

GASTRIC CANCER

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Gastric cancer incidence and mortality dynamics in Kazakhstan in 2004-2014

Kazakhstan has a high incidence and mortality of gastric cancer (GC). Epidemiological analysis of GC prevalence in Kazakhstan during 2004-2014 was conducted for the purposes of monitoring and assessment of cancer care, treatment and preventive measures. Primary GC incidence and mortality have decreased from 22.3‰ to 17.2‰, and from 18.7‰ to 12.9‰, respectively (standardized WHO World indices). GC incidence in men was 2.5 times higher than in women. Several regions like Pavlodar, Kyzylorda, Aktobe, and Akmola had a high GC incidence. In 2009-2014, the incidence has increased in Astana, Zhambyl, Akmola, Aktobe regions, with a decrease in North Kazakhstan and Mangistau regions. The proportion of stages I-II increased by 1.8 times. The ratio of mortality to incidence for the period has decreased from 83.9% to 66.6% what indicates an improvement in cancer care in the Republic of Kazakhstan. The revealed features of GC incidence and mortality in the Republic of Kazakhstan will be taken into account during further expansion of screening and long-term planning of treatment and diagnostic measures.

Keywords: gastric cancer, morbidity, mortality, the Republic of Kazakhstan.

Introduction. The incidence of gastric cancer (GC) is high in different countries worldwide. GLOBOCAN reports 951 594 cases of gastric malignancies in 2012, with 723 073 fatal cases [1]. The average world morbidity was 12.1% (17.4% in men, and 7.5% in women) – No. 6 among all cancers. The mortality was 8.9% (12.8% in men, and 5.7% in women) – No. 4 among all cancers. Mortality to morbidity ratio was 73.6%.

Materials and methods. The target of research was the updated information obtained from the «Reports on cancer morbidity» and «Reports on patients with malignant neoplasms» (Form No.7 and Form No.35 approved by the Order of the Minister of Health of the Republic of Kazakhstan № 128 of March 6, 2013) for 2004-2014, information from the «Notification about a patient with a primary cancer or another malignant neoplasm» (Form No. 090/u approved by the Order of the acting Minister of Health of the RK № 514 of July 31, 2012), and the data of the Committee for Statistics of the Ministry of National Economy of the RK on the number and sex and age composition of the population of the RK in 2004-2014. In total, 30 699 cases of GC were registered in Kazakhstan in 2004-2014, with 25 013 deaths. The materials were analysed through the Republic, with the account of the administrative and territorial division into 14 regions and two main cities of Republican status – Astana and Almaty. The traditional methods of statistical data processing were applied

[2-4] to calculate the extensive, intensive, standardized and age-specific incidence rates, as well as mortality rates per 100,000. The statistical indicators were calculated using the IARC (International Agency for Research on Cancer) recommended methods [5]. The standardized indicators were calculated using the world standard population of the WHO (World Health Organization) [6]. The status of cancer care was assessed by the indicators of cancer service of the RK for 2008 and 2014 [7, 8].

Results. The incidence rates (per 100,000 standardized by World age structure) varied from 2.2% in Poland and Estonia to 41.8% in Korea (Table 1). Kazakhstan was in the group of countries with high incidence rate. WHO, GLOBOCAN 2012 estimates slightly exceeded the real indicators of the Electronic Registry of Cancer Patients of the Republic of Kazakhstan (ERCP RK). That was due to the methodological calculations used by IARC in the formation of GLOBOCAN 2012 when the national morbidity rates were calculated on the basis of 5-year survival rates [9].

All the countries have shown significant differences in the incidence by sex: men were two or more times more likely to have GC than women. In Kazakhstan, sex differences were also expressed; the incidence among men was 2.6 times higher than in women. The «mortality to morbidity ratio» that characterized the level of cancer care development in a particular country was high in both developed and developing countries. That indicated the seriousness of the problem of radical treatment of GC and its necessary early detection. Low mortality to morbidity ratio was recorded in Japan (41.5%) and Korea (31.1%) while in Denmark, Canada and Estonia those ratios have approached or exceeded 100%. In Kazakhstan, the ratio was 77.8% according to the updated information of the Electronic Register of Cancer Patients of the Republic of Kazakhstan. It should be noted that according to GLOBOCAN 2012, this ratio was worse for Kazakhstan (83.5%). That evidenced some progress in early diagnostics and treatment of that cancer of complicated localization.

