

## REGIONAL REVIEW

# Cancer Epidemiology and Control in North-Western and Central Asia - Past, Present and Future

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### Abstract

The North-Western and Central region of Asia stretches from Turkey through Armenia, Georgia and Azerbaijan, to Iran and Turkmenistan, Uzbekistan, Kazakhstan, Kyrgyzstan, Tadjikistan and Afghanistan. These countries in the main share Turkic, Iranian or Caucasus ethnicity and culture and can be considered as a regional entity for cooperation in control of cancer. The present review of cancer registry and other epidemiological data was undertaken to provide an evidence base for cancer control programs and pointers to possible research collaboration. The most prevalent cancer site in males is the lung in the Western part of the region and the stomach in most of Iran and Central Asia, followed by the oesophagus in the latter two. Bladder cancer is comparatively frequent throughout. In females breast cancer is number one, generally followed by gastric, oesophageal or cervical lesions. However, there are interesting differences between countries or regions, particularly regarding the stomach. General tendencies for increase in adenocarcinomas but decrease in squamous cell carcinomas and gastric cancer point to change in environmental influence over time. Variation in risk factors depends to some extent on the level of economic development but overall the countries of the region face similar challenges in achieving effective cancer control, underlying the necessity for cooperation.

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### Introduction

The countries of the North-Western Asia, whether Turkic, Iranian or Caucasian, share a great deal in terms of culture as well as geographical proximity. The included population is approximately 250 million, the same size as the United States, but the level of economic development is varied and this is reflected in the infrastructure for cancer control. Given the increasing importance of neoplastic diseases, as well as the other chronic medical conditions like diabetes and circulatory problems, cooperation across the region to best marshal the available resources is a high priority. A comprehensive understanding of the present situation is therefore necessary.

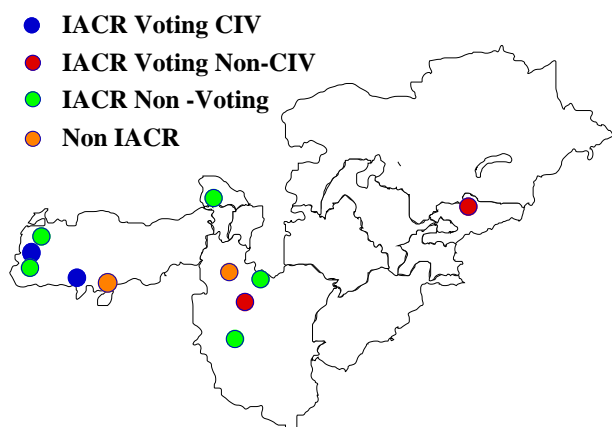
There is a general awareness of the scope of the cancer problem faced by North-West and Central Asia and efforts are increasing to develop and expand cancer control programs incorporating registration and screening or dearly detection. The present review was conducted to assess the state of cancer registration and research into underlying risk and protective factors, taking advantage of all of the Pubmed references covering the area, as well as the

CancerMondial website of the International Agency for Research on Cancer (IARC) ([www-dep.iarc.fr/](http://www-dep.iarc.fr/)).

### Cancer Registration in North Western and Central Asia

Although cancer registries have been active in the region for many years, Kyrgyzstan being listed in Cancer Incidence in Five Continents in 1992, only two registries, Izmir and Antalya in Turkey, are presently regarded as having sufficiently accurate data to be included in the International Agency for Research on Cancer publication. Therefore recourse has been made in the present case to Globocan 2002 for comparisons. However, Iranian registry data are also available in the Pubmed cited literature for the country as a whole (Sadjadi et al., 2005; Yavari et al., 2008), and for Ardabil (Sadjadi et al., 2003), East Azerbaijan (Somi et al., 2006; 2008), Tehran (Larijani et al., 2004), and Semnan (Babaei et al., 2005; 2006). Findings from the Commonwealth of Independent States and Kyrgyzstan have also been published (Iginov et al., 2002; 2005; Davydov and Aksel, 2007).

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**Figure 1. Cancer Registries in North-Western and Central Asia**

Members of the International Association for Cancer Registries are indicated in Figure 1. Unfortunately, many countries do not have any representation.

The available population-based data have been summarized in Tables 1 and 2, for males and females, respectively, and the overall picture in terms of the most prevalent cancers is illustrated in Figure 2. In males, lung cancer is number one in the Westernmost area, also with relatively high laryngeal cancer incidences, then stomach cancer takes over in countries, stretching into Central Asia, that also have relatively high incidences of oesophageal cancer. In Tehran, the relative rates of cancer increase from the upper oesophagus to the distal stomach. In Golestan, Iran, the reverse pattern is observed, while in Ardabil, the

**Table 1. Population-based Cancer Registry Data for Turkey and Iran - Males**

	Turkey			Iran			
	I*	A*	C+	Ar <sup>#</sup>	EA <sup>++</sup>	S <sup>##</sup>	T <sup>###</sup>
Buccal	1.4	1.5	-	1.7	2.8	3.4	2.4
Pharynx	0.3	0.1	-	0.7	1.0	-	10.9
Buccal	2.9	4.1	-	3.8	3.6	0.2	2.6
Pharynx	0.7	0.0	-	0.9	1.8	-	1.7
Nasopharynx	1.3	1.3	-	0.8	-	-	-
Oesophagus	2.3	1.6	-	15.4	12.4	11.7	6.8
Stomach	11.0	10.6	22.1	49.1	26.0	36.9	19.7
Colon	7.8	7.6	38.7	7.9	11.6	11.4	6.7
Rectum	6.3	5.1	-	-	-	-	4.3
Liver	3.2	3.8	12.4	1.6	2.2	5.8	3.8
Gallbladder	1.5	1.4	-	0.7	1.2	0.4	1.1
Pancreas	4.1	4.2	-	0.7	1.9	1.6	3.3
Larynx	11.0	7.2	-	0.3	2.1	3.0	5.3
Trachea, lung	74.5	37.5	81.0	7.9	9.6	9.2	14.9
Prostate	13.7	19.1	23.2	3.4	7.3	10.1	15.6
Kidney	3.3	2.9	-	1.1	3.4	2.3	3.2
Bladder	17.6	15.8	13.2	7.6	15.7	7.2	13.3
Brain	5.3	6.0	8.6	4.4	5.0	7.0	6.0
Thyroid	1.1	1.1	-	0.7	1.4	2.2	1.0
Non-Hodgkin	5.0	5.3	-	2.6	5.2	5.4	7.1
Leukemia	5.1	5.7	-	1.4	-	4.2	8.4
Total	125	126	249	96	164	136	163

\*Curado et al., 2007; <sup>#</sup>Hinçal et al., 2008; <sup>#</sup>Sadjadi et al., 2003; <sup>++</sup>Babaei et al., 2005; <sup>##</sup>Somi et al., 2008; <sup>###</sup>Larijani et al., 2004; A, Antalya; Ar, Ardabil; C, Cyprus; EA, East Azerbaijan; I, Izmir, S, Semnan; T, Tehran

mid portion (distal esophagus and proximal stomach) is involved most frequently (Taghavi et al., 2007). Bladder cancer features in the first five most frequent cancers in males throughout the region. In females, breast cancer predominates in all but two cases, with cervical, stomach and/or oesophageal lesions often as the second most frequent. A striking feature is the inclusion of ovarian and/or endometrial cancer in the first five.

With regard to trends over time, data are very limited although over the last 30 years in Shiraz and Tehran there has been a sharp increase in colon cancer, slight to moderate increase in stomach cancer and sharp decrease in esophageal cancer (Yazdizadeh et al., 2005). In Semnan Province of Iran, gastric cancer alone constitutes one-sixth of all cancers, (47.2%), followed by colon malignancies (8.1%) and esophageal lesions (6.8%) (Babaei et al., 2005). Gastrointestinal tract cancers exhibit significant spatial clustering of risk in northern Iran, pointing to potential life-style and environmental factors (Mohebbi et al., 2008)

### Organ Specific Epidemiology

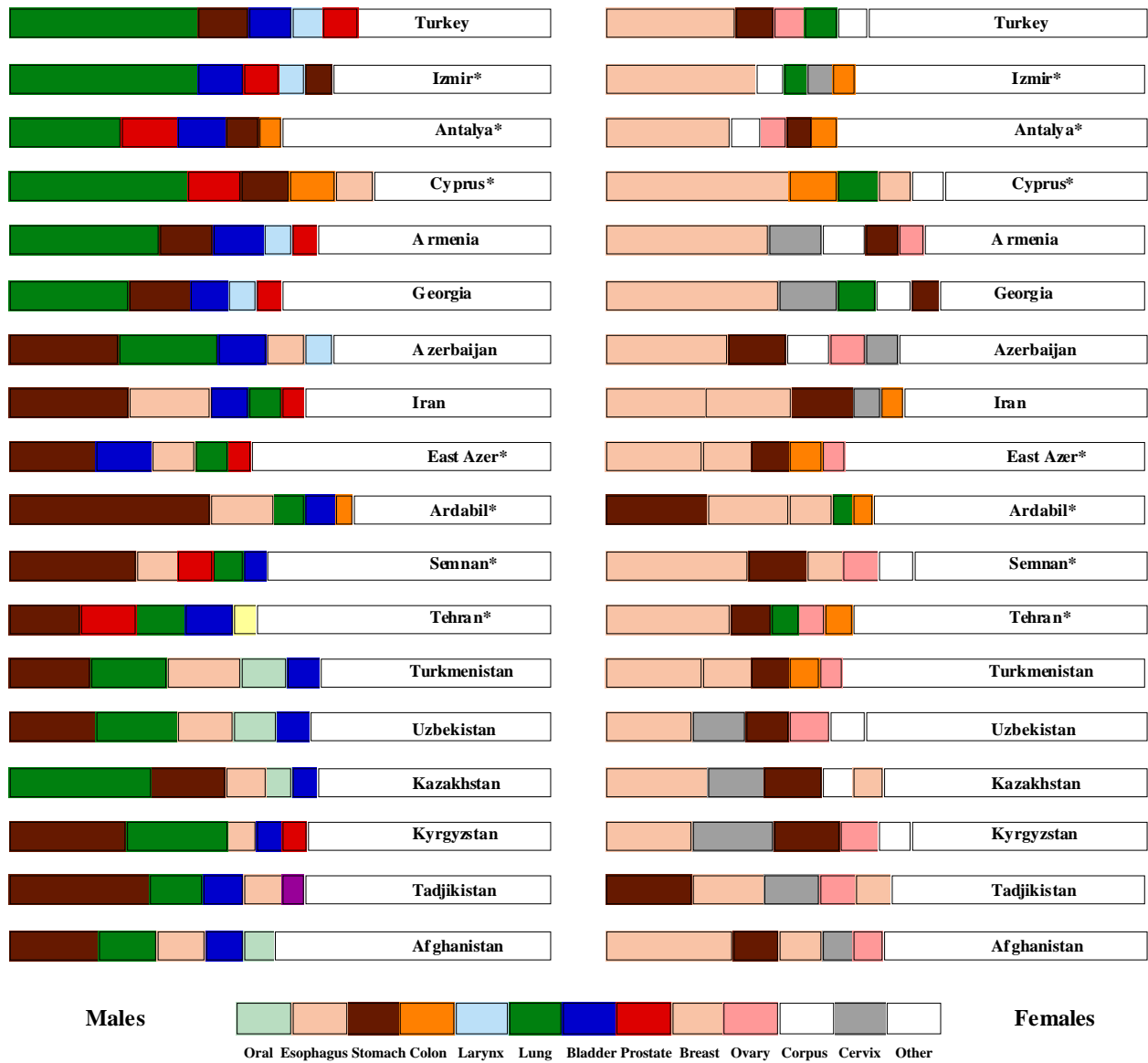
#### Skin Cancer

Skin cancers are relatively rare, except in some particular areas, for example in central Iran (Mohagheghi et al., 2009), with male melanoma rates below 2/100,000 except in Kazakhstan and Turkmenistan. However, rates may be increasing (Eser, personal communication), and there is some interest in sun exposure of Turkish high school students and their sun bathing habits (Dalli et al., 2004).

