Cancer Dashboard for Serbia – Lung Cancer

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THE SWEDISH INSTITUTE FOR HEALTH ECONOMICS
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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.

At the beginning of 2026, IHE already published a dashboard report for Serbia that focused on cancer care in general. This new report focuses on lung cancer. It seeks to support Serbian policymakers in the decision-making and prioritization of initiatives in lung 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

Lung cancer remains one of Serbia's most urgent public health challenges. It is the leading cause of cancer-related death among men and, since 2024, also among women. More than 6,400 people are diagnosed each year, while almost 4,850 die from the disease. The burden is particularly pronounced in Belgrade and Vojvodina, which record the country's highest incidence and mortality rates. These figures call for a coordinated national response combining prevention, earlier detection, timely diagnosis, and equitable access to modern treatment.

The *Cancer Dashboard for Serbia – Lung Cancer*, prepared by the Swedish Institute for Health Economics, provides a timely assessment of the situation. Building on the broader Cancer Dashboard for Serbia published earlier in 2026, it examines the entire lung cancer pathway – from tobacco control and environmental risks to screening, diagnostics, treatment, and palliative care. Comparisons with neighboring countries and European benchmarks highlight both recent progress and the areas requiring urgent action.

Serbia has important foundations on which to build. Diagnostic imaging capacity has expanded and waiting times for radiation therapy have fallen. Particularly encouraging are the regional lung cancer screening initiatives. The program launched by the Institute for Pulmonary Diseases of Vojvodina in 2020 showed that low-dose computed tomography can substantially increase the proportion of cancers detected at an early stage. Screening has since been introduced in Belgrade and other parts of the country, providing valuable experience for a future national program.

Nevertheless, major challenges remain. Smoking prevalence is still among the highest in Europe, while air pollution contributes substantially to the disease burden. Most patients are diagnosed at an advanced stage, when treatment is more complex and survival prospects are poorer. Diagnostic pathways and waiting times vary between institutions, biomarker testing remains concentrated in few centers, availability of novel therapies should be brought in line with international clinical guidelines, and shortages of specialized professionals and limited palliative care capacity place additional pressure on patients and families.

Addressing these challenges requires a clearly funded National Cancer Control Plan, complemented by a dedicated lung cancer strategy, measurable objectives, standardized patient pathways, and regular public reporting. Regional expertise and successful local initiatives should be connected within a national framework so that patients receive the same standard of care regardless of where they live. Strengthening the Serbian Cancer Registry will also be essential.

This dashboard provides a valuable evidence base for action. We hope its findings will support cooperation among policymakers, healthcare professionals, patient organizations, and other stakeholders. Through decisive action across prevention, screening, diagnosis, treatment, and supportive care, Serbia can reduce the burden of lung cancer and achieve better and more equitable outcomes for patients throughout the country.

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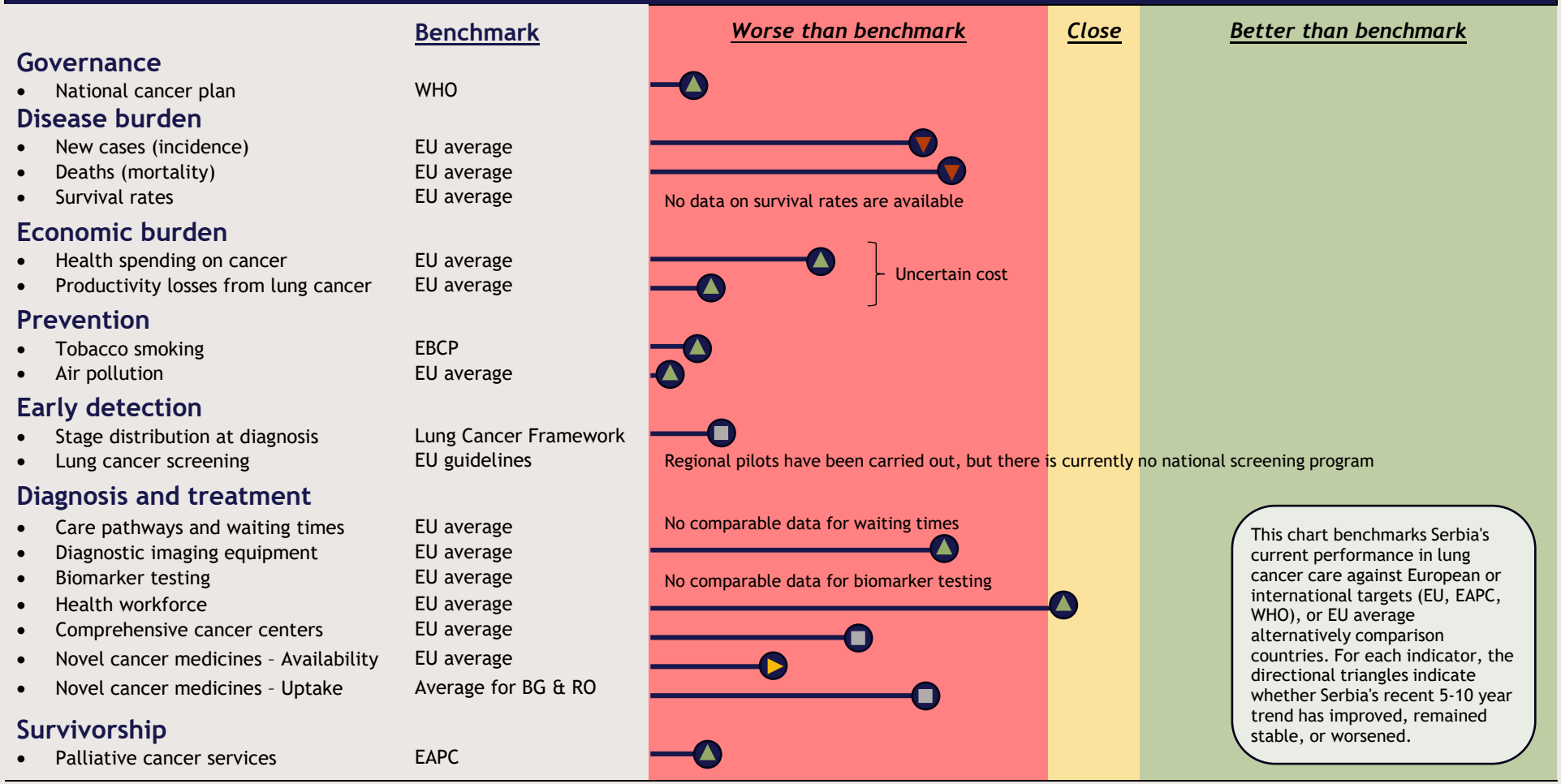
Dashboard overview Serbia – Lung cancer

Comparative Performance: Serbia vs. Benchmark



Legend: ▲ Positive development, ▶ Stable development, ▼ Negative development, ▢ No data or not applicable

Abbreviations: BG = Bulgaria, EAPC = European Association for Palliative Care, EBCP = Europe's Beating Cancer Plan, EU = European Union, RO = Romania, 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 measurable objectives and dedicated funding for priority cancer types, including lung cancer. 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

- ✓ Continue strengthening the Serbian Cancer Registry. The focus should be on improving the completeness of reporting and including statistics on survival rates and stage at diagnosis in order to support monitoring of outcomes, regional disparities, and policy impact.
- ✓ Continue increasing cancer-related healthcare spending aligned with prioritizing gaps in high-impact areas such as early detection, diagnostics, novel therapies, and care coordination.

Prevention

- ✓ Improve enforcement of existing indoor smoking bans and expand them to more locations, raise excise taxes for cigarettes along with implementing targeted awareness and smoking cessation programs, particularly for young people and other high-risk populations.
- ✓ Reduce environmental risk factors by aligning national air quality standards with WHO recommendations, improving monitoring systems across the whole country, and increasing investments in cleaner technologies and infrastructure to reduce harmful emissions.

Early detection

- ✓ Develop a national organized lung cancer screening program for high-risk populations, based on the evaluation of ongoing pilot programs and supported by national screening guidelines to enable a future nationwide rollout.
- ✓ For the national screening program, establish a national lung cancer screening registry with reporting of participation, stage at diagnosis, and outcomes.

Diagnosis and treatment

- ✓ Develop and regularly update national evidence-based guidelines for the diagnosis and treatment of lung cancer.
- ✓ Establish standardized national cancer care pathways with waiting time targets, strengthen referral systems, and systematically monitor delays across regions and hospitals.
- ✓ Strengthen comprehensive cancer centers and support multidisciplinary treatment approaches aligned with international standards.
- ✓ Develop capacity for biomarker testing throughout the country and expand test reimbursement in line with reimbursed medicines to ensure equitable and timely access to high-quality care.
- ✓ Accelerate access to novel guideline-recommended and cost-effective cancer medicines and ensure appropriate prescription of reimbursed medicines to all eligible patients.

Survivorship

- ✓ Strengthen palliative care capacity and integrate early palliative care into lung cancer pathways to improve quality of life and support for patients and families.

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, Croatia, Denmark, Finland, Greece, Italy, Lithuania, Poland, Portugal, and Serbia. 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.

The IHE Cancer Dashboard for Serbia, published in January 2026, provides a general overview of cancer care in the country (3). Building on this work, the current dashboard turns the focus to lung cancer in Serbia. It follows similar examples of lung cancer-specific dashboards in Denmark and Poland (4, 5).

Lung cancer

Lung cancer is the leading cause of cancer-related death in both men and women in Serbia (6). In 2024, it accounted for 6,424 new diagnoses (17% of all new cancer cases) and 4,842 deaths (24% of all cancer deaths). Men account for a higher proportion of new cases and deaths than women. Lung cancer however represents a growing burden for women, as it – for the first time - became the leading cause of cancer-related mortality in women in 2024, surpassing breast cancer (6).

Major opportunities exist to reduce the burden of lung cancer, particularly through prevention, earlier detection, and the adoption of effective novel medicines (7). For instance, tobacco smoking remains by far the leading risk factor, and organized population-based screening for high-risk individuals offers the potential to identify cases at an earlier, more treatable stage. Lung cancer is also the cancer type that saw one of the highest numbers of approvals of new medicines by the European Medicines Agency (EMA) in the last 15 years (8).

Structure of the dashboard and choice of indicators

This report begins with an overview of governance frameworks relevant to lung cancer, including Serbia's former National Cancer Control Plan (NCCP), Europe's Beating Cancer Plan (EBCP), and initiatives by the World Health Organization (WHO). It then provides an analysis of the disease burden and economic burden of lung cancer, highlighting the impact of the disease on patients, the healthcare system, and society at large. These contextual elements underscore the urgency of national-level action. The report then follows the lung cancer care pathway, structured around the four pillars of the EBCP. Taken together, the dashboard presents a comprehensive overview of the current status of lung 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** (2 indicators): Tobacco smoking, air pollution (outdoors)
- **Early detection** (2 indicators): Stage distribution of lung cancer, screening for lung cancer
- **Diagnosis and treatment** (7 indicators): Waiting times and care pathways, imaging equipment and availability of AI-supported tools in radiology, biomarker testing, health workforce, comprehensive cancer centers, lung cancer medicines – availability, lung cancer medicines - uptake
- **Survivorship** (1 indicator): Palliative care services

The starting point for the selection of indicators was the previous IHE Cancer Dashboards focusing on lung cancer for Denmark and Poland (4, 5), as well as forthcoming work on a global lung cancer care monitoring framework led by IHE. The final set of indicators was selected based on discussions with Dr. Zoran Andrić, Ms. Olja Ćorović (Udruženje Punim Plućima), Prof. Jelena Djekić Malbaša, Dr. Nikola Maric, MSD Serbia, and local data availability. All of the aforementioned local experts together with Dr. Mihailo Stjepanović also provided feedback on the initial draft of the report.

