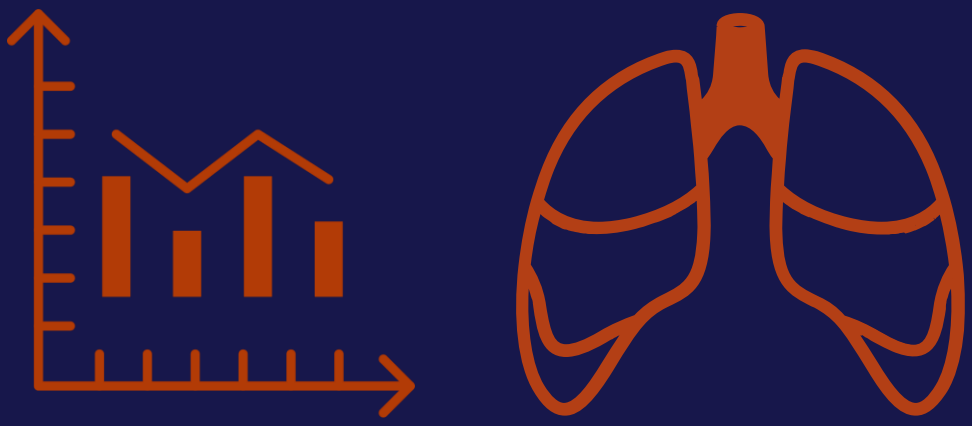
# Cancer Dashboard for Poland – Lung cancer

Bardh Manxhuka and Thomas Hofmarcher



iHE
THE SWEDISH INSTITUTE FOR HEALTH ECONOMICS
ENABLING INFORMED DECISION MAKING

# Cancer Dashboard for Poland - Lung cancer

ihe.se

## Purpose and content

This report is part of an international initiative aimed at facilitating the exchange of best practices in cancer care among European countries. The focus here is on lung cancer. The core of the report is a dashboard overview for Poland (see page 4), providing an illustrative description of a selected set of key indicators. Although a multitude of metrics is necessary to fully describe the lung cancer control status in Poland, the selected indicators relate to outcomes, resources, and process metrics in all areas of lung cancer control. These indicators benchmark the current status quo in Poland against target values specified in the National Oncology Strategy (NOS 2020-2030), the Polish Strategy to Fight Lung Cancer, targets set by international organizations, or the EU average.

The dashboard is intended to support the implementation of the NOS 2020-2030 and the Polish Strategy to Fight Lung Cancer, as well as other ongoing initiatives to improve lung cancer care in the country. The description seeks to assist Polish policymakers in decision-making and prioritizing initiatives in lung cancer care.

## Contents


Foreword ..... 3

Dashboard overview for Poland ..... 4

High-level recommendations ..... 5

Background ..... 6

Disease burden of cancer ..... 10

Economic burden of cancer ..... 13

Prevention ..... 16

Early detection ..... 18

Diagnosis and treatment ..... 21

Survivorship ..... 31

Afterword ..... 32

References ..... 33



**Prepared by IHE - The Swedish Institute for Health Economics**

**Authors:** Bardh Manxhuka & Thomas Hofmarcher



**Version:** September 3, 2024

This report was commissioned and funded by MSD. The views and opinions of the authors are not necessarily those of MSD. The responsibility for the analysis and conclusions in this report lies solely with the authors.

# Foreword

Lung cancer continues to be a significant health challenge in Poland, remaining the leading cause of cancer-related deaths in the country. While a decrease in overall lung cancer incidence has been observed, the steady increase among women is particularly concerning. Addressing this issue requires a multi-faceted approach. Primary prevention through health-promoting behaviors is vital, and the importance of early detection, especially through screening programs, cannot be overstated. The diagnostic process for lung cancer must be as efficient as possible, utilizing next-generation sequencing to ensure precise treatment selection. Well-structured patient pathways based on clear practice guidelines will further streamline diagnostics and improve outcomes. Primary care physicians also play a crucial role in quickly referring symptomatic patients to specialists. Surgical treatment is still the most effective treatment modality in the management of lung cancer, and it becomes more effective with the use of perioperative systemic therapies (molecular targeted agents or immune checkpoint inhibitors). The use of concomitant chemoradiotherapy should be enhanced in patients with locally advanced and inoperable non-small-cell lung cancer. Patients with advanced lung cancer should receive therapeutic options in a sequential way – reasonable use of available agents may significantly prolong life even in the metastatic stage of lung cancer. Lastly, maintaining effective supportive care throughout the patient's journey is critical to improving quality of life.

The report prepared by the Swedish Institute for Health Economics provides a valuable and comprehensive analysis of the current situation in lung cancer management in Poland. By leveraging real-world data, including insights from the National Cancer Registry, the report sheds light on the state of the healthcare system, highlighting both achievements and areas needing improvement. The comparison of disease advancement stages at diagnosis with other countries underscores the importance of timely intervention, while also revealing the effectiveness—or lack thereof—of current therapies in terms of survival rates.

A particularly noteworthy aspect of the report is its emphasis on inequalities in access to treatment across Poland, including disparities in waiting times from diagnosis to first treatment by voivodeships. The report also highlights the role of air pollution as a risk factor for lung cancer, a factor that has been underappreciated until now. However, there remains a need for stronger emphasis on reducing tobacco smoking through preventive education and the development of a network of smoking cessation clinics, as this remains the primary risk factor for lung cancer.

In addition to providing a clear and transparent overview of the governance strategies, economic burden, prevention, and treatment options available in Poland, the report positions the country within the context of Central and Eastern Europe, as well as against the EU-27 average. These insights are invaluable for stakeholders at all levels, and we strongly encourage a careful reading of this report to inform future policies and practices.

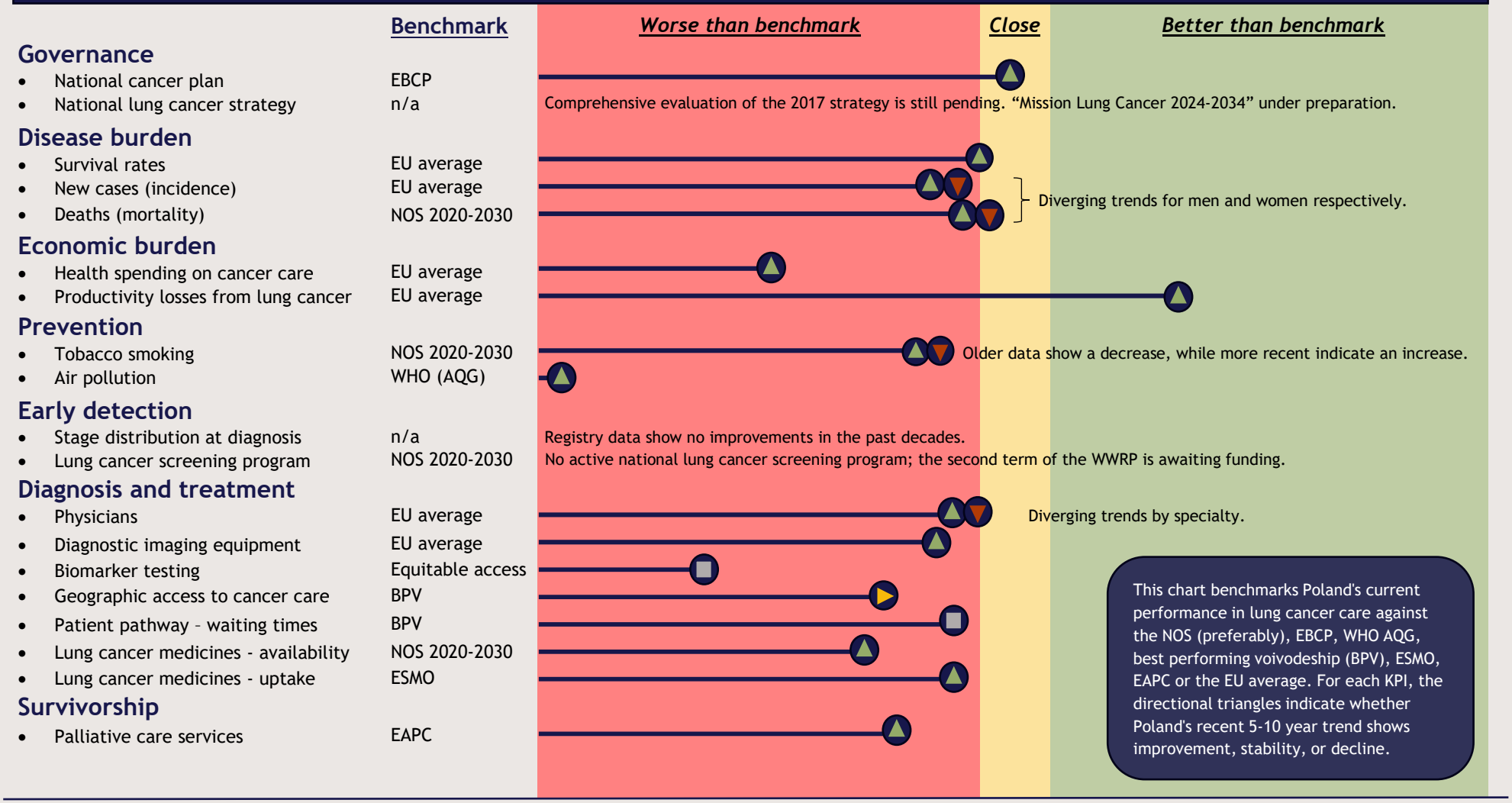
We extend our congratulations to the authors of this report and hope that its findings will guide impactful changes in the management of lung cancer in Poland.

*Prof. Joanna Didkowska*

*Prof. Maciej Krzakowski*

# Dashboard overview Poland – Lung cancer

## Comparative Performance: Poland vs. Benchmark




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

*Notes:* NOS = National Oncology Strategy, EBCP = Europe’s Beating Cancer Plan, WHO (AQG) = World Health Organization (Air Quality Guidelines), ESMO = European Society for Medical Oncology, EAPC = European Association for Palliative Care, KPI = key performance indicator, BPV = best performing voivodeship, WWRP = National Lung Cancer Early Detection Program, n/a = “not available”.

# High-level recommendations

## Governance

- ✓ Ensure full implementation of the National Oncology Strategy (NOS) 2020-2030 through a collaborative effort by all healthcare stakeholders, monitoring progress in annual reports.
- ✓ Strengthen the funding for cancer care to support the planned actions in the NOS 2020-2030 and improve equal access to high-quality, evidence-based cancer care for all patients across the country.
- ✓ Leverage the "*Strategy to Fight Lung Cancer"* and the upcoming "*Mission Lung Cancer 2024-2034*" to enhance lung cancer care by assessing and evaluating implementation challenges.
- ✓ Create Lung Cancer Units, similar to the existing Breast Cancer Units which have been successful in advancing care quality.

## Funding

- ✓ Review and optimize the current use of healthcare expenditure and resources in the existing National Cancer Network by the National Health Fund (NFZ). In the mid-term, increase public funding of cancer care (and healthcare in general) by the NFZ to improve outcomes for cancer patients.

## Prevention

- ✓ Increase the excise tax on tobacco and intensify public awareness campaigns on the health risks of smoking and the benefits of quitting, especially targeting women and people with low socioeconomic status, relying on the MPOWER framework of the World Health Organization (WHO).
- ✓ Intensify efforts to align national air quality standards with the 2021 WHO guidelines and launch education campaigns on the health risks of air pollution and preventive measures.

## Early detection

- ✓ Increase awareness of lung cancer symptoms of primary care physicians (GPs) to reduce the time until referral to a specialist.
- ✓ Establish a nationwide lung cancer screening program for high-risk populations, aligning with EU recommendations and 2025 targets of Poland's national strategies.
- ✓ Launch educational campaigns to raise awareness about the benefits of early detection through screening, engaging both citizens and healthcare providers to ensure high participation.
- ✓ Encourage GPs to refer patients for lung cancer screening in parallel with mammography or other screening examinations, if risk factors (e.g. smoking) are present.

## Diagnosis and treatment

- ✓ Invest in training and recruitment of medical staff (cancer specialists but also GPs, nurses, diagnosticians) to improve care quality and address inequalities in access across the country.
- ✓ Expand diagnostic infrastructure, including AI-supported radiology and pathology, capabilities for biomarker testing, and incentivize careers in primary care and pulmonology to reduce waiting times for lung cancer patients.
- ✓ Draw up comprehensive national guidelines to standardize lung cancer diagnostic and treatment pathways, including time limits for each step along the patient pathway.
- ✓ Accelerate the reimbursement and uptake of novel lung cancer medicines in line with recommended treatments in European clinical guidelines to improve patient outcomes.
- ✓ Monitor and publish yearly data on drug treatment rates as a quality indicator of lung cancer treatment.

## Survivorship

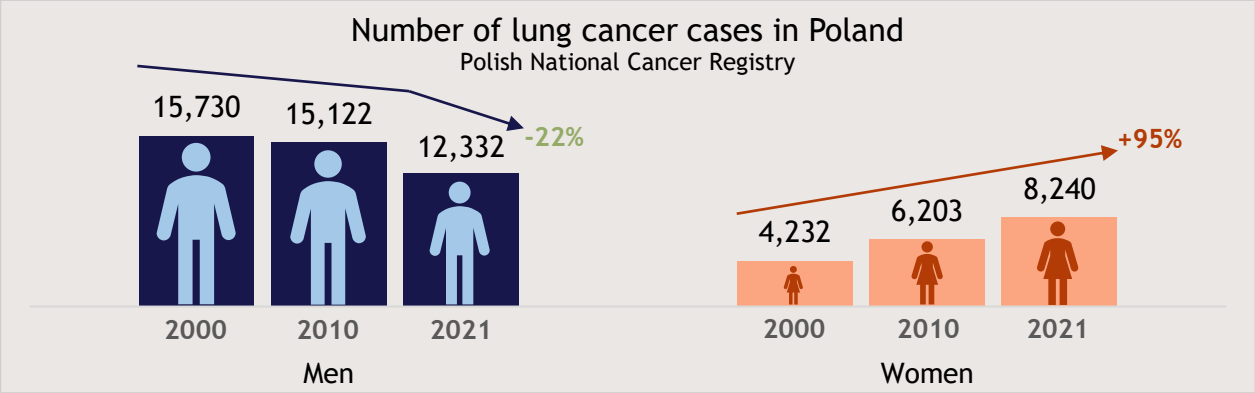
- ✓ Train and recruit more palliative care personnel to cater for the increasing number of cancer patients.
- ✓ Enhance the integration between treatment services and palliative care services to provide comprehensive support for cancer patients.

# Background

Cancer is the second-leading cause of death after cardiovascular diseases in men and women in Poland, accounting for around a quarter of all deaths (1). Historically, cancer incidence has been higher among men than women. However, data from the Polish National Cancer Registry reveal that as of 2021, the number of newly diagnosed cancer cases among women has surpassed that of men (2). Against the backdrop of this development, IHE developed in 2023 a Cancer Dashboard focusing on women's cancers (3). Building on this foundation and recognizing the significant impact of lung cancer across both genders, IHE has now developed a dedicated Cancer Dashboard for lung cancer in Poland.

## Lung cancer

Lung cancer is the leading cause of cancer-related deaths in Poland. In 2021, it accounted for 20,841 deaths (22% of all cancer deaths) and 20,572 new diagnoses (13% of all new cancer cases) (2).[1] Men represent around 60% of both incidence and mortality rates. Notably, approximately 26% of lung cancer deaths occur before the age of 65, similar to trends in the EU and on a global level (4, 5). Premature deaths in the working-age population lead to substantial economic costs, including lost working years and increased healthcare and caregiving expenses.




The development of the number of new cancer cases primarily reflects an aging population, given that the risk of getting cancer rises with age. For lung cancer, developments in the prevalence of major risk factors like cigarette smoking and air pollution also play a significant role, although there is a significant time lag of several decades between the exposure to risk factors and the manifestation of lung cancer (6). Information from the Polish National Cancer Registry shows that the number of new lung cancer cases in Poland has remained stable at approximately 21,000 per year over the past decades (2). However, a distinct gender disparity is highlighted: while new lung cancer cases among men have decreased by 22% since 2000, cases among women have surged by 95%, indicating a significant shift in risk dynamics between men and women.

## Governance of lung cancer

### *Polish Strategy to Fight Lung Cancer*

In 2017, the Polish Strategy to Fight Lung Cancer was formulated by leading lung cancer experts under the patronage of the Institute of Tuberculosis and Lung Diseases, in collaboration with the Polish Lung Cancer Group and the Polish League Against Cancer (7). It aims to enhance early detection and incorporate advanced treatments. The strategy defines clear goals and actions across five strategic objectives, which are subject to further refinement and ratification by the appropriate medical and community stakeholders:

1. **Reducing the occurrence and impact of lung cancer risk factors (primary prevention)**: Lowering exposure to primary risk factors for lung cancer and promoting healthy behaviors that decrease lung cancer risk.
2. **Increasing the effectiveness of early detection (secondary prevention):** Increase the share of lung cancer cases diagnosed at an early stage within the total number of new cases.
3. **Improving the quality and effectiveness of diagnosis:** Improving clinical procedures and diagnostic organization to increase early-stage detections and to implement an efficient system for rapid diagnostics.
4. **Improving the quality and effectiveness of treatment:** Boosting the effectiveness of treatments for lung cancer patients, which leads to better prognoses and enhances the quality of life for patients at early disease stages, in both physical and mental aspects.

[1] Note: Cancer incidence is commonly underestimated in the Polish National Cancer Registry.

5. **Development of knowledge and competences in the field of fighting lung cancer:** Advancing scientific knowledge, enhancing the quality of information, and increasing competencies related to lung cancer among all system participants.

Currently, a new lung cancer strategy, called "Mission Lung Cancer 2024-2034", is being developed by different organizations. Unlike the Polish Strategy to Fight Lung Cancer which was launched by the Ministry of Health (MoH), this new strategy rests on a collaboration of scientific organizations and patient advocacy groups being coordinated by the Polish Lung Cancer Group (Polska Grupa Raka Płuca).

## *Polish National Oncology Strategy (NOS)*

Recognizing the high and growing disease burden of cancer, the Polish government adopted the National Oncology Strategy (NOS) for 2020–2030 in February 2020 (8). There is earmarked funding to support the implementation of the NOS. For the years 2024–2030, the annual funding amounts to PLN 500 million. The multiannual program includes activities in five strategic areas:

1. **Investments in human resources**: Improving the staffing situation and the quality of education in the field of oncology.
2. **Investments in education, primary prevention, and lifestyle**: Reducing the incidence of cancer through risk reduction in the field of primary prevention.
3. **Investments in patients, secondary prevention**: Improving the effectiveness of secondary prevention.
4. **Investments in science and innovation**: Increasing the potential of scientific research and innovative projects in Poland to enable patients to benefit from the most effective diagnostic and therapeutic solutions.
5. **Investments in the cancer care system**: Improving the organization of the cancer care system by ensuring patients' access to high-quality diagnostic and therapeutic services as well as comprehensive care along the entire patient pathway.

