
Cancer Mortality Trends in Lithuania 1978–1999

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The aim of this study is to describe the cancer mortality trends in the period from 1978 to 1999 in Lithuanian population. The mortality rates for all cancer sites, cancers of stomach, colon and rectum, larynx, lung, breast, cervix and prostate cancer were analysed. In male, the age-standardised mortality has shown an increase from 159.9 deaths per 100,000 (95% CI 153.8–166.0) in 1978 to 191.7 (95% CI 185.9–197.4) deaths per 100,000 in 1999. The annual percentage change of the rate was estimated to be 1.04%. The mortality rate peaked in 1993 to 209.2 (95% CI 202.9–215.5) and later started to decrease. During the study period the age-standardised mortality rates in female were almost stable and showed 89.1 (95% CI 85.3–93.0) in 1978 and 94.5 (95% CI 91.0–97.9) in 1999. The annual percentage change of the rate was estimated to be 0.20%. Ageing of the population can serve as the explanation for increasing mortality rates – 45.8% of cases in male and 89.1% of cases in female can be explained by this phenomenon.

Several most representative cancer sites (stomach, colorectal, lung, larynx, breast, cervical and prostate cancers) were studied for trends. Except stomach, there was an increase in cancer mortality. The mortality rates show a slowdown by the end of the period.

Key words: cancer mortality, age-standardised rates, trends

INTRODUCTION

Mortality data are used to understand social, economic and health issues and are important to social and medical knowledge. Information on the number and causes of death is one of the basic components of a country's health information system. This information is used for many important purposes such as the development of public health programs and the allocation of health care resources.

Cancer is the second frequent cause of death in Lithuania as in the other European countries. In 1978, cancer deaths comprised 15.2% of all deaths in Lithuanian population. The proportion of cancer-related deaths in 1999 increased up to 19.2%. Cancer mortality is comprehensively studied in European countries (1, 2). During the last 30 years the trends in cancer mortality in Europe significantly changed. In 1970 the male and female cancer mortality (all ages) was higher in Western Europe than in the "socialist" Central and Eastern Europe (3). In most Western European countries total cancer mortality was moderately downward in the early 1990s (4). However, cancer mortality was still up-

wards in a few southern and eastern European countries (5–7). After the peak rate reached in 1988, moderate but steady declines were observed over the last decade in total cancer mortality rates in the European Union (8). Cancer mortality features were studied in Lithuania with the aim to explain the link rates 1970–1990 to socio-medical aspects [9].

The aim of this study is to describe and to explain the cancer mortality trends during the period from 1978 to 1999 in Lithuanian population.

MATERIALS AND METHODS

For analysis of cancer mortality trends, materials of Department of Statistic for the years 1978–1992 and materials of Lithuanian Cancer Registry for the years 1993–1999 were used. Cancer mortality statistics are based on the underlying cause of death as reported by the certifying physician on the medical certificate of death. During the period 1978–1992, the cancer mortality statistics officially were reported only for eight individual cancer sites (stomach, colon, rectum, larynx, lung, breast, cervix and prostate). Other cancer sites were combined into broad categories and tabulated. The causes of death were coded according to ICD-9 (International Classification of Diseases, 9th revision). Mortality rates for all cancer

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sites, cancers of stomach, colon and rectum, larynx, lung, breast, cervix and prostate cancer were analysed for the period of 1978–1999. Crude mortality rates and age-standardised rates were calculated for both sexes. The standardisation was performed by the direct method against the World standard population. Annual change of crude and standardized rates and their errors, as well as annual percentage change (APC) were calculated using the linear regression model.

The interpretation of trends was based on a comparison of the annual change of crude and standardized rates. Age_fraction (world) (AFW) was calculated by the following formula:

$$AFW = \frac{\text{annual-change-crude} - \text{annual-change-standardized}}{\text{annual-change-crude} - 100}$$

Confidence intervals (CI) were calculated for age-standardised rates at a 95% level of confidence (10).

