
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 certain 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 reflected 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).

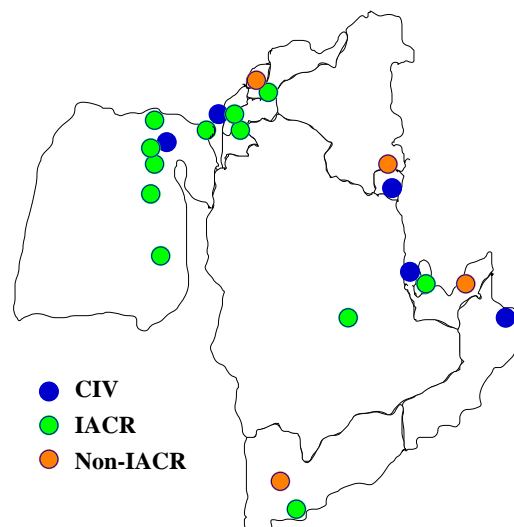


Figure 1. Cancer Registries in the Asian Middle East

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

	Jordan [#]	Israel [*]		Egypt [*]	Saudi ^{**}		Oman [*]	Qatar ^{##}	Bahrain [*]	Kuwait [*]
		Jews	Arabs		Arabia					
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

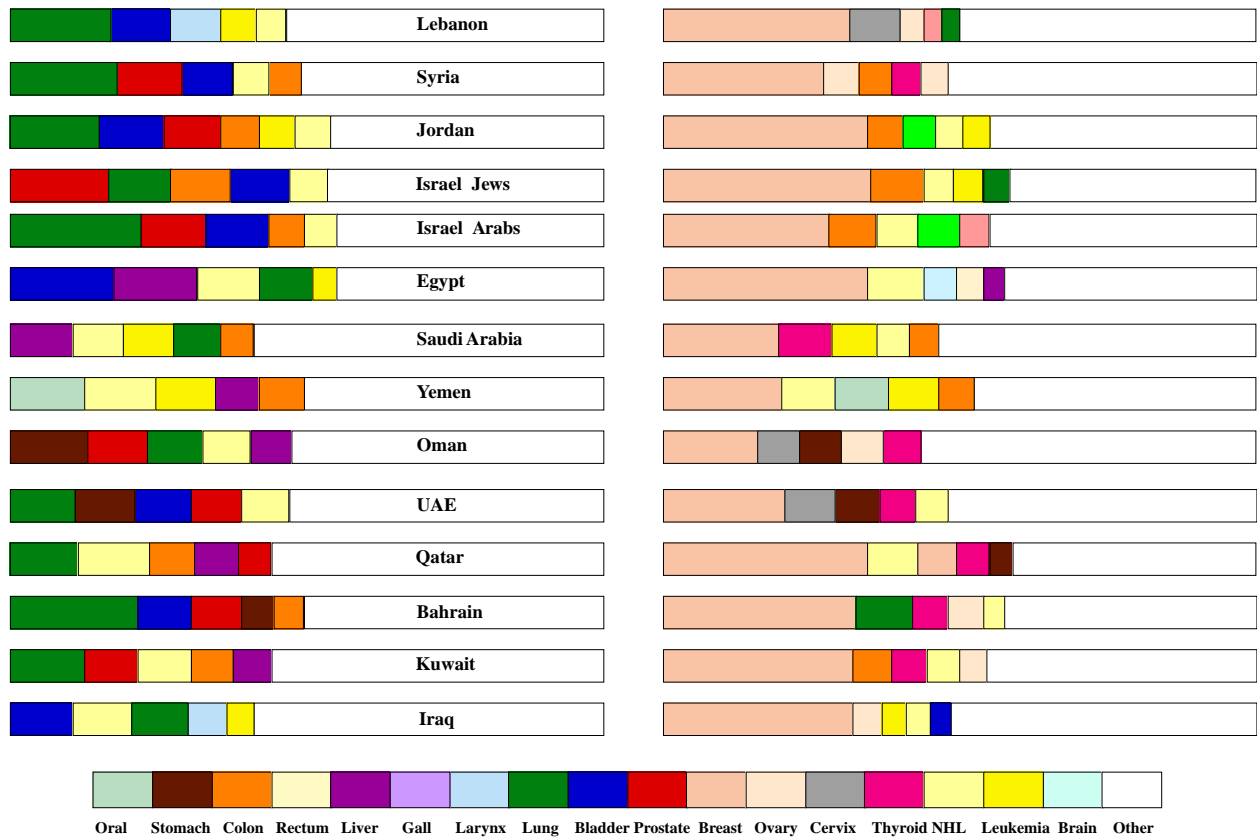


Figure 2. Percentage Data for the Five Most Prevalent Cancers in Countries of South-West Asia

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*		Egypt*	Saudi**		Oman*	Qatar###	Bahrain*	Kuwait*
	Jordan#	Jews		Arabs	Arabia				
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

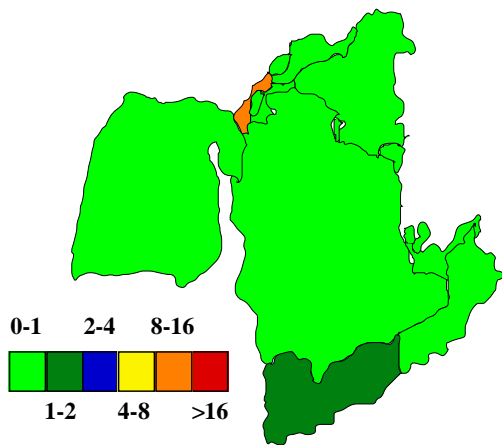


Figure 3. Male Melanoma Incidences/100,000
((Globocan, 2002; Ferlay et al., 2004)

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).

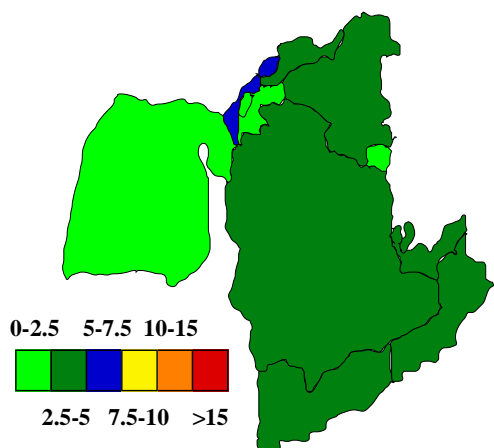


Figure 4. Male Oral Cancer Incidences/100,000
(Globocan, 2002; Ferlay et al., 2004)

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

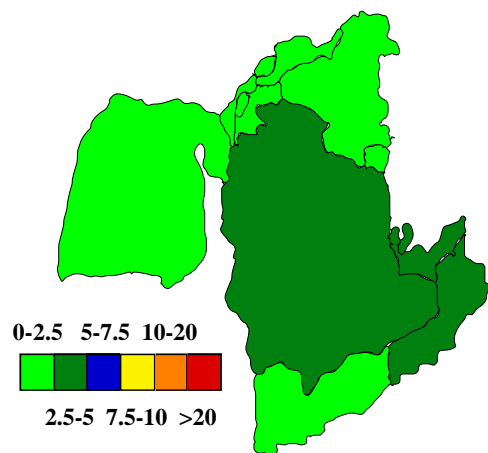


Figure 5. Male Oesophageal Cancer Incidences/100,000
(Globocan, 2002; Ferlay et al., 2004)

