Cancer Mortality In Egypt

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(Received for publication January 19, 1947)

One aspect of the study of cancer is the examination of records of the disease as it manifests itself in various parts of the world. The mortality records of the separate countries are fertile sources of information concerning the effects on the disease of varied climatic conditions, soils, diets, social habits, and race. Although death reports of the European countries as well as those of the United States have been extensively tabulated and studied, examination of reports for countries such as Egypt have not often been made. The reported cancer mortality rate in Egypt was 27.2 per 100,000 inhabitants in 1942. This rate is low compared with 122.1 in the United States and 183.4 in England and Wales for the same year. Its meaning with respect to the incidence of cancer in Egypt merits consideration, and forms the objective of the present paper.

Population Characteristics of Egypt

The population of Egypt in 1937 was 15,920,000; estimates for 1942 give the number as 17,230,000. The population is densely concentrated (over 1,000 per square mile) along the Nile Valley and in the oases, the inhabitable portion of Egypt comprising an area roughly equivalent to Holland. One-fourth of the population resides in urban towns and three-fourths in the rural area although in the latter it is practically impossible at any time to be out of sight of human beings except by going under cover. The rural population predominance is also shown by data on occupation: 58 per cent of the occupations specified in the 1937 census relate to agriculture and only 6 per cent to industry.

The age distribution is in favor of the younger ages, nearly half (48 per cent) being under 20 years of age, as contrasted to 30 per cent in England in 1942, and 34 per cent in the United States in 1940, while the percentage over 60 years of age was 6.4 compared with 15.8 in England, 1942, and 10.4 in the United States in 1940.

According to the census of 1937 the foreign-born population of Egypt included 187,000 persons, or 1.2 per cent of the total population. In the governorates and capitals of provinces they number 177,000 or 94.6 per cent of the total foreign-born population. In Alexandria and Cairo foreigners comprise 12.8 and 4.6 per cent of the population, respectively. The foreign-born are thus largely concentrated in the large urban centers.

Mortality Registration

The death registration system does not cover all of Egypt. Before 1925 registration was limited to the thirty governorates and capitals of provinces and comprised a total population of 2,000,000. In 1926 the registration area was extended to include all places where public health departments existed, a population of about 3,000,000. The area newly included consisted for the most part of small towns or large villages, an essentially rural population. Several years were necessary before the newly formed registration bureaus began to function properly and the year 1933 has been taken as the beginning of the present stabilized registration area.

The registration area in 1942 contained 5,590,000 persons or 32.4 per cent of the total population. About half of these were in Cairo and Alexandria, and a large proportion of the other half was also to be classed as urban although data unfortunately are not available to permit a more exact description of the urban-rural distribution of the area.

This point is important in evaluating the completeness and accuracy of death reporting in Egypt. In rural districts outside the registration area deaths are not recorded as to cause beyond the terms “accidental” or “non-accidental”, and a gross deficiency in recording the cause of death must also prevail in the rural sections most recently admitted to the registration area, particularly since about half the death certificates filed in Cairo and Alexandria do not show the cause of death. If this is true in the most advanced and medically best equipped section of the registration area, very little can be said for the poorer rural sections.

The failure to secure proper certification of cause in more than 50 per cent of the deaths in the two

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large cities may be laid to the general level of
gnorance of the people. Beset with superstition
and a belief in the efficacy of the herbs and the
medications prescribed by the quacks and laymen
they patronize, many die before proper medical
attention can reach them. The cause of death in
such cases remains unknown unless special investi-
gation is made by medical officers of health. Such
investigations are made and often do disclose the
real cause of death, but many cases remain in
which the true cause is never known. The picture
becomes still more confused when one considers
the fact that no proper control over certification is
maintained so that many deaths from cancer, for
example, may have been certified as due to some
other cause.

The remarks contained in the paragraphs to
follow must be considered in the light of the char-
acteristics of the system of mortality reporting
just described: a registration area comprising less
than one-third the total population and predomi-
nantly urban in an essentially rural country, a
deficiency of 50 per cent in medical certification of
death in the better sections of the area, and no
control over the diagnostic certification of death.

CANCER MORTALITY—GENERAL

The recorded death rate per 100,000 from cancer
varied between 17.7 in 1927 and 27.6 in 1935 over
the period 1918-1942. The general level of mor-
tality may be contrasted with that for other
countries in Table I, for the years 1926-1928 (12).