For each indicator across the lung 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.

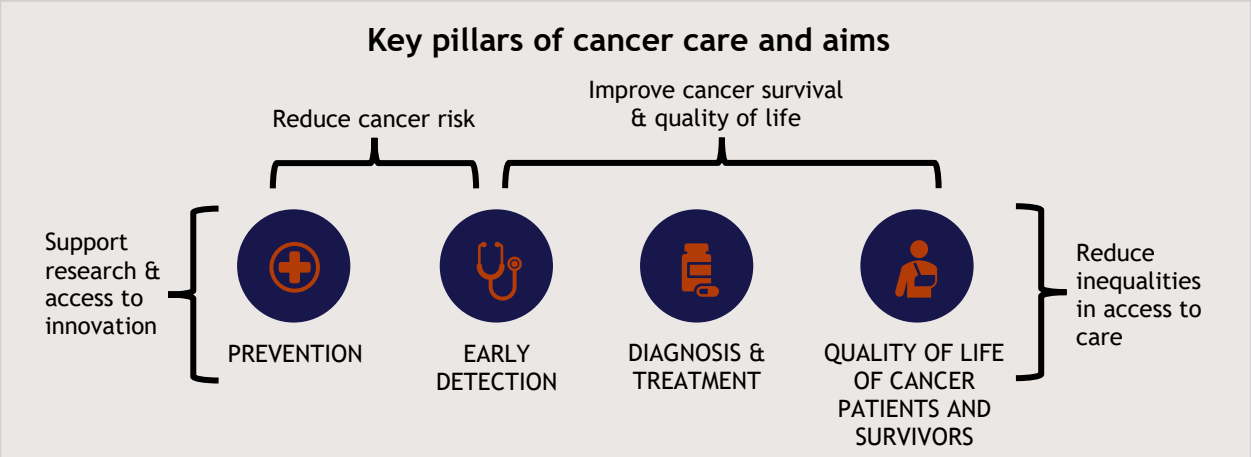
Governance of lung cancer care in Serbia

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 (9). 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. With regard to lung cancer screening, however, the need for stronger scientific evidence ensuring the cost-effectiveness of an implementation is emphasized.
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]. Furthermore, a lung cancer specific strategy is also under preparation during 2026 according to local experts interviewed for this dashboard.

Another key document is the Serbian Public Health Strategy for the period 2018-2026 (10), 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. Preventing and reducing tobacco use and exposure to tobacco smoke are among the measures cited as contributing to improved health and reduced health inequalities.



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 above) (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 (11). 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.

The EBCP not only prioritizes comprehensive cancer control but also stresses the importance of research and innovation in cancer care. It supports projects like the EU4Health Program's SOLACE project to refine lung cancer screening protocols (12). 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.

Initiatives by the World Health Organization (WHO)

In 2017, the World Health Assembly (WHA) (the decision-making body of the World Health Organization, WHO) adopted resolution WHA70.12 on cancer prevention and control (13). 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.

In 2025, the WHA adopted resolution WHA78.5 on lung health (14). This resolution, addressing both communicable and non-communicable lung diseases, encourages Member States to develop or consolidate comprehensive, integrated approaches to lung health, centered on primary care as the first point of contact. Recognizing air pollution as a major risk factor for lung diseases, and radon exposure as one of the leading causes of lung cancer after smoking, it urges Member States to intensify efforts to prevent smoking and vaping, reduce exposure to air pollution, and strengthen national air quality standards. The resolution also underscores the importance of implementing cost-effective interventions and ensuring access to affordable, cost-effective health products.

Apart from WHO-led initiatives, several recent international efforts to improve lung cancer care have been established. This includes the Lung Cancer Collaboration (LCC), launched as a partnership of the Lung Ambition Alliance (LAA) and the World Economic Forum (WEF) and now with a secretariat hosted by the Union for International Cancer Control (UICC), the Global Lung Cancer Coalition, and the Lung Cancer Policy Network (15). The LCC is now a multi-stakeholder cross-sectoral collaboration aiming to double five-year survival in lung cancer by 2030, in line with the broader goal of reducing premature deaths from non-communicable diseases by one-third by 2030, the focus of the United Nations' (UN) Sustainable Development Goal (SDG) 3.4.

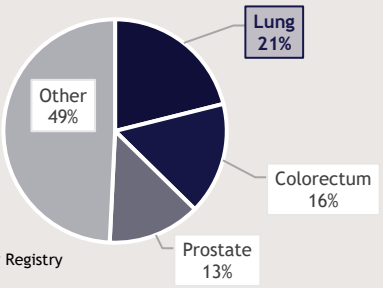
In addition, the 9th International Lung Cancer Network conference (Athens, June 2023), and resulted in the creation of a "Lung Cancer Consensus Statement: Bridging the Gap in the Diagnosis & Management of Lung Cancer" (7). This consensus centered around five principles of "Improving and expanding prevention", "Focusing on early detection", "Ensuring equitable and sustainable access to treatment", "Building partnerships and promote investment", "Combatting stigma, recognizing it as a social determinant of public health". Until the end of 2025, 20 organizations worldwide had formally endorsed the Consensus Statement, and support continues to grow.

Incidence and mortality

In 2024, 6,424 new cases of lung cancer (4,246 men and 2,178 women) were reported in the Serbian Cancer Registry (6), making it the most commonly diagnosed cancer in men and the second most commonly diagnosed cancer in women. Lung cancer, which is accounting for 24% of all cancer deaths overall, remains the leading cause of cancer-related mortality in men and, as of 2024, has also become the leading cause of cancer death in women, surpassing breast cancer. In 2024, it was responsible for 4,842 deaths, including 2,998 men and 1,844 women (28% and 20% of cancer deaths in men and women, respectively).

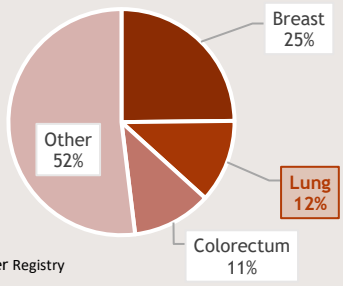
The standardized incidence rate of lung cancer differs also significantly by region (6). It is higher in the Northern Region of Serbia (Belgrade and Vojvodina Regions), reaching 70 per 100,000 men, compared with 50 per 100,000 men in the Southern Region (Šumadija and Western, Southern and Eastern Serbia Regions). This difference is also observable in women, with a standardized incidence rate of 32 per 100,000 women in the Northern Region compared to 22 per 100,000 women in the Southern Region. The standardized lung cancer mortality rate followed a similar pattern, being higher in the North than in the South. Just as for the incidence rate, the Belgrade (45 and 26 per 100,000 men and women respectively) and Vojvodina (38 and 20 per 100,000 men and women respectively) Regions exhibit the highest mortality rates in both sexes.

Cancer incidence among men in Serbia in 2024
Number of new lung cancer cases: 4,246



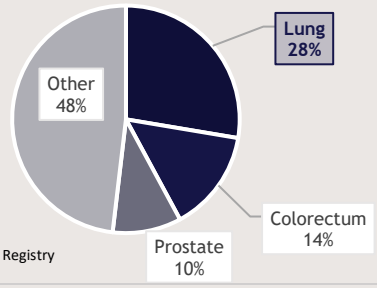
Source: Serbian Cancer Registry

Cancer incidence among women in Serbia in 2024
Number of new lung cancer cases: 2,178



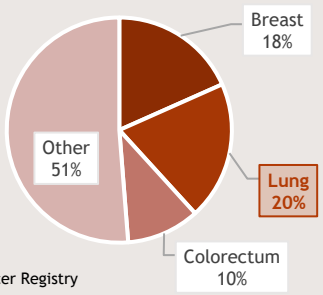
Source: Serbian Cancer Registry

Cancer mortality among men in Serbia in 2024
Number of lung cancer deaths: 2,998



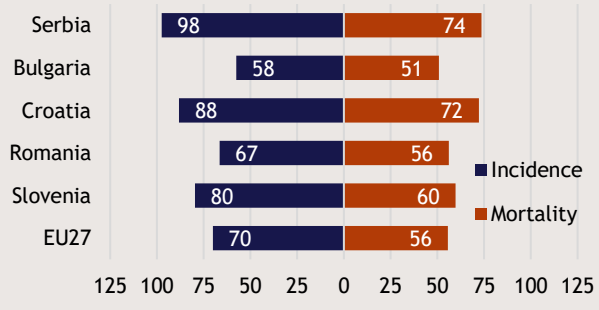
Source: Serbian Cancer Registry

Cancer mortality among women in Serbia in 2024
Number of lung cancer deaths: 1,844



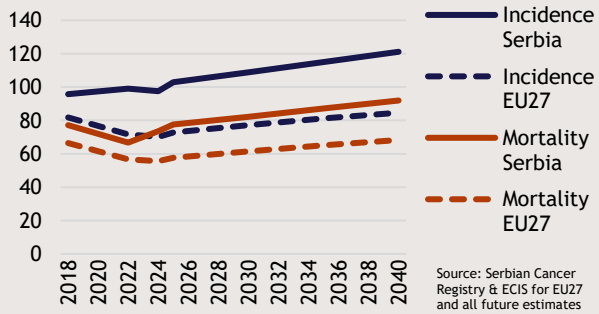
Source: Serbian Cancer Registry

Lung cancer incidence and mortality per 100,000 inhabitants (crude rates) in 2024, both sexes



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

Lung 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

The burden of lung cancer in Serbia substantially exceeds the EU average and that of neighboring countries, with an incidence rate of 98 cases per 100,000 inhabitants in 2024 (6). Although also above the EU average, estimates for incidence rates in Croatia and Slovenia remain considerably lower than in Serbia (16). With regard to lung cancer mortality rates, Serbia lies above the EU average, with 74 lung cancer deaths per 100,000 inhabitants. Among the comparator countries, only Bulgaria lies below the EU average with 51 deaths per 100,000 inhabitants.

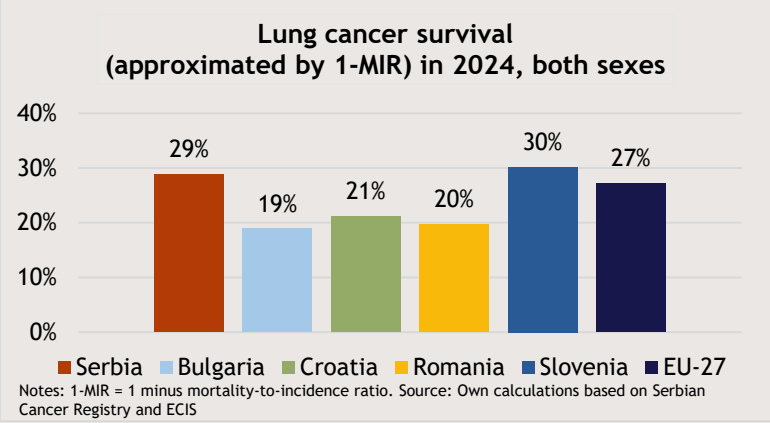
Projections based on expected demographic trends and continued population aging indicate that both lung cancer incidence and mortality will increase in Serbia, following patterns similar to those observed in the EU (17). Between 2025 and 2040, the incidence rate (per 100,000) is projected to rise by 18%, while mortality is expected to increase by 19% (18).