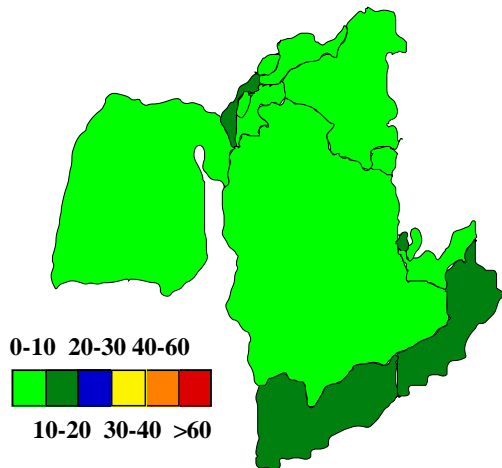


Figure 6. Male Gastric Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

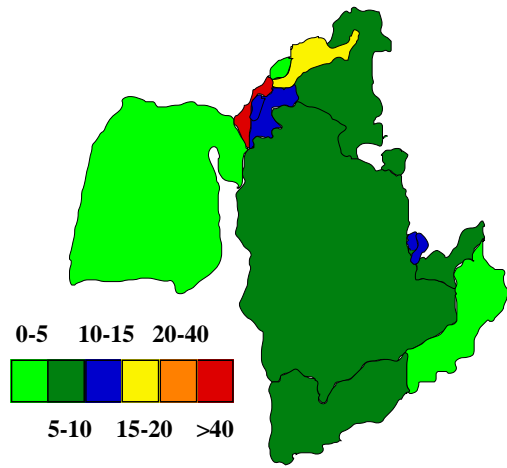


Figure 7. Male Colorectal Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

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 in 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 pronounced 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 tumors 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

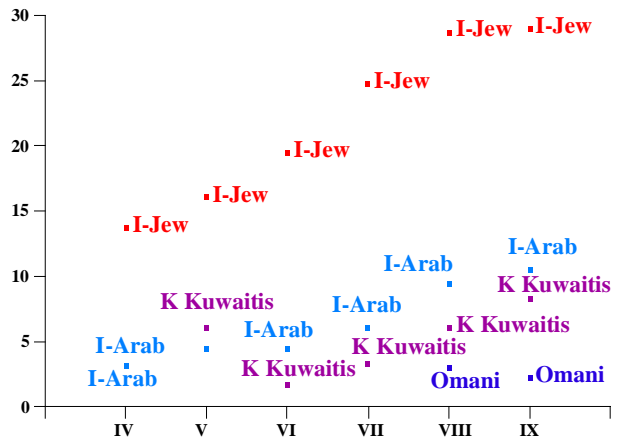


Figure 8. Male Colon Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

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 low incidence 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.

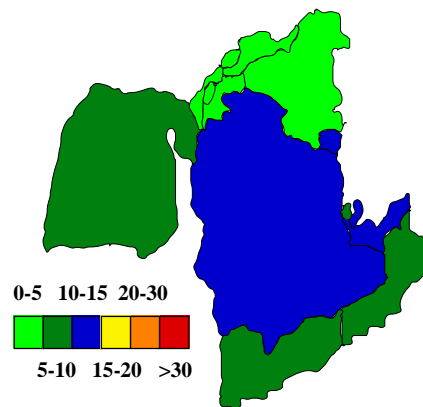


Figure 9. Male Liver Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

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 related

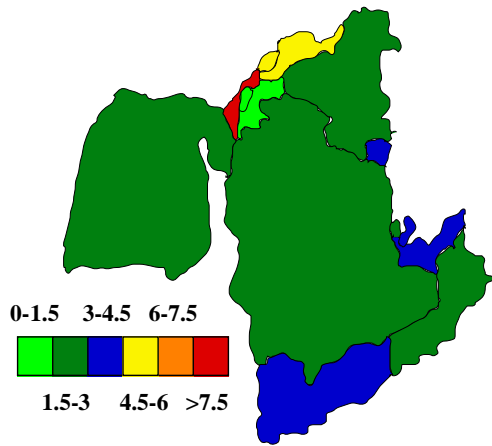


Figure 10. Male Pancreatic Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

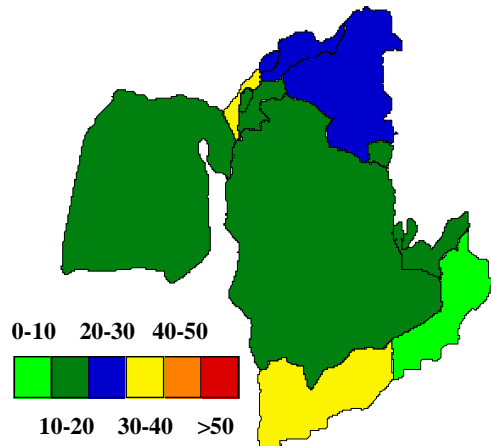


Figure 12. Male Lung Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

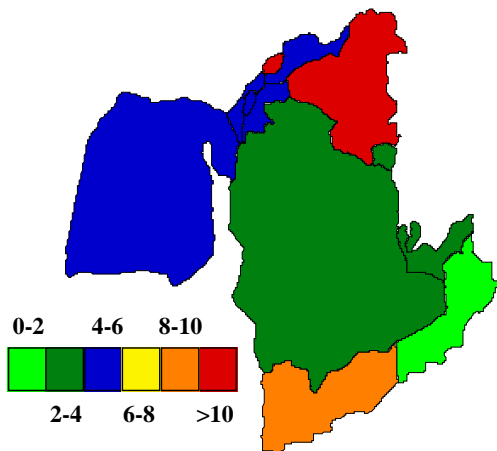


Figure 11. Male Laryngeal Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)
to the climate. The marked increase in the incidence of lung cancer among Israeli Arab men during the last decade, without any evidence of increased smoking prevalence, might reflect a gradual loss of some apparent 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

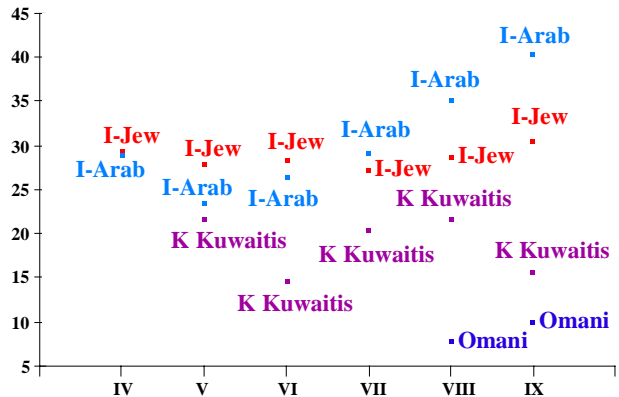


Figure 13. Male Lung Cancer Incidences/100,000 over Time ((Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

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

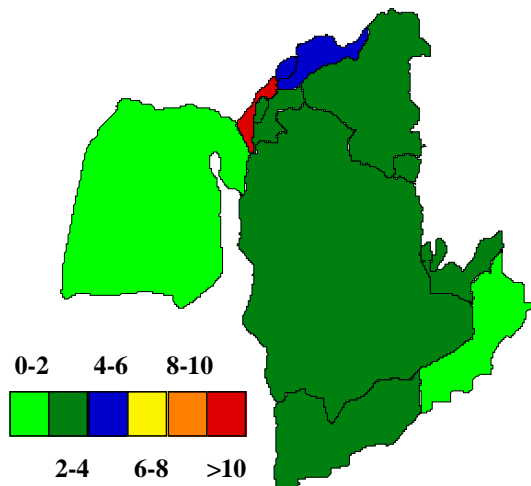


Figure 14. Kidney Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

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).

