

# Colorectal cancer mortality in Poland – analysis of regional variation

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## Abstract

**Introduction:** In 1999 in Poland 7,139 people died of colon cancer, while in 2008 this number rose to 9,915. Among malignant tumours, colorectal cancer is the second most commonly occurring one, frequently leading to death. The main reason for this is the fact that in 50% of patients with this cancer the illness is diagnosed at an advanced stage already. The risk increases significantly after 60 years of age. The aim of study was analysing the mortality of patients with colorectal cancer over 10 years in Poland (1999-2008), in both men and women from all provinces in the country.

**Material and methods:** The basis for the study was the number of deaths caused by colorectal cancer taking into account sex. Statistical data were drawn from the National Cancer Registry.

**Results:** In 1999 in Poland 3,706 men and 3,433 women died of colorectal cancer, while in 2008 the number of deaths stood at 5,385 and 4,530 respectively. In the years 1999-2008, colorectal cancer mortality rates among men were approximately 1.5 times higher than among women, and the majority of provinces demonstrate an upward trend. Among women the differences in the values of the coefficients are less clear.

**Conclusions:** Early detection of cancer could significantly reduce mortality among patients with colon cancer. Screening for colorectal cancer and colonoscopy are tests that should permanently become a part of preventive measures aimed at detecting disease and teaching risk factors, particularly in males and people over 60 years of age.

**Key words:** colorectal cancer, mortality, Poland.

## Introduction

In epidemiology, mortality is defined as the number of deaths caused by a given disease in  $k$  population (most frequently 100,000) among the total population (that is, the total number of healthy and sick people).

What may be gathered from the analyses and observations conducted is that in the category of morbidity as well as in the category of mortality in the world it is malignant tumour that is expected to soon become the primary factor, and not cardiovascular diseases. In Poland colorectal cancer is one of the most common malignant tumours, both among women (10.3%) and among men (10%). When it comes to the frequency of morbidity for both sexes, colorectal cancer has the second highest rates, and 50% of all cases are rectal cancers (standardized mortality ratio in 2000 was 4.7 for men and 2.7 for women). Five-year rectal cancer survival in our country amounts to 24-33.2%, while in Western European countries it

reaches 50% [1]. The peak of morbidity is noted after 65 years of age [2]. Unfortunately, cancer is diagnosed rather late, which leads to low effectiveness of treatment and to relatively high mortality.

In 1999 in Poland 7,139 people died of malignant colorectal cancer, while in 2007 the figure was 9,372 [3, 4]. The number of deaths is therefore increasing. The main cause of this state is the fact that tumour is not diagnosed until an advanced stage in 50% of cases [5]. A growing tendency was also demonstrated for the colorectal cancer mortality rate in Poland for the years 1999-2008, especially among men. An analysis of colorectal cancer mortality rates in voivodeships (Polish provinces) shows that there exist certain distinctions as regards both the mortality rate value in particular years and the rate's trend, separate for men and women.

The aim of this study is to analyse the colorectal cancer mortality rate in Poland for the years 1999-2008. Statistical data concerning mortality rates for men and women were analysed for the whole of Poland and for particular voivodeships.

**Material and methods**

The basis for the analysis was the number of deaths caused by colorectal cancer (colon, rectosigmoid colon, rectum), taking into account sex. The statistical data were obtained from the National Cancer Registry available on the relevant web site. The registered cases of deaths from colorectal cancer are analysed chronologically in annual reporting periods. The data (in total and for sex and age) concerning colorectal cancer mortality given in the absolute value and using the mortality rate for the years 1999-2008 were used in this study. The mortality values were given on the basis of the standardized (according to age) mortality ratio, which depends both on all aetiological factors peculiar to a given tumour and on its biology, as well as on the therapeutic powers in given diseased units. This ratio specifies how many people would be affected

by this illness in a given population (per 100,000 inhabitants) if the age structure of this population was the same as that of the population assumed to be standard. The standard population was assumed to be the "standard world population" and the data about its structure were drawn from the annual news bulletin "Nowotwory złośliwe w Polsce" (Malignant tumours in Poland), ed. Witold Zatonski and Jerzy Tyczynski, published by the Department of Epidemiology and Prevention of Cancer – National Cancer Registry.

Standardized rates are calculated by the formula:

$$SR = \frac{x_1 \times y_1 + x_2 \times y_2 + \dots + x_n \times y_n}{y_1 + y_2 + \dots + y_n} \times 100\,000,$$

where: SR – standardized rate for morbidity or mortality,  $x_{1...n}$  – crude rates for particular 5-year age groups,  $y_{1...n}$  – the number of the standard population in the corresponding age groups.

