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Vital statistics, in the words of Dr. Newsholme, "is the science of numbers applied to the life history of communities and nations," and this definition being accepted, we are on the outset confronted by a matter of general importance, since there are none of the people of this State so high or so low but that to them life has its value in direct proportion to its duration. Time was when mankind believed that those "whom the gods love die young," but this doctrine of fatalism no longer prevails in the light of modern medicine and sanitary science, for both of these efforts for social betterment and the amelioration of the conditions under which the people have to live could not exist but for the modern science of vital statistics, than which there is no field of research more promising of useful and practical results.

It has been necessary for me to confine myself in this discussion to mortality statistics, since even a superficial consideration of the other branches of the science, dealing with the statistics of marriages, divorces, and births, would consume more time than I have at my command. But, manifestly, the mortality statistics must needs be looked upon as the most important branch of the science, since they affect more directly the interests and the welfare of the living people of this State. Although I readily recognize the great social value of the statistics of marriages, divorces, and births, I personally have had but little opportunity to investigate these subjects.

My discussion as to the data of human mortality will be largely confined to the conditions as they exist in the State of New Jersey, and as they are made plain to us by the facts already in our possession through the efforts of the State Board of Health since 1878. Data of some historic value have been collected for previous years, but as regards the State as a whole, we have no information of scientific value for years previous to 1878. For some of the counties, especially for Essex, we have information of value for years as far back as 1859, in a report on the "Health and Morality of Newark, N. J.,"

1 Read before the New Jersey Sanitary Association.
by Dr. Edgar Holden, for the period 1859-1878. Another valuable paper on the “Climatology and Diseases of Essex County” is to be found in the Transactions of the Medical Society of New Jersey for the year 1887, in which also the vital statistics for years previous to 1878 are incorporated in considerable detail. Since 1878 and to June 30, 1899, there have been recorded in this State 550,955 deaths, and of these records and their practical value it is my intention to speak to you this evening.

The essential facts known to us as to this large number of deaths are: (1) The year of occurrence; (2) the ages of those dying, by certain specified groups of years; (3) the sex; (4) the causes, arranged according to reasonably well defined groups of diseases; (5) the locality, with a reasonable degree of precision. More details would, of course, be desirable, more accuracy would be of great value, but on the whole, as the information has been made public, it is of practical value to the State, to the medical profession, and to the public at large. The information available is sufficient to approximately indicate the rise or fall of the general death rate and the corresponding increase or decrease in the longevity of the people of this State. The information is not as useful as it could easily have been made had those in charge of the registration and publication of these statistics been more liberally supported by the State in their arduous efforts; but even in their present condition they are a valuable means of indicating to us the steady progress which has been made in this State during the past twenty years. It is but proper that mention should be made of one to whom we are largely indebted for the good work which has been done during a large part of this period, namely, Dr. Ezra Hunt, formerly the Secretary of the State Board of Health.

Our information as to the mortality in this State is supplemented by the census reports made for the past fifty years on the mortality of the United States, but in particular by the life tables of New Jersey, which have been incorporated in the census reports of 1880 and of 1890.

A careful study of this available body of information, really the vital history of the people of this State, is indeed not only a most interesting subject, but one of great promise of practical results. The first fact which is impressed upon us by a study of the life tables
of the two census years mentioned would indicate that the sanitary progress, of which we hear so much, has not affected as large a proportion of our population as is commonly supposed to have been the case. Unquestionably, immense progress has been made and almost wonderful results have been accomplished in the direction of diminishing the mortality of children under the age of fifteen years. As an illustration I may mention the fact that if we take the three years, 1879–1881, and compare them with the last three years, 1897–1899, we have only 24,208 deaths under twenty years of age in the latter period against 28,880 deaths under twenty years during the earlier period of our history, although during the same years the population has almost doubled itself. But this gain in longevity at earlier ages has not been made at the ages past middle life, and we have a pertinent illustration in support of this theory in the two life tables for New Jersey, published in 1880 and 1890, showing that while in 1880 the expectancy of life at the age of twenty-five was thirty-nine and eight-tenths years; in 1890 it was only thirty-seven and four-tenths years; that while in 1880 at the age of fifty the expectancy was twenty-two and three-tenths years; in 1890 the expectancy was only twenty-one years. In other words, the mortality at older ages is today higher than it was twenty, or even ten, years ago. I cannot burden this paper with statistics on the subject, but I hope to add a series of tables in an appendix to this paper when the same is finally published in the Transactions of the Association.

