

## RESEARCH ARTICLE

# Gastrointestinal Cancer Incidence in East Azerbaijan, Iran: Update on 5 Year Incidence and Trends

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### Abstract

**Background:** A cancer registry program has been established in East Azerbaijan and this has emphasized the importance of cancers of gastrointestinal tract in this region. The aim of the present pathology-based cancer registry report is to renew epidemiologic aspects of gastrointestinal tract cancers and estimate recent trends. **Materials and Methods:** A survey team reviewed and collected all records of cancer cases from all referral and valid pathology laboratories of East Azerbaijan province during September 2007-2011. Crude rates, age-specific rates of cancer incidence and annual percent change were calculated. **Results:** The total newly diagnosed cancer cases (n=6,889) comprised 4,341 males (63.0%) and 2,540 females (36.9%). Gastric cancer was the most common GI tract cancer with an ASR (per 10<sup>5</sup>) of 23.1 for males and 7.69 for females. The ASRs for esophageal and colorectal cancers were 9.69 and 11.2 in males and 7.35 and 8.93 in females. Trend analysis showed a significant decline for esophageal cancer and increasing incidence for colorectal cancer in females. **Conclusions:** The prevalence of gastric cancer is high in East Azerbaijan province of Iran. This pathology based cancer registry showed an ascending trend for colorectal cancer and decreasing trend for esophageal cancer in females during 2007-2011.

**Keywords:** Gastrointestinal cancer - cancer registry - trend - East Azerbaijan

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### Introduction

Demands for a vast epidemiologic data resulted in establishment of cancer registry programs in several countries. During past years very informative data on epidemiology and burden of cancer were provided in different regions of Iran. Such programs intend to make the most of this information by emphasizing the area of need as well as finding the meaningful trends during years and finally bring it out to strategic plans within the health care system.

Following reports from few provinces of Iran (Etemadi et al., 2008), the first report of National cancer registry program by Ministry of Health and Medical Education was brought out as early as 1986 (Center for Disease Control and Prevention, 2013). The program is pathology based and has been developed to reach and register more than 85% of expected number in recent years (Center for disease control and prevention, 2013). The first published report on Gastrointestinal (GI) cancer from northwest of Iran was a paper reporting crude rates during year 1995 in a local scientific journal (Somi et al., 2004). Both of these two pathology based reports indicated a high rate for gastric cancer in this region and resulted in establishment of a 5-year cancer registry program (from 1995 to 2004)

for all type of GI cancer (Hossein et al., 2006). This report included several source for information but both included registered cases with a definite pathology report. Afterward, a population based report completed the cancer statistics in this region and included all site of cancer (Somi et al., 2008). Despite all of shortcomings and complexity of achieving such a program for the first time, the report reached a proper number of valid cancer reports and confirmed a high incidence for gastric and esophageal cancer being within the first five in East Azerbaijan (Somi et al., 2008).

Six years after mentioned report, cancer is still a major public health problem and East Azerbaijan has a high mortality rate for gastric cancer. Comprise 1.35% of all, 3348 years of Disability adjusted life years (DALY) was estimated for women and 6652 years form men because of gastric cancer (Farahbakhsh et al., 2012). In this report, we provide an overview of GI cancer statistics for recent 5 years, including updated incidence and trends of cancer incidence in male and female.

### Materials and Methods

#### Source of data

The data used in this study were collected in a recent

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**Table 2. Total Number of Cancer Cases, Age-specific Incidence Rates, Crude Rates and Annual ASR in Females in East Azerbaijan**

	Total number	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	>85	Crud rate	%	ASR
Anal canal	3	0	0	0	0	0	0	0.006	0.03	0	0.02	0.02	0.02	0	0.01	0.02	0.008	0.006	0	0.16	0.6	0.1
Esophagus	133	0	0	0	0	0.02	0.01	0.03	0.05	0.33	0.25	0.6	0.87	1.47	1.34	0.96	0.66	0.33	0.25	7.48	27.1	7.35
s. intestine	14	0	0	0	0	0	0.01	0.006	0.01	0.03	0.04	0.11	0.14	0.22	0.07	0.04	0.06	0.01	0.02	0.81	2.9	0.64
Stomach	142	0	0	0	0.01	0.01	0.09	0.1	0.19	0.2	0.38	0.35	0.92	1.43	1.35	1.41	0.54	0.37	0.18	8.08	29.4	7.69
Colorectal	165	0	0	0.01	0.03	0.06	0.08	0.1	0.37	0.59	1.1	1.05	1.19	1.42	1.03	0.92	0.35	0.24	0.16	9.22	33.7	8.93
Liver	11	0	0	0	0	0	0.008	0.006	0.008	0.04	0.06	0.08	0.07	0.15	0.04	0.11	0.02	0	0	0.65	1.9	0.61
Pancreas	4	0	0	0	0	0.008	0	0.006	0.01	0.01	0.02	0.04	0.01	0.03	0.02	0.02	0.008	0	0	0.21	0.9	0.2
Gall bladder	11	0	0	0	0	0	0	0.006	0	0.03	0.02	0.04	0.13	0.1	0.09	0.08	0.05	0.02	0.01	0.59	1.7	0.6
Bile duct	4	0	0	0	0	0.01	0	0	0.01	0.02	0.02	0.03	0	0.04	0.05	0.03	0.008	0.006	0	0.21	0.8	0.23

