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Ethnoepidemiology of breast cancer mortality in Kazakhstan

Epidemiological studies of cancer mortality in different ethnic groups expand understanding of causal factors worth consideration in developing prevention strategies and assessing their results. The paper provides ethnic characteristics of breast cancer mortality in Kazakhstan. This retrospective study was based on the data from the Committee for Statistics of the Ministry of National Economy of the Republic of Kazakhstan on breast cancer mortality in 2009-2013 (ICD 10 – C50). Descriptive and analytical methods of epidemiology were used in the presented study of breast cancer mortality. The average age of death from breast cancer among Kazakh women (55.5±0.1 years) was younger than among Russian women (63.9±0.1 years). Crude and standardized rates of mortality among Russian women (29.9±0.3‰and 18.5±0.3‰, respectively) were higher than among Kazakh women (8.6±0.10/0000 and 10.3±0.10/0000, respectively). Age-specific breast cancer mortality showed a unimodal growth with the peak of mortality at the age of 60-69 among Kazakh women (37,4±1,00/0000), and 70 years and above – among Russian women (87,7±1,50/0000). Different age-specific trends among Kazakh and Russian women generally affected the growth of crude mortality among Kazakh women (T_{gr}=+1.2%) and its decrease among Russian women (T_{dec}=-1.4%). The authors have established the ethnic features of breast cancer which indicate a difference in mortality among Kazakh and Russian women. The obtained data shall be applied in planning anti-cancer activities.

Keywords: *breast cancer, mortality, ethnic groups, Kazakhstan.*

The map prepared by the International Agency for Research on Cancer (IARC) shows the territorial variability in breast cancer mortality. High standardized (world standard) mortality rates were found in Fiji (28.4‰), the Bahamas (of (26.3‰), Nigeria (of (25.9‰), Macedonia (25.5‰)), Pakistan (25.2‰), Solomon Islands (24.4‰), and Armenia (24.2‰) (Figure 1).