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 (19). Survival rates are also not published in the annual reports of the Serbian Cancer Registry (6), which makes it difficult to assess the most relevant patient outcome and thereby the quality of the cancer care system. Regional data from a retrospective registry study conducted in Vojvodina nevertheless revealed low survival rates for various subtypes of lung cancer over the 2010-2022 period, with a five-year survival rate of 7.4% for squamous carcinoma, 6.8% for adenocarcinoma and 1.9% for small-cell carcinoma (20). Looking at other countries, the Serbian five-year survival rates appear markedly low. In Croatia, the rate was 18.1% in the period 2019-2023 (21), while in Slovenia it ranged from 22.6% for men to 32.2% for women in the period 2018-2022 (22).

A proxy measure for survival rates is the complement of the mortality-to-incidence ratio (1-MIR). In 2024, the calculated 1-MIR for Serbia was 29%, based on age-standardized incidence and mortality data for bronchus and lung cancer obtained from the Serbian Cancer Registry (6). The Serbian 1-MIR for lung cancer not only exceeds the EU average (27%) (16), but is also higher than in three of the four comparison countries, with Slovenia displaying the highest ratio (30%). The Serbian 1-MIR has increased steadily over time, rising from 18% in 2016 to its 2024 level, which could indicate improved performance across the cancer care pathway.

Even though the Serbian 1-MIR estimates are above the EU average, they should be interpreted with caution, as several limitations of the 1-MIR measure have been pointed out in the literature (23), and the provision of survival rates should be a priority. Furthermore, as shown by the international comparison of incidence and mortality rates above, significant improvements remain to be made in Serbia to enhance patient outcomes and reduce the overall burden of lung cancer.



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

Recommendations

- Continue to develop the Serbian Cancer Registry by estimating survival rates for all cancer types, including lung cancer and include this information in the annual reports to allow for a better assessment of patient outcomes.
- Maintain the newly exhibited pace in reporting the latest statistics about cancer, which enables fast 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.
- Examine the regional differences in lung cancer incidence and identify root causes for those differences in order to develop an action plan to tackle these regional differences.

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 EUR 199 billion in 2018, corresponding to EUR 378 per capita (24). 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.

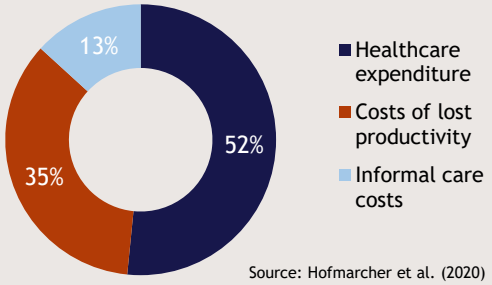
The overall economic burden of cancer consists of:

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

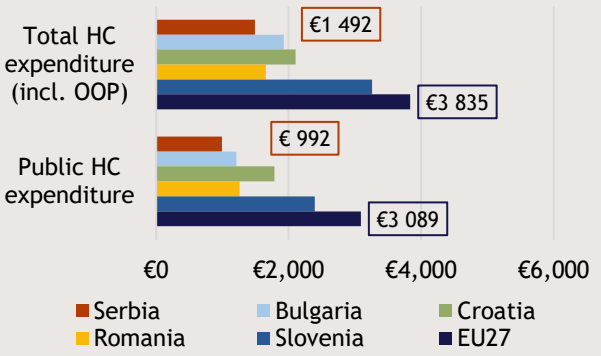
Composition of the economic burden of cancer in Europe in 2018



Source: Hofmarcher et al. (2020)

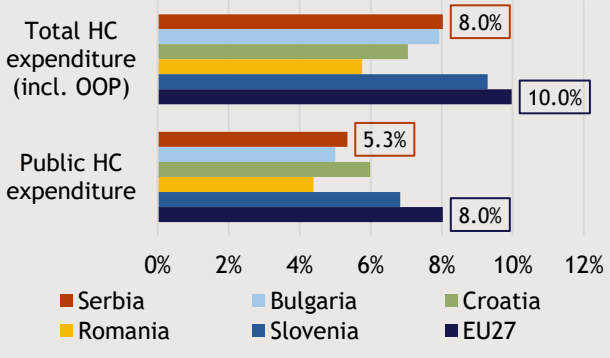
Serbia spent EUR 1,492 per capita (PPP-adjusted; EUR 912 non-PPP-adjusted) on healthcare (public and private) in 2023, which was the lowest level of all comparator countries. The estimate is less than half of the EU average of EUR 3,835 (25). The same pattern is observable in public healthcare expenditure per capita. Serbia once again ranks lowest with EUR 992, which is only one third of the EU average of EUR 3,089 (25). In relation to the size of the economy, Serbia spent 8.0% of its GDP (equivalent to RSD 708 billion) on healthcare, and public expenditure corresponded to 5.3% of the GDP (equivalent to RSD 471 billion), which was a similar relative level as Bulgaria but lower than Slovenia and the EU average (25). 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 (26).

Healthcare expenditure per capita, PPP-adjusted in 2023



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

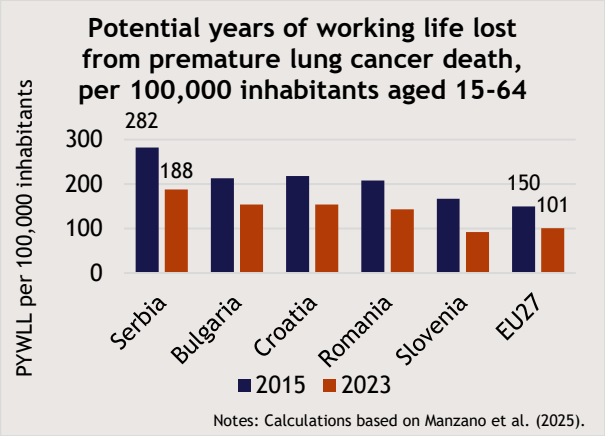
Healthcare expenditure as % of GDP in 2023



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 (27). Until 2017, cancer care spending by the RFZO increased to 23.8 billion or 11.6% public healthcare expenditure (27). Given that the public share of total health expenditure in 2017 was around 57% according to WHO data (26) 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 (24). 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 (8). 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) (8).

Costs of productivity loss from lung 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 leave and early retirement (8). In Serbia, the number of potential years of working life lost (PYWLL) from premature lung cancer death (between age 15-64) was 282 PYWLL per 100,000 inhabitants in 2015 and decreased by 33% to 188 PYWLL per 100,000 in 2023. All other comparator countries had lower levels of PYWLL in both 2015 and 2023, and Serbian estimates were almost twice as high as the EU average (8).

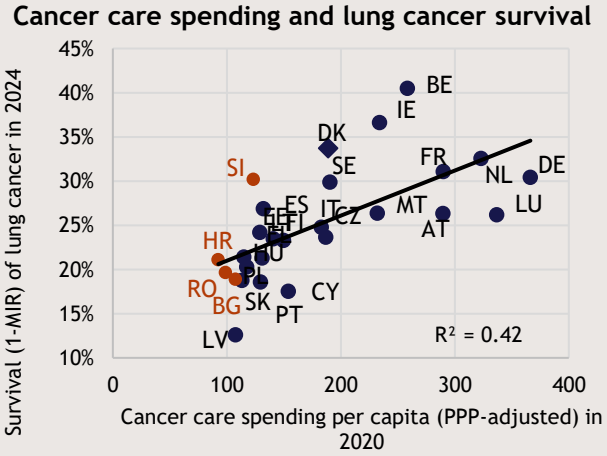


Notes: Calculations based on Manzano et al. (2025).

The macroeconomic impact of lung cancer has also been estimated for Serbia through the value of lost welfare (VLW), integrating disability-adjusted life years (DALYs) to the value of a statistical life (VSL). The Serbian VLW amounted to USD 383 million in 2021, representing roughly 0.58 % of its annual GDP ((28)), while comparison countries' VLW ranged between 0.23% and 0.45 % of their annual GDP, underlining the higher economic burden of lung cancer 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 in lung cancer across European countries; see Manzano et al. (2025) for clarification on methodology (8). 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, Bulgaria and Romania achieve a survival level that is in line with their comparatively low spending level, whereas Slovenia achieves a comparatively high survival rate given its 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 (29, 30).



Source: own calculations based on the methodology used by Manzano et al. (2025)
Notes: No data for Serbia; MIR = mortality to incidence ratio based on age-standardized rates

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, and screening programs requiring additional resources to be implemented. 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, out-of-pocket expenditures, 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.

Case study: Health-economic benefits of early detection in lung cancer

The detection of lung cancer in an early stage - when the tumor is still small and has not spread across the body - provides the best chances for survival, provided effective treatment is received after the diagnosis (1). However, even patients who are diagnosed at an early stage are by no means guaranteed to survive their disease (31). Treating lung cancer in early stages is associated with significantly lower costs, both direct and indirect costs (32, 33).

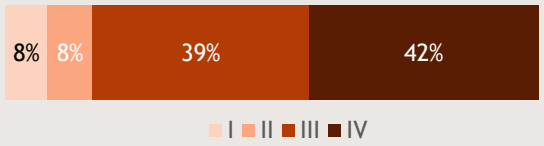
The initial treatment of early-stage lung cancer usually involves surgery to remove the tumor. In recent decades, radiation therapy was used following surgery (but sometimes also preceded it) to destroy any remaining cancer cells. Yet during the last few years, novel cancer medicines used before and/or after surgery have become another treatment option. However, after the initial treatment is completed and a patient is declared cancer-free, the cancer may come back (called "recurrence" or "relapse"). Cancer recurrence is relatively common after completing initial treatment and up to 5 years after diagnosis (34). The importance of "treating better" in early-stage cancer has recently received new impetus by the regulatory approval of several immunotherapies and target therapies in lung cancer. Clinical trials of these medicines have demonstrated their ability to reduce the risk of cancer recurrence and improve overall survival (31).

Data on the stage distribution of lung cancer at diagnosis in the Serbian population is limited. A retrospective study on data of the lung cancer hospital registry of the Institute for Pulmonary Health of Vojvodina in Serbia found that the majority (more than 80%) of patients were diagnosed in stage III to IV for the period 2011 to 2020 (35, 36).

In terms of survival, there is no national Serbian data available reporting survival by stage of diagnosis. Data from Northern Serbia however reveal very low 5-year survival rates, ranging from 7.4% for all stages of squamous carcinoma to 1.9% for small-cell carcinoma (20). An English study reported the 5-year survival rate in stage I in England in the diagnosis period 2018-2022 to be 65% compared to only 5% in stage IV (37).