**Table 2. Total Number of Cancer Cases, Age-specific Incidence Rates, Crude Rates and Annual ASR in Males in East Azerbaijan**

	Total number	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	>85	Crud rate	%	ASR
Anal canal	6	0	0	0	0	0	0.008	0	0.008	0	0.02	0.04	0.01	0.05	0.39	0.04	0.03	0.006	0	0.37	0.8	0.32
Esophagus	173	0	0	0	0	0.01	0.03	0.03	0.06	0.29	0.34	0.66	0.97	1.9	1.77	1.92	0.83	0.46	0.36	9.56	20.6	9.69
s. intestine	20	0	0	0	0	0.008	0	0.006	0.02	0.04	0.19	0.09	0.08	0.2	0.1	0.21	0.06	0.01	0.01	1.11	2.4	1.12
Stomach	406	0	0	0	0.01	0	0.03	0.15	0.35	0.57	0.99	1.7	2.27	4.5	4.45	4.04	2	0.87	0.62	22.21	48.1	23.07
Colorectal	201	0	0	0.01	0.01	0.03	0.14	0.16	0.28	0.73	0.86	1.26	1.14	2.11	1.6	1.51	0.71	0.34	0.25	11.5	24.1	11.2
Liver	15	0	0	0	0	0	0	0	0.01	0.04	0.04	0.14	0.15	0.16	0.15	0.09	0.02	0.01	0.01	0.9	2.3	0.86
Pancreas	4	0	0	0	0	0	0	0	0.008	0	0.01	0	0.01	0.01	0.06	0.05	0.02	0	0.01	0.26	0.5	0.2
Gall bladder	6	0	0	0	0	0	0	0	0.008	0.01	0.01	0.02	0.01	0.06	0.06	0.03	0.04	0.02	0.02	0.31	0.7	0.32
Bile duct	4	0	0	0	0	0	0	0	0.008	0	0.02	0.03	0.04	0.01	0.04	0.05	0.02	0	0	0.21	0.5	0.24

cancer registry and active cancer surveillance that was conducted by division of disease control and prevention, deputy of health, Tabriz University of Medical Sciences and the report if prepared in a collaboration with the Liver and gastrointestinal diseases research center (LGDRC).

East Azerbaijan province is located in North West of Iran with a population recently reported to be 3724620 including 1882031 males (50.5%) and 1842589 females (49.5%). Most of the inhabitants have Azeri ethnic background. This cancer registry collected the data from all of the pathology labs all over East Azerbaijan province, including labs located in the hospitals and private clinics. Details of this cancer registry methods in East Azerbaijan are described in our previous article (Hossein et al., 2006). A total of 8470 newly diagnosed reports were registered during September 2007 to September 2011, (compatible with 5 calendar years in Iran). Data were sent to LGDRC and a final data check was performed by a trained team, excluding new cancer cases from other provinces or neighboring countries and a check for duplicated data resulting in 6889 newly diagnosed cases during five official years.

