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THE GEOGRAPHIC CONCENTRATION OF CANCER CASES AND THE CENTERS OF ITS PREVENTION

Geografická koncentrace výskytu malignit a center jejich prevence

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Annotation
Monitoring of population health is an important indicator of regional development. The paper deals with the incidence of cancer cases in Czech population, the differences in individual regions are shown and discussed in relation to the health policy and target prevention programs. The aim of this contribution is to map cancer incidence from the perspective of the regions and to map activities at central and regional level, which aimed at the prevention issues. Data and Methods: Epidemiology analysis is based on data from the Czech National Cancer Registry and the associated portal svod was especially needed for the regional issue of the cancer incidence. It was found that the issue of differences in the incidence of the particular types of cancer among individual regions is not a negligible one. e.g. Plzeňský region is an absolute leader in the incidence of colorectal cancer. We also mapped prevention activities in the Czech Republic in relation to the availability of special screening centres in individual regions.

Key words
regions of the Czech Republic, cancer incidence, health policy,

Anotace
Sledování zdravotního stavu obyvatelstva je důležitým ukazatelem regionálního rozvoje. Příspěvek se zabývá incidencí případů rakoviny v české populaci, rozdíly v jednotlivých regionech jsou uvedeny a diskutovány ve vztahu k programům zdravotní politiky a cílové prevence. Cílem příspěvku je zmapovat výskyt rakoviny z pohledu regionů a zmapovat aktivity na centrální a regionální úrovni, které jsou zaměřeny na problematiku prevence. Data a Metody: Analýza epidemiologie se opírá o data národního onkologického registru a přidružené aplikace „svod“, která byla využita zejména k regionálnímu pohledu na výskyt rakoviny. Bylo například zjištěno, že Plzeňský kraj je v České republice absolutním lídrem v incidenci případů rakoviny střev. V rámci zkoumané problematiky jsme mapovali jednotlivé preventivní aktivity v České republice ve vztahu k dostupnosti specializovaných screeningových center v jednotlivých regionech.

Klíčová slova
kraje České republiky, incidence malignit, zdravotní politika

***JEL classification**: O12, X12*

1. Introduction

Cancer incidence is part of the population health even that the traditional concerns about access to primary and hospital care continue to dominate health policy. The premature morbidity and mortality due to serious diseases is an important demographic factor which undoubtedly has socio-economic impacts.

The concentration of the health policy to the preventive intervention of cancer should not be inferior. We focus on the cancer's impact on public health disparities and study cancer incidence as an indicator of health status among the regions of the Czech Republic, which can bring a clear message that appropriate health care policy aimed at regions should be applied. Epidemiologic studies analyse the distribution and determinants of health and disease and is an important part of public health. The aim of this paper is to point out the main problems and differences

among regions in the Czech Republic. Such a data can be useful in making decisions to address target populations, and to influence policy makers and the public.

2. Theoretical frame

The health of the population is one of the most important indicators for the regional development (Pavlík, 2015), State of the health of the population is essential for the reproductive process and the development of employment potential and thus for overall economic growth (Somerlíková, 2015). Generally, the quality of health of the population is one of the most important indicators of complex links between demographic, socio-economic, environmental and political processes (Dzúrová, 2000). The extension of malign illnesses has become an important part of it.