At present it is impossible to point out definitely and precisely the causes responsible for the unquestionable increase in the mortality at ages above twenty. We have not for this State the detailed information as to the causes of death which would be necessary for a thorough and complete study of the subject. I understand that these imperfections will be largely done away with in the future reports under the new law, according to which the Bertillon system of classification will be adopted, and I sincerely trust that together with this improvement in disease classification there will come a corresponding improvement in the collection of more detailed information as to the ages at death. To make our vital statistics of more practical value, the ages at death, together with the corresponding causes, must be given for single years under the age of five and for five-year periods over the age of five. It is only in this manner that we
can arrive at a definite conclusion as to the age incidence of disease and the causes which are responsible for the present excessive mortality at ages over twenty. But what is most needed in addition to a more complete registration of causes and ages is detailed information as to the occupations at death. At present we have absolutely no knowledge as to the relation of disease occurrence in different occupations, and it is in this direction that the greatest practical value of vital statistics finds its logical explanation.

As the result of frequent and comprehensive investigations, I am satisfied that there is no subject deserving of more thorough investigation and study on the part of our physicians and those in charge of the sanitary interests of our different towns and cities than the intimate relation which unquestionably exists between occupation and mortality. There are in this State trade centres where industries of a special order are carried on on a very large scale, and as such we may mention the pottery and rubber industries in Trenton, the glass industry in southern New Jersey, the hat industry in Orange and Newark, and the silk industry in Paterson; yet, as far as our information goes, we know nothing of determining value as to whether these industries are responsible for the increased mortality at ages over twenty of which I have spoken. It is true, and we may speak of this with pride, that special investigations have been made by disinterested students of the subject, and that reports of great value have been published in the annuals of the State Board of Health and of the State Bureau of Labor Statistics. No reports of any other State boards of health contain such precise and satisfactory information as to the diseases of workingmen employed in the principal industries of the Commonwealth. Commencing with 1878, we have in the reports of the State Board of Health a series of valuable papers on the diseases of hatters, of potters, of glass workers, of rubber workers, etc. Commencing with 1889, and terminating with 1895, we have in the annual reports of the State Bureau of Labor Statistics exceedingly valuable and suggestive inquiries into the trade life of workingmen, not only in the principal manufacturing industries, but also in other dangerous and unhealthy occupations. Very little in this direction has, however, been done for the past ten years, and it is my plea to you at this meeting that our special efforts in this direction should not be relaxed, or that we should be satisfied with
what has been done in the past, but that we should enlarge our scope of inquiry, supplement our limited body of observed facts with a large body of statistics collected by the State Board of Health as to the diseases of workingmen employed in the useful and productive trades and industries of this State.

Valuable as the investigations of the State Board of Health and of the State Bureau of Labor are to those who are most interested in the subject, they fall short in that they have not the support of a large series of observed facts to be found in the death certificates of those whose lives have terminated in this State during the past twenty years. I would urgently recommend that for practical use in our vital statistics we should have in the future a detailed and comprehensive table, showing for all of the principal occupations or industries the causes of death according to age periods. That this task is not impossible, or even very difficult, is illustrated in the excellent reports of the health officers of Sheffield and Blackburn, England. These reports can well serve as a model for our own State Board, should it appear to be possible and feasible to undertake the construction of occupation mortality tables. I am fully aware of the inherent difficulties which accompany such inquiries; I fully realize the difficulty of obtaining exact information as to the occupation at death, but it is not for us to be discouraged by such difficulties, but for us who are really and vitally interested in the collection and publication of such statistics to solve the difficulty, and that this difficulty can be solved—all of us know who are familiar with the excellent and useful reports published under the direction of the Registrar-General of England every ten years. In certain directions an improvement of our present statistics is easily possible. There should first be added to the death certificate a second question as to occupation, stating the industry or trade in which decedent was engaged at the time of his or her death. To explain to you the meaning of this point, I will say that at present a death certificate may contain a statement of the occupation of decedent at the time of his death as that of a moulder, but unless it is stated that he was a moulder in a pottery, he would be classified among iron moulders or stove moulders, as the case might be. Similar cases could be mentioned, as, for instance, engineers, where we have no information as to whether decedent was a stationary engineer, employed on a railway, or possi-
bly a civil engineer; but if the second line is added referring to our first illustration, it would have been stated that the decedent was a moulder in pottery, and his death in that case would have been accurately classified. I would, therefore, suggest that the State Board should adopt a new death certificate, in which the first line referring to the occupation would merely ask the question as to "occupation at death"; the second line would ask the question, "industry or trade at death"; and by an answer to these two questions we would obtain the accurate and necessary information demanded for the best interests of the working people of this State. A third question could be added which would materially increase the value of these statistics, which, however, is not of quite so much importance as the second question which I would like to have added to our present certificate. It would be desirable to have a definite statement as to whether decedent at the time of his death was an employer or an employee. Manifestly, it is a very different matter whether decedent was the owner of a pottery or a working potter at the bench. If we could obtain this information we would very materially enhance the practical value of the vital statistics of this State.

