REGIONAL REVIEW

Cancer Epidemiology in South-West Asia - Past, Present and Future

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Abstract

South-West Asia, stretching from Lebanon and Syria in the north, through to Yemen in the south and Iraq in the east, is the home of more than 250 million people. Cancer is already a major problem and the markedly increasing rates for diabetes suggest that the burden of adenocarcinomas will only become heavier over time, especially with increasing obesity and aging of what are now still youthful populations. The age-distributions of the affected patients in fact might also indicate cohort effects in many cases. There are a number of active registries in the region and population-based data are now available for a considerable number of countries. Scientists from the region are also contributing to epidemiological research into the causes of cancer and how to develop effective control programs. The present review covers the relevant PubMed literature and cancer incidence data from various sources, highlighting similarities and variation in the different cancer types, with attempts to explain disparities with reference to environmental factors. In males, the most prevalent cancers vary, with lung urinary bladder or liver in first place, while for females throughout the region breast cancer is the major problem. In both sexes, non-Hodgkins lymphomas and leukemias are relatively prevalent, along with lung in males and thyroid in certian female populations. Coordination of activities within the Arab world, as well as Israel, could bring major benefits to cancer control in the eastern Mediterranean region.

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Introduction

The countries of South-West Asia share a great deal in terms of culture while markedly differing in their levels of economic development. The variation between and within populations is relected in different disease profiles, although in all cases the burden of cancer is already appreciable. The available data indicate that incidence rates are rising and with aging as well as continued population growth this means that the problem will loom larger in the future.

Since the literature regarding cancer registration data and associated epidemiological findings are scattered, the present research was undertaken to provide an overview. The countries included are the Lebanon, Syria, Israel and the Palestinian Authority (the West Bank and Gaza), Egypt, Saudi Arabia, Yemen, the Sultanate of Oman, the United Arab Emirates, Qatar, Bahrain, Kuwait and Iraq. Although comparisons of population-based cancer incidence rates in Israel and Jordan, with and without Egypt, have been published (Freedman et al., 2003; Freedman et al., 2007) a more general coverage has not been hitherto been available. All sources available to the authors were therefore accessed to give as comprehensive a picture as possible regarding the cancer burden, risk factors and preventive approaches. Representative relevant papers in PubMed were cited with the focus on individual organ sites, in an attempt to explain variation in incidence rates in terms of accepted risk and beneficial factors.

Cancer Registration in South-West Asia

The cancer registries within South-West Asia are shown in Figure 1. The oldest population-based registry is that of Israel, which has been reporting to Cancer Incidence in Five Continents since the series was launched in the 1960s (see Table 1). Kuwait has been included since 1987, Oman since 2002 and Bahrain and Egypt since the last issue, in 2007. The population-based age-standardized cancer incidence data for the major body sites in Volume IX were examined for the present paper (see Tables 2 and 3 for females and males respectively). In addition, findings for Jordan, from The Middle East Cancer Consortium, with membership comprising Cyprus, Egypt, Israel, Jordan and the Palestinian Authority (established in 1996, now including Turkey) were obtained from http://

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Table 1. Numbers of Middle Eastern Countries and Registries in the Series of Nine Volumes of CIV

Volume	I	II	III	IV	V	VI	VII	VIII	IX
Israel*	1	1	1	1	1	1	1	1	1
Kuwait*					1	1	1	1	1
Oman*								1	1
Bahrain*									1
Egypt: Gharbia									1

*: National Cancer Registry

mecc.cancer.gov (Freedman et al., 2007) and from Saudia Arabia and Qatar from Bazarbashi et al (2001) and Bener et al (2008), respectively.

Percentages of all neoplasms for the five most frequent cancers for these and other countries are illustrated graphically Figure 2 were from Globocan 2002 or from hospital-based registries in Lebanon (Shamseddine et al., 2004), Yemen (Al-Thobhani et al., 2001), Bahrain (Alsayyad and Hamadeh, 2007) and Iraq (Habib et al., 2006; 2007).

In males, while lung cancer featured in the most frequent neoplasms in teh latest data in all but the Yemen case, urinary bladder tumours were more prevalent in three countries and liver and oral cavity lesions occupied the first position in Saudi Arabia and the Yemen, respectively. Jews in Israel were also exceptional in having prostate cancer as number one. For countries not included in Figure 2, Syrian males in Aleppo demonstrated age-adjusted incidence rates highest for bladder, leukaemia and lung cancers, in that order (Mzayek et al., 2002). In the Al Jouf region of Saudi Arabia, lymphomas and leukemias combined, colorectal and skin cancers have been reported to be most prevalent (El Hag et al., 2002). In Gaza, lung cancer, and again leukaemia and lymphoma appear to be most common (Kahan et al., 1997).

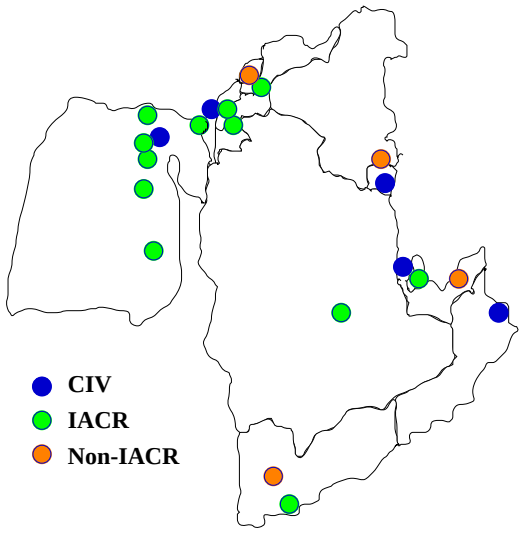

Figure 1. Cancer Registries in the Asian Middle East

Breast cancer, almost without exception, is the most frequent tumour type in females, followed by colon in five populations and cervix in three. In Syrian females age-adjusted incidence rates were highest for breast, uterus (+ cervix) and leukaemia (Mzayek et al., 2002). In Gaza, leukaemia and lymphoma occupy second and third place (Kahan et al., 1997).

Organ Specific Epidemiology

Skin Cancer

With the exception of Israel, skin cancer, including melanoma, is rare (see Figure 3). The most common skin cancers seen, at least in Saudi Arabia, are basal cell carcinomas (BCCs) and SCCs, with site distributions similar to studies in Caucasians pointing to sun as the risk factor, followed by Kaposi's sarcoma (Al-Maghrabi et al.,

Table 2. Age-standardized Cancer Incidence Data for South-West Asia - Males

		Israel*			Saudi**				
	Jordan#	Jews	Arabs	Egypt*	Arabia	Oman*	Qatar##	Bahrain*	Kuwait*
Buccal	2.6	3.4	2.7	0.5	1.0	2.3	-	3.3	1.8
Pharynx	2.3	0.5	0.5	1.8	0.3	0.4	-	0.8	0.3
Nasopharynx	2.3	0.9	1.1	1.8	2.5	1.0	0.7	2.9	1.7
Oesophagus	1.5	2.1	1.1	1.7	0.5	2.6	0.4	4.2	2.2
Stomach	6.0	12.0	6.7	3.3	2.4	13.4	2.0	8.5	3.4
Colon	7.6	29.2	10.6	4.2	2.4	3.0	6.5	7.9	8.4
Rectum	3.9	13.3	8.3	2.1	2.4	2.1	3.0	4.4	5.2
Liver	1.9	3.1	2.6	21.9	5.9	7.4	3.4	5.3	8.1
Gallbladder	0.8	1.3	2.0	1.2	0.8	0.7	-	0.8	1.8
Pancreas	1.8	8.3	5.0	4.0	1.1	2.1	0.7	4.9	3.7
Larynx	4.8	4.6	6.1	4.2	1.4	1.4	0.9	4.7	2.7
Trachea, lung	16.4	30.5	40.4	14.0	4.1	9.8	5.9	34.2	15.6
Prostate	11.2	49.2	20.0	8.5	3.4	10.5	3.0	14.3	10.5
Kidney	3.4	11.4	4.4	2.5	1.7	1.7	1.6	4.7	5.8
Bladder	13.2	28.1	18.1	27.9	2.9	5.1	1.8	14.7	6.3
Brain	4.4	6.1	4.9	4.0	1.9	3.5	2.0	3.0	5.1
Thyroid	1.7	3.5	2.0	1.1	1.5	1.7	-	1.1	3.5
Non-Hodgkin	7.3	17.5	10.0	16.9	4.4	8.2	5.9	7.1	10.4
Leukemia	7.3	10.0	7.3	5.4	3.9	4.8	-	7.7	4.9
Total	115	291	183	162	59	105	51	160	121