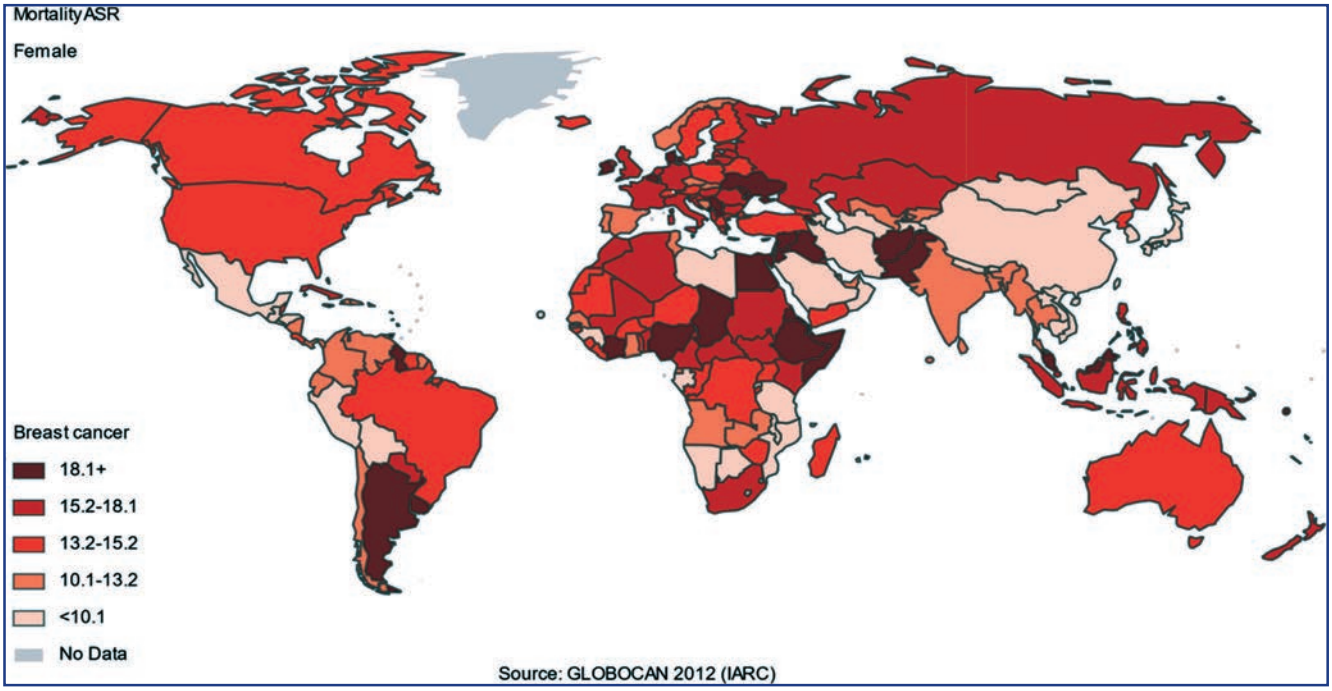

Figure 1 – Cartogram of breast cancer mortality in the world [1]

In Asia, the highest rates of breast cancer mortality were identified in Pakistan (25.2‰), Armenia (24.2‰), Lebanon (to (24.0‰)), Jordan (21.8‰), and Syria (21.5‰) (Figure 1).

The ethnic composition of population is one of among many exogenous and endogenous risk factors contributing to the emergence of malignant tumors. This problem is studied by ethnoepidemiology [2]. The main purpose of ethnoepidemiology is to explore the risk factors of cancer among specific ethnic groups with a common environmental background and similar characteristics of the host. The second goal is to establish preventive measures against cancer and promote general health based on ethnically spe-

cific cultural heritage [3]. The importance of this factor is due to the fact that the frequency of malignant tumors, in particular, breast cancer, is closely associated with the ethnic composition of population living in a certain geographical environment where the conditions of living, the habits and customs of certain ethnic groups differ from one another. In addition, mortality rates are used to estimate the social, demographic and medical well-being in the territory. Purpose of the research is the study of ethnic characteristics of breast cancer mortality in Kazakhstan

Material and methods. The main sources of information for this retrospective study was the data from the Committee for Statistics of the Ministry of National Economy of the Republic of Kazakhstan on breast cancer mortality in 2009-2013 (ICD 10 – C50) and the ethnodemographical data for the same period [4].

Descriptive and analytical methods of epidemiology were used in this study [5]. Extensive, crude, age and standardized mortality rates were calculated using standard techniques of medical and biological statistics [6, 7, 8]. The standardized indicator was calculated by direct method using the world standard age composition of population [9, 10]. Mortality rates were calculated per 100 000 of the relevant population. The trends of the indicators were determined by the method of least squares for 5 years of the study. Average annual rate of growth/decline of dynamic series was defined as geometric mean. We defined the average age of patients, the mean values (M, P), the average error (m), the average annual growth/decline in the level of indicators ($T_{gr/dec}$, %). 95% confidence intervals (95% CI) were calculated.

Results and discussion. 2304 Kazakh women have died from breast cancer in Kazakhstan in 2009-2013. This accounts for 33.5% of all deaths from breast cancer cases (6877 deaths in total). The number of deaths from breast cancer among Russian women in the same period amounted to 3866 (44.8%). The sspecific weight of death from breast cancer among Kazakh women by age groups showed a peak in 50-59 years (35.5%). Among Russian women, the peak was at 70 years and above - 35.9% (Table 1).

Table 1 – Distribution of deaths from breast cancer in the studied ethnic groups, Kazakhstan, 2009-2013

Age groups, years	All nationalities		Of them,			
			Kazakh women		Russian women	
	abs.	%	abs.	%	abs.	%
Up to 30	28	0.4	18	0.8	4	0.1
30-39	312	4.5	182	7.9	74	2.4
40-49	1073	15.6	550	23.9	324	10.5
50-59	2065	**30.0**	819	**35.5**	822	26.7
60-69	1495	21.7	424	18.4	**751**	24.4
70+	1904	27.7	311	13.5	1105	**35.9**
Total	6877	100.0	2304	100.0	3080	100.0

Average age of death from breast cancer among Kazakh women during the study period was 55.5±0.1 years (95% CI=55,2-55.7 years), with an increase from 55.1±0.6 years in 2009 to 55.9±0.5 years in 2013. The average annual rate of increase in the alignment was T_{gr}=+0.4%. The average age of death from breast cancer among Russian women was higher: 63.9±0.1 years (95% CI=63.7-64.1 years). The analyses of dynamics of the average age of Russian patients revealed a slight tendency to the "ageing" of death from 63.6±0.5 years in 2009 to 64.4±0.5 years in 2013. In the alignment, the average annual growth was not so pronounced T_{gr}=+0.3% (Figure 2).

