LUNG CANCER POLICY NETWORK

August 2025

Closing the gap: the role of global data in advancing lung cancer screening

The Lung Cancer Policy Network is a global network of multidisciplinary experts from across the lung cancer community, which includes clinicians, researchers, patient organisations and industry partners. The Network is funded by AstraZeneca, Bristol Myers Squibb Foundation, Johnson & Johnson, MSD, Pfizer, Siemens Healthineers, GE HealthCare, Guardant Health, and Intuitive. Secretariat is provided by The Health Policy Partnership, an independent health research and policy consultancy. All Network outputs are non-promotional, evidence based and shaped by the members, who provide their time for free.

About this report

This report was written by the Lung Cancer Policy Network Secretariat in close consultation with members of the Lung Cancer Policy Network.

We would like to acknowledge all Network members (see Acknowledgements) for their contributions, as well as member organisations for supporting this report:

Correction

The report was corrected in December 2025 to remove Uruguay from the list of countries in the implementation roll-out phase and reassign it to implementation research (pp. 2, 10, 11, 13). A new logo was also added from an endorsing member organisation (Vision Zero Cancer).

Contents

Foreword

Lung cancer remains the leading cause of cancer deaths globally, and is predominantly diagnosed and treated at a late stage. Decades of rigorous evidence show that targeted low-dose computed tomography (LDCT) screening detects lung cancer earlier and can significantly improve outcomes. Yet national screening programmes remain limited in number and reach.

This report confronts that disconnect directly. It explores why, in the face of such strong evidence, implementation has been slow and uneven, and what can be done to accelerate progress. By setting out the key steps and practical components required for effective lung cancer screening, it will guide countries looking to move from intention to action.

Drawing on data from the Lung Cancer Policy Network's interactive map of lung cancer screening, the report highlights the wealth of experience, innovation and evidence already available. These insights are not just academic; they are actionable. By learning from existing programmes, pilots and studies, policymakers can avoid duplication, anticipate challenges and design screening initiatives that are both effective and equitable.

This is a moment of opportunity. With the right infrastructure, investment and commitment, countries can harness what we already know to build the next generation of lung cancer screening programmes that are data-driven, person-centred and capable of transforming outcomes at scale.

The Lung Cancer Policy Network Steering Committee

The gap between evidence and policy

Detecting lung cancer earlier is crucial to improving survival rates. Approximately 70% people with lung cancer are diagnosed at a late stage (IV), when treatment options are limited and five-year survival rates estimated to be 7–18%.[3-5] Comparatively, the five-year survival rate for people diagnosed at stage I – when there are more treatment options available, including potentially curative surgery – can be over 80%.[4-6]

Globally, lung cancer is the most commonly diagnosed cancer; there were almost

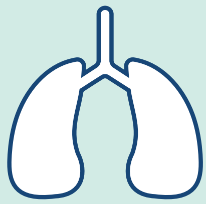
2.5 million

new diagnoses in 2022[1,2]

This number is expected to almost double by 2050[2]

x2

Screening high-risk populations is an effective way to achieve earlier detection. Lung cancer is often diagnosed late. It does not always cause symptoms in its early stages; and its initial symptoms can be mistaken for other conditions, so it often progresses unchecked.[7,8] Low-dose computed tomography (LDCT) screening offers a critical opportunity to shift the stage of diagnosis. Several landmark randomised controlled trials and decades of research demonstrate that LDCT screening in high-risk populations* is an effective tool for earlier detection in people who are asymptomatic, and leads to long-term survival – the 20-year lung cancer-specific survival rate is 81%.[9-15] Additionally, many locations where targeted LDCT screening has been implemented are seeing a real-world stage shift.[16,17]



Lung cancer is the leading cause of cancer-related deaths; in 2022 it accounted for 18.7% of all cancer deaths[1,2]

Despite decades of robust data from clinical trials and real-world data from national programmes, the roll-out of LDCT screening programmes remains far too slow, leaving a significant gap between proven science and public health policy. Political hesitancy has contributed to this gap. For example, the European Commission's 2022 inclusion of lung cancer in its screening recommendations was a positive step. However, grouping it with other cancers – despite much greater evidence for lung cancer screening than, for example,

* A population may be considered high risk because of exposure to risk factors or having characteristics known to increase the likelihood of developing lung cancer.[18,19]

gastric cancer – undermined the robust data supporting LDCT screening.[20-22] While a few countries have implemented regional or national LDCT programmes, the majority of countries with activity on lung cancer screening are at the research and pilot stage, and many others have no screening activity at all.[23]

Overcoming political hesitancy is essential to accelerating the implementation of screening programmes for lung cancer – and the interactive map is designed to facilitate this. The Lung Cancer Policy Network developed the first iteration of the map in 2022 as a global repository of research related to the implementation of LDCT screening for lung cancer. The map provides detailed information on clinical trials, pilot studies and screening programmes – as well as country-level policy context. Designed to support decision-makers as they consider implementing screening programmes for lung cancer using LDCT, the map promotes data sharing and facilitates the exchange of insights from established programmes. The data are regularly updated and expanded, so users can look at the evolving global uptake of lung cancer screening. The map is a valuable tool for policymakers and screening leads to explore data, identify implementation gaps and accelerate the adoption of LDCT screening worldwide.

> The interactive map is updated continually, and the data in this report are from version 3.1.1. To access the dataset used in this report, please email the Network Secretariat at networksecretariat@hpolicy.com. The most up-to-date version of the interactive map is available here. The full methodology for the interactive map is available here. The interactive map is not an exhaustive list of all lung cancer screening trials, studies or programmes.