The analysis of intensive and standardized indicators of GC incidence (Figure 1) shows a decrease in primary incidence. The primary incidence in 2004-2014 has also reduced from 20.0% to 16.4%. Standardized indicators have a similar pattern of lower incidence. The coefficient of regression of standardized indicators does not differ from the corresponding coefficient of intensive indicators, which indicates the absence of the effect of population aging on the level of morbidity. Reducing the incidence rate also indicates a decrease in the effect of adverse etiologic factors.

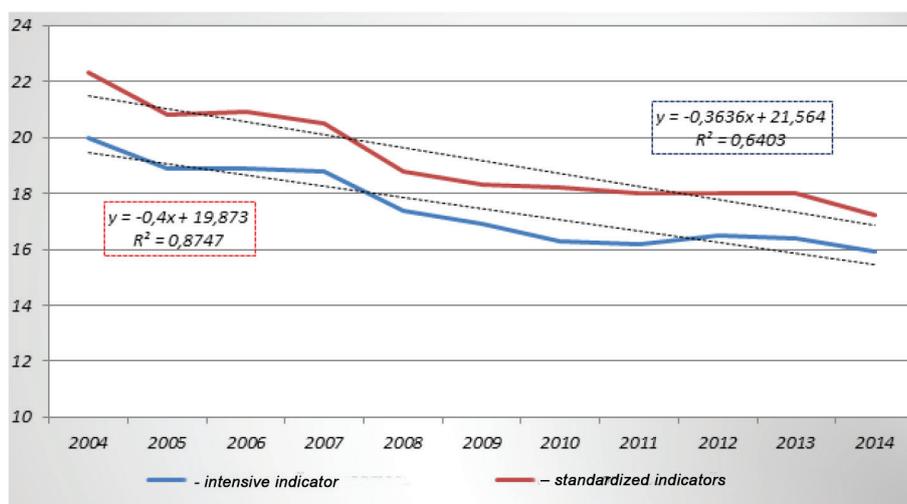
Table 1 – Incidence and mortality of gastric cancer in the selected countries, 2012 (per 100,000, WHO world standard, GLOBOCAN 2012).

Countries	Incidence			Mortality			Mortality to morbidity ratio,%
	Men	Women	Both sexes	Men	Women	Both sexes	
Kazakhstan*	35,25	12,79	21,6	30,4	10,5	18,0	83,5
Kazakhstan**	21,5	11,7	16,5	24,6	9,3	12,8	77,6
Kazakhstan***	28,7	11,1	18,0	22,0	8,7	14,0	77,8
Kyrgyz Republic	6,9	10,27	21,4	33,0	9,5	19,6	91,9
Russian Federation	6,4	0,9	3,1	5,9	0,7	2,7	87,1
Uzbekistan	16,8	8,8	12,5	15,6	8,1	11,4	91,2
Ukraine	5,5	0,5	2,5	4,5	0,3	2,0	80,0
Great Britain	10,0	3,5	6,5	8,7	2,9	5,6	86,2
Germany	6,9	1,3	4,0	4,5	1,1	2,7	67,5
Denmark	5,6	2,4	3,9	6,5	1,9	4,1	105,1
Latvia	7,1	1,0	3,5	6,8	0,7	3,2	91,4
Lithuania	7,6	0,8	3,6	7,4	0,7	3,5	97,2
Netherlands	10,0	2,8	6,3	8,3	2,3	5,2	82,5
Poland	4,0	0,8	2,2	3,8	0,7	2,1	95,5
Slovakia	6,4	0,8	3,4	5,8	0,7	3,0	88,2
Finland	3,7	1,1	2,3	3,0	1,0	1,9	82,6
France	6,1	1,7	3,8	5,1	1,0	2,9	76,3
Switzerland	6,1	1,9	3,8	4,4	1,1	2,6	68,4
Sweden	3,5	1,1	2,3	3,1	0,9	2,0	87,0
Estonia	4,5	0,6	2,2	5,1	0,3	2,2	100,0
Canada	4,6	1,1	2,8	4,6	1,0	2,7	96,4
USA	5,5	1,1	3,2	5,1	1,0	2,9	90,6
China	32,8	13,1	22,7	25,5	10,7	17,9	78,9
Korea	62,3	8,8	41,8	13,6	7,9	13,0	31,1
Japan	45,8	16,5	29,9	18,8	7,3	12,4	41,5
Australia	6,7	3,1	4,8	3,5	1,6	2,5	52,1
Brazil	13,1	6	9,2	10,9	4,6	7,4	80,4

* WHO, GLOBOCAN 2012

** ERCP RK, intensive (crude) indicators

*** ERCP RK, standardized indicators

**Figure 1** - Dynamics of WHO World intensive and standardized incidence rates of GC per 100,000 in the Republic of Kazakhstan in 2004-2014.**Incidence by sex**

The analysis of incidence of GC (Figure 2) revealed a difference by sex. Both in 2004-2008 and 2009-2014, men were 2.5 times more likely to suffer from GC than women. That was an average situation worldwide.

