

## **Possibilities of reducing mortality at the higher age groups ...**

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# Possibilities of Reducing Mortality at the Higher Age Groups

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Read before the Section on Vital Statistics,  
AMERICAN PUBLIC HEALTH ASSOCIATION,  
Colorado Springs, September, 1913

BY  
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Metropolitan Life Insurance Company, New York  
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## POSSIBILITIES OF REDUCING MORTALITY AT THE HIGHER AGE GROUPS.

Particular interest has been concentrated, during the last decade, on the mortality at the higher age groups. The unfavorable changes which have been observed in the death-rates at these ages are in striking contrast to the conditions at the younger ages, where, during the last fifty years, marked improvements have occurred in both sexes. This contrast has occasioned much comment from sanitarians, the medical profession, and especially from insurance executives, who, as you can well understand, are deeply concerned with the vast possibilities of checking losses from premature mortality. The interest of the community, however, is paramount to all others in view of the great value to it of each adult, not only in economic terms, but also in the larger social aspects which are involved in the serious disturbances to family life resulting from the death of a parent or a wage earner.

A very significant contribution to the discussion of the subject is the report of Dr. Irving Fisher of the Committee of One Hundred on National Health. In this report, Doctor Fisher pointed out that the causes of death which predominate at the higher age groups were preventable to a degree, and that, if the diseases and conditions involved were controlled to the extent of the facilities of modern medicine and sanitary science, there would be added to the expectation of life at least one and one-half years at age 45. This judgment of Doctor Fisher is extremely conservative in view of the fact that his estimates did not include the possible saving from tuberculosis, which is a considerable mortality factor at the older ages, and also because he assigned no coefficient of preventability to the various forms of cancer, which, since his writing, have shown a large measure of possible control.

It is impossible at this time to estimate in years and days with any degree of precision what saving in middle life can be accomplished. But it is increasingly evident to competent observers that the attitude taken by Doctor Fisher was more than justified and that the possibilities for human conservation at the present time are much more hopeful than they seemed five years ago. It is the purpose of this paper to consider some of the elements which enter into the mortality saving in the higher



age groups and to show what the possibilities are for the control of the conditions which determine these rates.

### MORTALITY CHANGES IN TEN YEARS

I present herewith Table I, which gives the death-rates for males and females for the years 1900 and 1911, respectively, for the Registration States as they were constituted in the year 1900. These included Connecticut, District of Columbia, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Rhode Island and Vermont, which states enjoyed good registration conditions at both dates. The figures presented, therefore, are quite comparable for the two periods. Figures earlier than those for 1900 would be most desirable for comparison, but they cannot be obtained.

TABLE I  
COMPARISON OF MORTALITY OF MALES AND FEMALES BY AGE GROUPS.  
DEATH-RATES PER 1,000 POPULATION  
(Registration States as constituted in 1900)

Age	Males			Females		
	1900	1911	Per Cent. Increase or Decrease	1900	1911	Per Cent. Increase or Decrease
Under 5 . . . . .	54.2	39.8	—26.57	45.8	33.3	—27.29
5-9 . . . . .	4.7	3.4	—27.66	4.6	3.1	—32.61
10-14 . . . . .	2.9	2.4	—17.24	3.1	2.1	—32.26
15-19 . . . . .	4.9	3.7	—24.49	4.8	3.3	—31.25
20-24 . . . . .	7.0	5.3	—24.29	6.7	4.7	—29.85
25-34 . . . . .	8.3	6.7	—19.28	8.2	6.0	—26.83
35-44 . . . . .	10.8	10.4	— 3.70	9.8	8.3	—15.31
45-54 . . . . .	15.8	16.1	+ 1.90	14.2	12.9	— 9.15
55-64 . . . . .	28.9	30.9	+ 6.92	25.8	26.0	+ 0.78
65-74 . . . . .	59.6	61.6	+ 3.36	53.8	55.1	+ 2.42
75 and over . . .	146.1	147.4	+ .89	139.5	139.2	— 0.22
All Ages . . . . .	17.6	15.8	—10.23	16.5	14.0	—15.15