In July 2024, the Polish government endorsed the latest annual report of the NOS for 2023 (9). Notably, this report includes plans to establish Lung Cancer Units in 2024, similar to existing Breast Cancer Units which have been successful in advancing cancer care.

## *Europe's Beating Cancer Plan (EBCP)*

In February 2021, the European Commission unveiled Europe's Beating Cancer Plan (EBCP), a comprehensive policy initiative aimed at tackling cancer from prevention through to survivorship (10). This plan integrates holistic strategies to mitigate the impact of cancer across the EU and aims to harmonize cancer care standards across member states. Key elements of the EBCP include:

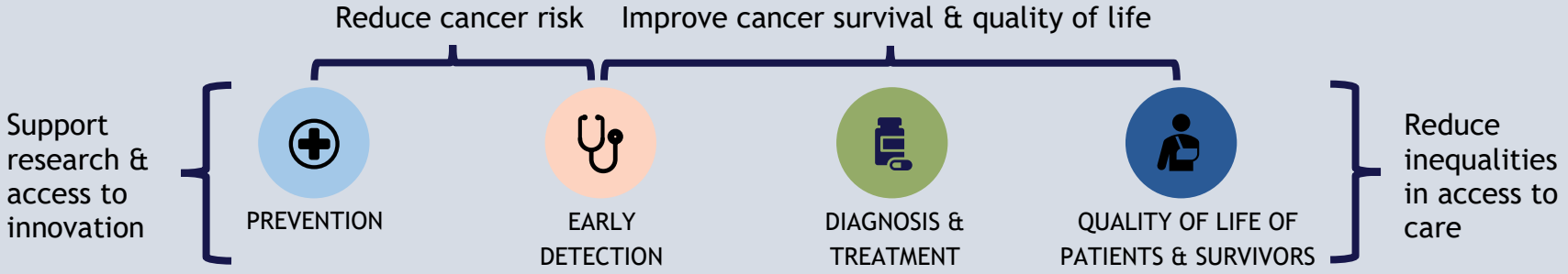
1. **Saving lives through sustainable cancer prevention (primary prevention):** Preventing cancer cases by reducing exposure to primary risk factors, increasing healthy literacy, and promoting healthy lifestyles.
2. **Improving early detection of cancer (secondary prevention):** Detecting cancer cases at early stages, where treatment is more likely to succeed, by increasing screening participation and developing new screening methods.
3. **Ensuring high standards in cancer care:** Improving the entire cancer care pathway by delivering high-quality care, investing in human resources, and ensuring access to novel medicines and innovation.
4. **Improving the quality of life for cancer patients, survivors, and carers:** Improving the quality of life of cancer survivors by monitoring follow-up care and ensuring cooperation between health and social care systems to mitigate challenges for patients and their families.

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, which includes Polish experts, to refine lung cancer screening protocols (11). Furthermore, the EBCP aligns with the EU Cancer Mission under the Horizon Europe 2021–2027 research funding program, emphasizing a collaborative approach to reducing cancer prevalence and enhancing patient care across Europe.

## Summary of relevant governance strategies

The overarching goals of the current strategies are convergent, focusing on prevention, early detection, and effective diagnosis and treatment

| | | | | |
|---|---|---|---|---|
| Polish National Oncology Strategy | Investments in education, **primary prevention**, and lifestyle | Investments in patients – **secondary prevention** | **Investments in the cancer care** system and human resources | Investments in **science and innovation** |
| Polish Strategy to Fight Lung Cancer | Reducing the occurrence and impact of lung cancer risk factors - **primary prevention** | Increasing the effectiveness of early detection - **secondary prevention** | Improving the **quality and effectiveness** of diagnosis and treatment | Development **of knowledge and competences** in the field of fighting lung cancer |
| Europe's Beating Cancer Plan | Saving lives through sustainable cancer prevention - **primary prevention** | Improving early detection of cancer - **secondary prevention** | Ensuring **high standards in cancer care** | Improving the **quality of life** for cancer patients, survivors, and carers |



# Structure of the dashboard and choice of indicators

This report starts with a summary of relevant Polish and European governance strategies related to lung cancer; see above. It then provides a comprehensive description of the disease and economic burden of lung cancer, emphasizing the critical role of strategic investment in cancer care. Such investments are pivotal in reducing the burden, thereby benefiting both patients and the economy.

The disease pathway of lung cancer is described with several indicators. They were grouped under the four pillars of the EBCP. The indicators were also supposed to relate to the strategic areas of the NOS 2020-2030, the Polish Strategy to Fight Lung Cancer, as well as the EBCP.

- **Prevention** (2 indicators): Tobacco smoking, air pollution
- **Early detection** (2 indicators): Stage distribution at diagnosis, lung cancer screening
- **Diagnosis and treatment** (7 indicators): Physicians, diagnostic imaging equipment, biomarker testing, geographic access to cancer care, lung cancer patient pathway and waiting times, availability of novel lung cancer medicines, uptake of novel lung cancer medicines
- **Survivorship** (1 indicator): Palliative care services

For each indicator, this report provides:

- General description of why this indicator is important and how it relates to the NOS 2020-2030, Poland's Strategy to Fight Lung Cancer, and the EBCP
- Description of the current status in Poland and comparison with other countries
- Recommendations for improvement

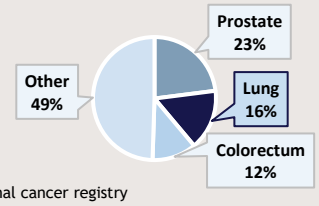
For the comparison with other countries, this report benchmarks Poland against Czechia, Hungary, and Slovakia (the Visegrád Group, the V4) as well as the EU average whenever data are available.

# Disease burden of lung cancer

In 2021, some 20,572 new lung cancer cases were registered in the Polish National Cancer Registry (2). These figures should be interpreted cautiously as cancer incidence tends to be underestimated in the registry. Lung cancer was the second most commonly diagnosed cancer in men (16%) and women (10%). The number of lung cancer deaths in 2021 was 20,841, which made lung cancer the leading cause of cancer death for men and women (2). The higher numbers of deaths than new cases of lung cancer indicate underreporting in the Polish National Cancer Registry. To better understand the magnitude of the burden of lung cancer, it will be important to improve reporting practices and data linkage in Poland.

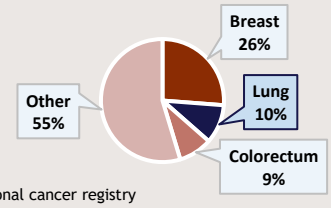
The age-standardized incidence rates (ASR, ESP2013) for lung cancer have shown a downward trend in men, from 143.5 in 1999 to 79.1 in 2021. For women, the rate has increased from 25.8 in 1999 to 38.4 in 2021 (2). Similarly, the age-standardized mortality rates have decreased in men, from 142.4 in 1999 to 86.7 in 2021, while for women, there was an increase from 23.6 in 1999 to 36.4 in 2021 (2). The NOS 2020-2030 aims to reduce lung cancer mortality rates in men to 78.5 by 2025 and keep the rates for women below 38.9 (8).

**Cancer incidence among men in Poland in 2021**
**Number of new cases: 77,610**



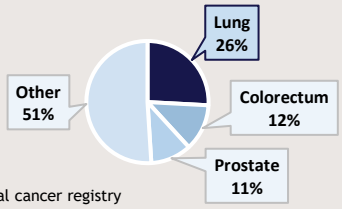

Source: Polish national cancer registry

**Cancer incidence among women in Poland in 2021**
**Number of new cases: 80,408**



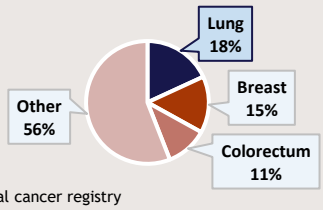

Source: Polish national cancer registry

**Cancer mortality among men in Poland in 2021**
**Number of deaths: 50,484**



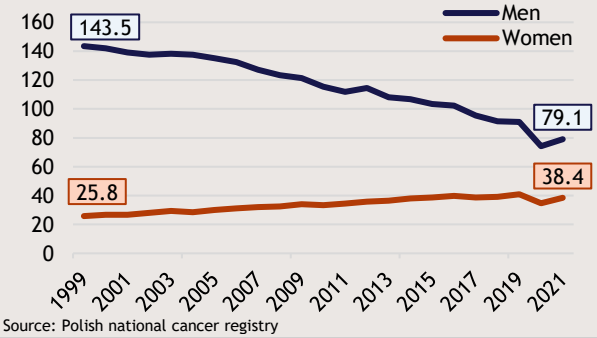

Source: Polish national cancer registry

**Cancer mortality among women in Poland in 2021**
**Number of deaths: 42,988**



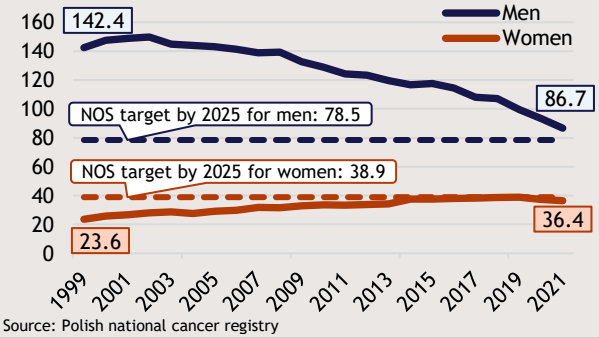

Source: Polish national cancer registry

**Changes in lung cancer incidence (ASR, ESP2013) in Poland over time, by sex**




Source: Polish national cancer registry

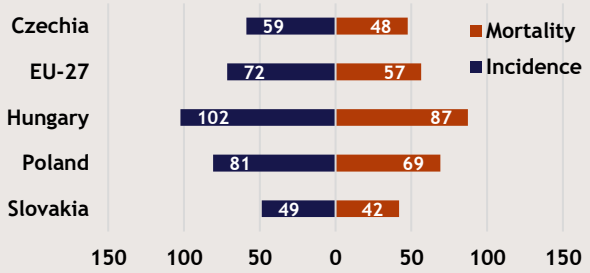
**Changes in lung cancer mortality (ASR, ESP2013) in Poland over time, by sex**




Source: Polish national cancer registry

According to estimations from the European Cancer Information System (ECIS), the number of new lung cancer cases in Poland was 30,379 in 2022, corresponding to an incidence rate of 81 per 100,000 inhabitants (12). This rate is above the EU average of 72 per 100,000 and is the second highest among the V4 countries behind Hungary. The estimated mortality rate for lung cancer in Poland in 2022 was 69 per 100,000 inhabitants, also higher than the EU average of 57 per 100,000 (12). Among the V4 countries, Hungary again had the highest mortality rate, while Slovakia had the lowest incidence and mortality rates.

**Estimates of lung cancer incidence and mortality per 100,000 inhabitants in 2022, both sexes**

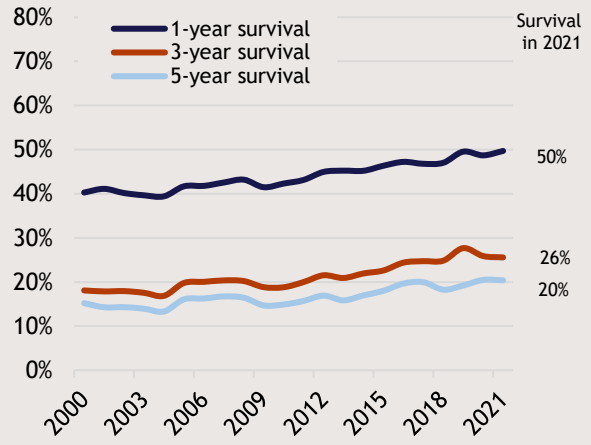



Source: ECIS

The survival rates of lung cancer are low compared to most other cancer types. According to data from the Polish National Cancer Registry, the 5-year age-standardized net survival rate of lung cancer reached 20% in 2021, up from 15% in 2000 (13); see Figure a. The 1-year survival rate has seen a slightly better improvement from 40% in 2000 to 50% in 2021. The latest international comparison of survival rates of lung cancer for the diagnosis period 2010-2014, as part of the CONCORD-3 study, showed that the Polish survival rate was just below the EU average (14% vs. 15%) but higher than the rates observed in the other V4 countries (14); see Figure b.

The survival rates of lung cancer differ by stage at diagnosis. Data from the Polish National Cancer Registry show that the 1-year and 5-year survival rates of lung cancer are highest if the tumor is diagnosed early in the loco-regional stage (67% and 33%, respectively in 2021) and lowest if diagnosed in the metastatic stage (31% and 5%, respectively in 2021) (13); see Figures c and d. Lung cancers with an unknown stage at diagnosis had a 46% 1-year and a 21% 5-year survival rate in 2021; see Figure e.

**Figure a: Survival rates of lung cancer in Poland**
(age-standardized net survival for men+women, all ages, all stages)




Source: Didkowska et al. (2024) with data from the National Cancer Registry

**Figure b: 5-year net survival rates of lung cancer during the diagnosis period 2010-2014, both sexes**

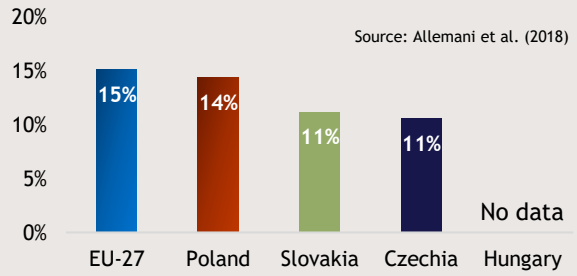
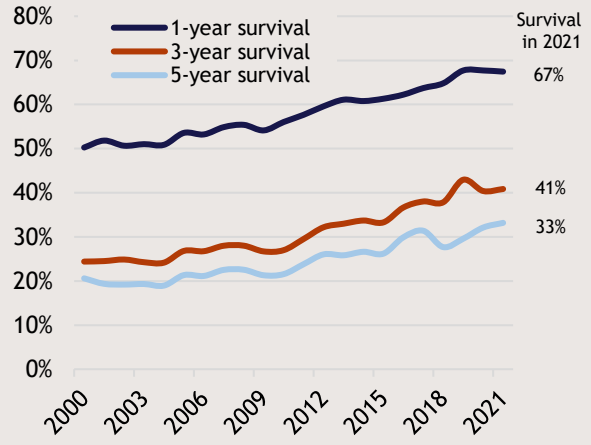
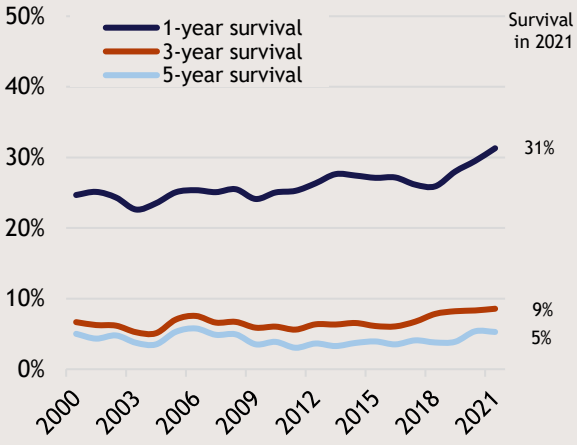



**Figure c: Survival rates of loco-regional lung cancer in Poland**
(age-standardized net survival for men+women, all ages)



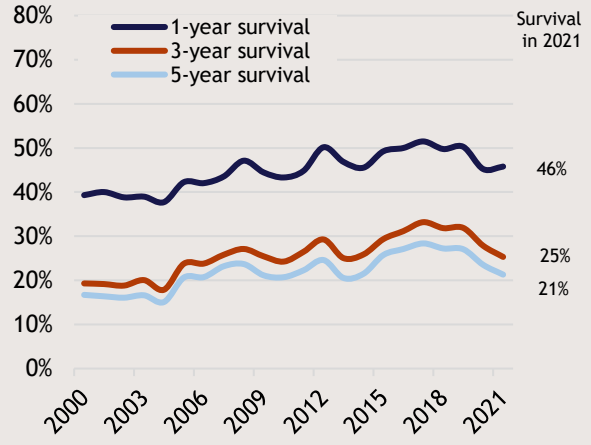

Source: Didkowska et al. (2024) with data from the National Cancer Registry

**Figure d: Survival rates of metastatic lung cancer in Poland**
(age-standardized net survival for men+women, all ages)



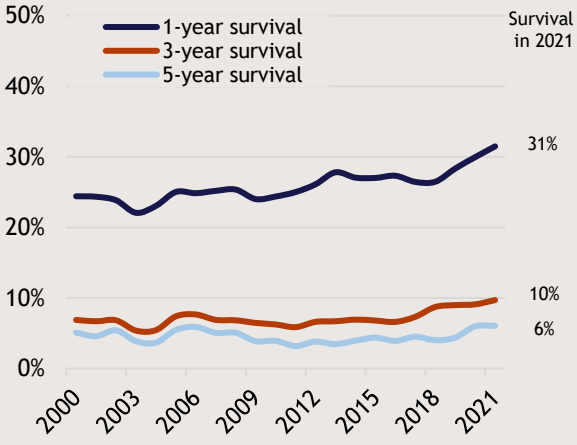

Source: Didkowska et al. (2024) with data from the National Cancer Registry

**Figure e: Survival rates of lung cancer with unknown stage in Poland**
(age-standardized net survival for men+women, all ages)




Source: Didkowska et al. (2024) with data from the National Cancer Registry

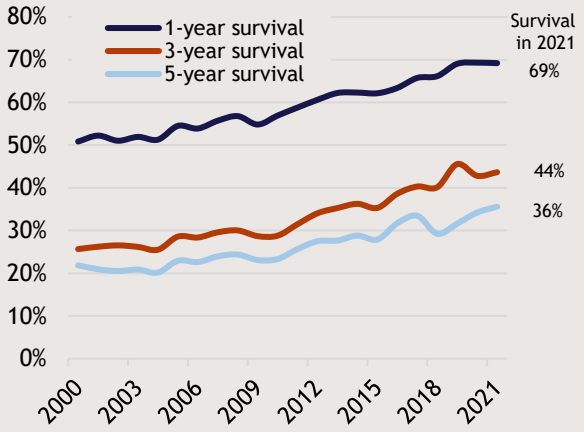
**Figure f: Survival rates of metastatic NSCLC in Poland**
(age-standardized net survival for men+women, all ages)




Source: Didkowska et al. (2024) with data from the National Cancer Registry

**Figure g: Survival rates of loco-regional NSCLC in Poland**

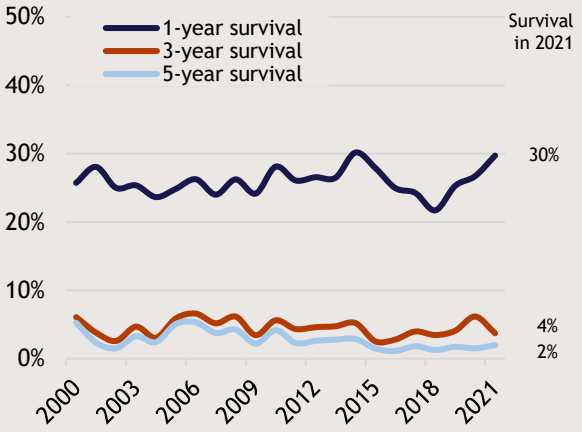
(age-standardized net survival for men+women, all ages)




Source: Didkowska et al. (2024) with data from the National Cancer Registry

**Figure h: Survival rates of metastatic SCLC in Poland**

(age-standardized net survival for men+women, all ages)




Source: Didkowska et al. (2024) with data from the National Cancer Registry

During the last decade, the medical treatment of lung cancer has changed most profoundly for the subtype non-small cell lung cancer (NSCLC), which accounted for around 85-88% of all lung cancer cases in Poland in the years 2000-2021 (13). Several dozens of personalized cancer medicines have been added to the therapeutic arsenal since 2009 with the first regulatory approval of a targeted medicine by the European Medicines Agency (EMA) and the first immunotherapy in 2015 (15). These medicines were initially only used in the treatment of metastatic NSCLC, but from 2021, some of these medicines have also been approved by the EMA for use in loco-regional NSCLC. According to data from the Polish National Cancer Registry, the 3-year and 5-year survival rates of metastatic NSCLC remained stable in 2000-2021, whereas an increase in the 1-year survival rate from 24% in 2018 to 31% in 2021 is noticeable; see Figure f. By comparison, the survival rates of loco-regional NSCLC have recorded a sustained increase from 2000 to 2021; see Figure g. The survival rates of metastatic small cell lung cancer (SCLC) have not improved over the period, with the 1-year survival rate reaching a similar level in 2021 as two decades earlier in 2001; see Figure h.