<table>
<thead>
<tr>
<th>Country</th>
<th>1926</th>
<th>1927</th>
<th>1928</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>93.3</td>
<td>92.4</td>
<td>94.8</td>
</tr>
<tr>
<td>Belgium</td>
<td>84.7</td>
<td>86.8</td>
<td>91.0</td>
</tr>
<tr>
<td>Bulgaria</td>
<td></td>
<td>63.0</td>
<td></td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>107.5</td>
<td>107.9</td>
<td>110.8</td>
</tr>
<tr>
<td>Denmark</td>
<td>140.0</td>
<td>144.0</td>
<td>142.0</td>
</tr>
<tr>
<td>Egypt</td>
<td>20.5</td>
<td>17.7</td>
<td>19.6</td>
</tr>
<tr>
<td>England and Wales</td>
<td>136.2</td>
<td>137.6</td>
<td>142.5</td>
</tr>
<tr>
<td>Finland</td>
<td>64.4</td>
<td>79.2</td>
<td>84.1</td>
</tr>
<tr>
<td>France</td>
<td>87.7</td>
<td>95.0</td>
<td>97.0</td>
</tr>
<tr>
<td>Germany</td>
<td>118.0</td>
<td>123.0</td>
<td>126.0</td>
</tr>
<tr>
<td>Greece</td>
<td>29.0</td>
<td>34.0</td>
<td>32.2</td>
</tr>
<tr>
<td>Japan</td>
<td>68.0</td>
<td>70.0</td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td></td>
<td>31.0</td>
<td>31.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>17.0</td>
<td>15.7</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>99.1</td>
<td>96.3</td>
<td>98.8</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td>68.0</td>
<td>70.1</td>
</tr>
<tr>
<td>Sweden</td>
<td>120.2</td>
<td>119.8</td>
<td></td>
</tr>
<tr>
<td>Switzerland</td>
<td>143.0</td>
<td>150.0</td>
<td>145.0</td>
</tr>
<tr>
<td>United States</td>
<td>94.9</td>
<td>95.6</td>
<td>96.1</td>
</tr>
</tbody>
</table>

With the exception of the rates for Mexico,
Egypt's cancer mortality is lowest on the list.
Rates for Czechoslovakia, Denmark, England,
Germany, Sweden, Switzerland, and the United
States are from 5 to 7 times the rate for Egypt.

The trends of cancer mortality in the registra-
tion area of Egypt, and in the two principal cities,
are shown in Fig. 1. The period prior to 1926 was
one of a constant rate varying between 22 and 26.
This was the period during which the registration
area was limited to the 2,000,000 population of the
governorates and capitals of provinces. The rate
fell during the years 1926-1932, following the ex-
tension of the registration area to cover another

![Fig. 1.—Trend of cancer mortality in Egyptian Regis-
tration Area, in Cairo and in Alexandria. Deaths per
100,000 population.](image-url)

1,000,000 in the rural regions, and slowly re-
covered as registration gradually improved. Fol-
lowing 1932 the rate for the registration area has
remained constant at a level slightly above that
for the first period. In the two cities, however, the
rate has shown a fairly steady rise, particularly
in Cairo.

A regional presentation of cancer mortality is
given in Fig. 2. The death rates are for the year
1942, and for the cities and towns designated.
Rates for the rural sections cannot be computed
because of the lack of rural population data for
the registration area. The rates range from 42.6
in the governorate of Ismailia to 8.9 in that of
Damietta and 4.5 in the chief town of Asswan.
The wide range of rates may be ascribed in part
to the relatively small population in many of the
towns and governorates. The figure shows no
special concentration of either high or low rates
in any particular region.

DATA FROM BIOPSIES AND AUTOPSIES

Out of 20,280 specimens from biopsies and
autopsies sent for examination to the pathological
laboratory of the Ministry of Public Health, Cairo,
from 1928 to 1937 inclusive, 3,031 or 15 per cent
Fig. 2.—Geographical distribution of cancer mortality in Egypt, 1942.
were classified as benign and 3,180, or 15 per cent, as malignant. The remaining specimens were not tumors (7).

Of 651 specimens taken from hospital patients of the Government Hospital in Alexandria from September, 1931 to November, 1938, 330 cases (15 per cent) were classified as benign and 401 (18 per cent) as malignant. The malignant lesions were classified as carcinomas, 292 (72 per cent); sarcomas, 78 (19 per cent); endotheliomas, 9 (2 per cent); and other tumors, 22 (6 per cent) (8).