You will observe that, for the males, all age groups up to and including 35-44 show decreases in the mortality rates for 1911 in comparison with those for 1900, the percentages of decrease ranging from 27.66, for the age group 5-9, to 3.70, at the age group 35-44. From this age group onward, the rates for 1911 are persistently higher than for the earlier date, the largest difference being at age period 55-64, when the percentage of increase reaches 6.92. For females, the decreases in the mortality rates extend



up to the period 45-54, inclusive, the decreases varying from 32.61 per cent., at the age group 5-9, to 9.15 per cent., at the age group 45-54. The ages 55-74 show a slight increase, and above 75 the rates for the two periods are virtually identical. It is evident, therefore, that at all ages the mortality has been much more favorable for the females than for the males, but, in both sexes, the various forces which have been at work to reduce mortality suddenly lose their effectiveness during the period of middle life, at which time an actual deterioration occurs. Above age 75, no significant changes have taken place and we are not much concerned with a problem of "old age" mortality.

#### THE INCREASED FREQUENCY OF CERTAIN CAUSES OF DEATH

It is necessary, therefore, in our analysis to concentrate attention on the diseases and conditions which cause the larger part of the mortality at the advanced ages. These include cancer, diabetes, apoplexy, organic heart disease, diseases of the arteries, cirrhosis of the liver and Bright's disease. The least median age at death of this group is about 55 years. Together, they form 51.2 per cent. of all deaths at age 40 and over, in the Industrial mortality experience of the Metropolitan Life Insurance Company during 1911. The corresponding percentage in the Registration Area is 51.4.

Table II shows the rate per 100,000 for each one of these causes for the years 1900 and 1910, respectively, in the Registration States as constituted in 1900.

TABLE II  
DEATH-RATE PER 100,000 OF POPULATION FOR CERTAIN CAUSES OF  
DEATH—MALE AND FEMALE COMBINED  
(Registration States as constituted in 1900)

Cause of Death	1900	1910	Per Cent. Increase
1. Cancer (all forms).....	63.5	82.9	30.6
2. Diabetes.....	11.0	17.6	60.0
3. Cerebral hemorrhage and apoplexy.....	72.5	86.1	18.8
4. Organic diseases of the heart	116.0	161.6	39.3
5. Diseases of arteries.....	5.2	25.8	396.2 ✓
6. Cirrhosis of liver.....	12.6	14.4	14.3
7. Bright's disease.....	81.0	95.7	18.1
Total.....	361.8	484.1	33.8



It is evident from this array that the rate per 100,000 has increased considerably in all of the causes mentioned, the rate for the seven diseases combined being 33.8 per cent. higher for 1910 than for 1900. The largest increases are to be observed for the circulatory diseases, namely, the diseases of the arteries and organic heart disease, the former having increased close to fourfold in the ten years. Similar conditions have been noted by registration officials throughout this country and in foreign lands, and it may safely be said that the increased frequency in the degenerative diseases pointed out above represents a distinct tendency in modern life which is worthy of the most searching attention.

We will now proceed to discuss the factors which, we believe, are in a large measure responsible for the conditions observed. In general, it is clear that we must look to the conditions of life in the earlier ages for an explanation. The organism at fifty is little more than what the preceding years have made it. The hereditary factor, or the so-called physical endowment of birth, must, to be sure, be considered; but, at this advanced age, its importance is largely overshadowed by direct influences of environment which have continuously modified the physique. We shall consider this early environmental influence under three heads, namely:

(a) The occurrence of disease in childhood and early adult life.

(b) Habits and modes of life, including especially such as constitute what insurance men call the "moral hazards," and

(c) The effects of occupation.

#### THE EFFECT OF THE COMMUNICABLE DISEASES ON MORTALITY

In the first place, such diseases as organic heart disease and Bright's disease, which are exceedingly prevalent at the advanced ages, are often the sequelæ to diseases occurring previously, namely, the acute infections of early life. I need only refer here to the many cases where scarlet fever, diphtheria, acute articular rheumatism or typhoid fever have left the patient impaired, either in the circulatory or in the renal systems. Medical literature is replete with cases of chronic nephritis which have followed in the trail of scarlet fever, and of heart and vascular lesions which had their origin in typhoid fever and acute articular rheumatism. These impairments often go unnoticed until, under the stress of middle life, they terminate in one or another of the



degenerative diseases which we have just considered. In such cases, the initial cause is usually not indicated on the death certificate, and it is, therefore, not possible for the statistician to evaluate the importance of this factor. That it is significant, however, will, I believe, remain unquestioned.