Experience from other European countries:

- In Hungary, the 3-year absolute survival rate for cases of metastatic NSCLC that were treated with cancer medicines increased significantly between 2011-2012 and 2019 - for non-squamous cell carcinoma from 14% to 29% and for squamous cell carcinoma from 13% to 22% (16). By contrast, no significant improvements were found in the 3-year survival of patients with SCLC.
- In the five Nordic countries, the 5-year net survival rates of lung cancer increased from around 9-17% in 2002-2006 to 17-34% in 2017-2021 (17).
- In Austria, the 1-year net survival rate of lung cancer increased from 41% in 1999-2003 to 60% in 2022 (18). The 3-year survival rate improved from 19% in 1999-2003 to 34% in 2019-2020, and the 5-year survival rate went up from 15% in 1999-2003 to 24% in 2014-2018.

The experience from these countries points to greater improvements in the survival rates than what can be observed in the Polish National Cancer Registry. Several factors may help to explain this situation:

- One reason for the modest improvement in the overall survival rate is that the proportion of metastatic cases has increased from 2000 to 2021; see the indicator “Stage distribution” in the Early detection section. Since metastatic cases have a lower survival, a greater proportion of them in the sample will bias the overall survival rates downwards.
- As explained above, for metastatic NSCLC the recent introduction of novel cancer medicines would have been expected to improve the survival rates, as also suggested by the aforementioned analysis in Hungary (16). Complicating factors in Poland might have been delays in the reimbursement of these medicines and uptake in clinical practice after reimbursement. For instance, the initial first-line immunotherapy for metastatic NSCLC with a high expression of PD-L1 (around 22% of all cases (19)) was reimbursed in Poland in May 2018, over 15 months after EMA approval, and the initial first-line immunotherapy for cases with non-high PD-L1 expression was not reimbursed until January 2021, around 2 years after EMA approval (20). The initial first-line targeted medicines for ALK and ROS1 mutations (affecting around 6% of patients (21)) also faced delays of around 3 years until their reimbursement in January 2019 (20). After the reimbursement of these medicines, the uptake in clinical practice remained below the recommended level in European clinical guidelines in 2018-2020 (21); see the indicator “Uptake of novel lung cancer medicines” in the Diagnosis and treatment section. Furthermore, previous research suggested that around half of all metastatic NSCLC patients do not receive any cancer medicines as part of their treatment in Poland (21). Enhancing and sustaining access to novel treatments is crucial not only to improve the treatment outcomes for patients but also to ensure consistent access to clinically recommended therapies.

# Economic burden of lung cancer

In Poland, the overall economic burden of cancer was estimated to amount to €5.3 billion corresponding to €140 per capita in 2018 (22). Most of the burden is attributed to lost productivity among working-age patients (48%), rather than health care expenditure (41%).

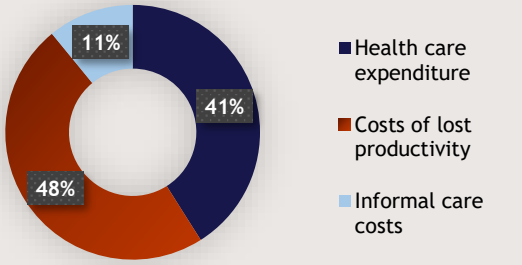
**The economic burden of cancer consists of:**

**Health care 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 Poland in 2018**




Source: Hofmarcher et al. (2020)

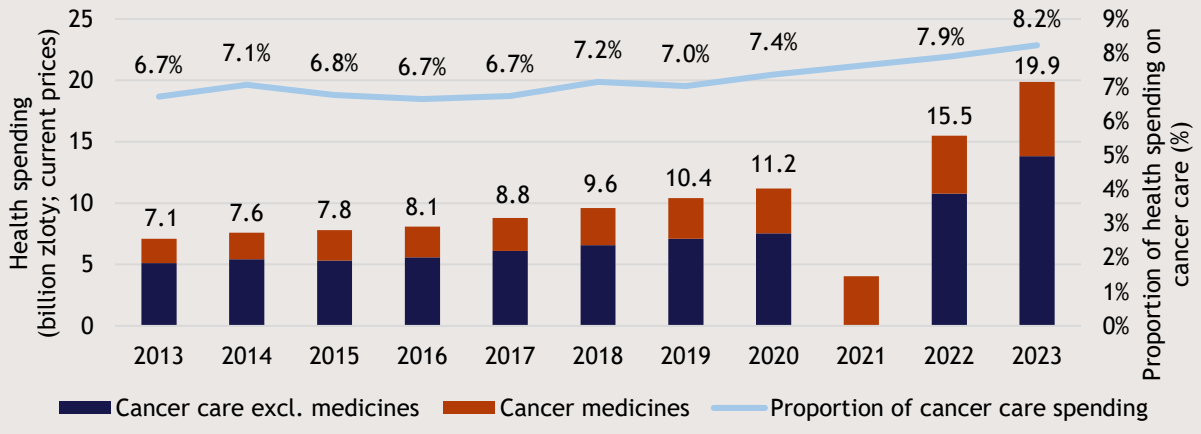
## Health spending on cancer care

The total amount of Poland's health care expenditure that is used specifically for cancer care is not precisely known. The total amount consists of public expenditure by the National Health Fund (NFZ) and private out-of-pocket payments by cancer patients for cancer care services. Yet co-payments by patients for oncology services and cancer medicines are very small compared with other health care services in Poland (23).

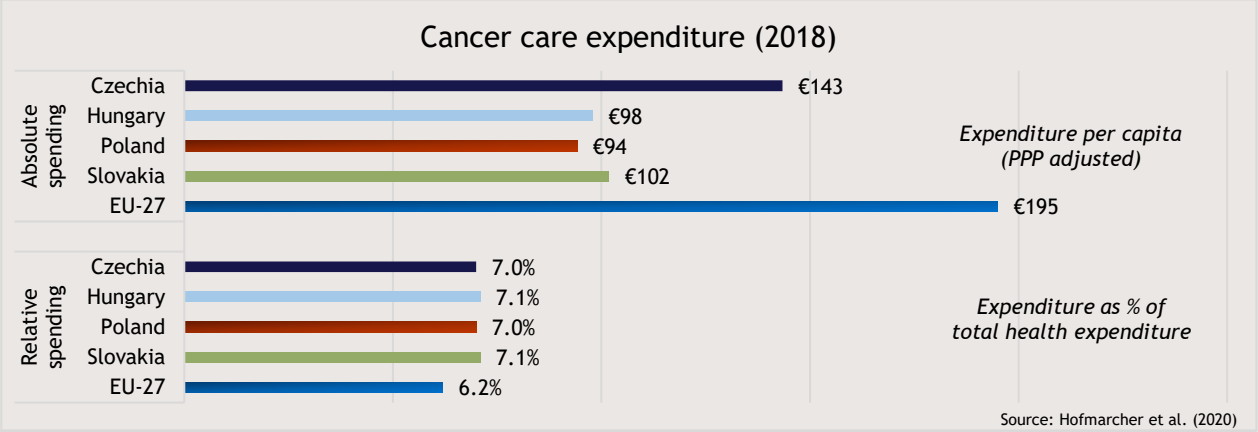
The NFZ has significantly increased spending on cancer care in recent times. Between 2013 and 2023, spending almost tripled from 7.1 billion to 19.9 billion zloty (in current prices) (24-26). However, overall health expenditure also increased during this period from 106 to 242 billion zloty (in current prices) (27). Therefore, the proportion of health spending on cancer care only rose slightly from 6.7% to 8.2% between 2013 and 2023. Expenditure on cancer medicines by the NFZ (consisting of innovative oncology medicines, chemotherapy, and medicines dispensed in open pharmacy) increased during this period from 2.0 to 6.1 billion zloty (in current prices) (28), but their proportion of cancer care expenditure was close to 30% throughout the period.

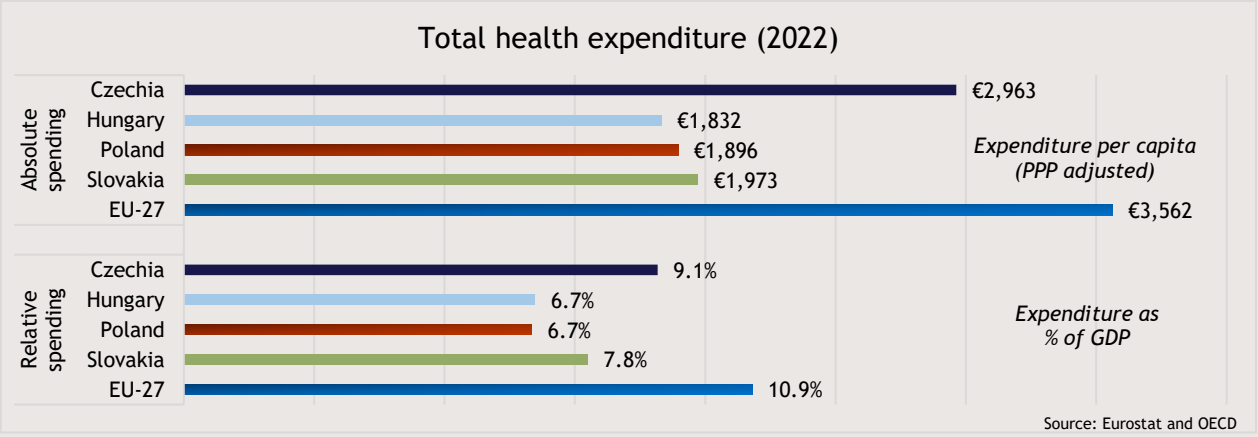
Cancer care expenditure by the NFZ

Source: NFZ and OECD




Cancer care expenditure in Poland in 2018 were estimated to be around €94 per capita (all figures adjusted for PPP) (22). This was the lowest amount among the V4 countries, and much lower than the EU average of €195. The main reason for the low level of spending on cancer care in Poland was not that a small proportion of health expenditure went to cancer care. In fact, Poland and the other V4 countries all spent around 7% of total health expenditure on cancer care, which was more than the EU average of 6.2%. However, overall spending on health care in Poland is low, reaching 6.7% of GDP (of which 75% are from public sources), compared to the EU average of 10.9% and 9.1% in Czechia. The absolute spending level on health care in Czechia (€2,963 per capita) is 56% higher than in Poland (€1,896 per capita). Limited overall spending on health care makes it difficult to adequately fund cancer care services and to provide high-quality cancer care for all patients.

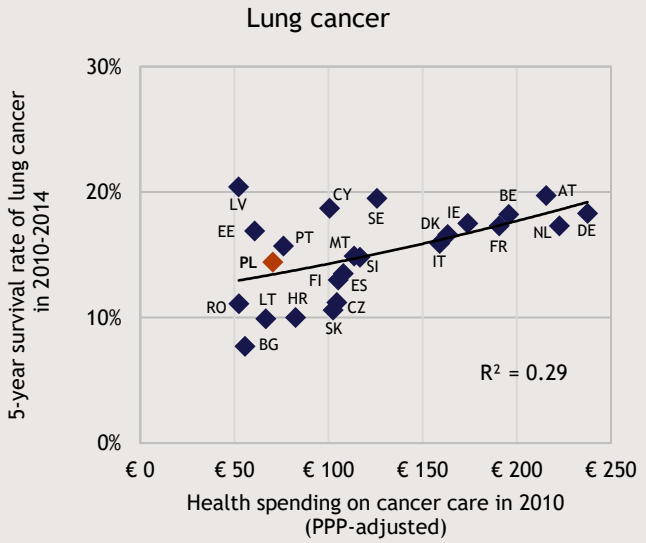



The specific amount of Poland's cancer care expenditure allocated to lung cancer is not known. Data from other countries show that lung cancer treatment accounts for about 10% of total cancer care expenditure, which is quite close to the share of lung cancer incidence in total cancer incidence. For instance, in the United States, lung cancer accounted for around 11% of total cancer care expenditure in both 2015 and 2020 (29), while in Sweden it was 8% in 2013 (30), and 8% across the EU in 2009 (31).

## Health spending on cancer care & survival rates

The ultimate aim of health spending on cancer care is to improve patients' chance to survive and their quality of life. The figure to the right shows how cancer care expenditures per capita in the EU-27 countries relate to survival rates in lung cancer. This is a crude way of exploring whether there is a link between spending and patient outcomes (32). The upward sloping trend line indicates that countries with higher spending tend to record higher survival rates (mostly in Northwestern Europe) and countries with lower spending tend to record lower survival rates (mostly in Eastern Europe). However, this association is relatively weak ($R^2$ = 0.29) and varies significantly among different countries. Nevertheless, this association has been documented also in previous time periods for EU countries (33), and might apply even nowadays. In Poland, the spending on cancer care was approximately €70 per capita (PPP-adjusted) in 2010, which places it on the lower end of the expenditure ranking. Correspondingly, Poland's survival rate for lung cancer in 2010-2014 is lower than several other EU countries, suggesting that there might be potential for improvement through increased health expenditure. However, it is also apparent that simply increasing spending does not guarantee better outcomes, due to key factors like healthcare infrastructure, access to care, and national health policies. Thus, while more spending may offer some benefits, it is paramount that the current use of health care expenditure and resources in cancer care are reviewed and optimized by the NFZ, prioritizing health interventions that are both effective and efficient.



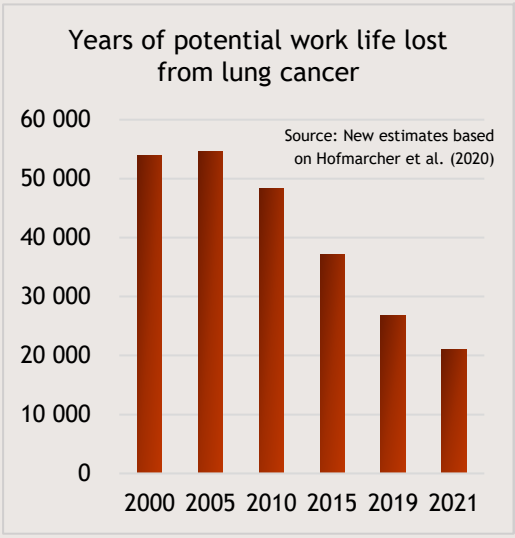

Source: Hofmarcher et al. (2019)

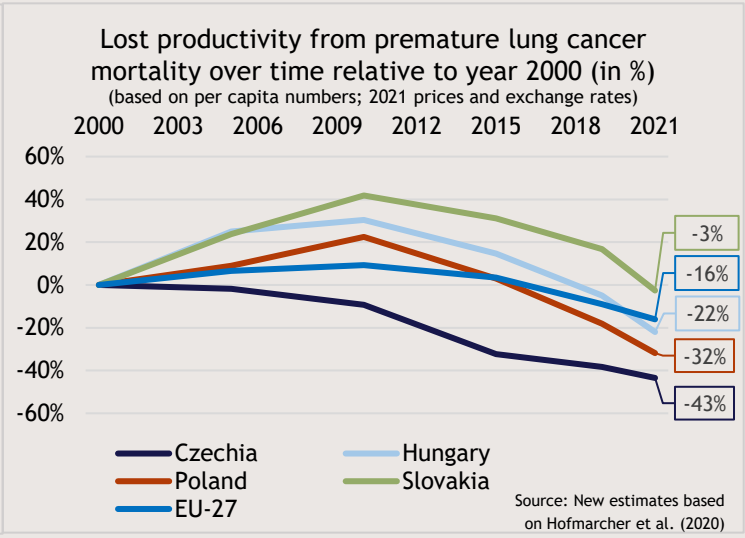
# Productivity gains for the economy

Cancer imposes a financial burden on the economy outside the health care system. This burden originates from work absences due to illness, early retirement, or premature death among cancer patients of working age. The potential work contributions of these patients that are lost due to lung cancer represent a productivity loss to the economy.

In Poland, the years of potential work life lost (YPWLL) due to premature mortality from lung cancer decreased significantly by about 61% from 54,000 to 21,000 years between 2000 and 2021. Such reductions are typically attributed to demographic shifts and improvements in the quality of care (early detection, diagnosis, medical treatment), which potentially enhance survival rates. In Poland, 5-year age-standardized net survival rates for lung cancer have increased by five percentage points from 15% in 2000 to 20% in 2021 across all age groups (13). During this time, the country has seen increased expenditure on cancer medicines by the NFZ (28), improved reimbursement rates for novel cancer medicines (3), and a rise in the availability and usage of diagnostic imaging equipment for lung cancer (34, 35). These developments are crucial components in the comprehensive care journey, including diagnosis, treatment, and follow-up.

The decrease in YPWLL is reflected in the overall reduction in productivity losses from premature lung cancer mortality in Poland, albeit not entirely. Between 2000 and 2021, productivity losses in Poland due to lung cancer mortality fell by 32%, from €9.3 to €6.3 per capita (2021 prices and exchange rates, not PPP-adjusted).[2] This reduction surpasses the EU average of a 16% decline and is second only to Czechia's 43% reduction among the V4 countries.




