CHANGES IN THE DEATH RATE SINCE THE SEVENTEENTH CENTURY

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IN his fundamental treatise, William Farr[2] compiled the mean annual number of deaths in London during several periods of the seventeenth, eighteenth, and nineteenth centuries. Choosing years which had been free from pestilence, and excluding the still-born, he quotes the following figures:

London 1660-1679: 80 deaths per 1,000 inhabitants
London 1771-1780: 50
London 1801-1810: 29.2

Today the death rate varies from 27.9 (Egypt) to 8.5 (New Zealand); so that for one death occurring now in New Zealand there were nearly ten deaths in London, two centuries and a half ago.

Let us analyze this reduction. Farr divided the causes of death into twenty classes, among which one represents the external causes (accidents, homicides, suicides), and several others include various infectious diseases. Present-day death rates from external causes for a selected list of countries[3] may be compared with the London mortality in the seventeenth century, as follows:

London 1660-1679:	7.6 per 10,000 inhabitants
London 1801-1810:	4
United States 1932:	9.86
Chile 1932:	7.3
Germany 1932:	6.9
New Zealand 1934:	5.71

[1] Secretary-General of the Ministry of Public Health of Belgium.

[2] Farr, William: VITAL STATISTICS. London, Edward Stanford, 1885, pp. 303-306.

[3] I have chosen Chile as representing the group of countries which have the highest general death rate, Belgium as an instance of a moderate mortality. The lowest death rates are found in the Anglo-Saxon and Scandinavian countries, in Switzerland, and in Germany; the lowest of all in South Africa (whites), Canada, Australia, New Zealand and the Netherlands.

England and Wales 1934:	5.62 per 10,000 inhabitants
Belgium 1933:	5.04
Netherlands 1932:	3.8

It is rather surprising to find that—barring the United States—the death rate from external causes is not higher than it was two hundred and fifty years ago in London in spite of our machines, our railways, our motor cars, our airplanes, and our craze for sports. However, except in the Netherlands, it is higher than in London at the beginning of the nineteenth century. The reason is that, in former times, fire and horses represented a much greater hazard than now; and many lives were lost from stagecoach accidents, from burglary, from brawls and quarrels. Human life was insecure and cheap.

As regards infectious diseases, the reduction is stupendous:

London 1660-1679:	486.7 per 10,000 inhabitants
London 1801-1810:	147.3
Chile 1932:	51.3
Belgium 1933:	15.5
England and Wales 1934:	13.2
United States 1932:	12.5
Germany 1932:	11.8
Netherlands 1932:	9.6
New Zealand 1934:	7.3

For one person who dies now from an infectious disease in New Zealand, 66 died in London two hundred and fifty years ago. The number is really greater, as croup, whooping cough, nonpulmonary tuberculosis, and several other infectious diseases were not included in Farr's classification. On the other hand, neither his statistics nor ours show in their right places the deaths due to late visceral complications of syphilis, rheumatic fever, typhoid, and diphtheria.

The mortality from infectious diseases represented the following percentages of the total death rate:

London 1660-1679:	66.6 per cent
London 1801-1810:	50.4

Chile 1932:	22.5 per cent
Belgium 1933:	11.8
United States 1932:	11.3
England and Wales 1934:	11.2
Germany 1932:	10.9
Netherlands 1932:	10.7
New Zealand 1934:	8.6

For tuberculosis, the reduction is not quite as great; but it is very striking:

London 1660-1679:[1]	125.5 per 10,000 inhabitants
London 1801-1810:[1]	71.6
Chile 1932:	25.5
Belgium 1933:	7.96
England and Wales 1934:	7.63
Germany 1932:	7.5
Netherlands 1932:	6.4
United States 1932:	6.24
New Zealand 1934:	4.2

For one death from tuberculosis in New Zealand today, there were thirty deaths in London two hundred and fifty years ago, and even more, as the mortality indicated by Farr relates to phthisis only.

It is interesting to note that the tuberculosis mortality represented 26 per cent of the mortality from infectious diseases in London during the seventeenth century, whereas in 1934 it was 56 per cent of the death rate from infectious diseases in New Zealand.

Deaths caused by violence or infection result from external agencies, from outside attacks upon the human organism. When these are subtracted from the general mortality, there remains a composite group of deaths which may be loosely classified as due to organic diseases. The annual death rates in the various countries from this broad group of causes are:

London 1660-1679:	30.57 per 1,000 inhabitants
London 1801-1810:	14.07
Chile 1932:	16.92

[1] Phthisis only.