This view of the effect of the acute infections must not be confused with that of other students who, in their discussion of the mortality conditions at the higher ages, have assumed that the acute diseases serve as a sort of filter for the elimination of weaklings who would not ordinarily reach a ripe old age. These writers have asserted that the decreased incidence of these diseases during the last two decades has diminished the force of natural selection against the weaker stock, and that, as a result, the mortality at the higher ages has been correspondingly increased. I believe that the weight of the emphasis should be placed at the other end of the beam. Whatever may be the increase assigned to the element which they point out, the direct results of the infections that occur in early life, and which leave serious impairments in heart and kidney, must be much more significant. We must, therefore, concentrate more and more attention upon the elimination of the communicable diseases of early life in order to reduce the mortality at the higher ages. In the future, the rate from such diseases as organic heart disease and Bright's disease will serve as an additional measure of the efficiency of present-day control of the communicable diseases of childhood and youth.

#### THE EFFECT OF VENEREAL DISEASE AND ALCOHOL

Secondly, the habits and modes of life have their effect upon the mortality at the later ages. Details of personal hygiene, such as a rational diet, a reasonable amount of exercise, regular bathing and those subtle refinements of mental hygiene, which are designed to conserve nervous force, are of great significance. Most important, however, for our discussion, are the effects of the venereal diseases and of the intemperate use of alcoholic beverages.

The earlier incidence of gonococcus infection and syphilis has a decided effect upon the mortality at the later ages from the serious circulatory, nervous and genito-urinary diseases which they induce. In the male, gonorrhea often develops serious involvements of the vascular system, and in the female we observe such complex pelvic disturbances as are responsible in so large a degree for many of the operations which result in a significant



part of the female mortality over age 45. Syphilis affects the nervous and circulatory systems, ultimately giving rise to circulatory and spinal lesions, which terminate in conditions reported as "locomotor ataxia," "cerebral hemorrhage," "paralysis" and the various types of mental alienation. We have the authority of Osler that in nearly 90 per cent. of the locomotor ataxia cases we find a syphilitic personal history. There are no similar figures available for the other degenerative diseases, but syphilis surely plays a prominent part in providing the initial changes which terminate in the causes mentioned. Health officers should, therefore, give their active support to all movements which are directed at the control of the venereal infections.

The effects of the intemperate use of alcohol upon middle age mortality are closely related to those of the venereal diseases; indeed, there seems to be a distinct correlation between these two forms of indulgence. The statistical analysis of the subject is full of difficulties in view of the reticence of physicians to report the facts of alcoholism on the death certificate. Yet the evidence is unmistakable that there is a marked influence on middle and old age mortality from this cause. The title "Alcoholism (Acute and Chronic)" in the census returns showed, in 1911, the not very significant rate of 4.9 per 100,000; but this is only a trace of the deaths resulting from alcoholism. No one can estimate the annual mortality loss that is hidden behind such returns as "pneumonia," "acute and chronic nephritis," "cirrhosis of the liver," "organic heart disease" and "arteriosclerosis," all of which causes are now, as we observed, on the increase in their incidence at the higher ages. If further evidence of the causal relation between alcoholism and higher mortality were necessary, we should need only to refer to the body of facts which have been accumulating in insurance offices showing that total abstainers are by far the best risks and that the mortality rates observed in various occupations are significantly tinged by the degree of exposure to alcohol which is characteristic of the occupation.

We cannot, therefore, observe without alarm the reports of the steadily increasing consumption of alcoholic beverages in the United States during the last thirty years, as shown by the reports of the Commissioner of Internal Revenue. In the period 1881-90, the per capita consumption of liquors and wines was 13.21 gallons, whereas in 1912 the figure per capita had risen to 21.98 gallons, an increase of 66.4 per cent. since the earlier date. In this changed condition, almost the sole contributing factor has been the con-



sumption of malt liquors. We are becoming, as a nation, too free in the use of alcohol, and it is high time that the lesson which Germany has apparently learnt and is taking to heart, as is shown by the reductions in the consumption of alcoholic beverages recently observed in that country, were applied among us before further damage is done.