During the period 1931-1938, 880 autopsies were made in the Alexandria Government Hospital; 79 of these (9 per cent) showed malignant disease (8). In Kasr-el-Ainy Hospital in Cairo, 5,924 postmortem examinations were made during the years 1905-1930 inclusive. Malignancy was found in 365 cases, or 6.2 per cent. The cases of malignant disease were analyzed by Professor M. F. Sorour (16) and were as listed in Table II.

| Table II: Sorour's Analysis of 5,924 Postmortem Examinations Made in Period of 1905-1930 Inclusive |
|-----------------------------------------------|---------------------------------------------------------------|
| Site of malignant disease | Number of cases | Percentage of total |
| Lip | 10 | 10 | 2.7 |
| Tongue | 9 | 9 | 2.5 |
| Larynx | 8 | 8 | 2.2 |
| Esophagus | 20 | 20 | 5.5 |
| Stomach | 13 | 13 | 3.6 |
| Liver | 15 | 15 | 4.1 |
| Gall bladder | 10 | 11 | 3.0 |
| Pancreas | 11 | 11 | 3.0 |
| Colon | 13 | 13 | 3.6 |
| Rectum | 11 | 11 | 3.0 |
| Bladder | 80 | 85 | 23.3 |
| Cervix uteri | 12 | 12 | 3.3 |
| Corpus uteri | 9 | 9 | 2.5 |
| Ovaries | 8 | 8 | 2.2 |
| Breast | 15 | 15 | 4.1 |
| Kidney | 5 | 4 | 2.5 |
| Retroperitoneal | 27 | 27 | 7.4 |
| Mediastinum and lung | 2 | 3 | 15 | 4.1 |
| Brain and dura | 6 | 6 | 1.6 |
| Thyroid gland | 3 | 1 | 4 | 1.1 |
| Other parts of the body | 54 | 54 | 14.8 |

**Cancer Mortality by Site**

Tabulations of cancer deaths by anatomical site and by sex are available for the years 1931-1942, inclusive, and are summarized in Table III. The male genital organs comprised the most frequent location of fatal cancer with 1,451 deaths (aside from the catch-all group of "other and unspecified" organs). Deaths from malignant disease of the stomach and duodenum accounted for the next largest number, 1,337. These deaths were approximately evenly divided between males and females. Disease involving the breast and uterus each accounted for somewhat over 1,200 deaths, while cancer of the liver and biliary passages, and of the respiratory tract, follow in order. Over twice as many deaths from cancer of the respiratory tract were found for males than for females, which was true also of cancer of the buccal cavity and pharynx. More deaths from malignant disease in other and unspecified organs were recorded for females than males, possibly because of a less precise diagnosis of cancer in the Mohammedan women of Egypt.

The trend of cancer mortality by site over the period 1931-1942, inclusive, is shown in Fig. 3. Rates for cancer classified as "other organs of the digestive tract" (Table III), of the male genito-urinary system, and of the respiratory system have shown a marked increase since 1936. A somewhat erratic but definite increase in mortality from cancer in other and unspecified organs is also shown. Mortality from malignancy of the esophagus, stomach and rectum, and of the breast shows a slight decrease, but not a significant one. Mortality from cancer of the skin decreased from a level of 0.3 per 100,000 during 1931-1935 to a rate of 0.1 in the years 1936-1942. No trend is evident in the death rates from cancer of the liver and biliary passages, of the uterus, and of the buccal cavity.

Some indication is given in these data of an increase in the mortality of cancer of the deep-seated organs (i.e. of the intestines and the male genito-urinary tract) and a decrease or leveling-off of deaths from cancer of the more accessible parts of the body (skin, uterus, and buccal cavity). If these facts can be interpreted in the same manner as similar findings in the United States, they may be cited as evidence of an improvement in diagnosis. The anti-bilharzial hospitals, stationary and mobile, increasing in number during the period, and examining large groups of the population, must have helped to reveal and record cases of cancer of the more deep-seated organs which otherwise would have been easily missed.

