

# Cancer Patterns in the Middle East

## *Special Report from the Middle East Cancer Society*

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To update its cancer statistics, the newly established Middle East Cancer Society examined the cancer frequency patterns in Egypt and the Gaza Strip. The results revealed differing overall patterns. For men the highest frequencies were found for lymphoma, bladder cancer and cancers of the oral cavity and pharynx in Egypt, and for lung cancer, leukaemia and lymphoma in Gaza. For women, breast cancer had the highest frequency in both areas, followed by cancers of the oral cavity and pharynx in Egypt, and leukaemia and lymphoma in Gaza. The distribution of cancer occurrence by organ system also varied. In the light of the different ethnicities, lifestyles, socioeconomic levels and carcinogenic exposure among the countries of the Middle East, this kind of comparison can provide the background for more sophisticated approaches for discerning risk factors in cancer. We believe that further cooperation among participating countries will overcome the present limitations in data collection, registration and access.

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In the Middle East, comprehensive population-based incidence data are available from the National Cancer Registries of Israel and Kuwait; however, our knowledge about other areas is limited (1). The figures in Israel tend to resemble those from Europe and North America, whereas those from Kuwait are significantly lower and the cancer patterns vary considerably (1, 2). These differences may be due to differences in ethnic origin, cultural and religious background, occupational exposures, nutritional status, socioeconomic status, and access to medical care. There is also considerable variation in the population age structures.

The advance of the peace process in the Middle East has allowed oncologists and epidemiologists from the region to coordinate their efforts in cancer research and control. In November 1994, the Middle East Cancer Society (MECS) was established in Cairo. It currently includes members from Egypt, the Palestinian Authority, Jordan, Cyprus, Turkey and Israel. To update its cancer statistics, the MECS included a session on the epidemiology of cancer among Egyptians, Israelis and Palestinians in its second meeting in 1995 at the United States National Cancer

Institute in Bethesda and in its first congress in 1996 in Tel Aviv. This report summarizes the special features noted in these populations.

### MATERIAL AND METHODS

For Egypt, cancer data were obtained for 1970–1994 from the Registry of the National Cancer Institute in Cairo (NCI-C), which comes under the auspices of Cairo University (3). The NCI-C is the only multidisciplinary medical centre specializing in cancer treatment on a national level in Egypt. It records all verified cancer cases with at least one hospitalization (non-hospitalization is rare for most types of cancer). All registrations are checked for duplicates. Population data were derived from the 1986 census conducted by the Central Agency for Public Mobilization and Statistics (4).

For the Gaza Strip, cancer data were obtained for 1990–1994 from the medical records of the Hemato-Oncology Clinic of Shifa Hospital. All cancer patients living in Gaza receive medical treatment in this clinic, and all pertinent records, histology reports, medical summaries,