It is important to note that, in addition to advancements in cancer care, demographic shifts can also significantly impact productivity losses from lung cancer. For example, although YPWLL decreased from 2005 to 2010, Poland saw an increase in productivity losses during this period, likely due to fluctuations in employment rates, which rose by 11% for men and 12% for women, after a previous decline. These changes in employment counteracted the expected reductions in productivity losses, as a higher number of working individuals meant a greater risk of losses due to premature mortality.

Ultimately, changes in productivity losses are influenced by both advancements in cancer care and demographic shifts. Therefore, to fully understand and address the economic impacts of health conditions like lung cancer, it is crucial to consider both healthcare advancements and demographic trends in strategic planning.

[2] The methodology used to calculate new estimates for this report is consistent with the study by Hofmarcher et al. (2020) on the economic burden of cancer in Europe (22).

Pillar 1: Prevention

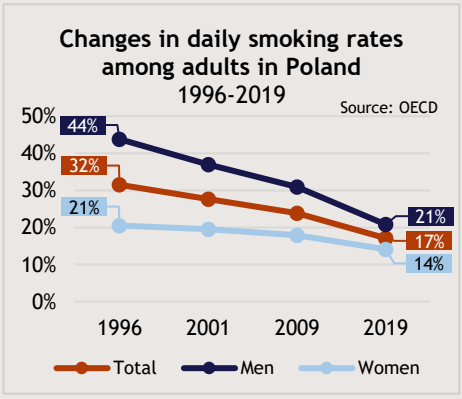
KPI: Tobacco smoking

## Background

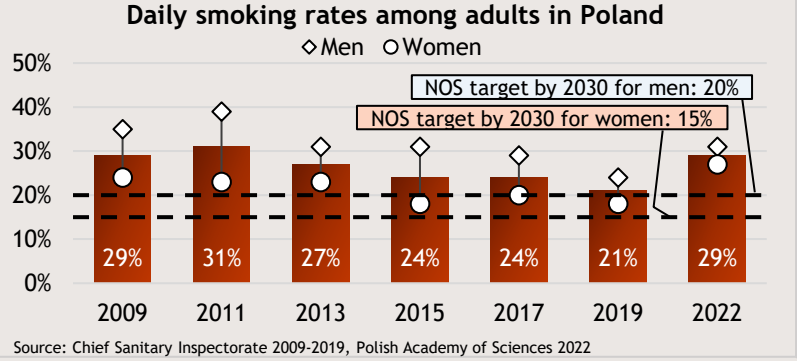
- Tobacco smoking is a major risk factor for developing various cancer types (36), and it has been linked to cancers at 12 different sites (37). Around 80% of all lung cancer cases are linked to cigarette smoking (38).
- The WHO suggests that implementing tobacco control measures can prevent one in five annual cancer cases (39). 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 (40). Only one EU-country (the Netherlands) has so far implemented the MPOWER (41).
- 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 (10).
- Since ratifying the WHO Framework Convention on Tobacco Control in 2006, Poland has implemented partial smoking bans, advertising restrictions, and mandatory text-only health warnings on tobacco packaging (42).
- Poland's Strategy to Fight Lung Cancer recognizes smoking as the main risk factor for lung cancer and suggests several forms of actions to limit access to tobacco products and exposure to second-hand smoking (7). The NOS 2020-2030 includes the aim to reduce the percentage of men and women who are daily smokers from 24% and 18%, respectively, to 20% and 15% by the end of 2030 (8).

## Current status in Poland

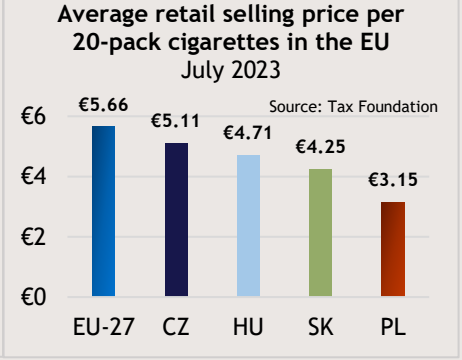
- International data from the OECD show a positive trend of daily smokers in Poland with a decline from 32% in 1996 to 17% in 2019 (see graph to the right) (43). The decrease was stronger in men.
- National data of the 2019-report on Poles' attitudes towards smoking show a higher daily smoking rate of 21% in 2019, with 24% for men and 18% for women (see graph below) (44). These rates exceeded Poland's 2030 targets of 20% for men and 15% for women. In addition, the Polish Academy of Sciences reports higher smoking rates in 2022, with 29% of adults (31% of men and 27% of women) being daily smokers (45). While the comparability of the numbers for 2022 to older data is uncertain, they indicate a possible recent surge in daily smoking rates in Poland.




- According to the latest available data from Eurostat for 2019, 23% of Polish adults were either daily or occasional smokers, the lowest among the V4 countries (46). Smoking prevalence varies by socioeconomic status and age: 29% in the lowest income quintile compared to 20% in the highest income quintile; 25% among adults aged 15-64 compared to 15% among those 65 years or older (47).
- Cigarette prices in Poland are the second lowest among EU countries. As of July 2023, the average retail selling price for a pack of 20 cigarettes, including taxes, stands at €3.15 (48). This price is significantly lower than the EU average of €5.66 and the lowest among the V4 countries.




Source: Chief Sanitary Inspectorate 2009-2019, Polish Academy of Sciences 2022




## Recommendations

- Rely on the WHO MPOWER framework to intensify public awareness campaigns and educational programs, emphasizing the health risks associated with smoking and the benefits of quitting.
- Increase the excise tax on tobacco to discourage smoking, considering the notably low cigarette prices in Poland.

Pillar 1: **Prevention**

KPI: **Air pollution**

## Background

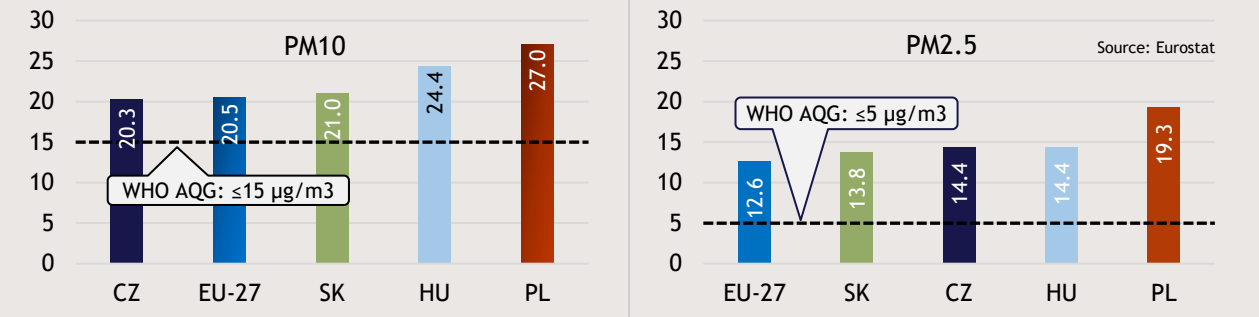
- According to the European Environment Agency (EEA), more than 10% of all cancer cases in Europe are caused by exposure to environmental and occupational risks including air pollution, second-hand smoke, radon, ultraviolet radiation, asbestos, and other pollutants (49). Air pollution alone (both indoor and outdoor) 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% (50-52). The WHO updated its air quality guidelines (AQG) in 2021, designed to support the reduction of pollution through legislative and/or and technological measures (53). 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 ($PM_{2.5}$).[3]
- The EBCP acknowledges the significant role that environmental and occupational hazards play in cancer development, emphasizing the importance of prevention strategies to save lives (10). Aligned with this goal, the Zero Pollution Action Plan of the European Commission seeks to decrease air and water pollution to lessen people's exposure to harmful environmental pollutants and mitigate health risks, including cancer (54). 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 Europe (55).
- Poland's Strategy to Fight Lung Cancer includes the objective of reducing the occurrence and impact of lung cancer risk factors which, among other things, calls for (i) legislative changes aimed at reducing emissions of carcinogenic substances and (ii) educating the public on the health effects of exposure to air pollution resulting from human activities (7). The NOS 2020-2030 does not contain a clear aim to reduce air pollution (8).

## Current status in Poland

- Air pollutant levels in the EU, including Poland, have steadily declined since the early 2000s (56), largely as a result of legislative actions following the 2005 WHO AQG (57). Rapid reductions in pollutant concentrations occurred during Covid-19 lockdowns, but reverted to pre-pandemic levels quickly (58). Even so, the long-term reduction in emissions has led to a sustained decrease in air pollutants. For instance, Poland saw annual mean concentrations of $PM_{10}$ and $PM_{2.5}$ decline by 32% and 37%, respectively, from 2010 to 2019 (59).
- Poland has the fourth highest concentration of $PM_{10}$ and the second highest concentration of $PM_{2.5}$ in the EU. According to 2019 Eurostat data, $PM_{10}$ exposure was approximately 27 µg/m$^3$ — higher than the EU average of 21 µg/m$^3$ and the highest among V4 countries. $PM_{2.5}$ exposure was around 19 µg/m$^3$, which is 1.5 times higher than the EU average and second only to Bulgaria among all EU countries (59). Neither the V4 countries nor the EU average met the 2021 WHO AQG recommendations, and Poland is far away from doing so.
- Poland experiences a significant health impact from particulate matter exposure. In 2021, $PM_{2.5}$ was associated with 125 deaths per 100,000 inhabitants — more than twice the EU average of 57 per 100,000 (60). This equated to 1,375 years of life lost (YLL) per 100,000 inhabitants in Poland (vs. the EU average of 578 per 100,000) (61).

**Particulate matter concentration**

Numbers show population weighted annual mean concentration (µg/m$^3$) of particulate matter 10 ($PM_{10}$) and particulate matter 2.5 ($PM_{2.5}$) at urban background stations in agglomerations in 2019.




## Recommendations

- Align national air quality standards with the 2021 WHO guidelines for $PM_{10}$ and $PM_{2.5}$.
- Launch education campaigns on the health risks of air pollution and preventive measures.
- Increase investment in clean technology and infrastructure to reduce emissions.

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

Pillar 2: Early detection

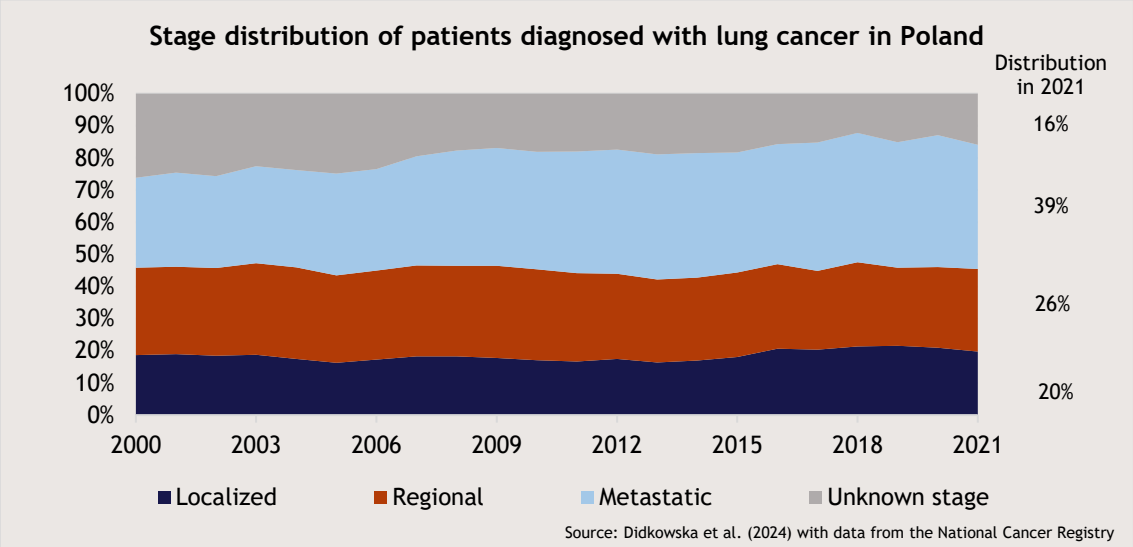
KPI: Stage distribution at diagnosis

## Background

- The stage at which lung cancer is diagnosed is critical for determining treatment options and prognosis. 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 57% compared to only 3% in stage IV lung cancer in England during the diagnosis period of 2013-2017 (62).
- The stage distribution at diagnosis for lung cancer has remained largely unchanged over the years. Around 50% of lung cancer patients are still diagnosed at a metastatic stage, where the prognosis is generally poor (21). Several factors contribute to late-stage diagnosis, including the asymptomatic nature of early-stage lung cancer, lack of public awareness, and potential delays in the care process (63). 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.
- Both Poland's Strategy to Fight Lung Cancer and the NOS 2020-2030 acknowledge the challenge of diagnosing lung cancer at early stages but include no specific aims or targets (7, 8).

## Current status in Poland

- The stage distribution at diagnosis is a crucial indicator of the effectiveness of a healthcare system in detecting lung cancer early. 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.
- Data from the Polish National Cancer Registry show a rather stable stage distribution of lung cancer cases between 2000 and 2021 (13). The proportion of localized cases (stage I) fluctuated between 16% and 21% in all years. The proportion of regional cases (stage II and III) varied between 24% and 29%. There was a noticeable growth in the proportion of metastatic cases (stage IV) from just below 30% in 2000-2002 to around 40% in 2017-2021. This growth in metastatic cases was paralleled by an almost equally large decrease in cases without staging information (unknown stage), which dropped from around 26% in 2000-2002 to 15% in 2017-2021. There is no visible impact of Covid-19 on the stage distribution in 2020 and 2021 compared to pre-pandemic years.




- The large proportion of metastatic cases at diagnosis and the absence of clear progress in the stage distribution show that early detection of lung cancer requires more attention. In Poland, patients with suspected lung cancer are referred by GPs to be diagnosed and staged in pulmonary hospitals, pneumonology, or thoracic surgery departments. The diagnostic and staging process has been described as lengthy and suboptimal, e.g., because of inadequate access to endobronchial ultrasound and mediastinal staging, repeated biopsies, inadequate material for molecular tests (64).

## Recommendations

- Continuously monitor the stage distribution of lung cancer and associated indicators to document progress in early detection and identify areas for improvement in public awareness, GP training, and diagnostic pathways.
- Early diagnosis needs to be improved through (i) better awareness of lung cancer symptoms of GPs to reduce the time until referral to a specialist and (ii) a lung cancer screening program targeting current and former smokers as well as other risk groups; see the next indicator for more details about screening.

Pillar 2: Early detection

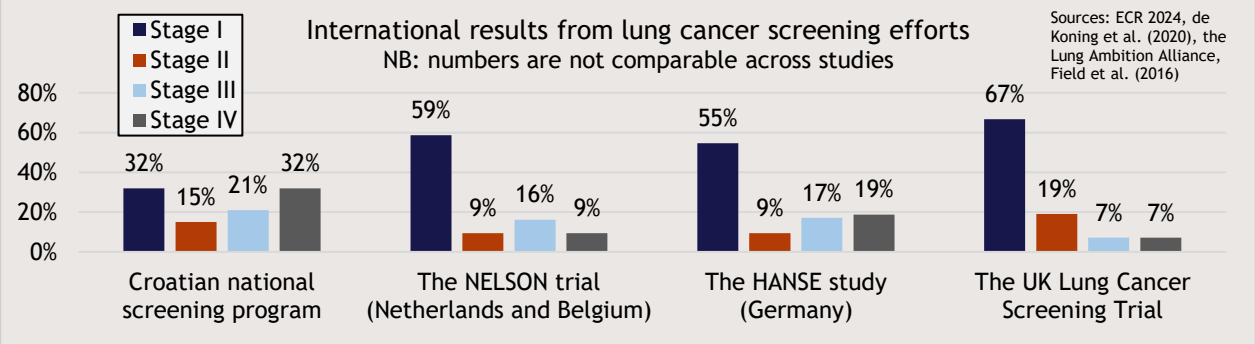
KPI: Lung cancer screening

## Background

- As explained in the previous indicator, the detection of lung cancer at earlier stages results in higher survival rates and lower treatment costs (62, 65). 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 (21).
- Results from several randomized-controlled trials show that targeted screening of former and current heavy smokers with low-dose computed tomography (LDCT) results in an extensive shift of patients to an earlier stage at detection and subsequent reduction in mortality (66). Lung cancer screening with LDCT has the possibility to reduce lung cancer mortality by at least 20% (11). 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) (66).
- The updated screening recommendation by the Council of the European Union from 2022 states that countries should explore the feasibility and effectiveness of LDCT to screen individuals at high risk for lung cancer, including heavy smokers and ex-smokers, and link screening with primary and secondary prevention approaches (67). Furthermore, 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 and also involving Polish experts, is ongoing in multiple EU countries (11).
- Croatia is the only EU country with an ongoing national lung screening program since 2020 (68). Other countries, including Poland and Czechia, have either ongoing or recently concluded large-scale pilot programs (68-70).
- Poland's Strategy to Fight Lung Cancer focuses on early detection through periodic examinations for high-risk individuals and aims to achieve 50% inclusion in targeted periodic screenings by 2025 (7). The NOS 2020-2030 aims to introduce new screening methods, including for lung cancer, by 2025, enhancing early detection through combined primary and secondary prevention measures to increase program participation (8).

## Current status in Poland

- Since 2008, Poland has engaged in LDCT screening research with pilot programs in Szczecin, Gdańsk, Poznań, and Warsaw, each with different methodologies (71). These pilots screened around 50,000 individuals, detecting lung cancer in about 1% of participants, with 64% to 70% diagnosed at stage I (71).
- The success and findings of earlier pilots shaped the 2018 Polish consensus on national LDCT screening (72), leading to the National Lung Cancer Early Detection Program (WWRP) in 2020, which concluded in 2024 (70). The program, funded by the MoH and the European Social Fund (73), was implemented across 31 medical entities in Poland. Eligibility included individuals aged 55-74 who are current smokers or former smokers with a significant smoking history, and those aged 50-74 with specific occupational exposures or related health conditions (70). Outcome data from the first term of the program are not yet available.
- Poland has no active national lung cancer screening program as of August 2024. To secure funding for a new term of the WWRP, efforts are focused on raising awareness of LDCT screening benefits and aligning delivery with workforce capacity (71).
- International experiences highlight the value of lung cancer screening programs in shifting the stage distribution towards earlier stages. The first results of Croatia's national lung cancer screening program, presented at the European Congress of Radiology (ECR) in 2024, indicated that lung cancer was diagnosed in 1.2% of 27,000 screened individuals, with 47% detected at early stages (stage I or II). Similar benefits have been observed in the NELSON trial (74), the German HANSE study (75), and the UK Lung Cancer Screening Trial (76). While methodologies and settings vary, making direct comparisons challenging, there is mounting evidence of substantial benefits of LDCT screening for patient outcomes.