* From Curado et al., 2007; **Bazarbashi et al., 2005; #Freedman et al., 2007; ##Bener et al., 2008

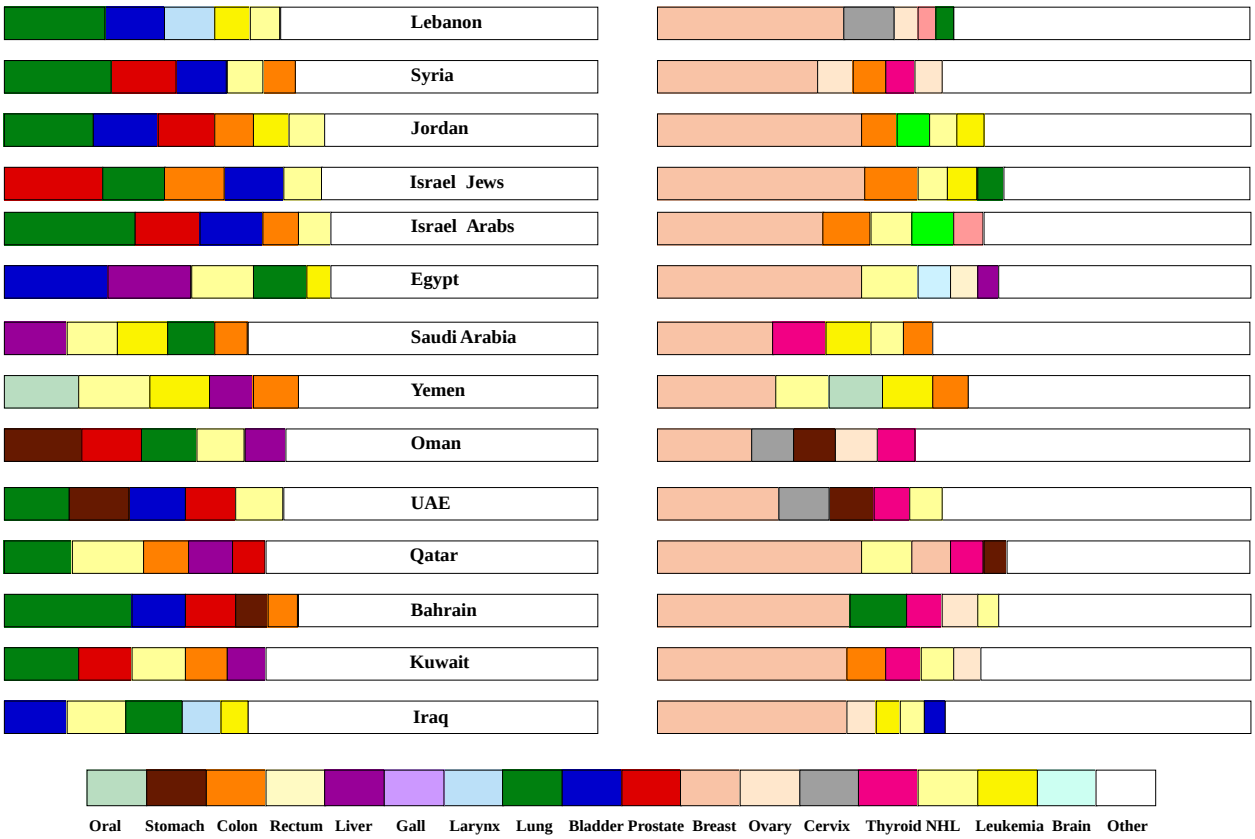

Figure 2. Percentage Data for the Five Most Prevalent Cancers in Countries of South-West Asia

2004). In Qatar, BCC is the commonest skin cancer but expatriates account for a large proportion, especially Europeans (Mahmoud and Azadeh, 1996).

Oral Cancer

Cancer of the buccal cavity is relatively rare across the Arab countries, with the exception of parts of the Yemen

Table 3. Cancer Registry Data for South-West Asia - Females

		Israel*			Saudi**				
	Jordan[#]	Jews	Arabs	Egypt*	Arabia	Oman*	Qatar[##]	Bahrain*	Kuwait*
Buccal	2.3	1.8	0.7	0.1	1.3	1.0	0.7	1.6	1.5
Pharynx	0.2	1.9	0.4	1.8	0.3	0.6	-	1.5	0.2
Nasopharynx	0.5	1.9	0.4	1.8	0.7	1.7	1.9	0.3	0.8
Oesophagus	0.7	0.9	0.4	0.9	0.9	2.7	1.1	1.8	1.6
Stomach	3.5	6.3	3.5	2.0	1.7	6.2	2.5	5.4	2.6
Colon	7.2	24.6	10.8	2.7	3.1	2.2	2.2	5.1	7.6
Rectum	3.0	9.6	3.7	1.7	1.8	1.4	6.1	2.2	4.2
Liver	1.3	1.4	0.7	4.5	2.2	3.2	1.8	3.1	3.6
Gallbladder	0.3	4.8	2.8	1.0	1.1	1.1	0.7	0.9	1.7
Pancreas	1.0	5.8	2.4	2.3	0.6	1.6	1.1	2.8	3.0
Larynx	0.4	0.7	0.6	0.3	0.1	0.3	-	0.7	0.5
Trachea, lung	3.1	12.4	5.1	3.6	1.4	2.3	2.5	11.8	4.6
Breast	38.0	96.8	38.5	42.5	11.8	14.6	30.1	46.8	41.3
Ovary	4.6	9.9	3.7	5.1	2.3	6.2	-	7.4	5.4
Corpus uteri	5.8	13.2	9.0	2.6	2.0	0.9	-	5.2	3.6
Cervix uteri	2.6	5.8	2.4	2.1	2.2	6.5	-	6.0	4.5
Kidney	1.9	5.8	1.6	1.5	1.2	1.6	1.8	3.5	2.0
Bladder	1.8	5.3	1.7	3.1	1.2	2.2	0.7	3.8	2.9
Brain	3.6	4.3	3.3	6.2	1.3	2.6	1.4	0.9	3.1
Thyroid	4.5	12.1	7.0	2.6	4.4	5.9	5.7	7.7	7.3
Non-Hodgkin	5.4	14.0	9.1	9.9	4.1	4.4	6.8	5.6	6.5
Leukemia	4.9	14.0	3.9	4.1	2.7	3.3	-	3.3	3.8
Total	112	282	134	122	58	91	87	143	129

*From Curado et al., 2007; **Bazarbashi et al., 2001; [#]Freedman et al., 2007; [##]Bener et al., 2008

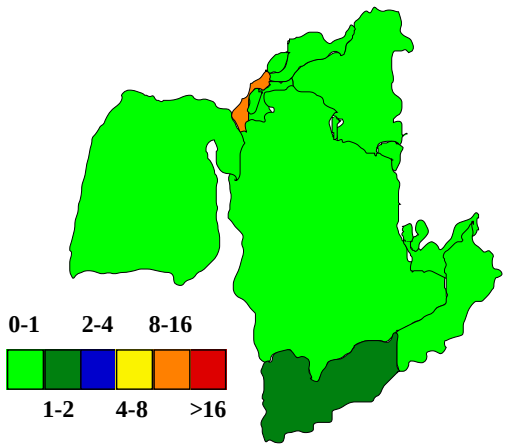

Figure 3. Male Melanoma Incidences/100,000 ((Globocan, 2002: Ferlay et al., 2004)

where it is number one, and somewhat high levels in Israel (see Figure 4). The relative frequency of oral SCC is thought to be related to the habits of chewing tobacco and qat in the Yemen (Sawair et al., 2007). Qat chewing can provoke the development of oral keratotic white lesions which become more severe with duration (Ali et al., 2004; Scheifele et al., 2007). Furthermore, in Saudi Arabia there are very wide regional disparities in incidence, with an almost thirty-fold difference between the lowest and highest rates (Brown et al., 2006). The lower lip may be the most commonly affected site followed by the tongue in Iraq (Al-Rawi and Talabani, 2008). The floor of the mouth is the most common site, then again the tongue in Jordan (Ma'aita, 2000). Of the cases of cancer recorded in the Kuwait Cancer Registry in the 10 years 1979-1988, 7.4% involved the lip, oral cavity or pharynx (Morris et al., 2000).