The distribution of Egyptian cancer deaths by site is compared with similar distribution for England and Wales and for the United States in Table IV. Although roughly comparable, it is seen that the site most frequently recorded, digestive organs and peritoneum, comprise only 34.4 per cent of the total as against 52.7 and 45.9 per cent in England and Wales, and in the United States, respectively. Deaths comprising the somewhat anomalous grouping, "male genital organs and urinary
TABLE III: CANCER DEATHS AND DEATH RATES BY SITE AND BY SEX FOR THE 12-YEAR PERIOD, 1931-1942. EGYPTIAN REGISTRATION AREA

<table>
<thead>
<tr>
<th>Site</th>
<th>Deaths</th>
<th>Annual rate/100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Buccal cavity and pharynx</td>
<td>388</td>
<td>164</td>
</tr>
<tr>
<td>Digestive tract and peritoneum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esophagus</td>
<td>67</td>
<td>29</td>
</tr>
<tr>
<td>Stomach and duodenum</td>
<td>683</td>
<td>654</td>
</tr>
<tr>
<td>Rectum</td>
<td>296</td>
<td>144</td>
</tr>
<tr>
<td>Liver and biliary passages</td>
<td>847</td>
<td>836</td>
</tr>
<tr>
<td>Pancreas</td>
<td>77</td>
<td>40</td>
</tr>
<tr>
<td>Peritoneum</td>
<td>43</td>
<td>50</td>
</tr>
<tr>
<td>Other organs, including intestine</td>
<td>525</td>
<td>372</td>
</tr>
<tr>
<td>Respiratory tract</td>
<td>747</td>
<td>269</td>
</tr>
<tr>
<td>Uterus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other female genital organs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male genital organs</td>
<td>48</td>
<td>1181</td>
</tr>
<tr>
<td>Skin</td>
<td>1451</td>
<td>46</td>
</tr>
<tr>
<td>Other nonspecific organs</td>
<td>1078</td>
<td>1205</td>
</tr>
<tr>
<td>Total</td>
<td>6302</td>
<td>6304</td>
</tr>
</tbody>
</table>

Organs of both sexes, form nearly twice as high a proportion of cancer deaths as in the other two countries. The greater difference, however, is to be found for the catch-all grouping of "other and nonspecified organs," which bulks greatly over the similar figures for the other countries. If this rubric were reduced to comparable size through more accurate reporting and better diagnosis, it is probable that the distribution of cancer deaths by site in Egypt would conform very closely with those for England and Wales, and the United States.

CANCER MORTALITY BY AGE AND SEX

The distribution of cancer deaths by age and sex is available for the registration area of Egypt for the year 1942 (Table V).

Deaths are fairly evenly proportioned between the sexes for each age group although an excess is shown for the males for ages 10 to 24 and 45 to 54, and for the females for ages 55 to 64 and 75 years and over. The death rates by age groups increase over the life span from 1.4 for ages under 10 years to 200.0 for ages 75 years and over. Compared with similar rates for the United States and for England and Wales for comparable years, rates for Egypt are the lowest for each age group. The difference, however, is less at the younger ages than at the older ones; at ages under 55 years the rates for Egypt are about half those for the other two countries. Above the age of 55, however, the disparity increases until the rate for 75 years and over is only about one-sixth of the corresponding rate for the other two countries.

TABLE IV: PERCENTAGE DISTRIBUTION OF CANCER DEATHS BY ANATOMICAL SITE, EGYPTIAN REGISTRATION AREA, 1931-1942, ENGLAND AND WALES, 1938-1944, AND THE UNITED STATES, 1943

<table>
<thead>
<tr>
<th>Anatomical site</th>
<th>Egyptian Regis. Area 1931-1942</th>
<th>England and Wales* 1938-1944</th>
<th>United States† 1943</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Total</td>
</tr>
<tr>
<td>Buccal cavity and pharynx</td>
<td>6.2</td>
<td>2.8</td>
<td>4.5</td>
</tr>
<tr>
<td>Digestive organs and peritoneum</td>
<td>40.2</td>
<td>28.0</td>
<td>34.4</td>
</tr>
<tr>
<td>Respiratory system</td>
<td>11.8</td>
<td>4.6</td>
<td>8.4</td>
</tr>
<tr>
<td>Uterus</td>
<td>20.9</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Other female genital organs‡</td>
<td>1.7</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Breast</td>
<td>0.8</td>
<td>20.3</td>
<td>10.2</td>
</tr>
<tr>
<td>Male genital organs</td>
<td>23.0</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Urinary organs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin (scrotum excepted)</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Brain and other parts of nervous system</td>
<td>17.2</td>
<td>20.7</td>
<td>18.9</td>
</tr>
<tr>
<td>Other or unspecified organs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total, all sites</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* These data were computed from data kindly supplied to me by the Rt. Hon. Lord Amulree, Ministry of Health, Whitehall, London.
† These data were computed from data kindly supplied to me by Mr. J. C. Caje, Director of the Bureau of the Census, Department of Commerce, Washington, D. C.
‡ The data, for Egypt, include female urinary organs.
It was previously pointed out that the age distribution of the population of Egypt differs from that of the United States or of England and Wales in having a greater percentage of younger persons and a smaller percentage of older persons. The difference thus operates in the direction of a smaller total cancer death rate for all ages. The extent of the age effect can be shown. If the age distribution of Egypt had been the same as that for the United States in 1940, and the cancer death rates for Egypt shown in Table V were operative, the mortality rate from cancer for all ages would have been 39.8 instead of 27.2. The increase of 12.6, or 46 per cent, although large, clearly shows that the factor of age does not account for the relatively small total cancer death rate recorded for Egypt.