- An effectively executed lung cancer screening program should be supported by targeted educational campaigns. These campaigns are essential to raise awareness about the importance of early detection and to encourage participation in screening. Authorities need to actively engage with both patients and GPs to shape and run these campaigns, ensuring that the benefits of screening are widely understood and accessible. The International Association for the Study of Lung Cancer (IASLC) has assembled the following list of factors to consider for a successful implementation of a lung cancer screening program (66):

| | |
|---|---|
| Governance | Clear definition of roles between national, regional or local levels in terms of decision-making, organization, and deployment of screening, with centralized monitoring of data and a national protocol guiding all implementation |
| | Opportunities for the involvement of relevant professional societies and patient organizations in decision-making on lung cancer screening |
| Information | Comprehensive data management system, covering all aspects of the program |
| | Full interoperability between screening program and health data systems to capture outcomes for all screening attendees and ensure regular updating of invitation database |
| | Widespread information campaign conveying appropriate, accessible information about screening through all possible channels |
| Health workforce | Comprehensive workforce planning to ensure sufficient personnel to perform scans and follow-up care |
| | Training and accreditation criteria are defined for all imaging personnel and applied in all participating screening centers |
| | Full engagement of primary care physicians, with appropriate training in place |
| Service delivery | Screening program fully integrated into multidisciplinary care pathways |
| | Preemptive addressing of any deficits along the lung cancer pathway that may result in delays in diagnosis and access to care |
| | Full integration of lung cancer screening program with an existing smoking cessation program |

## Recommendations

- Establish an adequately funded nationwide LDCT screening program, building on the experiences of the WWRP and targeting high-risk populations, in line with the 2025 goals of Poland's Strategy to Fight Lung Cancer.
- Invest in training and expanding the healthcare workforce to support the screening program. Ensure adequate resources and infrastructure to handle increased screening and follow-up care, aligning with EU recommendations and successful international models.
- Launch educational campaigns to raise awareness about the benefits of early detection through LDCT screening. Engage both patients and healthcare providers to ensure widespread participation and understanding.
- Encourage GPs (or specialists) to refer patients for lung cancer screening in parallel with mammography or other screening examinations, if risk factors (e.g. smoking) are present (so-called cross-referrals).

Pillar 4: Diagnosis and treatment

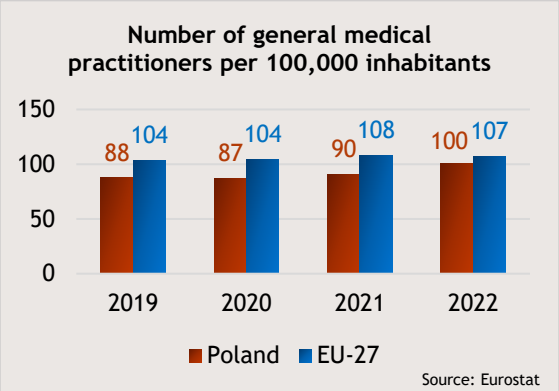
KPI: Physicians

## Background

- Modern lung cancer care is highly specialized and requires competence from different medical fields. This includes pulmonologists, diagnostic radiologists, and pathologists for the diagnosis of lung cancer, and surgeons, therapeutic radiologists, 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.
- Poland's MoH recognizes the shortage of physicians and the uneven distribution of specialists involved in oncology across the country (8). This issue is intensified by an aging workforce within the medical profession. The Polish Oncological Society (PTO) indicates that the current number of oncology specialists is inadequate to meet increasing demands, which is further compounded by the fact that only about 70% of specialization training positions are being filled (8).
- The NOS 2020-2030 sets specific aims to fill 100% of oncology specialization training slots by 2024 and to boost the number of practicing oncologists and related specialists by 10% by 2028 (8). The Polish Strategy to Fight Lung Cancer focuses on enhancing competencies specifically in lung cancer care across the entire health care system, aligning with broader national efforts to improve oncological services (7).

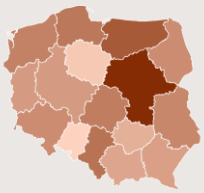
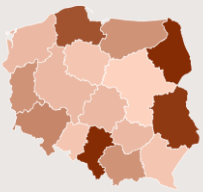
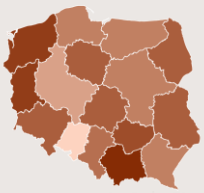
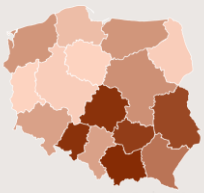
## Current status in Poland

- In 2022, Poland had a below-average density of GPs, with 100 GPs per 100,000 inhabitants compared to the EU average of 107 GPs per 100,000, although the situation has improved in recent years (77). Czechia and Hungary had also below-average GP numbers. A shortage of GPs in primary care might impede timely access for patients displaying signs and symptoms of lung cancer, potentially delaying early diagnosis.




- Data from the NFZ in 2021 and published by the MoH highlight low availability and significant regional disparities in the distribution of specialists essential to lung cancer care in Poland (78). Results are presented in the maps and table below. Such shortages could hinder timely and accurate diagnosis and treatment of lung cancer, impacting patient outcomes. Projections for 2026 indicate a 25% increase in clinical oncologists and relatively stable numbers of radiation oncologists and thoracic surgeons, but a concerning 14% reduction in pulmonologists, which could significantly affect lung cancer treatment capacities across the country (78).

**Number of specialized physicians per 100,000 inhabitants in Poland by voivodeships, 2021**

| Clinical oncology | Onc. radiation therapy | Thoracic surgery | Lung diseases |
|---|---|---|---|
|  |  |  |  |
| Poland 2021: 1,071 (2.7)<br>Poland 2026: +25% | Poland 2021: 796 (2.0)<br>Poland 2026: +1% | Poland 2021: 265 (0.7)<br>Poland 2026: -0.4% | Poland 2021: 2,613 (6.9)<br>Poland 2026: -14% |
| **Highest** | **Highest** | **Highest** | **Highest** |
| 1. mazowieckie (4.7)<br>2. warmińsko-mazurskie (3.8)<br>3. śląskie (3.3) | 1. podlaskie (3.1)<br>2. śląskie (3.1)<br>3. lubelskie (3.0) | 1. małopolskie (1.1)<br>2. lubuskie (1.0)<br>3. zachodniopomorskie (1.0) | 1. małopolskie (8.4)<br>2. łódzkie (8.3)<br>3. opolskie (8.3) |
| **Lowest** | **Lowest** | **Lowest** | **Lowest** |
| 1. opolskie (1.4)<br>2. kujawsko-pomorskie (1.6)<br>3. świętokrzyskie (2.1) | 1. mazowieckie (1.8)<br>2. podkarpackie (1.9)<br>3. opolskie (1.9) | 1. opolskie (0.1)<br>2. wielkopolskie (0.4)<br>3. warmińsko-mazurskie (0.6) | 1. lubuskie (5.4)<br>2. kujawsko-pomorskie (5.4)<br>3. wielkopolskie (5.5) |

Source: DAiS study based on data from the NFZ in Poland, the Central Statistical Office, and the Education Monitoring System of the e-Health Center. Data is published by the Polish MoH (78).

## Recommendations

- Intensify training and recruitment efforts of GPs, nurses, diagnosticians and oncology specialists to meet national strategy goals to alleviate shortages in critical lung cancer care areas and across voivodeships.

Pillar 3: Diagnosis and treatment

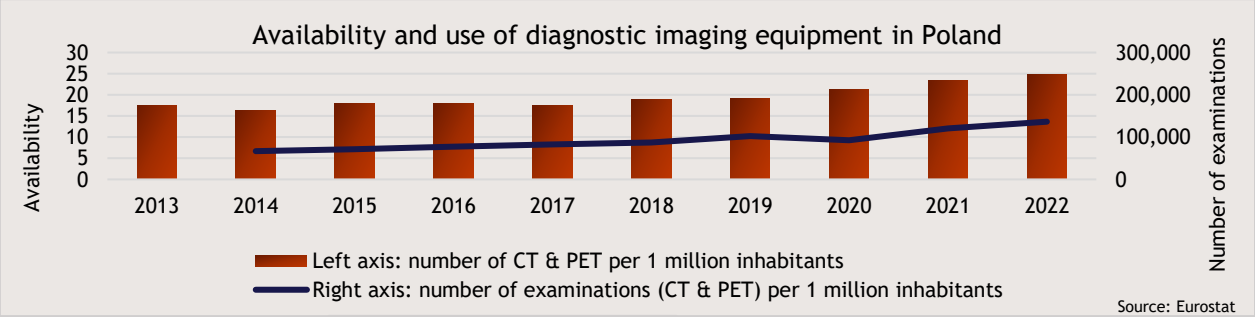
KPI: Diagnostic imaging equipment

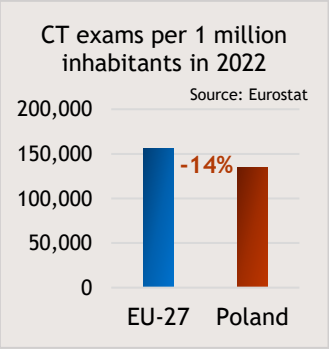
## Background

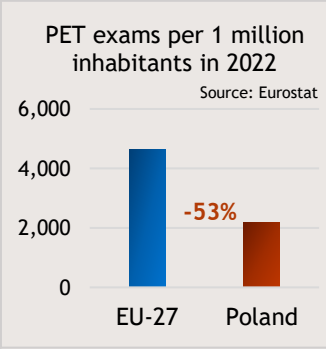
- Imaging equipment such as computed tomography (CT) scanners and positron emission tomography (PET) scanners support physicians in the lung cancer care pathway from diagnosis to treatment and follow-up.
- The investment costs for scanners are high and they require specialized medical personnel to operate them, which naturally restricts their availability. General guidelines or benchmarks regarding the ideal number of scanners per inhabitant or cancer patient do not exist. An undersupply of scanning units may lead to access problems in terms of geographic proximity and/or waiting times.
- The NOS 2020-2030 aims to enhance the diagnostic capabilities within Poland's oncology care by addressing the existing deficiencies in diagnostic procedures and equipment, ensuring uniform access and high-quality standards. Significant investments in medical infrastructure and diagnostic equipment will be made throughout the duration of the strategy (8). Poland's Strategy to Fight Lung Cancer includes no specific aims (7).

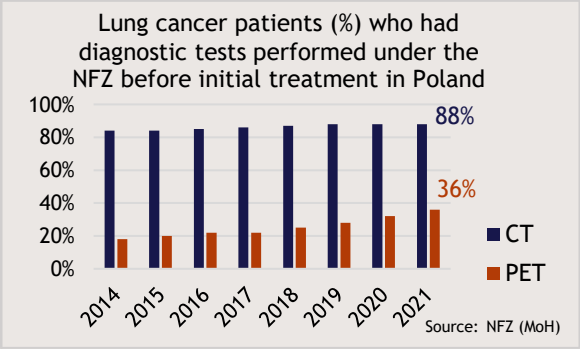
## Current status in Poland

- The availability of CT and PET scanners in Poland was 24 and 1.0 units per million inhabitants, respectively, in 2022 (34). Compared to the EU average, the availability of CT scanners was 11% lower and for PET scanners 56% lower, yet Poland topped the V4 countries for CT units but had the joint fewest PET units. The availability of CT and PET scanners per million inhabitants in Poland increased by 39% and 150%, respectively, from 2013 to 2022.
- The annual number of examinations per million inhabitants with CT and PET scanners also saw substantial increases of 104% and 102%, respectively, between 2014 and 2022 (35). Nevertheless, Poland conducted fewer exams — 14% less using CT scanners and 53% less with PET scanners — compared to the EU average in 2022.
- NFZ data suggests that 88% of lung cancer patients who started treatment in 2021 had a CT scan performed, whereas only 36% of lung cancer patients received a PET scan (78). However, these figures might be underestimated, as diagnostic imaging is also performed privately.
- An increase in the availability of diagnostic imaging equipment, although essential, does not alone guarantee improvements in the lung cancer care pathway. Without sufficient medical personnel conduct the examinations and to interpret the scans, the enhanced equipment alone will not mitigate diagnostic delays or improve treatment outcomes. Therefore, it is imperative to strengthen the specialist workforce alongside expanding the diagnostic infrastructure to ensure comprehensive and effective lung cancer care.




## Recommendations

- Increase the number of CT and PET scanners and implement training programs to increase the number of qualified personnel to operate the scanners and interpret the scans, ensuring that enhanced diagnostic capabilities are fully utilized and waiting times in the care pathway are reduced.
- Ensure that the increased availability of diagnostic imaging equipment is coupled with streamlined workflows and integrated care pathways, including incorporation of AI-supported analysis, to reduce diagnostic delays.

Pillar 3: Diagnosis and treatment

KPI: Biomarker testing

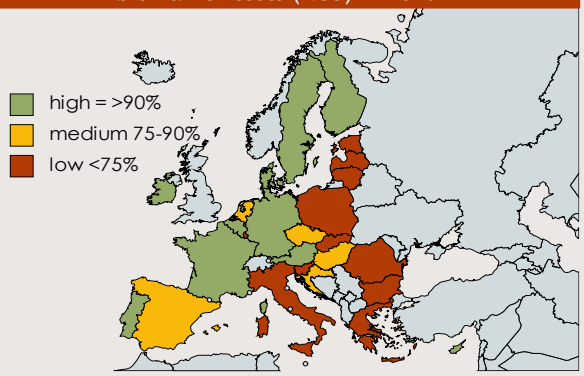
## Background

- Biomarker testing is part of the diagnostic process of modern cancer care. It aims to identify the molecular characteristics of the tumor and helps to select appropriate treatments.
- Testing with single biomarkers has been done for decades in certain cancer types (e.g., breast cancer). With increasing knowledge of molecular targets, single-biomarker testing has become impractical in some cancer types (e.g., lung cancer). Multi-biomarker testing, specifically with next-generation sequencing (NGS) technology, tests for several biomarkers in parallel rather than sequentially. NGS testing is increasingly becoming standard of care in several cancer types, thereby replacing or complementing single-biomarker testing (79).
- The EBCP's flagship initiative "Cancer Diagnostic and Treatment for All" includes several action plans and advocates the use of NGS (10). 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 to use NGS in the treatment of advanced non-squamous NSCLC, prostate cancer, cholangiocarcinoma, ovarian cancer, and certain instances of colorectal cancer in 2020 (80), and extended this recommendation to additional cancer types in 2024 (81).
- The NOS 2020-2030 aims to ensure full compliance with quality standards in pathology and genetic diagnostics for oncology patients by 2026. To do so, the MoH will introduce mandatory accreditation of genetic diagnostic facilities performing oncological diagnostics which will be financed from public funds (8). Poland's Strategy to Fight Lung Cancer includes no specific aims (7).

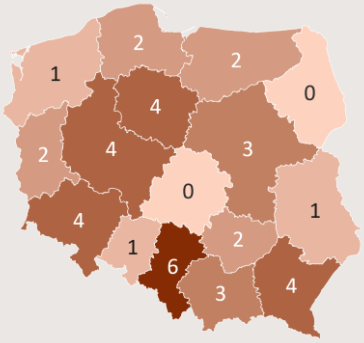
## Current status in Poland

- According to an international study conducted in 2020, Poland had a low availability of multigene biomarker tests, with less than 75% of needs met, aligning with other V4 countries (82). This underlines the challenges in adopting comprehensive genomic profiling on a national scale. Reimbursement levels for these tests also reflected limited support, mirroring the availability constraints and highlighting financial and regulatory barriers (82).
- The current state of biomarker testing in Poland, characterized by limited availability and insufficient reimbursement, poses significant barriers to personalized lung cancer care. PD-L1 testing exemplifies these broader issues. Only 39 out of 113 medical centers, equal to 35%, have received accreditation from the Polish Quality Monitoring Center (CMJ), which is an eligibility criterion for public funding by the NFZ (83). This results in significant regional disparities in access to PD-L1 testing for lung cancer patients, and consequently restricts the use of personalized treatment options across different voivodeships.

Estimated availability of multigene biomarker tests (NGS) in 2020




Number of medical centers with CMJ accreditation in Poland by voivodeship




**CMJ-accredited medical centers:** **35%** (39/113)

**Voivodeships without CMJ-accredited centers:**

- podlaskie
- łódzkie

## Recommendations

- Expand the availability of NGS technology to ensure comprehensive genomic profiling for lung cancer patients across all regions of Poland, aligning with EBCP and ESMO recommendations.
- Improve reimbursement policies to cover the costs of essential biomarker tests, including PD-L1 and NGS when recommended by international guidelines, to remove financial barriers and ensure equitable access.
- Mandate and streamline the accreditation process for biomarker testing centers to reduce regional disparities in access to tests, including basic tests such as PD-L1.

# Pillar 3: Diagnosis and treatment

## KPI: Geographic access to cancer care

## Background

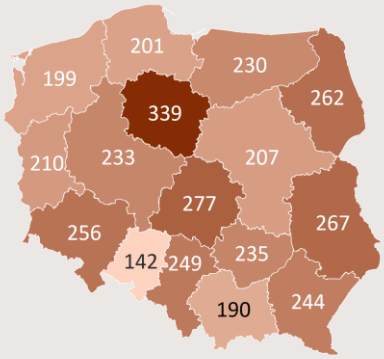
- Equitable access to cancer care is vital for effective treatment outcomes. Geographic and infrastructural disparities often impede timely access. Ensuring easy accessibility and minimizing travel distances to key care facilities for all lung cancer patients is crucial, aligning treatment availability with patient needs.
- A core objective of the EBCP is to ensure equitable cancer care across EU member states (10). The plan includes establishing a network of National Comprehensive Cancer Centers by 2025, aiming to standardize high-quality diagnostics and treatments and bring care closer to patients' homes. By 2030, the goal is for 90% of eligible patients to access these centers locally, thereby reducing disparities across and within EU member states.
- Poland's Strategy to Fight Lung Cancer and the NOS 2020-2030 acknowledge regional disparities in access to cancer care (7, 8). Numerous actions across the entire patient pathway aim to standardize care and ensure timely and effective treatment for all patients, irrespective of region. For instance, the NOS 2020-2030 aims to address these disparities by addressing region-specific needs at every step of the strategy's implementation (8).

## Current status in Poland

- A report by the Polish MoH detailed significant regional disparities in access to key lung cancer treatments across voivodeships in Poland (78). These disparities in key treatments highlight the unequal distribution of treatment options, potentially impacting patient outcomes based on geographic location. Notably, while the northwestern part of Poland has the highest number of lung cancer cases per 100,000 inhabitants (2), novel treatments like immunotherapy and targeted therapy are more commonly administered in the southeastern part (2, 78).