Nasopharyngeal Cancer

Nasopharyngeal cancer is relatively common in Western North African males but otherwise rare. Characteristics of NPC patients in Lebanon and their parameters of outcome are comparable to those reported in Western series (Geara et al., 2005). Early onset of suggests a possible underlying genetic susceptibility in Saudi Arabians (Andejani et al., 2004).

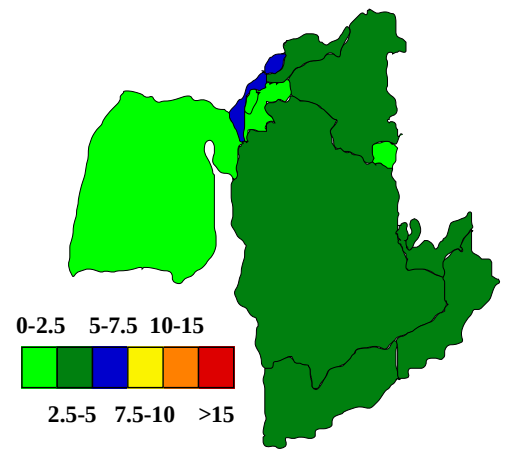

Figure 4. Male Oral Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

Oesophageal Cancer

In clear contrast to Iran, the Arabic world has generally very low incidences of oesophageal cancer (see Figure 5). CIV data for relative incidence of the squamous cell carcinoma and adenocarcinoma types are listed in Table 4. The reason for the variation between countries and sexes remains unclear. In Bahrain, in direct opposition to the CIV data, SCC (males) and adenocarcinomas (females) were the main histological types, with the lower and upper third of the oesophagus as the most and least frequently involved sites, respectively (Al-Hilli and Malik, 2003). However, the CIV data are not in agreement. In the Yemen, a preponderance of women with carcinoma of the mid-oesophagus was noted, previously only recorded in areas of high prevalence, with a high frequency of Qat chewing and water-pipe smoking found for both men and women (Gunaid et al., 1995). A slight preponderance of female cases was also found for Qataris, with nutrition and social status as probable etiologic factors (Ejeckam et al., 1993).

Stomach Cancer

With the exception of males in Israel and Oman, gastric cancer incidences are low (Figure 6). The fact that Omani females also have a relatively high value suggests a specific factor in this country. The difference from Iran is not due to a lower frequency of the more virulent *H. pylori* strains, at least from data for Iraq (Hussein et al., 2008). In the Gulf, there is no difference between farmers with a lower standard of living and non-farmers in respect of their *H. pylori* profiles (Bener et al., 2006). The prevalence of infection in dyspeptic patients in Yemen appears high (Gunaid et al., 2003).

Table 4. Oesophageal Cancer Histopathology: SCC-AC Percentages

	Male			Female		
	SCC	AC	Ratio	SCC	AC	Ratio
Egypt	60	25	2.4:1	80	14	5.7:1
Israel Jews	38	38	1.0:1	92	0	---
Arabs	28	27	1.0:1	18	37	0.5:1
Bahrain	52	52	1.0:1	80	0	---
Kuwait	38	38	1.0:1	67	33	2.0:1
Oman	28	26	1.0:1	25	31	0.8:1

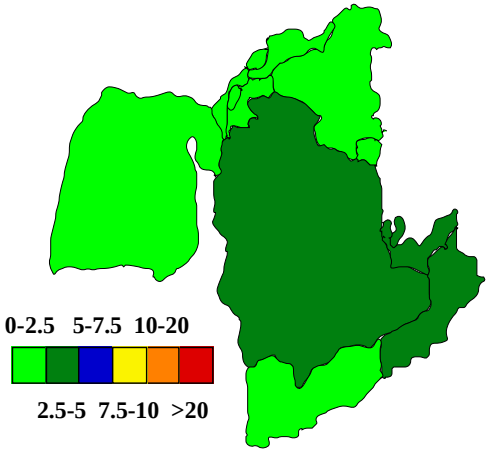

Figure 5. Male Oesophageal Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

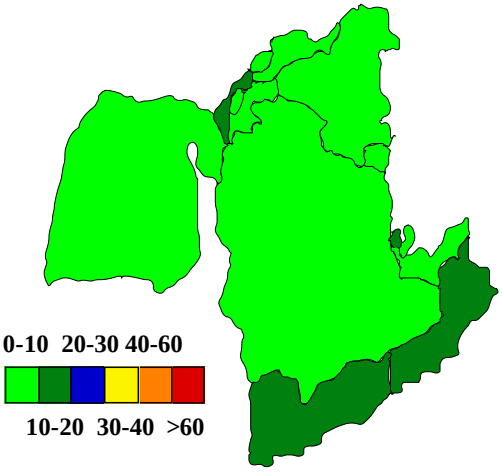

Figure 6. Male Gastric Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

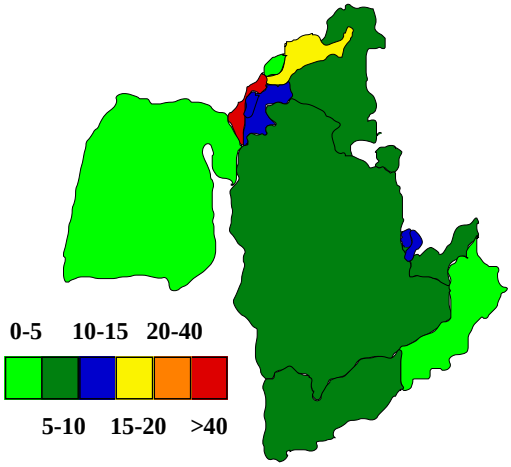

Figure 7. Male Colorectal Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

Colorectal Cancer

Compared to Israel, the incidences of colon and rectum cancer in the Arab world are low, although in some of the more affluent countries it is number two after breast (see Figure 7). There is only limited variation ijn incidence rates between sexes and the colon-rectum ratio varies from approximately 1:1 to 3:1 (see Table 5), with the one exception of Algeria where rectal cancers are in the majority. Incidence rates rose until recently in Israeli Jews and a less pronouncd steady increase has also been observed in Israeli Arabs and Kuwaitis, although perhaps not Omanis (see Figure 8).

In Yemen there is a relatively high proportion of early-onset tumors (19.3% of cases were <40 years), with a left sided subsite distribution (49.4% of cases in the rectum and rectosigmoid junction) (Basaleem and Al-Sakkaf, 2004). Similarly, in Egypt 38% of patients are younger than 40 and 75% of lesions are on the left side (Abou-Zeid et al., 2002), and in Qatar the descending and sigmoid colon is the most common anatomical site affected (Rasul et al., 2001). Cases in Saudi Arabia also tend to be relatively young (Mansoor et al., 2002). In Israel, the proportion of right-sided tumours has been decreasing in both genders of Arabs (Rozen et al., 2007b), with a relatively high rate of rectal cancers, at least in males (Fireman et al., 2005).This pattern of increasing rectal and left-sided CRC had been seen over a decade earlier in Jews of Asian-African origin and then their trend reversed during the last decade. A trend for increase in right colorectal cancer in Jews aged > or =65 years has also been reported, partially explained by population aging and by recent immigrants from Russia, who are at high-risk (Rozen et al., 2007a). The profound rightward shift of colorectal carcinoma described in Saudi Arabia, compounded with a rising incidence of advanced lesions in younger age group, is also of interest (Guraya and Eltinay, 2006). Arab patients are younger than their Jewish counterparts in Israel with a higher percentage of poorly-differentiated and mucinous, advanced stage cancers (Shpitz et al., 2006). There is variation with the country of origin and Israeli-born Jews appear to have the lowest incidence and also the best survival data for stages-2 and -3 colorectal cancers (Barchana et al., 2004). Increased