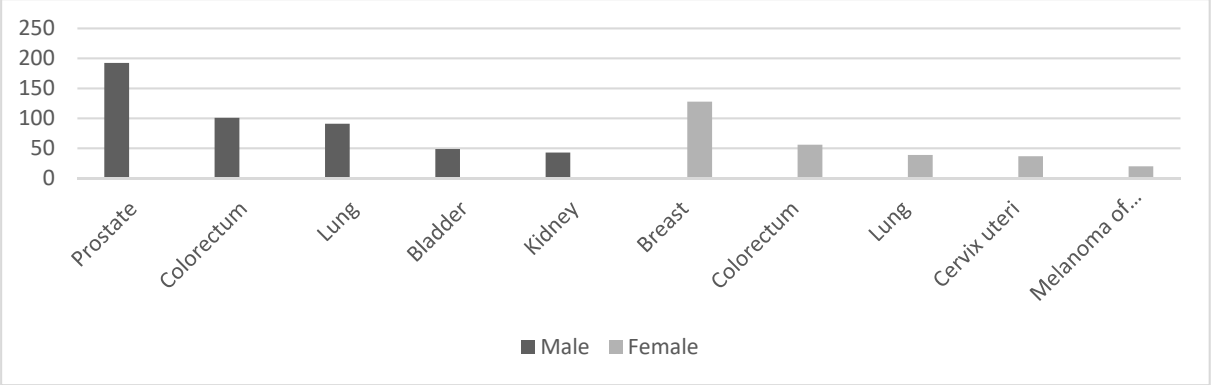
Within regions, in the literature there often mapped, for example, distinctive differences in the approach to primary care (Gusmano, Weisz, Rodwin, 2014). But the incidence of a particular diagnosis is also important. Study of the geographical distribution of cancer is a being performed to obtain its causation and determine the incidence of different types of cancer in different parts of particular areas (McNamara, 2017; Muir, 1991; Randi, 2006; Youlden, 2008; Baade, 2009; Bray, 2005). In general rising trend of cancer is a public health problem all over the world, the Czech Republic is not an exception. Currently, malignant tumours are responsible for 12 per cent of the deaths worldwide, according to WHO estimates, cancer now causes more deaths than all coronary heart disease or all stroke. Previous studies have documented significant variations in cancer incidence rates across countries. However, no research has examined the pattern among the Czech regions.

What is even more serious problem is that in comparison with other countries the Czech Republic suffer from the alarmingly growing cancer burden of the Czech population (Ferlay, 2012). Moreover, the Czech Society for Oncology and the Institute Biostatistics and Analyses of the Masaryk University repeatedly point out that problem. Each year in the Czech Republic (total population of over 10.5 million), more than 77,000 people are diagnosed with cancer and nearly 28,000 dies from it (Dušek, 2010). As it concerns e.g. colorectal cancer, the international comparison shows that the Czech Republic ranks among the most affected countries (Ferlay, 2012). The overall incidence of individual types of cancer is shown in fig. 1 and fig. 2.

The overall incidence (mortality) of the individual types of cancer are shown in graph 1 and graph 2.
The cancer incidence list is topped by prostate (192,6) and colorectum (101) and lung (91) cancer at men. For women the leader is cancer of breast (128), colorectum (56) and lung (39) see Fig. 1. The values are reported per 100 000 inhabitants.
The mortality list differs substantially at both sexes. For men: lung (76), colorectum (50), prostate (41), pancreas (24), kidney (17,5) and for women lung (30), breast (27), colorectum (24), pancreas (17,9), ovary at the fourth place.

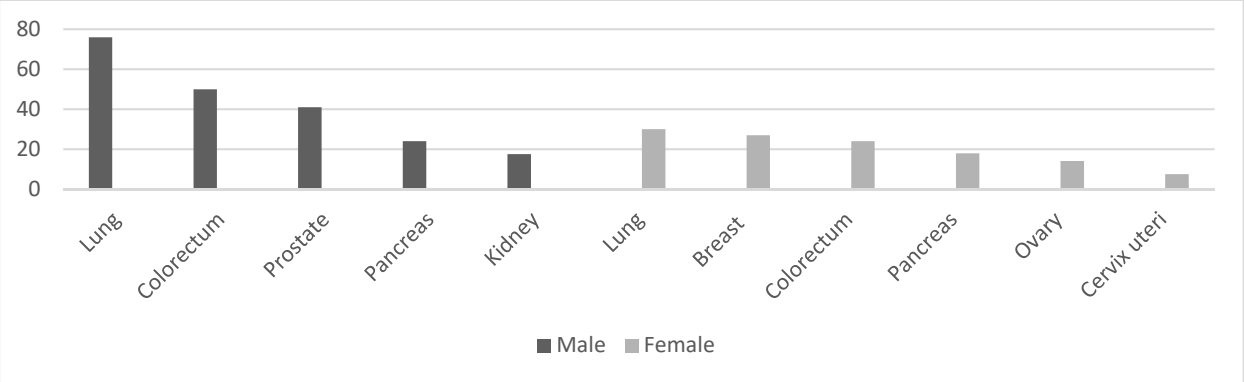
To understand the Czech context, it is important to note here that the Czech Republic is divided into 14 regions (respectively in thirteen regions and the region of capital city Prague). This division is enacted according to the Act no. 129/2000 Coll. (Law on Regions) and replaced the older administrative units seventy -six districts and is in accordance with the European Charter of Local Self-Government (Radvan et al, 2018).

