Cancer Dashboard for Serbia

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Purpose

In 2023, the Swedish Institute for Health Economics (IHE) launched an international initiative with support from MSD, aiming to facilitate the exchange of best practices in cancer care across European countries. This initiative is called "Cancer Dashboards in Europe". It has its background in the launch of the Europe's Beating Cancer Plan and the question of how to translate political commitment into action. The objective is to create country-specific dashboard-style reports with a comprehensive and illustrative description of a selected set of key indicators in all areas of cancer care. These indicators benchmark the current status quo in a country against target values specified in national cancer plans, targets set by international organizations, or values of other countries. The reports also provide evidence-based recommendations on how to improve the current situation in a country.

This dashboard report for Serbia focuses on cancer in general. It is intended to support the introduction and implementation of a new National Cancer Control Program and other ongoing initiatives to improve cancer care in the country. The description seeks to support Serbian policymakers in the decision-making and prioritization of initiatives in cancer care. The dashboard is intended to be a living document, which can be updated when newer data become available. It can also be extended to additional areas and indicators that become relevant based on developments in Serbia or Europe.

Contents

Prepared by IHE – The Swedish Institute for Health Economics

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Foreword

The report of the Swedish Institute for Health Economics (IHE) represents the most recent analysis of the state of cancer care in Serbia, along with a set of concrete recommendations. It offers an excellent and highly relevant perspective on our current situation, particularly in the context of preparations for formulating a new National Cancer Control Plan.

Serbia had its first cancer control plan as early as the 1980s and has a long tradition of clinical oncology and multidisciplinary decision-making. Nevertheless, despite this legacy, Serbia today unfortunately ranks among the European countries with the highest cancer-related mortality rates.

The social and public-health impact of this situation is profound and calls for more than addressing individual aspects of cancer care. What is needed is a well-managed and coordinated national response - a broad and comprehensive approach spanning prevention and early detection, modern diagnostics and treatment options, as well as systematic follow-up of patients. Having skilled specialists, clinicians, pathologists, radiologists, and modern equipment is clearly not sufficient on its own. Positive trends and successful indicators remain limited.

What should Serbia improve urgently?

One of the first essential steps is the development of a modern National Cancer Registry that would serve as a reliable source of relevant data for all stakeholders involved in monitoring trends and shaping decisions in clinical oncology. This task requires time and sustained institutional commitment, as existing data on cancer incidence and mortality need to be further developed.

Clear priorities must be defined - from early detection and diagnostics to optimal treatment and access to innovative therapies - all within a framework of strong national coordination.

The network of oncology institutions should evolve to include even the most advanced models of care, such as comprehensive cancer centers, supported by secondary centers that rationally cover the territory of the Republic, and a strengthened primary level of oncological healthcare. At the primary level, preventive measures must be further developed, alongside improved provision of palliative care. National coordination should ensure an adequate workforce in oncology diagnostics and treatment, regular renewal of radiation therapy equipment, and timely and continuous updates of the RFZO reimbursement list with innovative medicines.

Existing screening programs are well designed, but participation rates must be increased through stronger local engagement at the municipal level, direct patient invitations, and greater involvement of both the professional community and the general public. Increased uptake of HPV vaccination is equally important, as are public campaigns addressing the most common cancer risk factors.

Many initiatives have already been launched, and this report clearly documents and supports those efforts. In addition, the Europe's Beating Cancer Plan (2021–2030) provides a strong strategic framework. However, the scale of cancer incidence and mortality in Serbia demands swift and decisive action, and I believe that this report's set of observations and recommendations represents a meaningful and effective step in that direction.

Davorin Radosavljevic, MD, PhD, Senior Research Associate

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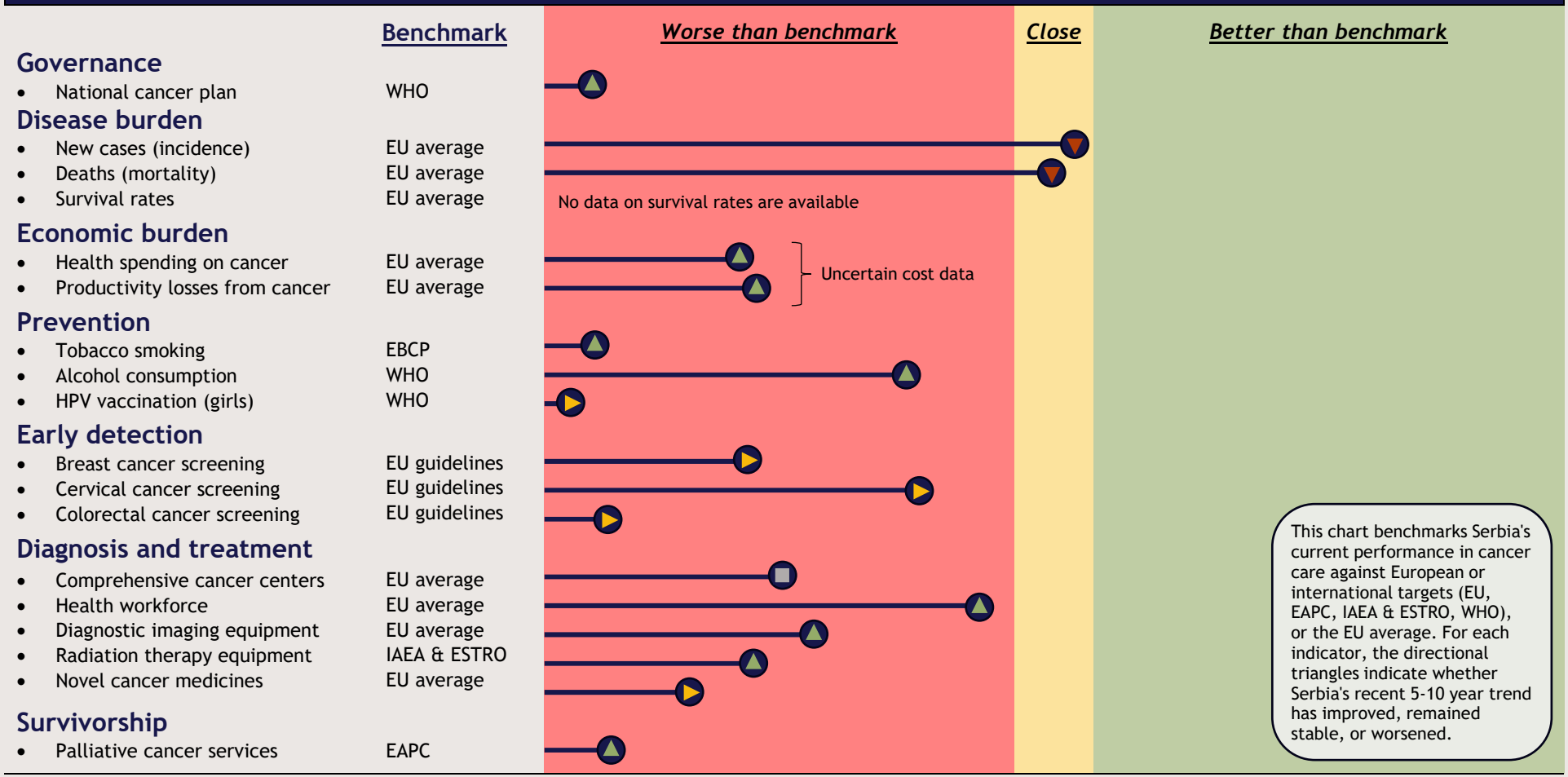
Dashboard overview Serbia

Comparative Performance: Serbia vs. Benchmark



Legend: Positive development, Stable development, Negative development, No data or not applicable

Abbreviations: EAPC = European Association for Palliative Care, EBCP = Europe's Beating Cancer Plan, ESTRO = European Society for Radiotherapy and Oncology, EU = European Union, HPV = human papillomavirus, IAEA = International Atomic Energy Agency, WHO = World Health Organization.
Notes: All indicators are defined in % or per capita terms; see the main text for a detailed description and the Appendix for the exact definition used.

High-level recommendations

Governance

- ✓ Develop a new National Cancer Control Plan (NCCP) with clear objectives that can be evaluated and with a funding plan for all actions. Progress with implementation should be monitored in annual public reports. The plan should draw on experiences from previous NCCPs, best practices from other countries, and the Europe's Beating Cancer Plan.

Funding and data

- ✓ Prioritize investment in high-impact areas such as early detection, diagnosis, access to novel therapies, care coordination, and staffing.
- ✓ Establish better monitoring systems with comprehensive, consistent and timely data, capturing outcomes (survival rates) through the Serbian Cancer Registry, expenditure by the RFZO, and process indicators (screening rates, waiting times, treatment patterns, etc.).

Prevention

- ✓ Improve enforcement of existing indoor smoking bans and expand them to more locations, raise excise taxes for cigarettes and alcohol along with running targeted educational campaigns on smoking and alcohol risks, especially toward men.
- ✓ Align the legal status of the HPV vaccine with other vaccines in the national immunization program. Raise public awareness on HPV and implement reminder notifications for pediatricians, while digitizing the system.

Early detection

- ✓ Re-initiate the development of national screening programs and guidelines for breast, cervical, and colorectal cancer based on the latest international recommendations for the target age groups and testing methods, along with:
  - Introduction of invitation systems for eligible individuals based on population lists (e.g., censuses, voting lists, or RFZO-insured persons list) through electronic or traditional methods (e.g., e-mail, SMS, direct phone calls) with reminders and flexible booking of appointments.
  - Creation of a capacity plan for healthcare services to ensure smooth and uninterrupted execution of the screening programs
  - Implementation of an electronic database for individuals covered by the screening programs to enable precise monitoring of screening coverage and to propose corrective measures in regions where screening effectiveness is suboptimal.

Diagnosis and treatment

- ✓ Develop a roadmap to upgrade leading oncology clinics to Comprehensive Cancer Centers (CCCs) with an equitable geographic distribution.
- ✓ Recruit and retain oncology staff through better financial incentives and work conditions, and also ensure increased use of multidisciplinary teams in the care process.
- ✓ Continue to expand capacity of modern diagnostic imaging and radiation therapy equipment, and simultaneously train staff to operate the equipment and analyze results.
- ✓ Ensure regular updates of the reimbursement list of cancer medicines and prioritize the inclusion of novel medicines that have a substantial clinical benefit and are cost-effective.

Survivorship

- ✓ Expand and integrate palliative care with cancer treatment services to meet the needs of an aging population and the increasing number of cancer patients.

Background

IHE Cancer Dashboards

Cancer has received growing political attention across Europe in recent years. The launch of Europe's Beating Cancer Plan (2021) by the European Commission reflected a strengthened commitment to addressing the burden of cancer in a more systematic and coordinated way (1). Across the European Union (EU) and in Serbia, cancer is the second-leading cause of death in both men and women, responsible for about one in five deaths (2). Substantial inequalities in cancer care persist, both between and within European countries. A key challenge lies in translating international and national initiatives into action: while the policy landscape is rich in ambition, it often lacks funding and clear and practical tools to support implementation, guide prioritization, and monitor progress at national and/or regional level.

To help bridge the gap between policy plans and action, the Swedish Institute for Health Economics (IHE) has developed a series of national Cancer Dashboards since 2023 for countries such as Austria, Denmark, Greece, Italy, Lithuania, Poland, and Portugal. These dashboards provide an intuitive and structured overview of how countries perform in cancer care. By combining data, benchmarking, and evidence-based recommendations, they offer policymakers and stakeholders actionable insights, highlighting where progress is being made, where efforts must accelerate, and where strategic investment is required. Ultimately, each dashboard serves as a navigation tool to support the planning, implementation, and evaluation of effective, equitable, and outcome-oriented cancer control.

While some dashboards cover specific types of cancer, others provide a general overview of cancer care. Building on this work, this dashboard focuses on cancer care in Serbia.

Structure of the dashboard and choice of indicators

This report begins with an overview of Serbian and European governance frameworks relevant to cancer, including Serbia's former National Cancer Control Plan (NCCP) and Europe's Beating Cancer Plan (EBCP). It then provides an analysis of the disease burden and economic burden of cancer, highlighting the impact of the disease on patients, the healthcare system, and society at large. These contextual elements set the stage for understanding the urgency of national-level action. The report then follows the cancer care pathway, structured around the four pillars of the EBCP. Together, the dashboard presents a comprehensive view of the current status of cancer management in Serbia.

The dashboard is structured as follows:

- **Governance** (1 indicator): National cancer plan
- **Disease burden** (3 indicators): New cases (incidence), deaths (mortality), survival rates
- **Economic burden** (2 indicators): Health spending on cancer care, productivity losses from cancer
- **Prevention** (3 indicators): Tobacco smoking, alcohol consumption, human papillomavirus (HPV) infection
- **Early detection** (3 indicators): Screening for breast, cervical, and colorectal cancer
- **Diagnosis and treatment** (5 indicators): Comprehensive cancer centers, health workforce, diagnostic imaging equipment, radiation therapy equipment, novel cancer medicines
- **Survivorship** (1 indicator): Palliative care services

The starting point for the selection of indicators was the original list of indicators assembled by IHE for the European Cancer Pulse of the European Cancer Organisation (3). The final set of indicators was selected based on discussions with Dr. Ana Jovićević, Dr. Davorin Radosavljević, Dr. Nenad Mijalković, MSD Serbia, and local data availability.