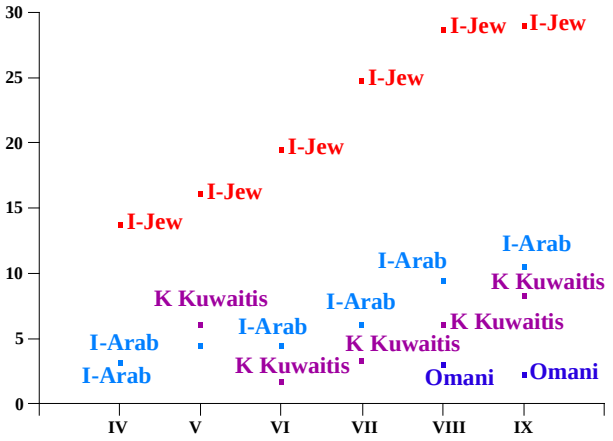

Figure 8. Male Colon Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

expression of cyclin D1, p53, Ki-67, beta-catenine and Her-2/neu, and decreased expression of p27 may be important events in the three ethnic groups with colorectal cancer. The lower mortality rate among Ashkenazi Jews may be partially explained by their better molecular biology profile (Darwish et al., 2002). A high proportion of familial MSI cases and a lowincidence of TP53 mutations are hallmarks of the Saudi colorectal carcinomas (Bavi et al., 2008).

The low incidence of colorectal cancer in the Arab countries could be due to the dietary factors, with high intake of fruit and vegetables (Al-Shamsi et al., 2003). One environmental factor might be pesticides. Farming in Egypt is associated positively with high serum organochlorines and serum levels in colorectal cancer

Table 6. Colorectal Cancers: Colon and Rectal Carcinoma Incidences and Ratios

	Male			Female		
	Colon	Rectum	Ratio	Colon	Rectum	Ratio
Egypt	4.2	1.2	3.5:1	2.7	1.7	1.6:1
Israel Jews	29.2	13.3	2.2:1	24.6	9.6	2.6:1
Arabs	10.6	8.3	1.3:1	10.8	3.7	2.9:1
Bahrain	7.9	4.4	1.8:1	5.1	2.2	2.3:1
Kuwait	8.4	5.2	1.5:1	7.6	4.2	1.8:1
Oman	2.5	2.1	1.2:1	2.2	1.4	1.6:1

patients are higher than in controls (Soliman et al., 1997).

While fecal occult blood testing, flexible sigmoidoscopy and colonoscopy are the standard screening techniques , with computerized tomography colonography now entering the field (Saidel-Odes and Odes, 2005) colorectal cancer screening appears opportunistic except in Israel, where the screening program the average-risk population fecal occult blood tests from the age of 50 years. Quantitative immunochemical FOBT has good sensitivity and specificity for detection of clinically significant neoplasia (Levi et al., 2007) and it has been shown to be highly cost-effective to screen average-risk asymptomatic individuals (Leshno et al., 2003). The results of the Israeli population-based screening program using Hemoccult Sensa show that it is possible to achieve a high detection rate in a well-organized community set-up and, in addition, also a shift in tumor stage towards smaller tumors, a low positivity rate, and an acceptable false positivity rate (Rennert, 2003). Compliance, however, is very low, reaching only 6% of eligible persons in 2005, and the knowledge of physicians regarding the screening and surveillance of colorectal cancer needs to be improved (Zbidi et al., 2007). One approach to improved CRC screening program is directed at in-house staff in the hospital setting (Levi et al., 2007). Rates of CRC screening and intention to be screened are lower among Arabs than Jews, with lower perceived benefits of early detection and internal health locus of control (Azaiza and Cohen, 2008).

Experts in family medicine in Israel have significantly greater knowledge of most issues of CRC than primary care experts in other fields and general practitioners (Birkenfeld and Niv, 2006).

Liver Cancer

Liver cancer, while much less frequent than in high-incidence countries, is nevertheless a major problem in males in Egypt and Saudi Arabia and to a lesser extent in the other countries of the Gulf (see Figure 9). The hepatocellular carcinoma accounts for the majority of tumours although there some variation between the sexes in the relative incidence of cholangiocellular carcinomas (see Table 7). The hepatitis B virus (HBV) is the leading cause of HCC in Lebanon (Yaghi et al., 2006) and in Egypt (Anwar et al., 2008), but in the latter HCV has now become the predominant factor associated with the more recent epidemic. It has been well documented that Egypt has one of the highest prevalence rates of HCV infection in the world with different strains involved (Abdel-Hamid et al., 2007), but there may also be an etiological role for aflatoxin B1 (Hifnawy et al., 2004). There is significant geographic variation among districts (Lehman et al., 2008). Prevalence of HCC is high in the Nile Delta area, and is more common in males, rural residents and farmers so that pollution due to insecticides might be a risk factor (Abdel-Wahab et al., 2007).

Gallbladder Cancer

Gallbladder cancer is rare in South-West Asia.

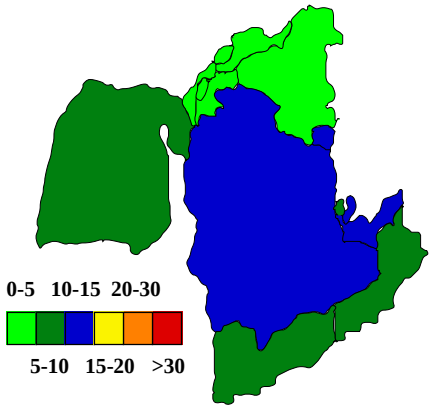

Figure 9.Male Liver Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

Table 7. Liver Cancer Histopathology: HCC-Cholangiocellular Carcinoma Percentages

	Male			Female		
	HCC	CC	Ratio	HCC	CC	Ratio
Egypt	88	4	22.0:1	80	6	13.3:1
Israel Jews	84	7	12.6:1	64	17	3.8:1
Arabs	69	3	23.0:1	42	14	3.0:1
Bahrain	75	15	5.0:1	54	27	2.0:1
Kuwait	77	8	9.6:1	89	11	8.1:1
Oman	77	16	7.7:1	67	27	2.5:1

Pancreatic Cancer

Except in Israel, the Lebanon and Syria, rates for pancreatic cancer are generally low (see Figure 10, the clustering of cases in the northeast Nile delta region possibly being related to water pollution (Soliman et al., 2006), linked to cadmium and farming (Kriegel et al., 2006). In general, multiple tobacco consumption methods, passive smoking, pesticide exposures, and diabetes are associated with an increased risk for pancreatic cancer, with prolonged lactation and increased parity associated with a reduced risk (Lo et al., 2007).

Laryngeal Cancer

Iraq, the Lebanon and to a lesser extent the Yemen, Egypt and relatively developed North Africa, have high incidences of laryngeal cancer, it elsewhere appearing of minor importance (see Figure 11).

Lung Cancer

Although incidences are lower than in the West (see Figure 12) , of the countries included in Figure 2, seven of thirteen have lung cancer as number one, and all but one include the site in the most frequent five. In a recent survey, the highest ASR was in Bahrain (34.3 for males, 12.1 for females) followed by Qatar (18.5 and 5.5) and Kuwait (13.8 and 4.0); the lowest rates were in Saudi Arabia (4.8 and 1.3 for females) (Al-Hamdan et al., 2006). It is increasing in Israeli Arabs (see Figure 13). From CIV data, squamous cell carcinomas and adenocarcinomas account for approximately the same proportions in males, while adenocarcinomas (AC) tend to predominate in females (see Table 8).