#### THE EFFECT OF OCCUPATION.

Third, and most important, in our discussion of the factors contributing to middle age mortality, are the effects upon the body of the habits and conditions of work. This is what we may call the occupation factor. We are all familiar with the picturesque example of the modern business man who is supposed to work at white heat and under great pressure, and who, as a result, presents long before due time the classic picture of the broken-down human machine suffering from the whole gamut of the degenerative diseases. The sanatoria and watering places of Europe annually reap their harvest from this product of American commercial life. But we cannot be much concerned with this small group in our discussion. They do not modify our death-rates materially, which are determined rather by the conditions of life and work prevailing among the industrial classes of the country. We must, therefore, turn to this much larger group, who, unfortunately, have not received sufficient attention from medical men in their search for the factors of occupational stress.

The character of American industry has completely changed in the last fifty years. Formerly, most work was conducted in the manner of the hand trades; to-day, there is evident all along the line a specialization of industry which brings together under one roof large numbers of workers, each one performing some small and distinctive part of the total process. This condition may be best exemplified, perhaps, by the changes that have occurred in the manufacture of shoes. Only a few generations ago the entire process of shoemaking was in the hands of individual workmen, each one of whom performed every operation in the process of making a shoe. To-day, in cities like Brockton and Lynn, there are immense establishments where shoes are made entirely by machine processes directed by specialist workmen who perform, at high speed and over long hours, one or at most a few operations in the production of a shoe. What is true of shoemaking is characteristic of other large industries.

This specialization has not been carried to its present degree



of perfection without having left its mark upon the individual workman. He no longer enjoys the pleasure incident to the performance of a whole task. The unceasing whirl of high-speed machinery, the persistent noises of the shop and the necessary nervous accommodation to the rapid movements of the machines result, after long periods of time, in distinct psychoses. Our vital statistics are not as yet sufficiently refined to indicate the precise effects of these nervous conditions upon the health of the worker, and we can, at present, only speculate upon the importance of this factor. There are, however, sufficient suggestions from physiology and pathology that these vague derangements of the nervous system, due to speeding-up processes and to the general maladjustment of individuals to their work, may result ultimately in distinct lesions of the heart and kidney. Many cases of tuberculosis and other serious affections of early life may be traced to the lowering of normal vitality which follows occupational stress. It is our contention that this element also plays a large and hitherto unsuspected rôle in the causation of the diseases of later life. I urge for serious consideration a study of this phase of occupational hygiene.

Apart from these subjective changes, which, we believe, have occurred as a result of the specialization of industry, we must consider those objective phases of occupation which are inseparable from present-day working conditions. The presence of large numbers of workmen under one roof brings about new and distinct problems of hygiene in industry. The large shop at once raises the question of the purity of the air supply, its temperature and humidity, the adequacy of natural and artificial light, the provision of lavatories and other sanitary facilities, together with a host of minor details which in their entirety markedly affect the health condition of the individual workman. The effects of high temperatures and humidity upon the health and longevity of workpeople are best illustrated by the disheartening conditions revealed by Perry in his monograph on the cotton-mill operatives. The extreme variations in temperature, as observed in the steel mills, have long been known for their disastrous effects upon the workmen engaged therein, especially with regard to the high incidences of rheumatism and pneumonia, both of which play a prominent part in middle life mortality.

We must also consider the factors of dusts, fumes and poisons which play a significant part in present day occupational mortality. The dusts, especially those of metallic or mineral origin,



are well known for their effects upon the respiratory system. We should remember in this connection that many who become incapacitated for continued work at the dusty trades often enter other and lighter work, dropping thus in the scale of economic efficiency, and later succumb to other conditions of middle life. The fumes and poisons, especially those which arise in the refining and handling of lead, copper and arsenic, in like manner, cripple thousands early in life, throwing them on other industries for indifferent employment and support. Middle age mortality returns, as they come into our statistical laboratory for study, are loaded with indications of occupational poisonings of one sort or another in early life. In no other way can we explain the large incidence of the degenerative diseases in those cases of apparently negative occupations at death, which on further inquiry reveal the previous employment in trades like that of the painter, compositor, or laborer in paint, rubber and color works.