**Results**

As may be observed in Table I, in 1999 in Poland the colorectal cancer mortality value amounted in total to 3,706 among men (in which there were 1,043 cases of rectal cancer) and 3,433 among women (with 901 cases of rectal cancer). In the subsequent years the mortality value was gradually increasing, reaching in 2008 the rate of respectively 5,385 (with 1,559 cases of rectal cancer) and 4,530 (with 1,160 cases of rectal cancer) cases. The trend in mortality for the years 1999-2008 may be seen in Figure 1.

As shown in Tables II and III, the colorectal cancer mortality rate in Poland in the years 1999-2008, given as the standardized mortality ratio, was 1.5 times higher for men than for women and amounted to 15.7 in 1999 and 18.9 in 2008, demonstrating a growing tendency. Among women the rates were 9.4 and 10.2 respectively, also demonstrating a growing tendency, although slightly less explicit.

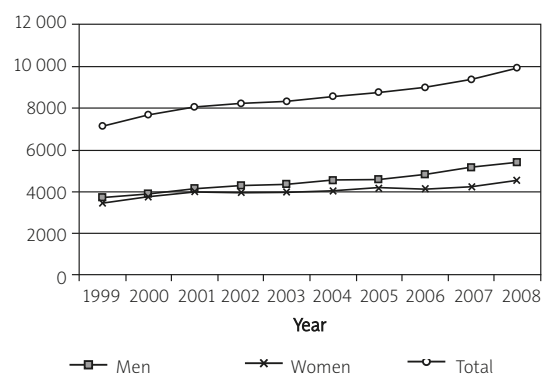
**Table I.** The number of deaths caused by colorectal cancer among men and women in Poland in the years 1999-2008

| Parameter               | Year |      |      |      |      |      |      |      |      |      |
|-------------------------|------|------|------|------|------|------|------|------|------|------|
|                         | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Men                     | 3706 | 3903 | 4111 | 4286 | 4321 | 4526 | 4571 | 4814 | 5141 | 5385 |
| Including rectal cancer | 1043 | 1122 | 1188 | 1241 | 1256 | 1275 | 1301 | 1387 | 1491 | 1559 |
| Women                   | 3433 | 3754 | 3964 | 3922 | 3984 | 4042 | 4197 | 4151 | 4231 | 4530 |
| Including rectal cancer | 901  | 996  | 992  | 989  | 1011 | 1040 | 983  | 1006 | 1053 | 1160 |
| Total                   | 7139 | 7657 | 8075 | 8208 | 8305 | 8568 | 8768 | 8965 | 9372 | 9915 |
| Including rectal cancer | 1944 | 2118 | 2180 | 2230 | 2267 | 2315 | 2284 | 2393 | 2544 | 2719 |

Simultaneously, the mortality rates in the period studied for particular voivodeships indicate significant differences, in terms of both value and trend. In 1999 the lowest mortality rate among men was noted in the Lublin Voivodeship (11.4), and the highest in the Greater Poland Voivodeship (18.7). Among women the rate was respectively 7.1 in the Lublin Voivodeship and 11.0 in the Silesian Voivodeship. In 2008 the lowest mortality rate among men was noted in the Lesser Poland Voivodeship (15.5), and the highest in the Silesian Voivodeship (21.8). Among women the lowest rate was found in the Subcarpathian Voivodeship (7.1) and the highest in the Greater Poland Voivodeship (12.2).

In the years 1999-2008 the mortality rates among men demonstrated a growing tendency in the majority of provinces, with the exception of the Podlaskie Voivodeship, in which there were significant differences in particular years without a clear trend, varying between the rates of 10.1 in 2000 and 19.8 in 2007. In as many as 8 provinces the mortality rates among men in 2008 were higher than the average rate for Poland, i.e. 18.9. These provinces were the Lower Silesian, Kuyavian-Pomeranian, Lubusz, Opole, Pomerania, Silesian, Warmian-Masurian and Greater Poland Voivodeships.

In the years 1999-2008 the mortality rates among women indicated slightly different trends than among men. An explicit increase was noted in the Masovian, Opole, Warmian-Masurian, Greater



**Figure 1.** The changing trend in colorectal cancer mortality rate in Poland for the years 1999-2008

Poland and Pomeranian Voivodeships, amounting to respectively 10.6 (7.8 in 1999), 11.7 (9.0 in 1999), 11.4 (9.2 in 1999), 12.2 (10.8 in 1999) and 9.8 (8.5 in 1999). In 7 provinces the mortality rates in 2008 were higher than the average rate in Poland. These provinces were the Kuyavian-Pomeranian, Lubusz, Masovian, Opole, Silesian, Warmian-Masurian and Greater Poland Voivodeships.

