HAS THE MORTALITY FROM CANCER CHANGED IN COPENHAGEN?

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(With 1 Chart.)

The German social statistician Sombart rightly asserts that in many cases we obtain a sharper and better impression by limiting our investigations to the conditions prevailing in a single year-class than by taking several age-classes together, which are always in some respects heterogeneous.

This idea should be specially important in all investigations into changes in the frequency of cancer, because some of the many pitfalls which exist are very different in the various age-classes.

In the early years of life cancer is so rare that in some cases it does not come into consideration as a cause of death at all. In the later years there will at times be a tendency to regard certain indefinite clinical conditions as occult cancer, while on the other hand the comprehensive diagnosis "Debilitas senilis" has gradually come to include fewer and fewer cases of cancer. If we limit ourselves to the age-class 55–64 years the last-named pitfall will hardly be of any importance. In this age-class, where cancer occurs relatively frequently, we should expect that the change in frequency could be expressed numerically, provided that it is not affected by the practice amongst doctors of using more or less symtomatic diagnoses because the open death certificates are read by the survivors. The age-class 55–64 has also the advantage that the great influenza epidemics in the later observation years thinned its ranks relatively slightly.

In Table I the mortality from cancer in Copenhagen in this age-class is shown for the 20 years from 1904 to 1923. During this period external conditions were quite uniform. The large influx of the neighbouring communities had come to an end.

The table is elaborated on the basis of the Annual Reports of the State Medical Officer, but all the deaths occurring in patients who lived outside the city were rejected for the whole period of 20 years. This was not done in the Annual Reports before 1921. In the 17 preceding years there were no less than 239 deaths amongst men and 268 amongst women, or an increase of $\frac{1}{6}$ and $\frac{1}{10}$ respectively.

The absolute figures for the four five-year periods which the investigation extended over are, for all deaths from cancer in the population of Copenhagen,

Men	354	440	488	528
Women	421	483	561	644

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These absolute numbers show a rise of 50 per cent. from the first to the last five-year period both for men and women and, during the four five-year periods, a considerable preponderance of women. But when we inspect the relative figures it is quite a different story, for among 10,000 living there are annually, in the same age-groups,

Men	60	63	61	60
Women	50	51	50	52

The relative figures thus show neither a rise nor a fall, and the cancer mortality for men is about 20 per cent. above that for women in the four five-year periods[1].

Table I[2].

Number of Deaths from Cancer per 10,000 *Persons in the Age-Class* 55–64 *Years in Copenhagen.*

	Men		Women			
	Cancer of the stomach	Other forms of cancer	Cancer of the breast	Cancer of the uterus	Cancer of the stomach	Other forms of cancer
1904	19	31	6	9	14	21
1905	29	46	9	11	9	23
1906	26	41	7	10	13	20
1907	24	27	2	5	19	32
1908	22	36	9	12	8	15
1909	25	37	5	12	12	15
1910	31	40	3	10	11	25
1911	27	30	4	12	17	26
1912	27	39	7	9	14	20
1913	21	40	8	8	10	24
1914	26	44	7	6	12	17
1915	21	34	6	11	17	24
1916	22	40	6	9	17	24
1917	24	44	5	14	10	20
1918	18	36	5	7	14	21
1919	18	37	8	12	14	30
1920	19	38	6	4	14	14
1921	20	38	6	13	11	25
1922	23	44	10	10	9	24
1923	21	41	7	12	12	19
1904–08	24	36	6	9	13	23
1909–13	26	37	5	10	13	22
1914–18	22	40	6	9	14	21
1919–23	20	40	7	10	12	22
1904–23	23	38	6	10	13	22

Of the six columns of observations in Table I, each of which consists of 20 observations, three columns (the two of cancer of the stomach and the one of cancer of the breast) consist practically entirely of genuine cancer cases,

[1] In the preceding age-class 45–54, the corresponding absolute figures were:

Men	124	175	177	180
Women	368	364	407	400

and the corresponding relative figures:

Men	23	26	23	22
Women	29	26	28	25

[2] The curves are drawn from the figures in the table to the first decimal place.

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while the three other columns (the two of other forms of cancer and the one of cancer of the uterus) are deficient, in that the deaths from sarcoma, occurring in the age-class in question, are included on account of our old indefinite system of nomenclature. In other words, the first elementary requirement in every numerical calculation, namely, that the numbers dealt with shall be homogeneous, is not absolutely fulfilled in the three last-named columns. The change in frequency can, therefore, be explained here in several ways.