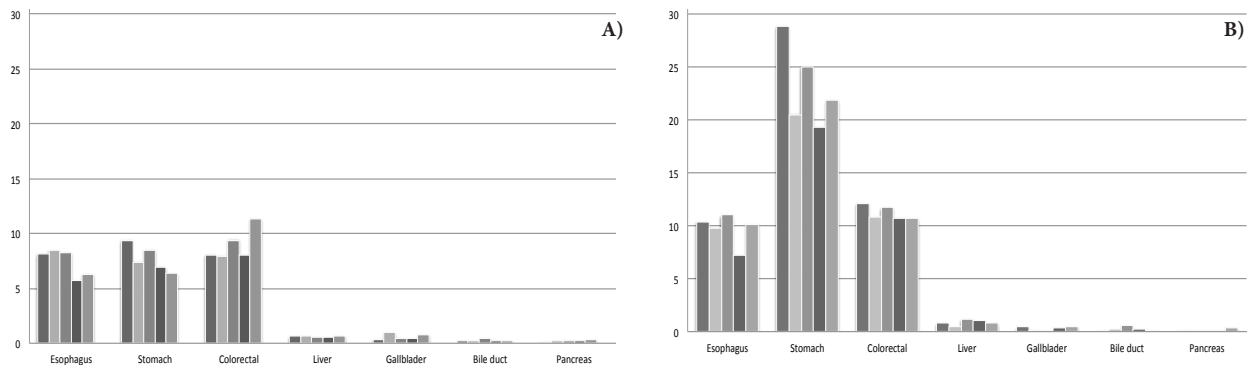
*Statistical measures*

Data are expressed an mean±standard deviation or number (%) were appropriate. A total number of cases of cancer in each year, crude rates (CRs) and age-specific rates of cancer incidence were calculated for 5-year age groups (0-4, 5-9, ..., 80-85, 85+), sex and site (9 sites). Age-standardized rates (ASR) per 100,000 person-years were calculated as standardized to the world standard population.

To show a snapshot of recent results in our region, we included data from our previous 5-year cancer registry report (with a same method) for year 2004 (Hossein et al., 2006) while the data for years between these two registries were considered missed values. Long-term trends in age-standardized cancer incidence rates were examined by calculating the annual percentage change over a time period using Joinpoint regression (segmented regression). To estimate trends in cancer rates over time we calculated Annual percent change (APC). The average annual percent change (AAPC) was estimated as a geometric weighted average of the APCs in the period of 2004 to 2011 weighed by the length of internals. The Joinpoint analyses were performed using the 'Joinpoint' 4.0.1 software. A p value of less than 0.05 was considered significant.

**Results**

The total newly diagnosed cancer cases (n=6889) included 4,341 males (63.01%) and 2,540 females (36.87%). The diagnosis was based on histopathology reports in all. The mean (±SD)



**Figure 1. Annual Age-specific Incidence Rates of the Gastrointestinal Tract Cancers in Females and Males in East Azerbaijan, beginning from year 2007 (the very left column) to year 2011(right column)**

age at time of diagnosis was  $66.1 \pm 12.6$  year for gastric,  $66.0 \pm 12.3$  year for esophageal,  $59.4 \pm 14.7$  for colorectal,  $60.2 \pm 13.8$  year for small intestinal,  $61.1 \pm 13.5$  year for anal canal,  $59.3 \pm 12.7$  year for liver,  $64.6 \pm 12.6$  year for gallbladder,  $60.3 \pm 12.7$  for bile duct and  $59.37 \pm 14.1$  year for pancreatic cancer.

Total Number of Cancer Cases, Age-specific Incidence Rates, Crude Rates and Annual ASR in Females and males in East Azerbaijan are provided in Table 1 and 2. The highest ASR in females was estimated for colorectal cancer followed by gastric and esophageal cancers. The highest ASR in males was estimated for gastric cancer followed by esophageal and colorectal cancers. These results are illustrated in Figures 1 for both genders with another approach. These figures show the results for each year separately from 2004 to 2011.

More than 70% of male and 60% of female patients with gastric cancer were elder than 60 years. ASR for gastric cancer seemed to have a reducing trend, with fluctuations, thus to estimate the significance of this look we analysis the trend during 2004-2011 as described before, but this pattern was not statistically significant (Table 3).

The incidence of esophageal cancer seemed to have a decreasing pattern as well and the ASR of esophageal cancer significantly increased in females (Table 3). Near 70% of female and 90% of male patients were elder than 50.

## Discussion

The current pathology based report, updated the data about incidence of gastrointestinal cancers in East Azerbaijan province of Iran and shows that gastric, esophageal and colorectal cancers are the most common and all of the cancer are more prevalent in male (except for cancer of gall bladder). This report also illustrated an increasing trend for colorectal cancer in females and a decreasing trend for esophageal cancer in females.

The first aim of this report was to provide an update on gastrointestinal cancer incidence in East Azerbaijan province and showed that this region has still a high prevalence of gastric cancer which was prominent in our previous reports as well (Somi et al., 2004; 2008; Hossein et al., 2006). Where more than half of cancers of gastrointestinal tract in Iran are diagnosed in stomach, there have been several studies on regional difference

**Table 3. Joinpoint Analysis for Trend of Common Gastrointestinal Cancers in East Azerbaijan 2004-2011**

		APC	95% CI
Gastric cancer	Female	-3.63	-9.2 - 2.3
	Male	-1.05	-8.7 - 7.3
	Total	-1.64	-8.7 - 5.9
Esophageal cancer	Female	-6.97*	-12.2 - -1.4
	Male	-2.23	-9.7 - 5.9
	Total	-4.08	-10.4 - 2.7
Colorectal cancer	Female	9.86*	3.5 - 16.6
	Male	6.28	-2.5 - 15.8
	Total	2.64	-0.7) - 6.0

in incidence and diverse risk factors (Malekzadeh et al., 2009). Gender and age distribution of diagnosed cases in this study had a similar pattern to previous reports (Hossein et al., 2006) and was higher in men and elder age. While total ASR of gastric cancer had an annual decrease of 1.64%, this pattern did not reach the significance and should be analyzed in the future.