A BRIEF HISTORY OF LDCT LUNG CANCER SCREENING MILESTONES*

- **1999** — **The Early Lung Cancer Action Project** (ELCAP) publishes results showing that LDCT detects lung cancer at earlier stages than chest X-ray.[24]
- **2006** — The **International Early Lung Cancer Action Program** (I-ELCAP) shows the effectiveness of lung cancer screening and a stage shift in detection.[25]
- **2011** — **The National Lung Screening Trial** (NLST) reports a 20% reduction in lung cancer mortality with LDCT screening in high-risk populations.[10]
- **2013** — The **United States Preventive Services Task Force** (USPSTF) recommends annual LDCT screening for people at high risk of lung cancer: adults aged 55 to 80 years who have a 30 pack-year smoking history and currently smoke, or who have quit within the past 15 years.[26]
- **2015** — The Centers for Medicare & Medicaid Services starts covering LDCT screening in the **US**, and a national screening programme is launched.[27]
- **2019** — The **South Korean** cancer screening programme expands to include lung cancer.[28,29]
- **2020** — The **Nederlands-Leuvens Longkanker Screenings Onderzoek** (NELSON) trial in Europe shows a reduction in mortality for people screened using LDCT.[9]
- A national screening programme for lung cancer launches in **Croatia**.[30]
- The **European Society of Radiology** (ESR) and the **European Respiratory Society** (ERS) issue a joint statement outlining an action plan to support the roll-out of LDCT screening and address barriers to implementation.[31]
- A national programme for lung cancer screening launches in **Poland**.[32]
- **2021** — The **USPSTF** updates its guidelines, lowering the age for screening eligibility to 50 and reducing the smoking history threshold to 20 pack-years, substantially increasing eligibility.[33]
- **Canada** begins to roll out provincial screening programmes.[34]
- **2022** — **Taiwan** launches screening programme for lung cancer; it is the first large-scale programme to include people with a family risk of lung cancer but who have never smoked.[35]
- A systematic review of eight trials demonstrates that screening reduced deaths from lung cancer by 21%.[36]
- As part of **Europe's Beating Cancer Plan**, the **European Council** formally recommends a stepwise approach to implementing lung cancer screening and incorporates it into the **EU cancer screening strategy**.[37-39]
- The **UK National Screening Committee recommends lung cancer screening** for the four UK countries, informed by the phased implementation of the Targeted Lung Health Check initiated in England in 2019.[40,41]
- **2023** — **UK** prime minister announces funding for full roll-out of a national screening programme for lung cancer.[42]
- The **American Cancer Society** updates its guidelines to align with the USPSTF's criteria – with the notable exception of removing the criterion related to years since quitting.[43]
- The **Strengthening the Screening of Lung Cancer in Europe** (SOLACE) project receives EU4Health funding with the explicit goal of facilitating implementation of lung cancer screening.[44]
- **Pan-European** technical standards are published to guide national implementation efforts.[45]
- **I-ELCAP** 20-year follow-up data find that lung cancer-specific survival was 81%.[11]
- **2025** — **Australia** launches a national screening programme for lung cancer.[46]

*This is not an exhaustive list.

What do the data tell us?

While there is no one-size-fits-all approach to the design of a lung cancer screening programme, there are shared considerations that support successful implementation. Screening programmes for lung cancer are complex; a range of factors influence their development and roll-out. Considerations around the optimal planning, design and implementation of screening are crucial for all locations engaging in screening. Without evidence-based planning in all of these areas, such initiatives risk being ineffective, inequitable or unsustainable.

Policymakers need robust data to evaluate how to implement a national programme; the interactive map can help inform best practice for LDCT screening. Valuable insights can be drawn from existing trials, implementation studies and established programmes to guide and optimise new efforts. Analysis of the map data enables users to answer key questions about implementation, including:

- Which countries have formally committed to organised screening programmes for lung cancer using LDCT?
- Which programme designs, eligibility criteria and recruitment methods are being used to optimise attendance, particularly among populations at highest risk of lung cancer?
- Which screening outcomes have been reported – for example, the proportion of participants diagnosed at an early stage – and how do these compare with clinical trial evidence?
- Which countries are exploring the integration of LDCT screening with innovations such as biomarker testing, smoking cessation support or computer-aided detection?
- What lessons can be drawn from existing LDCT screening studies or national programmes and how they were implemented?

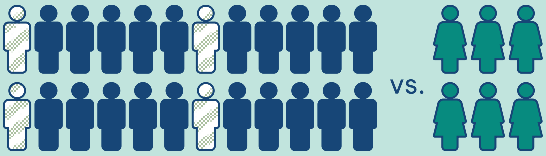
The global policy context for lung cancer screening

Patterns of lung cancer risk and prevalence vary widely, reflecting the complex interplay of factors such as tobacco use, environmental exposure and socioeconomic development.

Five-year **survival rates are as low as 10–20%** in most countries.[147]

Globally, **men are about twice as likely as women to be diagnosed with, or die from, lung cancer** – but this varies by region.[1]

In regions such as North America and Northern Europe, lung cancer rates are similar for men and women, while in North Africa and Eastern Europe **men are four to five times more likely than women to develop lung cancer.**[1]



The difference in lung cancer rates is mostly a reflection of how the tobacco epidemic has progressed. High-income countries where smoking rates have begun to decline are also seeing a decline in lung cancer (particularly among men), while many economically transitioning countries continue to experience rising rates due to ongoing or recent peaks in smoking prevalence.[148]

The tobacco epidemic among women is generally at an earlier stage of its progression compared with men. In some high-income regions lung cancer rates for women are approaching or surpassing those for men – potentially indicating a future rise in the prevalence of the disease among women.[149–51]

Globally, **people who have both previously smoked and have a high level of education tend to have a lower risk of lung cancer** than people who have previously smoked and have a low level of education. However, the relationship between education and lung cancer rates has not been observed in people who have never smoked.[52]

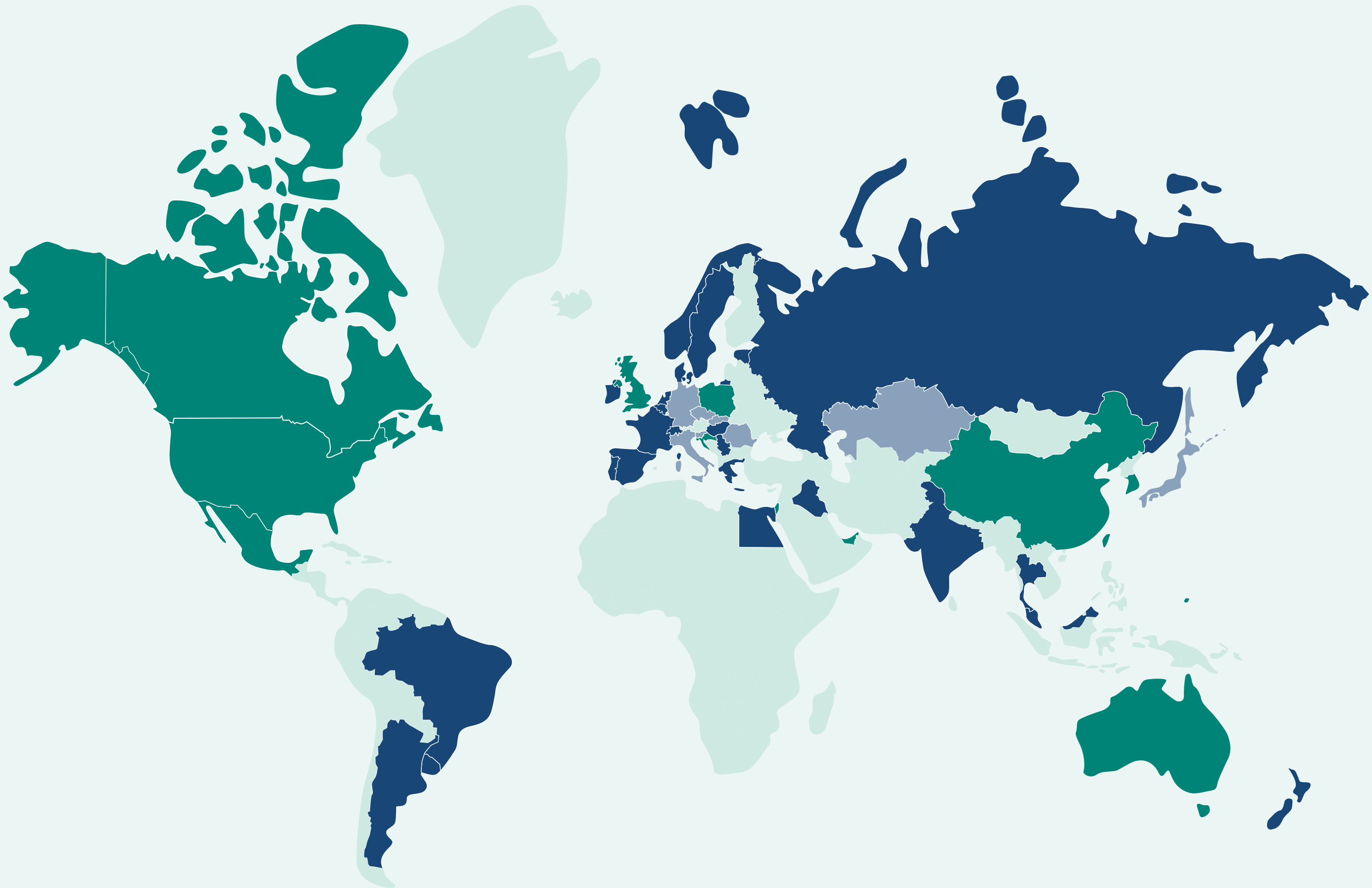
Environmental exposure (both outdoor and indoor) and occupational hazards significantly contribute to lung cancer globally.[153] Their impact is especially important as smoking rates decline.

