Chart 4 shows the trends by color and sex at ages 1 to 24. The four curves are in general agreement, but distinctly different from the picture shown at all

ages. Among these young people, irrespective of color or sex, heart disease rates have declined and this is true both before and since the influenza outbreak. In young persons of both races, the minimal rates have been recorded in recent years. Among white persons, the rates have fallen nearly 50 per cent. The record among the colored is not so good as among whites, but they exhibit some improvement. In contrast to the generally unfavorable picture at all ages combined, therefore, a very healthy situation prevails at the younger ages.

TRENDS IN HEART DISEASE MORTALITY OF CHILDREN AND YOUNG ADULTS  
Metropolitan Life Insurance Company, Industrial Department  
1911-1932

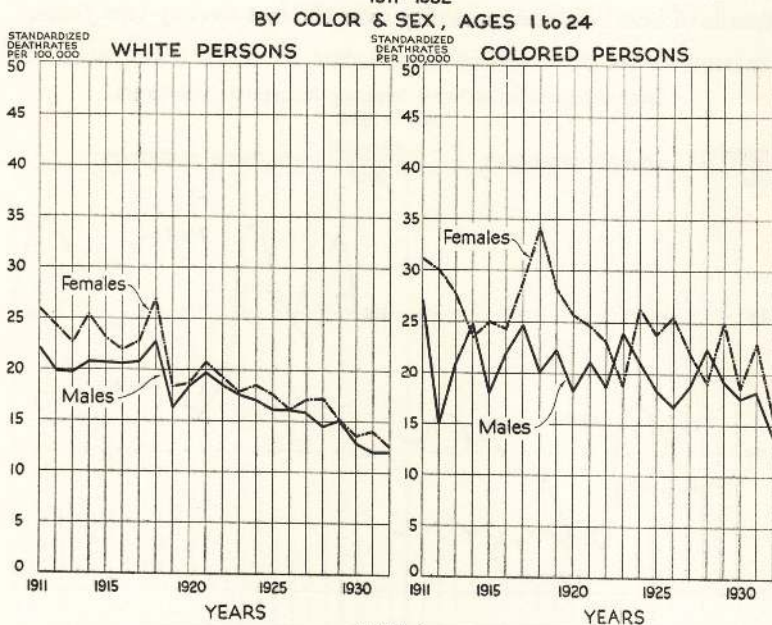


CHART 4

The changes in the heart disease picture in the main working ages of life—between 25 and 44—are brought out in Chart 5. Among white males at these ages, there has been a rather steady decline in heart disease mortality up to and including 1918; a precipitate fall during the next two years to a minimum level which was maintained through 1922; then a rebound back to the 1919 level around which the deathrate has fluctuated with very

moderate variations. Despite this sharp rebound, heart disease rates in these working ages have remained approximately 25 per cent below the pre-influenza level. Among white females, the heart disease deathrate prior to the pandemic also showed a downward tendency. The havoc which the epidemic played with pregnant women with heart disease is shown by an abrupt increase in heart disease rates in 1918. The next year, however, showed a fall in the rate to a lower level than in any previous year, and since that time the heart disease rate among women between ages 25 and 44 has shown, if anything, a downward tendency. Among the colored, the situation is somewhat more mixed. Colored males in this important period of life have suffered a sharp increase in mortality so that the rates in some recent years have approached

**TRENDS IN HEART DISEASE MORTALITY IN THE MAIN WORKING PERIOD OF LIFE**  
 Metropolitan Life Insurance Company, Industrial Department  
 1911-1932

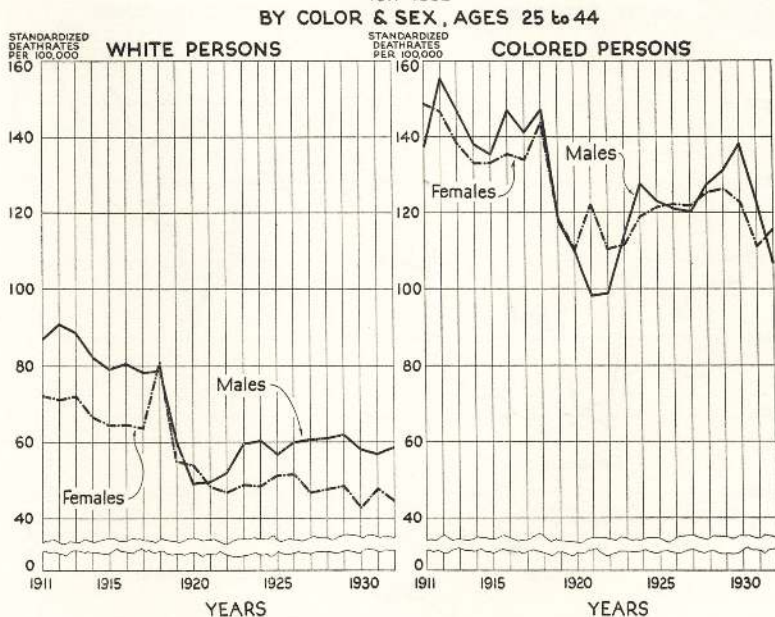


CHART 5

the levels obtaining fifteen years ago. The trend has been slightly more favorable among young colored women. On the whole, then, the situation as regards heart disease in the important productive years is far better today than two decades ago and as in childhood

and adolescence, contrasts sharply with the unfavorable condition at all ages combined.

It is obvious from the foregoing that the increasing deathrate from heart disease must be a phenomenon of middle life and of old age. Chart 6 shows the deathrates in the broad age group, 45 to 74, by color and sex. Among insured white men at these ages, the deathrate from 1911 to 1918 is almost a straight line, except for a dip in the rate in 1915, and a moderate rise in 1917. Following 1918 there was a sharp fall, and the low level attained in 1919 was maintained for the next two years, since when the rate has risen sharply. In most recent years, the rate has exceeded the level of 1911 to 1918. Among white females at these ages, also,

TRENDS IN HEART DISEASE MORTALITY OF MIDDLE LIFE AND OLD AGE  
Metropolitan Life Insurance Company, Industrial Department  
1911-1932