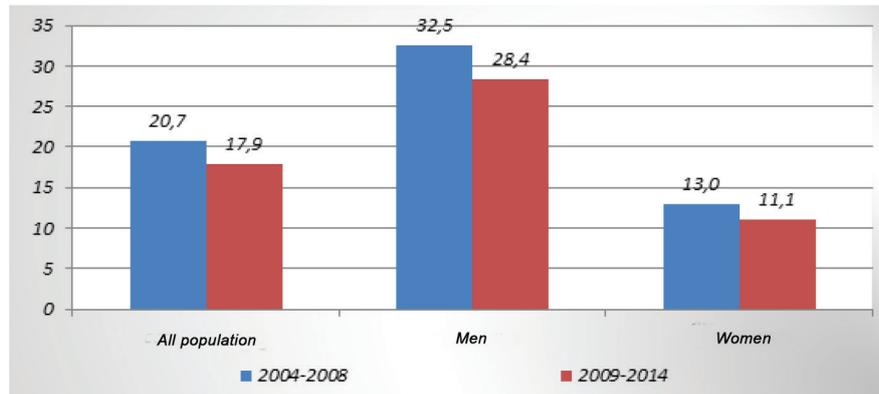


Figure 2 - Incidence of gastric malignancies in the Republic of Kazakhstan by sex (WHO World standards per 100,000, in 2004-2008 and 2009-2014)

Incidence by age

The analysis of age distribution of gastric malignancies (Figure 3) showed an increase of incidence starting from the age of 40 to 44 years, with a steady growth and the maximum rates at the age of 70 both in 2004-2008 and 2009- 2014.

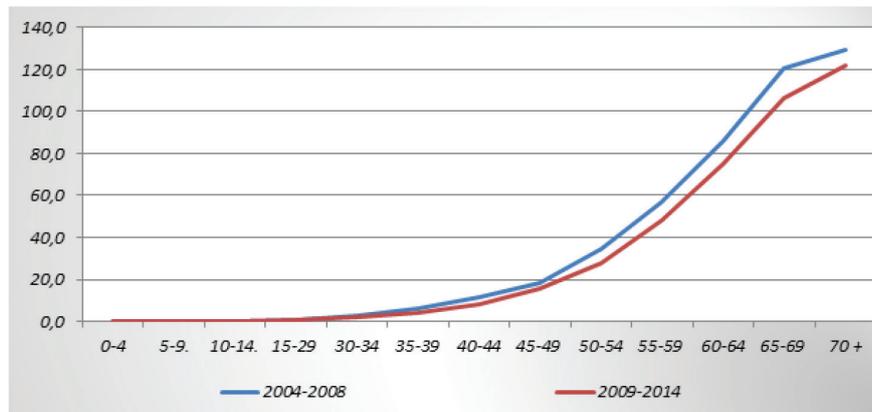


Figure 3 - Age indicators of gastric malignancies in the Republic of Kazakhstan (averages per 100,000 of the relevant age, in 2004-2008 and 2009-2014)

Both sexes had the highest incidence rate at the age of 70 and above, and the age dynamics was similar for both sexes: the incidence rate increased from the age of 40-44 and continued to grow steadily.

Incidence by region of the country

Territorial distribution of gastric malignancies (Figure 4) showed the regions with high incidence (Pavlodar, Kyzylorda, Aktyubinsk, and Akmola regions) while other regions were nearly at the same level. The incidence has notably increased in Astana, Zhambyl, Akmola, and Aktoobe regions in 2009-2014 vs. 2004-2008. In North Kazakhstan and Mangistau region, there was a slight decrease in the incidence in in 2009-2014 vs.2004-2008.