CANCER MORTALITY COMPARED WITH THAT OF OTHER DISEASES

In view of the low cancer mortality rate in Egypt compared with that of other countries it is interesting to note that an entirely different situation exists with regard to mortality from all causes of death. We have available for study the total recorded deaths in the registration area of Egypt for the period 1918-1942 and a tabulation by cause of death for the ten year period 1932-1941. The average annual mortality rate for all causes was 32.2 per 1,000 population for the period 1918-1942; for the period 1932-1941 in the expanding registration area, the rate was 36.8. Similar rates for the United States and for England and Wales in 1940 were 10.8 and 13.8 respectively (exclusive of deaths of civilians due to operations of war in England and Wales). The death rate for all causes in Egypt is thus approximately three times as great as that for the United States, and for England and Wales, in spite of a presumed under-registration of deaths and a very favorable age distribution.

Death rates for the principal causes of death are shown in Table VI. Diarrhea and enteritis, the respiratory diseases, tuberculosis, the other infections and parasitic diseases, heart disease, and the nonvenereal urinary and genital diseases all rank higher in the list than cancer. The *prima facie* evidence of this table points to a low prevalence of cancer in Egypt.

However, other facts lead us to accept this evidence with great caution. Cancer outranks nearly all the other diseases on the list in difficulty of diagnosis. The excessive rates for the rubrics “senility” and “other causes” indicate that, in general, diagnostic certification of deaths is poor in Egypt. These two groups together form 28 per cent of all deaths in Egypt in contrast to 13 and 10 per cent in the United States and in England and Wales, respectively. It is a well-known fact that in regions where medical service and death certification are poor, assignments of cause of death to senility and to “ill-defined causes” (included in Table VI in the “other cause” rubric), are high. It will also be recalled from the preceding paragraphs, that criticism of death registration in Egypt is in general directed towards certification of cause of death, and not towards the actual enumeration of numbers of deaths.

Further, it is easy to establish the fact that the rate of cancer mortality is markedly low in areas of defective death registration. As an illustration, tables of mortality were examined for 52 counties in 10 states in the United States in which registration was notably poor in 1920. The cancer death rate per 100,000 was 12.5 in this group of counties, half that of the rate in Egypt (23.3) in the same year, and but 15 per cent of the cancer death rate in the American death registration area in 1920. The point seems clear that a low level of cancer mortality can be accepted only after abundant demonstration that the mechanism of death certification and reporting is well set up and functioning properly.

It is interesting, before closing the present section, to compare the various causes of mortality in Egypt with those of the United States, and of England and Wales, as shown in Table VI. The outstanding contrast is for diarrhea and enteritis; mortality from this cause is 10 times greater in Egypt than in the other two countries. Excessive mortality is also indicated for the respiratory...
TABLE VI: DEATH RATES FROM PRINCIPAL CAUSES OF DEATH IN THE EGYPTIAN REGISTRATION AREA 1932-1941, THE UNITED STATES, 1940, AND IN ENGLAND AND WALES, 1940