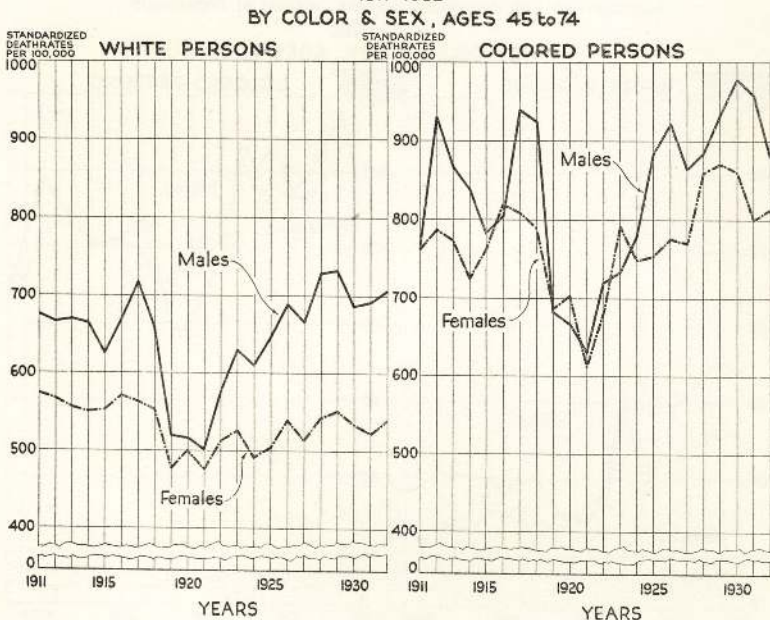


CHART 6

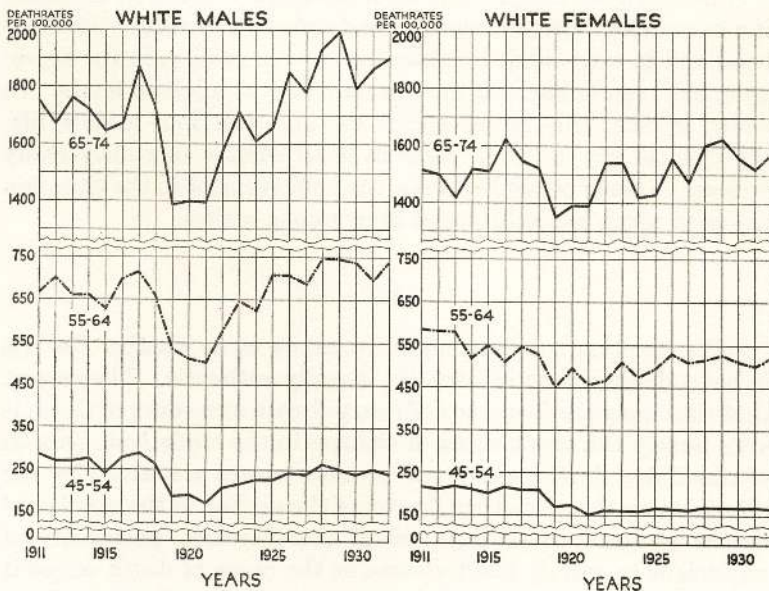
the trend from 1911 to 1918 was practically level. After 1918, the rate fell to new low levels, but since 1921 has experienced a rebound; not so sharp, however, as among males. In this broad age group, the white female rate has remained slightly below the level of the early years of this experience. Among the colored, the situation

resembles that among white males. Indeed, the increases in their deathrates from heart disease since 1921 have been so large that, within the past five years, the rates have attained a level higher than that of fifteen to twenty years ago.

If we dissect this broad age group further, we find that the heart disease situation grows steadily worse with advancing age. Thus, as Chart 7 shows, among white men between ages 45 and 54, the current rates are still below those prevailing prior to 1918. At all ages past 55, however, the rates have not only been increasing, but have attained a level appreciably in excess of those prevailing in the earlier years. Among white women between 45 and 54, the rate has been remarkably stable, and has displayed

DETAILED TRENDS IN ORGANIC HEART DISEASE MORTALITY AFTER AGE 45

Metropolitan Life Insurance Company, Industrial Department  
1911 - 1932



little, if any, tendency to increase. Between 55 and 64, despite a perceptible upward trend since 1919, the mortality in recent years has not reached the pre-influenza level. Only at ages past 65 have recent deathrates among white women exceeded those of earlier years.

This chart does not include curves for ages 75 and over because, as was stated earlier, the insurance experience contains too few persons at these older ages to give reliable deathrates. Official statistics indicate, however, that the rise in the deathrate at these advanced ages has gone on at a more rapid pace than for any other period of life. This is most significant because nearly one-third of all the deaths from heart disease occur after age 75.

Among older negroes, the situation is worse than among white persons. The detailed rates for them in these ten-year age groups fluctuate so widely from year to year, that it is difficult to make any clear-cut generalizations. Among colored men, however, even beginning with age 45, the deathrates in recent years have frequently attained the level of two decades ago, and in negroes of both sexes past 55, the rates in the past five years have been equal to, or even exceeded those of the pre-influenza years.

Summarized briefly, then, the heart disease mortality situation is a mixed one. Certain aspects are decidedly favorable. In childhood and in early adult life, heart disease mortality, in the aggregate, has been falling and the rates are now at minimal levels. In white women, this improvement extends well into middle life. Only in old age is the increase in heart disease mortality really serious. Among colored persons, the improvement in the situation has been much less substantial than among whites.

#### IV

The question has been raised by many as to whether the rise in heart disease, even in later life, is really authentic. They assert that the change in frequency of heart disease as a cause of death is very largely the result either of changes in the statistical methods of classifying deaths where two or more causes are stated by the physician on the official certificate; of the decline in the number of deaths assigned to senility and of the increased propensity of physicians to specify heart disease as the cause of death where it is accompanied by so-called degenerative changes in the kidneys and arteries. An example of this attitude toward the situation is the attempt of the Bolduans<sup>3</sup> to show that there has been no increase whatever in heart disease in New York City. To demonstrate this thesis, they bring together all the diseases of the heart—including the acute bacterial types—apoplexy, arterial disease,

nephritis and half the deaths assigned to senility. At all ages combined, the mortality from this aggregate of conditions has not increased for New York City, but some rise is recorded at ages 65 and over, and, in the last decade, between ages 45 and 65. There is, in some degree, a medical basis for the assumptions underlying this reasoning, but the case for it is not proved by the purely arithmetical procedure of adding up the deaths from this varied list of causes. The extent of the changes in heart disease mortality is too great to be explained away in this manner. Moreover, the trend from this composite of diseases has certainly less validity than the carefully compiled statistics on heart disease alone. It is not convincing for the additional reason that, among men past 45, there has been an increase in the deathrate from all causes somewhat parallel to that in heart disease. In older females, where the increase in heart disease occurs only at advanced ages, the total deathrate during old age has maintained a fairly constant level. During this period there has been a decline of considerable proportions in the mortality of old people from infections, notably the pneumonias and tuberculosis. These declines would have resulted in an appreciable fall in the total deathrate, but were counteracted by an increase in the deathrate from some other cause or causes. It is logical then to assume that at least part of the recorded rise in heart disease is authentic.

## V

What do these varying and contrasting trends mean? Why should deathrates from heart disease in early life go down and the rates in later life increase? The reasons for this diversity in trend must be sought in a consideration of the causes and types of heart disease which prevail in the main age periods of life. For heart disease is not a single entity. It is a complex of many factors, etiological and pathological. Not only are there many recognized types of heart defects, but some of them have the same origins, others are of different origins. Moreover, in the same diseased heart there may coexist two or more types of structural change which may or may not be of the same etiological origin.