**Table 2. Population-based Cancer Registry Data for Turkey and Iran - Females**

	Turkey			Iran			
	I*	A*	C+	Ar <sup>#</sup>	EA <sup>++</sup>	S <sup>##</sup>	T <sup>###</sup>
Buccal	1.4	1.5	-	1.7	2.8	3.4	2.4
Pharynx	0.3	0.1	-	0.7	1.0	-	10.9
Nasopharynx	0.5	0.5	-	0.7	-	-	-
Oesophagus	1.1	0.6	-	14.4	11.7	8.8	5.3
Stomach	5.1	5.5	8.3	25.4	11.6	14.8	10.0
Colon	5.3	5.6	30.8	5.9	9.7	10.5	6.1
Rectum	4.2	3.5	-	-	-	-	3.4
Liver	1.3	1.2	4.7	2.3	2.0	3.5	3.2
Gallbladder	2.0	1.8	-	0.7	1.7	2.1	1.6
Pancreas	2.7	2.6	-	0.2	1.3	2.8	2.6
Larynx	0.5	0.6	-	0.2	0.3	1.1	0.9
Lung	5.9	4.8	15.5	3.6	3.7	4.8	7.0
Breast	34.8	29.1	72.5	7.6	23.5	21.3	31.4
Ovary	4.9	6.1	10.5	0.8	5.3	17.0	6.5
Corpus uteri	6.5	7.2	12.6	0.5	2.2	-	3.8
Cervix uteri	5.4	4.4	9.5	0.7	1.9	1.1	4.8
Kidney	1.6	1.6	-	1.3	1.8	0.7	1.7
Bladder	2.1	2.5	5.9	1.8	3.7	3.0	3.8
Brain	3.1	4.4	5.6	3.1	5.5	6.3	4.5
Thyroid	3.6	4.5	-	1.0	4.9	4.5	2.8
Non-Hodgkin	4.1	3.9	-	1.4	2.9	4.5	4.8
Leukemia	4.0	3.8	-	1.3	-	3.1	6.1
Total	125	126	212	96	131	136	136

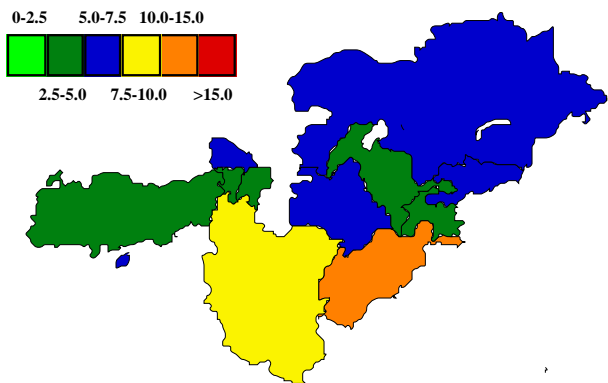
\*Curado et al., 2007; <sup>#</sup>Hinçal et al., 2008; <sup>#</sup>Sadjadi et al., 2003; <sup>++</sup>Babaei et al., 2005; <sup>##</sup>Somi et al., 2008; <sup>###</sup>Larijani et al., 2004; A, Antalya; Ar, Ardabil; C, Cyprus; EA, East Azerbaijan; I, Izmir, S, Semnan; T, Tehran



**Figure 2. Percentage Data for the Five Most Prevalent Cancers in Countries/Registries of North-Western and Central Asia** (from Globocan, 2002: Ferlay et al., 2004 and the references listed for Tables 1 and 2)

*Oral Cancer*

Oral cancers are rare except in some of the Central Asian Republics and Iran (see Figure 3). Clearly smoking is one risk factor, as evidenced by an additive interaction with the GSTM1-null genotype (Suzen et al., 2007) but recent research within the area has been very limited.

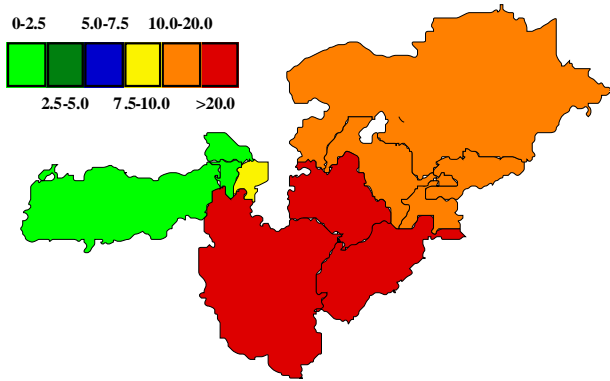


**Figure 3. Male Oral Cancer Incidences/100,000** (Globocan, 2002: Ferlay et al., 2004)

During the Soviet era, a series of studies were carried out and Nass use and cigarette smoking emerging as independent risk factors for oral leukoplakia (Zaridze et al., 1985; Zaridze et al., 1987; Evstifeeva and Zaridze, 1992). Alcohol intake was not found to be independently associated with the presence of oral precancerous lesions (Evstifeeva and Zaridze, 1992)

*Oesophageal Cancer*

Through Iran and all of Central Asia, oesophageal cancer is of major importance and has attracted a great deal of research interest, with setting up a cohort in Golestan (Pourshams et al., 2005). Intriguingly, rates appear very low in Western Turkey and the Caucasus. However, in Van close to the Iranian border the situation is clearly different (<http://www.ukdk.org/pdf/kitap/en/51.pdf>). In Turkish population-based registries, the percentages of SCCs and ACs of the esophagus are reported to be 72.5 and 20.5 in Antalya and 71.7 and 18.7 in Izmir males, respectively, and 58.8/35.3 and 82.0/6.7 in females (Curado et al., 2007).



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

Thermal irritation and coarse food (physical damage to the mucosal lining of the esophagus) are risk factors, presumably interacting with low socioeconomic status and poor nutritional diet (Mosavi-Jarrahi and Mohagheghi, 2006). Drinking of hot tea ‘kitlama’ and low fruit diet are the most common risk factors for oesophageal cancer in high risk area in Eastern Turkey (Onuk et al., 2002). Consumption of smoked, salted, hot, fatty foods, and well water, cigarette smoking, poor intake of fresh fruits and vegetables and poor hygienic conditions are also probable culprit factors (Turkdogan et al., 2005).

A traditional diet rich in nitrate and nitrite is significant in the development of endemic upper gastrointestinal (oesophageal and gastric) cancers in the Van region of Turkey (Turkdogan et al., 2003). Low zinc and molybdenum levels (Nouri et al., 2008) and riboflavin deficiency (Siassi and Ghadirian, 2005) are prevalent in high-incidence areas and nutrients such as phosphorus and niacin confer play protection (Siassi et al., 2000). Risk is increased in those who use tobacco only, in those who used opium only, and in those who used both tobacco and opium (Nasrollahzadeh et al., 2008). Smoking is an independent risk factor for oesophageal lesions and significantly associated with chronic oesophagitis (Zaridze et al., 1985; Zaridze et al., 1987; Evstifeeva and Zaridze, 1992). Alcohol intake was not found to be independently associated with the presence of oral and oesophageal precancerous lesions (Evstifeeva and Zaridze, 1992). Polycyclic aromatic hydrocarbons might also contribute to the high risk (Hakami et al., 2008). However, variations in CYP1A1 m1, CYP1A1 m2, CYP2A6\*9 polymorphic genes were not found to be major contributors to the high incidence among Turkomans (Sepehr et al., 2004).

Familial heritable factors could be significant (Akbari et al., 2006), although the dramatic decrease in incidence found in Iranian immigrants in Canada suggest that the genetic influence must be limited (Yavari et al., 2006). In addition, the human papilloma virus may play a role in Iran (Farhadi et al., 2005). In a recent study 23.6% of tumour specimens and 8.6% of non-involved tumour margins were found to be HPV positive (Far et al., 2007).

Data on relative incidences of squamous cell carcinomas and adenocarcinomas are limited, but in Turkish males the latter account for about 20%. In northwest Iran there appears to be a relatively low incidence of adenocarcinomas, but the situation is

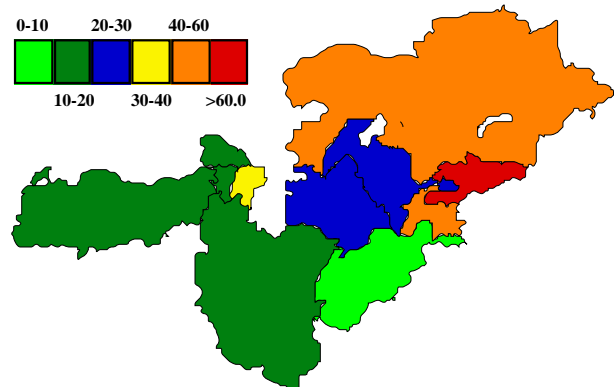
complicated by gastric involvement (Bafandeh et al., 2006). In one series in Northeast Iran, there were ten times as many SCCs as ACs (Islami et al., 2004), while in Eastern Azerbaijan, they accounted for 86.9% and 12.8% of cases, respectively, although many tumors were in the lower third of the esophagus (Gholipour et al., 2008). The oesophageal cancer incidence rate in the Turkmen Plain, eastern part of the Caspian Littoral of Iran is decreasing (Semnani et al., 2006) and similar data have been published by other authors (Sadjadi et al., 2003; 2005). In Kerman, the South-east of Iran, risk of SCCs appears to have remained more or less constant over time, while that of ACs has increased around 11% annually (Haghdoost et al., 2008).

The control of esophageal cancer is also a top priority in Kazakhstan (Sharmanov et al., 1996). Regarding traditional analytical epidemiology one group have evaluated variation between plain (Kzyl-Orda Region) and mountainous (Alma-Ata Region) areas, finding an inverse association with altitude for this cancer (Akhtiamov and Kairakbaev, 1983). There are much higher rates in Kyrgyz than in Russians in Kyrgyzstan, with an altitude link (Igisinov et al., 2002).

Of men from whom blood was drawn for analysis, 4%, 66%, and 86% had low levels of retinol, carotene, and riboflavin, respectively, providing an opportunity and a justification for chemopreventive trials focused on precancerous lesions as end points (Zaridze et al., 1985b). Differential evaluation of different pathologies of the esophageal mucosa suggested a link between catarrhal and erosive esophagitis and vitamin B2 deficiency and atrophic esophagitis and vitamin A deficit (Zaridze et al., 1989). Furthermore, a significant decrease in the prevalence odds ratio (OR) of oral leukoplakia was observed after 6 months of treatment in men receiving retinol, beta-carotene, and vitamin E, and of risk of progression of chronic esophagitis (Zaridze et al., 1993).

*Stomach Cancer*

Stomach cancer is relatively prevalent throughout the region, especially in parts of Iran and the Central Asian republics (see Figure 5). Particularly high rates are evident in Ardabil (Sadjadi et al., 2003), and incidences may be increasing (Semnani et al., 2006). In NW Iran the great majority of tumours originate from the right side of the



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

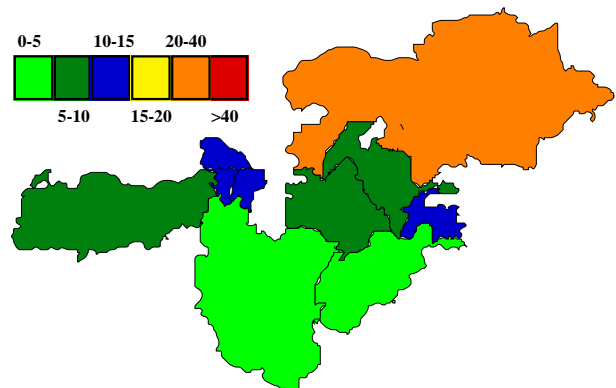
cardia (Derakhshan et al., 2004). Over 36 years, the prevalence of cancers in the upper and middle third of the stomach in Tehran have increased and that of the lower third has decreased, especially in younger patients (Abdirad et al., 2006). Proximal lesions also predominate in the eastern part of Turkey, contrasting with the distal tumours found in the western region (Bor et al., 2007).

In Ardibil, atrophic gastritis, reactive atypia, and intestinal metaplasia are reported to be common in antrum, corpus, and cardia subsites, with most subjects positive for *H. pylori* infection (Malekzadeh et al., 2004). The bacterium is the main risk factor for gastritis in all stomach sites, but the relationship is stronger for the antrum and cardia than for the body (Ghadimi et al., 2007; Sotoudeh et al., 2008). The role of intestinal metaplasia is open (Dincer et al., 2002). The Epstein-Barr virus is only found in a very small number of cases (~3%) (Abdirad et al., 2007). Gastric cancer risk is statistically increased by the GSTM1 null genotype (Saadat and Saadat, 2001) and possibly also the GSTT1 null genotype (Saadat, 2006), pointing to tobacco as a risk factor. Selenium deficiency may play a role in the high incidence of gastric cancer in Ardabil Province (Nouarie et al., 2004). The incidence of gastric cancer also appears to reflect the climatic-geographical zone (Saenko, 1979).

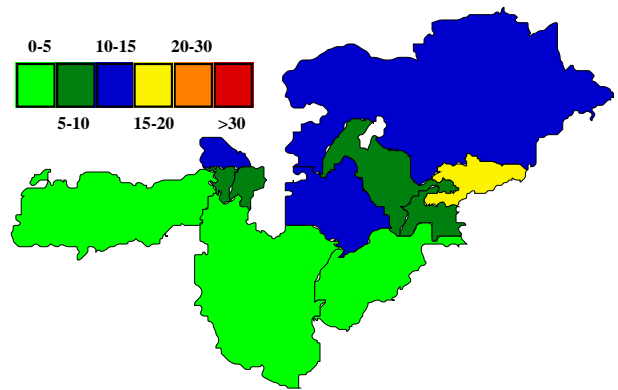
Gastric cancer history in parents and familial clustering of the disease have been reported (Bakir et al., 2003). Gastric cancer patients in Iran have a low 5-year survival rate due to delayed consultation and diagnosis (Sadighi et al., 2005; Zeraati et al., 2005).