Air pollution is the second leading cause of lung cancer.[54]

There is growing recognition of the role of genetics in lung cancer risk, and there are geographical differences in the genetic drivers for lung cancer. For example, epidermal growth factor receptor (EGFR) mutations are a bigger driver of lung cancer in Asian populations – particularly among people who have never smoked – than in other populations.[55 56]

While a growing number of countries are making progress towards implementing screening programmes, far more needs to be done to ensure broad and equitable access. According to data from the interactive map, 13 countries or territories have national or regional lung cancer screening programmes, and 8 others have made formal commitments to implementation; a further 24 countries are conducting critical implementation research, including regional pilots and national feasibility studies.[23] This activity signals increasing momentum, but the limited number of national programmes also highlights a gap that must be addressed urgently. To reduce lung cancer mortality and improve outcomes at scale, policymakers must act decisively to move from research and commitment to sustained, system-wide implementation.

Several initiatives are underway to expand the reach and impact of lung cancer screening – so now is the time to act. In 2022, the International Association for the Study of Lung Cancer (IASLC) developed a consensus-based five-year roadmap as an education resource. The roadmap identified nine strategic priorities, including the development of screening quality indicators; improved risk stratification (including for people who have never smoked); integrated AI and biomarker protocols; and accessible geospatial tools to address disparities.[57] The adoption of a lung health resolution by the World Health Organization (WHO) in 2025 further reinforced a commitment to lung health – including the prevention and early detection of lung cancer.[58] And the International Agency for Research on Cancer (IARC) has announced a meeting in 2026 as part of the development for *IARC Handbooks of Cancer Prevention Volume 21: Lung Cancer Screening,* which will serve as a critical milestone.[59]



National or regional LDCT screening programme roll-out:

1. Australia
2. Canada
3. China
4. Croatia
5. Guam
6. Israel
7. Mexico
8. Poland
9. South Korea
10. Taiwan
11. United Arab Emirates
12. United Kingdom
13. United States

Formal commitment:

1. Czechia
2. Germany
3. Italy
4. Japan
5. Kazakhstan
6. Romania
7. Slovakia
8. Slovenia

Implementation research:

1. Argentina
2. Belgium
3. Brazil
4. Denmark
5. Egypt
6. Estonia
7. France
8. Greece
9. Hungary
10. India
11. Iraq
12. Ireland
13. Malaysia
14. The Netherlands
15. New Zealand
16. Norway
17. Portugal
18. Russia
19. Serbia
20. Spain
21. Sweden
22. Switzerland
23. Thailand
24. Uruguay

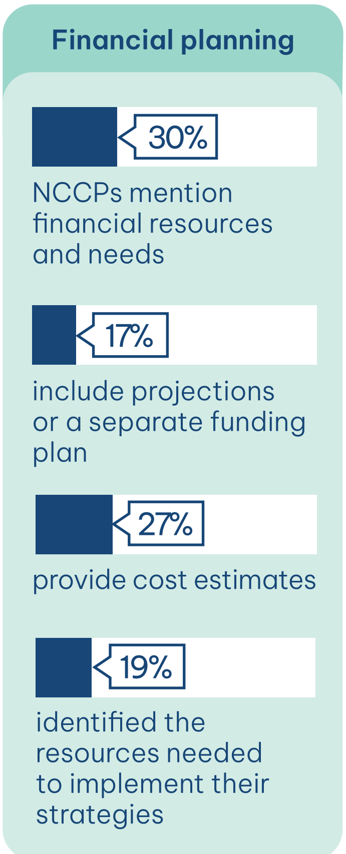
The importance of including lung cancer in national cancer control plans

What are national cancer control plans?

National cancer control plans (NCCPs) are strategic tools that help governments set priorities and recommend actions, based on a country's needs and resources, for the prevention, diagnosis, treatment, palliation, care, data collection and monitoring of cancer.[60 61]

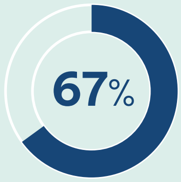
NCCPs are recognised as essential tools for addressing the growing impact of cancer, and prioritising and coordinating programmes. Over the past decade, the importance of NCCPs has been emphasised repeatedly by global health bodies and in commitments by WHO Member States.[62 63] The effective funding and implementation of NCCPs ensures that cancer control is treated as a public health priority, and translates global commitments on non-communicable diseases into meaningful national action.[62 64] Countries with well-developed and consistently implemented cancer plans achieve better outcomes and higher survival rates.[61 65]

Policymakers must ensure that NCCPs are not only developed but also fully implemented, monitored and resourced to drive sustainable improvements in cancer outcomes. To be impactful, NCCPs must be living documents equipped with clear delivery pathways, robust quality assurance mechanisms, comprehensive data use, independent oversight and broad workforce engagement.[66] Despite progress, many NCCPs – particularly in those low- and middle-income countries – still lack the necessary comprehensiveness and contextual adaptation.[64] Financial planning also remains a major gap; only 30% of NCCPs mention financial resources and needs.[64] Just 17% include projections or a separate funding plan; 27% provide cost estimates; and 19% identify the resources needed to implement their strategies.[64] These issues need to be addressed to achieve broader commitments, such as the cancer-related targets in the 2030 Sustainable Development Goals.[67]



When screening efforts are supported by national health policies, it is easier to organise, fund and implement them effectively, highlighting the importance of policy alignment. Data from the interactive map show that while 143 countries have an NCCP, only 39 specifically mention detecting lung cancer earlier;[23] this is a missed opportunity given the proven benefits of early intervention. Among the 21 countries that have formally committed to LDCT screening or have begun national roll-out, approximately 67% have incorporated early detection strategies into their NCCP.[23] Integrating earlier detection of lung cancer into NCCPs is one way to demonstrate formal commitment to implementing screening programmes.