## Discussion

Irrespective of the advances in medicine of the recent years, colorectal cancer is still one of the most frequent causes of death. The risk of morbi-

**Table II.** Standardized mortality ratio for colorectal cancer in Poland in the years 1999-2008 among men, taking into account voivodeships (Polish provinces)

| Variable            | Year |      |      |      |      |      |      |      |      |      |
|---------------------|------|------|------|------|------|------|------|------|------|------|
|                     | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Lower Silesian      | 17.3 | 18.1 | 17.0 | 17.7 | 18.9 | 17.6 | 17.2 | 19.6 | 21.5 | 20.3 |
| Kuyavian-Pomeranian | 17.6 | 17.7 | 21.5 | 18.1 | 15.6 | 19.6 | 18.6 | 18.5 | 23.0 | 20.8 |
| Lublin              | 11.4 | 13.1 | 15.2 | 12.9 | 14.3 | 15.0 | 16.0 | 13.4 | 12.4 | 15.6 |
| Lubusz              | 15.6 | 20.3 | 17.4 | 17.7 | 16.7 | 20.3 | 16.5 | 17.1 | 19.5 | 20.1 |
| Łódź                | 15.4 | 14.2 | 16.4 | 19.0 | 18.1 | 16.0 | 18.0 | 17.6 | 17.3 | 18.9 |
| Lesser Poland       | 14.6 | 15.5 | 14.2 | 17.3 | 16.3 | 15.5 | 15.3 | 16.0 | 15.5 | 15.5 |
| Masovian            | 15.4 | 15.5 | 15.8 | 17.4 | 16.7 | 16.4 | 17.2 | 17.1 | 17.7 | 18.4 |
| Opole               | 13.7 | 16.6 | 18.8 | 16.0 | 15.9 | 18.6 | 19.1 | 22.2 | 19.7 | 20.1 |
| Subcarpathian       | 12.7 | 13.0 | 15.1 | 12.5 | 14.4 | 13.9 | 14.9 | 14.8 | 16.3 | 16.2 |
| Podlaskie           | 16.2 | 10.1 | 14.2 | 17.4 | 14.3 | 16.3 | 16.7 | 16.2 | 19.8 | 15.7 |
| Pomeranian          | 17.2 | 18.0 | 19.2 | 17.7 | 18.4 | 16.8 | 17.7 | 17.9 | 19.9 | 19.1 |
| Silesian            | 16.7 | 17.5 | 17.8 | 17.5 | 18.5 | 19.6 | 19.0 | 17.9 | 20.7 | 21.8 |
| Świętokrzyskie      | 14.4 | 13.3 | 12.2 | 15.3 | 14.5 | 15.0 | 13.7 | 14.5 | 17.0 | 16.6 |
| Warmian-Masurian    | 14.1 | 16.3 | 16.2 | 14.5 | 18.6 | 20.5 | 16.9 | 21.6 | 18.3 | 21.3 |
| Greater Poland      | 18.7 | 18.4 | 18.3 | 21.6 | 20.3 | 21.0 | 20.2 | 22.1 | 20.6 | 21.1 |
| West Pomeranian     | 17.1 | 20.3 | 18.1 | 16.4 | 14.4 | 20.0 | 16.3 | 17.5 | 17.3 | 18.2 |
| Poland              | 15.7 | 16.1 | 16.7 | 17.2 | 17.0 | 17.5 | 17.3 | 17.7 | 18.5 | 18.9 |

**Table III.** Standardized mortality ratio for colorectal cancer in Poland in the years 1999-2008 among women, taking into account voivodeships (Polish provinces)