*Colorectal Cancer*

Colorectal cancers are still very infrequent in North-Western and Central Asia, although there are signs of increase (Semnani et al., 2006). There is a slight predomination of colon over rectum in both sexes and males have slightly higher incidences. A marked increase has been reported for Shiraz, with no alteration in the ratio of right to left sides (Hosseini et al., 2004), whereas in Tabriz, a left shift of both colorectal adenomas and cancers has been described (Bafandeh et al., 2005; 2006). On the basis of more left lesions, screening with fecal occult blood testing and sigmoidoscopy have been recommended as most appropriate for screening (Erkek et al., 2007). In Turkey, colon cancers slightly outnumber those in the rectum but the situation in Iran is unclear. Synchronous colon and



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



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

rectum lesions may not be rare (Yalcinkaya et al., 2008).

In Turkey, the young age group colorectal cancers appear more common than in Western communities so that genetic or cohort effects have been surmised (Zorluoglu et al., 2004). Almost half of cases in Iran may also be below the age of 50 years, with a family history in one third of cases, again suggestive of genetic factors (Azadeh et al., 2008). However, the high proportions of young cases could also be at least partly due to the young age-structure of these countries (Ansari et al., 2006).

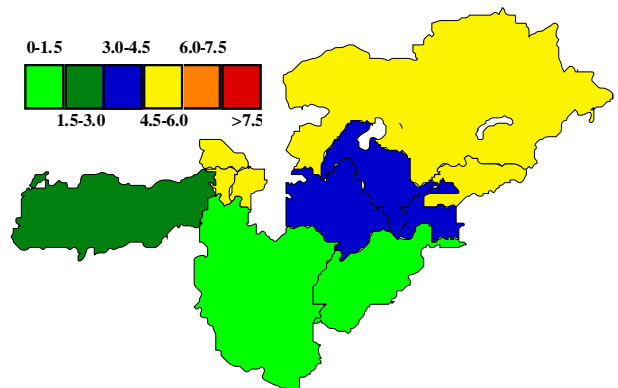
The Turkish version of the Champion’s Health Belief Model Scales is a reliable and valid instrument that can be used for measuring beliefs related to colorectal cancer (Ozsoy et al., 2007). Stage of tumor, distant metastasis, grade of tumor, and tumor size are the most important prognostic factors (Moghimi-Dehkordi et al., 2008).

*Liver Cancer*

Liver cancer is not a major problem in the region, except possibly in Kyrgyzstan (see Figure 7). In Southern Iran, the predominant etiology of hepatocellular carcinoma is hepatitis B and hepatitis C, whereas alcohol and metabolic diseases are only found in rare cases (Hajiani et al., 2005). Expression of p53, RB1 and c-fos genes appears to have a key role in the pathogenesis (Moghaddam et al., 2007).

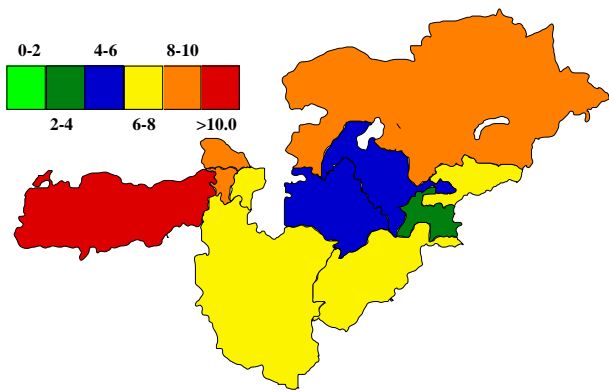
*Pancreatic Cancer*

Pancreatic cancer rates are moderately high in the ‘European’ area of the former Soviet Union, but otherwise they are very low, especially in Iran (see Figure 8). In



**Figure 8. Male Pancreatic Cancer Incidences/100,000** (Globocan, 2002; Ferlay et al., 2004)





**Figure 9. Male Laryngeal Cancer Incidences (Globocan 2002)**

Turkey, links with high insulin and C-peptide levels suggest that insulin resistance may be a risk factor (Cetin et al., 2002).

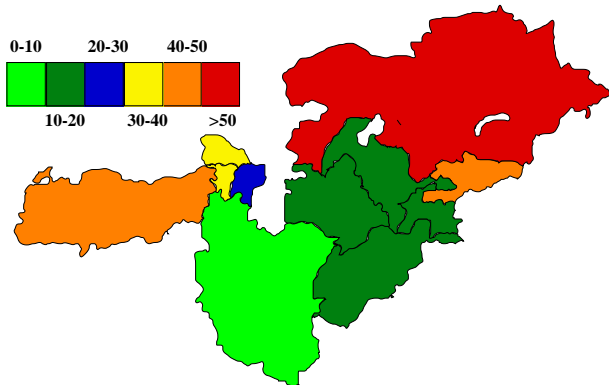
NAT2 slow acetylators have a higher risk of developing pancreatic cancer than fast acetylators, in line with the well established tobacco etiology (Ayaz et al., 2007).

*Laryngeal Cancer*

Turkey and the countries of the Caucasus have exceedingly high rates of laryngeal cancer (see Figure 9). In a series of papers, Elci et al demonstrated diesel exhaust, silica and cotton dust exposure, also together with lung smoking and alcohol use, to be major risk factors (Elci et al., 2002; 2003). Opium dependency has not only been established as an independent possible risk factor for laryngeal cancer but also significantly increases the likelihood of developing of the disease at a younger age (Mousavi et al., 2003).

*Lung Cancer*

Lung cancers account for a large proportion of male neoplasms in the region, except intriguingly in Iran (see Figure 10), but rates in females are very low other than in Western Turkey and Georgia. The histology is largely SCC in males in Turkey, with late stage presentation (Goksel et al., 2002), but in females there are twice as many ACs. In Istanbul, the AC is the most common lung cancer (Okutan et al., 2005), but in Thrace SCCs predominate, even in females (Karlikaya and Cakir Edis, 2005). In Turkish population-based registries, the percentages of SCCs and ACs of the lung were found to be 42.1 and 15.5 in Antalya



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

and 29.2 and 15.6 in Izmir males, respectively, and 19.8/39.7 and 13.0/33.4 in females (Curado et al., 2007). In line with the expected tobacco etiology, the null GSTM1 genotype is an independent risk factor (Pinarbasi et al., 2003), although no link overall was found for CYP1A1 Msp1 (Demir et al., 2005). HPV has also been suggested to be a risk factor in Mazandaran, Iran (Nadji et al., 2007).

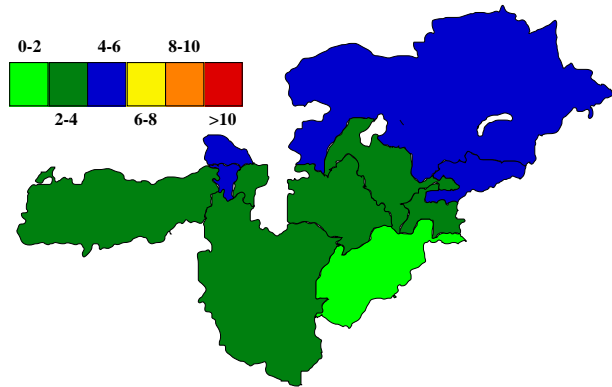
Different types of lung cancer are associated with several occupations (Elci et al., 2003) and Turkey includes areas with exceedingly high incidences of asbestos- and erionite-induced mesotheliomas (Emri and Demir AU (2004). In 11 villages around Eskisehir in central Anatolia, the risk of mesothelioma is 88.3 times greater in men and 799 times greater in women, respectively, in comparison to world background incidence rates, due to asbestos-contaminated soil (Metintas et al., 2002). Environmental exposure to asbestos begins at birth and this may be important in the age of disease onset, with no apparent familial genetic influence (Metintas et al., 2008).

*Kidney Cancer*

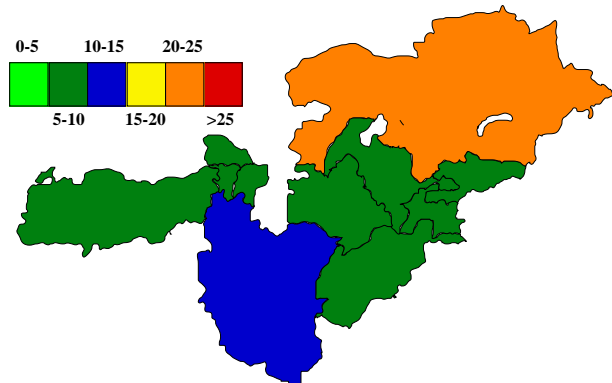
Low rates prevail, as compared with the Western world, with highest incidences in the former Soviet Union countries (see Figure 11). Slight increase was recently noted in Izmir (Eser et al., 2009).

*Urinary Bladder Cancer*

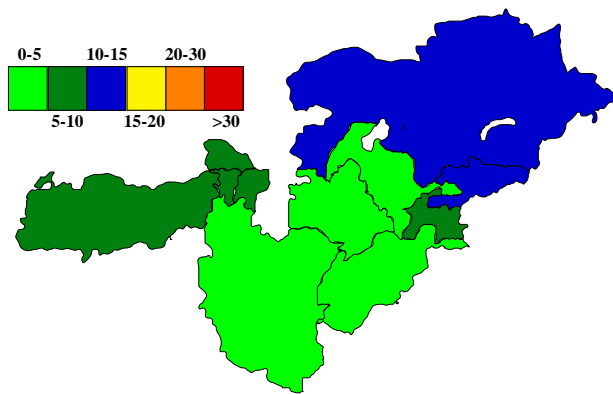
Appreciable rates for bladder cancer are consistently seen in the region, with highest rates in Kazakhstan and Iran (see Figure 12), but limited to males, the most important risk factors being smoking and occupation (Yaris



**Figure 11. Kidney Cancer Incidences ((Globocan, 2002: Ferlay et al., 2004)**



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



**Figure 13. Prostate Cancer Incidences/100,000** (Globocan, 2002; Ferlay et al., 2004)

et al., 2006; Mohseni et al., 2004; Demirel et al., 2008). Opium consuming smokers exhibit higher incidences than those who were only smokers (Aliasgari et al., 2004). Roles for the GSTM1 null and specific GSTP1 genotypes have been proposed in the development of bladder cancer in Turkey (Toruner et al., 2001) and there are also links with industrial agents and agricultural chemicals (Gumus et al., 1999). Slight increase was recently noted in Izmir (Eser et al., 2009).

#### Prostate Cancer

In some parts of Turkey, the Caucasus and Iran, prostate cancer has become notable (see Figure 13), although at levels much lower than in the Western world. However, marked increase over time was recently noted in Izmir (Eser et al., 2009) and the lack of nationwide screening programs, younger age structures and limited quality cancer registration systems also needs to be taken into account (Sadjadi et al., 2007). Patients diagnosed with prostate cancer have low levels of serum testosterone and high levels of serum FSH compared with patients with BPH (Sofikerim et al., 2007).

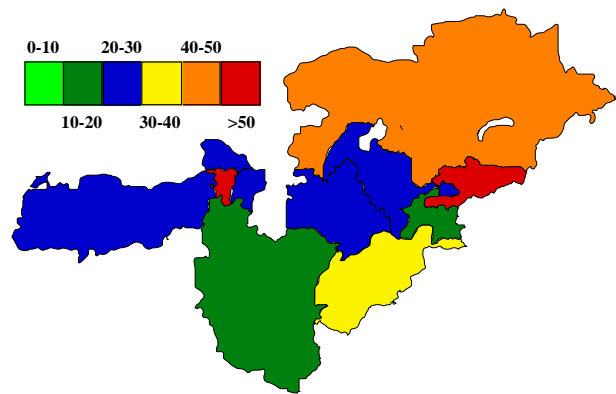
Risk is reported to increase with aging, the frequency of sexual intercourse, fat intake and elevated serum estradiol, while high testosterone concentrations, a history of diabetes and dietary consumption of lycopene are protective (Pourmand et al., 2007). Other factors including educational level, marriage status, dietary meat consumption, vasectomy and smoking have not been shown to affect risk in the Iranian population (Pourmand et al., 2007).

Prostate specific antigen (PSA) gene promoter variation may play a significant role in the development of cancer and benign prostate hyperplasia, and a CYP17 gene polymorphism was found associated with BPH in a Turkish population (Gunes et al., 2007). Patients with PTEN mutations have a poorer prognosis (Pourmand et al., 2007).

Screening is opportunistic on a voluntary basis for men above 50 years (Razi, 2007). Normal PSA levels appear lower than in the US, Europe and Japan (Mehrabi et al., 2007).