**Table 1a**  
Relative cancer frequency by percent and ranking for 15 selected sites: males<sup>a</sup>

Site	Gaza <sup>b</sup>	Egypt <sup>c</sup>	SEER <sup>d</sup>	Sweden <sup>e</sup>	Israel <sup>f</sup>	
					Jews	Non-Jews
Prostate	7.6 (5)	0.5 (12)	31.6 (1)	24.2 (1)	10.0 (3)	6.5 (5)
Lung	17.7 (1)	2.2 (8)	15.8 (2)	10.2 (3)	11.9 (2)	21.7 (1)
Colorectal	5.9 (7)	4.0 (6)	11.9 (3)	12.5 (2)	18.2 (1)	6.5 (5)
Bladder	7.7 (4)	40.1 (1)	60.0 (4)	7.1 (4) <sup>g</sup>	9.8 (4)	8.8 (2)
Lymphoma	10.3 (3)	9.6 (2)	4.6 (5)	4.0 (7)	4.4 (6) <sup>h</sup>	10.3 (3)
Oral & pharynx	2.2 (12)	7.6 (3)	3.1 (6)	2.9 (11)	2.9 (12)	3.9 (8)
Melanoma	1.3 (13)	2.1 (9)	2.7 (7)	3.1 (10)	3.0 (11)	0.4 (15)
Kidney	10.0 (14)	0.5 (12)	2.7 (7)	4.3 (6)	3.9 (8)	1.5 (13)
Leukaemia	10.0 (2)	4.9 (5)	2.6 (9)	2.9 (11)	3.4 (10)	6.9 (4)
Stomach	3.5 (10)	1.3 (10)	2.4 (10)	5.6 (5)	6.1 (5)	3.7 (9)
Pancreas	3.1 (11)	0.6 (11)	2.1 (11)	3.6 (8)	4.0 (7)	2.7 (11)
Larynx	4.4 (9)	5.5 (4)	1.5 (12)	1.0 (15)	2.0 (13)	2.9 (10)
Brain	7.4 (6)	N.A. <sup>i</sup>	1.5 (13)	3.2 (9) <sup>g</sup>	3.5 (9) <sup>g</sup>	5.3 (7) <sup>g</sup>
Liver	4.9 (8)	0.3 (14)	1.4 (14)	2.0 (13)	1.5 (14)	2.4 (12)
Oesophagus	0.3 (15)	3.6 (7)	1.3 (15)	1.3 (14)	0.8 (15)	0.5 (14)

<sup>a</sup> Rank in parentheses. Sites with the same cancer frequency are given the same ranking. Data for US SEER areas and Sweden provided for comparison.

<sup>b</sup> Cancers diagnosed in Gaza between 1990 and 1994.

<sup>c</sup> Registry of the National Cancer Institute in Cairo, 1970–1994.

<sup>d</sup> Based on the estimated number of cancers for 1994 (2).

<sup>e</sup> Cancers diagnosed between 1983 and 1987 (1).

<sup>f</sup> Cancers diagnosed between 1987 and 1989 (5).

<sup>g</sup> Includes non-invasive tumours.

<sup>h</sup> Non-Hodgkin's lymphoma only.

and death certificates from referral centres in Israel or elsewhere are sent here. Because the treatment services and medical records are centralized and the population is relatively small, cancer confirmation is considered to be extremely good. Population data on the Gaza Strip were taken from the December 1992 census report (5).

Since populations in the Middle East are quite different in ethnicity, socio-economic status and carcinogenic exposures, the data from Cairo and the Gaza Strip were presented in the tables with data from Israel, USA and Sweden to serve as references.

## RESULTS

In 1986, the population of Egypt was 48.2 million, and that of the Cairo metropolitan area, 9.7 million (4). A total of 50 638 cancer patients (30 383 males and 20 255 females) were registered between 1970 and 1994 (about 2 000 cases annually).

The population of the Gaza Strip in 1992 was 842 000; following the signing of the peace agreement with Israel, approximately 50 000 Palestinians have returned thereafter. Between 1990 and 1994, an average of almost 350 new cancer cases were diagnosed annually.

## Sex

**Males (Table 1a):** In Egypt, the leading cancer diagnosed among males was bladder cancer (40.1%). Lymphomas (9.6%) and cancer of the larynx (7.6%) and oesophagus (3.6%) also occurred quite frequently, while cancers of the prostate (0.5%) and lung (2.2%) were relatively rare. In Gaza, lung cancer had the highest relative frequency (17.7%), followed by leukaemia (10.0%) and lymphoma (10.3%).

**Females (Table 1b):** In Egypt and Gaza, breast cancer accounted for 34% of all cancers. In Gaza, this was followed by leukaemia (7.8%), lymphoma (6.2%) and cancer of the brain (6.1%); cancer of the corpus uteri (2.8%) was infrequent. In Egypt, bladder cancer (14.4%), and cancers of the oral cavity and pharynx (7.9%) occupied second and third positions in the leading cancers; lung cancer was relatively rare.

Melanoma was relatively uncommon in both males and females in all countries.