### MEASURES OF CONTROL

This high mortality of middle life is thus largely a resultant of our occupational conditions. What measures may we then employ in our attempts at relief? Essentially our future endeavors will, we believe, take the following directions:

1. The further development of that type of efficiency engineering which will result not alone in economies of production, but in such economies of human effort as will conserve the health and life of the individual workman. The first viewpoint is that of the industry, while the second is essentially that of society as a whole. This programme will take into account the radical improvement of the conditions of work such as the hours of labor, the sufficiency of light, the purity of air, and the maintenance of a favorable temperature and humidity in the shop. This will involve the enactment and enforcement of far-sighted labor legislation. Such efforts will amply repay employers and the state for the additional expense involved in increased product, on the one hand, and in the extension of the span of life, on the other.

2. The medical examination of workmen, both at the time of their entrance into the industry and periodically thereafter. A medical examination will often discover the presence of the organic diseases which we have been discussing, and will encourage the early application of remedial measures. Many instances of this kind of enlightened management are already in evidence. The



North Company of Worcester, Mass., during the past year has instituted the physical examination of its twelve hundred employees. Persons suffering from physical defects are informed of the fact and are advised to secure proper treatment. In some cases, where the nature of the work has tended to aggravate the condition, a change of occupation is arranged. An extension of this programme should be recommended by health officers and social workers to the managers of industrial establishments. In this way the community will receive the benefit of a comparatively inexpensive and most effective measure for life conservation.

3. The education of workmen and employers in the essentials of occupational hygiene. By means of lectures delivered in the factory and before trade organizations, workmen can readily receive instruction which will result in the prevention of diseases and accidents. Pamphlets should also be widely distributed. No programme of conservation in industry can be thoroughly successful unless it has the active co-operation of the workmen themselves.

4. The close study of death certificates by officers of the departments of health and labor, to discover whether proper preventive measures have been taken to prevent the death when it is suspected that industrial conditions are at bottom responsible for the disease or condition reported. In this way, we shall be able to determine what industries are contributing, abnormally, deaths from preventable accidents, from poisonings and from other important occupational causes. Health and labor officials should determine in each instance whether the labor laws have been complied with, and see that the guilty persons are prosecuted for violations. This programme is carried out fully in Great Britain by the medical officers of health of each district.

#### DIABETES AND CANCER

Two diseases, diabetes and cancer, which play an important part in the mortality at the higher ages, still remain for our brief consideration. While the definitive causes of both diseases are still obscure, considerable progress has been made recently in our therapeutic control of them. Research directed in the field of the chemistry of metabolism has done much toward checking the course of diabetes, especially in early cases. We may expect results from the clearer realization that many cases of the disease have their onset in the metabolic disturbances which follow tubercular and traumatic conditions. It will be the particular



function of the periodical medical examination of workers to discover incipient cases of this disease, a large number of which, at the outset, can readily be managed.

The cancer situation is much more involved. The increase in the mortality rate from cancer has been very decisive, but there are indications that the rate has probably reached its high-water mark. Altogether, the outlook for its control was never brighter than at the present time. Not only are the recent contributions of the research laboratories to the pathology and etiology of cancer most encouraging, but progress is also reported in the surgical and ray treatment of the disease. Great promise, moreover, is held out by the campaign of popular education which is in full swing on all sides. The aroused interest of the public and the better and earlier diagnoses by physicians will lead to the discovery of many cases in the early stages and will present them for surgical treatment. More especially should efforts be concentrated upon the education of women in the practice of consulting the physician or surgeon upon the merest suspicion of the appearance of cancer of the female genital organs. Even at this time, most cases come to the operating table all too late. It is against the fatal policy of delay that the efforts of most public bodies interested in the problem should be directed.

In conclusion, we should add a few words of commendation for the movements which have recently developed for the better care of persons in middle life afflicted with functional disturbances of the heart and kidney. The proper care of these cases, with reference to choice of occupation, will lead often to the prolongation of life. Many of those afflicted can participate without much injury to themselves in gainful occupations if properly directed, where without such guidance they soon overtax their limited energies and become unfit for any work. It should be kept in mind, however, that such a policy, useful as it undoubtedly is, will have ultimately the effect of increasing our mortality at the older ages. Such an increase should not be looked upon with any apprehension, since it is quite normal and involves no social loss.