But a further decided and material improvement in this direction is possible through a co-operation between the Bureau of Labor Statistics and the Bureau of Factory Inspection. The reports of the latter are at present of practically no value for the study or solution of questions pertaining to the trade life and disease or accident liability of men employed in the unhealthy or dangerous industries of this State. I can conceive of no practical reason why so large an amount of routine information should be published which can serve no useful purpose except (and the reports are practically limited to this information) that of record, and why the energy and effort expended in this direction should not serve the more useful purpose of placing before the people of this State information of value as to the real sanitary condition of factories and the health factors affecting our working people in the same manner as this has been done for so many years in the reports of the Board of Factory Inspectors of Great Britain. Many of the reports of the factory inspectors of different States are in this respect of far greater value than the reports published by our own Board of Factory Inspectors, and I believe that if the subject were thoroughly investigated by a commit-
tee of the legislature, or by disinterested citizens of this State, there would be inaugurated an improvement which would make it possible for those who are interested in the subject to realize fully the present state of factory life in this Commonwealth. It would be possible on the basis of the statistics and supplementary information collected by the co-operation of the State Board of Health, the State Bureau of Labor Statistics, and of the State Board of Factory Inspectors, to produce a body of indisputable facts, on the basis of which it would be possible to frame more scientific rules and regulations by which our working people engaged in the most useful pursuits of life could be better protected than they are at the present time, and as they fully deserve to be.

These statistics of mortality by occupations, and the supplementary information as to the sanitary state of our factories, would have a secondary practical value to a large number of physicians, who in the light of published facts and on the ground of their own experience, verified and supplemented by such facts, would realize the almost boundless and at the present neglected opportunity for the study of diseases of working people employed in dangerous and unhealthy occupations for the purpose of developing special ability, which in time will give us a class of medical specialists of the diseases of workingmen, as we now have such specialists for diseases of the eye or ear, and for other parts of the body. Certainly no class of specialists is more urgently needed and none are likely to make more rapid progress in their own material welfare. The increase in general intelligence among our working people today, justly considered the most advanced industrial workers in the world, will soon create a distinct demand for more satisfactory and reliable advance on matters pertaining to illness and casualities directly the result of the industries in which our people are engaged. The advice of such specialists will be respected, and men will act thereon, and if necessary change their occupation, or change to another branch of their occupation less dangerous or injurious than the one in which they may be engaged, and in which they may have developed diseases in their incipient stages, not sufficiently advanced to be beyond improvement or complete recovery. Much has already been done in this direction by a few devoted and intelligent physicians, but most of all by such men as Dr. Arledge, the English authority on diseases of men employed in
the potteries. There will come a time when we will coin a new term in medicine and speak of industrial medicine, just as we today speak of industrial chemistry, and both sciences or arts will indeed be most closely allied to each other.

I have limited myself to this one illustration of the value and utility of vital statistics, for unless we have more accurate information and a larger body of collected data as to the diseases of our working people, supported by accurate and extensive statistics as to the deaths in different occupations and the ages at which the deaths occurred, the development of industrial medicine will not be possible. What is true of the necessity of such statistics for the purpose of industrial medicine, is equally true of all other branches of medical inquiry into the longevity of our people as affected by other determining factors, such as surface geology, proximity to forest areas, of seashore and mountain climates, and many other factors which unquestionably have a direct influence upon the health of the people of this State. To enhance the practical value of the collected vital statistics would require in every locality a sincere and genuine interest in the local phenomena and the factors making for a long or a short life.