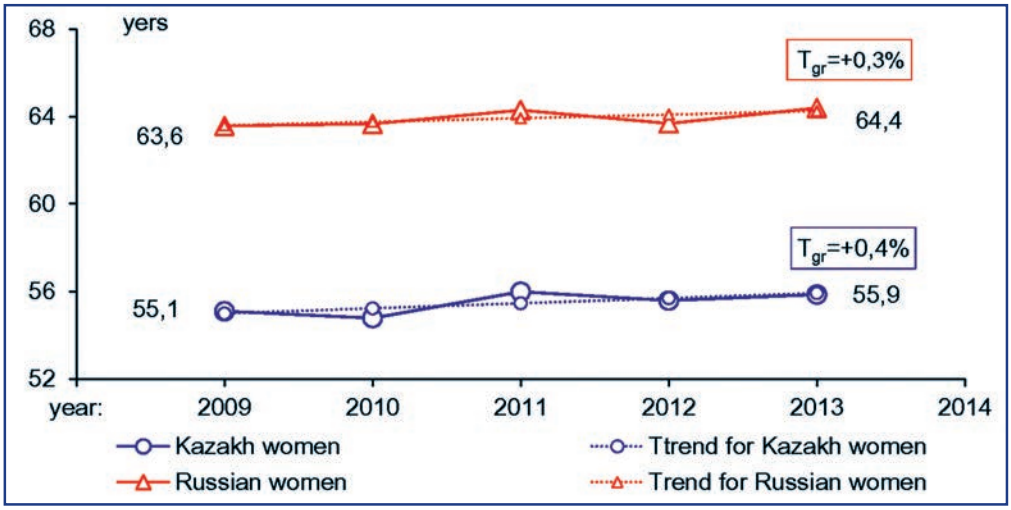

Figure 2 – Trends in the average age of death from breast cancer among Kazakh and Russian women, Kazakhstan, 2009-2013

Average annual crude mortality from breast cancer among Kazakh women amounted to 8.6±0.1‰ (95% CI = 8.5-8.7‰). The mortality rate increased from 8.4±0.4‰ in 2009 to 8.8±0.4‰ in 2013. In the alignment, the growth rate was T_{gr}=+1.22% (Figure 3).

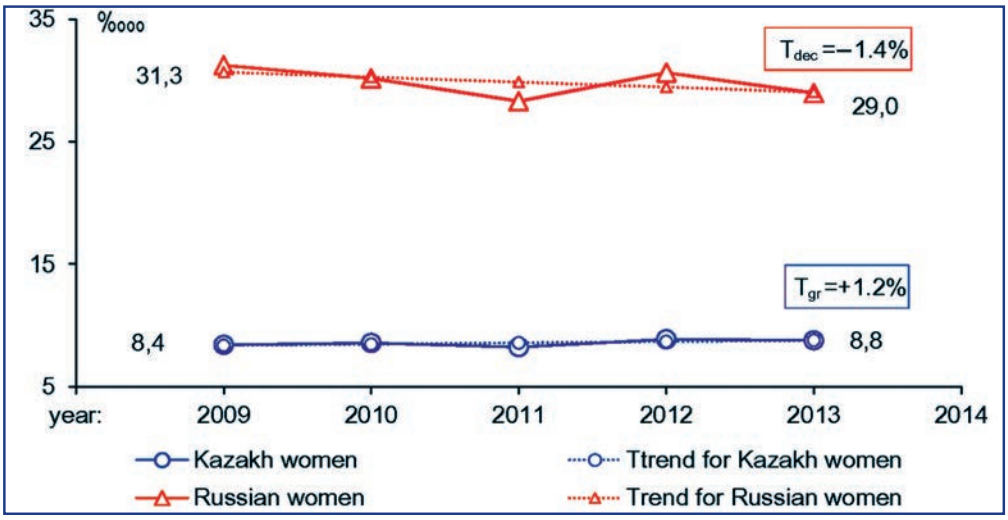

Figure 3 – Dynamics of crude mortality rate from breast cancer among Kazakh and Russian women, Kazakhstan, 2009-2013

Crude mortality from breast cancer among Russian women has decreased from 31.3±1.2‰ in 2009 to 29.0±1.2‰ in 2013. In the alignment, the decrease rate was T_{dec}=-1.4 (Figure 3). The average annual crude rate was 29.9±0.3‰ (95% CI=29.3-30.5‰).