It will clarify our discussion considerably if we review rapidly the causes of heart disease and their relation to structural changes in the heart. Unfortunately, careful study on a statistical basis

of the frequency of the various etiological types of heart disease has been long in getting started, and only in recent years have really reliable facts been collected. Even this limited material must be handled with caution because often the groups studied are selected from one point of view or another, and due regard is not given to the differences in age composition between various groups studied. The facts given in the literature must be taken as tentative, and not as final. For them we are indebted to the investigations of Cohn and his co-workers,<sup>4, 5, 6</sup> in New York, White,<sup>7</sup> in Boston, and others.<sup>8-16</sup> Acute rheumatic fever is found to be responsible for about 30 per cent of all cases of heart disease in and around New York. Under age 20, however, four out of five cases of heart disease have a rheumatic origin, and indeed, if we exclude cases of unknown etiology, nine out of ten cases. In the next decade of life, two-thirds of all cases have a rheumatic background; in the fourth decade more than half, and in the fifth, one-fourth of male heart cases and one-third of female cases. After age 50, rheumatic infection plays a relatively small part in the causation of heart diseases.

Syphilis is responsible for about one out of twenty cases of heart disease. But this cause shows very sharp differentials in the various sex and age groups. Under age 30, it is relatively uncommon as a factor in deaths except for a negligible proportion of children with congenital syphilis. Among females, on the whole, it is also relatively uncommon except between ages 40 and 50, when it reaches a maximum of 10 per cent of all heart disease cases. The problem of syphilitic heart disease is largely concentrated in men. Between ages 30 and 40, about 10 per cent of the cases of heart disease have this origin; between 40 and 60, about 20 per cent; and after 60, about 10 per cent.

By far the largest proportion of heart disease is of the senescent or arteriosclerotic type. Such cases constitute about one-half of the total at all ages combined. They include primarily those suffering arterial changes in the heart, and the rarer cases in which the degenerative change in the heart muscle is not associated with the arteries. Arteriosclerotic heart disease is found very infrequently before age 40, but after that age constitutes a large and increasing proportion. Between 40 and 50, about one-sixth of the cases are of this type; between 50 and 60, about one-half; but after age 60 about three-fourths.



Other causes, in the aggregate, account for a sizeable proportion of heart disease, but no single one of them stands out, except hyperthyroidism, which, in women between 30 and 50, is a rather frequent cause of heart symptoms.

The proportions just cited relate to conditions in the northeastern section of the country. It will be realized without going into detail that they vary from place to place. For example, in the south, the frequency of the rheumatic type of heart disease is much less than in the north. On the other hand, there, and in many communities with large negro populations, the syphilitic types are more common. It should be noted also that the proportion of cases of undetermined etiology differs so widely from place to place and from study to study that they tend to make exact comparison difficult.

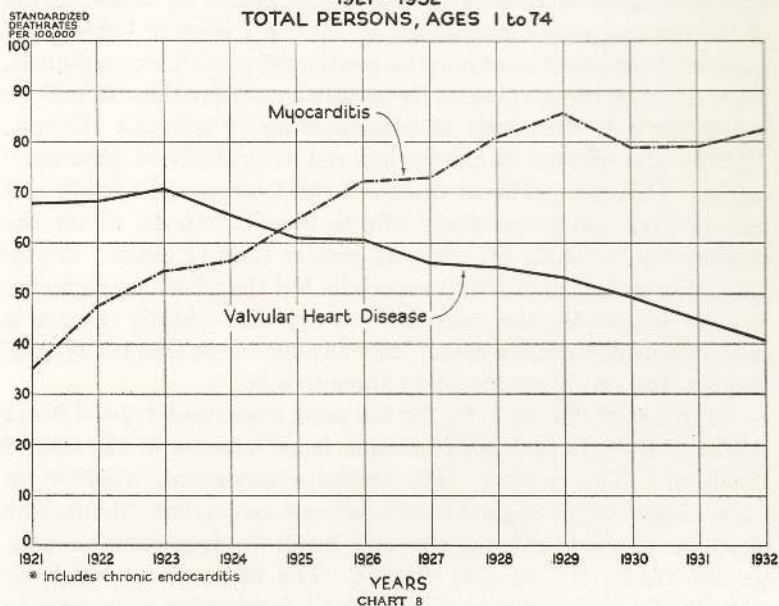
Next let us review briefly the diseases of the heart structures arising from these various causes. Endocarditis or inflammation of the internal serous membrane of the heart is caused chiefly by diseases of the infectious type; rheumatic, streptococcal or syphilitic. Disease of the heart valves is frequently caused by these infections but often it is the result of atheromatous or sclerotic changes. Mitral valve disease is chiefly but not exclusively of rheumatic origin. This type of heart disease is most common in youth and middle age, and particularly affects females, among whom the incidence is probably 50 per cent greater than in males. Aortic valve disease is also of infectious origin, but the offending organism is more frequently the spirochete of syphilis. Aortic disease is most common in middle life and affects males more frequently than females, the ratio being roughly three to one.

Myocardial disease is by far the most important type of heart trouble. Its principal manifestation is an increase in the size of the heart. The cause of this cardiac enlargement, whether by hypertrophy or dilatation or both, is heart strain, the chief factors of which are ascribed, on the one hand, to hypertension and, on the other, to valvular disease. The latter is, as we have seen, chiefly of rheumatic origin. But hypertensive cases greatly out-number those with a valvular background. Degeneration and fibrosis, the other important type of myocardial change, result chiefly from coronary disease. Cases of this kind are practically limited to middle life and old age, more especially to the latter.

Now, since 1921, the mortality records of chronic heart disease among Metropolitan policyholders distinguish two broad structural groups: valvular heart disease, on the one hand, and chronic myocardial disease, on the other. The trend of the rates from each of them, shown in Chart 8, has distinct bearing on the preventive situation in heart disease. During the period for which the data are available, the mortality from valvular disease has fallen steadily. The chart does not show the details, but the decline in deathrates from these conditions has affected every age, both males and females, and negroes, as well as white persons. The rate of fall has been greatest among young persons. Current deathrates at ages under 25 are barely half what they were in 1921-1922.

TRENDS IN MORTALITY FROM CHRONIC VALVULAR HEART DISEASE\* AND CHRONIC MYOCARDITIS

Metropolitan Life Insurance Company, Industrial Department  
1921 - 1932



Between ages 25 and 44 there has also been substantial improvement, although less than at the younger ages. Even past 45 years of age, the improvement in the recorded mortality from valvular disease has been substantial, and in white persons, curiously enough, it is even somewhat greater than at ages 25 to 44.