| Variable            | Year |      |      |      |      |      |      |      |      |      |
|---------------------|------|------|------|------|------|------|------|------|------|------|
|                     | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
| Lower Silesian      | 10.4 | 11.0 | 11.3 | 9.7  | 10.8 | 9.8  | 9.5  | 11.2 | 9.8  | 9.6  |
| Kuyavian-Pomeranian | 10.9 | 10.9 | 12.4 | 11.7 | 9.7  | 10.5 | 11.0 | 11.4 | 10.1 | 11.6 |
| Lublin              | 7.1  | 7.8  | 7.6  | 9.0  | 9.0  | 9.1  | 6.7  | 6.8  | 7.1  | 7.9  |
| Lubusz              | 9.6  | 10.3 | 8.9  | 11.1 | 10.0 | 9.8  | 9.1  | 8.6  | 8.3  | 11.2 |
| Łódź                | 9.6  | 10.6 | 11.0 | 10.0 | 10.5 | 9.8  | 9.6  | 8.9  | 9.3  | 9.9  |
| Lesser Poland       | 10.6 | 9.2  | 10.0 | 8.7  | 10.3 | 9.7  | 10.3 | 9.0  | 8.4  | 8.5  |
| Masovian            | 7.8  | 10.2 | 11.2 | 9.8  | 9.3  | 8.9  | 9.7  | 9.8  | 9.3  | 10.6 |
| Opole               | 9.0  | 9.7  | 9.3  | 8.7  | 10.5 | 10.9 | 14.0 | 12.2 | 11.2 | 11.7 |
| Subcarpathian       | 7.5  | 7.2  | 8.4  | 7.4  | 8.9  | 8.0  | 8.9  | 8.2  | 7.0  | 7.1  |
| Podlaskie           | 8.6  | 9.2  | 7.3  | 8.2  | 8.0  | 9.0  | 10.5 | 8.8  | 9.5  | 8.6  |
| Pomeranian          | 8.5  | 10.6 | 11.5 | 11.0 | 9.8  | 10.8 | 9.3  | 9.5  | 10.8 | 9.8  |
| Silesian            | 11.0 | 10.1 | 11.6 | 11.0 | 11.7 | 11.3 | 11.0 | 11.0 | 11.3 | 12.0 |
| Świętokrzyskie      | 9.4  | 7.8  | 7.5  | 10.2 | 7.6  | 8.1  | 8.4  | 8.4  | 9.0  | 9.5  |
| Warmian-Masurian    | 9.2  | 9.7  | 9.7  | 10.9 | 9.6  | 9.9  | 9.0  | 10.6 | 9.0  | 11.4 |
| Greater Poland      | 10.8 | 13.1 | 11.6 | 11.3 | 12.2 | 10.8 | 12.2 | 11.0 | 12.3 | 12.2 |
| West Pomeranian     | 8.8  | 8.9  | 10.6 | 9.9  | 8.7  | 9.7  | 10.9 | 8.5  | 9.9  | 8.6  |
| Poland              | 9.4  | 10.0 | 10.4 | 10.0 | 10.1 | 9.9  | 10.1 | 9.7  | 9.7  | 10.2 |

dity increases with age and is highest after 65 years of age [6]. Every year the morbidity rate increases by approximately 2.5%, and since the 1960s it has grown 5 times, which contributes to the rise in the mortality rate [7]. For comparison, the mortality rate of colon and rectal cancer in 1963 among men amounted to 3.0 and 3.1, while in 1999 it was 5.9 and 9.1. Among women the corresponding values were 2.8 and 2.2 in 1963, and 4.7 and 5.6 in 1999. Unfortunately, the cancer registry for this period was incomplete in various voivodeships, which is why the analysis of differences between provinces in both morbidity and mortality rates is impossible [8]. In Poland, in comparison to other countries [9], the fatality rate is very high and amounts to about 0.83. This means that the curability of colorectal cancer is about 20%, which is a dramatic fact when compared to the 60% rate of other countries [10]. The situation looks widely different in Western and Northern European countries, where it is stabilizing, and the morbidity is gradually decreasing [11]. The basic method of treatment in colorectal cancer is still surgery, which, in the case of extended resection, gives a 32-79% level of 5-year survival [12]. In the case of metastasis, the method of choice is surgical resection of metastatic areas together with pharmacological treatment, i.e. chemotherapy. In the case of liver metastasis, only 15-20% of metastatic areas can be resected surgically, which gives a 25-40% level of 5-year survival [13]. Another method of treatment is radiation therapy, used to

treat patients with a specific genotype of cancer [14]. It is believed that the high mortality rate is the result of the fact that people are unaware that regular screening tests are necessary. What is more, the disease is diagnosed at an advanced stage (which is often caused by the patients' negligence of the first symptoms and insufficient prevention).

As shown in the results of tests, in the years 1999-2008 in Poland there was a high colorectal cancer mortality value. It reached as many as several thousand deaths a year, indicating a growing tendency. The increasing mortality could be a result of a few factors, such as increasing colorectal cancer morbidity or frequent diagnosis at an advanced stage. Lack of preventive measures on a large scale also contributes to the rising rate of morbidity and mortality related to this illness. In Poland about 60-70% of cases are diagnosed and treated at stage III and IV of advancement. Consequently, not more than 20% of cases can be lastingly cured [15]. Among men the mortality value was higher (54%) than among women (52%), taking into account all cases in a year. The fact that among men the rate is higher has not been explained and may be a complex issue. An explanation of the differences between the mortality values among men and women would require in-depth epidemiological studies.

In the years 1999-2008 significant regional differences may be noted in the colorectal cancer mor-

tality values given in the standardized mortality ratio. These differences concern mainly the mortality rate among men. The regional differences may be a result of inequalities in the availability of both preventive tests and specialized oncological centres. An explanation of these differences would require additional studies in the area of statistics and epidemiology, including for example the location of oncology centres.

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