For each indicator across the cancer care pathway, this report provides:

- A general explanation of its relevance, and how it relates to the Serbian NCCP 2020-2022 and the EBCP
- A description of the current situation in Serbia, with international comparisons
- Recommendations for improvement and alignment with national and international targets

Data sources for all indicators are summarized in the Appendix. All data were drawn from publicly available sources.

Benchmarking is conducted internationally to provide relevant reference points against Bulgaria, Croatia, Romania, Slovenia, and the EU average, whenever data are available.

Governance

In 2017, the World Health Assembly (the decision-making body of the World Health Organization, WHO) adopted resolution WHA70.12 on cancer prevention and control (4). It calls on governments to commit themselves to accelerating action against cancer. Specifically, it urges governments to develop and implement national cancer control plans that are inclusive of all age groups, that have adequate resources, monitoring and accountability, and that seek synergies and cost-efficiencies with other health interventions.

Governance of cancer care in Serbia

The Serbian National Cancer Control Plan (NCCP) 2020-2022 was initiated by the Ministry of Health (MoH) and succeeds the 2010-2015 "Serbia against Cancer" program (5). Its purpose was to strategically coordinate resources throughout the healthcare system to enhance all areas of cancer prevention, treatment, and rehabilitation. The program was structured around three main areas:

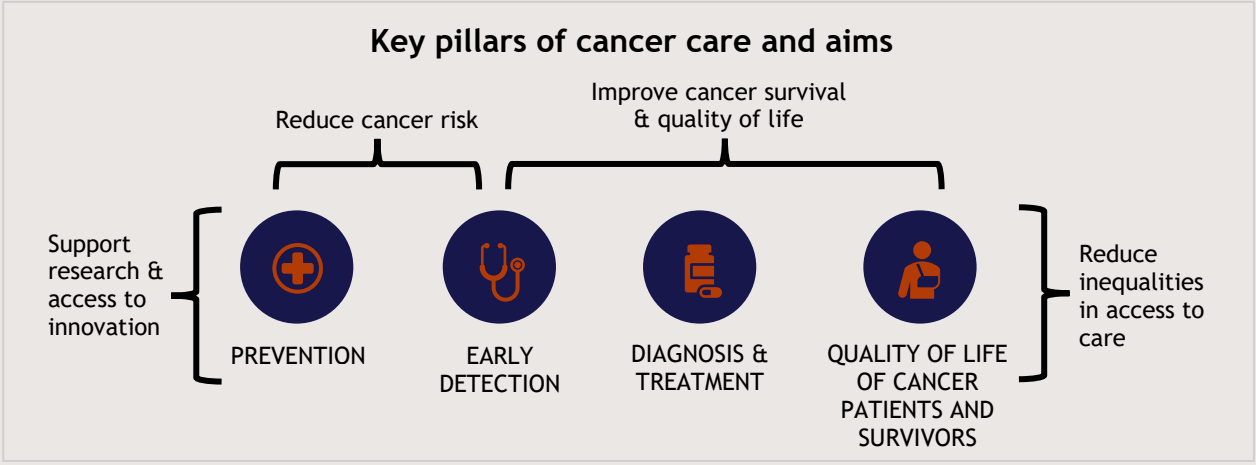
1. **Prevention**: The first aspect is primary prevention, emphasizing reducing tobacco smoking, and increasing vaccination against hepatitis B and HPV. The second aspect is secondary prevention, highlighting the need to improve screening for breast, cervical, and colorectal cancer.
2. **Cancer diagnosis and treatment**: The plan underscores the need for improvement in key areas of cancer diagnosis and treatment services, such as an expanded workforce and infrastructure, better access to novel medicines, and improved radiation therapy services. This area also spotlights research, calling for more clinical trials, and psychosocial services, supporting the mental health of cancer patients.
3. **Rehabilitation and palliative care**: This area emphasizes the need to expand and improve palliative care services and support cancer patients in their reintegration into society.

The MoH established a working group for the preparation of the NCCP 2023-2025. The draft based on the previous 2020-2022 NCCP was prepared and sent to the MoH. The preparation of yet another NCCP started in 2025 [communication during 62nd Oncology Congress, November 12, 2025].

Another key document is the Serbian Public Health Strategy for the period 2018-2026 (6), which targets non-communicable diseases, one of which is cancer. Its objectives include improving health and reducing health inequalities, disease prevention, health promotion, and supporting the development of the healthcare system.

Europe's Beating Cancer Plan (EBCP)

In 2021, the European Commission unveiled Europe's Beating Cancer Plan (EBCP), a comprehensive policy initiative aimed at tackling cancer through ten flagship initiatives that cut across four main areas of action - prevention, early detection, diagnosis and treatment, and the quality of life of cancer patients and survivors - and follow the entire disease trajectory (see figure below) (1). There are also several simultaneous goals of cancer care. One goal is to prevent what can be prevented. Approximately 30-50% of cancer cases could theoretically be prevented because they are caused by modifiable risk factors (7). Another goal is to improve the survival and quality of life of patients - through early detection (e.g. screening programs), diagnosis and treatment (e.g. through access to modern diagnostic tools and treatments), and follow-up care for survivors. Cross-cutting goals are to reduce inequalities in access to care (e.g. of different socioeconomic groups) and to support research and access to innovations to advance cancer care from the current status quo. Furthermore, the EBCP aligns with the EU Cancer Mission under the Horizon Europe 2021–2027 research funding program (which is also accessible for Serbia), emphasizing a collaborative approach to reducing cancer prevalence and enhancing patient care across Europe.



Disease burden of cancer

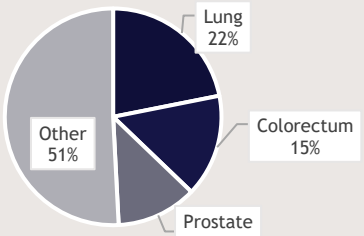
Incidence and mortality

In 2022, the number of new cancer cases (incidence) registered in the Serbian Cancer Registry was 38,877 (20,590 men and 18,287 women; all sites excluding non-melanoma skin cancer) (8). The three most common diagnosed cancer types in men were lung, colorectal, and prostate cancer, and in women they were breast, lung, and colorectal cancer (8). They account for around half of all cancer cases. Around 44% of cancer patients were below 65 years at the time of diagnosis and the other 56% were 65 years or older (8), whereas in the EU only 35% of new patients were below 65 years in 2022 (9). Cancer in working-age people has important implications for the economy and the size of the economic burden (see next section).

The number of cancer deaths (mortality) registered in the Serbian Cancer Registry was 19,164 (10,519 men and 8,645 women; all sites excluding non-melanoma skin cancer) in 2022 (8). Lung cancer was the leading cause of cancer death in men, whereas breast cancer led in women (8). Overall, cancer caused 18% of all deaths in Serbia in 2022, which made cancer the second-leading cause of death after cardiovascular diseases (47%), which is quite different from the EU (cancer caused 22% and cardiovascular diseases 33% of all deaths) (2).

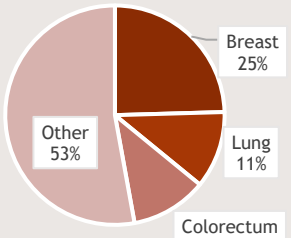
The cancer burden in Serbia is similar to the EU average and Romania. Serbia recorded 585 new cases per 100,000 inhabitants and 288 deaths per 100,000 in 2022, while Croatia and Slovenia had higher numbers (8, 9). Past trends of new cases and deaths in the Serbian Cancer Registry indicate constant increases over time, although there was a temporary decrease in 2020-2022 coinciding with the Covid-19 pandemic (8). Projections of future cancer numbers - which are based on the expected demographic development and take into account the effects of further population aging - indicate growing numbers of incidence and mortality in Serbia, exhibiting a similar trend as the EU. Cancer incidence (per 100,000) in Serbia is expected to grow by 17% between 2025 and 2040, and mortality by 22% (10).

Cancer incidence among men in Serbia in 2022
Number of new cases: 20,590



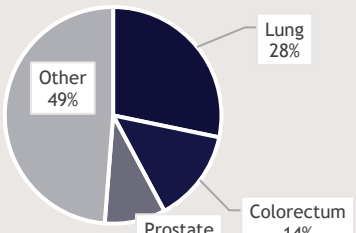
Source: Serbian Cancer Registry

Cancer incidence among women in Serbia in 2022
Number of new cases: 18,287



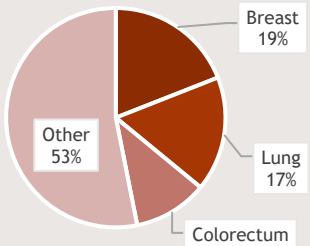
Source: Serbian Cancer Registry

Cancer mortality among men in Serbia in 2022
Number of deaths: 10,519



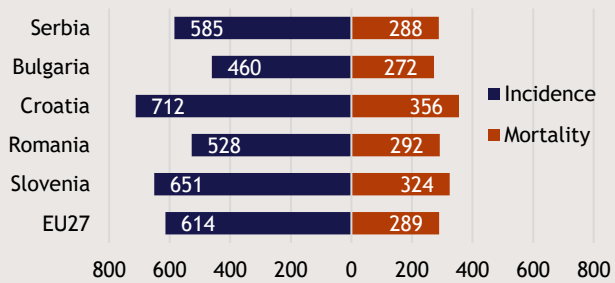
Source: Serbian Cancer Registry

Cancer mortality among women in Serbia in 2022
Number of deaths: 8,645



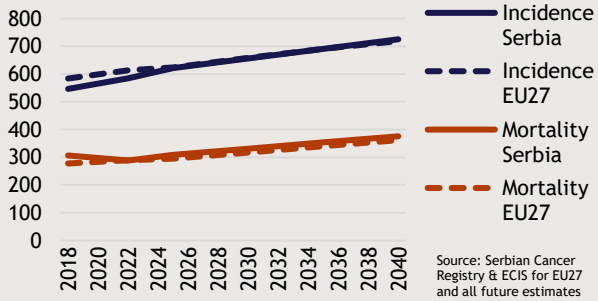
Source: Serbian Cancer Registry

Cancer incidence and mortality per 100,000 inhabitants (crude rates) in 2022, both sexes



Source: Serbian Cancer Registry and ECIS-estimates in other countries

Cancer incidence and mortality per 100,000 inhabitants (crude rates) over time, 2018-2040, both sexes



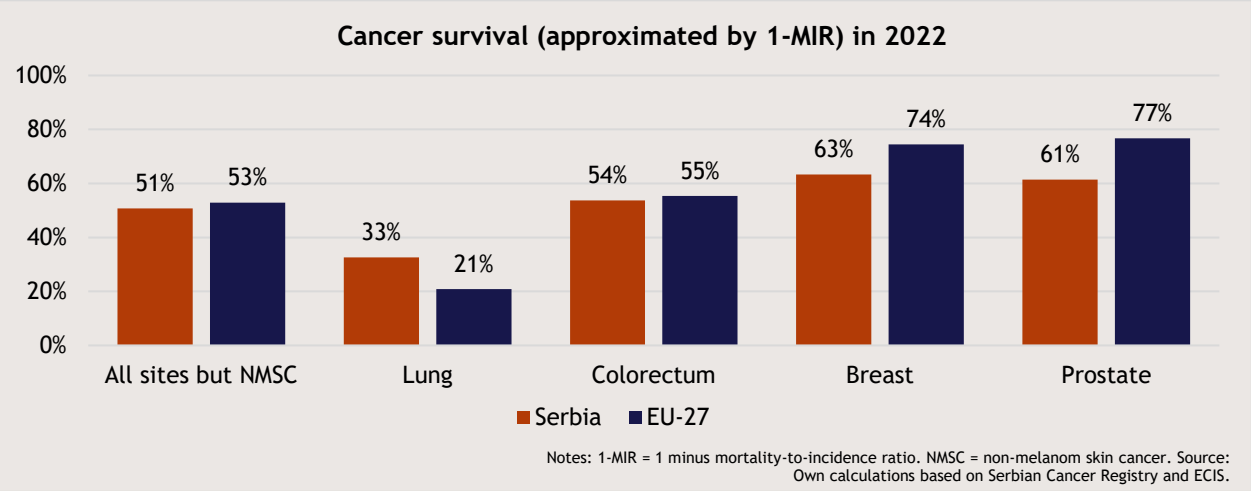
Source: Serbian Cancer Registry & ECIS for EU27 and all future estimates

Survival

The latest internationally comparable survival rates are from the CONCORD-3 study which covered the diagnosis period 2000-2014, yet Serbia was excluded from this study due to datasets (Central Region and Vojvodina) not being compliant with the study protocol and could not be rectified in time (11). Survival rates are also not published in the annual reports of the Serbian Cancer Registry (8), which makes it difficult to assess the most relevant patient outcome and thereby the quality of the cancer care system.

A proxy measure for survival rates is the complement of the mortality-to-incidence ratio (1-MIR), although limitations of this measure have been pointed out in the literature (12). The 1-MIR for Serbia was 51% in 2022, based on numbers for all cancer sites excluding non-melanoma skin cancer from the Serbian Cancer Registry (8). This is only slightly lower than the 1-MIR in the EU-27 of 53% in 2022, based on estimated numbers (9). For lung cancer, the Serbian 1-MIR is above the EU-27 average, indicating better performance, yet these numbers are uncertain as lung cancer incidence and mortality in Serbia were considerably impacted by the Covid-19 pandemic. For colorectal cancer, the Serbian and EU numbers are essentially equal. For breast and prostate cancer, the Serbian 1-MIR is quite far below the EU-27 average. The Serbian 1-MIR has improved over time, as it only stood at 40% in 2016, based on numbers for all cancer sites excluding non-melanoma skin cancer from the Serbian Cancer Registry (13).