Colorectal cancer is the world fourth common cancer. But the incidence is not equal in different parts of the world and is more prevalent in developed and westernized countries (Australia, New Zealand, Europe and North America) (International Agency for Research on Cancer, 2014). Studies on ethnic differences as well as migrants and environmental factors suggest colorectal cancer as an environmental disease including cultural, social factors and the lifestyle. High consumption of total energy and animal fat, lower dietary fiber and benefit of activities of moderate intensity seem to be the most consistent factors (Boyle and Langman, 2000; Mirvish et al., 2002; Raju and Cruz-Correa, 2006). This pattern of life style that has a close relation to an increased body mass index, has been introduced as a prognostic factor for survival of Iranian patients with colorectal cancer (Moghimi-Dehkordi et al., 2008).

There are few reports about burden of colorectal cancer in Iran but they indicate an increase in recent years. Such reports are compatible with results of the current study and few earlier reports from different part of Iran that indicate an increase in the incidence of colorectal cancer (Moghimi-Dehkordi et al., 2008; Atrkar-Roushan et al., 2013). This increasing pattern has been noticed by Asian countries where the pattern of cancer incidence is similar to our country (Xie et al., 2012; Atrkar-Roushan et al., 2013) and seems to be universal for both males and

females from Eastern European countries, most parts of Asia and select countries of South America (Center et al., 2009). Even if improved diagnostic and screening methods result in better and early identification of these patients, it will not explain the whole reason for such an increasing pattern and risk factors such as western dietary models, obesity and low physical activity seem to have a major role (Safari et al., 2013). The final goal of all cancer research is to prevent people dying from the disease. Now that awareness has been accruing rapidly about actions and interventions that could lead to a reduction in death from colorectal cancer by reducing the known risk factors of the disease, identifying the disease at an earlier stage, or improving the outcome of treatment, it should influence the target of patient education and screening programs especially for females in our region.

Results of this study showed that the incidence of esophageal cancer has a declining trend in East Azerbaijan which reached the significance in females. This is compatible with results from other regions of Iran as well (Amani et al., 2013; Atrkar-Roushan et al., 2013). A declining trend in North of Iran (the region with high prevalence of esophageal cancer) has been noticed during past decades and ASR of 80 males and 80 for females in the 1970's had reduced to 43.4 and 36.3 (Semnani et al., 2006; Mohebbi et al., 2008) and decreased from 7.2 and 5.2 per 10<sup>5</sup> men and women in 1996 (Guilan province) to 6.9 and 4.1 per 10<sup>5</sup> in 2004-2005. Whether or not this decrease is because of life style changes (e.g. tea drinking habits (Farhad et al., 2009), smoking, level of mycotoxins and nitrosamines in food (Pourshams et al., 2005) or timely diagnosis and treatment of Barrett's esophagus) is beyond this report but is noteworthy to be studied in further reports including the type of esophageal cancer. On the other hand; another study about prevalence of esophageal cancer in Iran during 2003-2009 reports an increasing trend (Kiadaliri, 2014). This study also reports an inverse association between the provinces' social rank and incidence rate of esophageal cancer, thus regional reports may be a better representation of the situation. However; reports from other countries also confirm such a decreasing trend for ASR of esophageal cancer during 1989-2008 in china (Zhao et al., 2012) and during 1983-2008 in Hong Kong (Xie et al., 2012) as well.

Results of this report might be influenced by quality of keeping medical records in medical centers, which has deeply been improved during recent years. For example only 5.5% of the registered cases did not have the data for age while these rates were higher in our previous experience. The other limitation of this report is its pathology base nature, which has its own clinical and strategic implications indeed. However we believe that this method could gather most of the information about diagnosed patients as specimens are obtained and evaluated after every diagnostic and even palliative procedures. Thus these results might validly represent and be very close to real prevalence.

In conclusion, East Azerbaijan still has a high incidence of cancer in gastrointestinal tract and stomach in particular, mostly in males. The determined decreasing trend in esophageal cancer and increasing trend in

colorectal cancer (in females) is compatible with other regions of Iran and needs to be considered in educational and screening policies of our health care system.

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