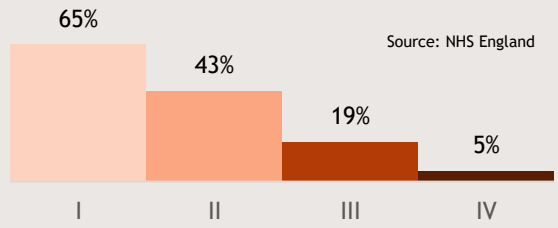
Data on treatment costs by disease stage for lung cancer in the Serbian setting are scarce. International evidence examining treatment costs across different stages of lung cancer suggest rising expenditures as the disease progresses, with particularly high and sustained costs observed in advanced stages (38-40). A study evaluating medical costs of lung cancer by stage and histology in the Netherlands demonstrated rising costs as the disease progresses into later stages (38). The average monthly costs for a patient in stage IA during the initial phase of care are EUR 3,228, while they reach up to EUR 8,293 for stage IV patients. This rising trend in the costs can be found in all phases of care, with significantly lower costs in earlier stages (IA-II) compared to later stages (III-IV). The study also found that in each stage of the disease, the costs for the initial and the terminal phase of care are the highest.

Stage distribution of lung cancer at diagnsosis in Vojvodina Region (2011-2020)



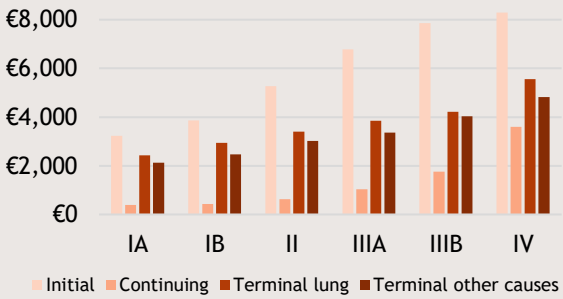
Source: Djekic Malbasa et al. (2023)
Notes: A small percentage was not indicated in the study, likely due to unknown stage at diagnosis.

5-year net survival of lung cancer by stage



Source: NHS England

Monthly lung cancer attributable costs by stage and phase of care



Source: de Nijs et al.

In summary, without a national screening program for lung cancer or improved earlier detection of symptoms in primary care in Serbia, a large proportion of patients will be diagnosed in later stages, where the survival prognosis is poor and treatment costs are high. First results from the national screening program for lung cancer in Croatia show promising results (27,000 CT scans during first round of screening, 47% of the cases were diagnosed in stage I-II) (41, 42). This demonstrates the feasibility of a national lung cancer screening program to improve patient outcomes.

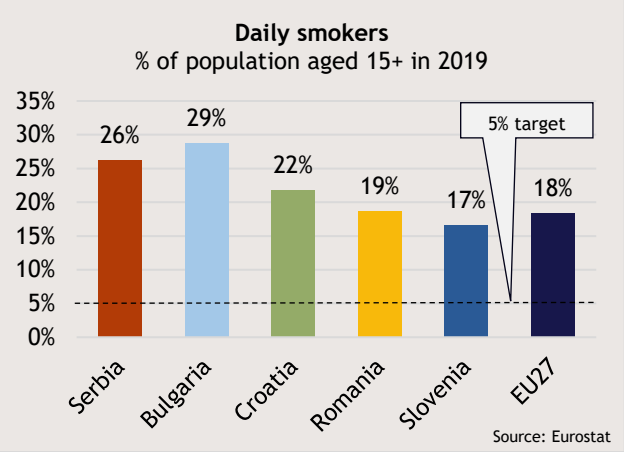
Prevention
Tobacco smoking

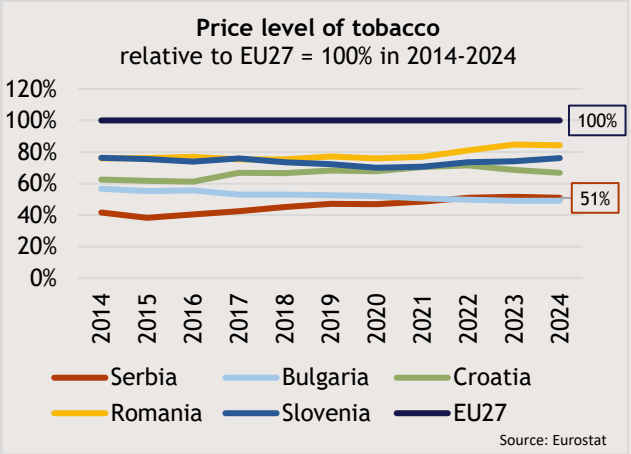
Background

- Tobacco smoking is a major risk factor for developing various cancer types (43), and it has been linked to cancers at 12 different sites (44). Around 80% of all lung cancer cases are linked to cigarette smoking (45).
- The WHO suggests that implementing tobacco control measures can prevent one in five annual cancer cases (46). 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 (47). 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 (48). 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% (9). The Serbian Public Health Strategy set a target of 10% for the reduction of the share of adult population smoking daily or occasionally and the population exposed to tobacco smoke in the workplace and public places (10). 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 (49).

Current status in Serbia

- To date, smoking in restaurants at designated spots in Serbia is still allowed (50) and surveys have shown that compliance of the smoking ban in workplaces and educational facilities is low (51). Cigarette packages must feature textual, but not graphic warnings, and packaging is not mandated to be plain (49).
- Data from the Serbian Institute of Public Health show a high smoking prevalence in 2023, with 37.9% of adults (18-64 years) smoking cigarettes or other tobacco products daily (34.1%) or occasionally (3.8%) (52). Cigarette daily smoking rates in 2019 show that Serbia had the second highest smoking prevalence among all comparator countries, after Bulgaria, and markedly above the EU average of 18% (53). However, national data show that the prevalence of daily and occasional smokers decreased by about 8 percentage points from 2010 to 2019 (51).
- 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) (49). 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 (54). 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 and meet the recommendation by the United Nations. This would also harmonize the Serbian tobacco policy with EU entry requirements.
- Implement targeted awareness and smoking cessation programs for high-risk groups (particularly young people) in order to achieve a sustainable reduction in smoking rates.

Prevention
Air pollution

Background

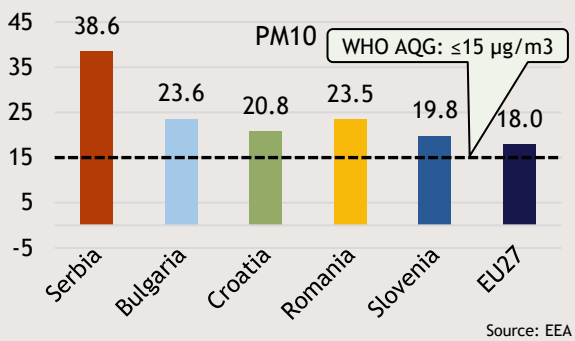
- According to the European Environment Agency (EEA), more than 10% of all cancer cases in Europe are caused by exposure to environmental and occupational risks including air pollution, second-hand smoke, radon, ultraviolet radiation, asbestos, and other pollutants (55). Air pollution alone (both indoors and outdoors) accounts for about 1% of all cancer cases in Europe and causes around 2% of all cancer-related deaths. For lung cancer specifically, the share of mortality linked to air pollution is considerably higher, estimated conservatively at 9% and more likely around 17% (56-58).
- The WHO updated its air quality guidelines (AQG) in 2021, designed to support the reduction of pollution through legislative and/or and technological measures (59). These guidelines recommend upper thresholds for long-term exposure to particulate matter: no more than 15 μg/m^3 for particulate matter 10 (PM_{10}) and 5 μg/m^3 for particulate matter 2.5 ($PM_{2.5}$).[1]
- The EBCP acknowledges the significant role that environmental and occupational hazards play in cancer development, emphasizing the importance of prevention strategies to save lives (1). Existing EU measures on air pollution controls include the National Emissions Reduction Commitments (NEC) Directive and the Ambient Air Quality Directives, which set strict air quality standards across countries (60).
- The Serbian NCCP 2020–2022 identified air pollution as one of the main risk factors for the development of malignant diseases (9). In 2022, the Air Protection Program 2022-2030 and accompanying action plan was adopted, aiming to half health damages due to air pollution by 2030 compared to 2015 (61). The new Law on Air Protection adopted in 2025 further strengthens the legal framework and aligns more closely with the EU (62).

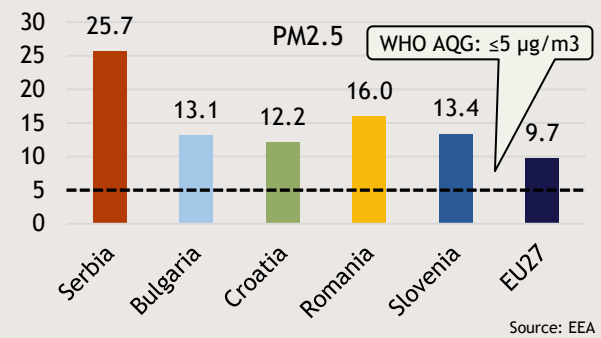
Current status in Serbia

- Industrial activities, transports and household heating are the main drivers of air pollution in Serbia (63). Despite a gradual reduction in fine particulate matter pollution between 2010 and 2019 (64), national data indicate regular exceedances of the authorized pollutant concentration levels in several urban areas (65), and a growing amount of the population living in agglomerations with poor air quality (61).
- Serbia has one of the highest air pollution burdens in Europe and displays the highest PM_{10} and $PM_{2.5}$ concentration of all comparison countries in 2024. According to data from the EEA, both the PM_{10} and $PM_{2.5}$ annual mean concentration in Serbia exceeded the WHO AQG recommendations, and lied well above the EU average and the comparison countries (66).
- Serbia experiences significant health impacts from particulate matter exposure. In 2023, $PM_{2.5}$ was associated with 188 deaths per 100,000 inhabitants — over three times as much as the EU average of 60 per 100,000 (67). This equated to 1,945 years of life lost (YLL) per 100,000 inhabitants in Serbia (vs. the EU average of 626 per 100,000). Looking at lung cancer specifically, $PM_{2.5}$ was responsible for 299 years of life lost (YLL) per 100,000 inhabitants in Serbia (vs the EU average of 100 per 100,000).

Particulate matter concentration

Numbers show annual mean concentration (μg/m^3) of particulate matter 10 (PM_{10}) and particulate matter 2.5 ($PM_{2.5}$), in 2024.





Recommendations

- Align national air quality standards with the 2021 WHO guidelines for PM10 and PM2.5.
- Increase investment in clean technology and infrastructure to reduce emissions.
- Improve monitoring coverage across the country to allow a better mapping of environmental and health damage linked to air pollutions.

[1] PM_{10} = particles less than 10 micrometers in diameter; $PM_{2.5}$ = particles less than 2.5 micrometers in diameter.