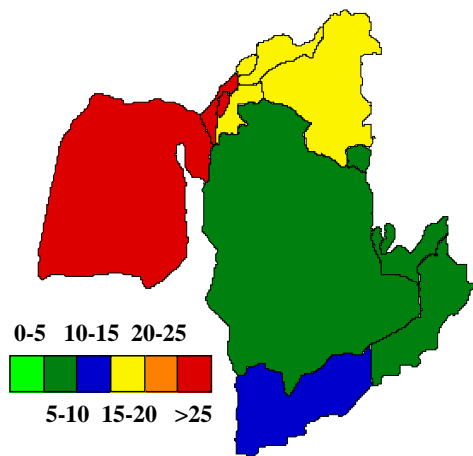


Figure 15. Male Urinary Bladder Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

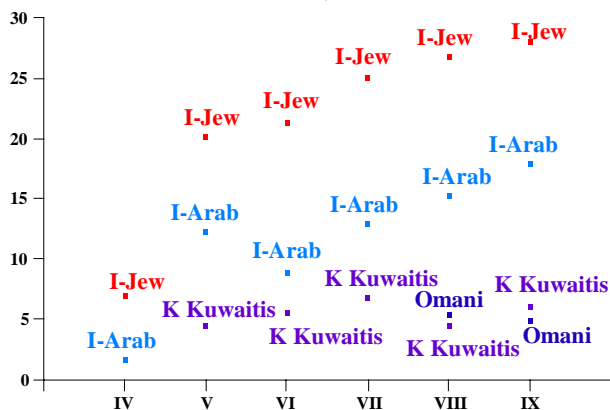


Figure 16. Urinary Bladder Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

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 found 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

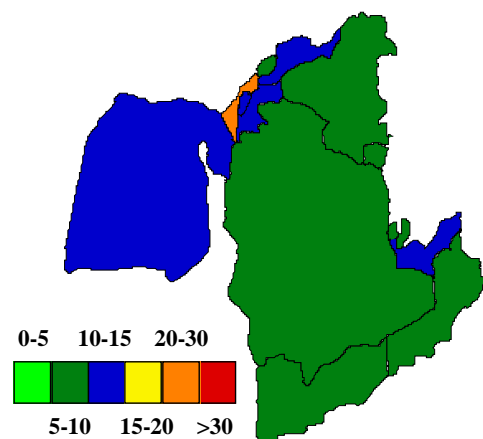


Figure 17. Male Prostate Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

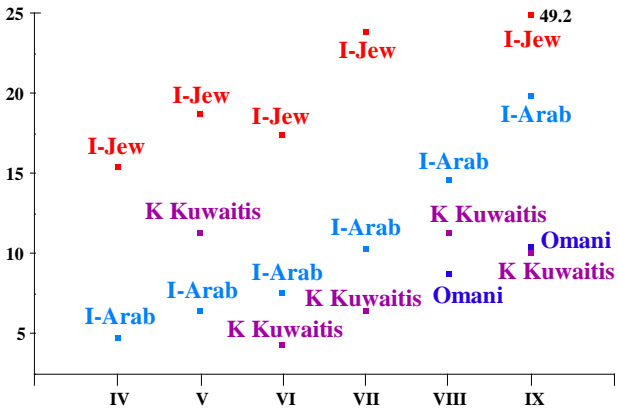


Figure 18. Prostate Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

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).

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 small 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 screening in 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).

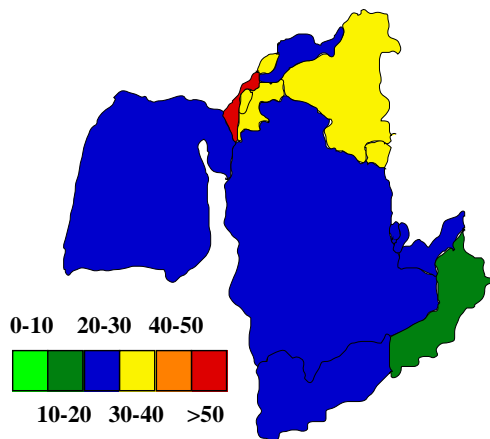


Figure 19. Female Breast Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

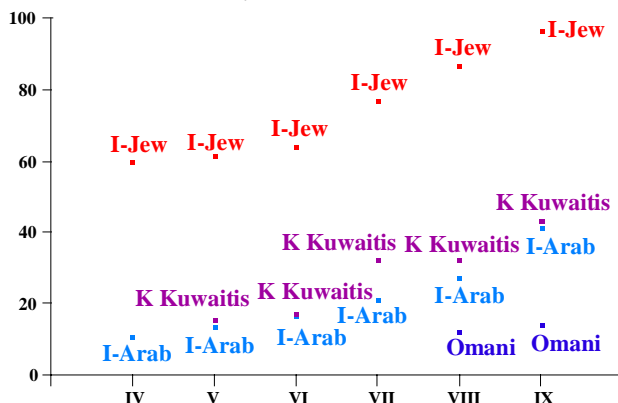


Figure 20. Female Breast Cancer Incidences/100,000 over Time (Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007)

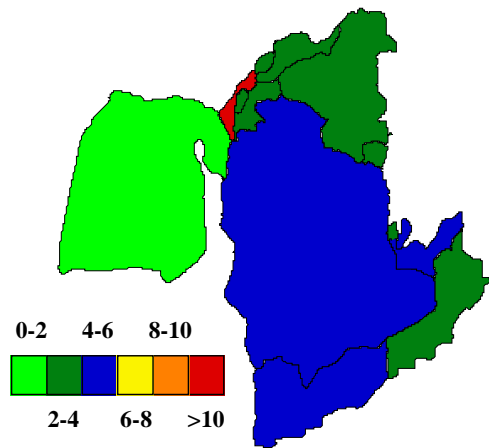


Figure 21. Ovarian Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

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-Khwsy 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-

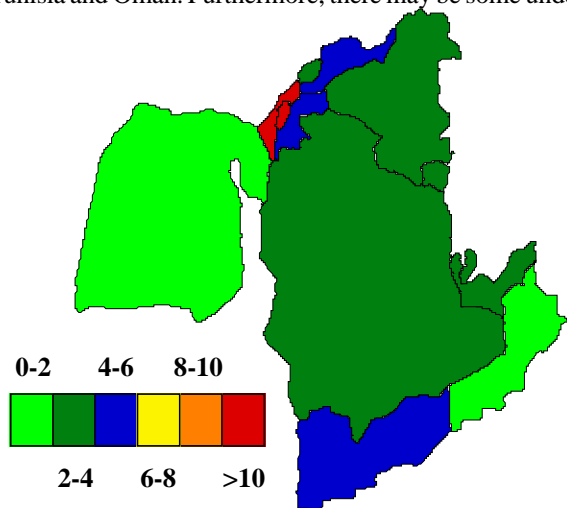


Figure 22. Endometrial Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

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 bilharzias 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).