Fig. 1: Estimated incidence by cancer in the Czech Republic, Female and Male, all ages in 2018 (no of cases per 100 000)



Source: Own processing, based on data

Fig. 2: Mortality by cancer in The Czech Republic, Female and Male, all ages in 2018 (no of cases per 100 000)



Source: Own processing, based on data European Commission

The relative profile of most prevalent cancer types (breast cancer in women, prostate cancer in men, colorectal and lung cancer in both sexes) corresponds to the outcomes of most recent European epidemiology summaries (Ferlay, 2012) and furthermore in agreement with international reports, lung cancer is the most frequent cause of death from cancer.

3. Methodology

To map and discuss the epidemiologic trends of incidence of the main types of cancer in the Czech Republic with emphasis on the regional differences were used data of Institute of Health Information and Statistics (UZIS) of the Czech Republic, an affiliated application "SVOD". The data for UZIS is provided by the national oncologic register, which is operated under The Czech Society for Oncology (CSO). The list of accredited mammography screening centres in the Czech Republic sorted by the region was used, the data about the ordering periods were available on the website of the screening program. Cancer incidence and mortality among males and females are performed in ASR (W), world age-standardized incidence rate (number of newly diagnosed in case of incidence and number of died in case of mortality per 100 000 inhabitants). Our aim is to map the differences in incidence among the regions of the Czech Republic. E.g. for the colorectum incidence the code dg. C18 – C 21 was selected. From the list of cancer incidence, we excluded lung cancer for its specific. Moreover, the distribution of specialized screening centers in relation to existing screening programs in the Czech Republic was mapped to find if there are substantial differences in approach to prevention. With the epidemiological data accessible (which the National oncologic register manages), the cancer burden in the Czech Republic can be assessed throughout the population and for individual regions.

4. Results

Our results show that the incidence of diagnosis differs across the regions, e.g. the healthiest regions seems to be Prague in case of colorectal cancer, but on the other hand, the Prague, together with the Královéhradecký Region hold unfavourable pace when concerning the breast cancer. The Plzeňský Region is a sad leader of Colorectal cancer incidence, followed by the Karlovarský and the Moravskoslezský Regions.