Early detection
Stage distribution at diagnosis

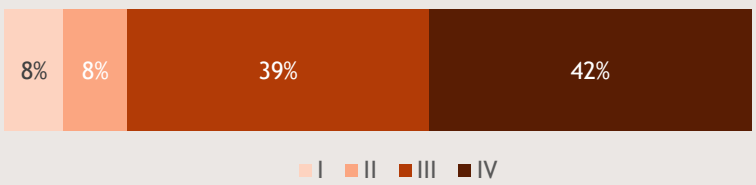
Background

- The stage distribution at diagnosis is a crucial indicator of the effectiveness of a healthcare system in detecting lung cancer early. Early-stage diagnosis significantly increases the chances of successful treatment and long-term survival. For instance, the five-year survival rate in stage I lung cancer was 65% compared to only 5% in stage IV in England in the diagnosis period 2018-2022 (37). General benchmarks for the ideal stage distribution at diagnosis for lung cancer do not exist, but the general aim is to have a large proportion of cases diagnosed at early, more treatable stages.
- The stage distribution at diagnosis for lung cancer has remained largely unchanged over the years. Around 50% of lung cancer patients in Europe are still diagnosed at a metastatic stage (68). Several factors contribute to this persistent pattern, including the asymptomatic nature of early-stage lung cancer, lack of public awareness, and potential delays in the care process (69). General practitioners (GPs) play a crucial role in early detection, and their awareness and understanding of the etiology and symptoms of the disease are essential for timely referral and diagnosis.
- The Serbian NCCP 2020-2022 primary purpose is to cure more patients by among other things preventing and detecting cancer early. The plan, however, highlights the insufficient use of evidence-based early detection methods that have proven effective in other developed countries.

Current status in Serbia

- There is a dearth of data regarding stage distribution in Serbia which limits its ability to assess early detection outcomes in the country. In settings without organized screening programs, lung cancer is typically diagnosed at locally advanced and metastatic stage.
- A retrospective study conducted on lung cancer hospital registry data of the Institute for Pulmonary Diseases of Vojvodina from 2011 to 2020 confirms the predominance (more than 80%) of advanced stages (stage III and IV) at diagnosis in the Vojvodina Region (36). This study also reveals that a statistically significantly larger proportion of women were diagnosed in the earlier stages of the disease, with 5.3% (vs. 3.1% of men) diagnosed in stage IA and 4.4% (vs. 3.5% of men) diagnosed in stage IB. These results captured stage at diagnosis before the implementation of the screening program in Vojvodina Region in 2020. As suggested by preliminary results of the regional pilot (see next section), its implementation has the potential to substantially shift stage at diagnosis towards earlier stages of lung cancer.

Stage distribution of lung cancer at diagnosis in Vojvodina Region (2011-2020)



Source: Djekic Malbasa et al. (2023)
Notes: A small percentage was not indicated in the study, likely due to unknown stage at diagnosis.

- According to a local expert, stage at diagnosis data is currently not published for any other region in Serbia.
- The large proportion of advanced cases at diagnosis and the strong association with smoking show that early detection of lung cancer requires more attention. Moreover, the diagnostic and staging process, which are key elements for early detection, can vary between institutions, both in time and technology availability, leaving margin for improvement (70).

Recommendations

- Improve early diagnosis by raising GP awareness of lung cancer symptoms through regular, mandatory training sessions in order to reduce time to specialist referral.
- Consider nationwide roll-out of organized lung cancer screening for current and former smokers following conclusion of current pilots; see next indicator for details.
- Improve monitoring of the stage distribution of lung cancer (and other cancer types) by including reporting of the stage at diagnosis in the cancer registry's protocol.

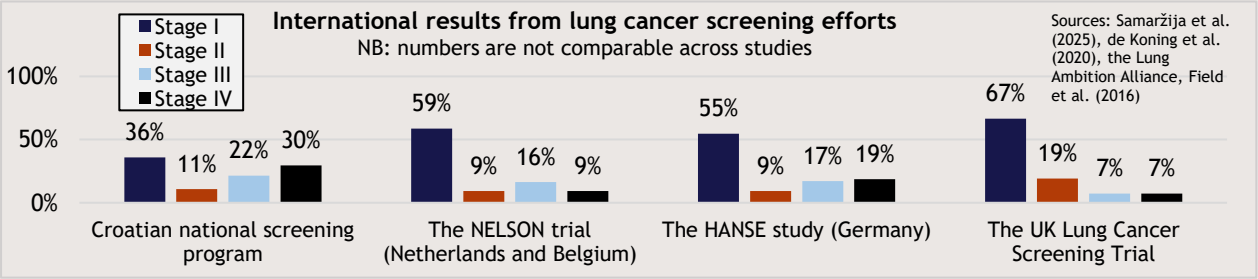
Early detection
Lung cancer screening

Background

- The detection of lung cancer at earlier stages results in higher survival rates and lower treatment costs (32, 71). Due to the mild and non-specific symptoms of lung cancer in early stages, the disease is diagnosed at a metastatic stage in around 50% or more cases (68). Results from several randomized controlled trials show that targeted screening of former and current heavy smokers with low-dose computed tomography (LDCT) leads to an extensive shift of patients to an earlier stage at detection and subsequent reduction in mortality by at least 20% (72, 73). The number needed to be screened to avoid one cancer death has been estimated to be around 130-220 individuals, which is considerably lower in comparison with breast cancer (645-1724 individuals) (72).
- The updated screening recommendation from the Council of the European Union advises countries to explore the feasibility and effectiveness of LDCT for lung cancer screening in high-risk populations, including heavy smokers and former smokers, while linking screening to primary and secondary prevention strategies (74). The 5th Edition of the European Code Against Cancer, published in 2025, further recommends implementing annual or biennial LDCT screening combined with smoking cessation interventions for these high-risk groups, and inviting the population to take part in it (75). In addition, EU countries are encouraged to conduct research on how to reach and invite the target group, as population registries do not contain information on people's past and current smoking behavior. To support the implementation and optimization of LDCT screening programs, a large EU project called SOLACE, funded under the EU4Health Program, is ongoing in multiple EU countries (73).
- Croatia was the first EU country to introduce a national lung cancer screening program in 2020 (76). Others have since then launched large-scale pilot programs or even started nationwide implementation (76-79).
- While supporting organized screening programs for breast, cervical and colorectal cancer, the Serbian NCCP stresses the need for stronger evidence on the effectiveness and cost-effectiveness of lung cancer screening (9).

Current status in Serbia

- No national lung cancer screening program has been implemented to date in Serbia, but several regionally or locally organized screening programs have been launched. The first pilot project of lung cancer screening was developed by the Institute for Pulmonary Diseases of Vojvodina and started in 2020. The eligible target population, composed of former or current heavy smokers (30 pack-years, or 20 pack-years with additional risk factors) between 50 to 74 years of age, was estimated to be around 33,000 individuals (70). Between September 2020 and December 2022, lung cancer was found in 1.8% of the 2,138 subjects screened, with 75% of them detected in stages I to IIIA (80). Lung cancer screening has also been offered in all Belgrade municipalities since November 2024 (81), in Šumadija District since February 2025 (82) and most recently in the Southeastern region since December 2025 (83).
- Data from the Vojvodina pilot showed statistically significant differences in stage at diagnosis, with 45.8% of the screened patients diagnosed in stage I and 22.2% in stage IV (compared to 7.8% and 45.7% of the non-screened, respectively), demonstrating the value of screening for early detection and improved survival chances (84). Results from other regions are not available yet.
- International experiences support the Serbian findings and highlight the potential value of lung cancer screening programs in shifting the stage distribution towards earlier stages. While methodologies and settings vary, impeding direct comparisons, there is mounting evidence of substantial benefits of LDCT screening for patient outcomes.



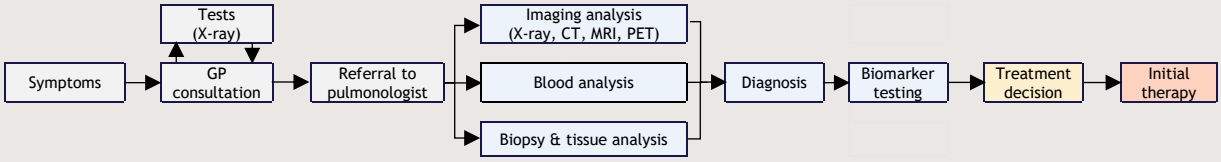
Recommendations

- Develop and adopt national guidelines for LDCT screening of high-risk populations.
- Create a screening registry to collect and share data on participation, stage at diagnosis and outcomes nationally.
- Ensure systematic evaluation of the pilots to guide national rollout, with a focus on operational challenges.
- Develop targeted outreach strategies and educational efforts to raise awareness and address stigma surrounding lung cancer. Encourage GPs to refer patients to lung cancer screening if risk factors (e.g., smoking) are present.

Diagnosis and treatment
Care pathways and waiting times

Background

- Lung cancer often presents with nonspecific symptoms, resulting in frequent misdiagnosis and multiple GP visits before referral, which contributes to the high proportion of late-stage diagnoses (68). Delays in the care pathway are common — from first symptoms to diagnosis and treatment — due to slow diagnostic procedures, lengthy assessments, and scheduling bottlenecks (85). The general lung cancer patient journey can be visualized as follows:



- The European Cancer Organisation recommends that clear care pathways should be defined to mitigate delays and improve early detection and treatment outcomes (85). Similar to clinical guidelines, standardized cancer care pathways are a governance tool to support the care process and make it more equitable across a country as well as to reduce waiting times and improve timely diagnosis and access to treatment which helps to improve the quality of cancer care (86, 87).
- There is under Serbian law no general rule entitling patients to care within a predefined timeframe. However, the Law on Health Insurance establishes waiting lists for certain types of healthcare services (88), determined in the Rulebook on Waiting Lists (89). The rulebook defines criteria to assess the patients' health status for placing on waiting lists as well as maximal waiting times. Patients should be placed on the waiting list of the health institution where the insured person will be provided with health services the fastest. The regulation also defines the health services for which no waiting lists are formed, and to which patients are entitled within 30 days. While chest-CT scan for the initial staging phase of a primary lung tumor does not figure on the list, implying right to immediate access to examination, a waiting list is established for chest CT-scan for monitoring in the case of an already established primary malignant disease, implying that examination should be provided within six months.

Current status in Serbia

- Data on waiting times along the cancer care pathway in Serbia are scarce. Long waiting times, especially for diagnostic procedures and treatment initiation, have been documented (70), but there are no available national data on cancer pathway monitoring. Evidence from the regional screening program of Vojvodina revealed varying time to first invasive diagnostic procedure across screening sites after positive LDCT findings (90). The average waiting time for bronchoscopy was 42.9 days across all centers but ranged from 36.3 to 50.6 days. Differences across centers were less pronounced for time to surgery, with an average waiting time of 63.4 days. The different organizational structure of the included centers, with one tertiary referral center and two general hospitals with limited capacity for invasive diagnostic procedures, might provide an explanation for these variations.
- Interviews with local experts confirmed discrepancies between institutions, waiting times from diagnosis to start of treatment varying between 14 to 21 days in one institution to around 72 days in another. Administrative procedures, such as the requirement of additional approval by RFZO of high-cost therapies, have been mentioned as one major source of treatment delay.
- In a multicenter retrospective cohort study conducted in Bulgaria, Romania and Serbia, times between diagnosis and treatment initiation have been found to be lower in Serbia than in the two other countries in stage IV lung cancer patients (91). However, this can be explained by 30% of Serbian patients receiving treatment with chemotherapy which does not require approval from the RFZO commission as opposed to e.g. immunotherapy or combination immunotherapy where this is the case.
- Improvements in waiting times for radiation therapy have also been recorded for different types of cancer including lung cancer. A 2023 report of the World Bank reveals that between 2018 and 2022, waiting times to start radiation therapy were reduced by more than half, from 2-3 months to 1-1.5 months (92).