Although the Serbian numbers might fall below the EU average, this also indicates that it is possible to improve cancer survival and reduce the number of cancer deaths by following best practices from other countries in the region. For instance, improving cancer screening programs allows for earlier diagnosis, and investing in cancer care infrastructure, equipment, and effective medicines ensures cancer patients receive high-quality treatment. The remaining analysis in this report will evaluate the performance of Serbia in relation to other European countries and thereby reveal strategic opportunities to improve patient outcomes and reduce the overall burden of cancer.



Notes: 1-MIR = 1 minus mortality-to-incidence ratio. NMSC = non-melanom skin cancer. Source: Own calculations based on Serbian Cancer Registry and ECIS.

Recommendations

- Continue to develop the Serbian Cancer Registry by estimating survival rates by cancer type, and include this information in the annual reports to allow for a better assessment of patient outcomes.
- Reduce the reporting lag in the Cancer Registry data by ensuring appropriate staffing to work with the data. Aim to publish statistics on a timelier basis to enable faster monitoring of the current situation and the impact of ongoing initiatives as well as more responsive policy action.
- Include reporting of the stage at diagnosis in the registry's protocol in order to facilitate measurement of the progress in the area of early detection.

Economic burden of cancer

The economic burden of cancer in Serbia is not well documented. In Europe, the overall economic burden of cancer was estimated to be €199 billion in 2018, corresponding to €378 per capita (14). Of this burden, around 52% are healthcare expenditure on cancer care, 35% are costs of lost productivity to the economy, and 18% is the value of informal care provided.

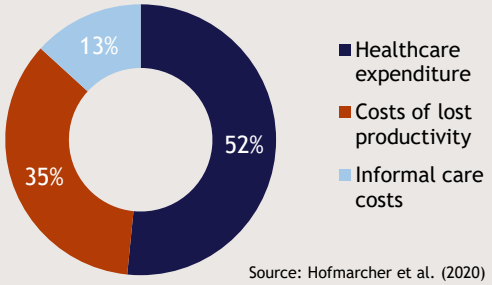
The overall economic burden of cancer consists of:

Healthcare expenditure (direct costs):
- Resources of the health care system (medical equipment, staff, medicines, etc.) funded both by public and private sources

Costs of lost productivity (indirect costs):
- Productivity losses from absence due to sickness, permanent incapacity/disability, and premature mortality of working-age patients

Informal care costs:
- Value of the time forgone by relatives and friends to provide unpaid care

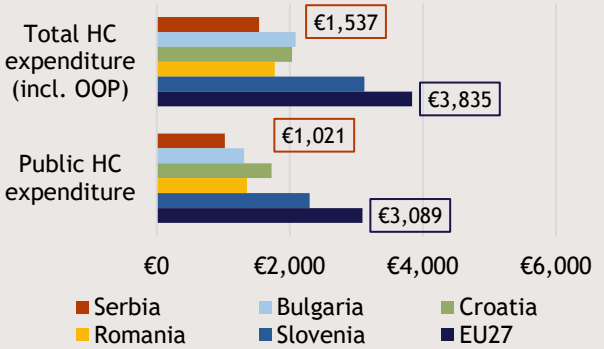
Composition of the economic burden of cancer in Europe in 2018



Source: Hofmarcher et al. (2020)

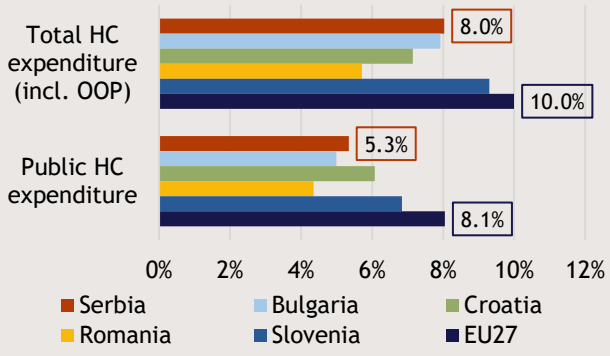
Serbia spent EUR 1,537 per capita (PPP-adjusted; EUR 912 non-PPP-adjusted) on healthcare (public and private) in 2023, which was the lowest level of all comparator countries and less than half of the EU average of EUR 3,835 (15). Also the public healthcare expenditure per capita of EUR 1,021 in Serbia was the lowest among the comparator countries and only one third of the EU average of EUR 3,089 (15). In relation to the size of the economy, Serbia spent 8.0% of GDP (equivalent to RSD 708 billion) on healthcare, and public expenditure corresponded to 5.3% of GDP (equivalent to RSD 471 billion), which was a similar relative level as Bulgaria but lower than Slovenia and the EU average (15). In Serbia, around 32% of total health expenditure are out-of-pocket payments and 1% are private voluntary healthcare payment schemes, whereas the EU average is 15% for out-of-pocket payments and 5% for private voluntary healthcare payment schemes. The total health expenditure in Serbia measured in billion RSD has more than doubled between 2010 and 2022, but measured as % of GDP, it has fluctuated between 8 and 10% over the same period (16).

Healthcare expenditure per capita, PPP-adjusted in 2023



Notes: HC = healthcare, PPP = purchasing power parity, OOP = out-of-pocket.
Source: Eurostat

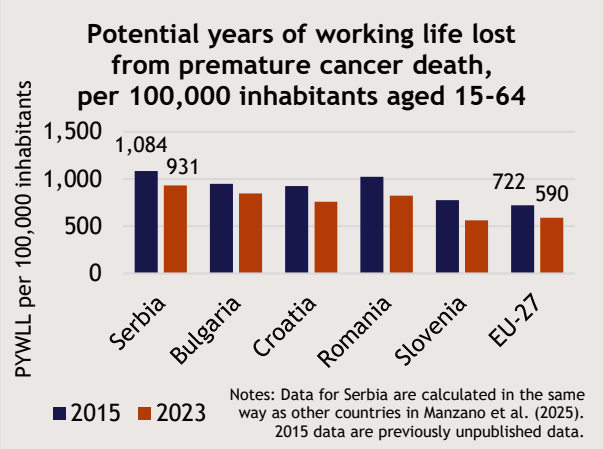
Healthcare expenditure as % of GDP in 2023



Notes: HC = healthcare, PPP = purchasing power parity, OOP = out-of-pocket.
Source: Eurostat

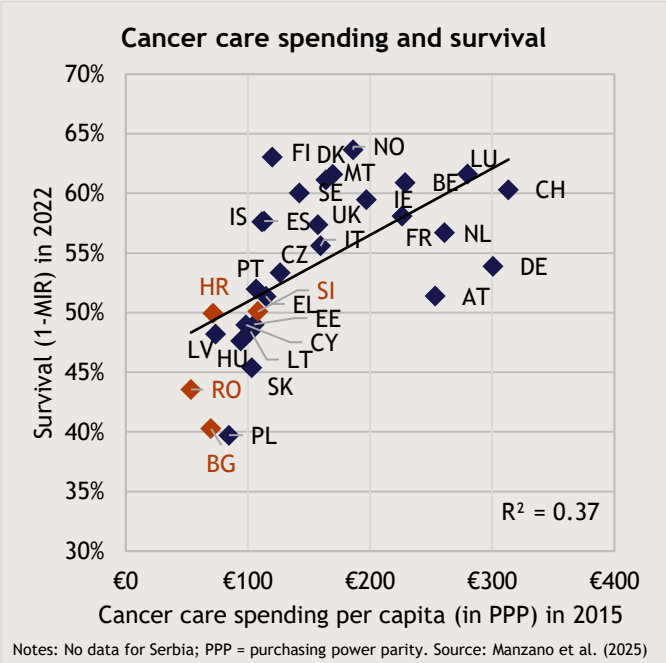
According to an older report from the Institute of Public Health of Serbia, the National Health Insurance Fund (RFZO) spent RSD 15.1 billion on cancer care (ICD-10 codes C00-D48) in 2010, corresponding to 10.0% of public healthcare expenditure (17). Until 2017, cancer care spending by the RFZO increased to 23.8 billion or 11.6% public healthcare expenditure (17). Given that the public share of total health expenditure in 2017 was around 57% according to WHO data (16) and assuming no out-of-pocket spending on cancer care services, around 6.7% of total health expenditure were spent on cancer care in Serbia in 2017. This is a similar estimated share as in Bulgaria, Croatia, Romania, and Slovenia as well as in Europe overall of around 6-7% in 2018 (14). In 2023, the proportion of cancer care expenditure in the comparator countries and Europe overall was still at around 5-8% of the total health expenditure (18). If the 2017-share of Serbia of 6.7% were applied to the 2023 total health expenditure per capita, Serbia is estimated to have spent EUR 103 per capita (PPP-adjusted) on cancer care. By comparison, the EU average spending on cancer care per capita was EUR 268 in 2023, and ranged from EUR 130 in Croatia to EUR 161 in Slovenia among the comparator countries (all PPP-adjusted) (18).

Costs of productivity loss from cancer in Serbia are not well established. In other European countries, the biggest part of the productivity loss stems from premature death before retirement age and a smaller part from sick leaves and early retirement (18). In Serbia, the number of potential years of working life lost (PYWLL) from premature cancer death (between age 15-64) was 1,084 PYWLL per 100,000 inhabitants aged 15-64 in 2015 and decreased by 14% to 931 PYWLL per 100,000 in 2023. All other comparator countries had lower levels of PYWLL in both 2015 and 2023, and in the EU there was a decrease by 18% from 722 to 590 PYWLL per 100,000 (18). The higher mortality-related productivity losses in Serbia are a result of the larger proportion of cancer patients being of working age in Serbia than in the EU (see also the section "Disease burden") as well as the potentially lower survival rates in Serbia.



Health spending on cancer care & survival rates

The ultimate aim of health spending on cancer care is to improve patient outcomes, both in terms of survival and quality of life. The figure to the right offers a crude way of exploring the link between cancer care spending and patient outcomes across European countries; see Manzano et al. (2025) for clarification on methodology (18). The upward-sloping trend line suggests that countries with higher cancer care spending tend to achieve higher survival. In contrast, countries with low spending generally report lower survival (mostly in Central and Eastern Europe). Croatia and Slovenia achieve a survival level that is line with their comparatively low spending level, whereas Bulgaria and Romania achieve comparatively low survival rates given their spending level. While the positive association shown in the graph does not prove causality, it is consistent with previous evidence showing that European countries investing more in cancer care tend to achieve better survival outcomes (19, 20).



The scattered pattern in the graph also underlines that spending alone is not enough. Patient outcomes are shaped by how resources are allocated and used across the entire care pathway. Strategic prioritization, such as early detection, timely diagnosis, and equitable access to effective treatment, is essential to translating spending into tangible survival benefits. Going forward, further gains in survival will likely depend on the broad adoption and expansion of effective technologies, many of which come at a higher cost. Health systems must therefore ensure that investments in cancer care are used in a cost-effective and outcome-oriented way. This means not only evaluating the value of new interventions but also identifying and addressing inefficiencies along the entire care pathway.

Recommendations

- Continue to invest in cancer care to enhance the quality of healthcare services. Ensure that increased spending is directed towards high-impact areas along the care pathway and addresses bottlenecks. This includes early detection, timely diagnosis, access to novel diagnostics and therapies, and care coordination (see the remaining KPIs in the report).
- Establish systematic, annual reporting of healthcare spending on cancer overall and by cancer type by the RFZO. The current lack of up-to-date cancer expenditure data hampers effective prioritization, value assessment, and resource planning.
- Apply a societal perspective in evaluating targeted investments in earlier detection and treatments in order to acknowledge and capture reductions in productivity losses induced by survival gains.
- Strengthen flexible work time arrangements to facilitate the reintegration of cancer patients and cancer survivors during and after treatment in order to reduce productivity losses.