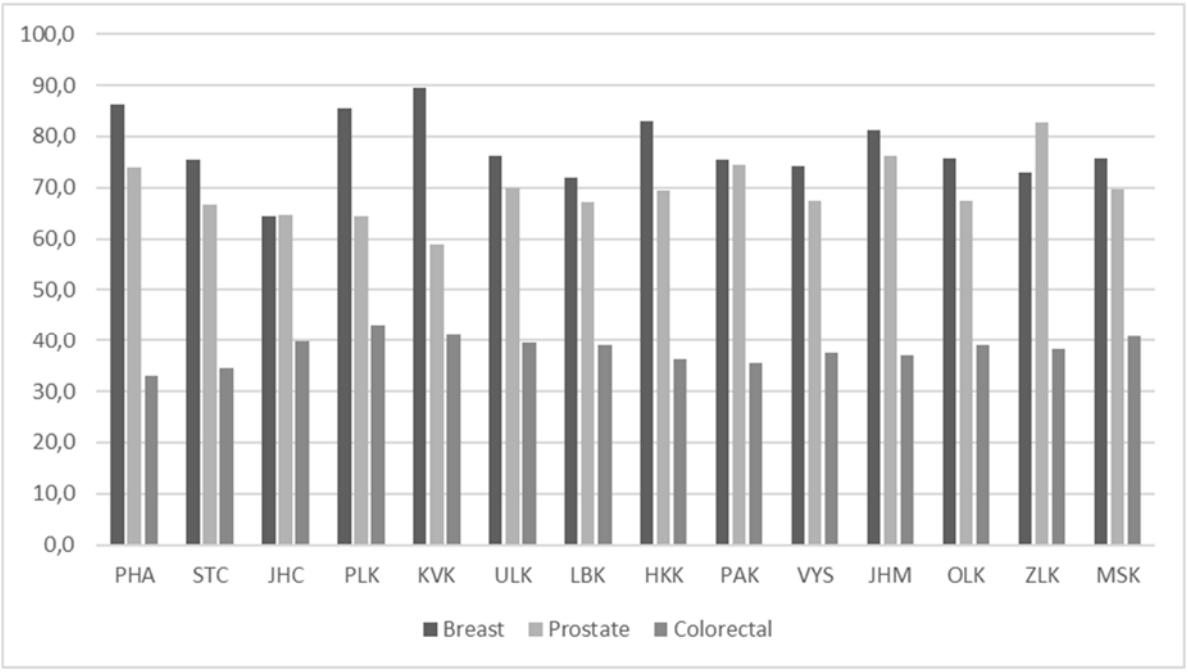
Tab. 1: Cancer incidence in particular regions, 2016 – 2018 (no of cases per 100 000 inhabitants)

Region	PHA	STC	JHC	PLK	KVK	ULK	LBK	HKK	PAK	VYS	JHM	OLK	ZLK	MSK
Breast	**86.2**	75.5	64.4	85.6	**89.6**	76.1	72.0	83.0	75.5	74.3	81.3	75.8	73.0	75.8
Prostate	74.0	66.5	64.6	64.5	58.9	69.8	67.2	69.4	74.4	67.4	**76.2**	67.5	**82.8**	69.6
Colorectal	33.0	34.7	39.7	**43.2**	**41.3**	39.5	39.0	36.3	35.6	37.4	37.0	39.0	38.2	40.8

(Abbreviations of regions: PHA – Praha, STC – Středočeský, JHC – Jihočeský, PLK – Plzeňský, KVK – Karlovarský, ULK – Ústecký, LBK – Liberecký, HKK – královéhradecký, PAK – Pardubický, VYS – Vysočina, JHM – Jihomoravský, OLK – Olomoucký, ZLK – Zlínský, MSK – Moravskoslezský

Source: Own processing, based on data

Fig. 3: Cancer incidence in particular regions, 2016 – 2018 (no of cases per 100 000 inhabitants)