Brain and Nervous Tissue Cancer

Relative to world levels, incidence rates for brain and

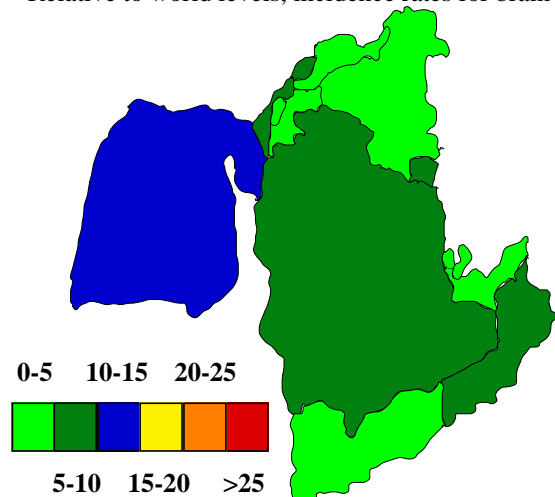


Figure 23. Cervical Cancer Incidences/100,000 (Globocan, 2002; Ferlay et al., 2004)

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 Israel 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

Although 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

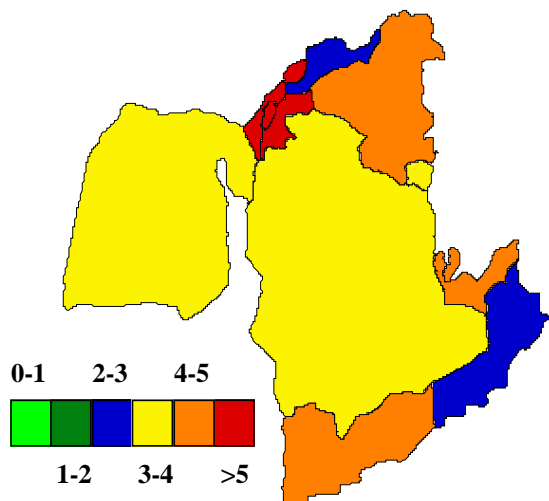


Figure 24. Male Brain and Nervous Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

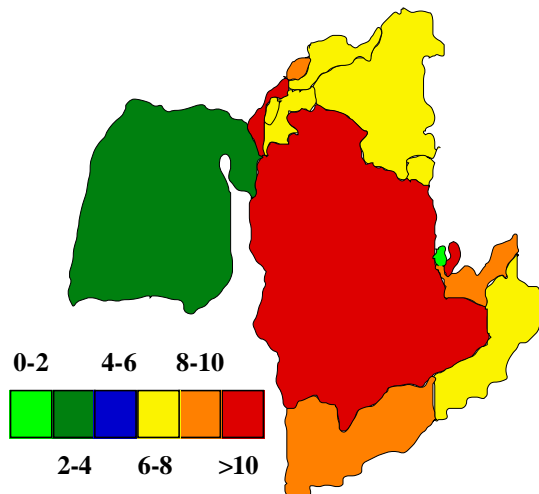


Figure 26. Male Non-Hodgkins Lymphoma Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

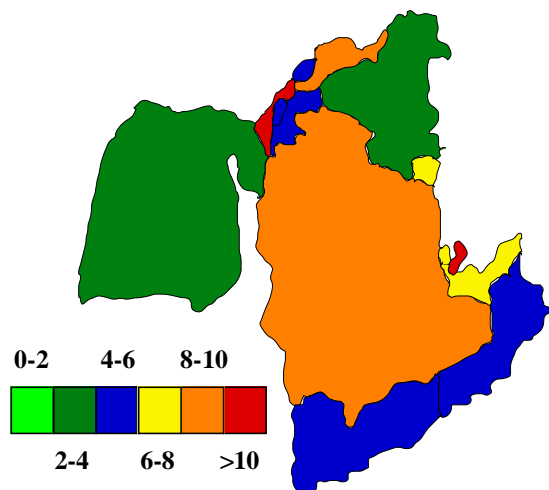


Figure 25. Male Thyroid Cancer Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

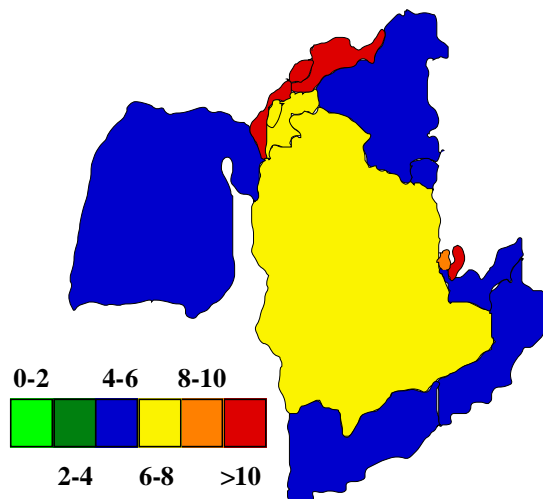


Figure 27. Male Leukemia Incidences/100,000 (Globocan, 2002: Ferlay et al., 2004)

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; Kulwicksi 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 countries are particularly 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 been 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.

References

- Abdel Aziz MT, Abdel Aziz MZ, Atta HM, et al (2006). Screening for human papillomavirus (HPV) in Egyptian women by the second-generation hybrid capture (HC II) test. *Med Sci Monit*, **12**, MT43-9.
- Abdel-Fattah MM, Yassine OG (2007). Non-Hodgkin's lymphomas in Alexandria, Egypt; incidence rates and trend study (1995-2004). *Eur J Cancer Prev*, **16**, 479-85.
- Abdel-Fattah M, Zaki A, Bassili A, el-Shazly M, Tognoni G (2000). Breast self-examination practice and its impact on breast cancer diagnosis in Alexandria, Egypt. *East Mediterr Health J*, **6**, 34-40.
- Abdel-Hady ES, Emam M, Al-Gohary A, et al (2006). Screening for cervical carcinoma using visual inspection with acetic acid. *Int J Gynaecol Obstet*, **93**, 118-22.
- Abdel-Hamid M, El-Daly M, Molnegren V, et al (2007). Genetic diversity in hepatitis C virus in Egypt and possible association with hepatocellular carcinoma. *J Gen Virol*, **88**, 1526-31.
- Abdel-Wahab M, El-Ghawalby N, Mostafa M, et al (2007). Epidemiology of hepatocellular carcinoma in lower Egypt, Mansoura Gastroenterology Center. *Hepato-gastroenterology*, **54**, 157-62.
- Abdul Hamid G, Tayeb MS, Bawazir AA (2001). Breast cancer in south-east Republic of Yemen. *East Mediterr Health J*, **7**, 1012-6.
- Abdulmughni YA, Al-Hureibi MA, Al-Hureibi KA, et al (2004). Thyroid cancer in Yemen. *Saudi Med J*, **25**, 55-9.
- Abomelha MS (2004). Genito-urinary cancer in Saudi Arabia. *Saudi Med J*, **25**, 552-6.
- Abou-Zeid AA, Khafagy W, Marzouk DM, et al (2002). Colorectal cancer in Egypt. *Dis Colon Rectum*, **45**, 1255-60.
- Abu-Rabia A (2005). Herbs as a food and medicine source in Palestine. *Asian Pac J Cancer Prev*, **6**, 404-7.
- Abuzallouf S, Motawy M, Thotathil Z (2007). Baseline staging of newly diagnosed breast cancer--Kuwait cancer control center experience. *Med Princ Pract*, **16**, 22-4.
- Akil N, Yasmeen A, Kassab A, et al (2008). High-risk human papillomavirus infections in breast cancer in Syrian women and their association with Id-1 expression: a tissue microarray study. *Br J Cancer*, **99**, 404-7.
- Al-Hamdan N, Al-Jarallah M, Al-Jarallah M, et al (2006). The incidence of lung cancer in the Gulf Cooperation Council countries. *Ann Saudi Med*, **26**, 433-8.
- Al Hamdan N, Bazarbashi S, Ajarim D, et al (2001). History of cancer registration in the country of Saudi Arabia. *Asian Pacific J Cancer Prev*, **2** (IACR Suppl), 61-4.
- Al-Hilli F, Malik AK (2003). Oesophageal cancer in Bahrain. *East Mediterr Health J*, **9**, 372-6.
- Ali AA, Al-Sharabi AK, Aguirre JM, Nahas R (2004). A study of 342 oral keratotic white lesions induced by qat chewing among 2500 Yemeni. *J Oral Pathol Med*, **33**, 368-72.
- Al-Kadri HM, Al-Awami SH, Madkhali AM. Assessment of risk factors of uterine cancer in Saudi patients with postmenopausal bleeding. *Saudi Med J*, **25**, 857-61.
- Al-Lawati JA, al-Shaqsi B, al-Siyabi N (2001). Cancer registration in the Sultanate of Oman. *Asian Pacific J Cancer Prev*, **2** (IACR Suppl), 71-4.