RESULTS

All cancer sites (ICD-9, 140–208)

During the period 1978 to 1999, in Lithuania the number of reported cancer deaths per year increased from 2860 to 4318 for male and from 2321 to 3368 for female. The mortality rates for male increased from 179.5 per to 247.6 per 100,000. During this period, in female the cancer mortality rates changed from 130.0 to 172.3 per 100,000. The age-standardized mortality rates show different features in each sex (Fig. 1). The age-standardised mortality rates increased from 159.9 deaths per 100,000 (95% CI 153.8–166.0) in 1978 to 209.2 (95% CI 202.9–215.5) in 1993. Since 1994 a decrease is evident in male cancer mortality (191.7 (95% CI 185.9–197.4) deaths per 100,000 in 1999). Between 1978

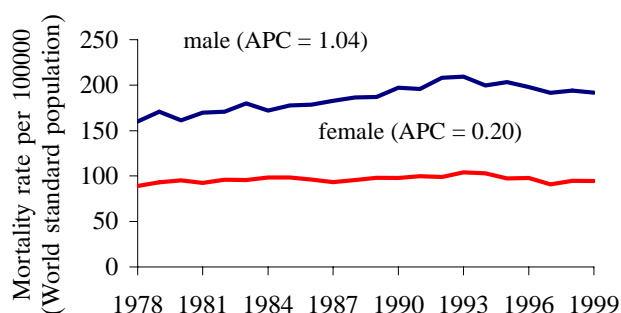


Fig. 1. Cancer mortality trends in Lithuania 1978–1999

and 1999 the mortality rate increased annually by 1.9 cases per 100,000 ($p < 0.001$). During the period 1978–1999, the age-standardised mortality rates in female were almost stable – 89.1 (95% CI 85.3–93.0) in 1978 and 94.5 (95% CI 91.0–97.9) in 1999. The estimated slope for female mortality was 0.2 ($p = 0.06$). Annual percentage change was estimated to be 1.04% for male and 0.20% for female. The age fraction was much higher for females (89.1%) than for males (45.8%). Characteristics of mortality indicators are given in Table 1.

Table 1. Characteristics of mortality indicators in 1978–1999 of selected cancer sites by sex

Site	Sex	Annual change of age-standardized rate	Annual percentage change (APC), %	Age fraction (AFW), %
All sites	male	1.9016 ± 0.26	1.04	45.8
	female	0.1916 ± 0.12	0.20	89.1
Stomach	male	-0.8081 ± 0.05	-2.69	-9.2
	female	-0.4021 ± 0.02	-3.21	13.3
Colorectal	male	0.3573 ± 0.03	2.46	32.0
	female	0.1021 ± 0.02	1.00	71.3
Larynx	male	0.1320 ± 0.03	2.22	28.2
Lung	male	0.6357 ± 0.13	1.16	46.4
	female	0.0178 ± 0.02	0.36	85.8
Breast	female	0.1984 ± 0.04	1.22	59.0
Cervix uteri	female	0.0413 ± 0.01	0.58	56.8
Prostate	male	0.3560 ± 0.03	2.95	30.4

Stomach cancer (ICD-9, 151)

In 1978, malignant neoplasms of the stomach were the second cause of death among all cancer sites in male and the first in female. The proportion of stomach cancer-related deaths among deaths caused by all cancers declined from 24.8% to 11.2% in male and from 19.8% to 10.7% in female in the period 1978–1999. Stomach cancer was ranked second as the cause of deaths in 1999 in male and third in female. In the years 1978–1999, the number of deaths from stomach cancer declined from 708 to 482 for male and from 460 to 359 for female. Crude mortality rates dropped from 39.4 to 21.2 per 100,000 for male and from 16.6 to 9.0 per 100,000 for female in the years 1978 and 1999, respectively. The age-standardised mortality rates declined also (Fig. 2). In 1978, the mortality rates in male and female were 39.4 and 16.6 per 100,000, respectively (95% CI 36.4–42.5 and 15.0–18.2). In 1999, mortality rates decreased to 21.2 in males and 9.0 in females per 100,000 (95% CI 19.3–23.1 and 8.0–10.0). The annual decrease for stomach cancer age-standardised rates was -0.8 cases per 100000 for males ($p < 0.001$) and -0.4 for females ($p < 0.001$). An-