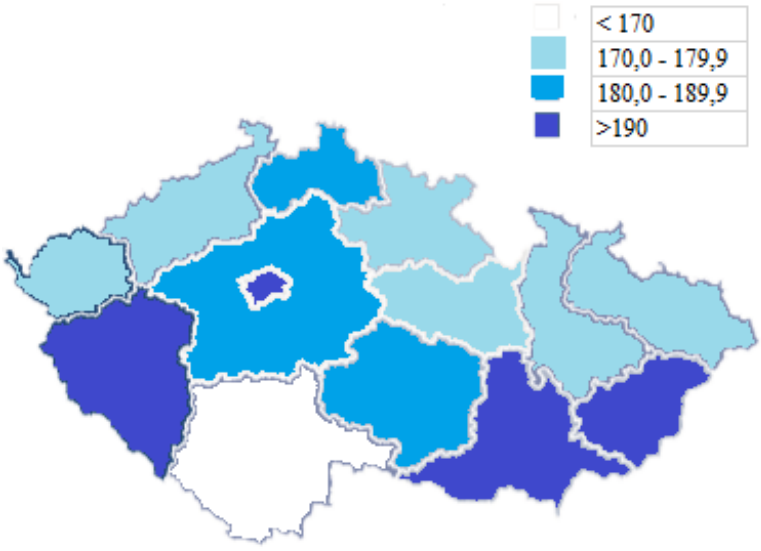


Source: Own processing, based on data

The highest incidence of Breast cancer is in Karlovarský, Prague, and Plzeňský region. Zlínský region suffers from the prostate cancer incidence at most, the Jihomoravský and Pardubický regions immediately follow.

The cumulative incidence numbers of colorectal, breast and prostate are shown in the fig. 4. Regions with the highest incidence are Praha, Plzeňský, Jihomoravský and Zlínský. Our results point out the problem that differences in the incidence of the cancer, no matter if types or overall are not negligible and these should, therefore, be taken into account when planning the prevention plan no matter if primary or secondary one.

Fig. 4 Cancer incidence in the Czech Republic ∑ colorectal, breast, prostate per 100 000 in individual regions, 2016 – 2018



Source: Own processing, based on data

Activities aimed at the prevention

Concerning the prevention activities at the national level, we should remind two important strategic documents. The first programme of the Czech Government at the national level is the "Health for All in the 21st Century" programme (hereinafter only "Health 21") concerning the long-term programme of improvement of the population

health status. The outcome of this programme for the regional level is the recommendation given to presidents of regions that they should use this programme in preparing and implementing health policy projects at the regional level. Health 21 is followed up by "Health 2020" – the national strategy of health protection and promotion and disease prevention. It is a framework summary of measures to enhance public health in the Czech Republic. Health 2020 is a framework health programme of the European health policy aiming to improve population health significantly, decrease inequalities in the accessibility of health care and ensure such health care systems that will provide universal, equal and sustainable health care of high quality. The Czech government recommended the regions of the Czech Republic that they should implement Health 21 and Health 2020 in preparing similar documents within their regional health policies. Individual strategic documents of the regions were evaluated concerning the two above mentioned conceptual strategic documents. However, both programs focus on general goals.

Regarding the cancer target prevention practice, in the Czech Republic the inhabitants can up to two years visit a general practitioner, from 50 to 55 years once a year, from 55 years every two years a test for faecal occult blood, women once a year should visit a gynaecologist and women from 45 years of age every two years preventive mammography examination, more often when a positive family history or other risk factor is present. It is estimated that only 50 % of women utilize the possibility of mammographic screening. An important part of prevention is special screening programs, there are 3 specialised screening programs, the cervical cancer screening, Breast cancer screening, and the colorectal screening.

Cervical Cancer Screening Programme
The program was introduced in 2008 with the aim, a network of 37 accredited laboratories was established, ensuring availability across the Czech Republic. The programme is equipped with information support provided by the Institute of Biostatistics and Analyses of the Masaryk University (the Institute also runs the Cervical Cancer Screening Registry). The programme has the ambition to decrease cervical cancer incidence rates in the Czech Republic to values comparable with those reported by countries with advanced health care systems.

Breast Cancer Screening Programme (BCS)
Since September 2002, the Czech Republic has joined most European countries and has launched nationwide mammography screening, allowing women aged 45-69 to undergo regular preventive examinations, with the aim of increasing the proportion of early disease detection in the population. Early detection of breast cancer can find lesions for which treatment is more effective and generally more favourable for the quality of life. In the further development of the program, the upper age limit was abolished, mammography screening is covered by public health insurance for all women aged 45 years and above

Screening centres for the early breast cancer detection are represented in all the regions, see the tab.4., the centres s passed the accreditation process and its activity is continuously monitored according to the relevant rules. Numbers of the centres are adequate to the population share, the waiting time (min, max, and average) and the waiting time for the screening test do not differ significantly.