Recommendations

- Establish national standardized cancer care pathways from first symptoms to diagnosis and treatment and integrate waiting time targets in the pathways.
- Reduce delays in cancer care by systematically following up waiting time statistics on a national level and by identifying and addressing root causes of prolonged waiting times by hospital and region.

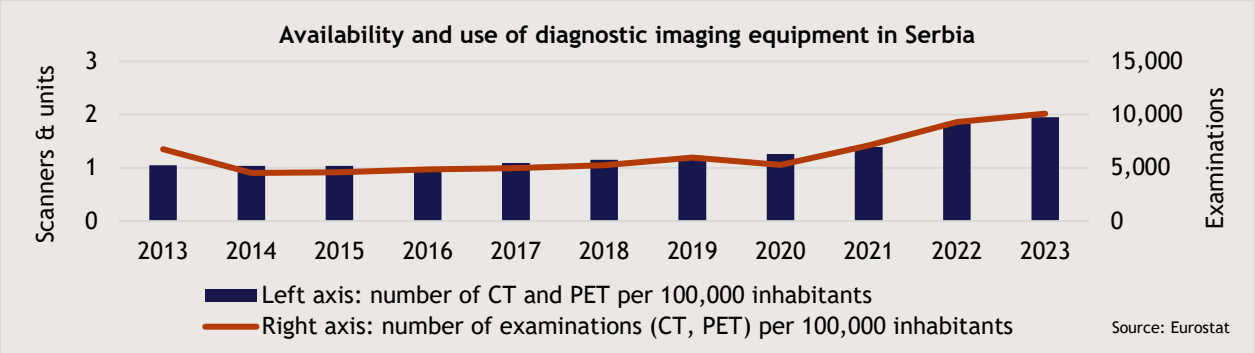
Diagnosis and treatment
Diagnostic imaging equipment

Background

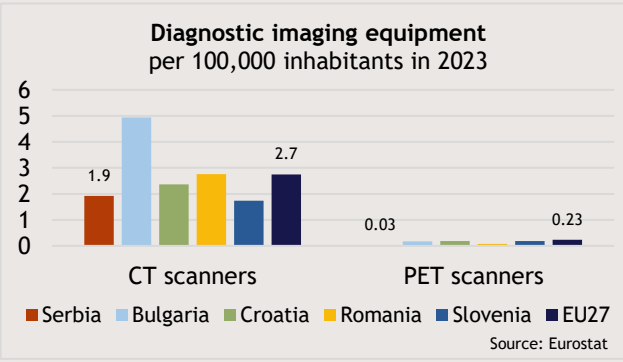
- Imaging equipment such as computed tomography scanners (CT) and positron emission tomography scanners (PET) are required throughout the cancer care journey including diagnosis, treatment, and follow-up to ensure accurate management decisions and optimal outcomes (93). The investment costs for scanners 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 (94). 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 (95, 96).
- The Serbian NCCP 2020-2022 describes a shortage of diagnostic imaging equipment but does not include any specific targets to improve access (9).

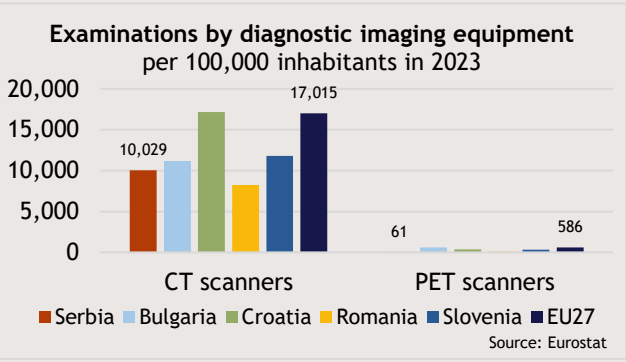
Current status in Serbia

- The availability of diagnostic imaging equipment in Serbia has almost doubled (+86%) from 1.1 CT and PET scanners per 100,000 inhabitants in 2013 to 2 scanners per 100,000 in 2023 (97). The number of examinations with this equipment increased less (+50%) from 6,738 exams per 100,000 inhabitants in 2013 to more than 10,000 in 2023 (98).



- Looking at the composition of equipment, the number of CT 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 and 87% fewer PET scanners in 2023 (97). 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 and 90% fewer PET scans per 100,000 inhabitants than the EU average in 2023 (98), which compared to the number of equipment also points to a lower use of available equipment in Serbia.
- Bronchoscopes have also been pointed out as insufficient in Serbia, with 15 bronchoscopy centers in 2022 but varying waiting times and coverage across the country (70). Despite being the reference standard diagnostic, videobronchoscopy was available in only 5 centers, and ultrasound-guided bronchoscopy in just a few centers.





Recommendations

- Allocate additional resources to invest in new diagnostic imaging equipment, and, where feasible, AI-supported tools to improve detection and workflow.
- Increase the number of bronchoscopy units to allow for less invasive diagnostic procedures.
- 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
Biomarker testing

Background

- Biomarker testing is part of the diagnostic process of cancer care. It identifies the molecular characteristics of a tumor and helps select appropriate treatments. Nearly half (47%) of new medicines for solid tumors approved by the European Medicines Agency (EMA) in 2015-2020 were linked to a biomarker (99). While single-biomarker tests (e.g., immunohistochemistry for EGFR mutation in lung cancer) have been standard for decades, they have become impractical in lung cancer, which nowadays has multiple actionable targets. Multi-biomarker testing, specifically with next-generation sequencing (NGS) technology, analyzes several biomarkers in parallel rather than sequentially and is increasingly becoming standard of care (100).
- The EBCP's flagship initiative "Cancer Diagnostic and Treatment for All" includes several action plans and advocates the use of NGS (1). The overall intention is to improve cancer diagnosis and treatment through personalized medicine and the use of the latest innovations in cancer care. The European Society for Medical Oncology (ESMO) issued its first recommendation for routine use of NGS in 2020 for advanced-stage tumors in non-squamous non-small cell lung cancer and cancers of the prostate, ovaries, bile duct, and colon (101).
- The Serbian NCCP 2020-2022 highlights the need to improve access to molecular and genetic testing, both in terms of capacity and geographic coverage, particularly given that the increase in novel targeted therapies requires adequate diagnostics. The NCCP therefore aimed to have at least one reference laboratory adequately equipped for molecular and genetic analyses of tumor samples by 2022.

Current status in Serbia

- The need for improved accessibility to modern molecular technologies has already been highlighted in Serbia (102). Reimbursement issues and the centralization of biomarkers testing (including EGFR, ALK and PD-L1 only) in very few centers, only three in the whole country, result in a bottleneck, occasioning long waiting times and reduced availability for lung cancer patients (70). Moreover, approved lung cancer molecular tests are currently not reimbursed by RFZO but provided by and funded by the pharmaceutical industry (103).
- In an international survey conducted by ESMO in 2021, medical oncologists and pathologists in different countries informed about the availability of various testing methods for different cancer types in their respective countries (104). The study found that in lung cancer care in Serbia, single-biomarker testing with immunohistochemistry (IHC) and polymerase-chain reaction (PCR) was "usually" available. However, access to advanced technologies such as small (i.e. <50 genes) and large (i.e. >50 genes) NGS was limited to research or clinical trials. This is similar to most comparison countries with the exception of Croatia, where they could be used "occasionally".
- NGS was performed in 13 publicly owned institutions in Serbia in 2023 and has been included in RFZO's list of services since 2022 for different panels (105).
- According to a local expert, Serbia currently only reimburses EGFR-, ALK- targeted therapies and immunotherapy for PD-L1 positive patients, with thus no need for more advanced biomarker testing. Should newer targeted therapies become available through reimbursement (e.g. for mutations ROS1, BRAF, MET, RET, HER2, KRAS, NTRK etc), there will however be a need to expand advanced biomarker testing capacities.

Availability of testing methods in lung cancer (end of 2021)

	IHC	PCR (single gene)	Small NGS (<50 genes)	Large NGS (>50 genes)
Bulgaria				
Croatia				
Romania				
Serbia				
Slovenia				

Source: Bayle et al. (2023). Color code: Green=Always; Blue=Usually; Orange=Occasionally; Red=Research.

Recommendations

- Develop the capacity for lung cancer standard pathohistological analyses by recognizing additional competent laboratories to allow for shorter diagnostic-to-results time interval and earlier treatment start.
- Increase the diagnostic workforce, especially pathologists, and address inefficiencies in the financing of molecular diagnostics to ensure timely results and treatment initiation.
- Improve the reimbursement of newer targeted therapies while expanding the diagnostic infrastructure in hospitals or developing external partnerships with private laboratories to perform NGS tests, with the aim to increase and accelerate biomarker testing and pathological assessment and consequently clinical decision on treatment.

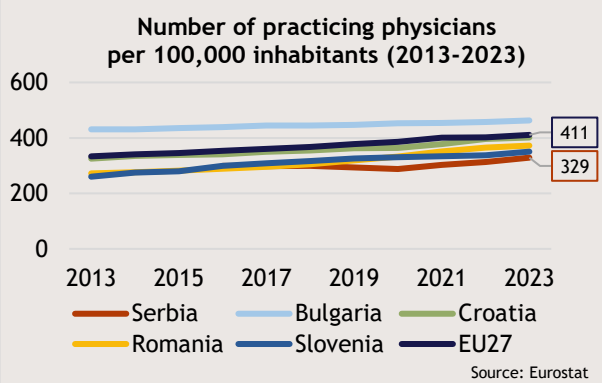
Diagnosis and treatment
Health workforce

Background

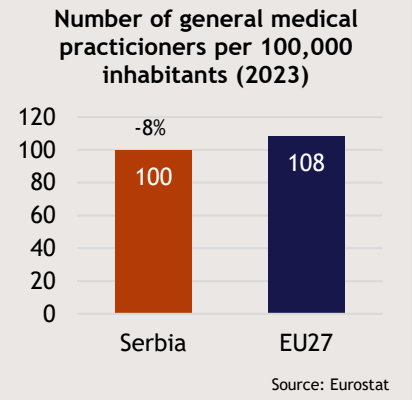
- Modern lung cancer care is highly specialized and requires competence from different medical fields. This includes e.g. pulmonologists, pathologists and diagnostic radiologists for the diagnosis of cancer, and surgeons, radiotherapists, medical oncologists, and pulmonologists for the treatment. GPs play a key role in facilitating early diagnosis in primary care as they refer symptomatic patients to the appropriate specialist (106). Nurses are involved throughout the care process, delivering patient education and treatment support (107).
- 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 (9).