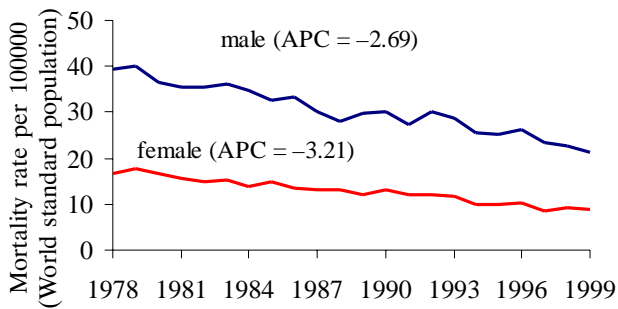


Fig. 2. Stomach cancer mortality trends in Lithuania 1978–1999

nual percentage change is estimated as 2.7% for male and 3.2% for female. AFW provides different features of change of the rates by sex – reduction in male is more related to young individuals (AFW = -9.2%).

Colorectal cancer (ICD-9, 153, 154)

In Lithuania, colorectal cancer was the third most frequent cause of death among malignant neoplasms in both sexes in 1978. In 1999, colorectal cancer was the second among cancer-related deaths in female and third in male. The number of colorectal cancer deaths grew up from 190 to 386 in male and from 283 to 424 in female in 1978–1999. From 1978, the crude mortality rate for male increased from 11.9 to 22.1 per 100,000 in 1999. The respective figures for females were 15.8 and 21.7 per 100,000. In 1978, the age-standardised colorectal cancer mortality rates were 9.8 per 100,000 (95% CI 8.4–11.3) in male and 9.6 per 100,000 (95% CI 8.4–10.8) in female (Fig 3). In 1999, the figures were 16.5 and 10.4 per 100,000 (95% CI 14.9–18.2 and 9.4–11.5). The annual growth of age-standardised mortality rates was higher in male (0.36 per 100,000, $p < 0.001$) than in female (0.1 per 100,000, $p < 0.001$). APC for males was estimated to be 2.5% and for females 1.0%. Only 31.7% of increase can be explained by ageing for male and 71.6% for female.

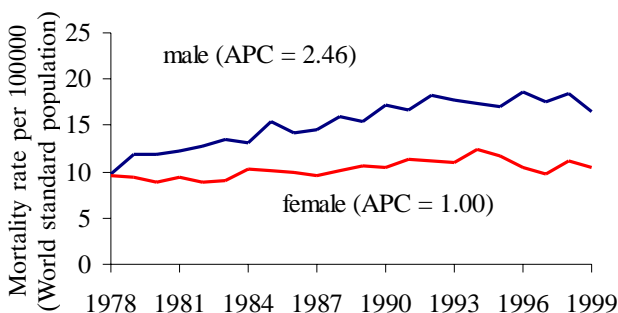


Fig. 3. Colorectal cancer mortality trends in Lithuania 1978–1999

Larynx cancer (ICD-9, 161)

Larynx cancer-related deaths comprised about 3% of all cancer deaths in Lithuanian male population in 1978 and 1999. Larynx cancer as a cause of death among female constitutes a very small proportion among malignant neoplasms (0.2% in 1999). During 1978–1999, the number of deaths almost doubled in male population. The mortality rates per 100000 male were 4.9 and 7.5 per 100,000 in the years 1978 and 1999, respectively. The age-standardised larynx cancer mortality rates in male increased from 4.6 per 100,000 (95% CI 3.6–5.7) in 1978 to 8.7 per 100000 (95% CI 7.4–10.0) in 1995 and then decreased to 6.0 (95% CI 5.0–7.1) (Fig. 4). The annual increase over the years 1978–1999 in male age-standardised rates was 0.13 per 100000 ($p < 0.001$). No significant changes were found in female age-standardised rates. The annual increase was 0.002 ($p = 0.28$).