#### Breast Cancer

The region is no exception to the world trend in having breast cancer as number one in frequency, with particularly



**Figure 14. Female Breast Cancer Incidences/100,000** (Globocan, 2002; Ferlay et al., 2004)

large proportions in Armenia and Georgia (see Figure 14). Change over time has also been described, dependent on the region and ethnic make up (Igisinov, 2005)

Risk factors in one Turkish study were found to be long-term lactation young age at menarche, late age at first full-term pregnancy, oral contraceptive use, positive family history and menstrual irregularity (Kurur et al., 2002). A history of diabetes or hypertension, use of alcohol, oral contraceptives and hormone replacement therapy, never having breastfed and delayed age at first birth were significant factors in other studies (Oran et al., 2004; Ceber et al., 2005; Beji and Reis; 2007). Smoking also apparently increases the likelihood of developing breast cancer (Ceber et al., 2005), possibly linked to GSTT1 but not CYP1A2, CYP2D6, NAT2, GSTM1, and GSTP1 gene polymorphisms (Kocabas et al., 2004; Altayli et al., 2008). With MnSOD Ala combined with either cytochrome P450 1B1 CYP1B1\*1 or catechol O-methyltransferase COMT-L (V158M) genotypes, risk was significantly increased in patients with a body mass index (BMI) greater than 24 (Kocabas et al., 2005). Elevated BMI might be particularly a risk factor for breast cancer in postmenopausal women (Yumuk et al., 2008). A close relation between exposure to electromagnetic fields and light at night with male breast carcinoma has been reported in eastern Turkey (Cok and Polat, 2001).

In Iran, family history of breast cancer in a first-degree relative, younger age at menarche, never married, first full-term pregnancy age>5 full-term pregnancies, and a negative history of breastfeeding have been found to be significant risk factors (Ebrahimi et al., 2003 Mahouri et al., 2007; Pourhoseingholi et al., 2008). In one study, high education, early age at menarche, abortion, breast feeding and its duration were not significant (Yavari et al., 2005). Variables such as obesity in postmenopausal women could increase risk (Montazeri et al., 2008) Both passive and active smoking equally increase the risk of female breast cancer (Sadri and Mahjub, 2007). Psychological determinants such as depressed mood may play an important role in etiology of breast cancer and deserve further investigation (Montazeri et al., 2004).

The IFN-gamma and interleukin genotypes may influence the risk of breast cancer development (Kamali-Sarvestani et al., 2005; Gonullu et al., 2007). There is also evidence of roles for polymorphisms in DNA repair genes (Saadat et al., 2007) and the GST gene family (Unlü et al.,

2008), although no predominant mutations in the BRCA1 and BRCA2 genes were found in Turkish high risk families (Manguoglu et al., 2003)

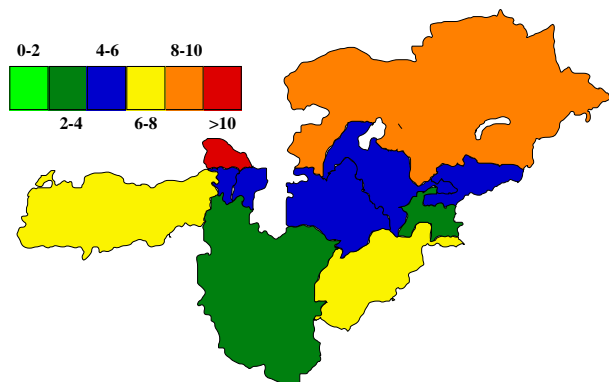
Breast cancer affects women in the region at least one decade younger than their counterparts in developed countries, with approximately one third of cases under 40 years old (Mousavi et al., 2006; 2008). Considerable proportions are stage II or III at diagnosis (Harirchi et al., 2004; Kermani, 2004; Mousavi et al., 2007), with an overall relative 5-year survival rate of 62% (Vahdaninia and Montazeri, 2004).

Most Muslim women do not perceive breast self-examination as being against their Islamic beliefs (Montazeri et al., 2003). Therefore attention needs to be focused on education programmes and encouraging women to self-examine with positive health beliefs (Hadi et al., 2002; Canbulat et al., 2008), especially those with a lower level of education (Parsa et al., 2006; Budakoglu et al., 2007; Yavari and Pourhoseingholi, 2007; Avci, 2008; Avci and Kurt, 2008). BSE training is necessary for nursing and midwifery students but should be repeated periodically for better efficacy (Haji-Mahmoodi et al., 2002; Balkaya et al., 2007; Yaren et al., 2008). Use of training guides may be recommended (Sevil et al., 2005), also for teachers (Jarvandi et al., 2002; Nahcivan and Secginli, 2007). Cultural attitudes toward breast cancer screening tests, modesty, lack of encouragement by family members and physicians are the major inhibitors to women's participation in breast cancer screening. Facilitating factors are self-care, proactive coping, state of mind and advocacy. Barriers are negligence, cancer-related fear, low self-efficacy, fatalism, misinformation, ineffective health communication and competing priorities (Lamyian et al., 2007). Poster displays may be useful for awareness campaigns but need to be designed to prevent anxiety (Montazeri and Sajadian, 2004).

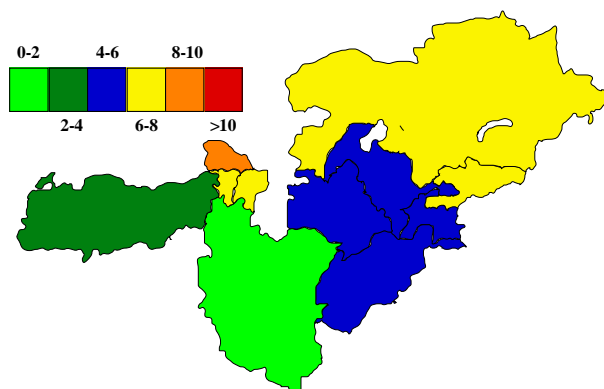
Replacement of general surgeons by midwives in the health care system as the first examiner for clinical breast screening may not be recommended (Kaviani et al., 2006). Women experience a high level of needs associated with a diagnosis of breast cancer (Erci and Karabulut, 2007) but levels of satisfaction are reasonable (Sadjadian et al., 2004).

#### Ovarian Cancer

While ovarian cancers are relatively prevalent,



**Figure 15. Ovarian Cancer Incidences/100,000** (Globocan, 2002; Ferlay et al., 2004)



**Figure 16. Endometrial Cancer Incidences/100,000** (Globocan, 2002; Ferlay et al., 2004)

especially in Georgia (see Figure 15), very little information is available on risk factors. In Kyrgyzstan, clear increase over time has been documented for Kyrgyz but not Russian communities, but in the latter case data are complicated by extensive emigration (Igisinov and Umaralieva, 2008). Low concentrations of IGF-I and IGFBP-3 could be a reliable pointer to differentiate benign from malignant ovarian tumors (Serin et al., 2008).

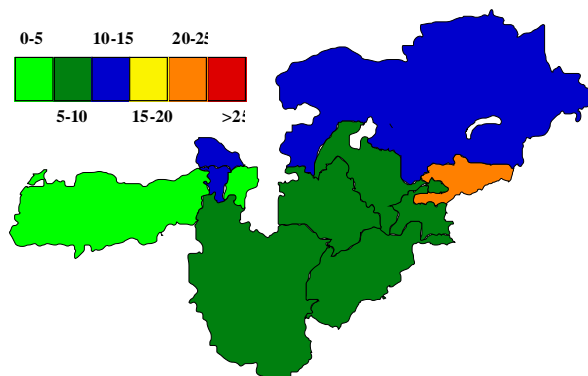
#### Corpus uteri

Similarly, the reason for the comparatively high incidences of endometrial cancers, again particularly in the Caucasus and countries of Central Asia with large Russian minorities (see Figure 16) is unclear.

#### Cervix uteri

In most of Central Asia and the 'European' parts of the region, cervical cancer accounts for an appreciable proportion of the total burden (see Figure 17). In Turkey, the overall frequency rate of HPV infection was demonstrated to be 6.1% (Ozcelik et al., 2003). Among HPV-positive dysplasia and metaplasia cases, 55.6% had HPV16 and 18 (Hamkar et al., 2002). In another series, 64% of lesion samples proved positive, mostly for 16, 31 or 18 (Esmaeili et al., 2008). High rates of infection with HPV genotypes have also been reported in sexually active Iranian women, again with HPV16 and 18 (Ghaffari et al., 2006).

Public education is necessary for cervical cancer prevention with population-based cancer screening programs (Turkistanli et al., 2003). Among married women



**Figure 17. Cervical Cancer Incidences/100,000** (Globocan, 2002; Ferlay et al., 2004)



of childbearing age, 68.5% reported having undergone at least one Pap test, correlating with knowledge about screening (Allahverdipour and Emami, 2008). Visual inspection with acetic acid has also been explored as a feasible method (Ghaemmaghami et al., 2004), although best used along with Pap smears (Eftekhar et al., 2005). The quality of the Papanicolaou smear can be improved by using the Ayre spatula first followed by the endocervical brush (Rahnama et al., 2005). It has been reported that women in Turkey would be willing to have themselves and their children receive HPV vaccine against cervical cancer and related diseases (Baykal et al., 2008).

Education by lecture and flash cards was more effective than by pamphlets for knowledge, attitude, and practice of women high school teachers in prevention of cervical cancer (Rezaei et al., 2004). One major problem is that cervical cancer patients do not pay enough attention to disease follow-up (Farnaz et al., 2008).

*Brain and Nervous Tissue Cancer*

Relatively high rates are seen in Turkey, Armenia, Georgia and Kazakhstan but there is no information on risk factors in the literature (see Figure 18).

*Thyroid cancer*

Thyroid cancer is prevalent in Iran and Kazakhstan (see Figure 19), and there are some very high risk areas. For example a high incidence of papillary tumours among ethnic Farsis has been described in Iran (Larijani et al.,

2004). Kazakh and Japanese scientists have reported on risk associated with the Semipalatinsk Nuclear Testing Site. In the period 1982-96, there was a noticeable increase in the number of cases of Hashimoto's thyroiditis and thyroid cancer (Zhumadilov et al., 2000). However, another study found no evidence of radiation risk for thyroid gland among local schoolchildren (Hamada et al., 2003).

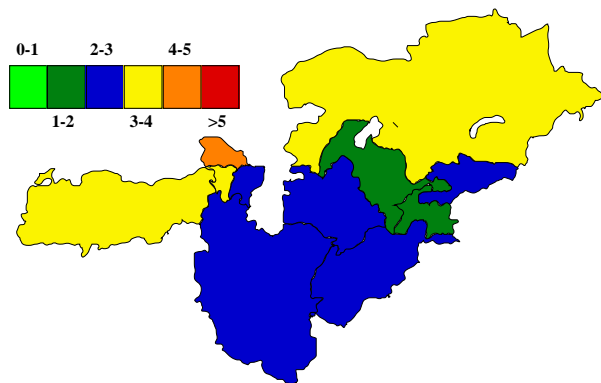
*Leukemias and Lymphomas*

Unlike the Arab world, incidences of NHL and leukemia are relatively low (see Figures 19 and 20). Data do not support any association between HCV infection and NHL in southeastern Anatolia region of Turkey (Isikdogan et al., 2003). Findings of collaboration with an American group suggested an increased risk of leukemia among those exposed to high irradiation, but this could have been a chance finding (Abylkassimova et al., 2000).

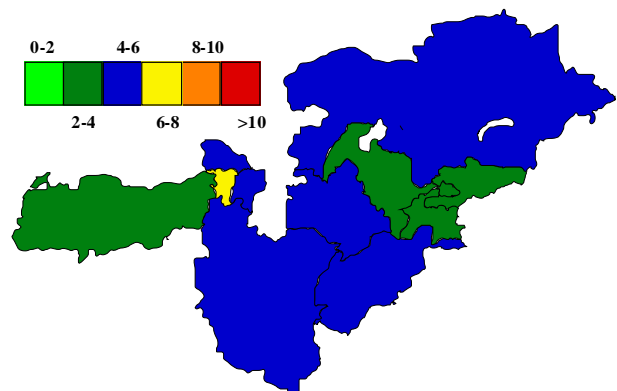
*Childhood cancers*

In Iran, childhood leukemias have been linked to high voltage overhead lines (Feizi and Arabi, 2007), with clustering in the inner city of Tehran metropolitan area (Mosavi-Jarrahi et al., 2007).

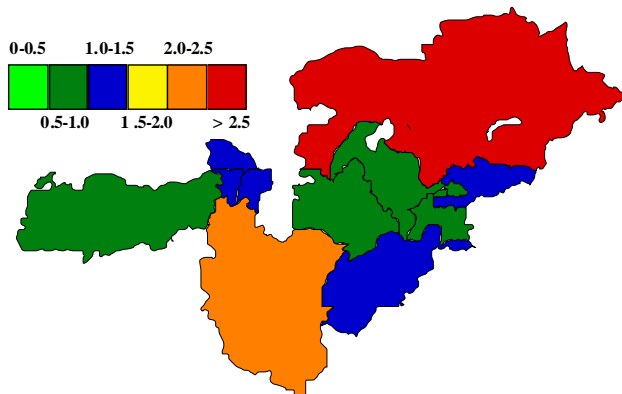
In central ASia the incidence of acute leukaemia was also found to significantly increase with increasing proximity of residence to nuclear testing areas, with some evidence of elevated numbers of brain tumours (Zaridze et al., 1994).