#### SUMMARY

We may now summarize our discussion of the factors which enter into the possible reduction of mortality at the middle ages as follows:

1. We must place even greater emphasis upon the municipal control of the communicable diseases of early life in order to reduce



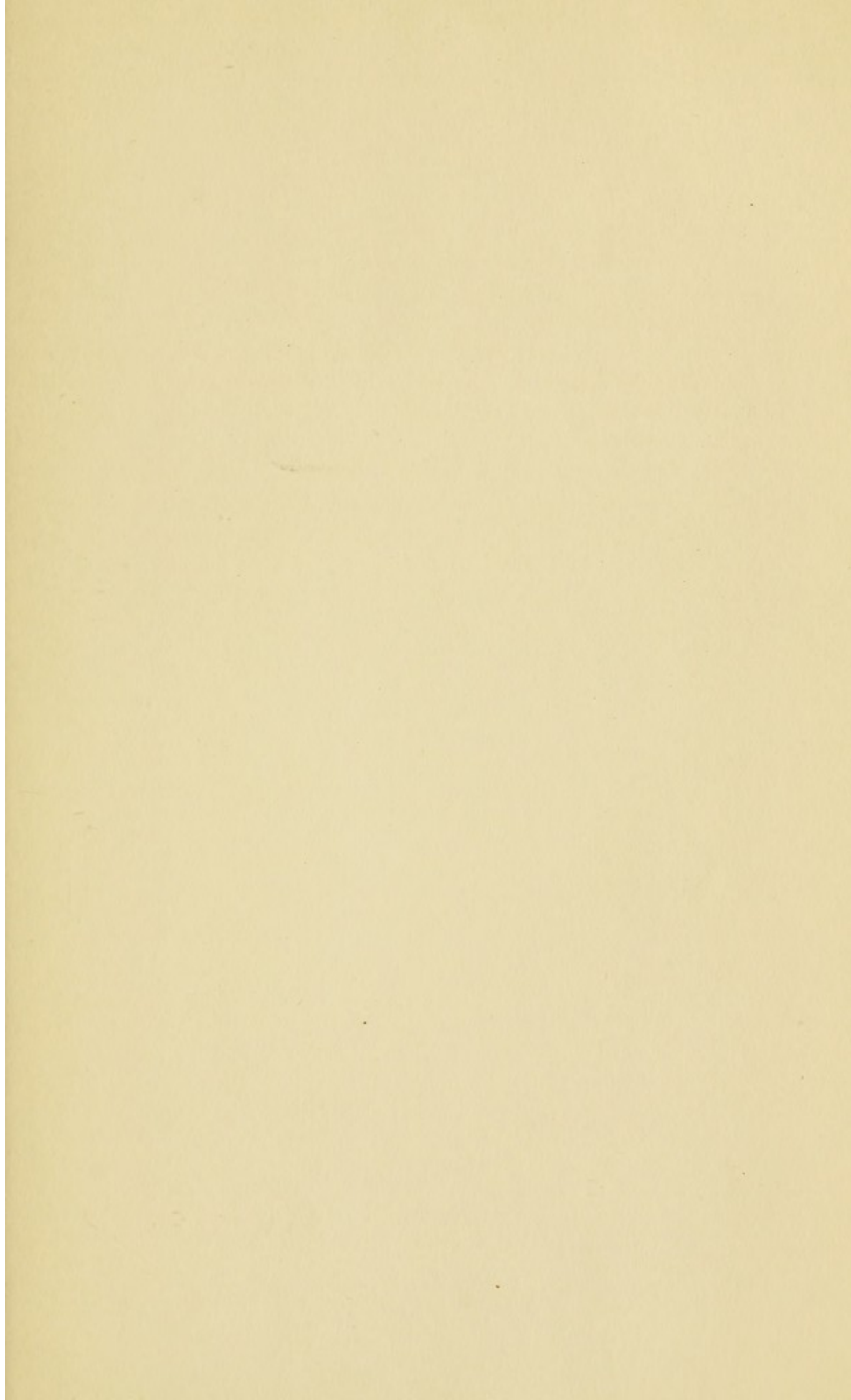
the instances of heart and kidney impairments which often result therefrom.

2. We must encourage the movements directed against the spread of venereal disease as well as against the intemperate use of alcoholic beverages.