## Organ systems

The distribution of cancer occurrence within several organ systems also varied considerably in the different population groups (Table 2).

**Table 1b**  
Relative cancer frequency by percent and ranking for 15 selected sites: females<sup>a</sup>

Site	Gaza <sup>b</sup>	Egypt <sup>c</sup>	SEER <sup>d</sup>	Sweden <sup>e</sup>	Israel <sup>f</sup>	
					Jews	Non-Jews
Breast	34.3 (1)	33.9 (1)	31.6 (1)	25.0 (1)	28.3 (1)	21.9 (1)
Colorectal	5.6 (6)	1.9 (9)	12.8 (2)	12.8 (2)	14.5 (2)	8.9 (2)
Lung	4.8 (8)	0.6 (12)	12.5 (2)	4.2 (6)	4.4 (4)	1.9 (10)
Corpus uteri	2.8 (11)	2.1 (8)	5.4 (4)	5.1 (4)	3.8 (6)	4.2 (7)
Ovary	3.1 (9)	2.8 (7)	4.2 (5)	5.6 (3)	5.4 (3)	4.2 (7)
Lymphoma	6.2 (3)	5.4 (4)	4.0 (6)	3.2 (11)	4.0 (5) <sup>g</sup>	5.8 (4) <sup>g</sup>
Cervix uteri	2.8 (10)	4.6 (5)	2.6 (7)	2.9 (12)	1.8 (13)	4.3 (6)
Melanoma	0.5 (15)	1.4 (10)	2.6 (7)	3.3 (10)	3.2 (8)	0.3 (15)
Pancreas	1.7 (12)	0.3 (13)	2.4 (9)	3.6 (9)	3.1 (9)	3.2 (9)
Bladder	0.7 (13)	14.4 (2)	2.3 (10)	4.6 (5) <sup>f</sup>	2.3 (12)	0.8 (14)
Leukaemia	7.8 (2)	2.9 (6)	2.2 (11)	2.1 (13)	2.5 (11)	7.1 (3)
Oral & Pharynx	0.6 (14)	7.9 (3)	1.7 (12)	1.4 (15)	1.4 (14)	1.9 (12)
Stomach	5.2 (7)	0.7 (11)	1.5 (13)	3.8 (7)	3.1 (9)	2.9 (10)
Brain	6.1 (4)	N.A.	1.4 (14)	3.7 (8) <sup>h</sup>	3.5 (5) <sup>h</sup>	4.8 (5) <sup>h</sup>
Liver	5.6 (5)	0.3 (13)	1.3 (15)	1.5 (14)	0.8 (15)	1.4 (13)

<sup>a</sup> Rank in parentheses. Sites with the same cancer frequency are given the same ranking. Data for US SEER areas and Sweden provided for comparison.

<sup>b</sup> Cancers diagnosed in Gaza between 1990 and 1994.

<sup>c</sup> Registry of the National Cancer Institute in Cairo, 1970–1994.

<sup>d</sup> Based on the estimated number of cancers for 1994 (2).

<sup>e</sup> Cancers diagnosed between 1983 and 1987 (1).

<sup>f</sup> Cancers diagnosed between 1987 and 1989 (5).

<sup>g</sup> Includes non-invasive tumours.

<sup>h</sup> Non-Hodgkin's lymphoma only.

*Oral cavity and respiratory system:* The hypopharynx was the predominant subsite of cancer of the oral cavity and pharynx in both Gaza (25%) and Egypt (33.3%). Up to 66% of respiratory cancers in Egypt occurred in the larynx.

*Digestive organs:* In Egypt, cancers of the rectum (34.3%) and oesophagus (30.8%) were the most prevalent malignancies of the digestive organs. The Gazans had a large proportion of liver (26.1%) and stomach cancers (21.5%).

*Lymphomas and leukaemias:* An unusually high percentage (62%) of the leukaemias in Gaza were lymphatic.