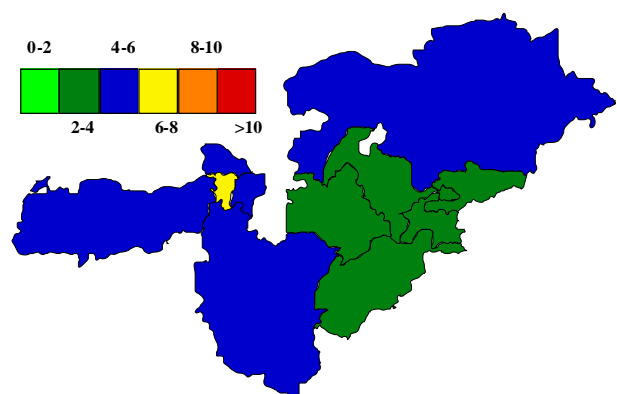
**Figure 18. Male Brain and Nervous Tissue Cancer Incidences/100,000** (Globocan, 2002: Ferlay et al., 2004)



**Figure 20. Male Non-Hodgkins Lymphoma Incidences/100,000** (Globocan, 2002: Ferlay et al., 2004)



**Figure 19. Male Thyroid Cancer Incidences/100,000** (Globocan, 2002: Ferlay et al., 2004)



**Figure 21. Male Leukemia Incidences/100,000** (Globocan, 2002: Ferlay et al., 2004)

## Future Perspectives

Within the region of North-West and central Asia there are high rates of obesity-related diabetes and other chronic diseases (Abdullakhodzhaeva and Utepov, 1990; Meimanaliev et al., 1991a; 1991b; Onat, 2001; King et al., 2002; Satman et al., 2002; Erem et al., 2004; Kausova, 2004), also in children (Kocaoglu et al., 2005; Sur et al., 2005). Therefore, primary prevention needs to focus on lifestyle modifications (Gokcel et al., 2003).

Furthermore, smoking prevalence among adolescents is alarmingly high and the gender gap is closing (Erguder et al., 2006; Uysal et al., 2007). Physicians have insufficient knowledge on smoking cessation therapies and the law regarding the use of tobacco and that smoking cessation techniques should be incorporated in the curriculum of the faculties and post graduation training programs. The level of general knowledge about cancer is also poor (Eftekhari and Yarandi, 2004).

Therefore, given the high rates for chronic diseases overall, many related to particular types of neoplasm, and also continued tobacco consumption, there are good grounds for believing that the burden of cancer will also become progressively heavier in the future, underlining the need for collaborative efforts for control.

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## References

Abdirad A, Ghaderi-Sohi S, Nadimi-Barfroosh H, Emami S (2006). Trend in incidence of gastric adenocarcinoma by tumor location from 1969-2004: a study in one referral center in Iran. *Diagn Pathol*, **1**, 5.

Abdirad A, Ghaderi-Sohi S, Shuyama K, et al (2007). Epstein-Barr virus associated gastric carcinoma: a report from Iran in the last four decades. *Diagn Pathol*, **2**, 25.

Abdullakhodzhaeva MS, Utepov Iafu (1990). The characteristics of atherosclerosis in women of the indigenous and nonindigenous nationalities of Tashkent with arterial hypertension. *Arkh Patol*, **52**, 44-7. [Article in Russian]

Abylkassimova Z, Gusev B, Grosche B, et al (2000). Nested case-control study of leukemia among a cohort of persons exposed to ionizing radiation from nuclear weapon tests in Kazakhstan (1949-1963). *Ann Epidemiol*, **10**, 479.

Aitbaev KA, Meimanaliev TS (1992). Prevalence of atherogenic dyslipoproteinemias among the highland population. *Kardiologiia*, **32**, 9-11 [Article in Russian].

Akimova EV, Gafarov VV, Dracheva LV, Kuznetsov VA (1999). Attitude of urban population to health and knowledge about risk factors of cardiovascular diseases according to postal questionnaire. *Ter Arkh*, **71**, 16-8 [Article in Russian].

Akbari MR, Malekzadeh R, Nasrollahzadeh D, et al (2006). Familial risks of esophageal cancer among the Turkmen population of the Caspian littoral of Iran. *Int J Cancer*, **119**, 1047-51.

Akhtiamov MG, Kairakbaev MK (1983). Incidence of esophageal cancer on the plains and in the mountainous regions of the Kazakh SSR. *Vopr Onkol*, **29**, 49-53. [Article in Russian]

Alekseev VP, Ivanov KI, Konstantinov VV, et al (2001). Epidemiology of ischemic heart disease and characteristics of atherosclerosis in male residents in Yakutsk. *Ter Arkh*, **73**, 12-8. [Article in Russian]

Aliasgari M, Kaviani A, Gachkar L, Hosseini-Nassab S (2004). Is bladder cancer more common among opium addicts? *Urol J*, **1**, 253-4.

Allahverdipour H, Emami A (2008). Perceptions of cervical cancer threat, benefits, and barriers of Papanicolaou smear screening programs for women in Iran. *Women Health*, **47**, 23-37.

Altayli E, Gunes S, Yilmaz AF, Goktas S, Bek Y (2008). CYP1A2, CYP2D6, GSTM1, GSTP1, and GSTT1 gene polymorphisms in patients with bladder cancer in a Turkish population. *Int Urol Nephrol*. [Epub ahead of print]

Andruchow JE, Soskolne CL, Racioppi F, Bertollini R (2005). Capacity building for epidemiologic research: a case study in the newly independent state of Azerbaijan. *Ann Epidemiol*, **15**, 228-31.

Ansari R, Mahdavinia M, Sadjadi A, et al (2006). Incidence and age distribution of colorectal cancer in Iran: results of a population-based cancer registry. *Cancer Lett*, **240**, 143-7.

Avci IA (2008). Factors associated with breast self-examination practices and beliefs in female workers at a Muslim community. *Eur J Oncol Nurs*, **12**, 127-33.

Avci IA, Kurt H (2008). Health beliefs and mammography rates of Turkish women living in rural areas. *J Nurs Scholarsh*, **40**, 170-5.

Ayaz L, Ercan B, Dirlik M, Atik U, Tamer L (2008). The association between N-acetyltransferase 2 gene polymorphisms and pancreatic cancer. *Cell Biochem Funct*, **26**, 329-33.

Azadeh S, Moghimi-Dehkordi B, Fatem SI, et al (2008). Colorectal cancer in Iran: an epidemiological study. *Asian Pac J Cancer Prev*, **9**, 123-6.

Babaei M, Mousavi S, Malek M, et al (2005). Cancer occurrence in Semnan Province, Iran: results of a population-based cancer registry. *Asian Pac J Cancer Prev*, **6**, 159-64.

Bafandeh Y, Daghestani D, Esmaili H. Demographic and anatomical survey of colorectal polyps in an Iranian population. *Asian Pac J Cancer Prev*, **6**, 537-40.

Bafandeh Y, Daghestani D, Esmaili H, Aharizad S (2006). Distribution of cancer and adenomatous polyps in the colorectum: study in an Iranian population. *Asian Pac J Cancer Prev*, **7**, 65-8.

Bafandeh Y, Hashemzadeh S, Sokouti M, Esmaili H (2006). Clinicopathologic characteristics of esophageal cancer patients in northwest Iran--very low incidence of adenocarcinomas. *Asian Pac J Cancer Prev*, **7**, 480-2.

Bakir T, Can G, Siviloglu C, Erkul S (2003). Gastric cancer and other organ cancer history in the parents of patients with gastric cancer. *Eur J Cancer Prev*, **12**, 183-9.

Balkaya NA, Memis S, Demirkiran F. The effects of breast self-exam education on the performance of nursing and midwifery students: a 6-month follow-up study. *J Cancer Educ*, **22**, 77-9.

Beji NK, Reis N (2007). Risk factors for breast cancer in Turkish women: a hospital-based case-control study. *Eur J Cancer Care*, **16**, 178-84.

Bor S, Vardar R, Ormeci N, et al (2007). Prevalence patterns of gastric cancers in Turkey: model of a developing country with high occurrence of *Helicobacter pylori*. *J Gastroenterol Hepatol*, **22**, 2242-5.

Budakoglu II, Maral I, Ozdemir A, Bumin MA (2007). The effectiveness of training for breast cancer and breast self-examination in women aged 40 and over. *J Cancer Educ*, **22**, 108-11.

- Cakir Edis E, Karlikaya C (2007). The cost of lung cancer in Turkey. *Tuberk Toraks*, **55**, 51-8.
- Canbulat N, Uzun O (2008). Health beliefs and breast cancer screening behaviors among female health workers in Turkey. *Eur J Oncol Nurs*, **12**, 148-56.
- Ceber E, Sogukpinar N, Mermer G, Aydemir G (2005). Nutrition, lifestyle, and breast cancer risk among Turkish women. *Nutr Cancer*, **53**, 152-9.
- Cetin M, Colak R, Bayram F, et al (2002). High prevalence of diabetes in patients with pancreatic cancer in central Anatolia, Turkey. *Diabetes Res Clin Pract*, **58**, 97-100.
- Cetingoz R, Kentli S, Uruk O, et al (2002). Turkish people's knowledge of cancer and attitudes toward prevention and treatment. *J Cancer Educ*, **17**, 55-8.
- Dalli D, Ogce F, Okcin FA (2004). Knowledge of the effects of sun exposure of Turkish high school students and their sun bathing habits. *Asian Pac J Cancer Prev*, **5**, 366-9.
- Davydov MI, Aksel' EM (2007). The incidence of malignant tumors and mortality caused by them in Commonwealth of Independent States in 2005. *Vestn Ross Akad Med Nauk*, **11**, 45-9. [Article in Russian]
- Demir A, Altin S, Demir I, et al (2005). The role of CYP1A1 Msp1 gene polymorphisms on lung cancer development in Turkey. *Tuberk Toraks*, **53**, 5-9.
- Demirel F, Cakan M, Yalçinkaya F, Topcuoglu M, Altug U (2008). The association between personal habits and bladder cancer in Turkey. *Int Urol Nephrol*, **40**, 643-7.
- Derakhshan MH, Yazdanbod A, Sadjadi AR, et al (2004). High incidence of adenocarcinoma arising from the right side of the gastric cardia in NW Iran. *Gut*, **53**, 1262-6.
- Dincer D, Besisik F, Sahin E, et al (2002). Intestinal metaplasia of the gastric cardia: a study from Turkey. *Hepatogastroenterology*, **49**, 1153-6.
- Dosemeci M, Gokmen I, Unsal M, Hayes RB, Blair A (1997). Tobacco, alcohol use, and risks of laryngeal and lung cancer by subsite and histologic type in Turkey. *Cancer Causes Control*, **8**, 729-37.
- Ebrahimi M, Vahdaninia M, Montazeri A (2002). Risk factors for breast cancer in Iran: a case-control study. *Breast Cancer Res*, **4**, R10.
- Eftekhar Z, Rahimi-Moghaddam P, Yarandi F, Brojerdi R (2005). Accuracy of visual inspection with acetic acid (VIA) for early detection of cervical dysplasia in Tehran, Iran. *Asian Pac J Cancer Prev*, **6**, 69-71.
- Eftekhar Z, Yarandi F (2004). Knowledge and concerns about cancer in patients with primary gynecologic cancers. *Asian Pac J Cancer Prev*, **5**, 213-6.
- Elci OC, Akpinar-Elci M, Blair A, Dosemeci M (2002). Occupational dust exposure and the risk of laryngeal cancer in Turkey. *Scand J Work Environ Health*, **28**, 278-84.
- Elci OC, Akpinar-Elci M, Blair A, Dosemeci M (2003). Risk of laryngeal cancer by occupational chemical exposure in Turkey. *J Occup Environ Med*, **45**, 1100-6.
- Emri S, Demir AU (2004). Malignant pleural mesothelioma in Turkey, 2000-2002. *Lung Cancer*, **45 Suppl 1**, S17-20.
- Erci B, Karabulut N (2007). Appraising the self-assessed support needs of Turkish women with breast cancer. *Eur J Cancer Care*, **16**, 137-43.
- Erem C, Arslan C, Hacıhasanoglu A, et al (2004). Prevalence of obesity and associated risk factors in a Turkish population (Trabzon city, Turkey). *Obes Res*, **12**, 1117-27.
- Erguder T, Soydal T, Ugurlu M, Cakir B, Warren CW (2006). Tobacco use among youth and related characteristics, Turkey. *Soz Praventivmed*, **51**, 91-8.
- Erkek B, Ozkan N, Bayar S, et al (2007). Subsite distribution of colorectal carcinoma and implications for screening; a retrospective audit of 1771 cases. *Hepatogastroenterology*, **54**, 77-80.
- Eser S, Zorlu F, Divrik RT, et al (2009). Incidence and epidemiological features of cancers of the genitourinary tract in Izmir between 1993-2002. *Asian Pac J Cancer Prev*, **10**, (in press).
- Esiyok D, Otles S, Akcicek E (2004). Herbs as a food source in Turkey. *Asian Pac J Cancer Prev*, **5**, 334-9.
- Esmaeili M, Bonyadi M, Dastranj A, et al (2008). HPV typing in women with cervical precancerous and cancerous lesions in northwestern Iran. *Gynecol Obstet Invest*, **66**, 68-72.
- Etemadi A, Sadjadi A, Semnani S, et al (2008). Cancer registry in Iran: a brief overview. *Arch Iran Med*, **11**, 577-80.
- Evstifeeva TV, Zaridze DG (1992). Nass use, cigarette smoking, alcohol consumption and risk of oral and oesophageal precancer. *Eur J Cancer B Oral Oncol*, **28**, 29-35.
- Fallah M, Kharazmi E (2007). Iran cancer incidence should be corrected for under-ascertainment in cancer cases in the elderly (aged 65+). *Asian Pac J Cancer Prev*, **8**, 348-52.
- Fallah M, Kharazmi E (2008). New methods of handling cases of unknown age in cancer registry data. *Asian Pac J Cancer Prev*, **9**, 259-62.
- Far AE, Aghakhani A, Hamkar R, et al (2007). Frequency of human papillomavirus infection in oesophageal squamous cell carcinoma in Iranian patients. *Scand J Infect Dis*, **39**, 58-62.
- Farhadi M, Tahmasebi Z, Merat S, et al (2005). Human papillomavirus in squamous cell carcinoma of esophagus in a high-risk population. *World J Gastroenterol*, **11**, 1200-3.
- Farnaz AH, Ebrahim E, Bitak K (2008). Pathologic characteristics, type of treatment and follow up of patients with uterine cervical carcinoma referred to the radiation oncology department, cancer institute, Imam Khomeini hospital, Tehran, Iran, 1995-2001. *Asian Pac J Cancer Prev*, **9**, 86-8.
- Feizi AA, Arabi MA (2007). Acute childhood leukemias and exposure to magnetic fields generated by high voltage overhead power lines - a risk factor in Iran. *Asian Pac J Cancer Prev*, **8**, 69-72.
- 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.
- Fidaner C, Eser SY, Parkin DM (2001). Incidence in Izmir in 1993-1994: first results from Izmir Cancer Registry. *Eur J Cancer*, **37**, 83-92.
- Gafarov VV (2000). 20-year monitoring of acute cardiovascular diseases in population of large industrial city in West Siberia (epidemiological study). *Ter Arkh*, **72**, 15-21. [Article in Russian]
- Ghadimi R, Taheri H, Suzuki S, et al (2007). Host and environmental factors for gastric cancer in Babol, the Caspian Sea Coast, Iran. *Eur J Cancer Prev*, **16**, 192-5.
- Ghaemmaghami F, Behtash N, Modares Gilani M, et al (2004). Visual inspection with acetic acid as a feasible screening test for cervical neoplasia in Iran. *Int J Gynecol Cancer*, **14**, 465-9.
- Ghaffari SR, Sabokbar T, Mollahajian H, et al (2006). Prevalence of human papillomavirus genotypes in women with normal and abnormal cervical cytology in Iran. *Asian Pac J Cancer Prev*, **7**, 529-32.
- Ghaffari SR, Sabokbar T, Tahmasebi S, et al (2006). Combining mammaglobin and carcinoembryonic mRNA markers for early detection of micrometastases from breast cancers--a molecular study of 59 patients. *Asian Pac J Cancer Prev*, **7**, 396-8.
- Gokcel A, Ozsahin AK, Sezgin N, et al (2003). High prevalence of diabetes in Adana, a southern province of Turkey. *Diabetes Care*, **26**, 3031-4.
- Goksel T, Akkoçlu A; Turkish Thoracic Society, Lung and Pleural