Average standardized (world standard) breast cancer mortality among Kazakh women in the RK was 10.3±0.1‰ (95% CI=10.2-10.4‰). The similar indicator among Russian women was statistically significantly higher (p<0.05) and amounted to 18.5±0.3‰ (95% CI=18.0-19.1‰). It is worth noting that the standardized mortality among Kazakh women has been statistically significantly higher (p<0.05) that the crude rate, with an opposite picture among Russian women as their crude rate has been higher that the standardized rate (Figure 4).

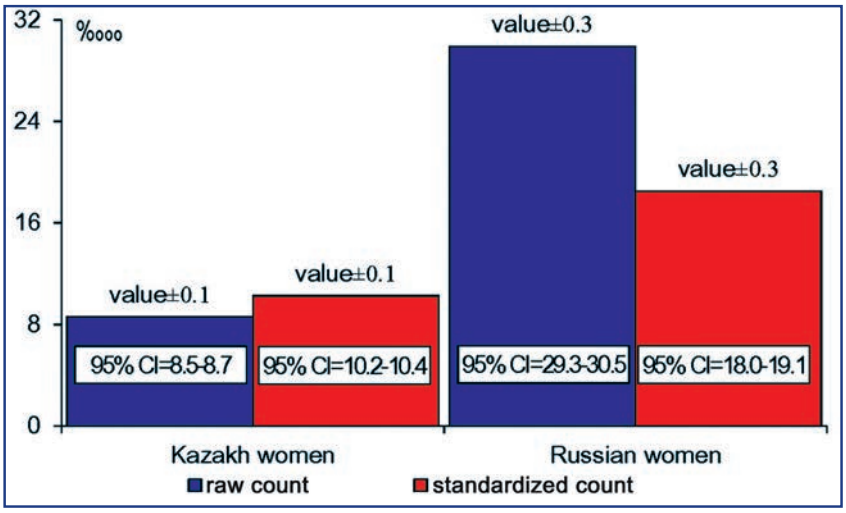

Figure 4 – Average annual breast cancer mortality among Kazakh and Russian women, Kazakhstan, 2009-2013

Age-specific breast cancer mortality among Kazakh women showed a unimodal growth with a peak at the age of 60-69 (37.4±1.0‰). Among Russian women, the peak was observed at the age of 70 + (– 87.7±1.5‰) (Table 2).

Table 2 – Distribution of deaths from breast cancer in the studied ethnic groups, Kazakhstan, 2009-2013

Age groups, years	Kazakh women			Russian women		
	P±m	95% CI	$T_{gr/dec}$, %	P±m	95% CI	$T_{gr/dec}$, %
<30	0.12±0.01	0.10-0.15	**−14.9**	0.11±0.02	0.08-0.14	**+33.6**
30-39	4.6±0.2	4.3-4.9	+2.2	5.1±0.5	4.2-6.0	+0.5
40-49	15.4±0.6	14.2-16.6	−3.5	24.2±1.1	22.1-26.3	**−8.9**
50-59	34.0±0.3	33.3-34.6	−1.6	52.4±1.0	50.4-54.5	−1.4
60-69	**37.4±0.7**	35.4-39.3	**+11.4**	76.2±1.2	73.9-78.5	+0.1
≥70	35.4±0.7	34.0-36.7	−2.3	87.7±1.5	84.7-90.7	−3.5

The analysis of 95% CI of age-specific mortality among Kazakh and Russian women in all age groups showed statistically significant differences (p<0.05). The intervals were not overlapping, except in the age groups of 50-59 and 70+. Age-specific breast cancer mortality among Russian women was statistically significantly higher (p<0.05)

than among Kazakh women in nearly all age groups where their 95% CI were not overlapping. In women below 30 from the studied ethnic groups, the differences in rates were not statistically significant (Table 2).

Age-specific breast cancer mortality among Kazakh women tended to decrease except the age groups of 30-39 and 60-69 years. In the last group, the growth of mortality was more pronounced – T_{gr}=+11,4%. The age-specific breast cancer mortality rated among Russian women have decreased at the age of 40-49 (T_{dec}=-8.9%), 50-59 (T_{dec}=-1.4%) and 70+ (T_{dec}=-3.5%). Other age groups had upward trends: below 30 – T_{gr}=+33.6%, 30-39 years – T_{gr}=+0.5% and 60-69 years – T_{gr}=+0.1% (Table 2).