Tab. 4: Special centres for the prevention

Region	PHA	STC	JHC	PLK	KVK	ULK	LBK	HKK	PAK	VYS	JHM	OLK	ZLK	MSK
BCS	11	5	3	5	2	4	3	6	3	5	7	6	4	8
MIN BCS	2	2	1	3	25	3	5	3	7	2	2	1	2	7
MAX BCS	45	30	10	16	25	20	30	29	10	22	40	15	14	22
AV BCS	15	35	4	7	25	12	14	13,5	6,6	6,6	16	6	6	16
Colorectal	48		11	11	8	12	10	13	8	11	21	13	10	26

BCS – mammographic centres, Colorectal – prevention of cancer of colorectum
Source: Own processing, based on data

In tab.4 we show the special mammographic centres in the Regions of the Czech Republic. There are from 11 (Prague) to 2 (Královehradecký) special centres in the regions with the waiting time from 2 to 45 days. The contacts for all accredited mammography screening centres in the Czech Republic are well available at the website.
Colorectal Cancer Screening Programme (CCS)
The third screening program is the colorectal cancer screening; it is a nationwide program as the previous two, launched under the Czech Ministry of Health. Qualified colonoscopy examinations at accredited screening centres are provided, these centres are monitored and checked according to the rules of the programme. Two independence

organizations are responsible for it. The Board of Colorectal Cancer Screening at the Czech Gastroenterological Society and Colorectal Cancer Screening Committee at the Czech Ministry of Health are the organizations. The accredited centres are represented in all regions (tab. 4.). Note is that data about time availability of colorectal screaning is not available. For the region, PHA and STC one number was available for both regions together.

What is common to these forms of screening is that since 2014 the citizens have been invited by their health company to preventive examinations. The Czech Republic was criticised by the European Union not to perform inviting to the screening before 2014.

Tab.5: Screening programs in the Czech Republic - summary

Screening	Type	Status	Eligible age in year (from/ to)	
Cervical	Non-population based	Nantionwide	25	69
Breast cancer	Non-population based	Nantionwide	45	69
Colorectal cancer	Non-population based	Nantionwide	50	

Source: Own processing, based on data

Prostate screening – Is it a path?

In some countries, it is already obvious to lead a program for the prevention of prostate cancer. However, the benefits of it remain unproven. There is currently no convincing evidence that this kind of screening improves mortality. The limitations include potential adverse health effects associated with false positive and negative results, which is presently a significant and not desirable effect of screening. "The American College of Preventive Medicine concludes that there is insufficient evidence to recommend routine population screening" (Lim, 2008).

5. Conclusion

Through the analysis, we identified regions with a higher rate of particular types of cancer, the differences are not negligible. Disparities of this health indicator among the regions of the Czech Republic can bring a clear message that appropriate research and health policy aimed at more problematic regions could be needed. An interpretation of the disparities is that the data show a need for more targeted regional prevention. The practice of using health data to manage public health planning efforts would not be new but comprehensive planning for cancer prevention and control is limited.

What is not less important is the existence of the cancer-preventing programs is the informational support of it. On the other hand, public preventive programs are not the only way, how to prevent cancer and improve the health status of the population. Data of word preventive centres shows that the prevention of some types of cancer produces limited benefits (e.g. screening of prostate cancer). Therefore, all related factors need to be considered. The second and very important way is promoting healthy lifestyles, nutrition has undoubtedly a major impact (in case of the cancer of the lung may be the most significant). There is a need for effective communication of cancer prevention issues to the lay public. Future research and activities included identifying and analysing relevant data to develop a state cancer control plan would be needed. In the author´s opinion the comparison of the cure at an early stage of cancer in the individual regions could be a new incentive to research. This issue can substantially differ among the regions and can affect the mortality. Such a research is challengeable for the Czech strategy of decreasing cancer mortality.

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