Lung cancer rates in Israel are lower than in other western countries despite the similar prevalence of smoking (Baron-Epel et al., 1999), but this might be relaled

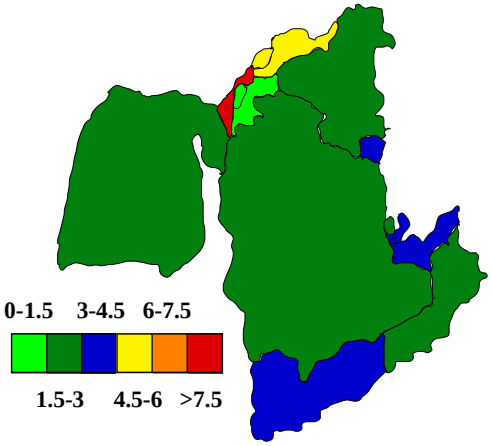

Figure 10. Male Pancreatic Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

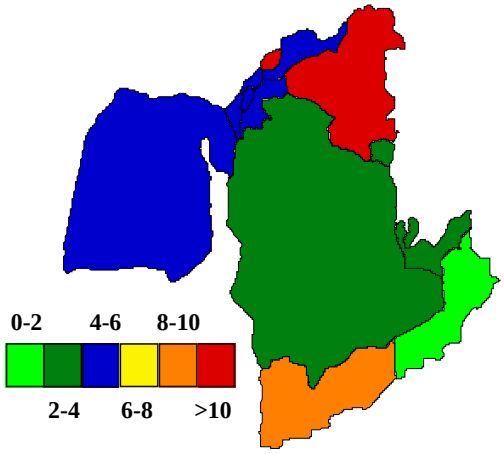

Figure 11. Male Laryngeal Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

to the climate. The marked increase in the incidence of lung cancer among Israeli Arab men during the last decade, without any evidence of increased smoking prevalence, might reflect a gradual loss of some apparent protection in this subpopulation (Tarabeia et al., 2008). In Egypt there has been a report that pleural mesothelioma is increasing, survival being linked to genetic alteration (Gaafar and Eldin, 2005).

For screening computed tomography might be applicable in Israel (Shaham et al., 2006).

Kidney Cancer

With the exception of males in Israel and to a lesser extent Bahrain and Kuwait Oman, renal cancer incidences are low (see Figure 14).

Urinary Bladder Cancer

While urinary bladder cancers are well known to be the predominant neoplasm in Egyptian males, it should be borne in mind that the actual incidence is higher in male Israeli Jews (see Table 2). High rates are also present in Iraq, Jordan and Bahrain, but not in Qatar and elsewhere in the Gulf, pointing to considerable variation in risk factors across the Arab world (see Figure 15). Prevalence is slowly increasing, at least in Israel (see Figure 16).

Traditionally, *Schistosoma haematobium* has been considered the most important etiological agent (Bedwani

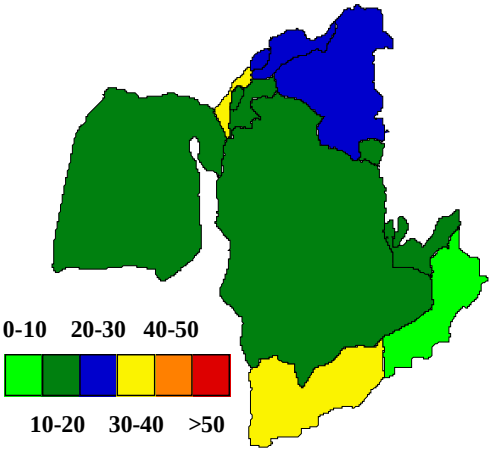

Figure 12.Male Lung Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

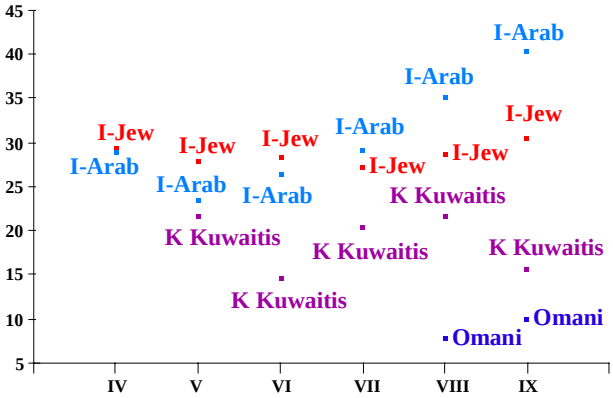

Figure 13. Male Lung Cancer Incidences/100,000 over Time ((Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Table 8. Lung Cancer Histopathology: SCC-Adenocarcinoma Ratios (Curado et al., 2007)

	Male			Female		
	SCC	AC	Ratio	SCC	AC	Ratio
Egypt	22.4	24.2	0.9:1	9.1	50.0	0.2:1
Israel Jews	28.3	29.1	1.0:1	13.7	47.4	0.3:1
Arabs	28.0	26.6	1.1:1	7.4	50.0	0.1:1
Algeria	63.0	6.4	9.8:1	43.8	28.1	1.6:1
Tunisia	46.6	18.5	2.5:1	23.5	29.4	0.8:1
Bahrain	34.5	21.6	1.6:1	26.9	30.8	0.9:1
Kuwait	17.1	18.9	0.9:1	18.8	37.5	0.5:1
Oman	28.5	26.0	1.1:1	25.0	31.3	0.8:1

et al., 1998), but transitional cell carcinoma has recently become the most frequent type in Egypt, replacing lesions with squamous features, corroborating findings from small-scale hospital-based studies indicating that the etiology of bladder cancer has changed significantly over the past 26 years (Felix et al., 2008). A remarkably strong association with various measures of cigarette smoking has been found that could explain 75% of bladder cancer cases among males from Alexandria (Bedwani et al., 1997). This is in line with the fact that polymorphisms in glutathione S-transferase genes are associated with increased risk of bladder cancer (Saad et al., 2005). Interestingly, odds ratios were 15.8 for male ever-smokers with a history of urinary schistosomiasis, compared with never-smokers without such a history, and 3.2 for men ever-infected with urinary *Schistosoma haematobium* and

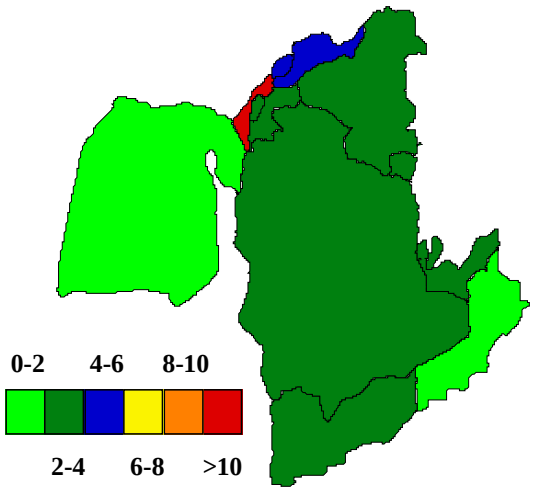

Figure 14. Kidney Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

ever-employed in high-risk occupations, compared with those never-infected and with no high-risk occupational history (Bedwani et al., 1998).

Despite the high prevalence, there are no population-based bladder screening programs in place. Combining NMP22 with malignant or suspicious cytological result improved sensitivity for the detection of bladder cancer but with a major decrease in specificity, suggesting a potential role in screening rather than diagnosis (Kapila et al., 2008).

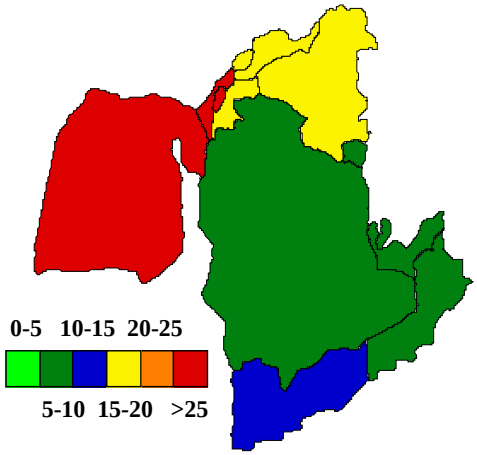

Figure 15. Male Urinary Bladder Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

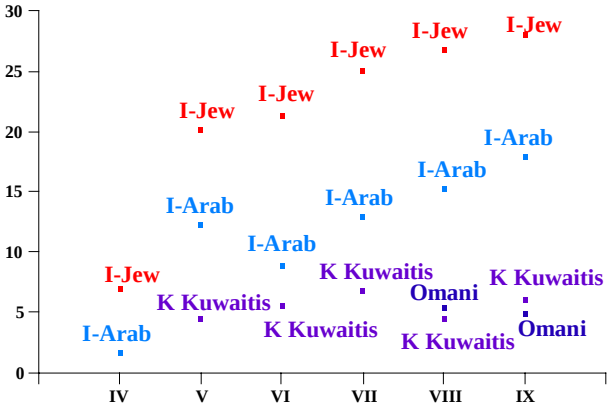

Figure 16. Urinary Bladder Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Prostate Cancer

In many of the countries of the Middle-east, prostate cancer is already a problem and in Israeli males it is the most frequent neoplasm (see Figure 17). While increasing, at least in Israel (see Figure 18), incidence rates are lower than in western countries (Mosli, 2003), despite high intake of calories and consumption of animal fat. An Egyptian case-control study pointed to butter and natural ghee as risk factors, while vegetables were protective (Kamel et al., 2006). In Israel, the proportion of patients of European, especially East European, origin is relatively high, with an absence of Ethiopian immigrants (Sion-Vardy et al., 2008).