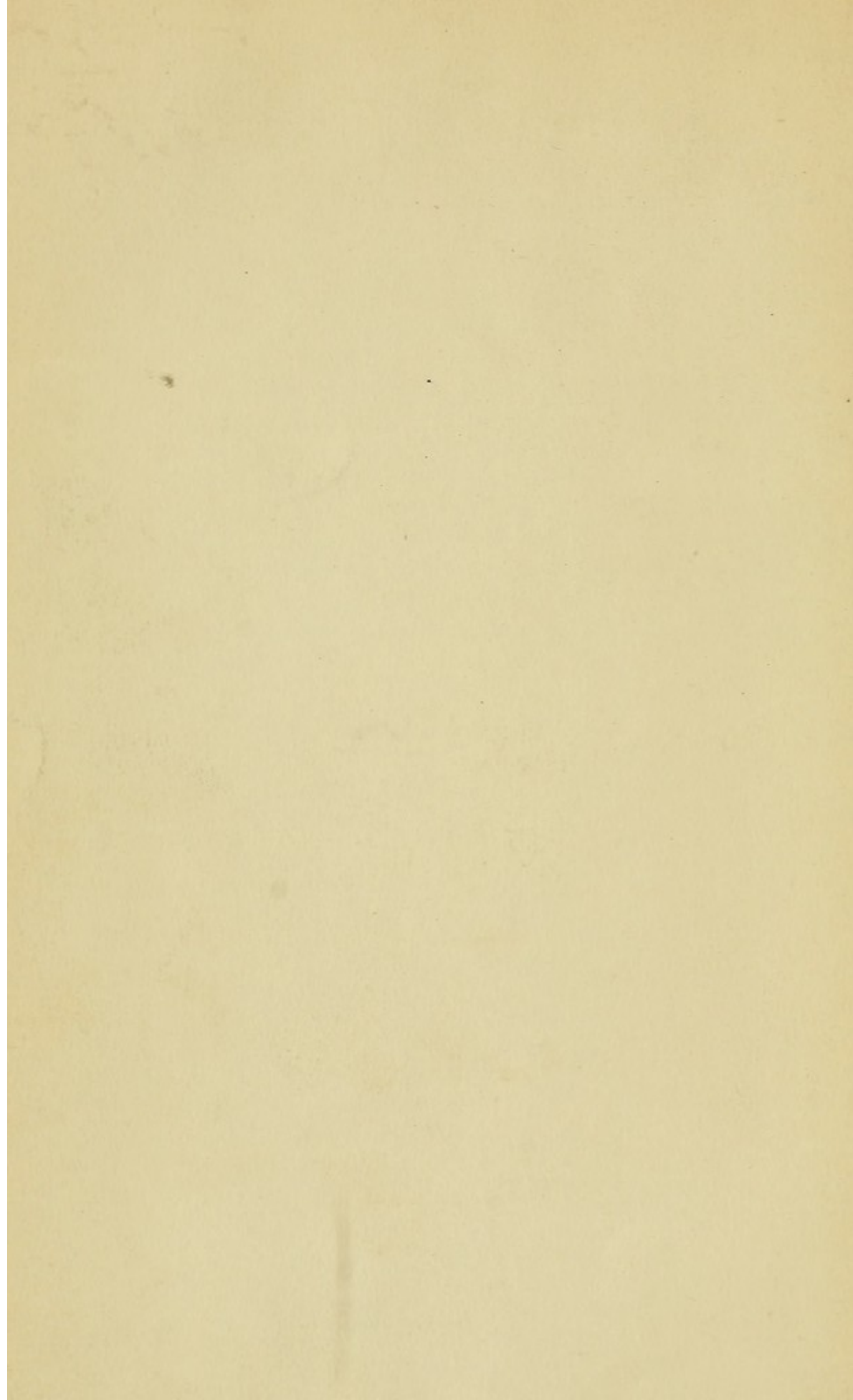
3. We must further all efforts for the improvement of adequate labor legislation and promote better understanding between employers and employees. This programme will include the improvement of factory sanitation, the medical examination of employees and the instruction of both employers and employees in industrial hygiene.

4. It will be necessary to supplement labor legislation with the careful examination of death certificates, to see that in every instance those who are responsible for preventable deaths are properly prosecuted.