There only remain the three first-named parallel columns containing 60 individual observations. One observation column, the deaths from cancer of the breast, comprised, however, only 257 deaths—therefore, on an average, only 13 per year. The figures are so small that even if a change in frequency has happened, we cannot expect to find a clearly demonstrable numerical indication of it. If in investigations such as these, where the material is and must be subject to very gross errors, we have to deal with small numbers, it will not pay to use statistical methods in judging the results.

There remain, therefore, only the two observation columns of cancer of the stomach. These comprise 1208 deaths (675 men and 533 women).

Under cancer of the stomach are included all the deaths certified as cancer whether they were carcinoma cardiae, ventriculi or pylori, but there is no doubt that a number of cases of cancer ventriculi are disguised under the more comprehensive diagnoses cancer, cancer abdominis, tumor cancrosus abdominis, etc. It is, therefore, a minimal number of cases of cancer ventriculi which are at our disposal and a numerical treatment of the material is subject to the proviso that in the 20 years of observation no change in the physicians' discrimination between the more general and the more special diagnoses has occurred.

When, as here, we only have access to about 10,000 men in the age-class observed in the first observation years, it is of course wrong to consider the cancer cases in relation to 100,000 men, because an error in the raw material will then be increased tenfold.

To all collective statistics dealing with cancer the old adage applies with regard to the diagnosis, that no fleet sails more quickly than its oldest and slowest ship. It is, therefore, difficult to go too far back in point of time, but I should think that a thorough elaboration of the extensive medico-statistical card-index collection of death certificates in Copenhagen would yield some information relative to a change in the frequency of external and internal cancer.

The question of the relation between the frequency of the external easily diagnosable cancer and the internal variety which is harder to diagnose, is always under discussion. The material from Frankfurt which Sir Arthur Newsholme[1] used, is, according to the American author Willcox[2], by no means

[1] *Vital Statistics*, 1923, p. 489.

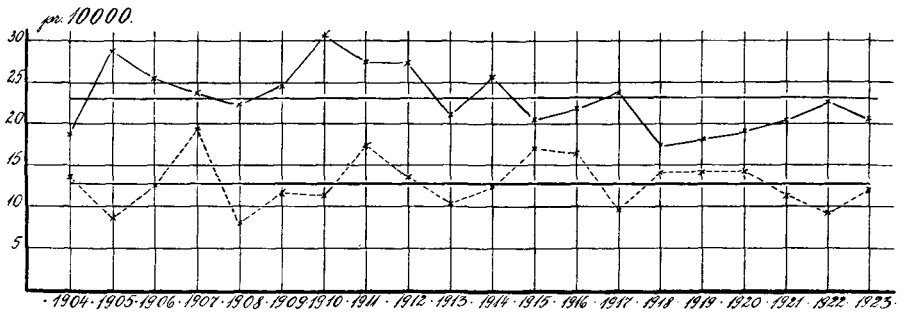
[2] "On the alleged increase of cancer," in the *Quarterly Publications of the American Statistical Association*, 1917, p. 701.

unassailable. The Copenhagen material seems to me to be much more suited to such an investigation.

The Copenhagen collection of indexed death certificates extends back to 1888, and a very large proportion of the fatal cancer cases occurred at the hospital. It was possible, therefore, to obtain supplementary information when it was deemed necessary.

But a reliable investigation must be based on the cards themselves of the card-index collection and not on the State Medical Officer's Annual Report. Such a statistical enquiry would naturally be costly and take up much time.

In the accompanying chart the distribution of the observations around the mean number of cases of cancer of the stomach per 10,000 individuals for men and women in the period 1904–1923 is given.



Cancer of the stomach in Copenhagen, 1904–1923. Deaths per 10,000 in the Age-Class 55–64 Years.

Men ———. Women - - - - - -.

In the case of the women it is obvious that the variations occur quite regularly above and below the mean and it is easy to see that none of them are more than twice the mean error. In the case of the men, again, no variation is greater than twice the mean error, but there is a tendency for the variations in the second half of the curve to fall more often below the mean—a fact to which any importance need scarcely be attached in view of the fact that the curve for "other forms of cancer" shows the opposite condition. The boundary between cancer of the stomach and "other forms of cancer" is so indefinite that the explanation may quite well be that the one group has grown at the expense of the other.

The main result of this special investigation is, therefore, that during the 20 years in which the newest and consequently the best Copenhagen material was available the number of deaths from cancer of the stomach in relation to the population in the age-class 55–64 years proved to be exactly the same from year to year. They are distributed in the individual years precisely in accordance with the throw of dice, and, as a Frenchman has cleverly remarked, dice lack both memory and conscience, so that it is pure chance which number comes uppermost at the next cast.

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