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Annual rates/100,000 population</th>
<th>Egypt 1932-1941</th>
<th>United States 1940</th>
<th>England and Wales 1940</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis</td>
<td>66.1</td>
<td>45.9</td>
<td>69.9</td>
<td></td>
</tr>
<tr>
<td>Syphilis</td>
<td>10.2</td>
<td>14.4</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td>1.3</td>
<td>1.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Dysentery</td>
<td>10.9</td>
<td>1.9</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Other infections and parasitic diseases</td>
<td>124.9</td>
<td>27.7</td>
<td>52.0</td>
<td></td>
</tr>
<tr>
<td>Cancer and other malignant tumors</td>
<td>26.9</td>
<td>120.3</td>
<td>172.3</td>
<td></td>
</tr>
<tr>
<td>Nonmalignant or unspecified tumors</td>
<td>1.7</td>
<td>5.0</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>19.4</td>
<td>26.6</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>307.9</td>
<td>54.9</td>
<td>72.7</td>
<td></td>
</tr>
<tr>
<td>Bronchitis</td>
<td>258.6</td>
<td>3.0</td>
<td>115.9</td>
<td></td>
</tr>
<tr>
<td>Other respiratory diseases</td>
<td>64.5</td>
<td>8.2</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>Cerebral hemorrhage</td>
<td>24.5</td>
<td>88.2</td>
<td>124.2</td>
<td></td>
</tr>
<tr>
<td>Hemiplegia and other paralyses of unstated origin</td>
<td>38.3</td>
<td>2.7</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Heart disease</td>
<td>124.3</td>
<td>292.5</td>
<td>341.6</td>
<td></td>
</tr>
<tr>
<td>Other circulatory disease</td>
<td>17.0</td>
<td>21.9</td>
<td>39.4</td>
<td></td>
</tr>
<tr>
<td>Disease of the liver and biliary passages</td>
<td>17.8</td>
<td>15.8</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Urinary and genital diseases, not venereal</td>
<td>135.0</td>
<td>95.4</td>
<td>60.4</td>
<td></td>
</tr>
<tr>
<td>Puerperal mortality</td>
<td>16.1</td>
<td>6.7</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Diarrhea and enteritis</td>
<td>1255.2</td>
<td>10.3</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>Senility</td>
<td>347.7</td>
<td>7.7</td>
<td>48.2</td>
<td></td>
</tr>
<tr>
<td>Violence</td>
<td>124.4</td>
<td>94.3</td>
<td>118.3</td>
<td></td>
</tr>
<tr>
<td>Other causes</td>
<td>683.3</td>
<td>131.9</td>
<td>89.4*</td>
<td></td>
</tr>
<tr>
<td>All causes</td>
<td>3675.7</td>
<td>1076.4</td>
<td>1379.9*</td>
<td></td>
</tr>
</tbody>
</table>

* Exclusive of deaths of civilians due to operations of war.

diseases although this finding is hardly established by the data of Table VI, since the rates for the other two countries are only for 1 year. However, during the 9 year period 1932-1940 the rates for respiratory disease varied between 66 and 105 in the United States, and between 145 and 210 in England and Wales so that the respiratory disease rate of 631 for Egypt is approximately 6 times that for the United States and 3 times that for England and Wales.

Deaths from chronic disease are low in Egypt. The rates for cerebral hemorrhage, and circulatory disease, are lower in Egypt than in the other two countries, while that for the non venereal urinary and genital diseases is somewhat higher. This group of diseases together, and including diabetes, shows a mortality rate of 320 per 100,000 in Egypt as against 525 and 579 for the United States and for England and Wales, respectively, for the years indicated.

NATIONALITY AND RELIGION

The foreign born population in 1937 included 187,000 persons or 1.2 per cent of the total population, concentrated in the urban centers.

Table VII gives the distribution of deaths from cancer and from all causes by nationality for the 25 year period of 1918-1942, together with the cancer death rate per 100,000 for each nationality of foreign-born. The rates show a wide variation from 14.5 for native Egyptians to 64.8 for the Italian foreign-born. The rates for the foreign-born, with the exception of the “other foreign-born” group, are all more than twice as great as for native Egyptians.

The mortality rates for all causes, on the other hand, are high (33.8 per 1,000) for native Egyptians and low (ranging between 9.1 and 12.4 exclusive of the “other” group) for the foreign-born. The rates for the foreign-born are much as one would expect in an average European population.

The variation in cancer mortality according to nationality is in part due to differences in the age distribution. Thirty-one per cent of the foreign-born population were listed as under 20 years of age in the census of 1937, contrasted with 48 per cent for native Egyptians, whereas the percentage of the population over 50 years of age was 18 for the foreign-born as against 12 for natives. The differences in age are large, but cannot account for the higher incidence of cancer mortality among the foreign-born.