Among the **21 countries** that have formally committed to LDCT screening or have begun national roll-out, approximately



have incorporated early detection strategies into their NCCP

The role of population-based cancer registries

What are population-based cancer registries?

Population-based cancer registries (PBCRs) systematically collect, store, validate and analyse data on new cancer cases in a population.[68 69] They provide comprehensive information on incidence, survival and related factors,[69 70] which is crucial for public health monitoring, cancer control planning and research.

The essential role of PBCRs in shaping effective cancer policy is widely acknowledged. In 2017, the World Health Assembly adopted a landmark resolution urging all WHO Member States to establish PBCRs.[63] This global mandate underscores the need for high-quality, comprehensive data on cancer incidence and mortality – disaggregated by age, cancer type and equity indicators – to drive evidence-based planning for cancer prevention, early detection, treatment and control.[63]

Sustainable and useful PBCRs rely on context-specific planning and stakeholder collaboration. The requirements of a PBCR largely depend on the setting, and include: population size and geographical spread; available resources; and the development level of medical services. PBCRs must be built through collaboration among a diverse group of stakeholders including healthcare professionals, community leaders, government officials and people living with cancer.[70 71] Key elements for success include:[70-72]

- defining a target population that accurately reflects the community
- ensuring that all registry personnel receive adequate training to build and maintain technical expertise
- developing a data system that is adaptable and interoperable with broader health information systems
- ensuring that data are complete, comparable and timely
- planning for evolving data collection requirements
- ensuring the legal and confidential aspects of the registry have been considered
- controlling the quality of the data in the registry
- securing long-term funding to support the registry's ongoing operations
- ensuring accessibility and data sharing to inform research, reporting and monitoring.

PBCRs provide comprehensive lung cancer data that can be used to inform the design of a screening programme; and once a screening programme is operational, PBCRs can help monitor its impact and effectiveness. Without a PBCR, it will be difficult for some countries to track the occurrence and impact of different types of cancer on an annual basis.[73] These data are critical for policymakers to set priorities, develop plans to address emerging trends, allocate resources appropriately, and measure the performance of interventions.[74,75] By providing data on incidence and mortality, and identifying disparities in outcomes, PBCRs enable decision-makers to understand the need for a screening programme and identify high-risk groups, thereby informing the effective targeting of screening efforts.[76,77] According to data in the interactive map, currently 135 countries have a PBCR.[23]

Currently,

135 countries

have a PBCR

Insights from trials, pilots and programmes on how to optimise screening

A substantial body of evidence from completed and ongoing trials, pilot studies and programmes offers valuable lessons for those developing their own initiatives. With this knowledge, individuals and organisations do not need to develop their approaches in isolation; instead, they can build on proven methods, avoid common pitfalls and adapt successful strategies to meet their specific needs.

Designing eligibility and recruitment for increased reach and impact

The role of risk models in informing screening eligibility

What are risk models?

Risk models are statistical tools used in lung cancer screening to estimate a person's likelihood of developing the disease in a given period. The models use various factors to develop an individualised risk prediction score,[78 79] including personal characteristics, smoking history, family history and exposure to carcinogens.[80 81]

Lung cancer risk is influenced by a wide range of factors that vary significantly across and within populations. While tobacco use remains the primary driver of lung cancer globally, other important risk factors – including air pollution, occupational hazards, indoor pollution from cooking fuels, and genetic predisposition – play a greater role in some countries than others.[51 82] This variation means that a one-size-fits-all approach to screening eligibility is not appropriate. Unlike other cancer screening programmes, such as for breast or colorectal cancers – which are population based, use fixed eligibility criteria such as age and sex, and are resource intensive – lung cancer screening is risk-targeted from the outset.[83] This means that eligibility needs to account for regional differences in risk factors to ensure screening remains effective and equitable.

Risk prediction models are valuable tools for identifying people at highest risk, who are most likely to benefit from screening. When carefully developed and applied, these models can improve the effectiveness of screening programmes, reduce potential harms, and ensure resources are targeted where they are needed most.[84-88] To be effective, models must account for regional and population-specific risk factors and be designed with flexibility, allowing them to evolve as new evidence emerges and our understanding of lung cancer risk develops.[89] Tailored, data-driven approaches not only help optimise the impact of screening programmes but also promote equity by ensuring that high-risk people in all settings are appropriately identified and reached. As such, selecting the right model is a key consideration when designing a lung cancer screening programme.[90]

Despite the benefits of risk prediction models, their inconsistent use in national screening programmes highlights the need for a more practical and flexible approach to determining eligibility. Many programmes – including those in Australia, South Korea, Taiwan and the US – rely on simpler eligibility criteria based on age, smoking history and sometimes family history. This approach reflects practical challenges, such as the limited availability of data needed to effectively run risk prediction models, and differences in regional risk profiles for lung cancer.[91] For instance, the risk profile for lung cancer in the Asia-Pacific region differs from that in Western populations. This has led to questions about the effectiveness of existing risk models and the development of regionally specific models that are more appropriate for local populations.[92 93]

Countries are increasingly adapting risk models, moving beyond age and smoking history to enable more personalised, equitable and effective screening strategies. Of the 235 clinical trials, pilot studies and programmes featured in the interactive map, 64 use risk prediction models to assess participant eligibility for screening (*Case study 1*).[23] The $PLCO_{m2012}$ model is the most commonly used; it features in 39 of these entries, highlighting its prominence in guiding evidence-based eligibility decisions.[23]

Of the 235 clinical trials, pilot studies and programmes,

64

use risk prediction models to assess participant eligibility for screening

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FIND OUT MORE about the factors considered in various risk prediction models here.

Case study 1. The use of two risk prediction models in the NHS Lung Cancer Screening Programme (formerly the Targeted Lung Health Check)[94]

In England, the programme for lung cancer screening employs a dual-model approach to identify people at high risk of the disease. By using two validated risk prediction models – PLCO$_{m2012}$ and the Liverpool Lung Project, version 2 (LLPv2) – the programme strengthens its ability to identify people with high risk and detect lung cancer early among those who are eligible.

England

PLCO$_{m2012}$ and LLPv2 both estimate a person's risk of developing lung cancer based on factors such as age, smoking history, family history and existing health conditions. Although the models are based on similar principles, they incorporate and weight risk factors differently. The programme considers a person eligible for LDCT screening if they meet the eligibility criteria of either model, provided inclusion criteria are met and no exclusion criteria are present. This allows for a broader identification of high-risk people. By using both models, the programme can identify people who might be missed by a single model alone, increasing the likelihood of detecting lung cancer at an early stage.

The potential of biomarkers to aid recruitment

What is a biomarker?