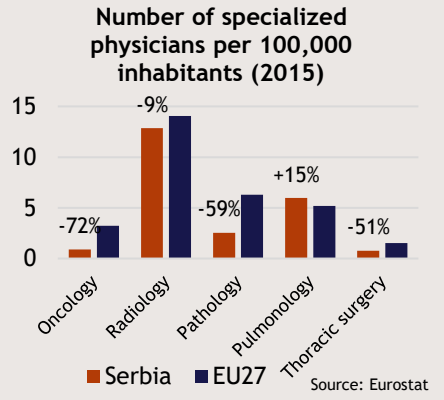
Current status in Serbia

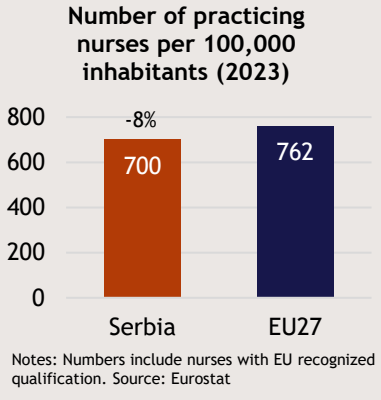
- Serbia has a rather low number of practicing physicians (of any specialty) per 100,000 inhabitants compared to the EU average and the comparator countries, as shown in the top figure. In 2023, Serbia had 329 practicing physicians per 100,000, which was 20% below the EU average of 411 physicians per 100,000. However, the physician density in Serbia increased by 10% from 2016 to 2023 (108).
- 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) (109). Considering the importance of GPs in primary care for easy accessibility for patients with signs and symptoms of lung 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 and pathology and thoracic surgery were especially scarce compared to the EU average number in 2015, while pulmonologists were more common and outperformed the EU average numbers (110).
- 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 (108). 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 (111, 112).







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.

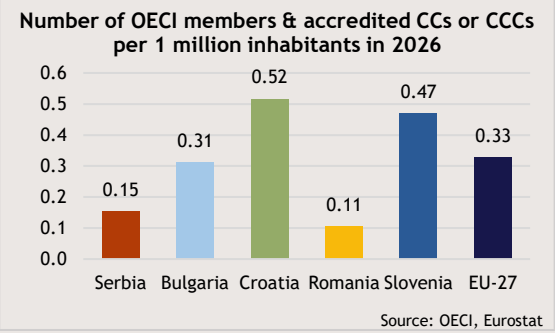
Diagnosis and treatment
Comprehensive cancer centers

Background

- A comprehensive cancer center (CCC) is often characterized by its organizational quality, multidisciplinarity, and integration of research into clinical care (translational research) (113). 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 (114).
- 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 (113). At the EU policy level, the OECI Accreditation and Designation (A&D) system is the most widely acknowledged and is thus 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 (115), 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 (116).
- 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 (9).

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 six lung cancer reference centers, which are the Institute for Pulmonary Diseases of Vojvodina, the Clinic for Pulmonology of the Clinical Center of Serbia, the Military Medical Academy, the University Hospital Medical Center Bežanijska Kosa, the University Clinical Center Niš, and the University Clinical Center Kragujevac.



- The Institute for Oncology and Radiology of Serbia (IORS) is an ESMO-accredited cancer center (117). Yet, 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 (118), but neither 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 CC[2].
- Patients with lung cancer can receive treatments on an in- or outpatient basis, both in general hospital and referent oncology centers. Administration of treatments in patients for whom immunotherapy or targeted therapy has been recommended only occur in referent oncology centers (70).

OECI-affiliated cancer centers and organizations (March 2026); Source: OECI (118)

	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

- Strengthen the role of CCCs and clear referral pathways to ensure timely access to multidisciplinary care. 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 could be upgraded to ensure easier geographic access.
- Consider establishing cross-functional teams specializing in different types of cancer to improve quality of care.

[2] 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 (113)

Diagnosis and treatment

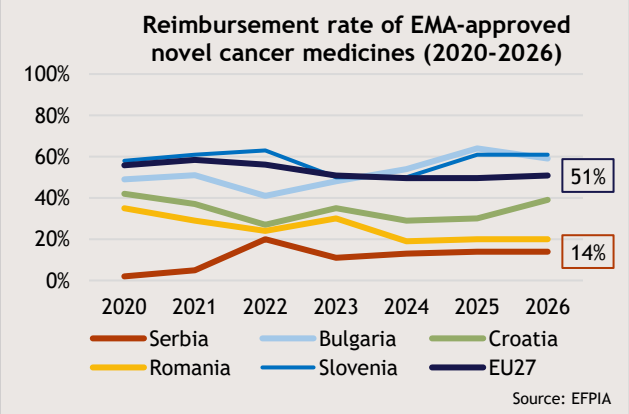
Novel cancer medicines - Availability

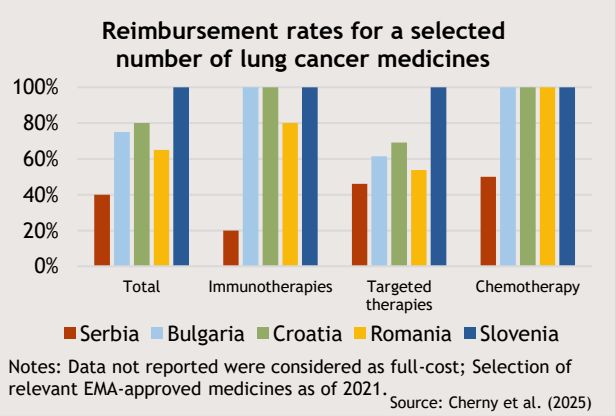
Background

- Novel cancer medicines introduced over the past decade have transformed lung cancer treatment standards. These primarily include immunotherapies and targeted therapies. Most of these medicines have been approved by the EMA since 2015 for use in advanced stages of lung cancer; from 2021 onwards, they were also introduced for early stages (8, 119, 120).
- As non-EU member, Serbian authorities must both organize the regulatory and reimbursement approval of novel cancer medicines. The regulatory approval is granted by the Medicines and Medical Devices Agency of Serbia (ALIMS) (121). The reimbursement is handled by the RFZO (122), upon which medicines can become accessible to patients on a broader 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% (9).

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 2021-2024 and reimbursed (defined as being on the public reimbursement list of the RFZO) in Serbia as of January 2026 was only 14% (123), ranking lowest out of all comparison countries.
- After almost no new medicines were reimbursed in 2020-2021, the Serbian rate increased to 20% in 2022 but then plateaued at 11–14% in 2023–2026. This development mirrors that the RFZO increased the availability of innovative medicines for various diseases, including oncology, on the reimbursement list of innovative medicines from 21 (2007-2015) to 81 (2017-2023) (124). 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 2026, it was 258 days according to the EFPIA WAIT survey (123). Time to availability has overall been decreasing since 2020.
- Access to novel lung cancer treatments has been pointed out as suboptimal in Central and Eastern European countries, especially in Serbia. The time lag between registration and reimbursement and the low reimbursement rates of novel lung cancer medicines account for the lacking availability in Serbia (125, 126). A study investigating the availability, out-of-pocket costs and accessibility of cancer medicines confirms previous findings of low reimbursement rates for lung cancer medicines in Serbia (126). As of May 2021, only 8 out of 20 EMA-approved lung cancer medicines were reimbursed in Serbia, corresponding to a 40% reimbursement rate. With 20% it is even lower for immunotherapies while these were almost all fully covered in the comparison countries. These differences indicate a significant gap in access to modern and effective treatments in Serbia, which may have important consequences on disease and patients' outcomes.





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 timely inclusion of new medicines into routine clinical practice.

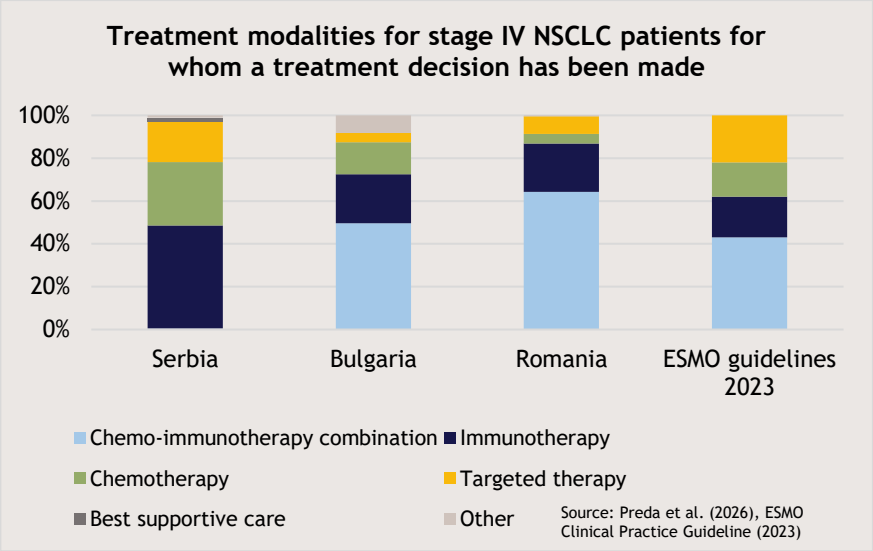
Diagnosis and treatment
Novel cancer medicines - Uptake

Background

- Lung cancer has been a major area of medical innovation, with immunotherapies (specifically immune checkpoint inhibitors) and targeted therapies reshaping standards of care across disease stages over the past decade (see previous indicator). Ensuring that these medicines are prescribed is essential to realizing their full potential.
- Reimbursement of novel medicines alone (see previous indicator) does not guarantee that patients are prescribed these medicines. The uptake (real-world use) of novel medicines depends on factors such as diagnostic capacity, infrastructure, treatment guidelines, and prescription practices. Previous research indicates that many lung cancer patients across Europe continue to receive outdated treatment regimens despite the availability of newer and guideline-recommended therapies (68), yet cross-country comparisons remain challenging, as few countries systematically collect and report real-world treatment data (119).
- The Serbian NCCP notes the existence of guidelines for diagnostic and treatment for leading cancer sites in Serbia but highlights that they are often outdated due to the lack of a regular update process (9). No guidelines were available for lung cancer.

Current status in Serbia

- A multicenter retrospective cohort study was conducted between May 2022 and March 2023 in Bulgaria, Romania and Serbia on stage IV NSCLC patients for whom a treatment decision has been made. The study indicates that despite a majority of patients being treated with immunotherapy (48%), the reliance on chemotherapy remains high (30%) in Serbia (91). The rest of the patients received targeted therapies (19%) or best supportive care (BSC) (2%). The comparatively high proportion of patients receiving targeted therapy in Serbia can, according to study authors, be attributed to variations in treatment accessibility, healthcare policies and potential impact of the COVID-19 pandemic on patient management and data collection. It was not checked whether patients, enrolled retrospectively over a 7-month period from five clinics (University Clinical Centre of Serbia, Institute for Oncology and Radiology of Serbia, University Hospital Medical Center Bezanijska kosa, University Clinical Center of Nis, Institute for Pulmonary Diseases of Vojvodina Sremska Kamenica), were representative for the Serbian lung cancer population. Serbia also stands in contrast with Bulgaria and Romania, where chemo-immunotherapy combination appears as first choice. This can be explained by limited reimbursement in Serbia, with immunotherapy being reimbursed in patients with high PD-L1 expression only, and thus, only as a monotherapy. Despite ESMO guidelines recommending the use of the chemo-immunotherapy combination in stage IV NSCLC patients with low PD-L1 expression (127), as illustrated by the graph above, chemotherapy remains the main treatment modality for these patients in Serbia.