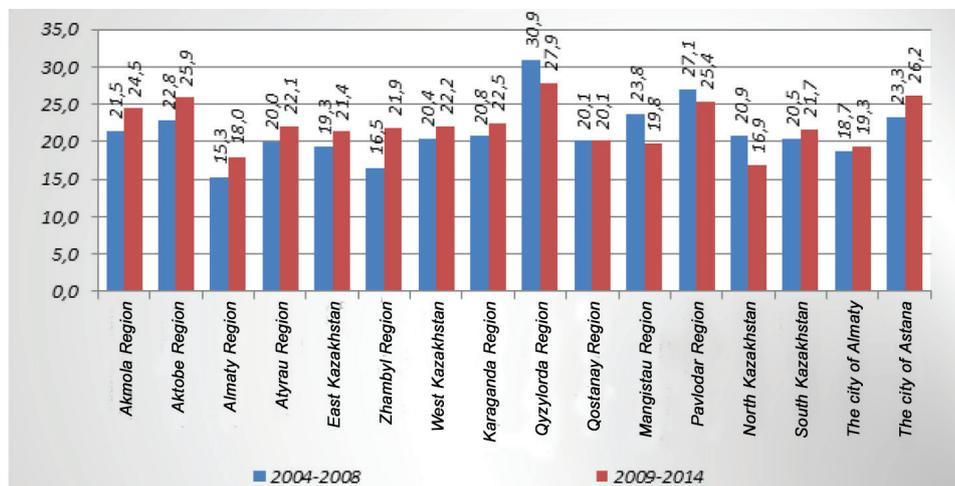


Figure 4 - Territorial rates of incidence of gastric malignancies in the Republic of Kazakhstan (WHO World standardized indicators per 100,000, in 2004-2008 and 2009-2014)

Specific share of stages I-II, III, and IV

In 2004-2014, the share of stages I-II has increased among primary gastric malignancies by 1.8 times (15.7% to 27.6%) whilst the stage IV has decreased from 30.3% to 25.0%, and the stage III – from 51.1% to 44.8% (Figure 5).

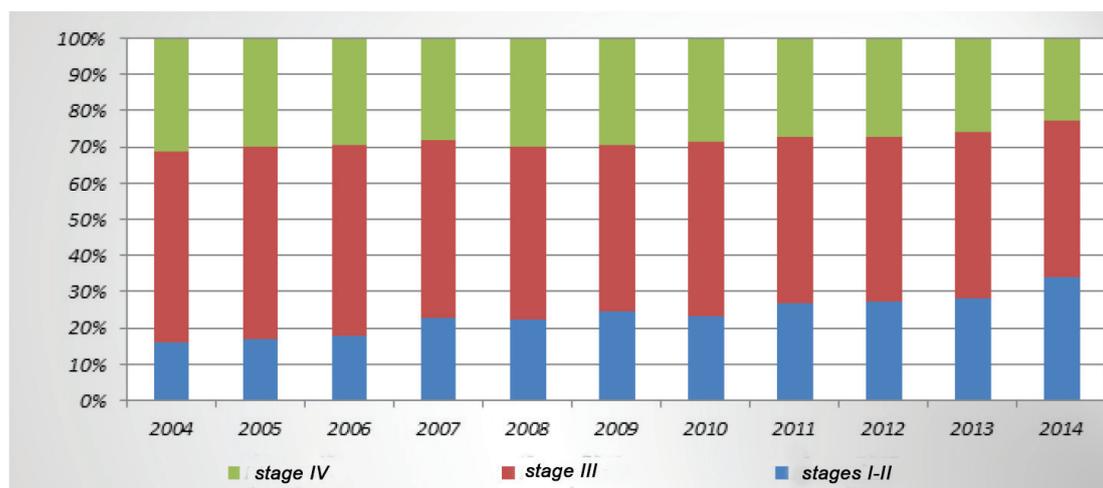


Figure 5 - Specific share of stages I-II, III, and IV of primary gastric malignancies in the Republic of Kazakhstan (%)

The status of cancer care

Table 2 presents the main statistical indicators characterizing the state of cancer care for patients with gastric malignancies [7, 8]. The number of newly registered cases has increased by 2.6% in 2013 vs. 2008; the number of morphological confirmations has increased by 3.7%, and amounted to 87.5%. The share of stages I-II has increased by 5.7% in 2013 vs. 2008. In addition, there was a decrease in the specific share of stage IV by 1.9% to reach 44.8% in 2014. Within-one-year mortality rate has decreased by 6.1% what evidenced the improvement in timely diagnostics of gastric malignancies. The number of patients receiving radical treatment has increased by 6.3% to reach 37.9%. The changes in 5-year rates are minor. Moreover, the increase in the share of late stages compared to the early stage of GC by 2.1 times in 2008 and 1.6 times in 2013 witnesses the seriousness of the problem of early diagnostics of GC.