A biomarker is a measurable molecular indicator that provides information on the risk and occurrence of cancer, or on treatment outcomes.[95]

Biomarkers may be able to identify people at high risk of lung cancer and potentially improve the impact of screening. In lung cancer screening, they have the potential to:[96-99]

- help stratify cancer risk, enhancing the selection of population for screening and complementing risk prediction models
- assist in differentiating between benign and malignant nodules identified through screening to help avoid overdiagnosis.

The integration of biomarkers into organised screening programmes holds considerable promise, but more research is needed to realise their potential in lung cancer. Using biomarkers may help optimise the impact of screening on detection (*Case study 2*), increase the efficiency of screening, and reduce the number of false positives.[99] Blood-, breath- and serum-based biomarkers have been studied in various trials; while some are available for clinical use for treatment decision-making, others require further evidence before they can be integrated into lung cancer screening.[97,98] Among the 235 trials, studies and programmes in the interactive map, only 13 entries use biomarkers to select participants for screening, and no national programme has implemented this approach.[23] However, 57 entries collect biospecimens from participants during the screening pathway.[23] This suggests a strong foundation for future innovation.

Among the 235 trials, studies and programmes:

13 use biomarkers to select participants for screening

57 collect biospecimens from participants during the screening pathway

Embedding biomarker research into screening infrastructure can help prepare health systems for the next generation of personalised, risk-based screening strategies. While further validation is still needed, the accelerating pace of evidence underscores the importance of proactive planning. By investing in infrastructure for sample collection and expanding testing capacity, countries can unlock the potential of biomarkers to improve early detection.[100]

Case study 2. Using biomarkers to improve lung cancer risk prediction in Italy

The BioMILD study started in 2013 with the aim of testing blood biomarkers and LDCT screening to evaluate whether biomarkers could improve the efficacy of screening through individual risk profiles and personalised screening intervals.[101]

Italy

The study found that combining the blood biomarker test with LDCT scans improved risk prediction when compared with LDCT alone.[102] People who tested positive with the blood test had about twice the risk of developing lung cancer within four years. Repeating the blood test over time made risk predictions even more accurate; after seven years, people who consistently tested positive had a lung cancer risk over 30%, while people who tested negative had around 5% risk.[102]

The results of the study show that while LDCT remains the primary screening tool, the blood biomarker test could optimise the management of suspicious lung nodules found on scans by guiding follow-up decisions.[102] This could reduce unnecessary tests and focus resources on people at the highest risk.

Identifying healthcare professionals to refer people to screening

Engaging effectively with referring healthcare professionals can increase screening uptake among the eligible population. Healthcare professionals play a key role in facilitating access to screening, and receiving a recommendation to screen from a healthcare professional is an important predictor of whether people who are at high risk of lung cancer will participate in screening.[103 104] Healthcare professionals – including family physicians, pulmonologists, respiratory medicine specialists and patient navigators – can engage potential participants, extending the programme's reach and enhancing its overall impact.

Understanding which healthcare professionals are most effective in referrals is essential for designing efficient programmes. The involvement of different professionals depends on factors such as health system structure, specialist availability, training, funding, population needs and integration with care pathways. Data from the interactive map show that family physicians are the most commonly involved healthcare professional in screening referrals.[23] Specifically:

- 89 entries involved family physicians (*Case study 3*)
- 20 included other clinical specialists
- 11 engaged respiratory medicine specialists
- only 2 involved pulmonologists (*Case study 4*).[23]

Healthcare referrals for lung cancer screening:

89 entries involved family physicians

20 entries included other clinical specialists

11 entries engaged respiratory medicine specialists

2 entries involved pulmonologists

These data highlight that lung cancer screening is often rooted in primary care settings, where trusted, ongoing clinician–patient relationships facilitate meaningful, shared decision-making and referrals.

To drive equitable and effective lung cancer screening, it is essential to integrate insights from healthcare professionals into planning; tailor recruitment strategies to local systems; and invest in multidisciplinary training. It is crucial to understand the perspectives of referring healthcare professionals, and to address the barriers and facilitators they face, recognising that their diverse professional backgrounds shape how they approach screening.[104] To maximise reach and foster equity, programme planners should: tailor workforce strategies to local health system capacities; invest in multidisciplinary training to support consistent and informed referral; and incorporate feedback from a range of referring healthcare professionals to inform the design of outreach and recruitment strategies.

Case study 3. Screening recruitment via primary care physicians in Croatia

Croatia

In Croatia, primary care physicians play a central role in recruiting participants for the national screening programme for lung cancer.[105] They identify eligible people and schedule their screening appointments.[105 106] This recruitment method was chosen because all citizens are assigned a primary care physician, and approximately 90% visit their doctor at least once a year.[107]

To support primary care physicians in screening recruitment:[107 108]

- medical records provide eligibility details, such as smoking status and comorbidities
- a national digital platform enables appointment scheduling at certified screening centres
- training for physicians has been provided to raise awareness of the programme (including a video guide on how to identify potential participants and how to use the digital platform; follow-up instructions are also sent via the healthcare digital network, offering continuous assistance for physicians)[109]
- physicians are reimbursed for the additional workload involved in referrals.

Training has enhanced physician knowledge, which has been linked to increased screening participation.[105] Using primary care physicians for recruitment has also helped to improve the geographical coverage of screening.[108]

Case study 4. Pulmonologist-led recruitment for lung cancer screening in an outpatient setting[110]

Brazil

An implementation study conducted at Hospital Nossa Senhora da Conceição in Porto Alegre, Brazil, evaluated the effectiveness of a pulmonologist-led screening programme for lung cancer. Unlike population-wide recruitment models, the programme embedded screening directly into the outpatient care routine. Pulmonologists requested LDCT scans during regular follow-up visits with people who were already under their care for chronic lung diseases or who had a history of smoking. This targeted strategy capitalised on existing care relationships to engage high-risk people.

Possible signs of cancer were identified in 14% of people in the first round of screening and 5.6% in the second round. Lung cancer was confirmed in 1.5% of people in each round. Importantly, most of these cancers (64%) were found at an early stage, when treatment is more likely to be successful. However, nearly one in five patients who had a positive screening result did not complete follow-up care, showing the need for better systems to keep people engaged after screening.

By leveraging specialist expertise and existing care pathways, the study demonstrates how screening can be integrated into routine respiratory care, particularly in resource-constrained public health systems.

Targeted outreach can improve recruitment

Targeted outreach is a critical strategy for improving lung cancer screening uptake, particularly among high-risk and underserved populations. These groups are particularly affected by lung cancer due to factors including socioeconomic disparities, environmental exposure and limited access to healthcare.[111] Underserved communities experience disproportionately low participation in LDCT screening, which undermines screening programmes' effectiveness and ability to address inequalities.[112,113] Tailored outreach efforts – including targeted campaigns, culturally appropriate information in accessible languages, and personalised support from healthcare providers – can help address barriers such as low awareness, misinformation and limited healthcare access.[90,114]

Targeted outreach strategies must be adapted to the needs of different communities. They should be sensitive to the needs of underserved populations and address the barriers they face when engaging with screening.[90,114] Co-designed approaches that incorporate local context, stakeholder input and evidence-based research on promoting participation are especially promising, as they align interventions with the real-world preferences and challenges of the intended population.[113] By reducing barriers and engaging underserved communities, targeted outreach strengthens the equity and effectiveness of screening programmes.