In marked contrast with these trends are the changes in mortality from disease of the heart muscle. Even among young persons, where chronic heart disease of this type is relatively infrequent, there has been a slight increase in the mortality. Between ages 25 and 44, the increases have been enormous. The rate for white men at these ages has doubled, and for white women risen by nearly two-thirds. Among negroes at these ages the increases are even more striking. In middle life and old age, also, there have been large increases in the rates for myocardial disease, and this is most significant because the bulk of the deaths from these conditions are concentrated in the ages past 45. Among white men past 45, deathrates for myocardial disease have doubled, and among white women have gone up by 75 per cent. Among colored persons, current levels of myocardial deathrates at these older ages are two and one-half times their level of a dozen years ago.

Striking parallels with this increasing myocardial mortality are found in the similar trends from coronary disease and from angina pectoris. Full recognition of the importance of coronary disease has been slow in developing. Consequently, only in 1930 did it appear as a separate entity in the classification of causes of death. In the short interval of two years, however, the recorded mortality from it has doubled. For angina pectoris which is usually symptomatic of coronary trouble, the mortality record is more complete. The deathrate from this condition has more than doubled in the last twenty years. Due to the close association in a great many cases of coronary disease with myocardial degeneration, these facts are of especial significance, though coronary disease is often reported under age 50, especially in males, without associated signs of ageing.

These diverse trends of valvular and myocardial disease and also of coronary disease are so sharply defined that we must be cautious in interpreting them. Both White<sup>17</sup> and Halsey<sup>18</sup> point out that changes in medical opinion constitute a major factor in the situation. A generation ago, attention was focused on valve changes in heart disease. But, largely as a result of the teachings of the late Sir James Mackenzie, the efficiency of the heart muscle of cardiac patients was more and more stressed. Despite a tendency to return to the earlier attitude, the influence of Mackenzie's views still predominates. Unfortunately, we cannot measure the effect of these shifts in medical opinion upon the heart disease

picture; but, on the whole, we are convinced that the trends of the deathrates indicate the direction of change, even if they are not a good measure of its degree.

These contrasting trends are of great import in the light of the facts given on the etiology of heart disease in relation to structural changes in the organ. Cardiac disease of young persons is, as we have seen, chiefly due to morbid changes in the heart valves, usually of infectious origin. The decline in heart disease mortality in early life, therefore, is not surprising, for these germ enemies of mankind have been the objects of successful attack. The incidence of rheumatic fever and of other rheumatic type conditions, the communicable diseases of childhood and certain other infections, has long been decreasing. This development is too familiar to warrant recounting in detail. The result of it has been a reduction in the frequency of heart disease at the ages where this background is the usual one. This change in the heart disease picture is greatest in early life, but continues well up to age 50. Among men in the broad working ages when syphilis is so often the cause of aortic damage, better control of this disease has also played a part in reducing heart mortality of the valvular type. The decline in syphilis mortality among white men has been real and substantial. Moreover, late manifestations of syphilis have probably been reduced by better and more intensive treatment, resulting in a greater proportion of cured cases. This aspect of the situation does not show as much improvement among colored men, but this phenomenon may be a statistical artifact because syphilis is probably more frequently diagnosed in colored men than formerly.

It is logical to connect the decline of heart disease mortality among young persons, and presumably its incidence, too, with the decline in incidence or mortality from syphilis, acute rheumatic fever, the communicable diseases of childhood, and other diseases of bacterial origin which are the frequent precursors of heart disease at those ages at which it is declining. But actual proof is lacking. At the Metropolitan, we have tried to prove these relationships statistically by computing coefficients of correlation between the deathrates of several of these diseases with the deathrates from chronic heart disease, using suitable intervals between each pair of rates and choosing our age groups in such manner that the rates would refer to the same cohort of individuals. In this investigation, we used the mortality statistics of the State of

Massachusetts for the years 1870 to 1930, so that our period of observation would be sufficiently long. Our results, however, were substantially negative. In view of the etiological background of heart disease in children and young adults, one would perhaps expect the relation between heart disease and the infectious diseases of childhood to show itself when statistics of mortality rates from the pertinent causes are compared for specific age groups over a series of years. But, as a matter of fact, the after effects of these childhood diseases are so varied and spread out over so long a period, that the method of correlation, howsoever applied to the mortality data, appears to be incapable of showing the relationship between the decline in these bacterial diseases in early life and in heart disease at succeeding ages. We frankly admit the failure of our investigation of this aspect of the problem, but we hope that it will be taken up by other research workers. It is worthy of serious study.

## VI

The attitude which the health officer may take toward the improvement in heart disease mortality in early life, which is in a degree synonymous with the reduction of endocardial and valvular disease, is justifiably one of satisfaction. Many forces have, of course, played a part in the result. Much of it represents the advance of medical science and the efforts of physicians everywhere. A good part of it is probably the result of public education in health matters and of betterment in living conditions of the masses. But no factor has been of greater importance than the work of public health officers and their co-workers. To them is due a large part of the credit in reducing heart disease in the young and in adults in their most productive years, and they may be proud of their share in it.

It would seem that the attitude toward the increasing heart disease in later life should be a very different one. Many have been concerned about this development. Why cardiac mortality at these later ages of life has increased has been a matter of wide conjecture. Much has been said regarding the pace of modern life in explaining it. But the picture is not very clear. It is true, of course, that the crowding of immense populations into cities, their intense activity, and the excitement in which increased earnings have enabled people to indulge are not conducive to orderly

and reposeful living. The many strains of modern life on the nervous system and indirectly upon the heart are by no means negligible, but in how far they add to the incidence of heart disease and its mortality is not easy to determine. In contrast with these harmful effects of modern life, no one can deny that very considerable benefits to the health and well-being of the masses accrue from the advances in modern science and technology. On the whole, men today, whether on the farm or in industry, work less hard than before. Machinery carries most of the burden of the work and, consequently, the heart strain from hard manual labor in which a very large proportion of our population had to engage in times past, is much less common today than formerly. Under conditions of present day life the masses are, in general, better fed, better clothed, better housed, and receive more frequent and better medical attention. In the face of all these advantages of modern life, one must proceed slowly in regarding the increase in its pace as the correct explanation of the rise in heart disease.

Part of the increase may very reasonably be ascribed to better knowledge and treatment of heart disease. The many improvements in medical technique and facilities, and the greater familiarity of the physicians with these improvements would have this effect. Take, for example, the electrocardiograph, the X-ray, and other laboratory procedures which have been developed for testing heart function and determining heart size. The result has been more frequent identification of cases, but the proportion of the increase in heart disease due to this factor is a matter of congratulation rather than of concern. The same may be said of better treatment of patients with heart disease that prolongs life and often enables useful members of the community to carry on many of their activities.