- Al-Lawati JA, Santhosh-Kumar CR, Mohammed AJ, Jaffer MA (1999). Cancer incidence in Oman, 1993-1997. *East Mediterr Health J*, **5**, 1035-41.
- Al-Maghrabi JA, Al-Ghamdi AS, Elhakeem HA. Pattern of skin cancer in Southwestern Saudi Arabia. *Saudi Med J*, **25**, 776-9.
- Almog R, Hagoel L, Tamir A, Barnett O, Rennert G (2008). Quality control in a National Program for the Early Detection of Breast Cancer: women's satisfaction with the mammography process. *Womens Health Issues*, **18**, 110-7.
- Al-Moundhri M, Al-Bahrani B, Pervez I, et al (2004). The outcome of treatment of breast cancer in a developing country--Oman. *Breast*, **13**, 139-45.
- Al-Rawi NH, Talabani NG (2008). Squamous cell carcinoma of the oral cavity: a case series analysis of clinical presentation and histological grading of 1,425 cases from Iraq. *Clin Oral Investig*, **12**, 15-8.
- Alsaif AA (2004). Breast self-examination among Saudi female nursing students in Saudi Arabia. *Saudi Med J*, **25**, 1574-8.
- Alsayyad J, Hamadeh R (2007). Cancer incidence among the Bahraini population: a five-year (1998-2002) experience. *Ann Saudi Med*, **27**, 251-8.
- Al-Shamsi SR, Bener A, Al-Sharhan M, et al (2003). Clinicopathological pattern of colorectal cancer in the United Arab Emirates. *Saudi Med J*, **24**, 518-22.
- Altaf FJ (2004). Breast cancer screening. *Saudi Med J*, **25**, 991-7.
- Altaf FJ (2006). Cervical cancer screening with pattern of pap smear. Review of multicenter studies. *Saudi Med J*, **27**, 1498-502.
- Altaf FJ, Abdullah LS, Jamal AA (2004). Frequency of benign and preinvasive breast diseases. *Saudi Med J*, **25**, 493-7.
- Al-Thobhani AK, Raja'a YA, Noman TA (2001). The pattern and distribution of malignant neoplasms among Yemeni patients. *Saudi Med J*. Oct;22(10):910-3.
- Andejani AA, Kundapur V, Malaker K (2004). Age distribution of nasopharyngeal cancer in Saudi Arabia. *Saudi Med J*, **25**, 1579-82.
- Anim JT, Kehinde EO, Sheikh MA, et al (2007). Serum prostate-specific antigen levels in Middle Eastern men with subclinical prostatitis. *Med Princ Pract*, **16**, 53-8.
- Anwar WA, Khaled HM, Amra HA, et al (2008). Changing pattern of hepatocellular carcinoma (HCC) and its risk factors in Egypt: possibilities for prevention. *Mutat Res*, **659**, 176-84.
- Atoum MF, Al-Hourani HM (2004a). Lifestyle related risk factors for breast cancer in Jordanian females. *Saudi Med J*, **25**, 1245-8.
- Atoum MF, Al-Hourani HM (2004b). Comparison of some risk factors between non-familial and familial breast cancer females in Jordan. *Saudi Med J*, **25**, 168-71.
- Azaiza F, Cohen M (2008a). Between traditional and modern perceptions of breast and cervical cancer screenings: a qualitative study of Arab women in Israel. *Psychooncology*, **17**, 34-41.
- Azaiza F, Cohen M (2008b). Colorectal cancer screening, intentions, and predictors in Jewish and Arab Israelis: a population-based study. *Health Educ Behav*, **35**, 478-93.
- Badrinath P, Ghazal-Aswad S, Osman N, Deemas E, McIlvenny S (2004). A study of knowledge, attitude, and practice of cervical screening among female primary care physicians in the United Arab Emirates. *Health Care Women Int*, **25**, 663-70.
- Bahnassy AA, Zekri AR, Abdallah S, El-Shehaby AM, Sherif GM (2005). Human papillomavirus infection in Egyptian esophageal carcinoma: correlation with p53, p21, mdm2, C-erbB2 and impact on survival. *Pathol Int*, **55**, 53-62.
- Barchana M, Liphshitz I, Rozen P (2004). Trends in colorectal cancer incidence and mortality in the Israeli Jewish ethnic populations. *Fam Cancer*, **3**, 207-14.
- Baron-Epel O, Andreev H, Barchana M, Green MS (1999). Smoking and incidence of lung cancer, 1981-1995. *Harefuah*, **136**, 522-7, 588 [in Hebrew].
- Basaleem HO, Al-Sakkaf KA (2004). Colorectal cancer among Yemeni patients. Characteristics and trends. *Saudi Med J*, **25**, 1002-5.
- Bazarbashi S, de Vol EB, Ravichandran K, Young SE (2005). Cancer Incidence Report Saudi Arabia, 2001. National Cancer Registry, Ministry of Health. www.kfshrc.edu.sa/oncology/files/ncr01
- Bavi PP, Abubaker JA, Jehan ZD, et al (2008). Colorectal carcinomas from Middle East. Molecular and tissue microarray analysis of genomic instability pathways. *Saudi Med J*, **29**, 75-80.
- Bawazir A, Basalem A, Suwailah M (2003). Cancer incidence. Five-year report, Aden, Lahej, Abyana dn Aldhale'e. Aden Cancer Center.
- Bedwani R, el-Khwsy F, Renganathan E, et al (1997). Epidemiology of bladder cancer in Alexandria, Egypt: tobacco smoking. *Int J Cancer*, **73**, 64-7.
- Bedwani R, Renganathan E, El Khwsy F, et al (1998). Schistosomiasis and the risk of bladder cancer in Alexandria, Egypt. *Br J Cancer*, **77**, 1186-9.
- Bener A, Adeyemi EO, Almehti AM, et al (2006). Helicobacter pylori profile in asymptomatic farmers and non-farmers. *Int J Environ Health Res*, **16**, 449-54.
- Bener A, Alwash R, Miller CJ, Denic S, Dunn EV (2001). Knowledge, attitudes, and practices related to breast cancer screening: a survey of Arabic women. *J Cancer Educ*, **16**, 215-20.
- Bener A, Ayub H, Kakil R, Ibrahim W (2008). Patterns of cancer incidence among the population of Qatar : a worldwide comparative study. *Asian Pacific J Cancer Prev*, **9**, 19-24.
- Bener A, Denic S, Al-Mazrouei M (2001). Consanguinity and family history of cancer in children with leukemia and lymphomas. *Cancer*, **92**, 1-6.
- Bener A, Honein G, Carter AO, et al (2002). The determinants of breast cancer screening behavior: a focus group study of women in the United Arab Emirates. *Oncol Nurs Forum*, **29**, E91-8.
- Bener A, Hussain R, Teebi AS (2007). Consanguineous marriages and their effects on common adult diseases: studies from an endogamous population. *Med Princ Pract*, **16**, 262-7.
- Birkenfeld S, Niv Y. Survey of primary physicians' knowledge of colorectal cancer screening. *J Clin Gastroenterol*, **40**, 64-7.
- Brown A, Ravichandran K, Warnakulasuriya S (2006). The unequal burden related to the risk of oral cancer in the different regions of the Kingdom of Saudi Arabia. *Community Dent Health*, **23**, 101-6.
- Centers for Disease Control and Prevention (2002). Prevalence of selected risk factors for chronic disease--Jordan, 2002. *MMWR Morb Mortal Wkly Rep*, **52**, 1042-4.
- Chaiter Y, Rennert G, Fischler R, et al (2007). Dietary intake of carotenoid isomers in Israel. *Int J Vitam Nutr Res*, **77**, 398-405.
- Chiedozi LC, El-Hag IA, Kollur SM (2003). Breast diseases in the Northern region of Saudi Arabia. *Saudi Med J*, **24**, 623-7.
- Cohen M (2006). Breast cancer early detection, health beliefs, and cancer worries in randomly selected women with and without a family history of breast cancer. *Psychooncology*, **15**, 873-83.
- Cohen M, Azaiza F (2005). Early breast cancer detection