Countries should develop locally appropriate, equity-focused outreach methods that resonate with their target populations. An analysis of 235 lung cancer screening trials, studies and programmes shows that more than 30% (88) actively use targeted outreach strategies to improve participation rates.[23] These efforts reflect a wide range of approaches tailored to community needs, highlighting the fact that no single strategy fits all settings. They include:[23]

88 in 235
screening trials, studies and programmes for lung cancer use targeted outreach strategies to improve participation rates

- **primary care invitations** and personalised reminders[112]
- **community-based advertising**, including posters, flyers, and newspaper and TV advertisements (*Case study 5*)
- **culturally tailored communication**, including materials in multiple languages (*Case study 6*)
- **community engagement**, such as health worker outreach (*Case study 7*) and mobile screening
- **digital tools**, including decision aids.

Case study 5. Use of advertisements to increase awareness of screening in the Korean Lung Cancer Screening Project (K-LUCAS)[115]

In the K-LUCAS pilot in South Korea, a public advertisement campaign was launched to boost awareness of lung cancer screening and participation. Advertisements were placed in newspapers, on public transport and on notice boards in public offices. They provided balanced information on the benefits and potential harms of screening.

Following the campaign, the number of participants in the pilot increased significantly. There was a higher proportion of older people with a smoking history of 40 pack-years or more, people with higher education levels and people with a family history of lung cancer. The proportion of people who currently smoke and people with higher smoking exposure also increased post-campaign. This shift suggests that balanced information may encourage participation by higher-risk people and discourage participation by low-risk people.

Case study 6. Engaging Indigenous people with Ontario's regional programme

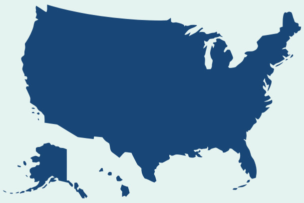
Indigenous populations in Canada – including First Nations, Inuit and Métis – are often under-represented in screening programmes and face significant barriers to access.[116] Given the large Indigenous population in Ontario,[116] the regional screening programme for lung cancer has implemented targeted strategies to address disparities and improve screening uptake.

Key engagement and support strategies include:[116 117]

- **Community engagement**: regional Indigenous Cancer Leads work directly with both rural and urban Indigenous communities to promote participation in screening. Engagement efforts are supported by the Indigenous Cancer Care Unit, which helps ensure programmes are informed by community perspectives.
- **Culturally safe materials**: educational materials are available in multiple languages, and have been developed in collaboration with communities to ensure cultural safety.
- **Targeted health education and support**: lung cancer awareness is promoted through community-informed initiatives, and the Indigenous Tobacco Program provides culturally appropriate counselling for smoking cessation.

These efforts aim to improve access, promote equitable screening, and ultimately reduce lung cancer rates among Indigenous peoples in Ontario.

Case study 7. Community health worker outreach as part of the Maine Health Lung Cancer Screening Program[118]



United States

The Maine Health Lung Cancer Screening Program piloted a community health worker outreach strategy to improve adherence to annual follow-up appointments for LDCT lung cancer screening. The pilot included a phone call from a trained community health worker (following a reminder letter) for people who had previously attended an LDCT scan but were at least one month overdue to attend their next scan. The pilot found that 86% of participants who received a phone call completed their next LDCT scan, compared with just 19.6% in the letter-only group. Of the 344 people who smoked and were screened, 215 received counselling from a community health worker, and 151 accepted referrals to the Maine tobacco helpline, surpassing average referral rates.

The pilot highlighted that community health workers can significantly boost adherence to lung cancer screening and connect diverse populations with prevention services.

Enhancing LDCT screening delivery to increase uptake and efficiency

Selecting the appropriate model of screening

Types of screening models		
In a **centralised screening model**, a central team handles all aspects of the programme, but referrals may be made by primary care providers.[119 120]	In a **decentralised model**, primary care providers work collaboratively with the screening programme team to recruit participants and review scans, and they share responsibility for follow-ups, result communication and care planning.[119 120]	A **hybrid screening model** combines elements of centralised and decentralised approaches; responsibilities are shared between primary care providers and the programme team.[119 120]

Selecting an appropriate screening model is critical to ensure equitable access, programme efficiency and long-term sustainability. Screening programmes for lung cancer can be structured using centralised, decentralised or hybrid models, each with distinct operational and governance implications. Key factors influencing this choice include: the country's health system structure; infrastructure and workforce availability; population distribution; and existing screening pathways.[119] A screening model that accommodates these factors, and is complimented by a carefully considered delivery approach, can help maximise uptake, ensure quality and support integration with other health services (*Case study 8*).

As screening efforts expand at the regional and national levels, there is a tendency to shift toward hybrid models to accommodate broader populations and diverse healthcare infrastructures. Data from the interactive map of lung cancer screening reveal a strong preference for centralised approaches: 109 trials, studies and programmes used that model; 16 adopted a hybrid model; and only 2 used a decentralised approach.[23] Among national and regional programmes, 27 used a centralised model while 14 adopted a hybrid model. The high number of centralised models is largely driven by trials and studies, which are often smaller in scale and geographically limited, making central

109
used a centralised model

16
used a hybrid model

2
used a decentralised model

coordination more feasible. As screening programmes expand at the national level, we might see an increasing use of hybrid models.

Case study 8. Utilising complimentary screening model and delivery approach to increase screening uptake

UK

By utilising a centralised screening model in combination with mobile screening units and fixed screening sites, the UK screening programme for lung cancer uses a tailored approach to optimise engagement and reach high-risk populations in their communities.[121] This process not only enhances accessibility but also addresses health inequalities by bringing vital screening to the people who need it most. For example, during the programme's roll-out in England, a detailed data analysis was used strategically to prioritise the deployment of mobile units to the areas of greatest incidence and mortality from lung cancer, where socioeconomic deprivation is disproportionately high.[122] The approach ensures that screening efforts reach underserved populations, improving early detection and potentially saving more lives.

Australia

Similarly, in Australia, the government has partnered with Heart of Australia to deliver mobile screening services to people living in rural and remote communities.[123] The routes for these mobile units have been co-designed with National Aboriginal Community Controlled Health Organisation, Aboriginal Community Controlled Health Services, the National Lung Cancer Screening Program Advisory Group, and states and territories.[123] This collaboration ensures that communities with the greatest need for screening can access the national programme.[123] Each year, the mobile clinics reach approximately 50 rural and remote communities in all states and the Northern Territory.[124]

The role of shared decision-making

What is shared decision-making?