#### Age

The age distribution of cancer patients varied substantially. Table 3 presents the percentage of cancer cases by age. More than 50% of the Arab population and 10% of Arab cancer patients were less than 20 years old, compared with 38% and 2%, respectively, of Jewish Israelis. At the other extreme, less than 5% of the Arab population and slightly more than 30% of Arab cancer patients were over 65 years old, compared with 10% and 58% of Jewish Israelis. In Egypt, only 12% of cancer patients were over age 65 years. Therefore, as expected, the median age for various cancer types was lower among the Arab populations than among Israeli Jews. Median age at diagnosis of

the different cancers (by site) can be found in Table 4. For the most part, diagnoses were made later in Gazans than in Egyptians.

#### DISCUSSION

This paper is the first to compare cancer patterns in four populations living in the Middle East. Because population-based cancer registries do not currently exist in either Egypt or Gaza, we evaluated the distribution of cancers by sex and age, and the relative frequencies of different cancers.

While our findings are informative, they are limited by several weaknesses: the incomplete incidence data from Gaza and Egypt for several types of cancers; the relatively few reported cancer cases in some of the populations; and the comparison of data collected partly from different years. For example, the data from Gaza cover the period from 1990 to 1994 and owing to the relatively sparse population of the area during this period (less than one million) and its young age structure, only 1 700 cancer cases were reported. Similarly, the number of cancer cases among Israeli Arabs was 1 408 during the years 1987 to 1989 (6, 7). The data from Egypt were taken from a single medical centre in Cairo, renowned for its treatment of bladder and head and neck cancers, but limited in services for lung and brain cancers. The resulting patient-selection

**Table 2**  
Relative site distribution in percent and ranking of cancers by organ system: both sexes<sup>a</sup>

Site	Gaza	Egypt	SEER	Israel	
				Jews	Non-Jews
<b>Oral cavity and pharynx:</b>					
Tongue	8.3 (4)	16.7 (3)	20.4 (1)	14.1 (3)	9.3 (3)
Gum & other oral cavity	20.8 (2)	18.5 (2)	18.5 (2)	32.4 (2)	16.3 (3)
Lip	12.5 (3)	9.8 (4)	11.1 (3)	35.5 (1)	44.2 (1)
Hypopharynx	25.0 (1)	33.3 (1)	10.2 (4)	2.8 (4)	7.0 (4)
Other	33.4	21.7	39.8	14.7	23.2
<b>Respiratory system:</b>					
Lung	82.1 (1)	29.0 (2)	90.5 (1)	84.4 (1)	88.3 (1)
Larynx	17.0 (2)	66.1 (1)	7.0 (2)	11.9 (2)	10.7 (2)
Other	0.9	4.9	2.5	3.7	1.0
<b>Digestive organs:</b>					
Colon	15.5 (3)	13.0 (3)	44.7 (1)	35.3 (1)	30.9 (1)
Rectum	12.9 (4)	34.3 (1)	17.9 (2)	23.6 (2)	17.9 (2)
Pancreas	12.9 (5)	4.8 (6)	11.7 (3)	12.7 (4)	15.0 (4)
Stomach	21.5 (2)	11.3 (4)	10.1 (4)	16.5 (3)	17.2 (3)
Oesophagus	3.5 (7)	30.8 (2)	5.0 (5)	2.3 (7)	2.02 (7)
Liver	26.1 (1)	5.8 (5)	3.9 (6)	4.2 (5)	10.3 (6)
Gallbladder	7.0 (6)	1.2 (7)	1.4 (7)	3.8 (5)	12.5 (5)
Other	0.6	0.5	5.4	1.6	4.0
<b>Lymphomas:</b>					
Non-Hodgkin's	64.8 (1)	60.4 (1)	82.9 (1)	80.8 (1)	80.8 (1)
Hodgkin's	35.2 (2)	39.6 (2)	17.1 (2)	19.2 (2)	30.0 (2)
<b>Leukaemias:</b>					
Non-lymphatic <sup>b</sup>	38.2 (2)	50.3 (1)	54.0 (1)	57.8 (1)	63.3 (1)
Lymphatic	61.8 (1)	49.7 (2)	46.0 (2)	42.2 (2)	36.7 (2)

<sup>a</sup> See footnotes for Table 1a. Data for US SEER areas provided for comparison.