Whatever the cause, it seems certain that the increase in heart disease mortality at the older ages must be accepted as a real one. It is our conviction, however, that the various conjectures and explanations which would cause us to look upon this situation with alarm are largely uncalled for. In our view, and we think it the proper one for the public health officer to take, this phenomenon is not a discouraging development, but is a natural result of lowering the mortality at the younger ages. To the extent that this is true, the increase in heart disease may surely be looked upon as a reward of accomplishment. By bringing under control the im-

portant communicable diseases, tuberculosis, typhoid and many other conditions, we have enabled larger numbers of individuals to survive to the later ages of life than ever before. There is reason to believe that a large proportion of the individuals so saved are of weaker constitution than those who formerly attained middle age and, consequently, the middle-aged today are, on the average, less able to round out a full expectation of life. This is, however, a moot question.

So far as this country is concerned, we have, further, the evidence of the differential mortality of native and foreign race stocks. Earlier studies by one of us,<sup>19, 20</sup> of mortality from all causes, and from heart disease in particular, show that the lowest rates are found among the native white population. The foreign born and their children have suffered consistently higher rates from all causes of death and from heart disease. Since, in the course of time, they have become a progressively larger fraction of our white population, they have tended to increase these deathrates in later life.

Another reason for our concern about the increased mortality from heart disease among the old has arisen, as Cohn<sup>21</sup> has aptly pointed out, from a choice of terms. We have become accustomed to call changes in the heart, which are an accompaniment of advancing age, "degenerative" and this term has conditioned our attitude towards them. But we know that such changes are perfectly natural and are going on not only in the heart but throughout the whole body. Essentially, functioning tissue is gradually replaced by non-functioning or connective tissue, and, according to the site or degree of this change, the function of the various structures suffers more or less interference. Many of these changes through the body have no serious effect on longevity and are hardly more than symptomatic as, for example, the loss of keenness of sight and hearing, the increased brittleness of the bones and the graying of the hair. In the heart and other vital organs, the case is different. In the heart, senescent or degenerative changes limit the efficiency of the heart and, despite the increase in size of the heart, result in its eventual failure. Or these changes directly or indirectly may result in injury to the muscle wall as, for example, following thrombosis or infarction—types of vascular accidents which are fraught with danger to the heart. Frequently the damage is so serious that death results in a few hours or days. Since the bulk of heart disease in later life is of

this senescent type, often hastened, it is true, by infections of various types, it follows that a large part of the heart disease at these ages is a matter of little if any practical concern.

The heart picture, therefore, in its aggregate, is an encouraging one, in spite of the increasing deathrate from cardiac disease. At the older ages where it is most frequent and where it is increasing, the health officer is really least concerned and, indeed, may look upon it as a measure of the effectiveness of his earlier work. This does not mean that he should look upon the problem of heart disease with indifference. From the point of view of its control, there is every reason to look forward to a continued improvement in mortality from heart disease in children and young adults, particularly from the valvular conditions. But further accomplishment along these lines will be a result largely of his continued efforts in combatting infections such as rheumatic fever, diphtheria, scarlet fever and syphilis, and in providing public facilities for their prevention. For the unfortunates who may still acquire heart disease in early life, he must see that adequate care is available, particularly for convalescents. The public health officer must be active in pushing projects for better housing of the poor because we know definitely that this will be fruitful in reducing still further the incidence of rheumatic infections.

Little may be expected in the way of reduction of heart disease in later life, particularly from myocardial disease. The health officer need not be concerned about deaths of this type which are the result of the inevitable breakdown of the organism with advancing age. But even though he may not check the upward course of myocardial disease, he should not neglect that part which is premature and responsible for much unnecessary suffering and disability among persons still in the prime of life. Very material benefit may be expected to accrue from education in better health habits, especially in the value of a moderate amount of exercise and of sufficient rest. Of especial importance is the promotion of the periodic health examination of persons in middle life. Many cases of heart lesions in their early stages may thus be detected, enabling the affected individuals to derive the benefits of prompt treatment and suitable alteration in their mode of life. The health officer should be prominent in advancing such measures. He will find in them further scope for his work and the further rewards of real accomplishment.



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## APPENDIX

The following tables contain the fundamental statistical material on heart disease mortality discussed in this article. They will make available to students the detailed experience of the Metropolitan Life Insurance Company on the subject, as well as certain official data of the United States. It is hoped that these tables will be useful to public health workers and others who are engaged in research problems of heart disease.

**TABLE 1**

Deathrates from Organic Heart Disease in the General Population\* and Among Metropolitan Industrial Policyholders—Total Persons, 1911–1932.

YEAR	STANDARDIZED DEATHRATES PER 100,000			
	ALL AGES		AGES 1-74	
	United States	United States	METROPOLITAN	
			1909 Classification of Heart Disease	1920 Classification of Heart Disease
1932.....	.....	.....	144.0	150.1
1931.....	.....	.....	142.7	149.1
1930.....	180.3	115.9	143.7	151.3
1929.....	186.7	120.4	151.2	158.9
1928.....	184.9	119.8	149.6	156.6
1927.....	171.0	112.9	141.0	147.8
1926.....	173.8	114.6	146.0	152.6
1925.....	162.1	108.8	138.7	144.8
1924.....	155.9	106.3	134.4	140.0
1923.....	154.4	105.5	138.7	144.1
1922.....	145.5	100.2	131.1	135.6
1921.....	136.3	95.2	121.0	123.9
1920.....	138.2	96.6	125.3	.....
1919.....	127.9	90.6	124.9	.....
1918.....	149.7	110.5	156.5	.....
1917.....	148.4	108.9	158.4	.....
1916.....	147.0	106.5	154.1	.....
1915.....	145.3	108.8	148.2	.....
1914.....	140.2	105.7	152.5	.....
1913.....	136.7	103.0	155.1	.....
1912.....	140.6	106.1	157.1	.....
1911.....	139.4	105.9	157.7	.....

\*Expanding Registration Area, 1911–1919 and Registration States of 1920, 1920–1930  
Heart disease classification of 1909 in 1911–1919 and classification of 1920 in 1920–1930.

TABLE 2

Deathrates per 100,000 from Organic Heart Disease (1909 Classification)  
Among White Persons. By Sex and Age Periods. Ages 1 to 74 Years.  
Metropolitan Life Insurance Company, Industrial Department, 1911-1932.