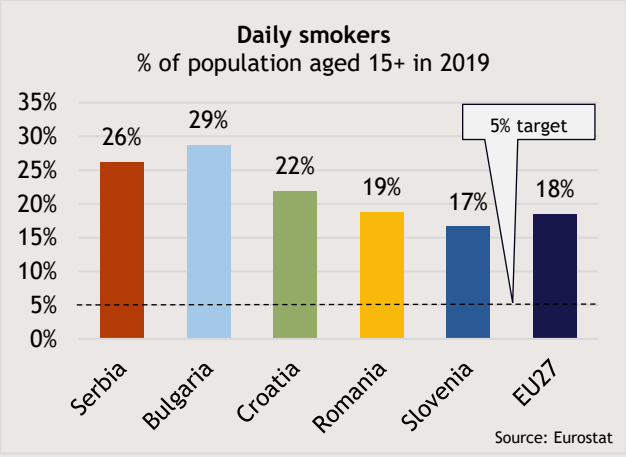
Prevention
Tobacco smoking

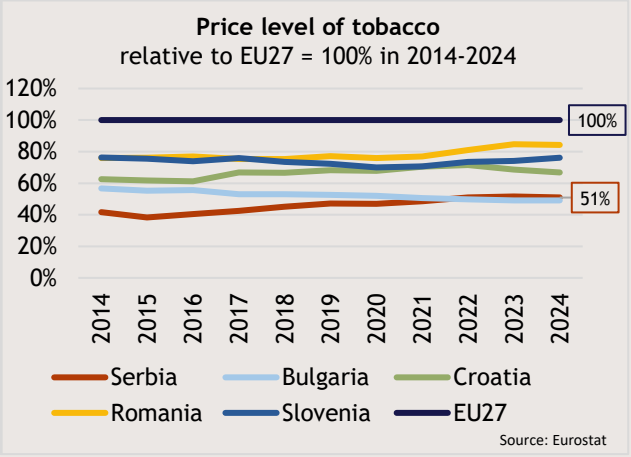
Background

- Tobacco smoking is a major risk factor for developing various cancer types (21), and it has been linked to cancers at 12 different sites (22). Around 80% of all lung cancer cases are linked to cigarette smoking (23).
- The WHO suggests that implementing tobacco control measures can prevent one in five annual cancer cases (24). In 2008, the WHO introduced the MPOWER framework – a package of six evidence-based, cost-effective, high-impact policy measures to help countries reduce the demand for tobacco (25). As part of this framework, best practice for tobacco taxation is defined as a total tax share of at least 75% of the retail price (26). The EBCP aims to help create a "Tobacco-Free Generation" where less than 5% of the population uses tobacco by 2040, compared to around 25% today (1).
- In the Serbian NCCP 2020-2022, a target was set out to reduce smoking prevalence in the adult (18+) population from 37% to 30% (5). In 2005, the first Law on Tobacco was introduced in Serbia, regulating the sale of tobacco products and introducing health warnings on cigarette packaging. Further regulations, including a ban on smoking in some inside public areas and the promotion of tobacco products were introduced throughout the 2010s (27).

Current status in Serbia

- Smoking in restaurants at designated spots is still allowed (28) and surveys have shown that compliance of the smoking ban in workplaces and educational facilities is low (29). Cigarette packages must feature textual, but not graphic warnings, and packaging is not mandated to be plain (27).
- In 2019, 26% of Serbians smoked daily (28% in men and 24% in women) (30). This is a lower smoking prevalence than in Bulgaria, but higher all other comparator countries and also the EU average of 18%. On a positive note, national data show that the prevalence of daily and occasional smokers decreased by about 8 percentage points from 2010 to 2019 (29).
- In a 2024 United Nations report, the total tax share of cigarettes was calculated to be 77%, in line with the MPOWER recommendation of at least 75%. However, the same UN report criticizes the low tax level in absolute levels, suggesting the excise tax should be continuously increased to outpace inflation and income growth. The Serbian excise tax per 1,000 cigarettes (EUR 72) is also lower than the EU member requirement (EUR 90) (27). The price level of tobacco in Serbia has been around 40% of the EU average in 2014-2016 and increased to around 51% in 2022-2024, meaning that tobacco is still half the price as the EU average (31). The Serbian price level was the lowest among all comparator countries until 2022, when it surpassed Bulgaria. Slovenia and Romania which have the highest tobacco prices also have the lowest daily smoking rates.





Recommendations

- Implement measures to enforce the current smoking ban in some inside areas and consider broadening it to include more locations. This protects people from tobacco smoke exposure, and changes norms around smoking.
- Raise the excise tax on cigarettes to deter smoking, to meet the recommendation by the United Nations. This would also harmonize the Serbian tobacco policy with EU entry requirements.

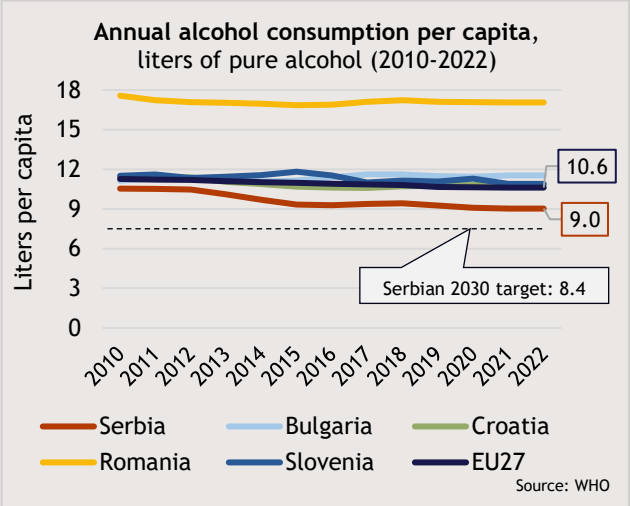
Prevention
Alcohol consumption

Background

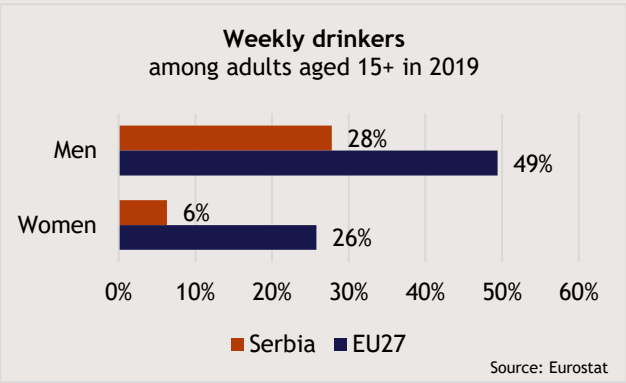
- Alcohol consumption is a major risk factor for noncommunicable diseases and caused 2.6 million deaths globally in 2019, including 4.3% of all cancer-related deaths. It is linked to several cancers, including breast, liver, colorectal, oral cavity, pharyngeal, laryngeal, and esophageal cancers (32).
- The WHO Global Alcohol Action Plan 2022-2030 sets a main global target of at least a 20% relative reduction in the harmful use of alcohol by 2030 (and an intermediate target of 10% reduction by 2025) compared to 2010. Progress toward these targets is measured through total alcohol per capita consumption, defined as the estimated volume of recorded and unrecorded alcohol consumed per person aged 15 and older in a calendar year, expressed in liters of pure alcohol (33). The EBCP supports the global target of a 10% reduction in harmful alcohol use by 2025 and commits to measures such as health warnings and nutrition labelling on alcoholic beverage packaging, stricter monitoring of online alcohol marketing, and support for evidence-based interventions in health care and the workplace (1).
- Alcohol is highlighted in the Serbian NCCP 2020-2022 as a key risk factor (5). The 2017-2025 Program for the prevention of harmful alcohol consumption includes several activities, including raising awareness of the dangers of alcohol, reducing the availability of alcohol, and controlling advertisement of alcoholic beverages (34).

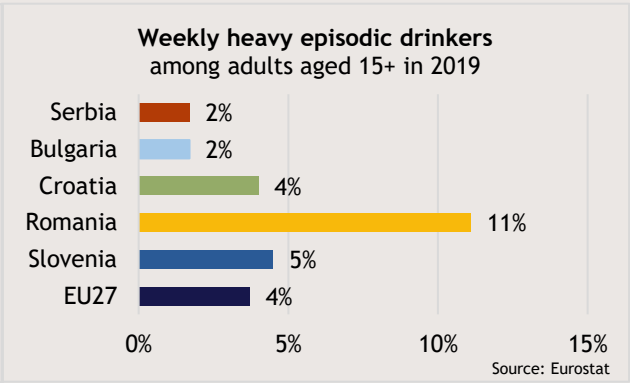
Current status in Serbia

- In Serbia, the alcohol consumption (in pure liters) decreased by 14% from 10.5 liters per capita in 2010 to 9.0 liters per capita in 2022 (35). This means that the 2025 WHO target of a 10% reduction has already been reached by this measurement. To reach the 2030 target of a 20% reduction, Serbia needs to decrease its alcohol consumption to 8.4 liters per capita.
- Drinking patterns in Serbia differ considerably between men and women. Overall, 17% of the population (aged 15+) drink weekly, but among men 28% drink weekly compared to only 6% of women (36). Weekly drinkers are also more common among the highly educated (36). The proportion of female and male weekly drinkers in Serbia is also far lower than the EU average.



- Only 2% of the Serbian population have heavy drinking episodes each week, which is on par with Bulgaria and lower than all other comparator countries and the EU average (37).





Recommendations

- Consider raising alcohol taxes and implement educational campaigns that highlight the dangers related to alcohol and cancer, in order to reach the 2030 WHO target. This information should especially target men, who are the more frequent drinkers.
- Oversee the current alcohol regulation framework to identify further measures to reduce the availability of alcohol.

Prevention

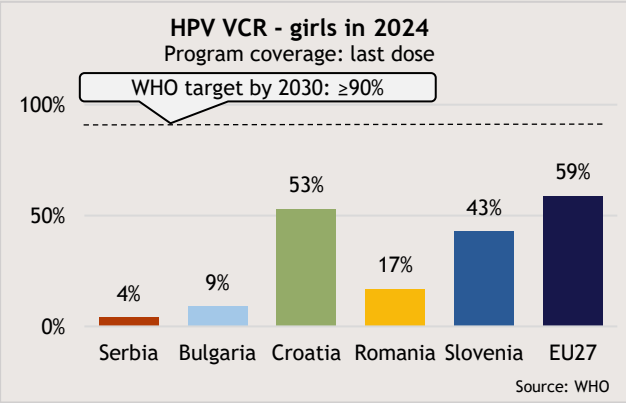
Vaccination against human papillomavirus (HPV)

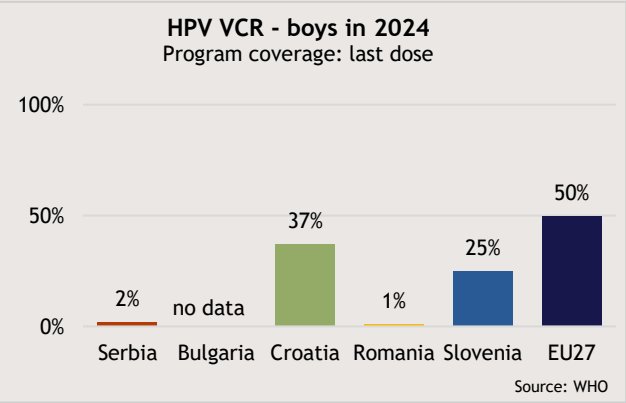
Background

- HPV is a group of sexually transmitted viruses that causes around 2.5% of all cancers in women and men in Europe (38). Vaccines against HPV have been available since 2006. HPV vaccines have been found to be an effective and cost-effective way to prevent cervical cancer and other HPV-related cancers (38). According to the WHO, the best option is to vaccinate girls around age 9-14, just before they become sexually active (39). There is, however, value in vaccinating boys and older teenagers and young adults, at least up to the age of 26 because it can protect against a new infection or re-infection and block transmission to a new partner (38).
- As part of its global strategy to eliminate cervical cancer, the WHO calls on all countries to achieve a 90% HPV vaccination coverage rate (VCR; fully vaccinated) in girls by age 15 by 2030 (38). Reflecting the WHO's global target, the EBCP aims to achieve at least a 90% HPV VCR in girls in the EU by 2030, and to significantly increase the VCR in boys by the same year, although no specific target has been set (1).
- The Serbian NCCP 2020-2022 included the target to establish HPV vaccine funding from external sources, but did not have specific targets regarding HPV VCR (5). In Serbia, vaccination against HPV has been recommended for young adults since 2008, but it has only been offered free of charge since June 2022 (40). It is part of the list of recommended vaccines and not the list of mandatory vaccines (such as the polio and MMR vaccines) in the national immunization program (NIP) (40). The target demographic of the vaccine is boys and girls aged 9-19 years, and vaccines are mainly offered in health facilities by pediatricians and not in schools or pharmacies (41).

Current status in Serbia

- In 2023, one year after the inclusion of the HPV vaccine in the NIP, the rate of girls having received *the first dose* of HPV vaccine was 5.5% in the 9-14 years age group, and 5.9% in the 15-19 years age group at the national level. The VCR was lower in regions with a higher degree of illiterate women (41).
- WHO data for 2024 show that 2% of boys and 4% of girls had received *the last dose of the* HPV vaccine within the vaccination program (42). This can be compared to the EU average of 50% for boys and 59% for girls. Bulgaria and Romania also had a low VCR for girls in 2024, but still higher than Serbia, whereas Croatia and Slovenia were closer to the EU average for both boys and girls (42). Yet all countries remain far from the 90% WHO target.
- Some older studies have examined the behavior of people in Serbia in relation to HPV vaccination. A study conducted in 2015 of the knowledge and attitudes of parents towards HPV vaccination of their children found that one quarter of parents agreed that their child should be vaccinated against HPV, with higher rates among parents to daughters, parents with more knowledge of the vaccine, and parents who had received a recommendation to vaccinate by a pediatrician (43). Another Serbian study from 2021 on motives for parents' consent for HPV vaccination found the strongest motive to be a recommendation from a pediatrician, followed by wanting to reduce the risk of HPV infection and protection against cancer (44).





Recommendations

- Align the legal status of the HPV vaccine with other vaccines in the NIP. Raise public awareness on HPV through informational campaigns and include pediatricians in these campaigns as they are the most trusted voices.
- Digitize the system for vaccination registration and implement reminder notifications for pediatricians.
- Consider offering HPV vaccines in pharmacies and schools in addition to health facilities to enhance accessibility and increase uptake.