Table 2 - Main statistical indicators of gastric cancer

Indicators	2008	2013
Number of primary cases	2726	2796
Morbidity per 100,000 (crude intensive indicator)	17.4	16.4
Morbidity per 100,000 (WHO World standardized indicator)	18.8	18.0
Share of stages I-II (% of primary cases)	21.9	27.6
Share of stages IV (% of primary cases)	46.7	44.8
Number of primary cases detected at screening	85	193
Detection rate of screening (% of examined)	3.1	6.9
Morphologically verified (% of detected)	83.8	87.5
Less than one year survival from the moment of diagnosis, of those registered last year (within-one-year mortality rate, %)	57.5	51.4
Radical treatment required (% of newly ill who received complex treatment)	31.6	37.9
Deaths from gastric malignancies	2251	2129
Mortality per 100,000 (crude intensive indicator)	15.2	14.6
Mortality per 100,000 (WHO World standardized indicator)	16.5	16.5
Mortality to morbidity ratio, % (intensive indicators)	87.4	89.0
Mortality to morbidity ratio, % (standardized indicators)	87.8	91.7
Patients registered by the end of the year	6584	6075
Of them, registered for 5 years and more (%)	40.5	45.3

In 2004-2014, the mortality rate was decreasing: the intensive indicators – 16, 7% to 11.9%, the standardized indicators – 18.7% to 12.9% (Figure 6). The “mortality to morbidity ratio» was changing wavyly, with increases (up to 87.8% in 2008) and decreases in different years. In fact, in 2004-2010 the mortality to morbidity ratio was stable at the level of 85%. Since 2010, it was steadily decreasing confirmed by quite high regression factor $R^2 = 0.6507$. During that period, the age-standardized mortality and incidence has decreased up to 66.6% in 2014 what was comparable to such countries as Germany and Switzerland [1].

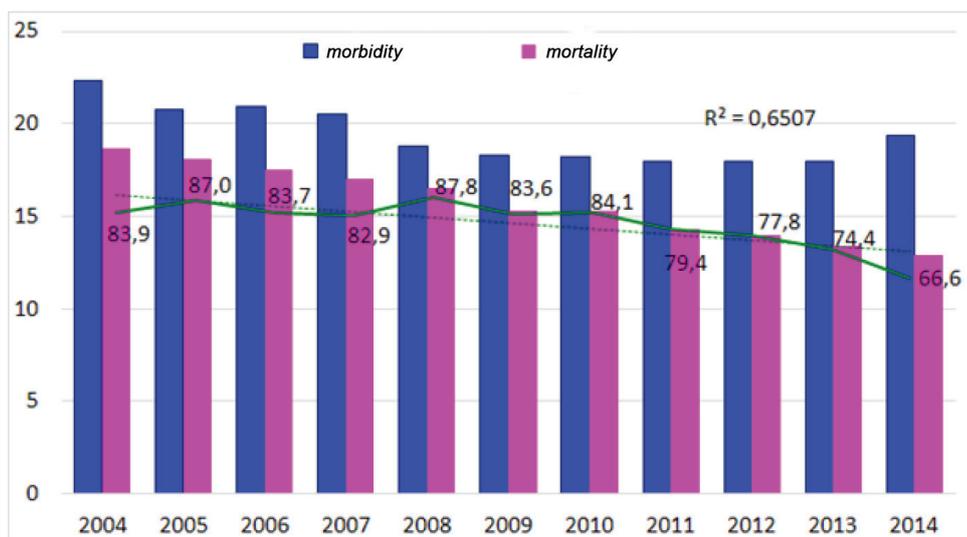


Figure 6 - Gastric malignancies: incidence, mortality (intensive indicators), mortality to morbidity ratio (%), in 2004-2014

In order to reduce mortality from GC, endoscopic screening was introduced in a pilot mode since 2013 aimed at early detection of oesophageal cancer and GC. Currently, screening is carried out in 11 regions of Kazakhstan every 2 years and covers about 330 thousand men and women from 50 to 60 years. 50% of target population is covered annually. There are certain problems with the implementation of this screening but even during the first years of screening the incidence of GC in 2014 has increased – for the first time in more than 10 years. The mortality from GC started decreasing only after 2010.

Conclusions. The analysis of GC prevalence in Kazakhstan shows a stable and still unfavourable situation. Only in the last 5 years there are some slightly positive trends: a decrease in mortality that is more evident in intensive indicators, an increase in the share of early stages, and a decrease in the mortality to morbidity ratio. The implementation of the State Program «Salamatty Kazakhstan», the Program for the Development of Cancer Care in the Republic of Kazakhstan, the launch of oesophageal and gastric cancer screening program supported the start of equipping of outpatient clinics with modern endoscopic equipment, the training of staff, promoted raising the awareness of population about oncologic alarm and early cancer diagnostics. The revealed peculiarities of GC incidence and mortality in the Republic of Kazakhstan shall be taken into account during long-term planning of therapeutic and preventive measures, the expansion and evaluation of quality of oesophageal and gastric cancer screening.

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