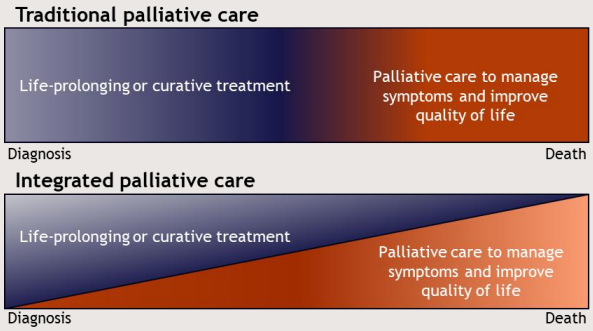
Recommendations

- Develop national lung cancer diagnostic and treatment guidelines.
- Accelerate the adoption of immunotherapy and targeted therapies in line with international clinical guidelines to improve treatment outcomes for patients.
- Continuously monitor and publish aggregated information on treatment patterns and patient outcomes, and implement strategies to address gaps in care, ensuring that the standard-of-care treatments are accessible and prescribed to all eligible patients.

Survivorship
Palliative care services

Background

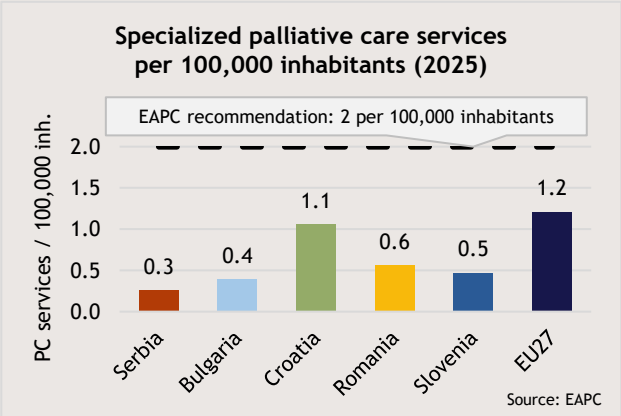
- In 2024, almost a quarter (23%) of Serbia's population was aged 65 or older (128). This share has increased every year since 2004 (17%), reflecting a sustained trend of population aging and pointing to a growing demand for palliative care (PC) services.
- Cancer is the most frequent cause of need for PC among life threatening or life-limiting health conditions (129). 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 (130).

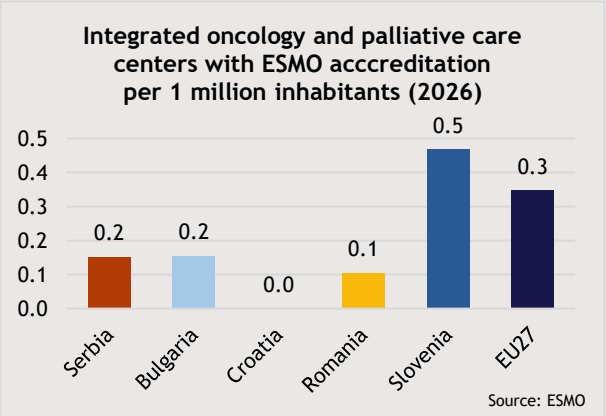


- The availability of PC services in a country is one metric to assess the capacity and potential access to PC. Another metric is the degree to which PC is integrated with the overall healthcare system (131). The European Association for Palliative Care (EAPC) recommends two specialized PC services per 100,000 inhabitants (132).
- 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 (133). 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 (9).

Current status in Serbia

- Serbia had 17 specialized PC services (non-cancer specific) in 2025 (129), which is an increase by 1 service since 2019 (132). This corresponds to 0.3 specialized PC services per 100,000 inhabitants in 2025 (129). 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 (129).
- 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 (IORS in Belgrade) (115). 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.
- Integrate early palliative care into lung cancer pathways to improve quality of life and support for patients and families.

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Appendix: Methodology and sources for indicators

Governance	
National cancer plan	Analysis of the National Cancer Control Plan 2020-2022 (9). **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 (6). Distribution of cancer cases by type was based on cancer numbers for "all sites excluding non-melanoma skin cancer" (C00-C97/C44). Data displayed in the graphs include lung and bronchus (C34), prostate (C61), colon and rectum (C18-C20) and breast cancer (C50). 5th graph: Serbian Cancer Registry (6), and estimates from ECIS for other countries (16). Serbian data for lung cancer include bronchus cancer (C34), while data for the comparison countries and EU27 also include cases of tracheal cancer (C33-34). 6th graph: Serbian Cancer Registry for 2018-2024 (6), Ferlay et al. (2018) for EU in 2018 (134) and ECIS for 2022 and 2024 (16). Future numbers for 2025-2040 for Serbia are estimated from the relative growth in crude rates reported by IARC-Globocan (18) that are applied to the 2022 crude rates from the Serbian Cancer Registry (6); for EU in 2025-2040 estimates from ECIS were used (17). Serbian data (2018-2024) for lung cancer include bronchus cancer (C34), while data for the comparison countries and EU27 also include cases of tracheal cancer (C33-34). Estimated growth in crude rates reported by IARC-Globocan (18) from 2025 on include trachea (C33-34). **For dashboard overview:** • Incidence crude rate per 100,000 inhabitants in 2024, bronchus and lung cancer (C34) including trachea (C33-34) for EU27. Registered data from the Serbian Cancer Registry and estimated data for EU27 (6, 16). • Mortality crude rate per 100,000 inhabitants in 2024, bronchus and lung cancer (C34) for Serbia, including trachea (C33-34) for EU27. Registered data from the Serbian Cancer Registry and estimated data for EU27 (6, 16).
Deaths (mortality)	
Survival rates	1st graph: Survival rate = 1 – mortality-to-incidence. Own calculations based on incidence and mortality (age-standardized rates, World Standard) sourced from the Serbian Cancer Registry for Serbia (6) and from ECIS for EU countries (16). **For dashboard overview:** Not applicable.
Economic burden	
Health spending on cancer	1st graph: Hofmarcher et al. (2020) (24). 2nd & 3rd graph: Eurostat (25). Health care expenditure by financing scheme. Specification: financing schemes = All financing schemes, Government schemes and compulsory contributory health care financing schemes. 2023. Euro per inhabitant (left graph), PPP-adjusted with factor derived from Eurostat (135) - Percentage of gross domestic product (GDP) (right graph). Weighted EU average. 4th graph: New calculations for 2015 and 2023 based on lung cancer death data from Eurostat (2), and methodology as described in Manzano et al. (2025) (8). 5th graph: New calculation based on ECIS estimates for 2024 (16) and Manzano et al. (2025) (8). 6th graph: Djekic Malbasa et al. (2023) (35, 36). 7th graph: NHS England (37). 8th graph: de Nijs et al. (2024) (38) **For dashboard overview:** • Estimated healthcare spending on cancer care per capita in EUR in 2023 (PPP-adjusted) (8, 25-27). • Number of potential years of working life lost (PYWLL) due to premature lung cancer death per 100,000 inhabitants aged 15-64 in 2023 (8).
Productivity losses from cancer	
Prevention	
Tobacco smoking	1st graph: Eurostat (53). 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 (54). 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 (aged 18-64 years) of cigarettes or other tobacco products in 2023 (52).
Air pollution	European Environment Agency (EEA). 1st graph: Air quality statistics. Specification: Particulate matter 10 concentration; Annual mean concentration (µg/m3) of particulate matter 10 (PM10); All areas and station types (year 2024) (66). 2nd graph: Air quality statistics. Specification: Particulate matter 2.5 concentration; Annual mean concentration (µg/m3) of particulate matter 2.5 (PM2.5); All areas and station types (year 2024) (66). **For dashboard overview:** Annual mean concentration (µg/m3) of particulate matter 10 (PM10) (66).
Early detection	
Stage distribution at diagnosis	1st graph: Djekic Malbasa et al. (2023) (35, 36). **For dashboard overview:** Proportion of patients in stage I and II at diagnosis between 2011 and 2020 at the Institute for Pulmonary Diseases of Vojvodina (36).
Lung cancer screening	1st graph: International results from various lung cancer screening efforts. Note that numbers are not directly comparable across studies. Data from Croatia's national screening program from Prof.

	Miroslav Samaržija (136). Data from the NELSON trial (137), the HANSE study (138), and the UK Lung Cancer Screening Trial (139) are publicly available. **For dashboard overview:** Benchmarking not applicable.
Diagnosis and treatment	
Care pathways and waiting times	**For dashboard overview**: Not applicable.
Diagnosis and treatment	
Care pathways and waiting times	**For dashboard overview**: Not applicable.
Diagnostic imaging equipment	1st graph: Data from 2nd and 3rd graphs. See below. 2nd graph: Eurostat (97). Devices for medical imaging. Specification: Hospitals and providers of ambulatory health care; Computed Tomography Scanners 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 (98). Medical technologies - examinations by medical imaging techniques (CT 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 and PET scanners per 100,000 inhabitants in 2023 (97).
Biomarker testing	1st table: Bayle et al. (2023) - supplemental material (section 2.2) (104). **For dashboard overview:** Not applicable.
Workforce	1st graph: Eurostat (108). 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 (109). 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 (110). Physicians by medical speciality - historical data (1985-2016); Oncology, Radiology, Pathology, Pulmonology, Thoracic surgery; per hundred thousand inhabitants. Unweighted EU average with missing data for Czechia, Denmark, Hungary, Finland, Sweden, and Slovakia for all specialties, Netherlands for hematology, Croatia for oncology and thoracic surgery, as well as Belgium for the latest. 4th graph: Eurostat (108). 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:** Sum of specialized physicians per 100,000 inhabitants (2015) (110).
Comprehensive cancer centers	1st graph: Number of centers and organizations based on OECI membership status (118). For calculations of numbers per 1 million inhabitants, Eurostat population data on 1 January 2025 were used (140). 1st table: OECI (118). Number of OECI-affiliated centers and organizations as of March 2026. **For dashboard overview:** Number of OECI-affiliated centers and organizations per 1 million inhabitants in 2025 (118).
Novel cancer medicines - Availability	1st graph: EFPIA Patients W.A.I.T. Indicator Survey (123, 141-146). 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; 2025 to 2020–2023 and 2026 to 2021-2024. The EFPIA data only refer to new medicines and not new indications of already approved medicines. 2nd graph: Cherny et al. (2025) (126). Data not reported were considered as full cost. Selection of relevant EMA-approved drugs as of 2021. **For dashboard overview:** Reimbursement rate of novel cancer medicines in 2026 (123).
Novel cancer medicines - Uptake	1st graph: Preda et al. (2026) (91) for data for Serbia, Bulgaria and Romania. For the ESMO benchmark, calculations based on ESMO Clinical Practice Guideline (127) for first-line treatment in patients with ECOG PS 0-2, and methodology as described in Manxhuka et al. (2024) and assuming a PD-L1 expression of ≥50% in 25% of non-oncogene addicted patients (119). **For dashboard overview:** Mean of the two relative differences of stage IV NSCLC patients for whom a treatment decision has been made who received immunotherapies (as mono- or combination treatment) (91).
Survivorship	
Palliative care services	1st graph: EAPC Atlas of Palliative Care (129). Palliative care specialised services per 100,000 inhabitants, p.71. Unweighted EU average. 2nd graph: ESMO website (115). ESMO Accredited Designated Centers. Data retrieved in April 2026, with latest accredited center in 2025. Population data for 2025 were sourced from Eurostat (140). **For dashboard overview:** Number of specialized palliative care services per 100,000 inhabitants in 2025 (129).


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