- practices, health beliefs, and cancer worries in Jewish and Arab women. *Prev Med*, **41**, 852-8.
- Cowgill KD, Loffredo CA, Eissa SA, et al (2004). Case-control study of non-Hodgkin's lymphoma and hepatitis C virus infection in Egypt. *Int J Epidemiol*, **33**, 1034-9.
- Curado MP, Edwards B, Shin HR, et al (eds) (2007). Cancer Incidence in Five Continents, Vol.IX, IARC Scientific Publications No. 160, Lyon IARC.
- Darwish H, Trejo IE, Shapira I, et al (2002). Fighting colorectal cancer: molecular epidemiology differences among Ashkenazi and Sephardic Jews and Palestinians. *Ann Oncol*, **13**, 1497-501.
- Denic S, Bener A, Sabri S, Khatib F, Milenkovic J (2005). Parental consanguinity and risk of breast cancer: a population-based case-control study. *Med Sci Monit*, **11**, CR415-9.
- Ejckam GC, Abdulla F, el-Sakka M, Dauleh W, Haseeb F (1994). Gynaecological malignancies in Qatar. *East Afr Med J*, **71**, 777-81.
- Ejckam GC, Ahmed FA, Azadeh B (1993). Esophageal cancer in Qatar. *Trop Geogr Med*, **45**, 25-7.
- el-All HS, Refaat A, Dandash K (2007). Prevalence of cervical neoplastic lesions and Human Papilloma Virus infection in Egypt: National Cervical Cancer Screening Project. *Infect Agent Cancer*, **2**, 12.
- El Hag IA, Katchabeswaran R, Chiedozi LC, Kollur SM (2002). Pattern and incidence of cancer in Northern Saudi Arabia. *Saudi Med J*, **23**, 1210-3.
- El-Helal TA, Bener A, Galadari I (1997). Pattern of cancer in the United Arab Emirates referred to Al-Ain Hospital. *Ann Saudi Med*, **17**, 506-9.
- el-Houseini ME, Mohammed MS, Elshemey WM, et al (2005). Enhanced detection of hepatocellular carcinoma. *Cancer Control*, **12**, 248-53.
- El-Khwsy FS, Maghraby HK, Rostom YA, Abd El-Rahman AH (2006). Multivariate analysis of reproductive risk factors for ovarian cancer in Alexandria, Egypt. *J Egypt Natl Canc Inst*, **18**, 30-4.
- El Saghir NS, Adib S, Mufarrij A, et al (1998). Cancer in Lebanon: analysis of 10,220 cases from the American University of Beirut Medical Center. *J Med Liban*, **46**, 4-11.
- El Saghir NS, Khalil MK, Eid T, et al (2007). Trends in epidemiology and management of breast cancer in developing Arab countries: a literature and registry analysis. *Int J Surg*, **5**, 225-33.
- El Saghir NS, Shamseddine AI, Geara F, et al (2002). Age distribution of breast cancer in Lebanon: increased percentages and age adjusted incidence rates of younger-aged groups at presentation. *J Med Liban*, **50**, 3-9.
- El-Shalakany AH, Saeed MM, Abdel-Aal MR, et al (2008). Direct visual inspection of the cervix with Lugol iodine for the detection of premalignant lesions. *J Low Genit Tract Dis*, **12**, 193-8.
- El-Shalakany A, Hassan SS, Ammar E, Ibrahim MA, Salam MA, Farid M. Direct visual inspection of the cervix for the detection of premalignant lesions. *J Low Genit Tract Dis*, **8**, 16-20.
- Fakhro AE, Fateha BE, al-Asheeri N, al-Ekri SA (1999). Breast cancer: patient characteristics and survival analysis at Salmaniya medical complex, Bahrain. *East Mediterr Health J*, **5**, 430-9.
- Fakri S, Al-Azzawi A, Al-Tawil N (2006). Antiperspirant use as a risk factor for breast cancer in Iraq. *East Mediterr Health J*, **12**, 478-82.
- Felix AS, Soliman AS, Khaled H, et al (2008). The changing patterns of bladder cancer in Egypt over the past 26 years. *Cancer Causes Control*, **19**, 421-9.
- Ferlay J, Bray F, Pisani P, Parkin DM (2004). GLOBOCAN 2002: Cancer Incidence, Mortality and Prevalence Worldwide. IARC CancerBase No. 5, version 2.0, IARC Press, Lyon.
- Fireman Z, Neiman E, Abu Mouch S, Kopelman Y (2005). Trends in incidence of colorectal cancer in Jewish and Arab populations in central Israel. *Digestion*, **72**, 223-7.
- Fraser A, Hellmann S, Leibovici L, Levavi H (2005). Screening for cervical cancer--an evidence-based approach. *Eur J Gynaecol Oncol*, **26**, 372-5.
- Freedman LS, Barchana M, Al-Kayed S, et al (2003). A comparison of population-based cancer incidence rates in Israel and Jordan. *Eur J Cancer Prev*, **12**, 359-65.
- Freedman LS, Edwards B, Ries LAG, Young JL (Eds) (2007). Cancer Incidence in Four Member Countries (Cyprus, Egypt, Israel, and Jordan) of the Middle East Cancer Consortium (MECC) Compared with US SEER. National Cancer Institute. NIH Pub. No. 06-5873. Bethesda, MD.
- Gaafar RM, Eldin NH (2005). Epidemic of mesothelioma in Egypt. *Lung Cancer*, **49 Suppl 1**, S17-20.
- Galal OM (2002). The nutrition transition in Egypt: obesity, undernutrition and the food consumption context. *Public Health Nutr*, **5**, 141-8.
- Geara FB, Nasr E, Tucker SL, et al (2005). Nasopharyngeal cancer in the Middle East: experience of the American University of Beirut Medical Center. *Int J Radiat Oncol Biol Phys*, **61**, 1408-15.
- Ghafoor M, Schuyten R, Bener A. (2003). Epidemiology of prostate cancer in United Arab Emirates. *Med J Malaysia*, **58**, 712-6.
- Gunaid AA, Hassan NA, Murray-Lyon I. (2003). Prevalence and risk factors for *Helicobacter pylori* infection among Yemeni dyspeptic patients. *Saudi Med J*, **24**, 512-7.
- Gunaid AA, Sumairi AA, Shidrawi RG, et al (1995). Oesophageal and gastric carcinoma in the Republic of Yemen. *Br J Cancer*, **71**, 409-10.
- Guraya SY, Eltinay OE (2006). Higher prevalence in young population and rightward shift of colorectal carcinoma. *Saudi Med J*, **27**, 1391-3.
- Habib OS, Al-Ali JK, Al-Wiswasi MK, Ajeel NAH (2006). The burden of cancer in Basrah: The state of the art - first report. Available on: www.basmedcol.com.
- Habib OS, Al-Ali JK, Al-Wiswasi MK, et al (2007). Cancer registration in Basrah 2005: preliminary results. *Asian Pac J Cancer Prev*, **8**, 187-90.
- Hajjaj AA, Senok AC, Al-Mahmeed AE, et al (2006). Human papillomavirus infection among women attending health facilities in the Kingdom of Bahrain. *Saudi Med J*, **27**, 487-91.
- Hifnawy MS, Mangoud AM, Eissa MH, et al (2004). The role of aflatoxin-contaminated food materials and HCV in developing hepatocellular carcinoma in Al-Sharkia Governorate, Egypt. *J Egypt Soc Parasitol*, **34**, 479-88.
- Hosny G, Elkaffas SM (2002a). A prediction model for the incidence patterns of female breast cancers in Alexandria, Egypt. *J Egypt Public Health Assoc*, **77**, 329-45.
- Hosny G, Elkaffas SM (2002b). Patterns in the incidence of pediatric cancer in Alexandria, Egypt, from 1972 to 2001. *J Egypt Public Health Assoc*, **77**, 451-68.
- Hussein MR, Ismael HH (2004). Alterations of p53, Bcl-2, and hMSH2 protein expression in the normal breast, benign proliferative breast disease, in situ and infiltrating ductal breast carcinomas in the upper Egypt. *Cancer Biol Ther*, **3**, 983-8.
- Hussein NR, Mohammadi M, Talebkhan Y, et al (2008). Differences in virulence markers between *Helicobacter pylori* strains from Iraq and those from Iran: potential importance of regional differences in *H. pylori*-associated