We, unfortunately, have developed, first, but little of this local spirit of inquiry, and, second, but little public appreciation and demand for published data as to the local health conditions. In curious contrast to the excellent work which has been done by the State Board of Health for so many years in publishing practical and useful information for the State as a whole, the local boards of health in New Jersey have published practically nothing of value, with the notable and recent exceptions of the cities of Asbury Park and Montclair. Some advance has also been made in the city of Newark, but none in proportion to the immense interests which are involved. For our other large cities, especially for Trenton, Camden, Jersey City, Paterson, and Orange, we have no health reports in such detail as are required for the best interests of the people of these cities. There is absolutely no reason why the cities of this State should not follow the example of other large cities in this country and publish annually a separate health report containing detailed information very much along the line as this has been done in so excellent a manner by the health officer of the city of Montclair, today perhaps the healthiest suburban city within fifty miles of the
city of New York. In few States in this Union is it possible to supplement such local reports by all the necessary information as to geology, climate, water supplies, and industrial statistics as is possible in New Jersey. No other State in the Union has so thoroughly equipped a geological survey in the hands of men who have given primary consideration to matters of immediate and practical importance, while at the same time not neglecting matters of remote importance. Our State Weather Service has published reports of a very high degree of usefulness, and as regards the State Bureau of Statistics, it has also contributed its share of information of value to the health officer in supplementing his conclusions as to the local conditions making for a long or short duration of life. It is much to be regretted that the reports of the State Bureau of Factory Inspection cannot be included in this praise of our State departments of supervision and investigation of subjects directly or indirectly affecting public welfare.

I cannot refrain on this occasion from calling your attention to a matter directly connected with the extension or development of the practical utility of vital statistics, and which but for urgent necessity I would gladly have left out of consideration, for in a measure it is to me a painful duty. You are all aware that in this State our vital statistics are in the first instance collected by the city clerks, and while there are certain reasons why this should be the case, in the light of the development of modern preventive medicine it is no longer desirable that this duty should fall to a class of men totally unfamiliar with the medical aspects of the data they are expected to register for the use of medical practitioners and sanitarians. This is not as it should be, and I urgently recommend that early steps be taken tending to a change in the law, and transferring this important duty from the city clerks to the local board of health or to a medical registrar of vital statistics, especially appointed for that purpose. In certain other States we have a still more antiquated system by which the Secretary of State is made the custodian of the vital statistics and under his supervision the statistics are compiled, published, and analyzed. This is contrary to the purpose of collecting vital statistics, since one totally unfamiliar with the essential requirements and needs of the science cannot be expected to do justice to the task imposed upon him. In consequence of this anomaly, vital statistics are in
many States collected without due skill and proper consideration of important details, while at the same time they are not in time placed before a trained medical observer for immediate consideration, verification, and correction. Gross errors must needs result from so antiquated and unwarranted a practice, which owes its origin to a time when certificates of marriage, birth and death served merely the legal purpose of establishing proofs of identity, but at the present time the legal aspect of these certificates is but subordinate to the far more important one of the State supervision of the public health, and hence the urgent necessity that the duty of collecting vital statistics in the first instance be transferred from the city clerk to the medical officer of health, or to a duly appointed medical registrar of vital statistics.

I cannot do better than illustrate the importance of this point by a reference to a slightly different matter, which at the same time will make clear to you the inexpediency of placing the collection, and, even worse, the analysis, of vital statistics in the hands of a State officer not directly connected with the sanitary administration or the preservation and improvement of the public health of the people of a State. Curiously enough, the illustration of which I shall make use is furnished by the State from which you would least expect so sorry an exhibition of ignorance and perversion, if not desecration, of a high public office, and at the same time of such utter indifference, if not contempt, of public requirements and public needs. In the State of Massachusetts vital statistics are also in the first instance collected under the authority of the Secretary of State, and it is by the authority of this same officer that the returns are annually published and analyzed by some one designated for this purpose. For forty-nine years, ending with 1890, this duty had been delegated to men trained in public health matters, to men thoroughly familiar with the science of vital statistics, to men deeply interested in the development of the highest degree of accuracy and skill, combined with a desire to make the vital records of the State attain to as high a degree of public utility as possible. During these forty-nine years, the science of vital statistics had been more highly developed in Massachusetts than in any other State of the Union, and the registration reports edited by the foremost men and authorities in the science of vital statistics had reached a point of public approval such as has never yet been
attained by any other State of this country. One would have expected where so high a degree of public utility had been reached, and where this important duty of study and analysis of the vital records had been developed to the complete satisfaction of the public, as expressed in the medical journals and other competent channels of public opinion, that it would have been impossible to ruthlessly destroy or to tear down the work of earnest men for half a century. Yet, without warning, without right, without justice, the Secretary of State in 1891 transferred this important duty away from the secretary of the State Board of Health to an unknown individual, who has since to the discredit of Massachusetts made the registration reports of that State not only a sorry evidence of his own ignorance, but an evidence of the indifference of the intelligent people of Massachusetts to an act of iniquity on the part of a high officer of State, such as is, probably, without a parallel in the history of vital statistics in the civilized world. The registration reports of Massachusetts, as they have been issued since 1890, contain not hundreds but thousands of errors, the majority of which are inaccuracies and misstatements, which even a high-school graduate, trained in simple arithmetic, would not be expected to make. The reports are full of fallacies, full of discrepancies, and are today a discredit to the people of Massachusetts, and a discredit to the science of vital statistics, and a direct step backward in the development of the point to which I have called your attention, namely, the development and extension of the practical uses of the science of vital statistics.