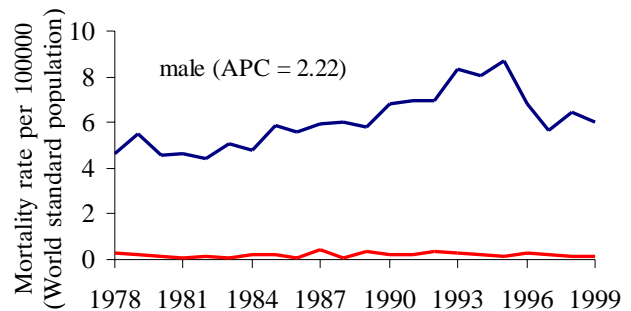


Fig. 4. Larynx cancer mortality trends in Lithuania 1978–1999

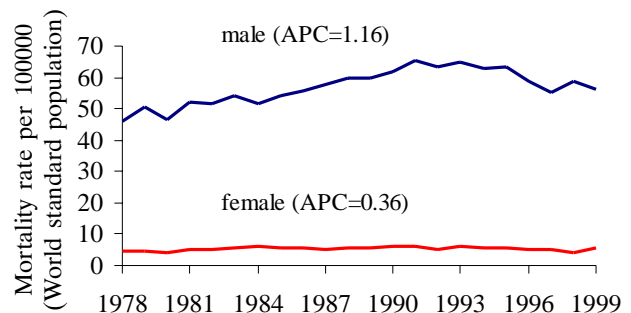


Fig. 5. Lung cancer mortality trends in Lithuania 1978–1999

Lung cancer (ICD-9, 162)

Lung cancer is the leading cancer among cancer related deaths in Lithuanian male population (29.1% in 1999). In females, lung cancer deaths contributed 5.4% of deaths in 1978 and 6.2% in 1999. Mortality from lung cancer increased from 50.3 per 100,000 in 1978 to 72.2 in 1999 in male. Changes in female lung cancer mortality are less evident (7.1 and 10.7

per 100,000 in 1978 and 1999, respectively). The age-standardised lung cancer mortality rate in male increased substantially in 1978–1991 – from 45.9 per 100,000 (95% CI 42.5–49.2) to 65.4 (95% CI 61.8–69.0), while during 1992–1999 the mortality rates showed some decrease – 56.3 per 100,000 (95% CI 53.2–59.4) in 1999 (Fig. 5). APC is estimated to be 1.163%, and only 46.4% of cases of deaths can be explained as related to ageing. During the period 1978–1999, the annual increase of lung cancer mortality was 0.6 ($p < 0.001$) in male. No significant changes were found in female age-standardised rates. The mortality rates were 4.6 per 100,000 (95% CI 3.7–5.4) in 1978 and 5.5 (95% CI 4.7–6.3) in 1999. The annual change in mortality rate was 0.02 ($p = 0.19$).

Breast cancer (ICD-9, 174)

In 1978, breast cancer was the second most frequent cause of female cancer-related deaths (13.9% of female cancer deaths). After 1986, the breast cancer becomes the first cause of death among cancer-related deaths in female population (15.5% of deaths in 1999). In the period 1978–1999, there was a substantial increase of breast cancer-related deaths (from 322 to 523) and increase in crude mortality rates (from 18.0 per 100,000 in 1978 to 26.8 in 1999). The increase of age-standardised mortality rate was observed (Fig. 6). Female breast cancer mortality increased from 13.9 per 100,000 (95% CI 12.3–15.5) to 16.8 (95% CI 15.2–18.3). The highest mortality rate was observed 20.1 per 100,000 (95% CI 18.4–21.9) in 1993. The annual increase of breast cancer mortality was most evident among all cancer sites in female 0.2 ($p < 0.001$). The APC is estimated to be 1.22 and 59.0% of increase can be explained by ageing.

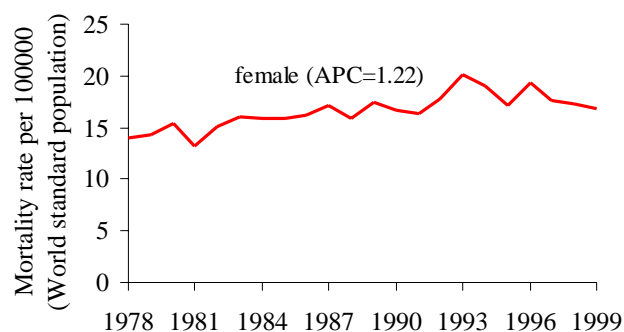


Fig. 6. Breast cancer mortality trends in Lithuania 1978–1999

Cervical cancer (ICD-9, 180)

Cervical cancer was the fourth most frequent cancer among the female in the period 1978–1999. From

1978 to 1999, the number of deaths increased from 160 to 225. During this period the mortality rates grew from 9.0 to 11.5 per 100,000. The age-standardised cervical cancer mortality rate changed from 6.6 per 100,000 (95% CI 5.5–7.7) in 1978 to 7.6 per 100,000 (95% CI 6.6–8.7) in 1999 (Fig. 7). The estimated slope of regression line was 0.04 ($p < 0.005$).