Screening is opportunistic except in Israel. Arab Kuwaiti and Omani men were foudn to have lower serum PSA levels and prostate volumes than those reported for Caucasians, but similar to those reported for Asians (Japanese and Chinese) (Kehinde et al., 2005). Mean PSA values for Saudi men are also low (Kamal et al., 2003). Although raised serum PSA is commonly associated with prostate cancer, subclinical prostatitis is a significant source of high serum PSA in over 40% of men in Kuwait, suggesting the need for a locally applicable paradigm to identify prostate cancer (Anim et al., 2007).

Breast Cancer

Breast cancer now occupies the number one position

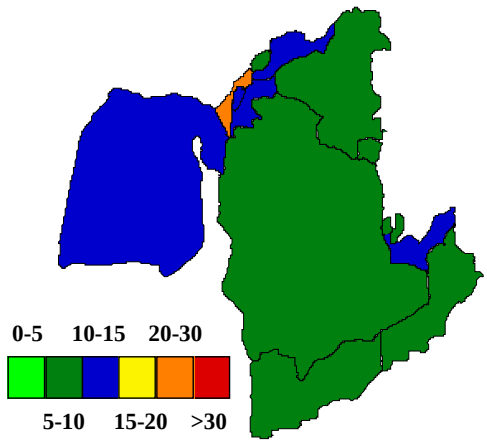

Figure 17. Male Prostate Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

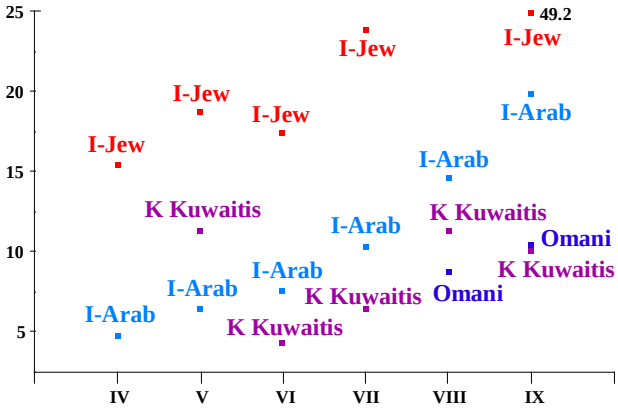

Figure 18. Prostate Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

in all countries of the Arab world, even if absolute rates are relatively low (see Figure 19). Consistent increases have been documented (see Figure 20). Breast cancer cases tend to be young and almost half of patients are below 50, with a median age of 49-52 years as compared to 63 in industrialized nations (El Saghir et al., 2007). A preponderance in the young has been reported for the Lebanon (El Saghir et al., 2002), Alexandria in Egypt (Hosny and Elkaffas, 2002a), Aden in the Yemen (Abdul Hamid et al., 2001).

Epidemiological findings point to the same risk factors as in the Western world. A positive family history of breast cancer, young age at menarche, late age at last full-term pregnancy and wide inter-birth interval were significant predictors for occurrence in Egypt (Kishk, 1999). Postmenopausal obesity is a significant risk factor in Jordan, along with number of pregnancies (more than 4) (Atoum and Al-Hourani, 2004a). On the other hand, longer period of breast feeding (more than 24 months) decreases the risk (Atoum and Al-Hourani, 2004b). Risk factors in Kuwait include high BMI, lack of regular exercise, early age at menarche, late age at first pregnancy, hormonal therapy, and frequent consumption of carbohydrate, sweets, animal fat, and vegetable oil (margarine) with low intake of fresh vegetables and olive oil (Saleh et al., 2008). In Iraq, family history and oral contraceptives use were found to be associated, but not antiperspirants (Fakri et al., 2006). Short duration of lifetime breastfeeding, late age at first breastfeeding and experience of insufficient milk were found to increase breast cancer risk in Israel (Shema et al., 2007). Parental consanguinity in Arabs, even when a marriage is between first cousins or double first cousins, was not associated with an altered risk of breast cancer (Denic et al., 2005). Infertility and usage of infertility drugs in general are not associated with increased risk for breast cancer (Lerner-Geva et al., 2004). One analysis yielded an estimated 73% higher breast cancer incidence in the highest compared to the light at night exposed communities (Kloog et al., 2008). High-risk HPV infections are associated with human breast cancer progression in Syrian women (Akil et al., 2008).

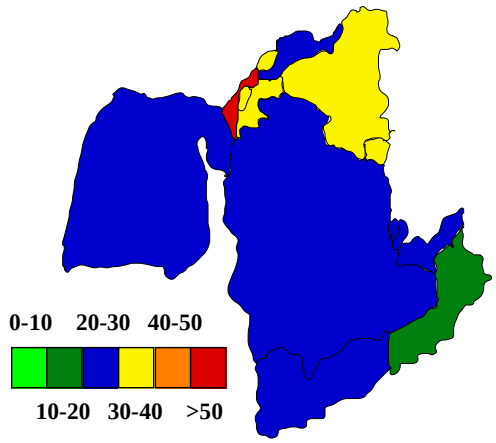

Figure 19.Female Breast Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

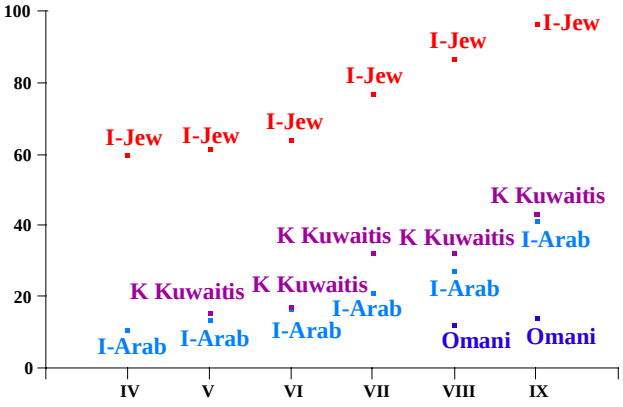

Figure 20. Female Breast Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

Locally advanced disease is very common in Egypt, Tunisia, the Yemen, Saudi Arabia, Kuwait, Syria, Palestine and others, and total mastectomy is the most commonly performed surgery (Abdul Hamid et al., 2001; Chiedozi et al., 2003; El Saghir et al., 2007; Saleh et al., 2007). In every age group, Arab women more likely than Israelis to be diagnosed at a more advanced stage of the disease (Tarabeia et al., 2007). Metastases may be relatively low, however (Abuzallouf et al., 2007)The 5 year survival is 59.6% in Saudi Arabia (Ravichandran et al., 2005) and 68.8% in Bahrain (Fakhro et al., 1999) while in Oman 5-year relapse-free and overall survival rates are reported to be 62% and 64%, respectively (Al-Moundhri et al., 2004). Prevalence of HER2/neu overexpression in a samll sample of Qatari female cases was found to be 26%, linked to an elevated relapse rate and mortality (Rasul et al., 2003).

Results from recent studies like the Cairo Breast Cancer Screening Trial show a positive impact of clinical breast examination leading to more early diagnosis and breast-conserving surgery, so that population-based screening in those countries with affluent resources and accessible care should be implemented (El Saghir et al., 2007).