YEAR	M A L E S						
	AGES 1-74*	AGES 1-24*	AGES 25-44*	AGES 45-74*	AGES 45-54	AGES 55-64	AGES 65-74
1932..	157.2	12.0	58.5	706.3	242.2	737.7	1901.4
1931..	153.8	12.0	56.8	691.2	252.5	696.6	1864.7
1930..	153.7	12.8	57.9	686.6	240.2	737.2	1795.6
1929..	164.6	15.1	61.9	731.7	252.1	746.4	1995.4
1928..	163.0	14.5	60.8	727.8	263.5	748.8	1935.2
1927..	152.2	15.8	60.6	666.2	239.8	686.3	1782.3
1926..	156.2	16.1	59.8	687.8	244.4	706.8	1852.5
1925..	147.2	16.1	56.6	645.2	227.3	707.5	1659.7
1924..	142.0	17.1	60.2	609.4	227.8	625.4	1611.6
1923..	145.8	17.6	59.7	628.9	215.8	647.0	1714.6
1922..	133.8	18.5	51.6	575.8	206.6	575.5	1574.1
1921..	119.7	19.7	49.5	501.6	171.6	502.2	1393.6
1920..	121.6	18.4	49.0	515.7	190.6	511.1	1398.9
1919..	124.6	16.3	60.3	519.8	186.6	534.8	1386.5
1918..	159.9	22.7	78.6	659.8	263.1	660.2	1725.4
1917..	169.6	20.7	78.2	717.3	288.2	715.4	1875.9
1916..	161.0	20.5	80.5	668.8	278.0	698.0	1670.0
1915..	152.2	20.6	79.1	624.3	242.0	630.0	1645.0
1914..	160.6	20.7	82.1	663.9	275.0	660.0	1720.0
1913..	163.0	19.7	88.5	668.7	270.0	660.0	1760.0
1912..	163.0	19.8	90.7	665.5	270.0	700.0	1670.0
1911..	165.0	22.1	86.8	675.9	285.0	665.0	1750.0

YEAR	F E M A L E S						
	AGES 1-74*	AGES 1-24*	AGES 25-44*	AGES 45-74*	AGES 45-54	AGES 55-64	AGES 65-74
1932..	121.7	12.5	44.4	539.1	164.6	523.2	1577.7
1931..	120.3	14.1	47.7	522.3	167.7	500.0	1519.0
1930..	120.5	13.6	42.7	532.7	166.5	510.4	1562.6
1929..	126.4	15.1	48.3	551.0	167.2	527.3	1626.3
1928..	125.7	17.3	47.5	542.9	168.9	515.9	1604.3
1927..	120.0	17.2	46.7	513.9	162.4	510.1	1473.1
1926..	125.6	16.2	51.5	538.6	164.6	531.4	1558.7
1925..	119.6	17.7	51.0	503.6	166.4	494.6	1433.7
1924..	116.9	18.5	48.4	491.5	158.7	473.7	1420.9
1923..	123.1	17.9	48.7	525.3	160.2	509.1	1542.7
1922..	120.8	19.4	46.8	512.4	161.0	467.5	1541.8
1921..	115.1	20.7	48.2	476.5	151.2	457.3	1389.7
1920..	120.2	18.7	53.8	499.8	173.4	495.4	1390.6
1919..	115.9	18.4	54.8	476.6	170.7	450.8	1351.9
1918..	142.3	26.9	80.8	552.1	207.6	530.3	1523.1
1917..	137.0	22.8	63.5	562.7	208.3	545.5	1549.2
1916..	138.1	22.0	64.4	568.7	215.0	512.0	1625.0
1915..	135.7	23.2	64.4	552.9	200.0	550.0	1510.0
1914..	136.8	25.4	66.5	549.8	210.0	520.0	1520.0
1913..	138.1	22.6	72.0	555.2	218.0	580.0	1420.0
1912..	140.8	24.4	71.0	566.5	210.0	582.0	1500.0
1911..	143.1	25.9	72.0	572.8	215.0	585.0	1516.0

\*Standardized.

TABLE 3

Deathrates per 100,000 from Organic Heart Disease (1909 Classification)  
Among Colored Persons. By Sex and Age Periods. Ages 1 to 74 Years.  
Metropolitan Life Insurance Company, Industrial Department, 1911-1932.

YEAR	M A L E S						
	AGES 1-74*	AGES 1-24*	AGES 25-44*	AGES 45-74*	AGES 45-54	AGES 55-64	AGES 65-74
1932..	205.1	13.9	106.6	878.8	405.0	948.2	2031.6
1931..	227.1	18.3	122.6	958.1	421.4	1060.7	2220.6
1930..	235.2	17.6	138.2	978.5	475.1	1011.3	2282.5
1929..	225.7	19.3	131.4	934.2	426.5	1015.7	2146.6
1928..	216.8	22.5	127.7	884.6	448.0	958.0	1925.5
1927..	208.8	18.8	120.4	863.6	401.5	945.6	1958.3
1926..	218.9	16.8	121.0	921.6	406.6	1013.3	2148.9
1925..	213.0	18.4	123.1	882.8	445.5	911.3	2009.4
1924..	196.1	21.2	127.7	778.8	370.2	874.3	1709.1
1923..	184.8	23.9	114.2	732.6	376.1	784.6	1595.6
1922..	175.3	18.7	99.0	720.4	375.7	719.5	1652.3
1921..	159.0	21.2	98.2	628.8	291.4	650.8	1496.9
1920..	168.1	18.3	109.9	666.6	326.6	695.6	1528.5
1919..	175.5	22.3	117.6	682.6	328.7	747.3	1518.9
1918..	229.0	20.1	147.2	925.2	460.7	1044.8	1971.8
1917..	232.5	24.7	141.2	940.4	468.7	1083.2	1960.8
1916..	207.3	22.0	147.2	805.0	429.0	918.0	1615.0
1915..	197.6	18.1	135.5	783.0	412.0	903.0	1567.0
1914..	212.2	24.8	138.0	837.5	460.0	835.0	1860.0
1913..	218.0	20.9	146.8	865.5	475.0	970.0	1730.0
1912..	229.7	14.9	155.5	929.7	430.0	1050.0	2060.0
1911..	199.5	27.1	137.4	765.7	380.0	830.0	1690.0

YEAR	F E M A L E S						
	AGES 1-74*	AGES 1-24*	AGES 25-44*	AGES 45-74*	AGES 45-54	AGES 55-64	AGES 65-74
1932..	196.0	15.7	115.6	812.2	382.8	897.0	1817.0
1931..	196.1	23.0	111.0	799.8	380.0	807.4	1918.5
1930..	208.9	18.6	122.7	860.9	382.3	900.9	2077.3
1929..	215.1	25.1	126.3	870.6	422.5	864.0	2090.9
1928..	209.7	19.1	125.4	859.6	423.8	923.4	1924.0
1927..	193.2	22.0	121.9	770.3	392.4	825.6	1693.2
1926..	196.2	25.6	122.3	775.9	342.8	849.9	1808.5
1925..	190.9	23.9	121.5	753.5	380.7	819.1	1637.7
1924..	190.3	26.4	119.0	747.6	384.3	801.8	1626.7
1923..	192.9	18.8	111.7	793.3	412.3	894.3	1636.7
1922..	174.1	23.1	110.5	684.0	362.2	702.0	1515.4
1921..	164.5	24.7	122.3	610.8	337.0	615.6	1339.0
1920..	179.0	25.7	110.3	703.3	345.9	684.9	1701.0
1919..	179.6	28.3	118.0	687.3	388.1	690.3	1487.4
1918..	209.6	34.2	143.9	789.1	397.2	898.2	1651.1
1917..	207.7	28.8	134.1	809.1	452.9	881.4	1638.1
1916..	207.7	24.4	135.7	818.7	448.0	818.0	1820.0
1915..	196.6	25.0	133.3	762.3	439.0	820.0	1530.0
1914..	188.8	23.5	133.1	725.2	457.0	730.0	1440.0
1913..	201.6	27.7	138.3	773.2	402.0	806.0	1715.0
1912..	207.7	30.0	146.7	786.2	470.0	840.0	1542.0
1911..	204.1	31.1	148.7	761.4	469.0	850.0	1390.0

\*Standardized.