<sup>b</sup> Unspecified included.

bias can be observed in the higher relative frequency of bladder cancer in this series (40% for males and 14% for females) than in the pathological series conducted from private hospitals in Cairo (32% for males and 5% for females) (8). Nevertheless, although the frequency of bladder cancer may vary, depending on the data source, it still remains by far the major cancer in Egypt.

The finding that figures for Israeli Arabs fall between those for Kuwaitis (8) and those for Israeli Jews suggests the importance of genetic, environmental, and economic factors in cancer occurrence. These must be taken into account in future regional studies as well as in various health programmes.

Factors common to Middle Eastern countries are vast desert areas and heavy solar exposure. In many areas, industrialization and urbanization are occurring rapidly and are often unaccompanied by proper protective legislation, leading to dangerous increases in environmental carcinogens. In addition, there is a high incidence of parasitic, bacterial and viral disease, as well as nutritional problems, which are known to play an important role in the aetiology of some malignant diseases. At the same time, religious practices and customs, economic status, and individual lifestyles often vary widely.

For example, in Egypt more than 50% of bladder cancers are associated with bilharzia eggs in the tissue, whereas the remainder are squamous or transitional carcinoma. This is also true for Iraq, Sudan, Yemen and southern Saudi Arabia (8). Carcinoma of the bilharzial bladder is different clinicopathologically from non-bilharzial carcinoma.

The higher relative frequency of malignant lymphomas in Egypt and in Gaza compared with that in developed countries has been associated with the low socioeconomic status, malnutrition, and prevalence of Epstein-Barr virus (EBV) (8). The age at first infection with EBV in developing countries is in childhood, whereas in the Western world, it is usually in adulthood.

The low relative frequency of cervical cancer observed in Egypt, the Gaza Strip and Israel contrasts with the high frequency reported in Lebanon, Morocco and Tunisia. A possible explanation of these differences might be the different exposure to human papilloma virus, mainly due to different sexual habits.

Although skin cancer is reportedly associated with excessive ultraviolet exposure of solar origin, there are differences in frequency observed between Arab countries and the Israeli population. This may be explained, at least in

**Table 3**  
Frequency (%) of cancer cases and total population by age: both sexes\*

Country/Area	Age (yrs)					
	<20		20-64		65+	
	Cancer cases	Total population	Cancer cases	Total population	Cancer cases	Total population
Gaza <sup>a</sup>	13	61	56	37	31	2
Egypt <sup>a</sup>	10	51	78	46	12	2
SEER <sup>c</sup>	1	29	40	60	59	11
Israel, Jews <sup>d</sup>	2	38	41	51	58	10
Israel, non-Jews <sup>d</sup>	11	54	53	43	36	3

\* Data for US. SEER areas provided for comparison.

<sup>a</sup> Gaza, cancer data from 1990 to 1994, population data from 1993.

<sup>b</sup> Egypt, cancer data from 1986 to 1994, population data from 1986.

<sup>c</sup> All races, cancer data from 1987 to 1991, population data from 1983 to 1987 (2).

<sup>d</sup> Israel, cancer data from 1989, population data from 1993.

part, by genetic differences in pigmentation (related perhaps in intermarriage rates) and dress habits (which have been greatly 'Westernized' among Israelis).

Alcohol consumption is very low in the entire region, but smoking (tobacco) is very common in Israelis of both sexes and in male Egyptians and Gazans. In Egypt, despite the widespread anti-smoking campaign of the past ten years, the proportion of male smokers decreased by only 9% (from 40% to 31%), whereas smoking in teenagers and women actually increased (9). Likewise, in Israel, which also has a strong anti-smoking campaign and where smoking is banned in public places, the proportion of male smokers aged 20 years or more decreased only from 44%

in 1983 to 38% in 1992, and in females, from 30% in 1983 to 25% in 1992 (10).