- disease. *J Clin Microbiol*, **46**, 1774-9.
- Jahan S, Al-Saigul AM, Abdelgadir MH (2006). Breast cancer. Knowledge, attitudes and practices of breast self examination among women in Qassim region of Saudi Arabia. *Saudi Med J*, **27**, 1737-41.
- Kahan E, Ibrahim AS, El Najjar K, et al (1997). Cancer patterns in the Middle East--special report from the Middle East Cancer Society. *Acta Oncol*, **36**, 631-6.
- Kamal BA, Ali GA, Taha SA (2003). Prostate specific antigen reference ranges in Saudi men. *Saudi Med J*, **24**, 665-8.
- Kamel NM, Tayel ES, El Abbady AA, Khashab SS. Risk factors of cancer prostate. A case control study. *J Egypt Public Health Assoc*, **81**, 143-63.
- Kapila K, Kehinde EO, Anim JT, et al (2008). Could nuclear matrix protein 22 (NMP22) play a role with urine cytology in screening for bladder cancer? - experience at Kuwait University. *Cytopathology* (in press).
- Kehinde EO, Mojiminiyi OA, Sheikh M, et al (2005). Age-specific reference levels of serum prostate-specific antigen and prostate volume in healthy Arab men. *BJU Int*, **96**, 308-12.
- Khalil KA, Salama OE, El Zeiny NA, El din Khalil S, Esmail NF (1999). A study of pattern of gastrointestinal malignant neoplasms in the last decade (1987-1996) in Alexandria. *J Egypt Public Health Assoc*, **74**, 503-27.
- Kishk NA. Breast cancer in relation to some reproductive factors. *J Egypt Public Health Assoc*, **74**, 547-66.
- Kloog I, Haim A, Stevens RG, Barchana M, Portnov BA (2008). Light at night co-distributes with incident breast but not lung cancer in the female population of Israel. *Chronobiol Int*, **25**, 65-81.
- Kriegel AM, Soliman AS, Zhang Q, et al (2006). Serum cadmium levels in pancreatic cancer patients from the East Nile Delta region of Egypt. *Environ Health Perspect*, **114**, 113-9.
- Kulwicki AD, Kepler C (2001). Assessment of cardiovascular risk factors among residents of a city in Jordan. *J Cult Divers*, **8**, 34-40.
- Lehman EM, Soliman AS, Ismail K, et al (2008). Patterns of hepatocellular carcinoma incidence in Egypt from a population-based cancer registry. *Hepatol Res*, **38**, 465-73.
- Leshno M, Halpern Z, Arber N (2003). Cost-effectiveness of colorectal cancer screening in the average risk population. *Health Care Manag Sci*, **6**, 165-74.
- Levi Z, Chorev N, Segal N, et al (2007). Screening for colorectal cancer in personnel of an academic medical center. *Dig Dis Sci*, **52**, 2301-4.
- Levi Z, Rozen P, Hazazi R, et al (2007). A quantitative immunochemical fecal occult blood test for colorectal neoplasia. *Ann Intern Med*, **146**, 244-55.
- Lerner-Geva L, Keinan-Boker L, Blumstein T, et al (2004). Infertility, ovulation induction treatments and the incidence of breast cancer--a historical prospective cohort of Israeli women. *Breast Cancer Res Treat*, **100**, 201-12.
- Lo AC, Soliman AS, El-Ghawalby N, et al (2007). Lifestyle, occupational, and reproductive factors in relation to pancreatic cancer risk. *Pancreas*, **35**, 120-9.
- Lubin F, Chetrit A, Modan B, Freedman LS (2006). Dietary intake changes and their association with ovarian cancer risk. *J Nutr*, **136**, 2362-7.
- Lubina A, Cohen O, Barchana M, et al (2006). Time trends of incidence rates of thyroid cancer in Israel: what might explain the sharp increase. *Thyroid*, **16**, 1033-40.
- Maaita M, Barakat M (2002). Jordanian women's attitudes towards cervical screening and cervical cancer. *J Obstet Gynaecol*, **22**, 421-2.
- Madanat H, Merrill RM (2002). Breast cancer risk-factor and screening awareness among women nurses and teachers in Amman, Jordan. *Cancer Nurs*, **25**, 276-82.
- Madbouly KM, Senagore AJ, Mukerjee A, et al (2007). Colorectal cancer in a population with endemic *Schistosoma mansoni*: is this an at-risk population? *Int J Colorectal Dis*, **22**, 175-81.
- Mahmoud SF, Azadeh B (1996). Basal cell carcinoma in Qatar. *Int J Dermatol*, **35**, 704-6.
- Mansoor I, Zahrani IH, Abdul Aziz S (2002). Colorectal cancers in Saudi Arabia. *Saudi Med J*, **23**, 322-7.
- McCredie M, Coates M, Grulich A (1994). Cancer incidence in migrants to New South Wales (Australia) from the Middle East, 1972-91. *Cancer Causes Control*, **5**, 414-21.
- Memon A, Varghese A, Suresh A (2002). Benign thyroid disease and dietary factors in thyroid cancer: a case-control study in Kuwait. *Br J Cancer*, **86**, 1745-50.
- Menczer J, Liphshitz I, Barchana M (2006). A decreasing incidence of ovarian carcinoma in Israel. *Int J Gynecol Cancer*, **16**, 41-4.
- Milaat WA (2000). Knowledge of secondary-school female students on breast cancer and breast self-examination in Jeddah, Saudi Arabia. *East Mediterr Health J*, **6**, 338-44.
- Morris RE, Mahmeed BE, Gjorgov AN, Jazaf HG, Rashid BA (2000). The epidemiology of lip, oral cavity and pharyngeal cancers in Kuwait 1979-1988. *Br J Oral Maxillofac Surg*, **38**, 316-9.
- Mosli HA (2003). Prostate cancer in Saudi Arabia in 2002. *Saudi Med J*, **24**, 573-81.
- Muir CS, Waterhouse J, Mack T, Powell J, Whelan SL (Eds) Cancer Incidence in Five Continents Vol. V. IARC Scientific Publications No 88. 1987 IARC, Lyon.
- Musaiger AO (1990). Nutritional disorders associated with affluence in Bahrain. *Fam Pract*, **7**, 9-13.
- Mzayek F, Asfar T, Rastam S, Maziak W (2002) Neoplastic diseases in Aleppo, Syria. *Eur J Cancer Prev*, **11**, 503-7.
- Nasr AH, Khatri ML (2000). Head and neck squamous cell carcinoma in Hajjah, Yemen. *Saudi Med J*, **21**, 565-8.
- Omar S, Khaled H, Gaafar R, et al (2003). Breast cancer in Egypt: a review of disease presentation and detection strategies. *East Mediterr Health J*, **9**, 448-63.
- Parkin DM, Muir CS, Whelan SL, Gao YT, Ferlay J, Powell J (Eds). Cancer Incidence in Five Continents Vol. VI. IARC Scientific Publications No 120. 1992 IARC, Lyon.
- Parkin DM, Vatanasapt V. (Eds) (2001). Cancer registration in Asia in the year 2000: Past present and future. *Asian Pacific J Cancer Prev*, **2**, S1-89.
- Parkin DM, Whelan SL, Ferlay J, Raymond L, Young J. (Eds) Cancer Incidence in Five Continents Vol. VII. IARC Scientific Publications No 143, 1997 IARC, Lyon.
- Parkin, DM, Whelan SL, Ferlay J, Teppo L, Thomas DB. (Eds). Cancer Incidence in Five Continents Vol. VIII. IARC Scientific Publications No 155, 2002 IARC, Lyon.
- Parvez T, Gumgumji AA, Anwar MS, Al-Ahmadi SS (2004). Awareness about causes of gastrointestinal tract (GIT) malignancies. *J Coll Physicians Surg Pak*, **14**, 98-101.
- Qasem BM (2001). History of cancer registration in the country of Jordan. *Asian Pacific J Cancer Prev*, **2** (IACR Suppl), 25-29.
- Qari FA (2004). Pattern of thyroid malignancy at a University Hospital in Western Saudi Arabia. *Saudi Med J*, **25**, 866-70.
- Rasul KI, Awidi AS, Mubarak AA, Al-Homsi UM (2001). Study of colorectal cancer in Qatar. *Saudi Med J*, **22**, 705-7.
- Rasul KI, Mohammed K, Abdalla AS, et al (2003). Study of HER2/neu status in Qatari women with breast carcinoma. *Saudi Med J*, **24**, 832-6.
- Ravichandran K, Hamdan NA, Dyab AR (2005). Population based survival of female breast cancer cases in Riyadh Region, Saudi Arabia. *Asian Pac J Cancer Prev*, **6**, 72-6.