With shared decision-making (SDM), people decide which tests, treatments or support packages are most suitable for them through discussions with healthcare professionals. In this approach, people's preferences and personal values are taken into account in addition to evidence. The process aims to ensure that people understand the risks, benefits and possible consequences of different options.[125 126]

SDM helps build trust, supports screening adherence and can improve outcomes. SDM in lung cancer screening involves potential participants and healthcare professionals collaboratively discussing the benefits, risks and alternatives.[127 128] The process enables people to make informed decisions that align with their preferences and personal risk factors.[96 129] Evidence shows that people who engage in SDM have greater knowledge, experience less decisional conflict and are more likely to adhere to annual screening.[127] Incorporating SDM can build trust in screening, increase screening rates and promote equity by making the process more accessible.[130-132]

Policymakers should consider investing in improving SDM infrastructure and tools to ensure lung cancer screening reaches its full potential. The formal SDM process – which is a requirement in the US – may contribute to slow uptake rates due to barriers such as limited time for consultations, competing health priorities, lack of decision aids, lack of reimbursement and inadequate implementation.[133 134] However, efforts are underway to tackle these issues (*Case study 9*). Additionally, the decision tools used during SDM can be misleading: results from trials are often distorted, inflating the risk of screening; and the information provided does not fully answer the questions that prospective participants may have.[135] To ensure that people are fully informed, SDM discussions need to include more clinically relevant information.[136] Enhancing SDM – through clinician training and guidance (*Case study 10*), use of decision aids, and co-designing materials with underserved populations to address evidence-based questions from the outset – can also support more equitable and effective implementation of screening programmes for lung cancer.[137-143] In the interactive map for lung cancer screening, 105 trials, studies and programmes have incorporated an SDM protocol.[23]

105
trials, studies and programmes **have incorporated an SDM protocol**

Case study 9. Addressing barriers to SDM in primary care[144]

The TELEhealth Shared decision-making COaching and navigation in Primary carE (TELESCOPE) project aims to tackle barriers to SDM in primary care by using patient navigators to deliver telehealth decision coaching to people who are eligible for lung cancer screening before their clinician visits. It is hoped that this approach will relieve time pressures on clinicians while providing personalised support that improves informed decision-making. The project offers a scalable and efficient way to fulfil SDM requirements and support guideline-compliant screening. Recruitment for the study is expected to be completed by May 2026.

Case study 10. Developing targeted SDM materials for the launch of Australia's national screening programme for lung cancer

Prior to the launch of Australia's national screening programme for lung cancer in July 2025, the government proactively developed an SDM guide for healthcare professionals.[145] This evidence-based tool equips providers with clear, practical advice on how to effectively engage potential participants in meaningful conversations about lung cancer screening. It clarifies who is best positioned to lead these discussions, emphasises the importance of SDM for informed personal choices, and offers tailored questions to address people's diverse needs. Importantly, it ensures that healthcare professionals communicate both the benefits and the potential harms of screening, fostering transparency and trust.[145] By supporting clinicians with this guidance, Australia aims to improve people's understanding, encourage informed participation, and ultimately enhance the success of its lung cancer screening efforts.

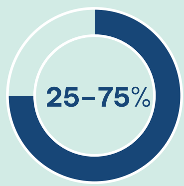
Additional SDM materials were also developed by and for Aboriginal and Torres Strait Islander peoples.[146] The resource outlines screening options, benefits and next steps, and encourages users to consider their support needs (such as transportation or interpreters) and personal priorities (for example cultural practices, values and community protocols) with their healthcare professional.[146] Co-creating these materials with the communities they serve ensures that the materials are appropriate.

Incorporating smoking cessation interventions

Embedding smoking cessation support in screening programmes is an opportunity to deliver high-impact interventions targeting people at greatest risk.

With tobacco exposure accounting for approximately 25–75% of tracheal, bronchus and lung cancer cases – depending on the geographical region – smoking cessation can be a highly effective way to reduce the risk of lung cancer, and also improving outcomes for people who are already diagnosed.[147-149] LDCT screening offers multiple clinical touchpoints to deliver cessation support to people who smoke and are at high risk of lung cancer (*Case study 11*).[150] Evidence shows that people who are offered such interventions as part of screening are more likely to quit than people offered usual smoking cessation support.[151] This integration enhances the overall effectiveness of lung cancer screening by improving outcomes for people who smoke; it lowers their risk of not just lung cancer, but also other tobacco-related conditions, including chronic obstructive pulmonary disease (COPD) and cardiovascular disease.[90 111 152]

Tobacco exposure accounts for approximately



of tracheal, bronchus and lung cancer cases

Embedding smoking cessation interventions in screening programmes can help achieve wider public health goals. It aligns with the 2025 World Health Assembly resolution, which calls for a more holistic, integrated approach to improving lung health.[58] It also has the potential to improve the screening programmes' cost-effectiveness and efficacy.[153-156]

To maximise public health impact, cessation services should be treated as a core component of screening rather than an optional add-on; and approaches should be tailored to local contexts and integrated appropriately to the screening pathway. There is no agreed optimal approach to integrating smoking cessation interventions,[79] although some studies have tried to address this uncertainty.[157] Data from the interactive map of 235 lung cancer screening trials, studies and programmes reveal that more than half (131) include smoking cessation interventions delivered at various points along the screening pathway: pre-screening (51), during screening (14), post-screening (16), at multiple points (12), and unspecified (38).[23] While the timing and design of cessation support vary, the inclusion of these interventions in over half of the mapped initiatives demonstrates increasing awareness of their effectiveness in lung cancer screening.

Of 235 lung cancer screening trials, studies and programmes,

131
include smoking cessation interventions:

- **51** pre-screening
- **14** during screening
- **16** post-screening
- **12** multiple points
- **38** unspecified

Case study 11. Integrating smoking cessation into a mobile screening programme in Brazil[158]

Brazil

In Barretos, Brazil, smoking cessation support was embedded in a lung cancer screening programme to maximise its health impact. Participants received a brief assessment by trained navigator staff, with follow-up support offered through 18 smoking cessation teams trained on public healthcare units, which serve hundreds of people who smoke.

As a first step, a clinical consultation evaluated a person's smoking habits, dependence level and readiness to stop smoking. The treatment included individual or group sessions with healthcare professionals as well as nicotine substitutes and medication. Follow-up assessments were built into the screening timeline, using the post-scan period as a 'teachable moment' to revisit and reinforce cessation efforts.

Of the 177 participants who smoked, 30.5% joined smoking cessation groups; of those, 27.8% successfully stopped smoking. Overall, 13.0% of all high-risk participants stopped smoking, with most (83.4%) maintaining abstinence for over a year. While participation in a cessation group was associated with a twofold increase in the likelihood of a person abstaining from smoking, the difference did not meet the threshold to be statistically significant. This highlights both the challenge and the potential of integrated cessation services.

Using computer-aided detection technologies for lung nodule detection

What are computed-aided detection technologies?

Computer-aided detection (CAD) technologies identify potential lung nodules (small clumps of cells) and serve as a second reader to radiologists, improving detection sensitivity and reducing the time needed for image analysis.[159 160]

CAD technologies address some of the challenges to interpreting and managing LDCT screening results. LDCT screening is highly sensitive and can detect small, often benign nodules; this can contribute to false positives,** overdiagnosis and sometimes unnecessary invasive follow-ups.[161] To address this, CAD technologies are increasingly being used to improve diagnostic accuracy and consistency by assisting clinicians in interpreting imaging results.