- Malignancies Study Group (2002). Pattern of lung cancer in Turkey, 1994-1998. *Respiration*, **69**, 207-10.
- Gonlugur U, Gonlugur TE, Kaptanoglu M, Nadir A, Cinar Z (2008). The changing epidemiological trends for carcinoma of the lung in Turkey. *Saudi Med J*, **29**, 749-53.
- Gonullu G, Basturk B, Evrensel T, et al (2007). Association of breast cancer and cytokine gene polymorphism in Turkish women. *Saudi Med J*, **28**, 1728-33.
- Gonullu G, Ersoy C, Ersoy A, et al (2005). Relation between insulin resistance and serum concentrations of IL-6 and TNF-alpha in overweight or obese women with early stage breast cancer. *Cytokine*, **31**, 264-9.
- Gumus B, Aras O, Atesci YZ, Muezzinoglu T (1999). Aetiological factors of bladder cancer in the Aegean region of Turkey between the years 1985-1996. *Int Urol Nephrol*, **31**, 197-202.
- Gunes S, Bagci H, Sarikaya S, Bilen CY, Kara N (2007). Prostate-specific antigen and 17-hydroxylase polymorphic genotypes in patients with prostate cancer and benign prostatic hyperplasia. *DNA Cell Biol*, **26**, 873-8.
- Guseinova TI, Ismailova SS, Zeinalov AF, Gumbatova AN (1998). Prevalence of carbohydrate metabolism disorders in free-living females of capable age in the city of Baku. *Ter Arkh*, **70**, 24-6. [Article in Russian]
- Hadi N, Sadeghi-Hassanabadi A, Talei AR, Arasteh MM, Kazerooni T (2002). Assessment of a breast cancer screening programme in Shiraz, Islamic Republic of Iran. *East Mediterr Health J*, **8**, 386-92.
- Haghdoost AA, Hosseini H, Chamani G, et al (2008). Rising incidence of adenocarcinoma of the esophagus in Kerman, Iran. *Arch Iran Med*, **11**, 364-70.
- Hajiani E, Masjedizadeh R, Hashemi J, Azmi M, Rajabi T (2005). Risk factors for hepatocellular carcinoma in Southern Iran. *Saudi Med J*, **26**, 974-7.
- Haji-Mahmoodi M, Montazeri A, Jarvandi S, et al (2002). Breast self-examination: knowledge, attitudes, and practices among female health care workers in Tehran, Iran. *Breast J*, **8**, 222-5.
- Hakami R, Mohtadinia J, Etemadi A, et al (2008). Dietary intake of benzo(a)pyrene and risk of esophageal cancer in north of Iran. *Nutr Cancer*, **60**, 216-21.
- Hamada A, Takamura N, Meirmanov S, et al (2003). No evidence of radiation risk for thyroid gland among schoolchildren around Semipalatinsk Nuclear Testing Site. **50**, 85-9.
- Hamkar R, Azad TM, Mahmoodi M, et al (2002). Prevalence of human papillomavirus in Mazandaran Province, Islamic Republic of Iran. *East Mediterr Health J*, **8**, 805-11.
- Harirchi I, Karbakhsh M, Kashefi A, Momtahan AJ (2004). Breast cancer in Iran: results of a multi-center study. *Asian Pac J Cancer Prev*, **5**, 24-7.
- Hinçal E, Taneri B, Taneri U, Djamgoz MBA (2008). Cancer incidence in North Cyprus (1990-2004) relative to European rates. *Asian Pac J Cancer Prev*, **9**, 725-32.
- Hosseini SV, Izadpanah A, Yarmohammadi H (2004). Epidemiological changes in colorectal cancer in Shiraz, Iran: 1980-2000. *ANZ J Surg*, **74**, 547-9.
- Hossein Somi M, Mirinezhad K, Farhang S, et al (2006). Gastrointestinal cancer occurrence in East Azarbaijan: a five year study from North Western Iran. *Asian Pac J Cancer Prev*, **7**, 309-12.
- Igisinov N (2004). Ethnic and age variation of cancer of the reproductive system in women of Kyrgyzstan. *Asian Pac J Cancer Prev*, **5**, 217-22.
- Igisinov N, Kudaibergenova I, Igisinov S, Subanbaev T (2002). Dynamics of the incidence rates for separate forms of cancer in the female population of Kyrgyzstan. *Asian Pac J Cancer Prev*, **3**, 29-32.
- Igisinov N, Kokteubaeva N, Kudaibergenova I (2005). Epidemiology of breast cancer in females of reproductive age in Kyrgyzstan. *Asian Pac J Cancer Prev*, **6**, 36-9.
- Igisinov N, Umaralieva G (2008). Epidemiology of ovarian cancer in Kyrgyzstan women of reproductive age. *Asian Pac J Cancer Prev*, **8**, 331-4.
- Igisinov S, Soodonbekov E, Igisinov N, Subanbaev T (2002). Epidemiology of esophagus, lung and breast cancer in mountainous regions of Kyrgyz Republic. *Asian Pac J Cancer Prev*, **3**, 73-6.
- Isikdogan A, Ayyildiz O, Dursun M et al (2003). Hepatitis C virus in patients with non-Hodgkin's lymphoma in southeastern Anatolia region of Turkey: a prospective case-control study of 119 patients. *Leuk Lymphoma*, **44**, 1745-7.
- Isikli B, Ozalp S, Oner U, et al (2007). PAP smear screening among married women living in Osamangazi University ALPU training area. *Asian Pac J Cancer Prev*, **8**, 60-2.
- Islami F, Kamangar F, Aghcheli K, et al (2004). Epidemiologic features of upper gastrointestinal tract cancers in Northeastern Iran. *Br J Cancer*, **90**, 1402-6.
- Jarvandi S, Montazeri A, Harirchi I, Kazemnejad A (2002). Beliefs and behaviours of Iranian teachers toward early detection of breast cancer and breast self-examination. *Public Health*, **116**, 245-9.
- Kamali-Sarvestani E, Merat A, Talei AR (2005). Polymorphism in the genes of alpha and beta tumor necrosis factors (TNF-alpha and TNF-beta) and gamma interferon (IFN-gamma) among Iranian women with breast cancer. *Cancer Lett*, **223**, 113-9.
- Karlikaya C, Cakir Edis E (2005). Lung cancer histopathology in the Thrace region of Turkey and comparison with national data. *Tuberk Toraks*, **53**, 132-8.
- Kausova GK (2004). The dynamic morbidity with ischemic heart disease in the Republic of Kazakhstan. *Probl Sotsialnoi Gig Istor Med*, **4**, 46-7. [Article in Russian]
- Kaviani A, Delavar B, Noparast M, et al (2006). The accuracy of midwives' clinical breast examination in detection of breast lumps. *Asian Pac J Cancer Prev*, **7**, 279-82.
- Kermani IA (2004). Variation of tumor markers in 277 breast cancer cases. *Asian Pac J Cancer Prev*, **5**, 291-3.
- King H, Djumaeva S, Abdullaev B, Gacic Dobo M (2002). Epidemiology of glucose intolerance and associated factors in Uzbekistan: a survey in Sirdaria province. *Diabetes Res Clin Pract*, **55**, 19-27.
- Koc M, Polat P (2001). Epidemiology and aetiological factors of male breast cancer: a ten years retrospective study in eastern Turkey. *Eur J Cancer Prev*, **10**, 531-4.
- Kocabas NA, Sardas S, Cholerton S, Daly AK, Karakaya AE (2004). N-acetyltransferase (NAT2) polymorphism and breast cancer susceptibility: a lack of association in a case-control study of Turkish population. *Int J Toxicol*, **23**, 25-31.
- Kocabas NA, Sardas S, Cholerton S, et al (2005). Genetic polymorphism of manganese superoxide dismutase (MnSOD) and breast cancer susceptibility. *Cell Biochem Funct*, **23**, 73-6.
- Kocaoglu B, Moschonis G, Dimitriou M, et al (2005). Parental educational level and cardiovascular disease risk factors in schoolchildren in large urban areas of Turkey: directions for public health policy. *BMC Public Health*, **5**, 13.
- Kogan EA, Sagindikova GS, Sekamova SM, Jack G (2002). Morphological, cytogenetic and molecular biological characteristics of lung cancer in persons exposed for a long time to radionuclide radiation pollution in the Semipalatinsk region of Kazakhstan. *Arkh Patol*, **64**, 13-8. [Article in Russian]
- Kuru B, Ozaslan C, Ozdemir P, et al (2002). Risk factors for