- Rennert G (2003). Fecal occult blood screening--trial evidence, practice and beyond. *Recent Results Cancer Res*, **163**, 248-53; discussion 264-6.
- Rozen P, Liphshitz I, Barchana M (2007). Changing sites of colorectal cancer in the Israeli Jewish ethnic populations and its clinical implications. *Eur J Cancer Prev*, **16**, 1-9.
- Rozen P, Rosner G, Liphshitz I, Barchana M. (2007). The changing incidence and sites of colorectal cancer in the Israeli Arab population and their clinical implications. *Int J Cancer*, **120**, 147-51.
- Saad AA, O'Connor PJ, Mostafa MH, et al (2005). Glutathione S-transferase M1, T1 and P1 polymorphisms and bladder cancer risk in Egyptians. *Int J Biol Markers*, **20**, 69-72.
- Sadan O, Schejter E, Ginath S, et al (2004). Premalignant lesions of the uterine cervix in a large cohort of Israeli Jewish women. *Arch Gynecol Obstet*, **269**, 188-91.
- Safi JM (2002). Association between chronic exposure to pesticides and recorded cases of human malignancy in Gaza Governorates (1990-1999). *Sci Total Environ*, **284**, 75-84.
- Saidel-Odes L, Odes HS (2005). Strategy for colorectal cancer screening. *Isr Med Assoc J*, **7**, 248-51.
- Salahaldin AH, Bener A (2006). Long-term and frequent cellular phone use and risk of acoustic neuroma. *Int Tinnitus J*, **12**, 145-8.
- Saleh F, Abdeen S (2007). Pathobiological features of breast tumours in the State of Kuwait: a comprehensive analysis. *J Carcinog*, **6**, 12.
- Saleh F, Reno W, Ibrahim G, et al (2008). The first pilot study on characteristics and practice patterns of Kuwaiti breast cancer patients. *J Environ Pathol Toxicol Oncol*, **27**, 61-75.
- Sawair FA, Al-Mutwakel A, Al-Eryani K, et al (2007). High relative frequency of oral squamous cell carcinoma in Yemen: qat and tobacco chewing as its aetiological background. *Int J Environ Health Res*, **17**, 185-95.
- Scheifele C, Nassar A, Reichart PA (2007). Prevalence of oral cancer and potentially malignant lesions among shammah users in Yemen. *Oral Oncol*, **43**, 42-50.
- Shaham D, Breuer R, Copel L, et al (2006). Computed tomography screening for lung cancer: applicability of an international protocol in a single-institution environment. *Clin Lung Cancer*, **7**, 262-7.
- Shamseddine A, Sibai AM, Gehchan N, et al, for The Lebanese Cancer Epidemiology Group (2004). Cancer incidence in postwar Lebanon: findings from the first national population-based registry, 1998. *Ann Epidemiol*, **14**, 663-8.
- Shema L, Ore L, Ben-Shachar M, Haj M, Linn S (2007). The association between breastfeeding and breast cancer occurrence among Israeli Jewish women: a case control study. *J Cancer Res Clin Oncol*, **133**, 539-46.
- Shpitz B, Millman M, Ziv Y, et al (2006). Predominance of younger age, advanced stage, poorly-differentiated and mucinous histology in Israeli Arab patients with colorectal cancer. *Anticancer Res*, **26**, 533-7.
- Sion-Vardy N, Priel-Cohen Z, Mermershtain W, Neulander E, Benharroch D (2008). Ethnicity and its significance in the pathobiology of prostatic carcinoma in Southern Israel. *Urol Oncol*, **26**, 31-6.
- Soliman AS, Smith MA, Cooper SP, et al (1997). Serum organochlorine pesticide levels in patients with colorectal cancer in Egypt. *Arch Environ Health*, **52**, 409-15.
- Soliman AS, Wang X, Stanley JD, et al (2006). Geographical clustering of pancreatic cancers in the Northeast Nile Delta region of Egypt. *Arch Environ Contam Toxicol*, **51**, 142-8.
- Soskolne V, Marie S, Manor O. Beliefs, recommendations and intentions are important explanatory factors of mammography screening behavior among Muslim Arab women in Israel. *Health Educ Res*, **22**, 665-76.
- Tarabeia J, Baron-Epel O, Barchana M, et al (2007). A comparison of trends in incidence and mortality rates of breast cancer, incidence to mortality ratio and stage at diagnosis between Arab and Jewish women in Israel, 1979-2002. *Eur J Cancer Prev*, **16**, 36-42.
- Tarabeia J, Green MS, Barchana M, et al (2008). Increasing lung cancer incidence among Israeli Arab men reflects a change in the earlier paradox of low incidence and high smoking prevalence. *Eur J Cancer Prev*, **17**, 291-6.
- Waterhouse J, Muir C, Shanmugaratnam K, Powell J (Eds). *Cancer Incidence in Five Continents Vol. IV. IARC Scientific Publications No 42. 1982 IARC, Lyon.*
- Woloski-Wruble A, Kadmon I (2002). Breast cancer: reactions of Israeli men to their wives' diagnosis. *Eur J Oncol Nurs*, **6**, 93-9.
- Yaghi C, Sharara AI, Rassam P, et al (2006). Hepatocellular carcinoma in Lebanon: Etiology and prognostic factors associated with short-term survival. *World J Gastroenterol*, **12**, 3575-80.
- Zbidi I, Hazazi R, Niv Y, Birkenfeld S (2007). Colonoscopy screening and surveillance of colorectal cancer and polyps: physicians' knowledge. *Isr Med Assoc J*, **9**, 862-5.