**Table 4**

Trends in Heart Disease Mortality at Ages 75 and Over. By Color and Sex.  
 United States Death Registration States of 1920 from 1920-1930  
 and Expanding Area\* from 1911-1919.

YEAR	DEATH RATES PER 100,000			
	WHITE MALES	WHITE FEMALES	COLORED MALES	COLORED FEMALES
1930.....	3890.7	3720.4	3518.3	2731.2
1929.....	4009.0	3914.5	3516.3	2927.1
1928.....	4034.5	3888.7	3422.7	2836.8
1927.....	3642.8	3505.8	3335.2	2528.8
1926.....	3743.2	3682.1	3336.9	2711.0
1925.....	3455.6	3331.8	3109.5	2618.6
1924.....	3280.7	3143.9	3079.2	2427.2
1923.....	3270.3	3193.6	2721.4	2415.5
1922.....	3111.6	3027.4	2431.7	2139.0
1921.....	2884.6	2826.6	2351.8	2081.2
1920.....	3012.0	2928.6	2538.9	2181.7
1919.....	2601.3	2529.5	.....	.....
1918.....	2772.6	2597.3	.....	.....
1917.....	2786.7	2588.9	.....	.....
1916.....	2842.3	2686.6	.....	.....
1915.....	2846.2	2682.8	.....	.....
1914.....	2708.9	2521.0	.....	.....
1913.....	2562.6	2387.0	.....	.....
1912.....	2637.2	2400.8	.....	.....
1911.....	2598.4	2321.9	.....	.....

\*Without distinction as to color.

**TABLE 5**

Standardized Deathrates per 100,000 from Chronic Endocarditis and Valvular Heart Disease and from Chronic Myocarditis. By Color, Sex and Broad Age Periods. Metropolitan Life Insurance Company, Industrial Department, 1921-1932.

COLOR; SEX; AGE	1932	1931	1930	1929	1928	1927	1926	1925	1924	1923	1922	1921
<b>CHRONIC ENDOCARDITIS, VALVULAR DISEASE:</b>												
Total Industrial Dept.												
All ages, 1 to 74 years.	40.6	44.8	49.4	53.2	55.3	56.0	60.6	60.9	65.5	70.5	68.2	67.8
<b>WHITE MALES:</b>												
All ages, 1 to 74 years.	41.0	43.3	48.1	52.5	55.1	55.6	60.3	60.4	65.4	69.2	65.6	63.4
Ages 1 to 24.....	8.1	8.4	9.6	11.0	10.3	12.3	12.6	13.0	13.7	14.2	15.4	16.8
Ages 25 to 44.....	27.4	26.1	28.0	31.2	31.4	31.9	32.5	31.4	35.7	37.4	34.0	32.3
Ages 45 to 74.....	151.7	165.2	184.1	198.8	213.8	210.5	233.4	234.6	252.2	268.5	251.2	238.9
<b>WHITE FEMALES:</b>												
All ages, 1 to 74 years.	34.8	39.7	42.0	45.6	47.6	49.0	53.3	54.0	56.8	64.1	63.5	65.8
Ages 1 to 24.....	8.5	10.5	10.1	11.4	13.3	13.1	13.1	14.4	15.7	15.3	16.1	17.3
Ages 25 to 44.....	23.3	26.1	23.6	27.1	26.7	27.9	31.3	30.9	31.2	32.5	32.3	35.0
Ages 45 to 74.....	124.4	140.5	157.7	167.7	173.5	179.5	197.2	197.8	208.5	246.0	241.0	245.9
<b>COLORED MALES:</b>												
All ages, 1 to 74 years.	74.2	85.4	106.3	99.3	98.6	96.7	104.8	106.0	113.0	114.9	108.0	98.3
Ages 1 to 24.....	7.9	10.9	10.8	12.3	14.3	12.5	12.4	12.5	14.2	17.5	14.5	17.2
Ages 25 to 44.....	49.5	52.6	69.3	64.9	62.3	58.1	65.8	70.8	85.5	76.6	63.6	68.3
Ages 45 to 74.....	293.4	339.2	423.9	389.7	384.7	386.0	417.0	415.5	424.7	439.6	431.6	365.7
<b>COLORED FEMALES:</b>												
All ages, 1 to 74 years.	69.7	78.0	88.8	101.9	101.4	98.0	101.9	99.0	117.3	112.7	110.6	106.9
Ages 1 to 24.....	10.1	13.6	11.2	14.0	13.4	16.1	19.5	19.1	20.6	11.8	19.7	21.8
Ages 25 to 44.....	49.6	49.6	62.9	67.9	58.3	64.6	65.6	38.9	77.5	66.5	71.5	83.3
Ages 45 to 74.....	263.1	297.5	340.2	393.8	407.8	373.0	382.6	410.1	442.6	459.2	418.7	375.1
<b>CHRONIC MYOCARDITIS:</b>												
Total Industrial Dept.												
All ages, 1 to 74 years.	82.3	78.9	78.9	85.6	80.8	72.8	72.2	64.5	56.4	54.4	47.5	34.9
<b>WHITE MALES:</b>												
All ages, 1 to 74 years.	93.5	90.3	88.3	98.5	91.9	83.0	81.6	72.8	63.7	60.9	51.8	36.7
Ages 1 to 24.....	1.5	1.2	1.4	2.3	2.2	1.7	1.7	1.5	1.8	1.6	1.3	1.0
Ages 25 to 44.....	17.6	18.7	19.4	23.1	20.5	19.0	18.0	14.3	15.1	14.0	10.1	6.6
Ages 45 to 74.....	462.1	444.5	432.4	478.0	447.4	403.9	398.2	358.1	308.2	295.1	254.3	181.0
<b>WHITE FEMALES:</b>												
All ages, 1 to 74 years.	70.6	66.2	68.0	72.3	69.0	62.5	62.8	56.6	50.3	49.5	45.1	34.1
Ages 1 to 24.....	1.3	1.6	1.6	2.1	2.1	2.3	1.8	1.6	1.3	1.3	1.8	1.1
Ages 25 to 44.....	12.4	13.4	12.4	15.4	15.0	13.3	13.5	13.7	11.3	10.2	9.1	6.5
Ages 45 to 74.....	349.9	324.3	335.5	352.1	335.2	303.2	305.6	273.2	244.3	242.0	218.8	167.2
<b>COLORED MALES:</b>												
All ages, 1 to 74 years.	90.7	99.2	93.3	95.9	93.3	82.2	81.1	72.8	55.7	44.3	38.9	29.6
Ages 1 to 24.....	1.1	2.3	3.5	1.8	3.8	3.1	1.1	2.2	1.6	2.4	1.9	.6
Ages 25 to 44.....	29.8	38.8	41.3	40.2	43.9	35.8	27.5	30.9	21.9	17.5	13.8	8.7
Ages 45 to 74.....	429.7	457.4	418.8	438.8	413.5	369.8	382.5	330.0	255.4	200.3	179.0	141.3
<b>COLORED FEMALES:</b>												
All ages, 1 to 74 years.	87.2	82.6	89.9	87.9	84.3	71.9	69.8	58.1	48.9	52.1	37.8	29.4
Ages 1 to 24.....	1.5	3.3	3.5	6.0	2.9	2.6	2.9	2.3	2.9	2.6	2.2	.7
Ages 25 to 44.....	32.6	32.8	35.7	36.7	40.7	36.5	35.5	26.6	20.8	21.9	18.2	16.0
Ages 45 to 74.....	405.7	376.4	409.7	390.4	373.6	315.4	305.1	258.9	217.7	233.6	165.6	128.5