Belgium 1933:	11.09	per 1,000 inhabitants
England and Wales 1934:	9.90	
Germany 1932:	8.91	
United States 1932:	8.82	
Netherlands 1932:	7.66	
New Zealand 1934:	7.18	

The mortality from these has also considerably diminished, although not in the proportion shown by the death rate from infectious diseases, as these organic diseases include cancer, against which we are comparatively impotent, as well as the diseases of old age. Still the death rate from organic diseases is now in New Zealand only 23 per cent of what it was in London two hundred and fifty years ago. A great part of this reduction originates in the saving of infant life, the rest in the saving of adolescents and adults from various noninfectious diseases. These advances are due to the progress of medicine, public health, nursing, hospitals, labor conditions, housing, social welfare, general and health education, in other words to the advance of science and the raising of the standard of life.

From these so-called organic diseases, we can single out two groups: malignant tumors and the wear and tear diseases.

I will not enter into the comparison of the cancer death rates in different countries, as they depend so much on the accuracy of the death certificates, on the available facilities for scientific diagnosis, and on the age composition of the population.

The wear and tear diseases form an interesting group, because they represent the natural termination of life. To die from accident, infectious disease, cancer, appendicitis, diabetes, gastric ulcer, or to die in childbirth is abnormal. To die from the progressive weakening of the heart muscle, from the gradual sclerosis of the vessels, is the normal death, even if the end is marked by an episode like apoplexy or bronchopneumonia.

How can we get an idea of the proportion of these natural deaths?

We cannot simply say that everyone dying after 75 or 80 enters into this category, because the normal life span is different from individual to individual, according to his or her constitution. If, on the other hand, we scrutinize individually the various causes of death, we will find no adequate answer, as every one of the lethal diseases, except senility, may have various origins.

We must be satisfied consequently with a somewhat gross approximation. Our aim is to estimate the number of deaths due to the chronic changes which age brings mainly in the heart and blood vessels. We will take as our first figure the total number of deaths from senility, from apoplexy, from noninfectious and noncancerous diseases of the circulatory organs and of the kidney. This, of course, includes a certain proportion of deaths due to the late visceral complications of syphilis, rheumatic fever, and other infectious diseases; to the abuse of alcohol; to acute diseases of the heart, blood vessels, and kidney. However, if we consider that in England among the total deaths from senility, diseases of the circulatory organs, nephritis and apoplexy, 74 per cent occurred at the age of 65 or over, we come near the truth in taking as the number of deaths caused by wear and tear 75 per cent of the total figure mentioned. To these deaths, we should add those deaths from chronic bronchitis, bronchopneumonia, pneumonia, congestion and infarct of the lungs which are the last episode of old age. If we reckon as such the cases in which death has occurred at 70 or later, this would increase our total by 7 per cent. On the whole, a reduction of 20 per cent on our first figure is the best estimation we can make of the number of natural deaths.

The total number of deaths from senility, apoplexy, and diseases of the heart, blood vessels, and kidneys was:

Belgium 1933:	4.92 per 1,000 inhabitants
England and Wales 1934:	4.75
United States 1932:	4.36
Germany 1932:	3.8

New Zealand 1934:	3.7 per 1,000 inhabitants
Netherlands 1932:	3.07

Reduced by 20 per cent, these figures would give us the approximate rate of "natural deaths."

However, in this case, the interesting point is not so much the absolute number as the proportion of "natural deaths" in the total death rate:

New Zealand 1934:	43.7 per cent (35 per cent with a 20 per cent reduction)
England and Wales 1934:	40.4 per cent (32 per cent with a 20 per cent reduction)
United States 1932:	39.4 per cent (32 per cent with a 20 per cent reduction)
Belgium 1933:	37.4 per cent (30 per cent with a 20 per cent reduction)
Germany 1932:	35.2 per cent (28 per cent with a 20 per cent reduction)
Netherlands 1932:	34.1 per cent (27 per cent with a 20 per cent reduction)

The proportion of "natural deaths" in the above countries, varying from 27 to 35 per cent, is remarkably high. Corroboration of this high proportion of "natural deaths" is found in the number of deaths at late ages. Thus, in Belgium, 45 per cent of all deaths occur at the age of 65 or later, 35 per cent at 70 or later, 24 per cent at 75 or later. And the proportion of late deaths is still higher in the other countries listed above.

Statisticians bent on strict precision will point to the evident inaccuracy of a method which labels whole groups of diseases as caused by the wear and tear of the body. I believe, however, that with the corrections mentioned, we get an approximation—nothing else could be aimed at—which is significant. Small differences in the proportions for different countries are not significant but the rate for "natural deaths," thus obtained, can be taken as a fairly reliable general indication of sanitary, medical, and social progress.