The cumulative risk of death from breast cancer among Kazakh women amounted to 1.10±0,01% (95% CI=1,09-1,12%), with a decrease from 1.12% in 2009 to 1.10% in 2013. However, this index showed an upward trend, and the average annual growth rate amounted to T_{gr}=+0.52% (Figure 5).

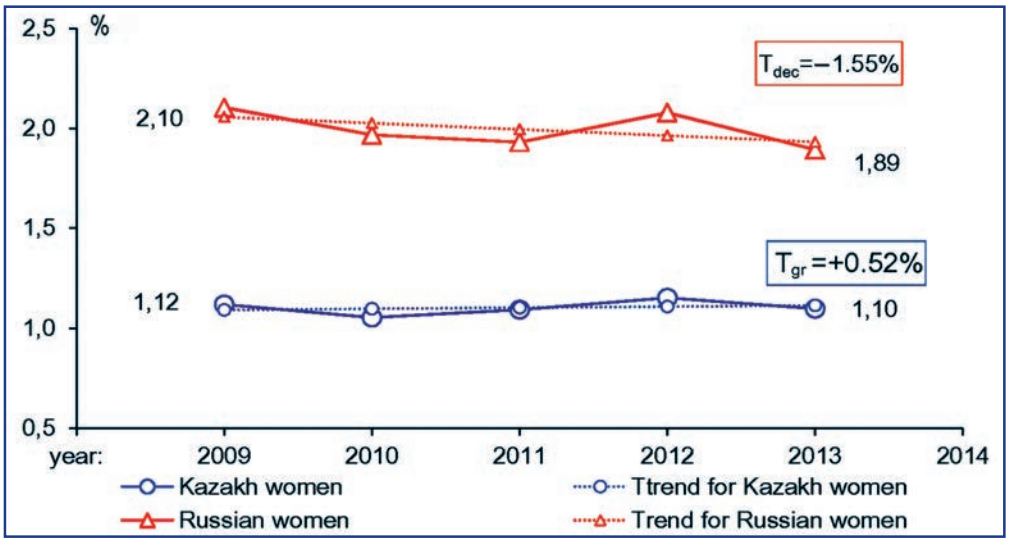

Figure 5 – The dynamics of cumulative risk of death from breast cancer among Kazakh and Russian women, Kazakhstan, 2009-2013

Among Russian women, the cumulative risk of death from breast cancer was statistically significantly higher (p<0.05) than among Kazakh women – 1.99±0.02% (95% CI=1.95-2.04%), with a decrease in aligned indicators and the average annual rate (T_{dec} = -1.55%) (Figure 5).

Thus, the established ethnic peculiarities of breast cancer mortality shall be taken into account in the organization of cancer activities, in particular, the mammographic screening in Kazakhstan.

Conclusions.

1. The average age of death from breast cancer among Kazakh women (55.5 years) was statistically significantly lower (p<0.05) than among Russian women (63.9 years), with a dynamics of "aging" in the studied ethnic groups.

2. Crude breast cancer mortality among Russian women (29.9‰000) was 3.5 times higher (p<0.05) than among Kazakh women (8.60/0000), with an upward trend among Kazakh women (T_{gr}=+1.2%) and a downward trend – among Russian women (Tdec=-1.4%).

3. Standardized (world standard) breast cancer mortality was higher (p<0.05) than the crude mortality among Kazakh women (10.3‰000), and lower (18.5‰000) – among Russian women. At that, the mortality among Russian women was also statistically significantly higher (p<0.05) than among Kazakh women.

4. Age-specific breast cancer mortality had a peak among Kazakh women at the age of 60-69 (37.4‰000), and among Russian women – at the age of 70+ (87.7‰000). The mortality in almost all age groups among Russian women was statistically significantly higher (p<0.05) than among Kazakh women, except women below 30 years. In that age group, the difference was not revealed.

5. Age of breast cancer mortality among Kazakh women had a downward trend, with the most pronounced decrease among women below 30 (T_{dec}= -14,9%) and the highest increase at the age of 60-69 (T_{gr}=+11.4 %). Among Russian women, there was an increase in mortality under the age of 30 (T_{gr}=+33.6%), and a decline at the age of 40-49 (T_{dec}=-8.9%).

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