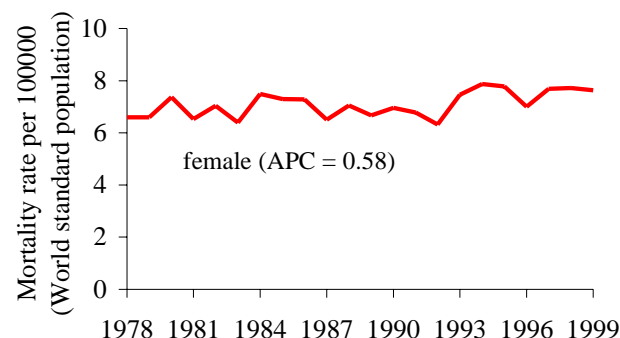


Fig. 7. Cervical cancer mortality trends in Lithuania 1978–1999

Prostate cancer (ICD-9, 185)

In the years 1978–1999, prostate cancer was the fourth most common cause among male cancer-related deaths. During this period, a substantial increase of the number of deaths caused by prostate cancer was recorded – from 188 to 384. The mortality rate increased from 11.8 to 22.0 per 100,000. The age-standardised mortality rates increased from 9.4 per 100,000 (95% CI 8.0–10.9) to 15.7 (95% CI 14.1–17.2) (Fig. 8). The APC was estimated to be 2.95%, and only 30.4% of cases can be explained by ageing.

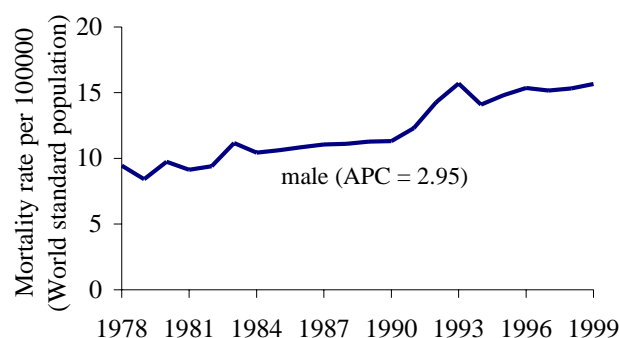


Fig. 8. Prostate cancer mortality trends in Lithuania 1978–1999

DISCUSSION

Cancer continues to be a major public health problem in Lithuania. The increasing rates are likely to reflect the rise in incidence and highlight the need of preventive actions.

Mortality trends of major cancer sites (colorectal and prostate cancer in male and colorectal, breast and cervical cancer in female) show an increase. During 1978–1999 female overall cancer mortality rates were almost stable due to a changing of patterns – an increase in breast, colorectal and cervical cancers was partly compensated for by a decrease in stomach cancer. Over the recent years, promising changes – stabilization and decline in cancer mortality – were observed. The most frequent cancer sites (stomach and later lung) were the main contributors to the decreasing numbers of cancer death as the cancer sites most closely related to tobacco and alcohol. During the last decades, the respiratory cancer deaths increased rapidly in West European countries, while in the recent years they started to decline in other European countries (11, 12). In most of West European countries total cancer mortality decreases because of a decline in lung cancer mortality for males, in stomach cancer for both sexes, and in cervical cancer for women, as well as some decline in breast and colorectal cancers (2, 5, 14–17). The lung cancer mortality rates among men in Lithuania during the period 1965–1994 showed an increase of lung cancer mortality in cohorts born before 1945. In the younger generations born after 1945, the risk declined (13). The decreasing mortality trend in male could be attributed to a reduction in the prevalence of smoking and a higher quality of cigarettes.

The stomach cancer rates in Lithuania dropped for both sexes sharply, but still are higher than in most European countries. Stomach cancer mortality declined throughout the EU (13). The cervical cancer mortality in Lithuania, according to WHO data, is one of the highest in Europe, and the recent trend does not indicate it to drop in nearest future. In all Western European countries, except Ireland, a substantial decline in cervical cancer mortality in younger women was observed, although the falls were larger and earlier for some Nordic countries. In East European countries, moreover, the absolute rates remained appreciably higher than in most of Western Europe. The declines registered in cervical cancer mortality in young women were largely due to screening, and the persisting variations in mortality across Europe underline the importance of adoption of organised screening programmes, with specific urgency in Eastern Europe.