Early detection

Breast cancer screening

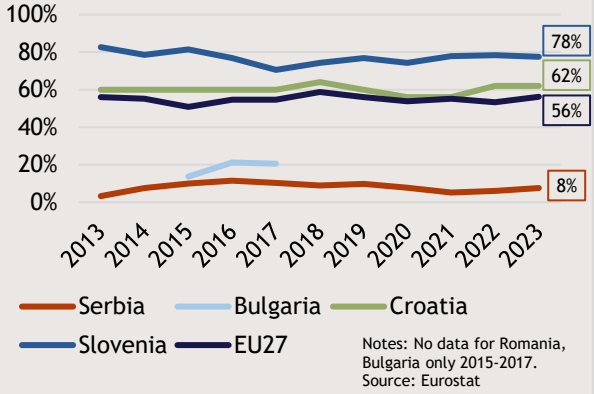
Background

- The goal of breast cancer screening is to detect a tumor as early as possible when it is still small and amenable to curative treatment (45). In early disease stages, survival rates are highest and treatment costs lowest (46).
- The EBCP includes the aim to invite 90% of the target population in each country for breast cancer screening by 2025 (1). Quality guidelines by the European Commission state that a screening participation rate above 75% is desirable (47). The latest European Code Against Cancer recommends digital mammography every two years for women aged 50-69 years, and consideration of extension to 45-74 years (48).
- Serbia implemented breast cancer screening with personal invitations to women aged 50-69 years every two years in 2012 (49). The municipalities are responsible for screening, however not all municipalities participate in the screening program. Screening is conducted with mammography machines in primary health centers (49). The Serbian National program for early detection of breast cancer specifies that the screening coverage should be at least 75% of the target population (50). Furthermore, it aims to increase awareness about breast cancer screening, strengthen the screening capacity, and ensure quality control.

Current status in Serbia

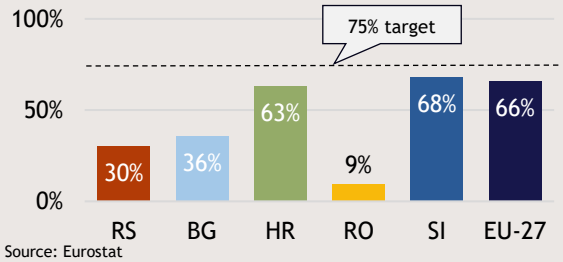
- In 2019, 30% of Serbian women aged 50-69 years stated that they had undergone breast cancer screening in the last two years. This is a higher rate than in Romania and a similar rate to that in Bulgaria, while Croatia, Slovenia, and the EU average exceed 60%, more than double the Serbian rate (51).
- Serbian women with the highest level of education had a self-reported screening rate of 39%, compared to 23% among women with the lowest level of education (51).
- Program-based data show that only 8% of Serbian women participated in the breast cancer screening program in 2023, which continues the low level seen in previous years (52). The big difference in self-reported data on screening (30% in 2019) compared to program-based data (10% in 2019) indicates that a majority of Serbian women get screened outside the existing program. This is similar to the situation in Bulgaria and Romania, whereas in Croatia and Slovenia women are mostly only screened within the program.

Program-based breast cancer screening rates

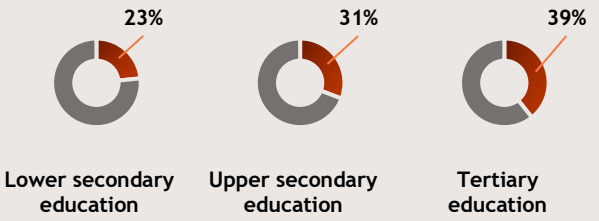


Notes: No data for Romania, Bulgaria only 2015-2017.
Source: Eurostat

Breast cancer screening rate: Self-reported data - overall and by education (50-69 years, women) in 2019



Source: Eurostat



Recommendations

- Re-initiate the development of a functioning screening program and guidelines based on the latest international recommendations for the target age group (45-74 years), along with (i) introduction of invitation system for eligible women based on based on population lists through electronic or traditional methods (e.g., e-mail, SMS, direct phone calls) with reminders and flexible booking of appointments, (ii) creation of a capacity plan for healthcare services to ensure smooth and uninterrupted execution of the screening program, (iii) implementation of an electronic database for women covered by the screening program to enable precise monitoring of screening coverage and to propose corrective measures in regions where screening effectiveness is suboptimal.
- Continue implementing informational measures to raise awareness of breast cancer and screening to improve participation, especially among women of lower socioeconomic status.

Early detection
Cervical cancer screening

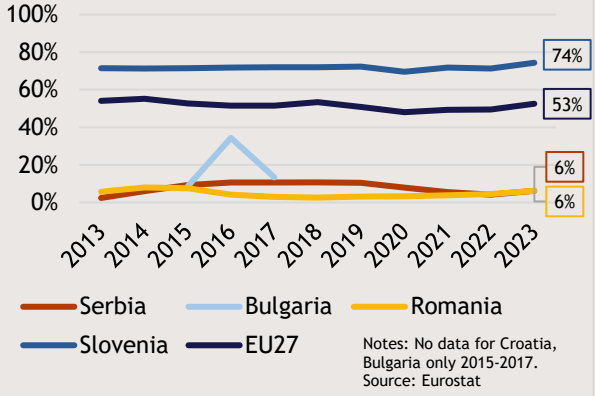
Background

- The aim of cervical cancer screening is to detect a cancer before the onset of symptoms or even earlier in its pre-stages. In early disease stages, survival rates are highest and treatment costs lowest (53, 54). The WHO recommends the HPV test instead of the older Pap smear (cytology) test as primary test method (55).
- The EBCP includes the aim to invite 90% of the target population in each country for cervical cancer screening by 2025 (1). Quality guidelines by the European Commission state that a screening participation rate above 85% is desirable (56). The latest European Code Against Cancer recommends using HPV tests in women aged 30-65 years at intervals no shorter than five years (48).
- Serbia implemented cervical cancer screening with personal invitations to women aged 25-64 years every three years in 2012 (49). The municipalities are responsible for screening, but not all municipalities participate in the screening program. Screening is conducted with Pap smear tests in primary health centers (49). The Serbian National program for early detection of cervical cancer specifies that the screening coverage should be at least 75% of the target population (57). Furthermore, it aims to increase awareness about cervical cancer screening, strengthen the screening capacity, and ensure quality control.

Current status in Serbia

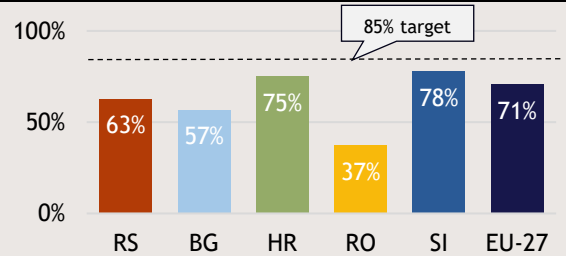
- In 2019, 63% of Serbian women aged 20-69 reported to have had a Pap smear test in the last three years. This is higher than in Romania and Bulgaria, but lower than in Croatia and Slovenia (58).
- Women with the highest level of education in Serbia had a self-reported screening rate of 77%, while women with the lowest education level only had a rate of 43% (58).
- Program-based data show that only 6% of Serbian women participated in the cervical cancer screening program in 2023, which perpetuates the low level seen in previous years (52). The big difference in self-reported data on screening (63% in 2019) compared to program-based data (10% in 2019), indicates that Serbian women get screened mostly outside the existing program. This is similar to the situation in Bulgaria and Romania, whereas in Slovenia women are mostly only screened within the program.

Program-based cervical cancer screening rates

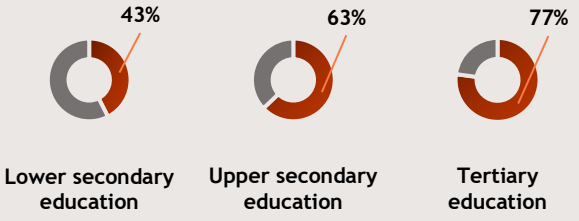


Notes: No data for Croatia, Bulgaria only 2015-2017.
Source: Eurostat

Cervical cancer screening rate: Self-reported data - overall and by education (20-69 years, women) in 2019



Source: Eurostat



Recommendations

- Re-initiate the development of a functioning screening program and guidelines based on the latest international recommendations for the target age group (30-65 years) and testing method (HPV testing), along with (i) introduction of invitation system for eligible women based on population lists through electronic or traditional methods (e.g., e-mail, SMS, direct phone calls) with reminders and flexible booking of appointments, (ii) creation of a capacity plan for healthcare services to ensure smooth and uninterrupted execution of the screening program, (iii) implementation of an electronic database for women covered by the screening program to enable precise monitoring of screening coverage and to propose corrective measures in regions where screening effectiveness is suboptimal.
- Pilot the distribution of HPV-based self-sampling kits in some municipalities.
- Continue implementing informational measures to raise awareness of cervical cancer and screening to improve participation, especially among women of lower socioeconomic status.

Early detection
Colorectal cancer screening

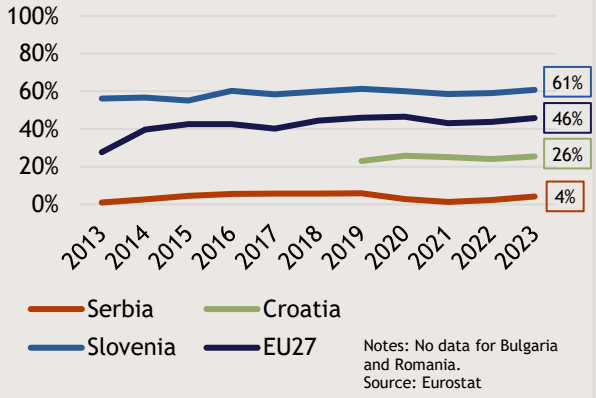
Background

- Colorectal cancer is to a large extent curable if diagnosed early and if appropriate treatment is provided (59). Treatment costs are also lowest in early stages of the disease (54). There are multiple screening methods, including stool-based (e.g., fecal immunochemical test, FIT) and imaging-based tests (e.g., colonoscopy) (60).
- The EBCP includes the aim to invite 90% of the target population in each country for colorectal cancer screening by 2025 (1). Quality guidelines by the European Commission state that a screening participation rate above 65% is desirable (61). The latest European Code Against Cancer recommends using FIT tests every two years in people aged 50–74 years (48).
- Serbia implemented colorectal cancer screening with personal invitations to individuals aged 50-74 years every two years in 2012 (49). The municipalities are responsible for screening, but not all municipalities participate in the screening program. Screening is conducted with FIT in primary health centers (49). The Serbian National program for early detection of colorectal cancer specifies that the screening coverage should be at least 75% of the target population (62). Furthermore, it aims to increase awareness about colorectal cancer screening, strengthen the screening capacity, and ensure quality control.

Current status in Serbia

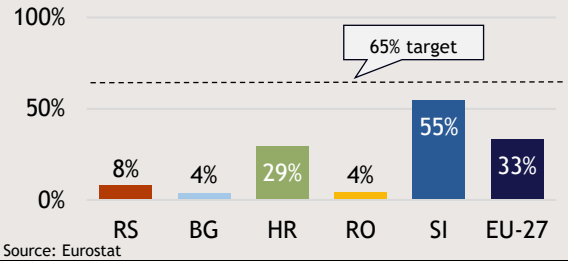
- In 2019, 8% of Serbians aged 50-74 reported that they had been screened for colorectal cancer in the last two years. This is comparable to Bulgaria and Romania but lower than Croatia, Slovenia, and the EU average (63).
- In contrast to breast cancer and cervical cancer screening rates, there are no large differences in colorectal cancer screening rates between groups of different education levels in Serbia (63).
- Program-based data confirm that the screening rate is low in Serbia compared to Croatia, Slovenia, and the average EU country. In 2023, the screening rate according to the program-based data was 4%, which was similar to previous years when participation fluctuated around 1–6% (52).

Program-based colorectal cancer screening rates

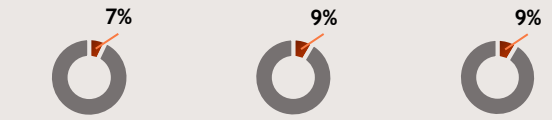


Notes: No data for Bulgaria and Romania.
Source: Eurostat

Colorectal cancer screening rate: Self-reported data – overall and by education (50–74 years, both sexes) in 2019



Source: Eurostat



Lower secondary education | Upper secondary education | Tertiary education

Recommendations

- Re-initiate the development of a functioning screening program and guidelines based on the latest international recommendations, along with (i) introduction of invitation system for eligible individuals based on population lists through electronic or traditional methods (e.g., e-mail, SMS, direct phone calls) with reminders and flexible booking of appointments, (ii) creation of a capacity plan for healthcare services to ensure smooth and uninterrupted execution of the screening program, (iii) implementation of an electronic database for individuals covered by the screening program to enable precise monitoring of screening coverage and to propose corrective measures in regions where screening effectiveness is suboptimal.
- Pilot the distribution of self-sampling kits in some municipalities.
- Continue implementing informational measures to raise awareness of colorectal cancer and screening to improve participation.