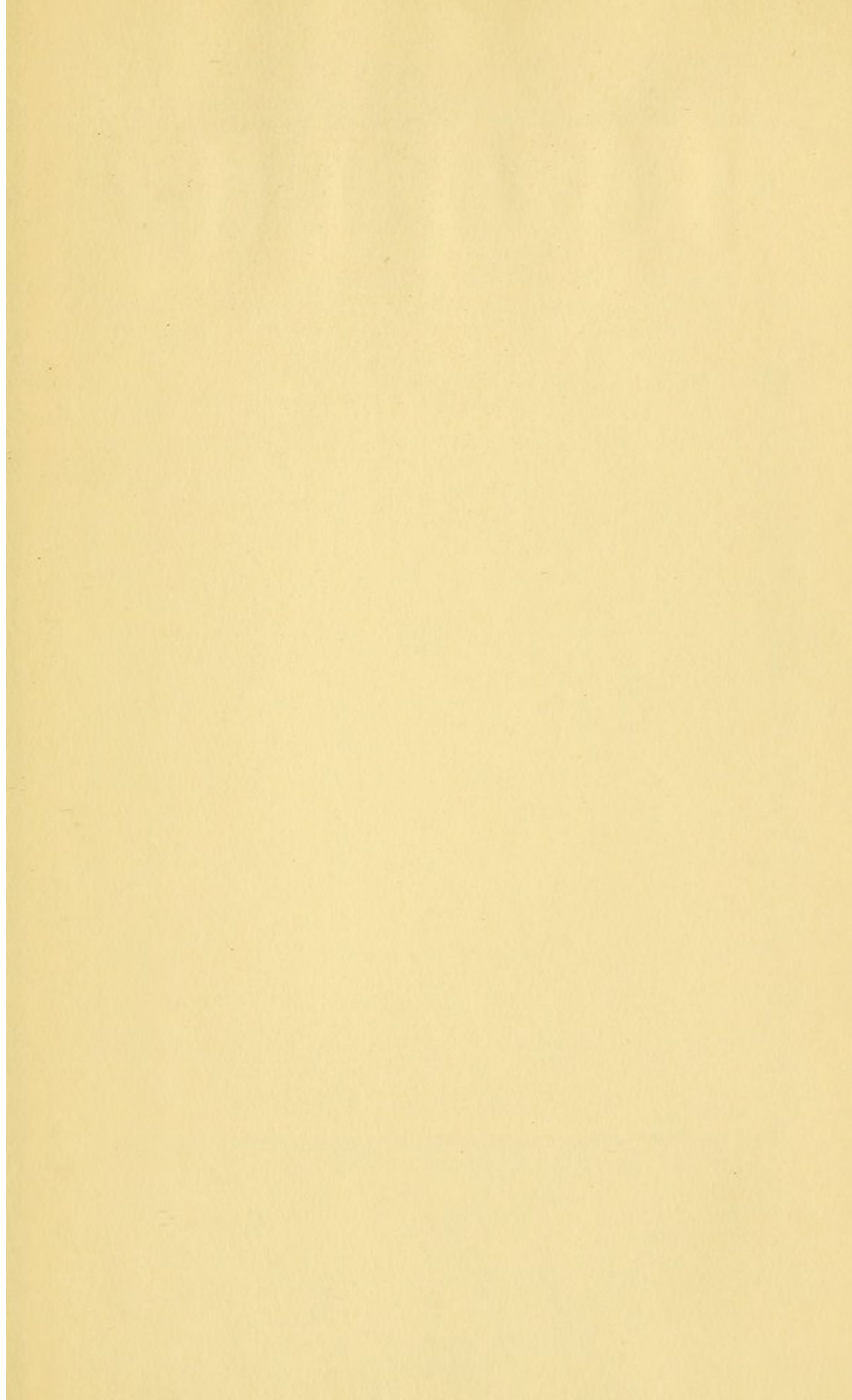
5. Finally, we must heartily encourage the movement for public education on all topics connected with personal hygiene, that there may be better co-operation between physicians and their patients and that there may be no unnecessary losses sustained through neglect of symptoms pointing to serious organic diseases.













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Possibilities of reducing mortality