The relative lack of public information on cancer in many countries in the region causes some patients to seek medical attention and treatment only at a late stage, resulting in higher cancer mortality rates. In light of the many differences among these populations, the kind of comparison performed here can provide the basis for improved screening and preventive programmes.

One of the objectives of the MECS is to upgrade the collection of comprehensive incidence data. It has recently established a subcommittee on cancer epidemiology and registration that will focus on cancer registration in the

**Table 4**  
Median age of cancer patients at diagnosis: both sexes\*

Site	Gaza <sup>a</sup>	Egypt <sup>b</sup>	SEER <sup>c</sup>	Israel <sup>d</sup>	
				Jews	Non-Jews
All sites	58	47	68	66	56
Oral cavity & pharynx	55	51	64	62	49
Digestive organs	61	52	71	67	64
Respiratory system	63	56	67	67	64
Bone	51	30	N.A. <sup>e</sup>	29	14
Soft tissue	38	41	N.A.	44	47
Breast	51	47	64	60	54
Female genital	58	47	63	60	38
Male genital	70	50	72	69	66
Urinary system	60	48	69	69	64
Brain & nervous system	39	46	56	58	49
Lymphomas	32	35	62	62	34
Leukaemias	27	31	67	64	29

\* Data for US SEER areas provided for comparison.

<sup>a</sup> Cancers diagnosed in Gaza between 1990 and 1994.

<sup>b</sup> Cancers in the Registry of the National Cancer Institute in Cairo from 1970 to 1994. Source: Sherif M, unpublished data.

<sup>c</sup> Based on the estimated number of cancers for 1994. (Ries et al., 1994).

Middle East and Egypt and is expected to establish the first population-based cancer registry in the Delta region in the near future. More countries in the Middle East and North Africa are being encouraged to join the MECS to allow for better international cooperation and attainment of a more complete picture of cancer patterns in the area.

#### REFERENCES

1. Parkin DM, Muir CS, Whelan SL, et al., eds. Cancer incidence in five continents. Vol. VI, International Agency for Research on Cancer. IARC Scientific Publ. No. 120. Lyon, France, 1992.
2. Ries LAG, Miller BA, Hankey BF, et al., eds. SEER cancer statistics review, 1973–1991: Tables and graphs. National Cancer Institute. NIH Publ. No. 94-2789. Bethesda, MD, USA, 1994.
3. Sherif M, Ibrahim A. The profile of cancer in Egypt. National Cancer Institute, Cairo, Egypt, 1987.
4. Central Agency of Public Mobilization and Statistics. Results of the 1986 Census. Central Agency of Public Mobilization and Statistics, Cairo, Egypt, 1990.
5. Central Bureau of Statistics. Statistical Abstracts of Israel 1983. Publ. No. 44. Central Bureau of Statistics, Jerusalem, 1993.
6. Israel Cancer Registry. Cancer in Israel, facts and figures, 1989. Ministry of Health, Jerusalem, Israel, 1993.
7. Iscovich J. Israel. In: Parkin DM, Muir CS, Whelan SL, et al., eds. Cancer incidence in five continents, vol. VI. International Agency for Research on Cancer. IARC Scientific Publ. No. 120. Lyon, France, 1992.
8. El-Bolkainy N. General pathology of cancer. El-Asdekaa Graphics Center, Cairo, Egypt, 1991.
9. Omar S. Smoking and Cancer. 8th Meeting of the Regional Advisory Panel on Cancer. WHO Regional Office, Alexandria, Egypt, 1989.
10. Aburbah M, Haklai Z, Klein H, Handelsman M. Health in Israel. Selected data. Ministry of Health, State of Israel, Jerusalem, 1996.