CAD and AI technologies play a critical role in enhancing the precision, reach and equity of screening programmes for lung cancer. CAD technologies have shown high accuracy in detecting and characterising nodules, although visual confirmation by thoracic radiologists remains necessary to minimise false positives.[90 163] CAD has demonstrated sensitivity rates as high as 96.7%, outperforming traditional double reading*** in some studies.[164] Additionally, CAD-supported mobile CT units, combined with remote AI assistance, have proven effective in expanding screening access to underserved and resource-limited areas; they allow for images to be read remotely by radiologists, overcoming local shortages.[165]

As lung cancer screening expands globally, the integration of CAD technologies presents a timely opportunity to optimise diagnostic capacity and improve efficiency. Programmes are increasingly exploring CAD to support image interpretation and help address radiologist shortages. Data from the interactive map show that CAD is being investigated or applied in 5 clinical trials, 35 implementation studies and 6 established screening programmes,[23] reflecting a growing global interest in leveraging

CAD is being investigated or applied in:

- **5** clinical trials
- **35** implementation studies
- **6** screening programmes

** A false positive is when someone initially tests positive during lung cancer screening, but subsequent diagnostic procedures reveal that they do not have the disease. This error can result from challenges in distinguishing between cancerous and benign features on a scan.[162]

*** Double reading is the practice of two radiologists independently reviewing the same CT scan.

digital solutions. For policymakers, this trend highlights the need to assess how CAD can be incorporated into national screening efforts to improve early detection and reduce delays in diagnosis (*Case study 12*). Successful implementation depends on aligning CAD tools with regional health system capacity, clinical practices and digital infrastructure – ensuring they are embedded into daily workflows for equitable and effective use in practice.[166]

Case study 12. Leveraging AI in Poland's national screening programme for lung cancer[167]

Poland was among the global pioneers in integrating AI into its national screening programme for lung cancer, which involved over 20 centres across 6 macroregions. As part of the programme, all centres leveraged AI to support radiologists in detecting and diagnosing lung cancer early.

AI was used to analyse image data and perform automatic triage. It would calculate tumour volume and growth rate, allowing radiologists to focus on clinical decision-making rather than time-consuming manual measurements. The use of AI enhanced diagnostic accuracy, reduced variability in results and supported structured reporting efficiency.

Poland's experience highlights how AI integration can strengthen screening systems for lung cancer by helping address workforce gaps, improve detection rates and standardise care, offering valuable lessons for other countries exploring technology-enabled models.

Leveraging data to accelerate screening implementation

Without decisive action, the toll of lung cancer will escalate dramatically, particularly in low- and middle-income countries, where incidence and mortality are rising fastest. Lung cancer is projected to be diagnosed in 4.62 million people and cause 3.55 million deaths per year by 2050 if current trends persist.[2] Yet this trajectory can be altered.

The evidence is clear: early detection using LDCT screening saves lives. Long-term follow-up data from I-ELCAP show that where lung cancer is detected early through screening, there is a high potential for cure, with a 20-year survival rate of 81%.[11] By rapidly scaling up the implementation of screening programmes, countries have an opportunity to prevent the projected surge in lung cancer deaths and dramatically alter the trajectory of the disease.

The past decades have laid a strong foundation, but bold implementation, expansion, optimisation and innovation must come next. As more data emerge from ongoing trials, pilots and established programmes, policymakers and health systems will be better positioned to refine screening strategies, enhance cost-effectiveness, and target high-risk populations more accurately. The interactive map of lung cancer screening provides easy and timely access to the evolving evidence base. If we accelerate progress now, we can fundamentally change the outlook for lung cancer and close the gap between what is possible and what is currently being delivered.

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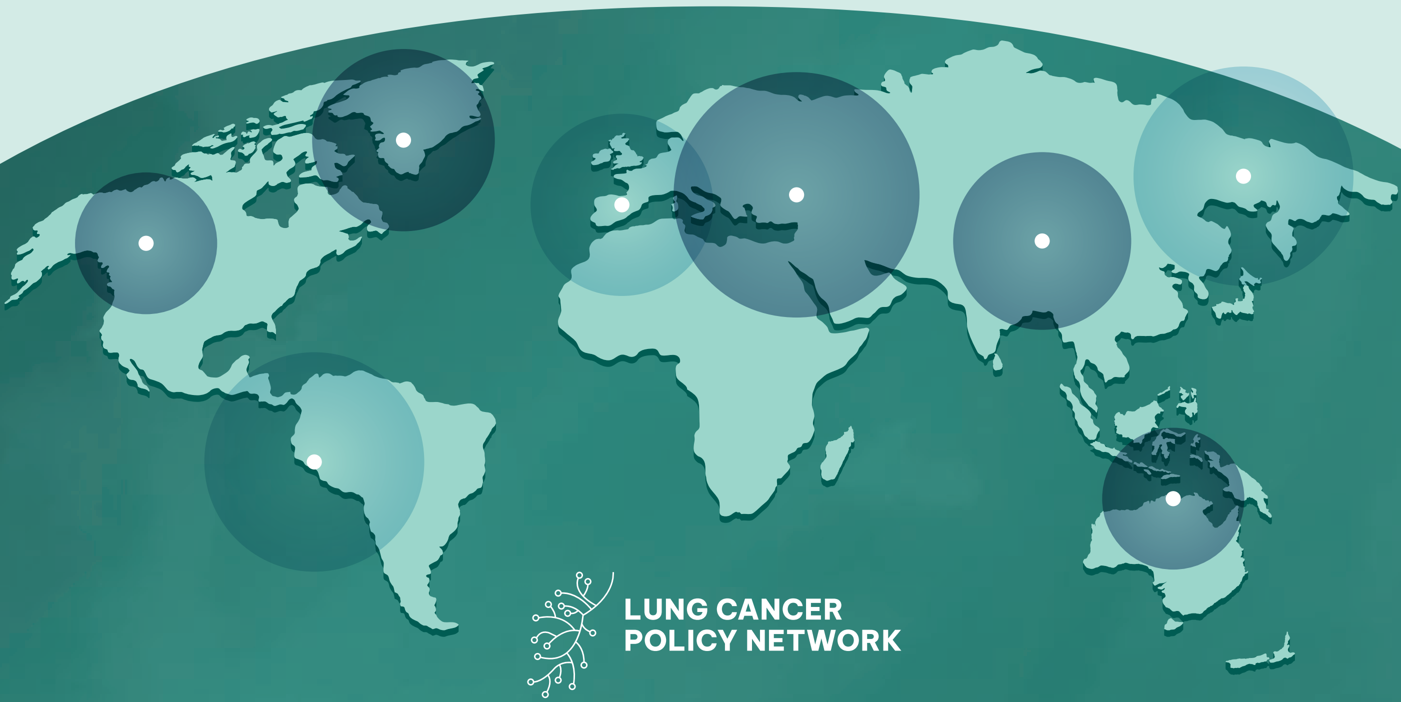

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