I would not have spoken of this perversion of a high public duty, and of the undoing of the good work of able and earnest men for half a century, were it not that I believe it to be our duty to recognize dangers which confront us in this State as much as they are present in every other community. I believe that it is only by the strictest vigilance exercised on the part of the public and of individuals who have the best interest of the people at heart that so difficult a task as the one in which you are engaged can be carried successfully onward from year to year. The results which follow the efforts of sanitarians are always remote, and more often benefit future generations than the people of the time who have to bear the immediate burden of expense. Hence this digression into a chapter of vital statistics, which to my mind records the most unfortunate and shameful betrayal of a public trust.
In conclusion, I may be permitted to touch once more, if ever so slightly, upon the value of vital statistics to the people of this State in other directions than the specific one of the inquiry into the diseases of the working people employed in the different industries recognized to be either unhealthy or dangerous, or both. We are in the last year of a century which marks a progress in sanitary science during fifty years such as has not been made during all the thousands of years of civilization which have preceded it. I believe it is not going too far to say that at no time in the world's history have the people been housed as well, have they been nourished as well, and have they in all respects lived as long and as well as the majority of our people do at the present time. But the problem which will confront us in the twentieth century more than in the nineteenth is the enormous growth of our large cities and the immense aggregation of millions of people upon a small area, such as we find to be the case in Greater New York, Greater Philadelphia, and even Greater Newark. The census returns for 1900, as far as they have been published, disclose a tendency of which I believe the people of this State should take early advantage, namely, the tendency of recent times on the part of the more intelligent people to leave the large cities and settle in the more healthy and more advantageous portions of the surrounding territory, where under semi-rural conditions they can enjoy a degree of happiness and health such as under the best conditions is not possible in the crowded centres of population. I believe that this tendency will become more confirmed, will become a more definite phase, during the next quarter of a century, and that it will prove of benefit to the people of this State, who from New York and Philadelphia will draw the best elements of the population as a new class of suburban residents in far greater numbers than has ever been the case before. But public intelligence has now reached a degree of development very considerably above that which prevailed a quarter of a century, or even a decade ago. Today, more than at any time in the past, do people inquire into the health factors of a community and the conditions making for a healthy and long life, and only in proportion as our cities and country sections hold out inducements in this direction, and make clear beyond a shadow of a doubt that our State is healthy and advantageous from this point of view, will we attract in the very near future the overflow of the intelligent and
desirable population of New York and Philadelphia, which will do much to aid us in the more rapid development of this State. I believe I am not going too far when I say that on the basis of my own investigation, and my own personal inspection of nearly every part of northern and southern New Jersey, I am warranted in the emphatic assertion that this State offers advantages for the health seeker and the home seeker such as cannot be found within a hundred miles of any other large city of this country. We have a State offering every variety of natural advantages, the seashore, the mountains, proximity to large forest areas, and even a lake country such as England itself has little more of beauty and attraction to boast of. You cannot extend the practical utility of vital statistics in a more beneficent direction than by giving strong encouragement to the local health officers of our cities and towns, and to all our physicians practising in the different sections of this State, in collecting and publishing the actual facts as they pertain to the longevity of the people of this State. Just in proportion as we thus demonstrate the practical value of vital statistics to the people at large, shall we gain for our State an increasing degree of public approval, which is so desirable and so fully deserved.