- breast cancer in Turkish women with early pregnancies and long-lasting lactation - a case-control study. *Acta Oncol*, **41**, 556-61.
- Lamyian M, Hydarnia A, Ahmadi F, et al (2007). Barriers to and factors facilitating breast cancer screening among Iranian women: a qualitative study. *East Mediterr Health J*, **13**, 1160-9.
- Larijani B, Shirzad M, Mohagheghi MA, et al (2004). Epidemiologic analysis of the Tehran Cancer Institute Data System Registry (TCIDSR): Focus on thyroid cancer. *Asian Pac J Cancer Prev*, **5**, 36-9.
- Mahouri K, Dehghani Zahedani M, Zare S (2007). Breast cancer risk factors in south of Islamic Republic of Iran: a case-control study. *East Mediterr Health J*, **13**, 1265-73.
- Malekzadeh R, Sotoudeh M, Derakhshan MH, et al (2004). Prevalence of gastric precancerous lesions in Ardabil, a high incidence province for gastric adenocarcinoma in the northwest of Iran. *J Clin Pathol*, **57**, 37-42.
- Manguoglu AE, Luleci G, Ozcelik T, et al (2003). Germline mutations in the BRCA1 and BRCA2 genes in Turkish breast/ovarian cancer patients. *Hum Mutat*, **21**, 444-5.
- Mehrabi S, Ghafarian Shirhzi HR, Rasti M (2007). Normal serum prostate specific antigen levels in men in Yasuj province, Islamic Republic of Iran. *East Mediterr Health J*, **13**, 1190-4.
- Mehrabi Y, Yavari P, Abadi A (2004). A study of cancer patterns among inpatients of public hospitals in Iran. *Asian Pac J Cancer Prev*, **5**, 387-92.
- Meimanaliev TS, Shleifer EA, Aitbaev KA, et al (1991). Prevalence of ischaemic heart disease risk factors among the male population in Frunze aged 40-59 years and results of a five-year prevention programme. *Cor Vasa*, **33**, 451-7.
- Meimanaliev TS, Shleifer EA, Finger EM, et al (1991). Relation between coronary disease risk factors and mortality among men aged 40-59 years in the city of Frunze (5-year follow-up). *Kardiologiya*, **31**, 35-7. [Article in Russian]
- Men T, Brennan P, Boffetta P, Zaridze D (2003). Russian mortality trends for 1991-2001: analysis by cause and region. *BMJ*, **327**, 964.
- Metintas M, Metintas S, Ak G, et al (2008). Epidemiology of pleural mesothelioma in a population with non-occupational asbestos exposure. *Respirology*, **13**, 117-21.
- Metintas S, Metintas M, Ucgun I, Oner U (2002). Malignant mesothelioma due to environmental exposure to asbestos: follow-up of a Turkish cohort living in a rural area. *Chest*, **122**, 2224-9.
- Moghaddam SJ, Haghighi EN, Samiee S, et al (2007). Immunohistochemical analysis of p53, cyclinD1, RB1, c-fos and N-ras gene expression in hepatocellular carcinoma in Iran. *World J Gastroenterol*, **13**, 588-93.
- Moghimi-Dehkordi B, Safaee A, Zali MR (2008). Survival rates and prognosis of gastric cancer using an actuarial life-table method. *Asian Pac J Cancer Prev*, **9**, 317-21.
- Moghimi-Dehkordi B, Safaee A, Zali MR (2008). Prognostic factors in 1,138 Iranian colorectal cancer patients. *Int J Colorectal Dis*, **23**, 683-8.
- Mohagheghi MA, Mosavi-Jarrahi A, Malekzadeh R, Parkin M (2009). Cancer incidence in the Iran Metropolis: the first report from the Tehran population based cancer registry, 1998-2001. *Arch Iranian Med*, **12**, 15-23.
- Mohebbi M, Mahmoodi M, Wolfe R, et al (2008). Geographical spread of gastrointestinal tract cancer incidence in the Caspian Sea region of Iran: spatial analysis of cancer registry data. *BMC Cancer*, **8**, 137.
- Mohseni M, Zand S, Aghamir S (2004). Effect of smoking on prognostic factors of transitional cell carcinoma of the bladder. *Urol J*, **1**, 250-2.
- Cancer Epidemiology in North-Western and Central Asia*
- Montazeri A, Ebrahimi M, Mehrdad N, Ansari M, Sajadian A. Delayed presentation in breast cancer: a study in Iranian women. *BMC Womens Health*, **3**, 4.
- Montazeri A, Haji-Mahmoodi M, Jarvandi S (2003). Breast self-examination: do religious beliefs matter? A descriptive study. *J Public Health Med*, **25**, 154-5.
- Montazeri A, Jarvandi S, Ebrahimi M, Haghighat S, Ansari M (2004). The role of depression in the development of breast cancer: analysis of registry data from a single institute. *Asian Pac J Cancer Prev*, **5**, 316-9.
- Montazeri A, Sadighi J, Farzadi F, et al (2008). Weight, height, body mass index and risk of breast cancer in postmenopausal women: a case-control study. *BMC Cancer*, **8**, 278.
- Montazeri A, Sajadian A (2004). Do women read poster displays on breast cancer in waiting rooms? *J Public Health*, **26**, 355-8.
- Mosavi-Jarrahi A, Mohagheghi MA (2006). Epidemiology of esophageal cancer in the high-risk population of Iran. *Asian Pac J Cancer Prev*, **7**, 375-80.
- Mosavi-Jarrahi A, Mohagheghi MA, Zeraati H, Mortazavi H (2001). History of cancer registration in the country of Iran. *Asian Pacific J Cancer Prev*, **2** (IACR Suppl), 25-29.
- Mosavi-Jarrahi A, Moini M, Mohagheghi MA, et al (2007). Clustering of childhood cancer in the inner city of Tehran metropolitan area: a GIS-based analysis. *Int J Hyg Environ Health*, **210**, 113-9.
- Mousavi MR, Damghani MA, Haghdoost AA, Khamesipour A (2003). Opium and risk of laryngeal cancer. *Laryngoscope*, **113**, 1939-43.
- Mousavi SM, Mohagheghi MA, Mosavi-Jarrahi A (2007). Epidemiology of Kaposi's sarcoma in Iran: 1984-2006. *Asian Pac J Cancer Prev*, **8**, 557-60.
- Mousavi SM, Mohagheghi MA, Mosavi-Jarrahi A, Nahvijou A, Seddighi Z (2006). Burden of breast cancer in Iran: a study of the Tehran population based cancer registry. *Asian Pac J Cancer Prev*, **7**, 571-4.
- Mousavi SM, Mohagheghi MA, Mosavi-Jarrahi A, Nahvijou A, Seddighi Z (2008). Outcome of breast cancer in Iran: a study of Tehran Cancer Registry data. *Asian Pac J Cancer Prev*, **9**, 275-8.
- Mousavi SM, Montazeri A, Mohagheghi MA, et al (2007). Breast cancer in Iran: an epidemiological review. *Breast J*, **13**, 383-91.
- Nadji SA, Mokhtari-Azad T, Mahmoodi M, et al (2007). Relationship between lung cancer and human papillomavirus in north of Iran, Mazandaran province. *Cancer Lett*, **248**, 41-6.
- Nahcivan NO, Secginli S (2007). Health beliefs related to breast self-examination in a sample of Turkish women. *Oncol Nurs Forum*, **34**, 425-32.
- Naieni KH, Ardalan A, Mahmoodi M, et al (2007). Risk factors of breast cancer in north of Iran: a case-control in Mazandaran Province. *Asian Pac J Cancer Prev*, **8**, 395-8.
- Nasrollahzadeh D, Kamangar F, Aghcheli K, et al (2008). Opium, tobacco, and alcohol use in relation to oesophageal squamous cell carcinoma in a high-risk area of Iran. *Br J Cancer*, **98**, 1857-63.
- Nouri M, Chalian H, Bahman A, et al (2008). Nail molybdenum and zinc contents in populations with low and moderate incidence of esophageal cancer. *Arch Iran Med*, **11**, 392-6.
- Nouarie M, Pourshams A, Kamangar F, et al (2004). Ecologic study of serum selenium and upper gastrointestinal cancers in Iran. *World J Gastroenterol*, **10**, 2544-6.
- Okutan O, Kartaloglu Z, Ilvan A, et al (2005). Does the primary lung cancer rate increase among females? *Bull Cancer*, **91**, E201-10.
- Onat A (2001). Risk factors and cardiovascular disease in Turkey.



- Atherosclerosis*, **156**, 1-10.
- Onuk MD, Oztupuz A, Memik F (2002). Risk factors for esophageal cancer in eastern Anatolia. *Hepato-gastroenterology*, **49**, 1290-2.
- Oran B, Celik I, Erman M, et al (2004). Analysis of menstrual, reproductive, and life-style factors for breast cancer risk in Turkish women: a case-control study. *Med Oncol*, **21**, 31-40.
- Ozcelik B, Serin IS, Gokahmetoglu S, Basbug M, Erez R (2003). Human papillomavirus frequency of women at low risk of developing cervical cancer: a preliminary study from a Turkish university hospital. *Eur J Gynaecol Oncol*, **24**, 157-9.
- Ozsoy SA, Ardahan M, Ozmen D (2007). Reliability and validity of the colorectal cancer screening belief scale in Turkey. *Cancer Nurs*, **30**, 139-45.
- Parsa P, Kandiah M, Abdul Rahman H, Zulkefli NM (2006). Barriers for breast cancer screening among Asian women: a mini literature review. *Asian Pac J Cancer Prev*, **7**, 509-14.
- Pinarbasi H, Silig Y, Cetinkaya O, Seyfikli Z, Pinarbasi E (2003). Strong association between the GSTM1-null genotype and lung cancer in a Turkish population. *Cancer Genet Cytogenet*, **146**, 125-9.
- Pourhoseingholi MA, Hajizadeh E, Moghimi Dehkordi B, et al (2007). Comparing Cox regression and parametric models for survival of patients with gastric carcinoma. *Asian Pac J Cancer Prev*, **8**, 412-6.
- Pourmand G, Salem S, Mehraei A, et al (2007). The risk factors of prostate cancer: a multicentric case-control study in Iran. *Asian Pac J Cancer Prev*, **8**, 422-8.
- Pourmand G, Ziaee AA, Abedi AR, et al (2007). Role of PTEN gene in progression of prostate cancer. *Urol J*, **4**, 95-100.
- Pourshams A, Saadatian-Elahi M, Nouraei M, et al (2005). Golestan cohort study of oesophageal cancer: feasibility and first results. *Br J Cancer*, **92**, 176-81.
- Rahnama P, Faghihzadeh S, Ziaei S (2005). Effect of the sampling sequence on the quality of Papanicolaou smear. *Int J Gynecol Cancer*, **15**, 66-9.
- Rasmi Y, Allameh A, Nasserri-Moghaddam S, et al (2006). Comparison of glutathione S-transferase-Pi expression at mRNA levels in oesophageal mucosa using RT-PCR-ELISA in individuals with reflux diseases, adenocarcinoma and squamous cell carcinoma. *Clin Biochem*, **39**, 997-1001.
- Razi A. Prostate cancer screening, yes or no? The current controversy. *Urol J*, **1**, 240-5.
- Rezaei MB, Seydi S, Alizadeh SM (2004). Effects of 2 educational methods on the knowledge, attitude, and practice of women high school teachers in prevention of cervical cancer. *Cancer Nurs*, **27**, 364-9.
- Saadat M (2006). Genetic polymorphisms of glutathione S-transferase T1 (GSTT1) and susceptibility to gastric cancer: a meta-analysis. *Cancer Sci*, **97**, 505-9.
- Saadat M, Kohan L, Omidvari S (2007). Genetic polymorphisms of XRCC1 (codon 399) and susceptibility to breast cancer in Iranian women, a case-control study. *Breast Cancer Res Treat*, **111**, 549-53.
- Saadat I, Saadat M (2001). Glutathione S-transferase M1 and T1 null genotypes and the risk of gastric and colorectal cancers. *Cancer Lett*, **169**, 21-6.
- Sadighi S, Raafat J, Mohagheghi M, Meemary F (2005). Gastric carcinoma: 5 year experience of a single institute. *Asian Pac J Cancer Prev*, **6**, 195-6.
- Sadjadi A, Malekzadeh R, Derakhshan M, et al (2003). Cancer occurrence in Ardabil: Results of a population-based cancer registry from Iran. *Int J Cancer*, **107**, 113-8.
- Sadjadi A, Nooraie M, Ghorbani A, et al (2007). The incidence of prostate cancer in Iran: results of a population-based cancer registry. *Arch Iran Med*, **10**, 481-5.
- Sadjadi A, Nouraei M, Mohagheghi MA, et al (2005). Cancer occurrence in Iran in 2002, an international perspective. *Asian Pac J Cancer Prev*, **6**, 359-63.
- Sadjadian A, Kaviani A, Yunesian M, Montazeri A (2004). Patient satisfaction: a descriptive study of a breast care clinic in Iran. *Eur J Cancer Care*, **13**, 163-8.
- Sadri G, Mahjub H (2007). Passive or active smoking, which is more relevant to breast cancer. *Saudi Med J*, **28**, 254-8.
- Saenko AI (1979). Epidemiology of stomach cancer in the Kirghiz SSR. *Vopr Onkol*, **25**, 9-12. [Article in Russian]
- Saenko AI (1978). Characteristics of cancer epidemiology in the Kirghiz SSR. *Vopr Onkol*, **24**, 104-9. [Article in Russian]
- San Turgay A, Sari D, Turkistanli EC (2005). Knowledge, attitudes, risk factors, and early detection of cancer relevant to the schoolteachers in Izmir, Turkey. *Prev Med*, **40**, 636-41.
- Satman I, Yilmaz T, Sengul A, et al (2002). Population-based study of diabetes and risk characteristics in Turkey: results of the turkish diabetes epidemiology study (TURDEP). *Diabetes Care*, **25**, 1551-6.
- Secginli S, Nahcivan NO (2004). Reliability and validity of the breast cancer screening belief scale among Turkish women. *Cancer Nurs*, **27**, 287-94.
- Semnani S, Sadjadi A, Fahimi S, et al (2006). Declining incidence of esophageal cancer in the Turkmen Plain, eastern part of the Caspian Littoral of Iran: a retrospective cancer surveillance. *Cancer Detect Prev*, **30**, 14-9.
- Sepehr A, Kamangar F, Abnet CC, et al (2004). Genetic polymorphisms in three Iranian populations with different risks of esophageal cancer, an ecologic comparison. *Cancer Lett*, **213**, 195-202.
- Serin IS, Tanriverdi F, Yilmaz MO, Ozcelik B, Unluhizarci K (2008). Serum insulin-like growth factor (IGF)-I, IGF binding protein (IGFBP)-3, leptin concentrations and insulin resistance in benign and malignant epithelial ovarian tumors in postmenopausal women. *Gynecol Endocrinol*, **24**, 117-21.
- Sevil U, Atan SU, Kiris H, et al (2005). Peer education project on breast self-examination in Izmir, Turkey. *Asian Pac J Cancer Prev*, **6**, 29-32.
- Sofikerim M, Eskicorapci S, Oruc O, Ozen H ( ) . Hormonal predictors of prostate cancer. *Urol Int*, **79**, 13-8.
- Siassi F, Ghadirian P (2005). Riboflavin deficiency and esophageal cancer: a case control-household study in the Caspian Littoral of Iran. *Cancer Detect Prev*, **29**, 464-9.
- Siassi F, Pouransari Z, Ghadirian P (2000). Nutrient intake and esophageal cancer in the Caspian littoral of Iran: a case-control study. *Cancer Detect Prev*, **24**, 295-303.
- Somi MH, Farhang S, Mirinezhad SK, et al (2008). Cancer in East Azerbaijan, Iran: results of a population-based cancer registry. *Asian Pac J Cancer Prev*, **9**, 327-30.
- Sotoudeh M, Derakhshan MH, Abedi-Ardakani B, et al (2008). Critical role of Helicobacter pylori in the pattern of gastritis and carditis in residents of an area with high prevalence of gastric cardia cancer. *Dig Dis Sci*, **53**, 27-33.
- Suzen HS, Guvenc G, Turanli M, et al (2007). The role of GSTM1 and GSTT1 polymorphisms in head and neck cancer risk. *Oncol Res*, **16**, 423-9.
- Taghavi N, Nasrollahzadeh D, Merat S, et al (2007). Epidemiology of upper gastrointestinal cancers in Iran: a sub site analysis of 761 cases. *World J Gastroenterol*, **13**, 5367-70.
- Tezcan S, Altintas H, Sonmez R, et al (2003). Cardiovascular risk factor levels in a lower middle-class community in Ankara, Turkey. *Trop Med Int Health*, **8**, 660-7.