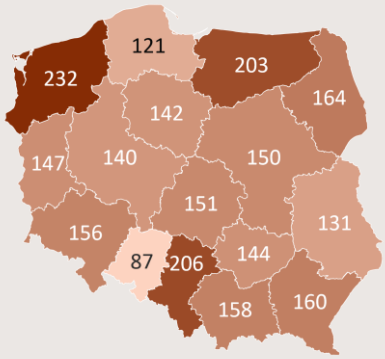
**Number of people receiving key treatments per 1,000 lung cancer patients by voivodeship, 2021**

Chemotherapy



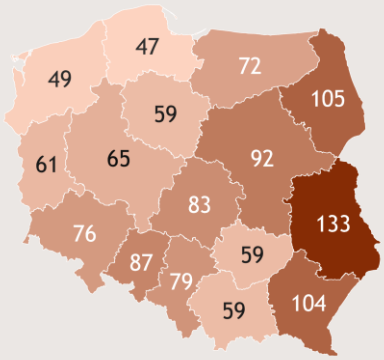

| Highest | Lowest |
|---|---|
| 1. kujawsko-pomorskie (339) | 1. opolskie (142) |
| 2. łódzkie (277) | 2. małopolskie (190) |
| 3. lubelskie (267) | 3. zachodniopomorskie (199) |

Radiotherapy




| Highest | Lowest |
|---|---|
| 1. zachodniopomorskie (232) | 1. opolskie (87) |
| 2. śląskie (206) | 2. pomorskie (121) |
| 3. warmińsko-mazurskie (203) | 3. lubelskie (131) |

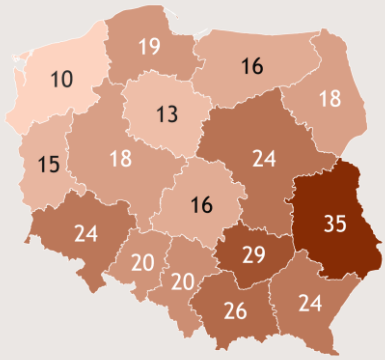
Immunotherapy




Source:
NFZ (MoH)

| Highest | Lowest |
|---|---|
| 1. lubelskie (133) | 1. pomorskie (47) |
| 2. podlaskie (104) | 2. zachodniopomorskie (49) |
| 3. podkarpackie (104) | 3. małopolskie (67) |

Targeted therapy



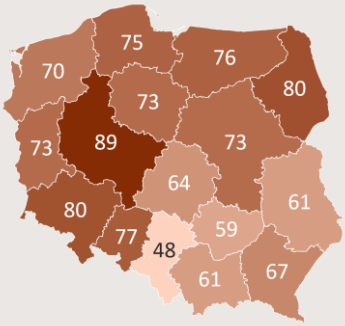

| Highest | Lowest |
|---|---|
| 1. lubelskie (35) | 1. zachodniopomorskie (10) |
| 2. świętokrzyskie (29) | 2. kujawsko-pomorskie (13) |
| 3. małopolskie (26) | 3. lubuskie (15) |

(description continues on the next page)

- Average travel times to the nearest key departments or clinics for thoracic surgery, lung disease, and oncology also vary significantly across regions (78). Longer travel times indicate potential delays and general difficulties in accessing necessary treatments and follow-up care.

**Average travel time (minutes) for each voivodeship to the nearest key departments or clinics**

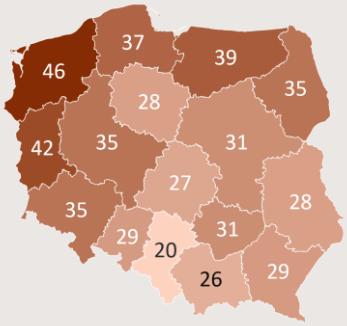
Thoracic surgery




Source:
NFZ (MoH)

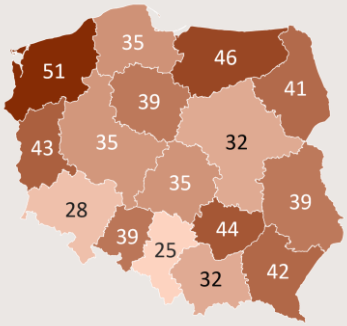
| Highest | Lowest |
|---|---|
| 1. wielkopolskie (89)<br>2. podlaskie (80)<br>3. dolnośląskie (80) | 1. śląskie (48)<br>2. świętokrzyskie (59)<br>3. lubelskie (61) |

Lung disease




| Highest | Lowest |
|---|---|
| 1. zachodnio-pomorskie (46)<br>2. lubuskie (42)<br>3. warmińsko-mazurskie (39) | 1. śląskie (20)<br>2. małopolskie (26)<br>3. łódzkie (27) |

Oncology




| Highest | Lowest |
|---|---|
| 1. zachodnio-pomorskie (46)<br>2. lubuskie (42)<br>3. warmińsko-mazurskie (39) | 1. śląskie (20)<br>2. małopolskie (26)<br>3. łódzkie (27) |

- Addressing regional disparities in lung cancer treatment access and travel times is crucial for improving patient outcomes in Poland. Equitably distributing treatment options across voivodeships and reducing travel distances to key care facilities will enhance timely and effective care. These efforts must align with national strategies and EU recommendations to ensure consistent, high-quality cancer care across all regions.

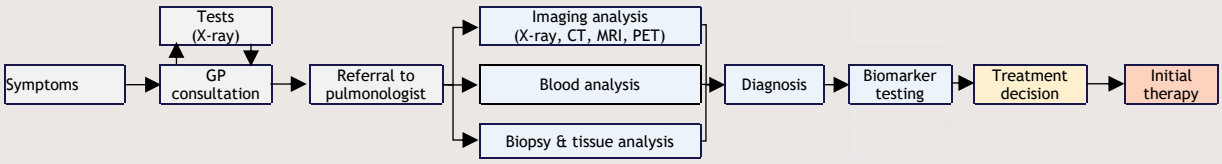
## Recommendations

- Align national efforts with EU recommendations and the NOS 2020-2030 to reduce regional disparities and ensure high-quality, consistent cancer care nationwide.
- Improve infrastructure and logistics to minimize travel distances to key cancer care facilities, ensuring timely access to necessary treatments.

# Pillar 3: Diagnosis and treatment
# KPI: Lung cancer patient pathway and waiting times

## Background

- Lung cancer often presents with nonspecific symptoms, leading to frequent initial misdiagnosis. Patients typically undergo multiple GP visits before being referred to a pulmonologist, and a significant number are diagnosed during emergency visits, which tends to correlate with advanced-stage disease and poorer outcomes (21).
- Delays in the lung cancer care pathway are common and problematic, from the first symptoms to final diagnosis and treatment. These delays are exacerbated by the slow progression of diagnostic procedures, lengthy assessments, and protracted scheduling for surgeries and therapies (84). The European Cancer Organisation recommends that clear care pathways should be defined to mitigate these delays and improve early detection and treatment outcomes (84). The general lung cancer patient journey can be visualized as following:

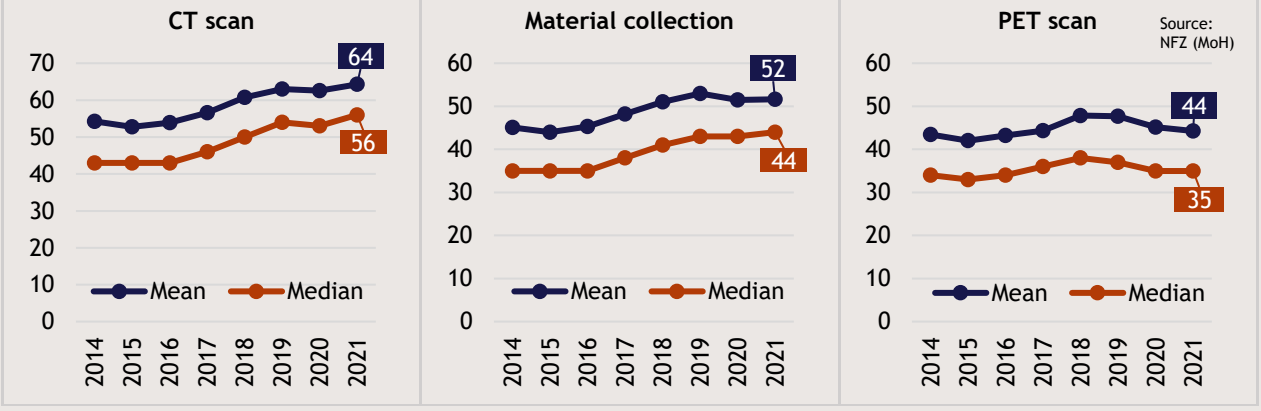



- The Polish Strategy to Fight Lung Cancer highlights critical diagnostic delays in Poland due to e.g., infrequent chest radiographs, long waits for consultations and CT scans, and prolonged pathology test results from a shortage of pathologists (7). The strategy aims to develop comprehensive national guidelines for the entire care pathway.
- The NOS 2020-2030 points to systemic issues such as non-standardized procedures and excessive administrative tasks as key factors causing delays in lung cancer diagnosis and treatment in Poland (8). The strategy includes the aim to implement a robust control system by the end of 2024 to ensure full adherence to diagnostic and therapeutic procedures for oncology patients.

## Current status in Poland

- Polish cancer patients frequently perceive the oncology care system as inadequate, reflecting broader systemic inefficiencies. The 2019 All.Can international survey highlighted significant issues, with 27% of Polish respondents experiencing initial misdiagnosis, 12% waiting three to six months for a diagnosis from their first physician visit, and 25% facing over two-month delays from diagnosis to treatment initiation (85). These findings emphasize the need for improved diagnostic accuracy and quicker treatment initiation across all cancers. This is particularly important for lung cancer, where early and precise diagnosis is crucial for better outcomes.
- A report by the Polish MoH detailed considerable delays in lung cancer treatment initiation based on data from the NFZ (78). On average, lung cancer patients in Poland waited 64 days (median 56 days) from the first CT scan to treatment, 52 days (median 44 days) from material collection to treatment, and 44 days (median 35 days) from the first PET scan to treatment. These delays were primarily caused by repeated scans, lengthy waits for results, and logistical issues in pathology and treatment scheduling, highlighting the urgent need for more efficient diagnostic and treatment processes.
- These results align with expert opinions from a local workshop in Poland, which identified significant barriers in the lung cancer care pathway, including delays from GP referral to hospital admission, inefficiencies in financing molecular diagnostics, long waits for pathology results, and poor tissue sample handling. A shortage of pathologists and inadequate reimbursement structures further exacerbate diagnosis and treatment delays (21).

**Waiting time (days) from diagnostic procedures to first treatment in Poland (2021)**

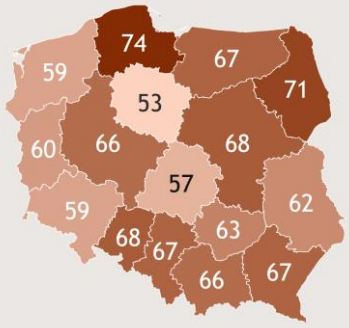



(description continues on the next page)

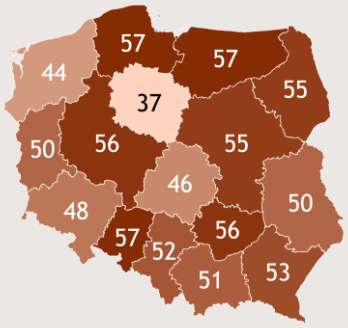
- The MoH report also highlighted significant regional disparities in waiting times for treatment following diagnostic procedures (78). Average waiting times varied notably across voivodeships: for a CT scan, the shortest wait was 53 days in kujawsko-pomorskie, while the longest was 74 days in pomorskie; for material collection, the range was from 37 days in kujawsko-pomorskie to 57 days in pomorskie; and for PET scans, from 36 days in Łódzkie to 53 days in mazowieckie. These disparities underscore the need for standardized healthcare practices and a more uniform delivery of care across Poland.

**Average waiting time (days) from diagnostic procedures to first treatment by voivodeship (2021)**

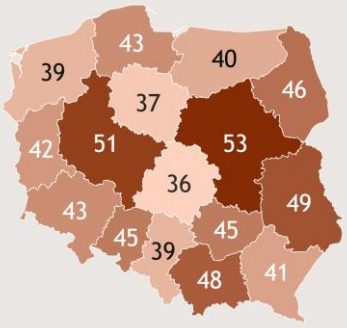
CT scan




Material collection




PET scan




Source:
NFZ (MoH)

| Longest | Shortest | Longest | Shortest | Longest | Shortest |
|---|---|---|---|---|---|
| 1. pomorskie (74)<br>2. podlaskie (71)<br>3. opolskie (68) | 1. kujawsko-pomorskie (53)<br>2. łódzkie (57)<br>3. zachodnio-pomorskie (59) | 1. pomorskie (57)<br>2. opolskie (57)<br>3. warmińsko-mazurskie (57) | 1. kujawsko-pomorskie (37)<br>2. zachodnio-pomorskie (44)<br>3. łódzkie (46) | 1. mazowieckie (53)<br>2. wielkopolskie (51)<br>3. lubelskie (49) | 1. łódzkie (36)<br>2. kujawsko-pomorskie (37)<br>3. zachodnio-pomorskie (39) |

- There have been previous efforts to standardize and accelerate pathways for cancer patients in Poland (86). This includes a dedicated 'fast pathway' to diagnostics and treatment for patients suspected of having cancer in 2015, and pilots of care pathways in four regions for five common cancer types, including lung cancer, in 2019-2022. The latter was preceded by the development of cancer type-specific patient pathways, with diagnostic and therapeutic guidelines, and the inclusion of metrics and indicators. Despite the good intention of these attempts to standardize care, there has been criticism by Polish experts that it was difficult to evaluate the success of the reforms and also failing to adequately consider the realities of the Polish healthcare system (86). Nevertheless, efforts to standardize patient pathways specifically for lung cancer should be made due to the poor prognosis of patients with this disease and the persistently long waiting times above presented.

## Recommendations

- Draw up and implement comprehensive national guidelines to standardize lung cancer diagnostic and treatment pathways, including time limits for each step along the patient pathway. Also include primary care and the role of GPs in the initial diagnostic process of lung cancer in the standardized pathways.
- Invest in diagnostic infrastructure and workforce, particularly in increasing the number of pulmonologists and pathologists and improving the handling and processing of tissue samples. Address inefficiencies in the financing of molecular diagnostics to ensure timely results and treatment initiation.
- Establish measures to reduce regional disparities in waiting times for diagnostic procedures and treatment. Standardize healthcare practices across all voivodeships to ensure uniform delivery of care and improve patient outcomes.

Pillar 3: Diagnosis and treatment

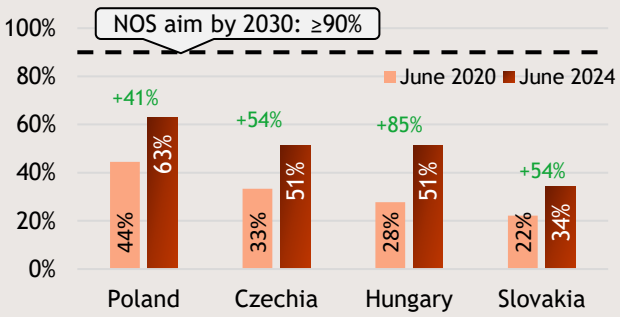
KPI: Availability of novel lung cancer medicines

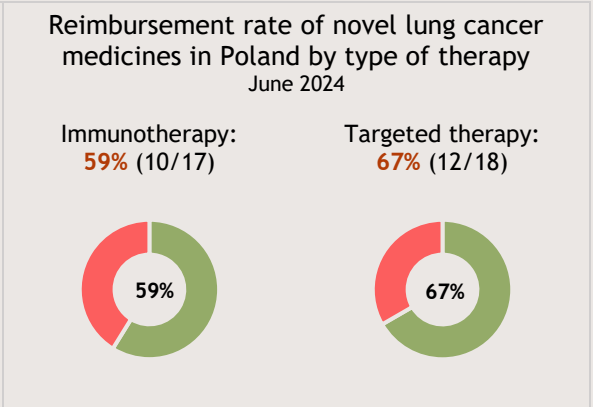
## Background

- Over the past decade, there has been a significant influx of new types of medicines for lung cancer, greatly advancing treatment standards. From 2011 to 2023, the European Medicines Agency (EMA) approved 28 new medicines for advanced-stage NSCLC and 2 medicines for advanced-stage SCLC (15). The new medicines primarily include immunotherapies that enhance the immune system's ability to attack cancer cells and targeted therapies, which focus on specific mutations that drive tumor growth. Since 2021, more and more of these medicines have also been approved for use in early-stage NSCLC, promising further enhancements in patient outcomes (87).
- The availability (i.e., local reimbursement in a country) of novel cancer medicines with EMA approval differs considerably between EU countries (88). Common causes for this include (i) constrained public medicine budgets, (ii) delayed submissions by companies or initiation of national pricing and reimbursement processes, (iii) undefined timelines for pricing and reimbursement decisions, and (iv) complex health technology assessment (HTA) procedures (89).
- At the EU level, a revision of the EU pharmaceutical legislation is underway, where one main objective is to reduce country differences in the availability of new medicines and to shorten the time from EMA approval until patient access (90). In addition, the new EU HTA regulation will apply for cancer medicines from 12th January 2025 (91). This will entail a joint (cross-country) clinical assessment of the effectiveness of new medicines.
- Poland's Strategy to Fight Lung Cancer notes a delay in the national reimbursement of novel lung cancer medicines but includes no specific aims (7). The NOS 2020-2030 includes the aim to increase the availability of cancer medicines and achieve an availability of at least 90% of all EMA-approved cancer medicines by 2030 (8).