Knowledge of breast cancer risk-factors and screening awareness are high among women nurses and teachers in Amman, Jordan (Madanat and Merrill, 2002) but health workers infrequently offered screening examinations and women were found to lack adequate knowledge about breast cancer screeningin Qatar (Bener et al., 2001). Health planners and healthcare providers must capitalize on encouraging factors and minimize deterring factors to optimize breast cancer screening practices (Bener et al., 2002). One approach adopted in Israel is to conduct telephone questionnaire investigations (Cohen and Azaiza , 2005). Positive correlations were found between nursing students BSE practice and their academic experience in nursing college in Saudi Arabia (Alsaif, 2004). Female secondary-school students in Jeddah demonstrated only low knowledge of risk factors and presentation in those not having familial experience (Milaat, 2000), although the vast majority demonstrated a positive attitude towards learning breast self-examination (Altaf et al., 2004). There is a significant association between failure to practise breast self-examination and diagnostic delay in Egypt (Abdel-Fattah et al., 2000). Guidelines are clearly needed (Altaf, 2004). It has been argued that husbands whose wives have breast cancer may also need a network of support to address their specific issues and concerns (Woloski-Wruble and Kadmon, 2002).

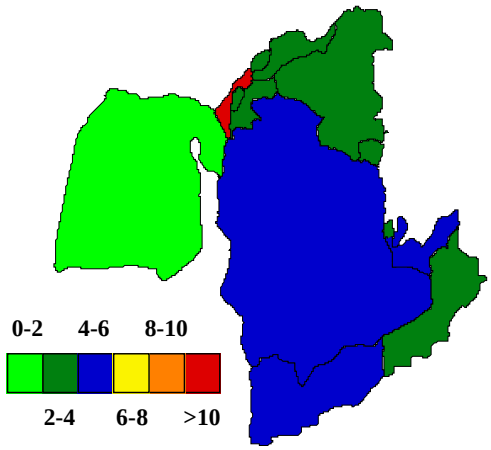

Figure 21. Ovarian Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

Ovarian Cancer

Ovarian cancer is moderately frequent in the Middle-east (see Figure 21), but the incidence may be decreasing, at least in Israel (Menczer et al., 2006). It has been suggested that substitution of non-animal for animal fat during adult life might reduce the risk of ovarian cancer (Lubin et al., 2006).

Endometrial Cancer

With the exception of Israel, endometrial cancer of the corpus uterus is relatively infrequent, with a picture similar to that for the ovary (see Figure 22). Research has indicated elevated risk with increased number of abortions, ovarian cycles and live births, and decreased risk with increased parity as compared to the nulliparous case (El-Khwsky et al., 2006). In another study, endometrial thickness >5mm, diabetes, hypertension and obesity were not found to be among the risk factors, in contrast to age and occurrence of post menopausal bleeding (Al-Kadri et al., 2004).

Cervical Cancer

While cervical cancer is generally low in the Arab world (see Figure 23) and does not appear to be increasing, it still occupies second place for frequency in Algeria, Tunisia and Oman. Furthermore, there may be some under-reporting and in a prospective study in Saudi Arabia the percentage of abnormal pap smears was 4.7%, much higher than the 1.6% reported in the compounded literature (Altaf, 2006). In spite of relatively high incidence rates for premalignant lesions of the uterine cervix in Israeli Jews, the incidence rate for invasive cervical cancer remains conspicuously low, with no obvious change over time (Sadan et al., 2004). Clearly the human papilloma virus is the prime risk factor and the Muslim religious background is naturally of great significance in this regard. It should be mentioned in this context that penile cancer is also extremely rare, as for example documented in Saudi Arabia (Abomelha, 2004). Regarding risk factors, early marriage, frequent coitus started early in life and increasing number of pregnancies are predisposing factors, while abortions and age at menarche are without influence (Ejeckam et al., 1994). Polygamy, smoking and hormonal contraception were not identified as risk factors in one study, whereas positive women again showed higher parity (Hajjaj et al., 2006). In Egypt, HPV 16/18 is the major risk factor, frequently with mixed infections and bilharzial infestation (el-All et al., 2007).

Screening programs are not in place, except in Israel, where direct visual inspection after Lugol iodine painting is feasible and easy to perform with superior sensitivity to cervical cytology and DVI-A in detecting cervical premalignant and malignant lesions (El-Shalakany et al., 2008). However, rough estimations of the effectiveness and cost of mass screening for cervical cancer in Israel, did not point to a need for population-based approaches (Saidel-Odes and Odes, 2005).

One problem is with attitudes. Of 98 physicians who participated in a study in the UAE only 40% reported ever having performed a Pap smear, so that a training programme on cervical screening was considered necessary (Badrinath et al., 2004). In Jordan, about a third of women were found to be unaware of the significance of a positive cervical smear and three-quarters did not know the causes of neoplastic development (Maaita and Barakat, 2002).

Brian and Nervous Tissue Cancer

Relative to world levels, incidence rates for brain and

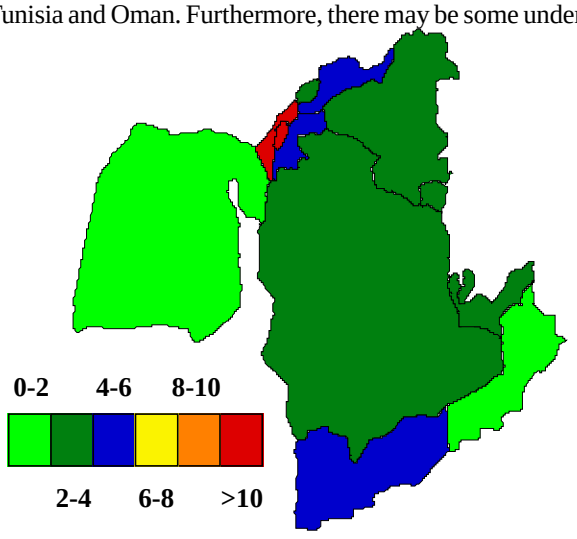

Figure 22. Endometrial Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

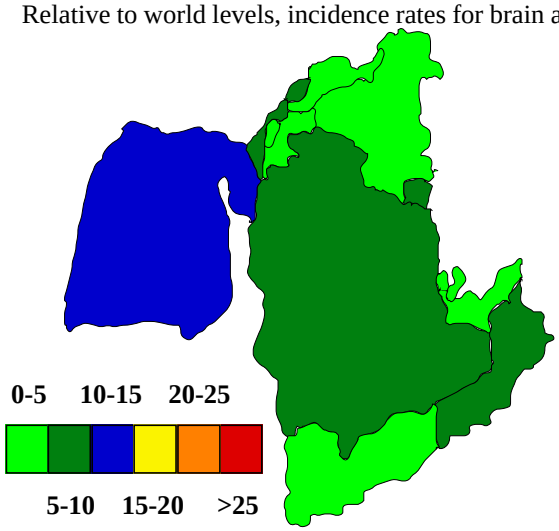

Figure 23. Cervical Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

nervous cancer in the region are relatively high (see Figure 24). The incidence of acoustic neuroma in Qatar is slightly higher than that in other countries, with a possible link to frequent cellular phone use (Salahaldin and Bener, 2006).

Thyroid Cancer

Thyroid cancer is of medium importance (see Figure 20), but occupies the number two position in females in Saudi Arabia and is prevalent in other countries of the Gulf as well as Isarael and Jordan. The dramatic decline in the incidence of follicular thyroid carcinoma combined with the increase in the advanced forms in Central Jordan may suggest a possible environmental factor (Shomaf et al., 2006). In contrast, papillary carcinomas form the bulk of cases in the Yemen, where the salt iodization program might have an effect (Abdulmughni et al., 2004).

Leukemias and Lymphomas

In both sexes, Non-Hodgkins lymphomas and to a lesser extent leukemias, are relatively important neoplasms across the region (see Figures 21 and 22). However, research findings are limited, especially as to risk factors. There is some support for the hypothesis that NHL is a malignant outcome of chronic HCV infection (Cowgill et al., 2004). It is possible that the tumour type is increasing, from data for Alexandria, particularly in the elderly population (Abdel-Fattah and Yassine, 2007).

Childhood cancers

There are only limited research data for cancers of childhood in South-West Asia. However, it is likely that lymphatic and haemopoietic cancer incidences are increasing (Hosny and Elkaffas , 2002b).