Diagnosis and treatment

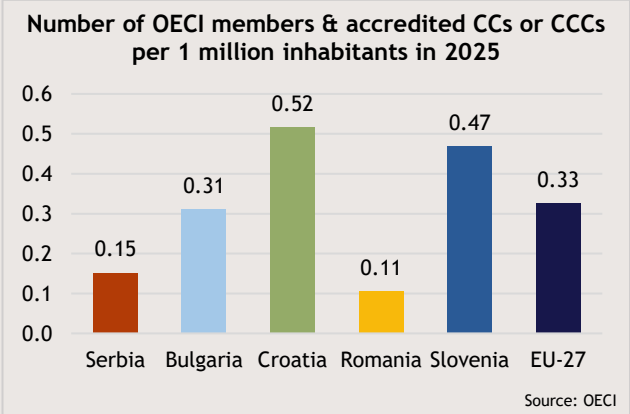
Comprehensive cancer centers

Background

- A comprehensive cancer center (CCC) is often characterized by its organizational quality, multidisciplinarity, and integration of research into clinical care (translational research) (64). Patients diagnosed and treated in specialized cancer centers (including, but not limited to CCCs) generally have better access to advanced diagnostics, therapies and clinical trials, seeing better outcomes than those treated in general hospitals (65).
- There is currently no "universal definition" of a CCC. The Organisation of European Cancer Institutes (OECI) facilitates the accreditation of CCCs by means of quality standards which represent the European consensus for evaluating the performance of cancer centers (64). At the EU policy level, the OECI Accreditation and Designation (A&D) system is the most widely acknowledged and is therefore used here for benchmarking. Nevertheless, it should be noted that the European Society for Medical Oncology (ESMO) also offers an accreditation program that recognizes centers providing highly integrated oncology and palliative care services (66), and some countries might solely rely on national accreditation systems, complicating international comparisons.
- The EBCP sets a target that 90% of eligible patients should have access to national CCCs linked through a new EU-wide network by 2030, aimed at facilitating the uptake of quality-assured diagnosis and treatment (1). To support this goal, the EUnetCCC Joint Action was launched in 2024, with the objective of establishing a network of certified CCCs across countries, including the development of a common EU certification scheme (67).
- The Serbian NCCP 2020-2022 states that the infrastructure surrounding oncology care needs to be improved and expanded. A large focus is placed on establishing cancer diagnosis-specific, cross-functional teams in all institutions treating cancer patients. It also mentions the need to establish a CCC to treat complex cases and lead the development of Serbian cancer treatment (5).

Current status in Serbia

- There is no accreditation system for healthcare institutions in Serbia and there are neither requirements nor quality standards for cancer care and specific procedures in oncology (in terms of infrastructure, personnel, procedures, education, services, etc.). Serbia has four major tertiary Clinical Centers (Клинички Центар) in Belgrade, Niš, Novi Sad, and Kragujevac. Dedicated oncology centers are the Institute for Oncology and Radiology of Serbia (IORS) in Belgrade and the Oncology Institute of Vojvodina in Novi Sad.



- The IORS is an ESMO-accredited cancer center (68). However, it is not an OECI member and thus not accounted for in the graph and table below. The Oncology Institute of Vojvodina is the only cancer institute which is a member of the OECI (69). However, it is not a certified cancer center (CC) nor a CCC. Of the comparison countries none has a CCC, and only Slovenia has one hospital which is a certified cancer center (CC)[1].

OECI-affiliated cancer centers and organizations (October 2025); Source: OECI (69)

	Number of CCCs	Number of CCs	CCCs in accreditation	OECI members
Serbia	0	0	0	1
Bulgaria	0	0	0	2
Croatia	0	0	0	2
Romania	0	0	0	2
Slovenia	0	1	0	0

Recommendations

- Guidelines or standards or norms are needed to specify what can/should be done at what level of health care, with requirements and quality standards defined.
- To be able to provide treatment at CCs or CCCs to more patients, establish a roadmap of actions required to upgrade the two oncology centers in Belgrade and Novi Sad to CCs/CCCs, and see if additional Clinical Centers outside Belgrade and Novi Sad could be upgraded to ensure easier geographic access.
- Consider establishing cross-functional teams specializing in different cancer types to improve quality of care.

[1] According to the accreditation process by OECI, the criteria to be a certified a cancer center (CC) are lower than for a CCC. For instance, the annual budget for cancer care, number of inpatient hospitals beds, and clinical staff requirements are lower (64).

Diagnosis and treatment

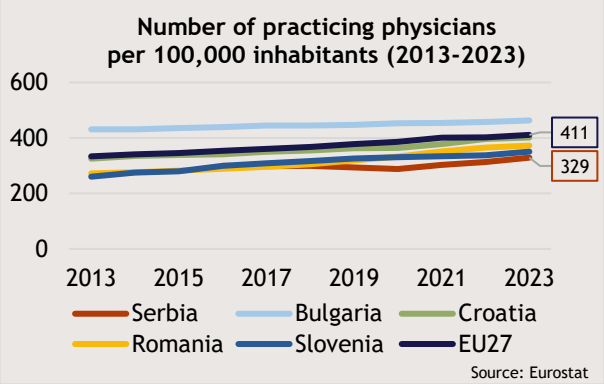
Health workforce

Background

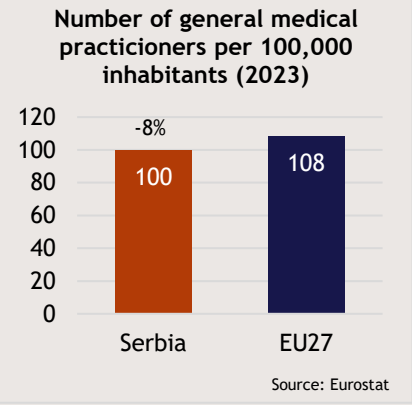
- Modern cancer care is highly specialized and requires competence from different medical fields. This includes pathologists and diagnostic radiologists for the diagnosis of cancer, and surgeons, radiotherapists, medical oncologists, and hematologists for the treatment (70). General practitioners (GPs) play a key role in facilitating early diagnosis in primary care as they refer patients with signs and symptoms to the appropriate specialist (71). Nurses are involved throughout the care process, delivering patient education and treatment support (72).
- The Serbian NCCP 2020-2022 highlights the importance of having multidisciplinary teams for providing high quality care to patients. It describes a situation of long waiting times for patients, where specialist shortages are one contributing factor. One explicit aim of the NCCP 2020-2022 was to increase the number of oncology specialists from 114 in 2018 to 125 in 2022 (5).

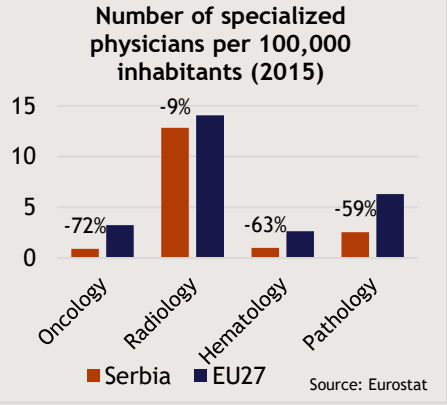
Current status in Serbia

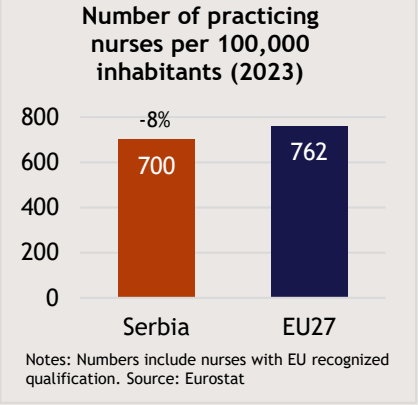
- Serbia has a rather low number of practicing physicians (of any specialty) per 100,000 inhabitants compared to the EU average and the comparator countries, as shown in the top figure. In 2023, Serbia had 329 practicing physicians per 100,000, which was 20% below the EU average of 411 physicians per 100,000. However, the physician density in Serbia increased by 10% from 2016 to 2023 (73).



- For general medical practitioners (GPs), the Serbian density of 100 GPs per 100,000 inhabitants was only 8% below the EU average in 2023 (bottom left figure) (74). Considering the importance of GPs in primary care for easy accessibility for patients with signs and symptoms of cancer, this appears rather positive.
- Existing personnel norms are outdated, and many aspects do not recognize specifics of oncology; for example, all tertiary hospitals have the same number of personnel defined by the number of hospital beds. The Serbian density of various oncology-related specialties differs but is generally low (bottom middle figure). Physicians specialized in oncology, hematology, and pathology were especially scarce compared to the EU average number in 2015, while radiologists were more common (75).
- The number of practicing nurses in Serbia has increased by 15% from 607 nurses per 100,000 inhabitants in 2016 to 700 nurses per 100,000 in 2023 (73). Despite this increase, the number of nurses was still 8% below the EU average in 2023 (bottom right figure).
- One explanation for the lack of physicians and nurses in Serbia is health professionals migrating to work abroad. Reasons for this migration include seeking better job compensation, both in terms of pay and benefits (76, 77).







Recommendations

- Introduce oncology-specific personnel norms for tertiary hospitals that reflect the complexity of cancer care.
- Incentivize newly educated physicians to choose specialties relevant to cancer.
- Develop a long-term oncology workforce and retention plan. Implement a 5–10 year national strategy aligned with workforce needs for various specialty physicians but also for specialized nurses/technicians, pharmacists etc. and aligned with (new) norms, focusing on improved salaries and working conditions.

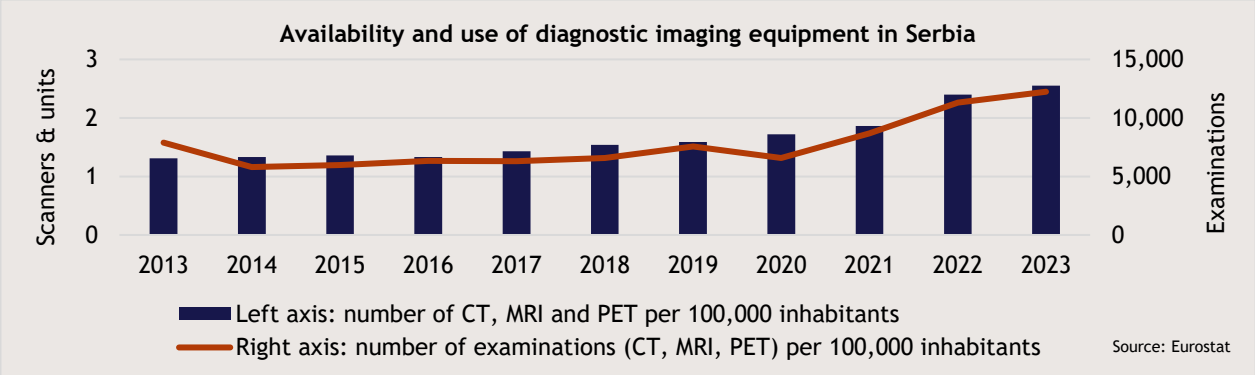
Diagnosis and treatment
Diagnostic imaging equipment

Background

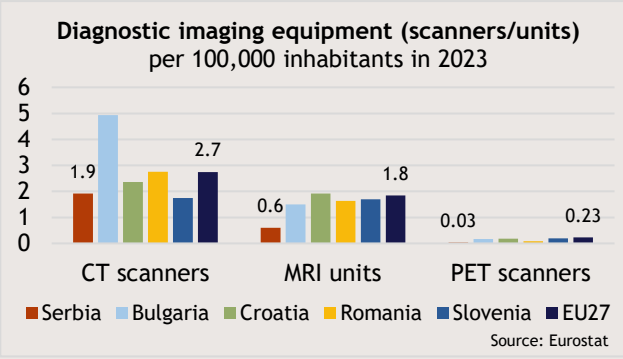
- Imaging equipment such as computed tomography scanners (CT), magnetic resonance imaging units (MRI), and positron emission tomography scanners (PET) are required throughout the cancer care journey including diagnosis, treatment, and follow-up to ensure accurate management decisions and optimal outcomes (78). The investment costs for scanners are high, and they require specialized medical personnel to operate them, which naturally restricts their availability. General guidelines or benchmarks regarding the ideal number of scanners per inhabitant or cancer patient do not exist (79). An undersupply of scanning units may lead to access problems in terms of geographic proximity and/or waiting times. Reducing the time between diagnosis and treatment start increases the chances of survival for many cancer types (80, 81).
- The Serbian NCCP 2020-2022 describes a shortage of diagnostic imaging equipment but does not include any specific targets to improve access (5).

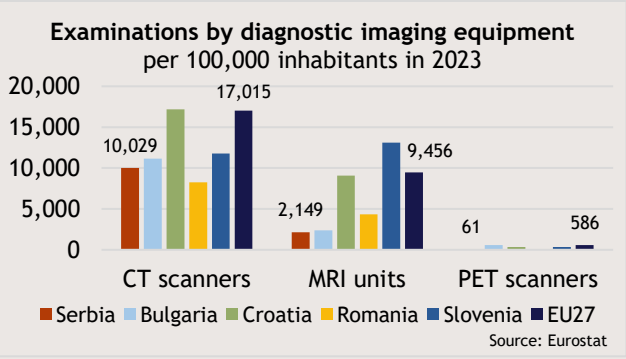
Current status in Serbia

- The availability of diagnostic imaging equipment in Serbia has almost doubled (+95%) from 1.3 CT, MRI, PET scanners or units per 100,000 inhabitants in 2013 to a 2.6 scanners or units per 100,000 in 2023 (82). The number of examinations with this equipment increased less (+55%) from almost 8,000 exams per 100,000 inhabitants in 2013 to more than 12,000 in 2023 (83).