## Current status in Poland

- As of March 2024, the EMA has approved five indications of immunotherapy and targeted therapy in early-stage NSCLC, 28 first-line indications in advanced-stage NSCLC, and two indications in advanced-stage SCLC. Poland leads the V4 countries in reimbursing these novel treatments, with 63% (22 out of 35) of EMA-approved indications of immunotherapies and targeted therapies for lung cancer reimbursed nationally as of June 2024. However, this still falls short of the NOS 2020-2030 target of achieving at least 90% reimbursement by 2030. For immunotherapies alone, Poland reimbursed 59% of indications, the highest among the V4. For targeted therapies, Poland reimbursed the highest proportion of 67% among the V4, surpassing Hungary at 56%, Czechia at 50%, and Slovakia at 44%. Poland's proportion of reimbursed medicines increased from 44% in 2020 to 63% in 2024, which indicates progress, albeit at a slower pace than in the other V4 countries.
- All V4 countries reimbursed the two indications with the highest ESMO-MCBS score of 5 for advanced-stage NSCLC as of June 2024. In contrast, Poland, Czechia, and Hungary only reimbursed two out of five indications with the highest ESMO-MCBS score of A for early-stage NSCLC, and Slovakia only reimbursed one of those indications.
- There are regional disparities between the V4 in terms of the duration from EMA approval to national reimbursement (20). Poland and Czechia generally make faster reimbursement decisions for novel lung cancer medicines than Hungary and Slovakia.
- Recent studies and data suggest that the introduction of novel EMA-approved medicines and their accessibility through national reimbursement have coincided with a boost in NSCLC survival rates. In Hungary, 3-year survival rates for advanced-stage NSCLC almost doubled between 2011–2012 and 2019 (16). Progress of a similar magnitude in 5-year survival rates of lung cancer has been observed in the Nordic countries between 2007-2011 and 2017-2021 (17). The improvements are less pronounced in Poland, as described above in the section "Disease burden of cancer". A reason for this might be the low initial uptake of novel lung cancer medicines despite reimbursement in Poland, as described in the next indicator.



| Reimbursement status of novel EMA-approved cancer medicines in lung cancer in the V4 | | | | | | |
|---|---|---|---|---|---|---|
| **Active substance** | | **Country** | | | | **ESMO-MCBS** |
| | | **Czechia** | **Hungary** | **Poland** | **Slovakia** | |
| | | **Early-stage NSCLC** | | | | |
| **IMMUNOTHERAPY** | | | | | | |
| Atezolizumab | | | | | | A |
| Nivolumab | | | | | | A |
| Pembrolizumab (neoadjuvant + adjuvant) | | | | | | A |
| Pembrolizumab (adjuvant only) | | | | | | A |
| **TARGETED THERAPY** | | | | | | |
| Osimertinib | | | | | | A |
| | | **Advanced-stage NSCLC (first-line treatments)** | | | | |
| **IMMUNOTHERAPY** | | | | | | |
| *PD-L1 positive* | Pembrolizumab | | | | | 5 |
| | Atezolizumab | | | | | 5 |
| | Cemiplimab (mono) | | | | | 4 |
| | Cemiplimab (Pt-combo) | | | | | 4 |
| | Durvalumab (unresectable stage III) | | | | | 4 |
| *PD-L1 all comers* | Pembrolizumab (NSQ) | | | | | 4 |
| | Pembrolizumab (SQ) | | | | | 4 |
| | Nivolumab & ipilimumab | | | | | 4 |
| | Durvalumab & tremelimumab | | | | | 4 |
| | Atezolizumab (beva-combo) | | | | | 3 |
| | Atezolizumab (nab-pac-combo) | | | | | 3 |
| **TARGETED THERAPY** | | | | | | |
| *EGFR* | Gefitinib | | | | | 4 |
| | Erlotinib | | | | | 4 |
| | Afatinib | | | | | 4 |
| | Osimertinib (mono) | | | | | 4 |
| | Dacomitinib | | | | | 3 |
| *ALK* | Crizotinib | | | | | 4 |
| | Ceritinib | | | | | 4 |
| | Alectinib | | | | | 4 |
| | Brigatinib | | | | | 4 |
| | Lorlatinib | | | | | 4 |
| *ROS1* | Crizotinib | | | | | 3 |
| | Entrectinib | | | | | 3 |
| *BRAF* | Dabrafenib + trametinib | | | | | 2 |
| *NTRK* | Larotrectinib | | | | | 3 |
| | Entrectinib | | | | | 3 |
| *RET* | Pralsetinib | | | | | 3 |
| | Selpercatinib | | | | | 3 |
| | | **Extensive-stage SCLC (first-line treatments)** | | | | |
| **IMMUNOTHERAPY** | | | | | | |
| *PD-L1 all comers* | Atezolizumab | | | | | 3 |
| | Durvalumab | | | | | 3 |

*Color key:* Indication is nationally reimbursed, Indication is not nationally reimbursed

Notes: The list contains EMA approved indications until March 31, 2024 and shows the reimbursement status as of June 1, 2024. NSCLC = non-small cell lung cancer, SCLC = small cell lung cancer, ESMO-MCBS = ESMO-Magnitude of Clinical Benefit Scale, mono = monotherapy, Pt-combo = combination with platinum-based chemotherapy, NSQ = non-squamous, SQ = squamous, beva-combo = combination with bevacizumab, paclitaxel & carboplatin, nab-pac-combo = combination with nab-paclitaxel & carboplatin.

## Recommendations

- Maintain access to effective, reimbursed therapies in line with European clinical guidelines.
- Incentivize pharmaceutical companies to submit reimbursement applications shortly after EMA approval.
- Prioritize and accelerate the reimbursement and adoption of novel, effective lung cancer medicines in line with recommended treatments in European clinical guidelines and as defined by the ESMO-MCBS framework as well as the NOS 2020-2030 target of a 90% reimbursement rate by 2030.
- Continuously monitor the impact of newly reimbursed treatments on survival rates. Use this data to guide future reimbursement decisions and ensure that novel therapies improve patient care.

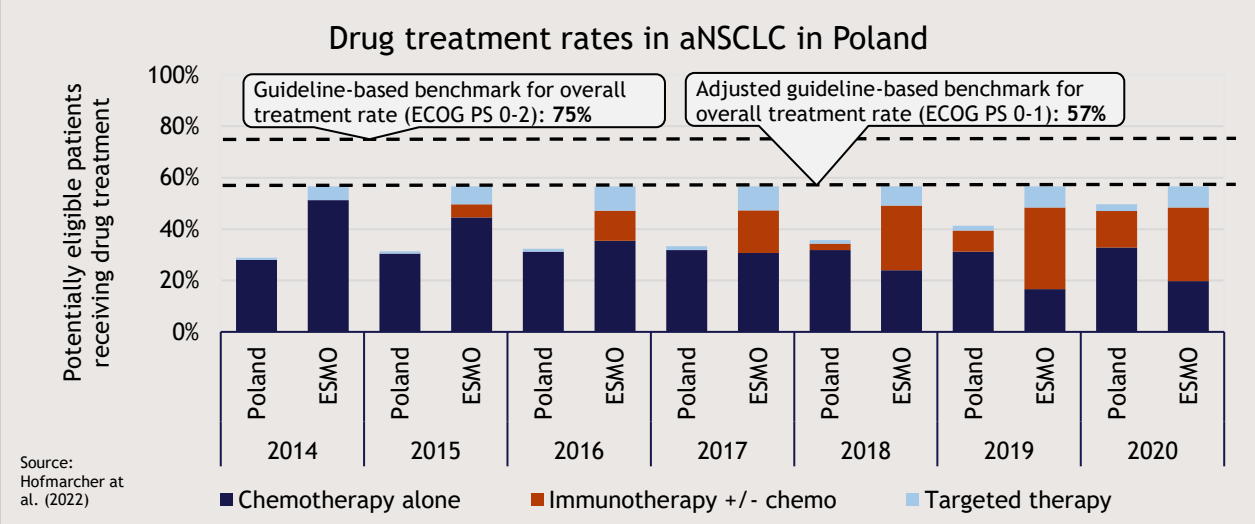
# Pillar 3: Diagnosis and treatment
# KPI: Uptake of novel lung cancer medicines

## Background

- Around 100 novel cancer medicines have been approved by the EMA in the last decade, with almost a third approved for advanced-stage non-small cell lung cancer (aNSCLC). However, significant variations exist across EU countries in ensuring access to these treatments for all eligible patients (20, 89). While the local reimbursement status of novel cancer medicines in a given country is one way to measure patient access (see the previous indicator), it is only an approximation and does not necessarily capture patient access in terms of uptake, i.e., actual use of reimbursed medicines.
- ESMO guidelines recommend systemic anti-cancer therapy (SACT) for aNSCLC in patients with good health (ECOG PS 0-2), excluding those in poor health (ECOG PS 3-4) who generally receive best supportive care only (92). A relevant treatment benchmark is 75% of patients, based on the assumption that 25% of patients are not suitable candidates for systemic therapy due to poor health (21). In Poland, however, SACT is typically only available to the healthiest patients with ECOG PS 0-1. Adjusting for this, the relevant treatment benchmark in Poland is 57%.
- Both Poland's Strategy to Fight Lung Cancer and the NOS 2020-2030 emphasize the importance of access to novel lung cancer medicines but include no specific targets or goals regarding their optimal uptake (7, 8).

## Current status in Poland

- The 2022 IHE report "Diagnosed but not treated: how to improve the patient access to advanced NSCLC treatment in Europe" revealed significant care gaps in aNSCLC across 12 European countries, including Poland and Hungary, from 2014 to 2020 (21). The report found that despite the availability and reimbursement of novel treatment options, many eligible patients remain untreated.
- In Poland, the drug treatment rate for aNSCLC increased from 29% in 2014 to 50% in 2020, spurred mainly by the adoption of immunotherapy since 2018. However, this rate falls short of the adjusted ESMO benchmark of 57% for patients with ECOG PS 0-1. In 2020, treatment distribution was 33% chemotherapy, 14% immunotherapy (with or without chemotherapy), and only 3% targeted therapy — significantly diverging from ESMO recommendations of around 20%, 29%, and 8%, respectively.
- Poland continues to face challenges in providing access to novel lung cancer medicines, consistently underutilizing immunotherapy and targeted therapy while relying on chemotherapy instead. This misalignment with ESMO clinical guidelines indicates delays in adopting current treatment standards. As a result, many eligible patients either seem to receive no SACT or treatments that no longer meet the recommended standard-of-care, potentially impacting treatment effectiveness and patient outcomes negatively.
- The potential benefits of adopting novel cancer therapies are exemplified by Hungary's experience, where enhanced integration of these treatments was associated with significantly improved aNSCLC survival rates (16).




Source: Hofmarcher at al. (2022)

## Recommendations

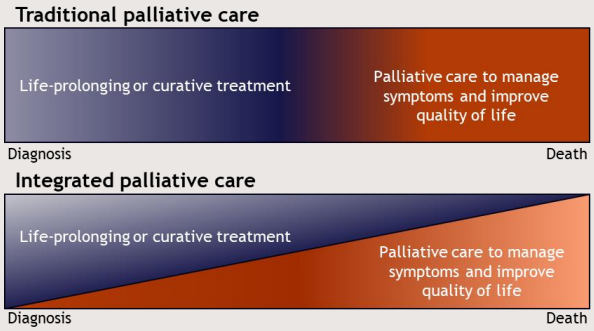
- Accelerate the adoption of immunotherapy and targeted therapies in line with international clinical guidelines to improve treatment outcomes for patients.
- Continuously monitor and publish drug treatment rates and patient outcomes, and implement strategies to address gaps in care, ensuring that the standard-of-care treatments are accessible to all patients.

Pillar 4: Survivorship

KPI: Palliative care services

## Background

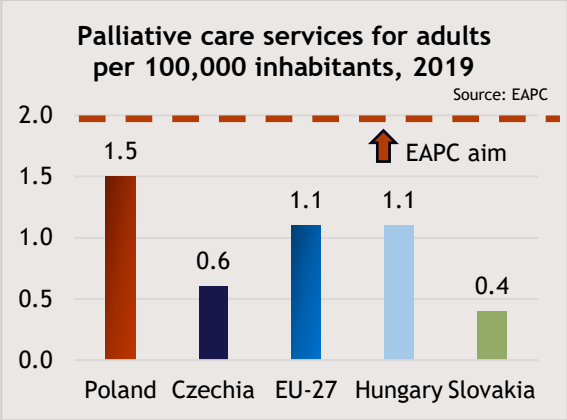
- In Poland, the share of the population aged 65 and older has nearly doubled during the two last decades, standing at 19% in 2023 (93). This results in an increasing demand for palliative care (PC) services.
- Cancer is the most frequent cause of need for PC among life threatening or life-limiting health conditions (94). Within oncology, PC has traditionally had a strong focus on the end-of-life-stage but more recent definitions emphasize its relevance earlier in the disease pathway (95).

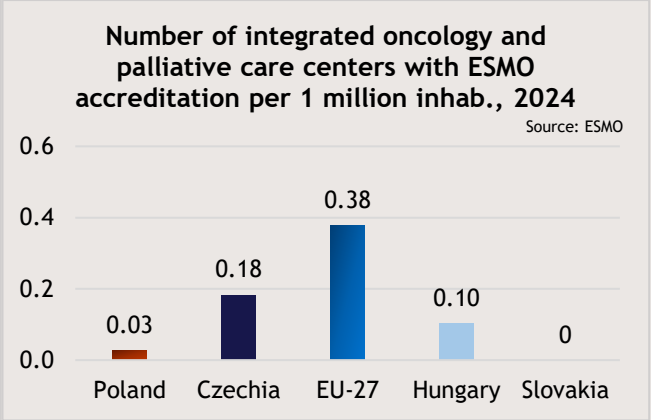



- The availability of PC services in a country is one metric to assess the capacity and potential access to PC. Another metric is the degree to which PC is integrated with the overall health care system (96). The European Association for Palliative Care (EAPC) recommends two specialized PC services per 100,000 inhabitants (94).
- Poland's National Oncology Strategy includes the aim to equalize and increase access to palliative care services at the regional level, regardless of a patient's place of residence, by the end of 2024. By 2026, the aim is to build a network of palliative and hospice care centers for cancer patients (8).

## Current status in Poland

- In 2019, Poland had 1.5 (non-cancer-specific) PC services per 100,000 inhabitants, which was higher than the other V4 countries and the EU-27 average (94). Neither the EU-27 average nor any of the V4 countries meet the EAPC recommendation of 2 PC services per 100,000 inhabitants. Poland shows a positive development, as the availability has increased from roughly 1.3 PC services per 100,000 in 2012 (97).
- Based on a voluntary accreditation system of cancer centers by ESMO, a comparison of the integration of PC with oncology care can be made (98). At present, the Maria Sklodowska-Curie National Research Institute of Oncology is the only Designated Center of Integrated Oncology and Palliative Care with an ESMO accreditation in Poland, which translates to 0.03 centers per 1 million inhabitants. This is lower than both Czechia (0.18 per million) and Hungary (0.10 per million), and substantially lower than the EU-27 average (0.38 per million).




## 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. The EAPC recommendation of two specialized PC services per 100,000 inhabitants could serve as a goal to be achieved.
- Recruit more PC personnel and ensure adequate training.

# Afterword

As a representative of the Lung Cancer Section of the "To Się Leczy" Foundation, which provides real daily support to families and individuals affected by this cancer throughout Poland, I warmly encourage you to read this report. The authors point out many aspects related to the care of lung cancer patients and recommend specific solutions based on best practices.

The report indicates that implementing the existing strategies (Europe's Beating Cancer Plan, Mission Lung Cancer 2024-2034, National Oncology Strategy) will allow for the optimization of diagnosis and treatment in Poland. Implementing these strategies will enable earlier detection of cancer, facilitate access to the most effective treatment, and most importantly, lead to longer lives of good quality.

At the time of diagnosis, patients and their families are terrified and lost in the healthcare system. They need clear and specific solutions. Therefore, one of the necessary changes is the introduction of comprehensive care centers for patients - so-called Lung Cancer Units, which operate successfully in other therapeutic areas.

I place great hope in this report that it will serve as an inspiration for decision-makers and many other stakeholders on how we can collectively improve the situation of lung cancer patients in Poland.

*Aleksandra Wilk*

*To Się Leczy Foundation*

# References


1. OECD/European Union. Health at a Glance: Europe 2022: State of Health in the EU Cycle. Paris: OECD Publishing, 2022.
2. Polish National Cancer Registry. [Apr 29, 2024]. Available from: https://onkologia.org.pl/en/report.
3. Manxhuka B, Hofmarcher T. Cancer Dashboard for Poland - Women's cancers. Lund: 2024.
4. Didkowska J, Wojciechowska U, Manczuk M, Lobaszewski J. Lung cancer epidemiology: contemporary and future challenges worldwide. Ann Transl Med. 2016;4(8):150.
5. European Cancer Information System (ECIS). Incidence and mortality estimates 2022. Available from: https://ecis.jrc.ec.europa.eu/index.php.
6. Chen J. A Comparative Analysis of Lung Cancer Incidence and Tobacco Consumption in Canada, Norway and Sweden: A Population-Based Study. Int J Environ Res Public Health. 2023;20(20).
7. Polska Liga Walki z Rakiem. Strategia Walki z Rakiem Płuca. 2017.
8. Ministerstwo Zdrowia. Narodowa Strategia Onkologiczna na lata 2020 – 2030. 2020.
9. Ministerstwo Zdrowia. Narodowa Strategia Onkologiczna - Sprawozdanie za rok 2023 [National Oncology Strategy - Report for 2023]. 2024.
10. European Commission. Europe's Beating Cancer Plan: Communication from the Commission to the European Parliament and the Council. 2021.
11. European Commission. SOLACE - Strengthening the screening of Lung Cancer in Europe. 2023 [Nov 22, 2023]. Available from: https://health.ec.europa.eu/non-communicable-diseases/cancer/europes-beating-cancer-plan-eu4health-financed-projects/projects/solace_en.
12. ECIS. Incidence and mortality estimates 2022. Available from: https://ecis.jrc.ec.europa.eu/index.php.
13. Didkowska J, Wojciechowska U, Barańska K, Miklewska M, Olasek P. Lung cancer survival rates in Poland. Warszawa: OncoTransfer, 2024.
14. Allemani C, Matsuda T, Di Carlo V, Harewood R, Matz M, Niksic M, et al. Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. Lancet. 2018;391(10125):1023-75.
15. Manxhuka B, Gustafsson A, Hofmarcher T. Patient access to treatment in advanced NSCLC - Are European health systems ready to measure what matters? Lund: IHE, 2024.
16. Kiss Z, Galffy G, Muller V, Moldvay J, Sarosi V, Papai-Szekely Z, et al. Significant changes in advanced lung cancer survival during the past decade in Hungary: impact of modern immunotherapy and the COVID-19 pandemic. Front Oncol. 2023;13:1207295.
17. Larønningen S, Arvidsson G, Bray F, Engholm G, Ervik M, Guðmundsdóttir EM, et al. NORDCAN: Cancer Incidence, Mortality, Prevalence and Survival in the Nordic Countries, Version 9.3 (02.10.2023). [Aug 13, 2024]. Available from: https://nordcan.iarc.fr/en.
18. Statistik Austria. Krebserkrankungen. [Aug 13, 2024]. Available from: https://www.statistik.at/statistiken/bevoelkerung-und-soziales/gesundheit/krebserkrankungen.
19. Dietel M, Savelov N, Salanova R, Micke P, Bigras G, Hida T, et al. Real-world prevalence of programmed death ligand 1 expression in locally advanced or metastatic non-small-cell lung cancer: The global, multicenter EXPRESS study. Lung Cancer. 2019;134:174-9.
20. Hofmarcher T, Szilagyiova P, Gustafsson A, Dolezal T, Rutkowski P, Baxter C, et al. Access to novel cancer medicines in four countries in Central and Eastern Europe in relation to clinical benefit. ESMO Open. 2023;8(4):101593.
21. Hofmarcher T, Lindgren P, Wilking N. Diagnosed but not treated: How to improve patient access to advanced NSCLC treatment in Europe. Lund: IHE, 2022.
22. Hofmarcher T, Lindgren P, Wilking N, Jonsson B. The cost of cancer in Europe 2018. Eur J Cancer. 2020;129:41-9.
23. Ruszkowski J. Colorectal cancer management in Poland: current improvements and future challenges. Eur J Health Econ. 2010;10 Suppl 1:S57-63.
24. Ministerstwo Zdrowia. Krajowa Sieć Onkologiczna. [Nov 18, 2023]. Available from: https://www.gov.pl/web/zdrowie/krajowa-siec-onkologiczna.
25. NFZ. Wydatki na onkologie w latach 2013-2018. 2020.
26. Minister Zdrowia. Interpelacja nr 968 w sprawie nakładów na ochronę zdrowia. [Aug 21, 2024]. Available from: https://sejm.gov.pl/INT10.nsf/klucz/ATTD2FJQT/%24FILE/i00968-o1.pdf.
27. OECD. OECD Data Explorer. [Aug 13, 2024]. Available from: https://data-explorer.oecd.org/.
28. NFZ. (internal analysis of funds for innovative oncology medicines, chemotherapy, open pharmacy).
29. National Cancer Institute. Financial Burden of Cancer Care. Available from: https://progressreport.cancer.gov/after/economic_burden.
30. Lundqvist A, Andersson E, Steen Carlsson K. Kostnader för cancer i Sverige idag och år 2040. IHE Report 2016:1. IHE: Lund, Sweden.
31. Luengo-Fernandez R, Leal J, Gray A, Sullivan R. Economic burden of cancer across the European Union: a population-based cost analysis. The Lancet Oncology. 2013;14(12):1165-74.
32. Hofmarcher T, Brådvik G, Svedman C, Lindgren P, Jönsson B, Wilking N. Comparator Report on Cancer in Europe 2019 – Disease Burden, Costs and Access to Medicines. Lund: IHE, 2019.
33. Jönsson B, Hofmarcher T, Lindgren P, Wilking N. Comparator report on patient access to cancer medicines in Europe revisited. Lund: IHE, 2016.
34. Eurostat. Devices for medical imaging [hlth_rs_medim]. [Aug 12, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_medim__custom_12561228/default/table.
35. Eurostat. Medical technologies - examinations by medical imaging techniques (CT, MRI and PET) [hlth_co_exam]. [Aug 12, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/hlth_co_exam__custom_12561978/default/table.
36. World Health Organization (WHO). Tobacco. [Jan 5, 2024]. Available from: https://www.who.int/health-topics/tobacco#tab=tab_1.