Future Perspectives

Althought most of the registries in the South-West Asia have not been operating for a sufficient length of time to give information on time trends, data are available over 30 years for Arab Israeli and for 25 years for Kuwaitis (see Table 10). Common to both are relatively consistent increases in cancers of the colon, prostate, endometrium and breast, as well as Non-Hodgkins lymphomas and perhaps ovarian and thyroid cancers. All of the adenocarcinomas are considered linked to a Westernized lifestyle. A nutrition transition, as well documented for Egypt (Galal, 2002) has occurred in the context of abundant dietary energy availability, urbanisation and moderate fat intakes. The prevalence of obesity in adults

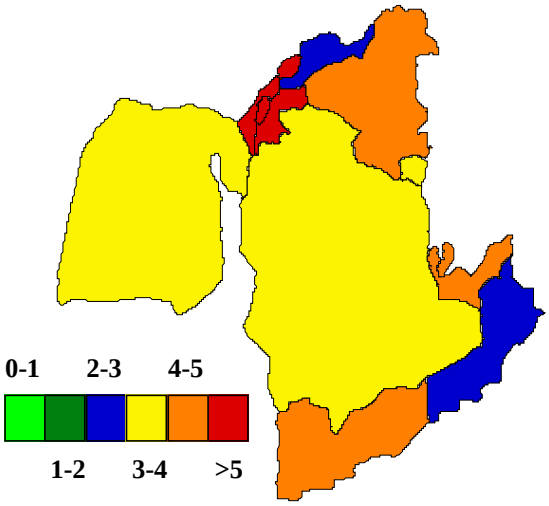

Figure 24. Male Brain and Nervous Cancer Incidences/ 100,000(Globocan, 2002: Ferlay et al., 2004)

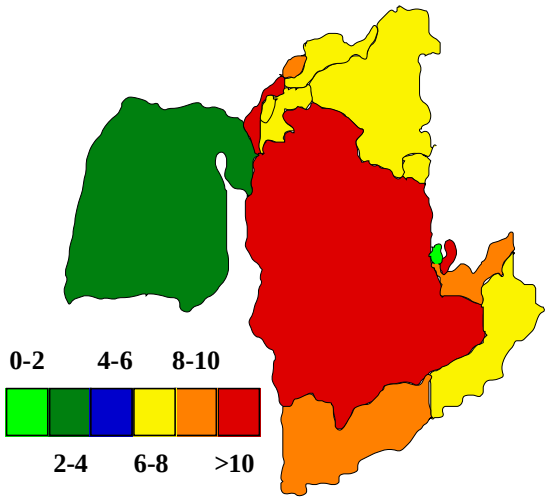

Figure 26. Male Non-Hodgkins Lymphoma Incidences/ 100,000 (Globocan, 2002: Ferlay et al., 2004)

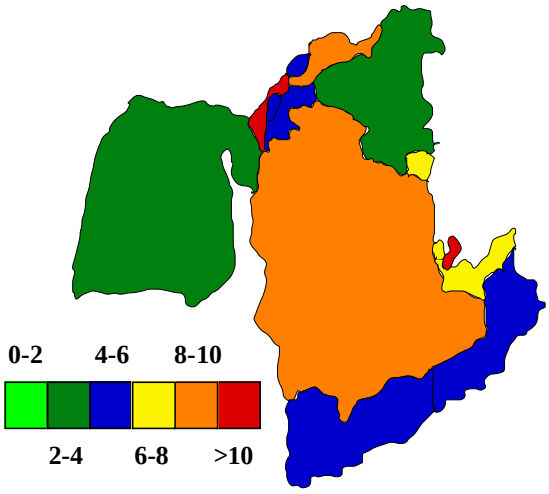

Figure 25. Male Thyroid Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

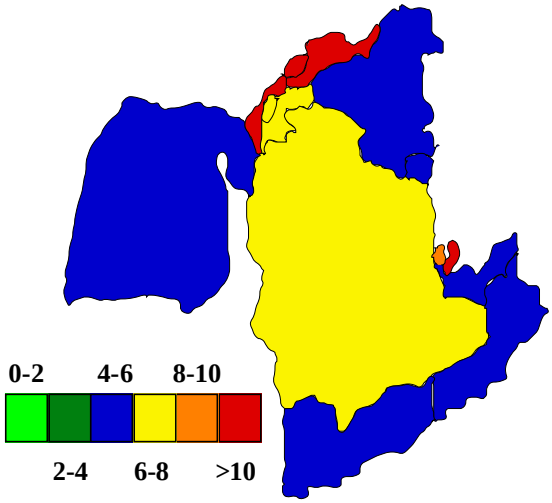

Figure 27. Male Leukemia Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

Table 8. ASR Cancer Incidence Over Time - CIV

Volume	IV*	V**	VI#	VII##	VIII##	IX+
Kuwait						
Oesophagus	---	1.7	3.7	1.7	1.7	2.2
Stomach	---	5.6	4.1	4.1	5.6	3.4
Colon	---	6.3	1.9	3.5	6.3	8.4
Rectum	---	4.0	2.4	3.9	4.0	5.2
Liver	---	4.4	7.2	7.3	8.4	8.1
Prostate	---	11.4	4.4	6.5	11.4	10.5
Breast	---	15.9	17.2	32.8	32.8	41.3
Ovary	---	3.3	3.7	4.7	5.7	5.4
Endometrium	---	1.8	2.4	2.4	3.8	3.6
Cervix	---	3.9	4.1	7.6	4.2	4.5
Thyroid	---	6.3	1.4	6.1	7.6	7.3
Larynx	---	3.5	2.4	2.5	3.5	0.5
Lung	---	21.5	14.5	20.3	21.5	15.6
Kidney	---	3.8	2.4	2.1	3.8	5.8
Bladder	---	4.6	5.7	7.0	4.6	6.3
NHL	---	8.6	7.3	5.5	8.6	10.4
Leukemia	---	5.5	7.4	5.1	5.5	4.9
Israeli Arabs						
Oesophagus	1.0	1.0	1.1	0.5	0.7	1.1
Stomach	7.2	7.9	6.9	6.8	6.7	6.7
Colon	3.3	4.7	4.6	6.2	9.6	10.6
Rectum	3.1	3.0	3.6	3.1	3.8	8.3
Liver	2.4	2.9	3.0	2.6	3.2	2.6
Prostate	4.9	6.5	7.7	10.4	14.8	20.0
Breast	11.0	14.0	17.0	21.3	27.7	41.3
Ovary	3.8	3.4	2.4	3.0	4.0	5.4
Endometrium	1.2	3.1	2.8	4.9	5.7	3.6
Cervix	2.1	3.0	2.6	3.0	2.5	4.5
Thyroid	1.8	2.5	2.6	4.1	4.8	7.3
Larynx	6.4	4.9	4.1	3.7	5.4	6.1
Lung	28.8	23.4	26.2	29.1	35.1	40.4
Kidney	8.6	2.5	3.3	3.3	3.3	4.4
Bladder	1.8	12.5	9.1	13.1	15.5	18.1
NHL	7.5	6.7	5.4	8.3	9.7	10.0
Leukemia	5.9	5.1	6.2	6.0	7.8	7.3

*Waterhouse et al., 1982; **Muir et al., 1987; #;##;###Parkin et al., 1992;1997;2002; +Curado et al., 2007

in the region is very high, particularly among women. The prevalences of diabetes mellitus and of hypertension parallel that of obesity. Smoking, physical inactivity, and obesity contribute substantially to the burden of chronic disease (Centers for Disease Control and Prevention, 2002; Kulwicki and Kepler, 2001). It is well known from migrant studies that Arab populations were earlier characterized by generally low rates for cancers of colon and rectum, lung, ovary and prostate (McCredie et al., 1994). Cancers which tended to be more common in migrants were stomach, liver, and bladder. These still are important but the future will see the main burden in diabetes-associated tumours, as in the developed world. To what extent these are affluence-related needs to now be determined by epidemiological research into psychosocial factors. The Arab countires are particulary interesting in this regard, given the wide variation in Gross National Product. Hopefully, such enigmas as the decreasing lung rates in Kuwait, despite clear increase in Israeli Arabs will thereby also be explained.

Areas which need particular attention are nutrition including the role played by local vegetables and herbs (Abu-Dabia, 2005). The importance of environmental exposure to pesticides and other contaminants has also be highlighted (Safi, 2002). Given the clear variation in cancer burden within the Arab world, despite a shared culture, collaboration across individual registries across the region should lead to a far better understanding of the status and the evidence base which is essential for effective cancer control programs.

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