- Looking at the composition of equipment, the number of CT scanners, MRI units, and PET scanners per 100,000 inhabitants in Serbia is mostly lower than in the comparator countries. Compared to the EU average, Serbia had around 30% fewer CT scanners, 67% fewer MRIs, and 87% fewer PET scanners in 2023 (82). The examinations performed with the available equipment in Serbia are also mostly lower than in the comparator countries. Specifically, Serbia recorded 41% fewer CT scans, 77% fewer MRIs, and 90% fewer PET scans per 100,000 inhabitants than the EU average in 2023 (83), which compared to the number of equipment also points to a lower use of available equipment in Serbia.





Recommendations

- Allocate additional resources to invest in new diagnostic imaging equipment to facilitate more timely diagnosis.
- Simultaneously, ensure that there are enough medical staff (imaging physicians, radiology technicians, and nurses) who can operate the new machines effectively and avoid idle running.

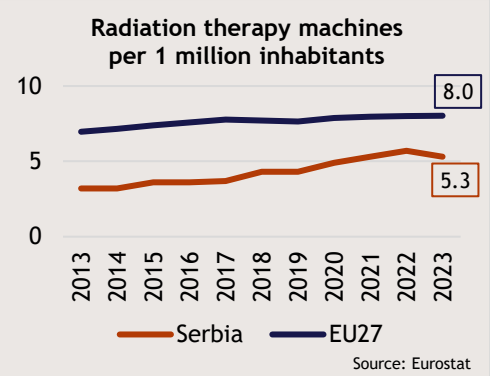
Diagnosis and treatment
Radiation therapy equipment

Background

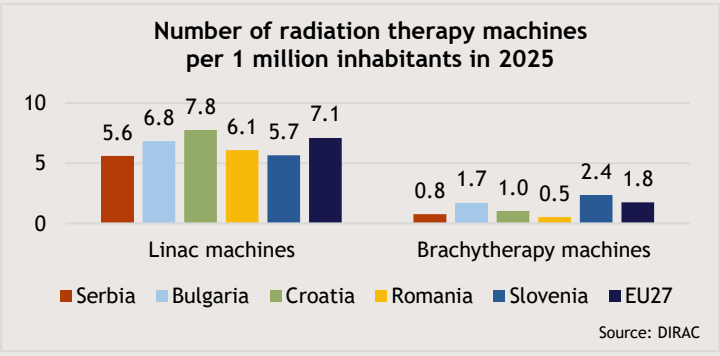
- Radiation therapy is essential in treating common cancers, with around 50% of all cancer patients requiring radiation therapy at some point during their treatment (84). The effectiveness of radiation therapy in targeting and eliminating tumors significantly influences patients' survival rates and quality of life (85, 86).
- Expanding access to radiation therapy requires both sufficient equipment and a qualified workforce to operate it. Strategic investments in infrastructure and specialist personnel are essential to ensure timely and equitable access to radiation therapy for all patients (87, 88).
- The International Atomic Energy Agency (IAEA) and the European Society for Radiotherapy and Oncology (ESTRO) recommend one linear particle accelerator (linac) per 450 newly diagnosed cancer patients (87, 89).
- The Serbian NCCP 2020-2022 states that the stock of radiation therapy machines has increased in recent years, but that there still is a strain on capacity. One of the targets of the plan was to increase the rate of patients receiving radiation therapy within 28 days of receiving the indication for it (5).

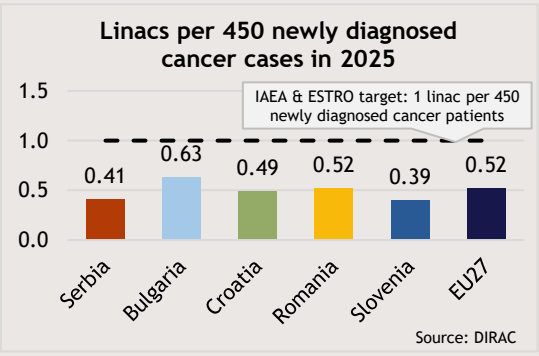
Current status in Serbia

- In 2023, Serbia had 5.3 radiation therapy machines per 1 million inhabitants, below the EU average of 8.0 and Bulgaria's 11.5 but similar to Romania (5.3), according to Eurostat data (82). Since 2013, the number of machines per capita has steadily increased in Serbia. While the current level is lower than the EU average, the difference has decreased over time.



- As of 2025, Serbia has 5.6 linacs per 1 million inhabitants, according to the IAEA's Directory of Radiotherapy Centers (DIRAC) (90). This is a comparable number as in Slovenia, but below Bulgaria and Croatia and the EU average of 7.1 linacs per 1 million. Similarly, the number of brachytherapy machines was rather low in Serbia with 0.8 machines per 1 million, while Bulgaria, Slovenia, and the EU average were more than twice as high (90). Serbia together with all comparator countries falls short of the IAEA/ESTRO recommendation of one linac machine per 450 newly diagnosed cancer cases, with the Serbian ratio of 0.41 being below the EU average (0.52) but above Slovenia's ratio (0.39).
- Serbia has (as of November 2025) eight radiotherapy centers spread across the cities of Belgrade [3 centers], Kladovo [1], Kragujevac [1], Niš [1], and Novi Sad [2], with each of these cities having one brachytherapy machine (90). However, there is limited information about how the radiation therapy machines are utilized and whether patients receive timely and equitable access.





Recommendations

- Continue to increase the number of radiation therapy machines and ensure a sufficient number of qualified specialists who can operate the machines to help improve access and utilization.
- Align efforts with the IAEA and ESTRO benchmark of one linac machine per 450 newly diagnosed cancer patients.

Diagnosis and treatment

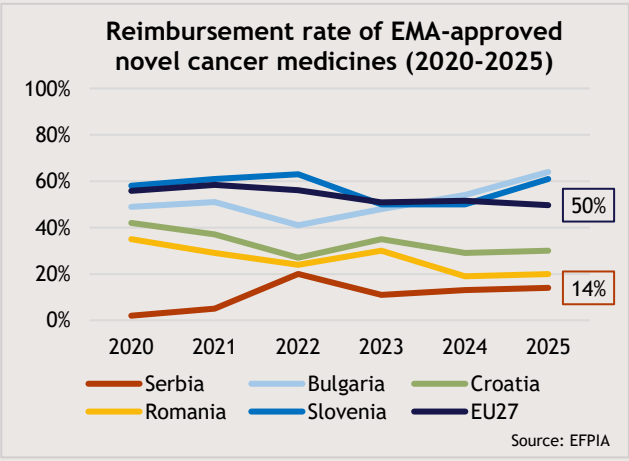
Novel cancer medicines

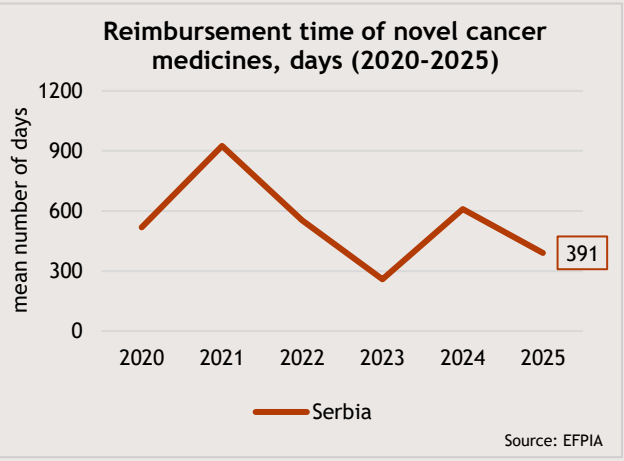
Background

- Novel cancer medicines introduced over the past decade have transformed treatment standards across many cancer types. More than 100 new cancer medicines have been approved by the European Medicines Agency (EMA) between 2015 and 2024 (18). These primarily include immunotherapies, which enhance the immune system's ability to attack cancer cells, and targeted therapies, which focus on specific mutations that drive tumor growth.
- Since Serbia is not an EU member, Serbian authorities must both organize the regulatory approval and reimbursement approval of novel cancer medicines. The regulatory approval granted by the Medicines and Medical Devices Agency of Serbia (ALIMS) (91). The reimbursement is handled by the RFZO (92), upon which medicines can become accessible to patients on a broad scale across the country.
- According to the Serbian NCCP 2020-2022, Serbia struggles to provide cancer patients with novel cancer medicines to a sufficient extent. One goal included is to increase the rate of novel cancer medicines present on the EU market also available in Serbia to 80% (5).

Current status in Serbia

- According to the European Federation of Pharmaceutical Industries and Associations (EFPIA), the rate of novel cancer medicines approved by the EMA in 2020-2023 that are reimbursed (defined as being on the public reimbursement list of the RFZO) in Serbia as of January 2025 was only 14% (93). This is the lowest figure out of all comparison countries.
- After almost no new medicines being reimbursed in 2020-2021, the Serbian rate increased to 20% in 2022 but then remained stable at 11–14% in 2023–2025. This development mirrors the fact that RFZO has increased the availability of innovative medicines for various diseases, including oncology, in the reimbursement list from 21 innovative medicines for the period 2007-2015 to 81 medicines for the period 2017-2023 (94). The recent stable trend reflects the lack of a more recent update of the reimbursement list.
- The mean number of days from medicine approval by ALIMS until reimbursement by RFZO in Serbia has fluctuated in the past years. For novel cancer medicines reimbursed until the beginning of 2025, it was 391 days according to the EFPIA WAIT survey (93).
- The availability of novel cancer medicines differs considerably between European countries and is especially low in countries not covered by the EMA, including Serbia (93). Many general causes for delays and unavailability of novel medicines at the country level across Europe have been identified, of which some might also be applicable to Serbia (95, 96). This includes factors such as (i) limited public budgets for medicines, (ii) late company submission or late start of the national pricing and reimbursement process, (iii) lack of clearly defined timelines for pricing and reimbursement, (iv) the complexity of the health technology assessment (HTA) process.





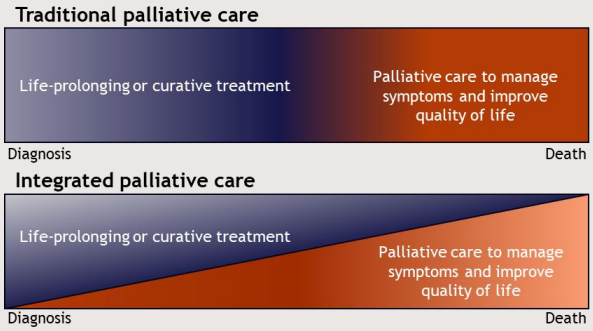
Recommendations

- Streamline the national approval and reimbursement process. One aim should be to accelerate the timelines of the regulatory approval process to reach the 80% goal of the NCCP 2020-2022.
- Ensure sufficient budget for more regular updates of the reimbursement list of novel medicines and prioritize the inclusion of a higher proportion of medicines that have a substantial clinical benefit and are cost-effective. Also ensure regular updates of clinical guidelines and an organization of healthcare that enables the inclusion of new medicines into routine clinical practice.

Survivorship
Palliative care services

Background

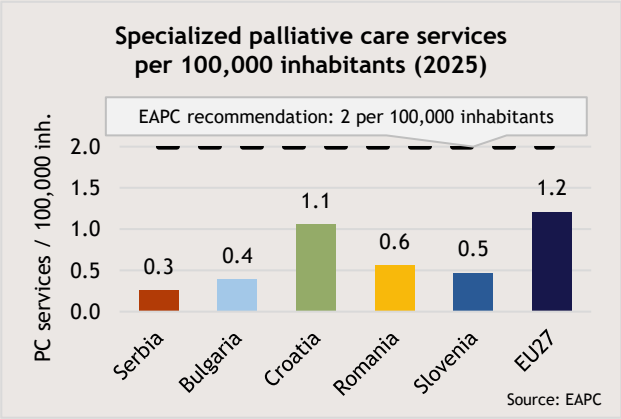
- In 2024, almost a quarter (23%) of Serbia's population was aged 65 or older (97). This share has increased every year since 2004 (17%), reflecting a sustained trend of population aging and pointing to a growing demand for palliative care (PC) services.
- Cancer is the most frequent cause of need for PC among life threatening or life-limiting health conditions (98). Within oncology, PC has traditionally had a strong focus at the end of life, but more recently there is a shift of integrating it earlier in the disease pathway (99).