Breast cancer is the predominant cancer among women in Lithuania. The rates of mortality from breast cancer, the most common cancer in female in Lithuania, have generally increased over the last decades, but recently they have turned downward, most probably due to better treatment.

Prostate cancer is the most commonly diagnosed cancer in western men. An evident increase in both incidence and mortality rates of prostate cancer were

seen for many of countries (17). After the incidence and mortality of prostate cancer started to decrease in the 1990s in the USA, the reasons for this evolution are widely debated, and most frequently the importance of early detection is emphasized. The PSA testing has become widely available in Lithuania, and the falling mortality rates are expected in the nearest future.

The mean age of nearly all industrialised populations is increasing, due to a lower birth rates and higher expectation of life, although not age but rather a prolonged time of carcinogenic exposure is an important determinant of cancer risk. During the period 1978–1999, the proportion of elderly people increased in Lithuanian population. In 1978 there were 20.8% of male and 28.6% of female and in 1999 24.6% of male and 33.3% of female older than 50 years. The increase of life expectancy over the last few decades in most areas of the world has greatly lifted cancer burden in the elderly (6). Less than 50% of the death now for male in Lithuania can be attributed to ageing of population, indicating cancer to be an important issue of public health in younger generations.

The cancer-related deaths are a major measurement of the effectiveness of cancer control in the country. Mortality from avoidable cancers in Lithuania is increasing. This fact implies the need of strong interventions. Nevertheless, primary prevention and more effective screening programs appear recommendable. Improvement in early diagnosis and effective treatment together with preventive measures should lead to persistently declining mortality rates.

CONCLUSIONS

1. Overall cancer mortality in the period 1978–1999 increases for both male and female. Annual percentage change for male was estimated to be 1.04% and for female 0.20%. 45.8% cases for male and 89.1% cases for female can be explained by ageing of population.

2. Among selected cancer sites, the prostate cancer showed the highest rates of annual percentage change (2.95%). Only 30.4% of cases can be explained by ageing of male population.

3. Stomach cancer showed the tendency to decrease steadily, annual percentage change being approximately 3% for both sexes.

4. Annual change of standardized rates for male were estimated to be 1.90 ± 0.26 cases per 100000. The mortality rates of major cancer sites during the very last years of the study period featured a decreasing tendency.

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MIRTINGUMO NUO VĖŽIO TRENDAI LIETUVOJE 1970–1999

S a n t r a u k a

Šio darbo tikslas – aprašyti mirtingumo nuo vėžio pokyčius Lietuvoje 1978–1999 metais. Išnagrinėti mirtingumo nuo skrandžio, storosios žarnos, gerklų, plaučių, krūties, gimdos kaklelio vėžio bei visų piktybinių navikų rodikliai. Standartizuoti vyrų mirtingumo rodikliai didėjo nuo 159,9 atvejo 100000 gyventojų (95% pasikliautiniai intervalai (PI) 153,8–166,0) 1978 m. iki 191,7 atvejo 100000 gyventojų (95% PI 185,9–197,4) 1999 metais. Vidutinis metinis rodiklio pokytis – 1,04%. Didžiausias mirtingumo rodiklis buvo pastebėtas 1993 m. – 209,2 atvejo (95% PI 202,9–215,5), o nuo 1994 m. vyrų mirtingumas nuo vėžio mažėja. Standartizuoti moterų mirtingumo rodikliai 1978–1999 m. beveik nekito: mirtingumas buvo 89,1 atvejo 100000 gyventojų 1978 m. (95% PI 85,3–93,0) ir 94,5 atvejo 100000 gyventojų (95% PI 91,0–97,9) 1999 m. Darbe yra išnagrinėti mirtingumo nuo skrandžio, storosios žarnos, plaučių, gerklų, krūties, gimdos kaklelio ir prostatos vėžio pokyčiai. Mirtingumo rodikliai, išskyrus skrandžio vėžį, didėjo. Laikotarpio pabaigoje mirtingumas nuo vėžio pradėjo mažėti.

Raktažodžiai: mirtingumas nuo vėžio, standartizuoti rodikliai, trendai