The foreign-born populations reside in the urban areas; 80.0 per cent of the total foreign population was recorded as resident in Alexandria and Cairo in 1937. A classification of the census returns by occupation shows that 39 per cent of all occupied foreign-born were employed in industry and com-
merce, as against 12 per cent of the occupied
Egyptian population. Of the latter, 58 per cent
were engaged in agriculture and fishing, as against
1.3 per cent of the foreign-born. A marked con-
trast thus exists between the native Egyptians
and the foreign-born population; the former are
rural dwellers, the latter are urban. Any compari-
son of mortality rates between the two groups
must be made in consideration of the manner of
death certification. It has been demonstrated pre-
viously that mortality reporting in Egypt is most
complete in urban areas and is defective in rural
ones. This fact alone is enough to account for the
differences shown in Table VII.

Nationality differences in mortality in Egypt
must be accepted with great caution until it is
abundantly demonstrated that the system of death
reporting and certification is complete.

The 19,896 deaths recorded during the period
1918-1942 are reclassified according to religion in
Table VIII. Mortality rates for cancer are lowest
among the Moslems, 16.3 per 100,000; next highest
among the Christians, 80.5; and highest among the
Jews, 187.4. In contradistinction to the rates for
the foreign-born, the all-cause mortality rates vary
in the same manner, though to a lesser degree.

Information is not available to give an indica-
tion of the urban-rural or the occupational distri-
bution of the population by religion. It would
appear evident, however, from a comparison of
Tables VII and VIII that the Christian and
Jewish populations of the latter table must include
a number of areas in which mortality is exceedingly
high. The foreign-born populations shown in
Table VII are largely Christian or Jewish; their
annual death rate is 9.1 per 1,000. Table VIII
shows that the Christian and Jewish rates for all
cases are 40.5 and 59.9, respectively. Further in-
vestigation must be carried out in order to clarify
the results shown in Table VIII.

OCCUPATIONAL CANCER

It may be conjectured that the greater exposure
of the foreign-born to the irritants and injuries of
industry renders them more liable than Egyptians
to attack by cancer. However, the number of
foreign-born working in certain industries in which
exposure to carcinogenic substances is suspected is
too small to account for the results shown in
Table VII. The number of such industries is quite
limited in Egypt and it is only rarely, if at all,
that the so-called occupational cancers are en-
countered in Egyptian medical practice, among
either Egyptians or foreign-born.

Chimney sweep’s cancer was never seen in
Egypt; it has even ceased to occur in England and
Wales, where it was first noticed, after the intro-
duction of modern methods of cleaning chimneys.
Cancer developing after long contact with coal
and wood tars, occasionally noted in Europe and
America, is unknown in Egypt. Persons trading
in coal and coke are largely Egyptians and do not
exceed 5,000 in number, while the number of per-
sons preparing pitch for the maintenance of roads
is also small. Malignancy developing on benign
epidermal lesions of the scrotum, forearms and
legs of persons engaged in paraffin works is also
unknown in Egypt. Cancer in brickmakers, de-
v eloping as epitheliomas in old skin lesions, is not
known in Egypt, although about 7,000 persons are
engaged in this occupation.

Cancer in cotton spinners, chiefly attacking
workmen who run spinning machines and in the
process become covered with mineral oil, is also
absent in Egypt. In a cotton spinning factory in
Alexandria, employing between 5,000 and 10,000
workmen under strict medical supervision, not a
single case of cancer of this type was observed over
a period of 12 years. The number of workmen in
cotton spinning and weaving in Egypt was 28,000
in 1937; nevertheless no cases of cotton spinners’
cancer have been recorded.

Miners, who do not exceed 800, petroleum re-
finers numbering about 1,500, and aniline dyers
numbering about 5,000, also appear to be free
from the cancers associated with these trades. The
type of cancer found among aniline dyers is of in-
terest to Egyptian cancerologists because of its re-
semblance to cancer of the bladder developing in connection with bilharziasis, one of the most frequently occurring types of cancer in Egypt.

X-ray cancer is also unknown in Egypt. I have not seen or heard of a single case in 20 years of practice in Egyptian hospitals, either among radiographers and physicians or among patients treated by radiotherapy, although in the provinces, x-rays are often handled by inexperienced persons.

**BILHARZIASIS AND CANCER**

Bilharziasis attacks from 30 to 90 per cent of the population, according to locality, and is most prevalent in rural areas, small towns and villages.