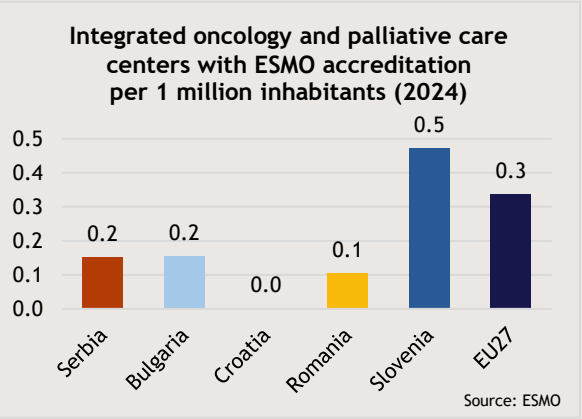


- The availability of PC services in a country is one metric to assess the capacity and potential access to PC. Another metric is the degree to which PC is integrated with the overall healthcare system (100). The European Association for Palliative Care (EAPC) recommends two specialized PC services per 100,000 inhabitants (101).
- In 2009, Serbia adopted a Palliative Care Strategy which included activities such as educating medical professionals in PC, establishing PC units, and compiling a list of essential medicines for PC (102). The Serbian NCCP 2020-2022 has several targets tied to PC, including increasing the number of PC units and PC beds, introducing PC as a mandatory subject at medical schools, and providing all essential medicines for PC care at the expense of the RFZO (5).

Current status in Serbia

- Serbia had 17 specialized PC services (non-cancer specific) in 2025 (98), which is an increase by 1 service since 2019 (101). This corresponds to 0.3 specialized PC services per 100,000 inhabitants in 2025 (98). While Bulgaria, Romania and Slovenia have similar (but higher) levels of specialized PC services per 100,000 to Serbia, both Croatia and the average EU country have a four times higher density of services than Serbia (98).
- Based on a voluntary ESMO accreditation system of cancer centers, a comparison of the integration of PC with cancer care can be made. Serbia has 1 such center (Institute for Oncology and Radiology of Serbia (IORS) in Belgrade) (66). This corresponds to 0.2 centers per 1 million inhabitants and is a similar density as in Bulgaria and Romania, while Croatia has none. Slovenia and the average EU country have more than double the density of Serbia.





Recommendations

- Expand and improve PC services in response to the growing elderly population, with a focus on accessible and integrated care with treatment services to provide comprehensive support for cancer patients.
- Align national efforts with the EAPC recommendation of two specialized PC services per 100,000 inhabitants.

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Appendix: Methodology and sources for indicators

Governance	
National cancer plan	Analysis of the National Cancer Control Plan 2020-2022 (5). **For dashboard overview:** Presence of a national cancer plan in 2025 (no = 10% of benchmark; yes = at benchmark).
Disease burden	
New cases (incidence)	1st, 2nd, 3rd, 4th graph: Serbian Cancer Registry (8). Cancer is specified as "all sites excluding non-melanoma skin cancer" (C00-C97/C44). 5th graph: Serbian Cancer Registry (8), and estimates from ECIS for other countries (9). Cancer is specified as "all sites excluding non-melanoma skin cancer" (C00-C97/C44). 6th graph: Serbian Cancer Registry for 2018-2022 (8), Ferlay et al. (2018) for EU in 2018 (103) and ECIS for 2022 (9). Future numbers for 2025-2040 for Serbia are estimated from the relative growth in crude rates reported by IARC-Globocan (104) that are applied to the 2022 crude rates from the Serbian Cancer Registry (8); for EU in 2025-2040 estimates from ECIS were used (10). Cancer is specified as "all sites excluding non-melanoma skin cancer" (C00-C97/C44). **For dashboard overview:** • Incidence crude rate per 100,000 inhabitants in 2022, All sites but non-melanoma skin cancer. Registered data from the Serbian Cancer Registry and estimated data for EU27 (8, 9). • Mortality crude rate per 100,000 inhabitants in 2022, All sites but non-melanoma skin cancer. Registered data from the Serbian Cancer Registry and estimated data for EU27 (8, 9).
Deaths (mortality)	
Survival rates	1st graph: Survival rate = 1 – mortality-to-incidence. Incidence and mortality (absolute numbers) were sourced from the Serbian Cancer Registry for Serbia (8) and from ECIS for the EU (9). **For dashboard overview:** Not applicable.
Economic burden	
Health spending on cancer	1st graph: Hofmarcher et al. (2020) (14). 2nd & 3rd graph: Eurostat (15). Health care expenditure by financing scheme. Specification: financing schemes = All financing schemes, Government schemes and compulsory contributory health care financing schemes. 2023. PPP standards per capita (left graph) - Percentage of gross domestic product (GDP) (right graph). Weighted EU average. 4th graph: New calculations for Serbia for 2015 and 2023 based on cancer death data from Eurostat (2), and methodology as described in Manzano et al. (2025) (18); 2015 data for other countries was previously unpublished. 5th graph: Manzano et al. (2025) (18). **For dashboard overview:** • Estimated healthcare spending on cancer care per capita in EUR in 2023 (PPP-adjusted) (15-18). • Number of potential years of working life lost (PYWLL) due to premature cancer death per 100,000 inhabitants aged 15–64 in 2023 (18).
Productivity losses from cancer	
Prevention	
Tobacco smoking	1st graph: Eurostat (30). Daily smokers of cigarettes by sex, age and educational attainment level. Specification: Daily smokers total, all education levels, all sexes, 2019. Weighted EU average. 2nd graph: Eurostat (31). Purchasing power parities (PPPs), price level indices and real expenditures for ESA 2010 aggregates. Specification: Price level indices (EU27_2020=100), analytical categories = tobacco, 2014-2024. Weighted EU average. **For dashboard overview:** Daily smokers of cigarettes in 2019 (30).
Alcohol consumption	1st graph: WHO (35). Alcohol, total per capita (15+) consumption (in liters of pure alcohol) (SDG Indicator 3.5.2). Specification: 2010-2022. Unweighted EU average. 2nd graph: Eurostat (36). Frequency of alcohol consumption by sex, age and educational attainment level. Specification: all ages, frequency = sum of every day & every week, all education levels, 2019. Weighted EU average. 3rd graph: Eurostat (37). Frequency of heavy episodic drinking by sex, age and educational attainment level. Specification: all ages, at least once a week, all education levels, both sexes, 2019. Weighted EU average. **For dashboard overview:** Reduction in per capita alcohol consumption (liters) in 2022 relative to 2010 levels (35).
HPV vaccination	1st graph: WHO (42). Human Papillomavirus (HPV) vaccination coverage. Specification: HPV vaccination program coverage, last dose, females. Unweighted EU average, without data for Greece. 2nd graph: WHO (42). Human Papillomavirus (HPV) vaccination coverage. Specification: HPV vaccination program coverage, last dose, males. Unweighted EU average, without data for Bulgaria and Greece. **For dashboard overview:** HPV vaccination program coverage, last dose, girls in 2024 (42).
Early detection	
Breast cancer screening	1st & 2nd graph: Eurostat (51). Self-reported last breast examination by X-ray among women by age and educational attainment level. Specification: Women, ages 50-69, within "less than 2 years", 2019. Weighted EU average. 3rd graph: Eurostat (52). Specification: Preventive cancer screenings - programme data; Malignant neoplasm of breast; Females. Numbers show the share of women who have been screened for breast cancer within the past two years (or per national screening interval), presented as a proportion of

	those eligible for an organized program in the given country. Data unavailable for BG, PT, and RO for all years. Unweighted EU average. **For dashboard overview:** Self-reported breast cancer screening rate in 2019 (51).
Cervical cancer screening	1st & 2nd graph: Eurostat (58). Self-reported last cervical smear test among women by age and educational attainment level. Specification: Women, ages 20-69, within "less than 3 years", 2019. Weighted EU average. 3rd graph: Eurostat (52). Specification: Preventive cancer screenings - programme data; Malignant neoplasm of cervix uteri; Females. Numbers show the share of women who have been screened for cervical cancer within the previous three years (or per national screening interval), presented as a proportion of those eligible for an organized program in the given country. Data unavailable for AT, BG, CY, EL, ES, HR, and PT for all years. Unweighted EU average. **For dashboard overview:** Self-reported cervical cancer screening rate in 2019 (58).
Colorectal cancer screening	1st & 2nd graph: Eurostat (63). Self-reported last colorectal cancer screening test by sex, age and educational attainment level. Specification: Both sexes, ages 50-74, within "less than 2 years", 2019. Weighted EU average. 3rd graph: Eurostat (52). Specification: Preventive cancer screenings - programme data; Malignant neoplasm of colon, rectosigmoid junction, rectum, anus and anal canal; males and females ("Total"). Numbers show the share of men and women who have been screened for colorectal cancer within the past two years (or per national screening interval), presented as a proportion of those eligible for an organized program in the given country. Data unavailable for AT, BG, CY, EL, PL, PT, and RO for all years. Unweighted EU average. **For dashboard overview:** Self-reported colorectal cancer screening rate in 2019 (63).
Diagnosis and treatment	
Comprehensive cancer centers	1st graph: Number of centers and organizations based on OECI membership status (69). For calculations of numbers per 1 million inhabitants, Eurostat population data on 1 January 2025 were used (105). Table: OECI (69). Number of OECI-affiliated centers and organizations as of October 2025. **For dashboard overview:** Number of OECI-affiliated centers and organizations per 1 million inhabitants in 2025 (69).
Workforce	1st graph: Eurostat (73). Health personnel. Specification: Practising; Physicians; per hundred thousand inhabitants. Unweighted EU average with missing data for Greece, Portugal, Slovakia and missing values in certain years for other countries approximated by latest available year. 2nd graph: Eurostat (74). Physicians by category. Specification: Generalist medical practitioners; per hundred thousand inhabitants. Unweighted EU average with missing data for Slovakia and missing values in certain years for other countries approximated by latest available year. 3rd graph: Eurostat (75). Physicians by medical speciality - historical data (1985-2016); Radiology, Haematology, Pathology; per hundred thousand inhabitants. Unweighted EU average with missing data for Czechia, Denmark, Hungary, Finland, Sweden, and Slovakia for all specialties and Netherlands for hematology. 4th graph: Eurostat (73). Health personnel. Specification: Practising; Nurses (EU recognised qualification); per hundred thousand inhabitants. Unweighted EU average with missing data for Portugal and Slovakia and missing values in certain years for other countries approximated by latest available year. **For dashboard overview:** Mean of the two relative differences in practicing physicians and nurses per 100,000 inhabitants in 2023 (73).
Diagnostic imaging equipment	1st graph: Data from 2nd and 3rd graphs. See below. 2nd graph: Eurostat (82). Devices for medical imaging. Specification: Hospitals and providers of ambulatory health care; Computed Tomography Scanners, Magnetic Resonance Imaging Units, and PET scanners; per 100,000 inhabitants. For countries missing data for "Hospitals and providers of ambulatory health care", either data for "Hospitals" or "Providers of ambulatory health care" were used. Unweighted EU average. 3rd graph: Eurostat (83). Medical technologies - examinations by medical imaging techniques (CT, MRI and PET). Specification: Hospitals and providers of ambulatory health care; per 100,000 inhabitants. For countries missing data for "Hospitals and providers of ambulatory health care", either data for "Hospitals" or "Providers of ambulatory health care" were used. Unweighted EU average with missing data for Ireland and Sweden. **For dashboard overview:** Sum of the number of CT, MRI, PET scanners per 100,000 inhabitants in 2023 (82).
Radiation therapy equipment	1st graph: Eurostat (82). Devices for medical imaging. Specification: Hospitals and providers of ambulatory healthcare; Radiation therapy equipment; per 100,000 inhabitants. For countries missing data for "Hospitals and providers of ambulatory health care", either data for "Hospitals" or "Providers of ambulatory health care" were used. Unweighted EU average with missing data for the Netherlands and missing values in certain years for other countries approximated by latest available year. 2nd graph: IAEA DIRAC (90). Linac = "MV therapy (He Photon And Electron Beam Rt)", Brachytherapy = "Brachy Therapy Incl El". Data for Kosova were removed. Data for 2025 or latest available year. Population data were sourced from Eurostat (105). Weighted EU average. 3rd graph: own calculations based on IAEA DIRAC (90). Linac = "MV therapy (He Photon And Electron Beam Rt)". Data for Kosova were removed. Data for 2025 or latest available year. Cancer incidence (all sites excluding non-melanoma skin) data from 2022 were sourced from ECIS (9). Weighted EU average.

	For dashboard overview: Number of linacs per 450 newly diagnosed cases in 2025 (9, 90).
Novel cancer medicines	1st graph: EFPIA Patients W.A.I.T. Indicator Survey (93, 106-110). Specification: Oncology medicines; availability rate (%). Data in 2020-2021 not available for CY, LU, and MT. Unweighted EU average. For most countries, local availability is defined as the inclusion of a medicine centrally approved by the EMA in a national or regional public reimbursement list. The year 2020 refers to EMA medicine approvals in 2015-2018; 2021 to 2016–2019; 2022 to 2017–2020; 2023 to 2018–2021; 2024 to 2019–2022; and 2025 to 2020–2023. The EFPIA data only refer to new medicines and not new indications of already approved medicines. 2nd graph: EFPIA Patients W.A.I.T. Indicator Survey (93, 106-110). Specification: time to availability (days); see notes above. The time to availability is not comparable between Serbia and other countries, because it is measured from the time of regulatory approval (ALIMS for Serbia, EMA for EU countries) until local reimbursement. **For dashboard overview:** Reimbursement rate of novel cancer medicines in 2025 (93).
Survivorship	
Palliative care services	1st graph: EAPC Atlas of Palliative Care (98). Palliative care specialised services per 100,000 inhabitants, p.71. Unweighted EU average. 2nd graph: ESMO website (66). ESMO Accredited Designated Centers. Population data were sourced from Eurostat (105). **For dashboard overview:** Number of specialized palliative care services per 100,000 inhabitants in 2025 (98).


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