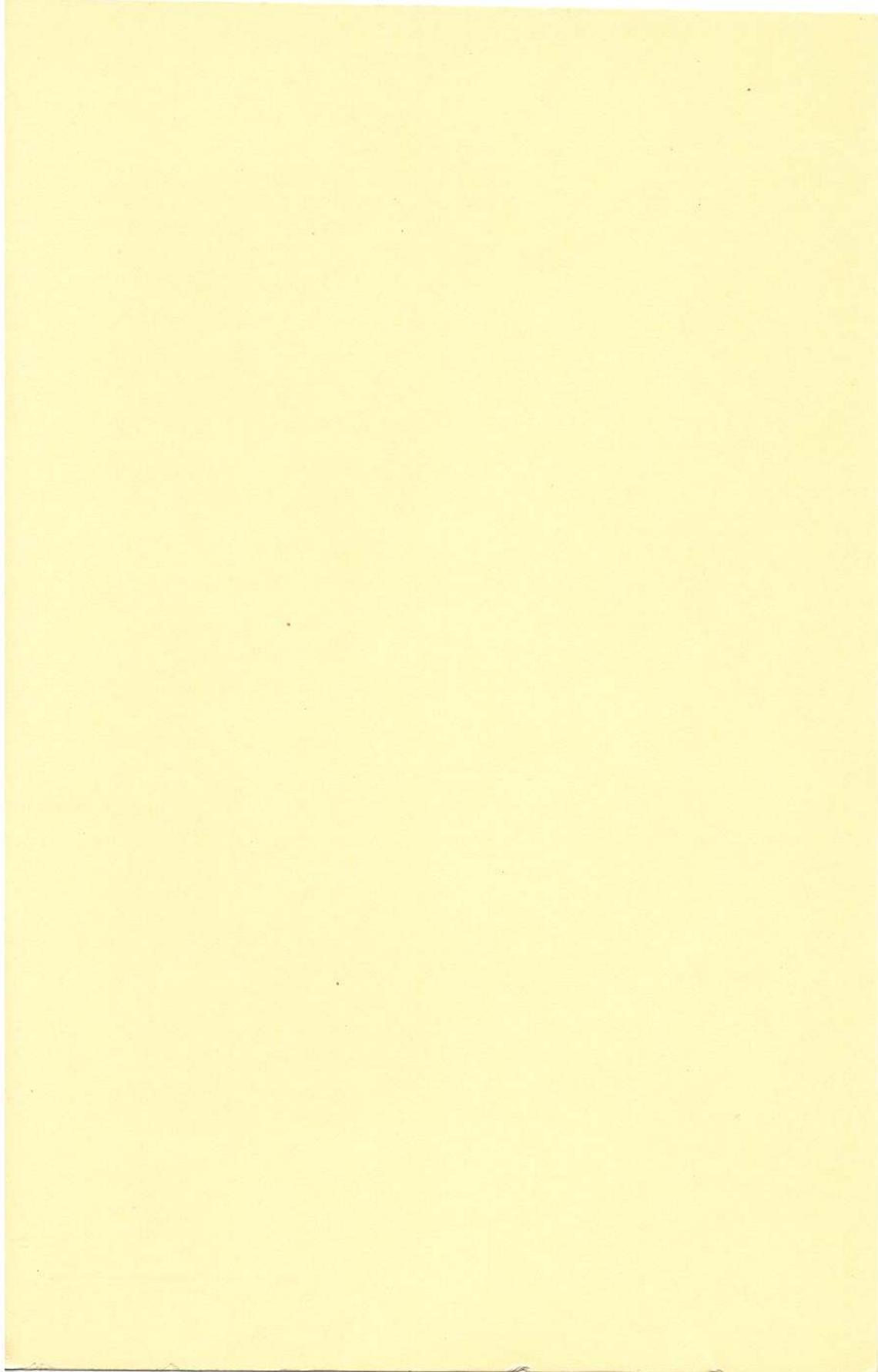


TABLE 6

Deathrates from Angina Pectoris, 1911-1932, and Diseases of the Coronary Arteries, 1930-1932. Total Persons—Ages 1-74, 45-74. Metropolitan Life Insurance Company, Industrial Department

YEAR	STANDARDIZED DEATHRATES PER 100,000			
	ANGINA PECTORIS		CORONARY DISEASE	
	AGES 1-74	AGES 45-74	AGES 1-74	AGES 45-74
1932.....	11.4	53.4	10.3	47.8
1931.....	11.5	53.8	8.0	36.5
1930.....	11.1	52.2	5.6	25.8
1929.....	11.3	51.4	.....	.....
1928.....	11.4	53.1	.....	.....
1927.....	10.7	50.2	.....	.....
1926.....	10.3	47.5	.....	.....
1925.....	8.2	37.0	.....	.....
1924.....	7.3	32.9	.....	.....
1923.....	7.2	33.2	.....	.....
1922.....	6.4	28.2	.....	.....
1921.....	6.3	29.1	.....	.....
1920.....	5.5	25.5	.....	.....
1919.....	5.2	23.0	.....	.....
1918.....	5.3	24.0	.....	.....
1917.....	5.1	23.4	.....	.....
1916.....	4.4	20.5	.....	.....
1915.....	5.0	22.9	.....	.....
1914.....	5.0	21.5	.....	.....
1913.....	5.2	23.2	.....	.....
1912.....	5.1	22.9	.....	.....
1911.....	4.4	19.3	.....	.....





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