In the series of 5,924 autopsies in Kasr-el-Ainy Hospital, Cairo, 1905-1930, analyzed by Professor Sorour (16), malignant disease was found in 20.6 per cent of the cases of bilharzial bladder and in 4.4 per cent of cases of bilharzial cirrhosis of the liver. In the same series, bilharziasis and cancer were associated in 16.6 per cent of the cases of cancer of the colon. The malignant bladder cases, 85 in number, were all associated with bilharziasis.

Dr. M. Ashour (7) and Dr. Anis Onsy Bey, examining a series of pathological specimens in the Ministry of Public Health Laboratories, found in 3,180 specimens of malignant disease 117 or 3.6 per cent showing bilharzial pathological changes. The bilharzial malignancies were 8 malignant papillomas, 104 carcinomas (46 of which were vesical, or 45 per cent) and 5 sarcomas.

These and similar data have been taken by various authors as proof of a definite relationship between bilharziasis and the development of cancer in certain parts of the body, especially the bladder, prostate and colon where malignant disease is often found to develop on old-standing bilharzial lesions. Such findings are termed bilharzial cancer. The parasitic infection is not credited with provoking malignant disease, but the irritation of the parasites and their ova and embryos, with the coincident chronic sepsis is suspected of being responsible.

Dolbey and Mooro (9) studied 671 cases of cancer in various sites and found malignant disease in a large number of bilharzial bladders but none in bilharzial renal pelves, ureters and intestinal tracts. They noticed that the large intestine was often the seat of large benign growths, resulting from chronic irritation induced by the parasites, which rarely developed malignancy. They ascribed this to the acid reaction of the bowels and absence of chronic sepsis such as that found in cystitis, and suggested that the high incidence of malignancy in bilharzial bladders was due to irritation of the ova in an alkaline medium such as the stagnant urine of bilharzial cystitis. Onsy (13), Sorour (17) and Barsoum (8), however, in biopsies and autopsies found an appreciable number of cases of cancer not only in bilharzial bladders but also in bilharzial prostates, testicles, small intestine, colons, rectums, livers, uteri, ovaries, vulvas, vaginas, etc. Any explanation, therefore, of the role of bilharziasis in the development of malignant disease must not be limited to the bladder, but must include other sites as well. This fact has led to acceptance only that chronic irritative action of the bilharzial ova and embryos and of the long-
standing inflammatory processes resulting from the parasitic infections are precursors of malignancy in bilharzial cancer.

This concept is strongly held by the majority of writers on cancer in Egypt. However, evidence of an association between bilharziasis and cancer would be difficult to avoid in a country so heavily infected with bilharziasis. Proponents of the theory of the causal relation of the disease to cancer have yet to show that the incidence of cancer is higher in a group of definite bilharzial cases than in one in which this disease is definitely absent but is similar to the first in the other pertinent factors of age, sex, race, occupation, etc. Further, unless a definite carcinogenic agent, or other predisposing factor, is proven to exist in bilharziasis, the term "bilharzial cancer" is unjustified. Investigations of this kind have not been carried out, to my knowledge, in Egypt, and the field is still quite open for research.

SUMMARY

Compared with rates for other countries, the recorded incidence of cancer mortality is low in Egypt, but death registration in the country is such that the low rate for Egypt can hardly be accepted. Before this can be done it must be abundantly demonstrated not only that all deaths within the designated registration area are reported, and the cause of death certified, but also that the certification is made as often as possible by a qualified physician with medical knowledge of the case before death. This can be accomplished in part by intensive and concerted action by the medical profession and the health authorities to secure a better registration system. Further improvement than this, however, must await a more complete development of medical care in Egypt, not only with respect to an improvement in the qualifications of the profession, but in the acceptance by the people of the medical profession as the only group qualified to diagnose and treat the ill.

It is likely that most of the differences noted between specific rates for sex, race, and areas are also due to defective reporting and certification.

Until medical practice and death registration are improved, it would appear that evidence of the actual amount of cancer in the country can best be secured by a series of well planned and conducted surveys by qualified medical investigators working in conjunction with experts in the field of statistical sampling. The promise of such surveys is great. The many contrasts of the social, occupational, racial, religious and dietary aspects of life in Egypt offer opportunity for comparisons which would yield valuable information concerning cancer.

The relation between bilharziasis and cancer is still uncertain and needs thorough and careful study, both from the point of view of the incidence of cancer in bilharzial cases and of the pathology and chemistry of the two diseases.

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14. Sorour, M. F. An Analysis of the Results of Post-mortems made in Kasr-El-Ainy Hospital, Cairo from 1905 to 1930. Personal communication.
Cancer Mortality In Egypt

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