37. U.S. Department of Health and Human Services. A Report of the Surgeon General. The Health Consequences of Smoking—50 Years of Progress. 2014. Available from: https://www.cdc.gov/tobacco/sgr/50th-anniversary/index.htm.
38. Wild CP, Weiderpass E, Stewart BW. World Cancer Report: Cancer Research for Cancer Prevention. Lyon, France: International Agency for Research on Cancer. 2020.
39. World Health Organization (WHO). Tobacco-related cancers and prevention. Available from: https://cancerpreventioneurope.iarc.fr/european-code-against-cancer/tobacco-related-cancers-and-prevention/.
40. World Health Organization (WHO). MPOWER. [Jan 5, 2024]. Available from: https://www.who.int/initiatives/mpower.
41. World Health Organization (WHO). The Netherlands at the forefront of tobacco control. [Jan 5, 2023]. Available from: https://www.who.int/europe/news/item/31-07-2023-the-netherlands-at-the-forefront-of-tobacco-control.
42. Tobacco Control Laws. Legislation by country/jurisdiction: Poland. Available from: https://www.tobaccocontrollaws.org/legislation/poland/summary.
43. OECD. Non-Medical Determinants of Health: Tobacco consumption. [Apr 12, 2024]. Available from: https://stats.oecd.org/index.aspx?DataSetCode=HEALTH_LVNG#.
44. Trząsalska A, Krassowska U. Raport z ogólnopolskiego badania ankietowego na temat postaw wobec palenia tytoniu: Kantar dla Głównego Inspektoratu Sanitarnego; 2019.
45. Balwicka-Szczyrba M, Balwicki Ł, Hanke W, Miller M, Tyrańska-Fobke A. Redukcja palenia papierosów i używania e-papierosów, w szczególności wśród młodego pokolenia Polaków: POLSKA AKADEMIA NAUK; 2023.
46. Eurostat. Smoking of tobacco products by sex, age and educational attainment level. [Apr 15, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1e__custom_10753583/default/table.
47. Eurostat. Smoking of tobacco products by sex, age and income quintile. [Apr 15, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk1i__custom_10853318/default/table.
48. Tax Foundation. Cigarette Taxes in Europe. 2023 [Apr 12, 2024]. Available from: https://taxfoundation.org/data/all/eu/cigarette-tax-europe-2023/.
49. European Environment Agency (EEA). Beating cancer — the role of Europe's environment. 2022 [Apr 15, 2024]. Available from: https://www.eea.europa.eu/publications/environmental-burden-of-cancer/beating-cancer-the-role-of-europes.
50. European Environment Agency (EEA). Healthy environment, healthy lives: how the environment influences health and well-being in Europe. 2020. Available from: https://www.eea.europa.eu/publications/healthy-environment-healthy-lives.
51. Institute for Health Metrics and Evaluation (IHME). Global Burden of Disease data set. 2020. Available from: https://ghdx.healthdata.org/gbd-results-tool.
52. Prüss-Üstün A, Wolf J, Corvalán CF, Bos R, Neira MP. Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks. Geneva: World Health Organization; 2016 2016.
53. World Health Organization (WHO). WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. 2021. Available from: https://www.who.int/publications/i/item/9789240034228.
54. European Commission. Zero Pollution Action Plan: Towards zero pollution for air, water and soil. 2021. Available from: https://environment.ec.europa.eu/strategy/zero-pollution-action-plan_en.
55. European Commission. Environment: Air - EU clean air policy aims to improve ambient air quality and tackle air pollution, to protect the environment and human health. Available from: https://environment.ec.europa.eu/topics/air_en.
56. European Environment Agency (EEA). Air quality in Europe 2022. 2022. Available from: https://www.eea.europa.eu//publications/air-quality-in-europe-2022.
57. World Health Organization (WHO). Air quality guidelines global update 2005: particulate matter, ozone, nitrogen dioxide and sulfur dioxide. 2006. Available from: https://www.who.int/publications/i/item/WHO-SDE-PHE-OEH-06.02.
58. European Environment Agency (EEA). COVID-19 and the environment: explore what we know. 2020. Available from: https://www.eea.europa.eu/post-corona-planet/explore.
59. European Commission. ECIR - European Cancer Inequalities Registry. [Apr 16, 2024]. Available from: https://cancer-inequalities.jrc.ec.europa.eu/.
60. Eurostat. Premature deaths due to exposure to fine particulate matter (PM2.5). [Apr 16, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/sdg_11_52__custom_10909938/default/table.
61. Eurostat. Years of life lost due to PM2.5 exposure. [Jul 11, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/sdg_11_51__custom_12132800/default/table?lang=en.
62. Office for National Statistics. Cancer survival in England - adults diagnosed. [Jul 14, 2024]. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/datasets/cancersurvivalratescancersurvivalinenglandadultsdiagnosed.
63. World Health Organization (WHO). Lung cancer. [Aug 12, 2024]. Available from: https://www.who.int/news-room/fact-sheets/detail/lung-cancer.
64. Adamek M, Biernat W, Chorostowska-Wynimko J, Didkowska JA, Dziadziuszko K, Grodzki T, et al. Lung Cancer in Poland. J Thorac Oncol. 2020;15(8):1271-6.
65. McGarvey N, Gitlin M, Fadli E, Chung KC. Increased healthcare costs by later stage cancer diagnosis. BMC Health Serv Res. 2022;22(1):1155.
66. Wait S, Alvarez-Rosete A, Osama T, Bancroft D, Cornelissen R, Marušić A, et al. Implementing Lung Cancer Screening in Europe: Taking a Systems Approach. JTO Clin Res Rep. 2022;3(5):100329.

67. Council of the European Union. Council Recommendation of 9 December 2022 on strengthening prevention through early detection: A new EU approach on cancer screening replacing Council Recommendation 2003/878/EC 2022/C 473/01. 2022.
68. Ward B, Koziar Vašáková M, Robalo Cordeiro C, Yorgancioğlu A, Chorostowska-Wynimko J, Blum TG, et al. Important steps towards a big change for lung health: a joint approach by the European Respiratory Society, the European Society of Radiology and their partners to facilitate implementation of the European Union's new recommendations on lung cancer screening. ERJ Open Res. 2023;9(3).
69. Van Meerbeeck JP, O'Dowd E, Ward B, Van Schil P, Snoeckx A. Lung Cancer Screening: New Perspective and Challenges in Europe. Cancers (Basel). 2022;14(9).
70. Ministerstwo Zdrowia. Program badań w kierunku wykrywania raka płuca. [2024-06-18]. Available from: https://www.gov.pl/web/zdrowie/program-badan-w-kierunku-wykrywania-raka-pluca.
71. Lung Cancer Policy Network. Lung cancer screening in Poland: Poland has made important contributions to the lung cancer screening agenda in Europe. 2022. Available from: https://www.lungcancerpolicynetwork.com/lung-cancer-screening-in-poland/.
72. Rzyman W, Didkowska J, Dziedzic R, Grodzki T, Orłowski T, Szurowska E, et al. Consensus Statement on a Screening Programme for the Detection of Early Lung Cancer in Poland. Advances in Respiratory Medicine [Internet]. 2018; 86(1):[53-74 pp.].
73. Ministerstwo Zdrowia. Ogólnopolski Program Wczesnego Wykrywania Raka Płuca (WWRP) za Pomocą Niskodawkowej Tomografii Komputerowej (NDTK) – połączenie prewencji wtórnej z pierwotną w celu poprawy świadomości dotyczącej raka płuca wśród społeczeństwa i personelu ochrony zdrowia. Warsaw: Ministry of Health, 2019.
74. de Koning HJ, van der Aalst CM, de Jong PA, Scholten ET, Nackaerts K, Heuvelmans MA, et al. Reduced Lung-Cancer Mortality with Volume CT Screening in a Randomized Trial. N Engl J Med. 2020;382(6):503-13.
75. The Lung Ambition Alliance. First results from the HANSE study: Inclusion criteria. Available from: https://www.lungambitionalliance.de/home/News/hanse-erste-ergebnisse.html.
76. Field JK, Duffy SW, Baldwin DR, Brain KE, Devaraj A, Eisen T, et al. The UK Lung Cancer Screening Trial: a pilot randomised controlled trial of low-dose computed tomography screening for the early detection of lung cancer. Health Technol Assess. 2016;20(40):1-146.
77. Eurostat. Physicians by category [hlth_rs_physcat]. [Aug 12, 2024]. Available from: https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_physcat__custom_12561330/default/table?lang=en.
78. Ministerstwo Zdrowia. Analizy nowotworu pluca: Jaka jest liczba chorych na nowotwór płuca? 2024. Available from: https://basiw.mz.gov.pl/2024/03/19/analizy-nowotworu-pluca/.
79. Malone ER, Oliva M, Sabatini PJB, Stockley TL, Siu LL. Molecular profiling for precision cancer therapies. Genome Med. 2020;12(1):8.
80. Mosele F, Remon J, Mateo J, Westphalen CB, Barlesi F, Lolkema MP, et al. Recommendations for the use of next-generation sequencing (NGS) for patients with metastatic cancers: a report from the ESMO Precision Medicine Working Group. Ann Oncol. 2020;31(11):1491-505.
81. Mosele MF, Westphalen CB, Stenzinger A, Barlesi F, Bayle A, Bieche I, et al. Recommendations for the use of next-generation sequencing (NGS) for patients with advanced cancer in 2024: a report from the ESMO Precision Medicine Working Group. Ann Oncol. 2024;35(7):588-606.
82. IQN Path & European Cancer Patient Coalition (ECPC) & European Federation of Pharmaceutical Industries and Associations (EFPIA). Unlocking the potential of precision medicine in Europe. 2021.
83. Centrum Monitorowania Jakości w Ochronie Zdrowia. Lista akredytowanych podmiotów - Jednostek diagnostyki patomorfologicznej. [Jul 15, 2024]. Available from: https://cmj.gov.pl/dla-podmiotu/lista-akredytowanych-podmiotow/jednostki-diagnostyki-patomorfologicznej/.
84. Berghmans T, Lievens Y, Aapro M, Baird AM, Beishon M, Calabrese F, et al. European Cancer Organisation Essential Requirements for Quality Cancer Care (ERQCC): Lung cancer. Lung Cancer. 2020;150:221-39.
85. All.Can study. How do Polish patients evaluate oncological care? Results of the international All.Can survey – responses from respondents from Poland. Warsaw: 2019.
86. Sagan A, Kowalska-Bobko I, Galazka-Sobotka M, Holecki T, Maciejczyk A, McKee M. Assessing Recent Efforts to Improve Organization of Cancer Care in Poland: What Does the Evidence Tell Us? Int J Environ Res Public Health. 2022;19(15).
87. Li MSC, Mok KKS, Mok TSK. Developments in targeted therapy & immunotherapy-how non-small cell lung cancer management will change in the next decade: a narrative review. Ann Transl Med. 2023;11(10):358.
88. European Federation of Pharmaceutical Industries and Associations. EFPIA Patients W.A.I.T. Indicator 2023 Survey. 2024.
89. European Federation of Pharmaceutical Industries and Associations. The root cause of unavailability and delay to innovative medicines: Reducing the time before patients have access to innovative medicines. 2023.
90. European Commission. Reform of the EU pharmaceutical legislation. [May 10, 2024]. Available from: https://health.ec.europa.eu/medicinal-products/pharmaceutical-strategy-europe/reform-eu-pharmaceutical-legislation_en.
91. European Commission. Regulation on Health Technology Assessment. [May 10, 2024]. Available from: https://health.ec.europa.eu/health-technology-assessment/regulation-health-technology-assessment_en.
92. Planchard D, Popat S, Kerr K, Novello S, Smit EF, Faivre-Finn C, et al. Metastatic non-small cell lung cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up (update 15 September 2020). Ann Oncol. 2018;29(Suppl 4):iv192-iv237.
93. World Bank. Population ages 65 and above (% of total population). [Aug 12, 2024]. Available from: https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS?locations=PL&most_recent_value_desc=true.
94. European Association for Palliative Care (EAPC). EAPC Atlas of Palliative Care in Europe 2019. 2019.
95. Kaasa S, Loge JH, Aapro M, Albreht T, Anderson R, Bruera E, et al. Integration of oncology and palliative care: a Lancet Oncology Commission. The Lancet Oncology. 2018;19(11):e588-e653.

96. Arias-Casais N, Garralda E, Sánchez-Cárdenas MA, Rhee JY, Centeno C. Evaluating the integration of palliative care in national health systems: an indicator rating process with EAPC task force members to measure advanced palliative care development. BMC Palliative Care. 2021;20(1):36.
97. Arias-Casais N, López-Fidalgo J, Garralda E, Pons JJ, Rhee JY, Lukas R, et al. Trends analysis of specialized palliative care services in 51 countries of the WHO European region in the last 14 years. Palliat Med. 2020;34(8):1044-56.
98. European Society for Medical Oncology (ESMO). ESMO Accredited Designated Centres. [Aug 9, 2024]. Available from: https://www.esmo.org/for-patients/esmo-designated-centres-of-integrated-oncology-palliative-care/esmo-accredited-designated-centres.

# Appendix: Methodology and sources for indicators

| | |
|---|---|
| **Prevention** | |
| Tobacco smoking | 1st graph: OECD (43). Specification: Non-medical determinants of health; Tobacco consumption; % of population aged 15+ who are daily smokers (years 1996, 2001, 2009, 2019).<br>2nd graph: Chief Sanitary Inspectorate 2009-2019 and Polish Academy of Sciences 2022 (44, 45).<br>3rd graph: Tax Foundation (48). |
| Air pollution | European Cancer Inequalities Registry (ECIR) (59).<br>1st graph: Specification: Particulate matter 10 concentration; Annual mean concentration ($\mu g/m^3$) of particulate matter 10 ($PM_{10}$) at urban background stations in agglomerations (year 2019). Data not available for Malta.<br>2nd graph: Particulate matter 2.5 concentration; Annual mean concentration ($\mu g/m^3$) of particulate matter 2.5 ($PM_{2.5}$) at urban background stations in agglomerations (year 2019). Data not available for Malta. |
| **Early detection** | |
| Stage distribution at diagnosis | Data come from the Polish Cancer Registry (13). |
| Lung cancer screening | This visualization presents international results from various lung cancer screening efforts. Note that numbers are not directly comparable across studies. Early data from Croatia's national screening program were presented at the European Congress of Radiology (ECR) in 2024. Data from the NELSON trial (74), the HANSE study (75), and the UK Lung Cancer Screening Trial (76) are publicly available. |
| **Diagnosis and treatment** | |
| Physicians | 1st graph: Eurostat (77). Specification: Physicians by category. Numbers for generalist medical practitioners per hundred thousand inhabitants. Data not available for Slovakia. Unweighted EU average.<br>2nd graph: DAiS study based on data from the NFZ in Poland, the Central Statistical Office, and the Education Monitoring System of the e-Health Center. Data are published by the Polish MoH (78). |
| Diagnostic imaging equipment | 1st graph: Eurostat (34, 35). Specification 1: Devices for medical imaging (CT and PET) per 1 million inhabitants in hospitals and providers of ambulatory health care. Specification 2: Number of examinations by medical imaging techniques (CT and PET) per 1 million inhabitants in hospitals and providers of ambulatory health care.<br>2nd & 3rd graph: Eurostat (35). Specification: Number of examinations by medical imaging techniques (CT and PET) per 1 million inhabitants in hospitals and providers of ambulatory health care. Unweighted EU-average. Data is not available for Ireland and Sweden.<br>4th graph: DAiS study based on NFZ data. Data are published by the Polish MoH (78). |
| Biomarker testing | 1st graph: In the publication by the International Quality Network for Pathology, the European Cancer Patient Coalition, and European Federation of Pharmaceutical Industries and Associations EFPIA, availability of multigene biomarker tests was estimated based on a composite score of different NGS test technologies (i.e., hotspot / panel / comprehensive) within a given country and proportion of laboratories offering any NGS modality in-house or through referral (82).<br>2nd graph: Data were sourced from the Polish Center for Monitoring Quality in Health Care (83). |
| Geographic access to cancer care | 1st and 2nd graph: Data were sourced from the Polish MoH (78). |
| Lung cancer patient pathway and waiting times | 1st and 2nd graph: Diagnostic procedures performed under the NFZ. Data were sourced from the Polish MoH (78). |
| Availability of novel lung cancer medicines | EMA approval dates of novel cancer medicines in NSCLC were sourced from the EMA website. National reimbursement dates were sourced from Hofmarcher et al. (2023) (20), and MSD. |
| Uptake of novel lung cancer medicines | Data were sourced from a study by Hofmarcher at al. (2022) (21). Calculations of the ESMO-based benchmark were adjusted to reflect Polish clinical practice of treating mainly aNSCLC with ECOG PS 0-1 rather than 0-2. |
| **Survivorship** | |
| Availability of palliative care services | 1st graph: Report by the European Association for Palliative Care (EAPC) (94). Unweighted EU-average.<br>2nd graph: Data sourced from ESMO's website (98). Unweighted EU-average. |


iHE
THE SWEDISH INSTITUTE FOR HEALTH ECONOMICS
ENABLING INFORMED DECISION MAKING