- Toruner GA, Akyerli C, Ucar A, et al (2001). Polymorphisms of glutathione S-transferase genes (GSTM1, GSTP1 and GSTT1) and bladder cancer susceptibility in the Turkish population. *Arch Toxicol*, **75**, 459-64.
- Tunçbilek I, Ozdemir A, Gültekin S, et al (2007). Clinical outcome assessment in mammography: an audit of 7,506 screening and diagnostic mammography examinations. *Diagn Interv Radiol*, **13**, 183-7.
- Turkistanli EC, Ergun FE, Sari D, Dalli D, Aydemir G (2002). Evaluation of the geographical and family background of student nurses and midwives and their knowledge of cancer and nutrition. *Asian Pac J Cancer Prev*, **3**, 257-61.
- Turkistanli EC, Sogukpinar N, Saydam BK, Aydemir G (2003). Cervical cancer prevention and early detection--the role of nurses and midwives. *Asian Pac J Cancer Prev*, **4**, 15-21.
- Türkdoğan MK, Akman N, Tuncer I, et al (2005). Epidemiological aspects of endemic upper gastrointestinal cancers in eastern Turkey. *Hepatogastroenterology*, **52**, 496-500.
- Türkdoğan MK, Testereci H, Akman N, et al (2003). Dietary nitrate and nitrite levels in an endemic upper gastrointestinal (esophageal and gastric) cancer region of Turkey. *Turk J Gastroenterol*, **14**, 50-3.
- Unlü A, Ates NA, Tamer L, Ates C (2008). Relation of glutathione S-transferase T1, M1 and P1 genotypes and breast cancer risk. *Cell Biochem Funct*, **26**, 643-7.
- Uysal MA, Dilmen N, Karasulu L, Demir T (2007). Smoking habits among physicians in Istanbul and their attitudes regarding anti-smoking legislation. *Tuberk Toraks*, **55**, 350-5.
- Vahdaninia M, Montazeri A (2004). Breast cancer in Iran: a survival analysis. *Asian Pac J Cancer Prev*, **5**, 223-5.
- Yalcinkaya U, Ozturk E, Ozgur T, Yerci O, Yilmazlar T (2008). P53 expression in synchronous colorectal cancer. *Saudi Med J*, **29**, 826-31.
- Yaren A, Ozkilinc G, Guler A, Oztop I (2008). Awareness of breast and cervical cancer risk factors and screening behaviours among nurses in rural region of Turkey. *Eur J Cancer Care*, **17**, 278-84.
- Yaris F, Dikici MF, Sabuncu HH, Yaris E (2006). A case-control study on the etiology of urinary bladder cancer in Istanbul, Turkey. *Asian Pac J Cancer Prev*, **7**, 591-4.
- Yavari P, Hislop TG, Bajdik C, et al (2006). Comparison of cancer incidence in Iran and Iranian immigrants to British Columbia, Canada. *Asian Pac J Cancer Prev*, **7**, 86-90.
- Yavari P, Mosavizadeh M, Sadrol-Heftazi B, Mehrabi Y (2005). Reproductive characteristics and the risk of breast cancer--a case-control study in Iran. *Asian Pac J Cancer Prev*, **6**, 370-5.
- Yavari P, Pourhoseingholi MA (2007). Socioeconomic factors association with knowledge and practice of breast self-examination among Iranian women. *Asian Pac J Cancer Prev*, **8**, 618-22.
- Yavari P, Sadrolheftazi B, Mohagheghi M, et al (2008). An epidemiological analysis of cancer data in an Iranian Hospital during the last three decades. *Asian Pac J Cancer Prev*, **9**, 145-50.
- Yazdizadeh B, Jarrahi AM, Mortazavi H, et al (2005). Time trends in the occurrence of major GI cancers in Iran. *Asian Pac J Cancer Prev*, **6**, 130-4.
- Yumuk PF, Dane F, Yumuk VD, et al (2008). Impact of body mass index on cancer development. *J BUON*, **13**, 55-9.
- Zaridze DG, Blettner M, Trapeznikov NN, et al (1985). Survey of a population with a high incidence of oral and oesophageal cancer. *Int J Cancer*, **36**, 153-8.
- Zaridze DG, Bukin IuV, Orlov EN, et al (1989). Relationship between the character of pathological changes in the esophageal mucosa and deficiency of several vitamins in a population with high incidence of esophageal cancer. *Vopr Onkol*, **35**, 939-45. [Article in Russian]
- Zaridze D, Evstifeeva T, Boyle P (1993). Chemoprevention of oral leukoplakia and chronic esophagitis in an area of high incidence of oral and esophageal cancer. *Ann Epidemiol*, **3**, 225-34.
- Zaridze DG, Li N, Men T, Duffy SW (1994). Childhood cancer incidence in relation to distance from the former nuclear testing site in Semipalatinsk, Kazakhstan. *Int J Cancer*, **59**, 471-5.
- Zaridze DG, Kuvshinov JP, Matiakin E, et al (1985). Chemoprevention of oral and esophageal cancer in Uzbekistan, Union of Soviet Socialist Republics. *Natl Cancer Inst Monogr*, **69**, 259-62.
- Zaridze DG, Marochko A, Basieva T, Duffy SW (1993). Cancer incidence in the native peoples of far eastern Siberia. *Int J Cancer*, **54**, 889-94.
- Zaridze DG, Matiakin EG, Poliakov BI, Khamrakulov FS, Trapeznikov NN (1987). Results of examining the population in a region with high morbidity for oral mucosal cancer: precancerous changes. *Vopr Onkol*, **33**, 38-41. [Article in Russian]
- Zeraati H, Mahmoudi M, Kazemnejad A, Mohammed K (2005). Postoperative life expectancy in gastric cancer patients and its associated factors. *Saudi Med J*, **26**, 1203-7.
- Zhumadilov Z, Gusev BI, Takada J, et al (2000). Thyroid abnormality trend over time in northeastern regions of Kazakstan, adjacent to the Semipalatinsk nuclear test site: a case review of pathological findings for 7271 patients. *J Radiat Res (Tokyo)*, **41**, 35-44.
- Zorluoglu A, Yilmazlar T, Ozguc H, Bagcivan E, Guner O (2004). Colorectal cancers under 45 years of age. *Hepatogastroenterology*, **51**, 118-20.

- Akbari ME, Hosseini SJ, Rezaee A, et al (2008). Incidence of genitourinary cancers in the Islamic Republic of Iran: a survey in 2005. *Asian Pac J Cancer Prev.* 2008 Oct-Dec;9(4):549-52.
- Alacacioglu A, Somali I, Simsek I, et al (2008). Epidemiology and survival of hepatocellular carcinoma in Turkey: outcome of multicenter study. *Jpn J Clin Oncol.* 2008 Oct;38(10):683-8.
- Bafandeh Y, Farhang S (2009). Subsite distribution of gastric cancer in an area of high prevalence--northwest Iran. *J Epidemiol.* 2009;19(4):202-5.
- Hosseini M, Naghan PA, Karimi S, et al (2009). Environmental risk factors for lung cancer in Iran: a case-control study. *Int J Epidemiol.* 2009 Aug;38(4):989-96.
- Köksal A, Sorkun HC, Demirhan H, et al (2009). Evaluation of cancer records from 2000-2004 in Denizli, Turkey. *Genet Mol Res.* 2009 Jan 27;8(1):64-75.
- Montazeri A, Sadighi J, Farzadi F, et al (2008). Weight, height, body mass index and risk of breast cancer in postmenopausal women: a case-control study. *BMC Cancer.* 2008 Sep 30;8:278.
- Mousavi SM (2009). Toward prostate cancer early detection in Iran. *Asian Pac J Cancer Prev.* 2009 Jul-Sep;10(3):413-8.
- Mousavi SM, Somi MH (2009). Gastric cancer in Iran 1966-2006. *Asian Pac J Cancer Prev.* 2009 Jul-Sep;10(3):407-12.
- Pourfarzi F, Whelan A, Kaldor J, Malekzadeh R (2009). The role of diet and other environmental factors in the causation of gastric cancer in Iran--a population based study. *Int J Cancer,* 125(8):1953-60.
- Reis N, Beji NK (2009). Risk factors for endometrial cancer in Turkish women: results from a hospital-based case-control study. *Eur J Oncol Nurs.* 2009 Apr;13(2):122-7.
- Rezaianzadeh A, Peacock J, Reidpath D, et al (2009). Survival analysis of 1148 women diagnosed with breast cancer in Southern Iran. *BMC Cancer.* 2009 Jun 5;9:168.

Denizli province, Turkey urinary cancers at 26.4%, gastrointestinal cancers at 19.2% and respiratory cancers at 18.9%; there was a significant increase in gastrointestinal, blood and skin cancers over the years. Lung (14.9%), breast (14.1%), bladder (8.0%), prostate (5.3%), and lymphatic (4.8%) cancer cases were the most common (Köksal et al., 2009)

The rate of prostate cancer incidence in Iran is significantly less than those in developed countries and similar to Eastern Mediterranean Regions. However, it is expected to rise dramatically in the future because of the anticipated increase in life expectancy and percentage of old age groups. Therefore, prostate cancer control should be integrated into the National Cancer Control Program focusing on prevention and early detection in men over 40 years old or with symptomatic BPH (Mousavi, 2009)

incidence rate of adenocarcinoma of the most proximal cardia region and adjacent gastro-oesophageal junction has increased (Mousavi and Somi, 2009).

Smoking, but also occupational exposures to inorganic dusts chemical compounds and heavy metals were also independent risk factors for lung cancer (Hosseini et al., 2009)

*Helicobacter pylori* infection as measured by serum IgG as well as the consumption of red meat and dairy products increases the risk of GC in Ardabil, while the intake of fresh fruit and fresh fish decrease the risk (Pourfarzi et al., 2009). gastric cardia was involved in 40.3% of patients with gastric adenocarcinoma, while the gastric fundus was involved in 3.7%, the gastric body in 49.1%, and the gastric antrum in 24.1% (Bafandeh and Farhang, 2009).

low level of awareness, lack of screening programs and subsequent late access to treatment, associated with poor survival of breast (Rezaianzadeh et al., 2009). obesity in postmenopausal women could increase risk of breast cancer (Montazeri et al., 2008)

the viral etiology (hepatitis B and C infections) in Turkish population is found to be an important factor in HCC development (Alacacioglu et al., 2008)

prostate cancer among our population was dramatically higher than in other countries of Asia (Akbari et al., 2008)

lower parity, early menarche and use of HRT were increased-risk factors but negative family history of cancer