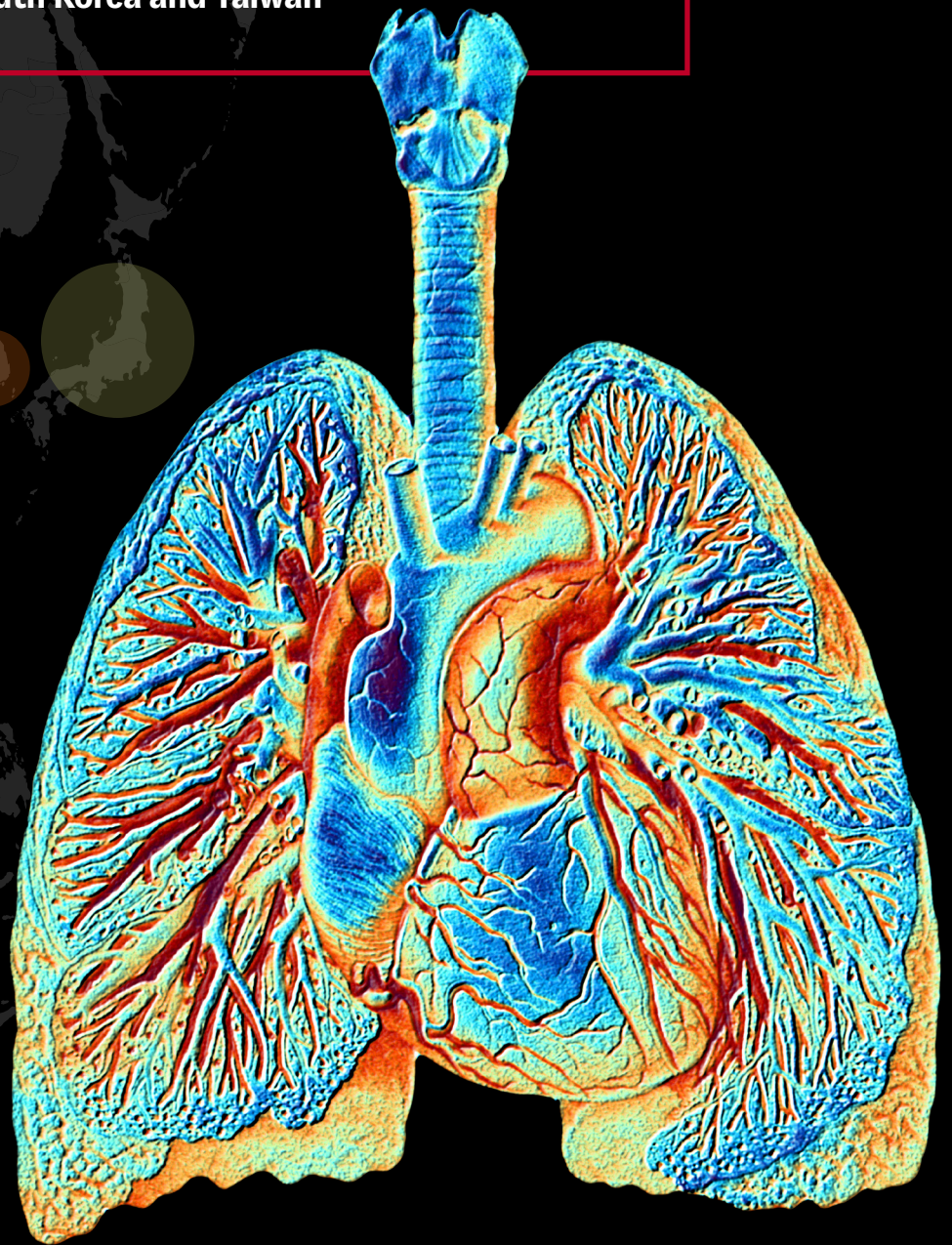


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Breathing in a new era

A comparative analysis of lung cancer policies in
Japan, South Korea and Taiwan



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About this report

Breathing in a new era: a comparative analysis of lung cancer policies in Japan, South Korea and Taiwan is an Economist Impact report sponsored by MSD.

This research, an extension to a previous Economist Impact study published in 2021, utilises the same scorecard framework. It incorporates a comprehensive literature review and interviews with distinguished experts in lung cancer care to update the scorecard and its findings. We wish to express our deepest gratitude to the following experts (listed alphabetically) for their invaluable time, expertise and insights, which were crucial to the creation of this report:

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- **James Chih-Hsin Yang**, Professor, Director, National Taiwan University Cancer Center
- **Pan-Chyr Yang**, Chair Professor, Department of Internal Medicine, National Taiwan University Hospital

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Introduction

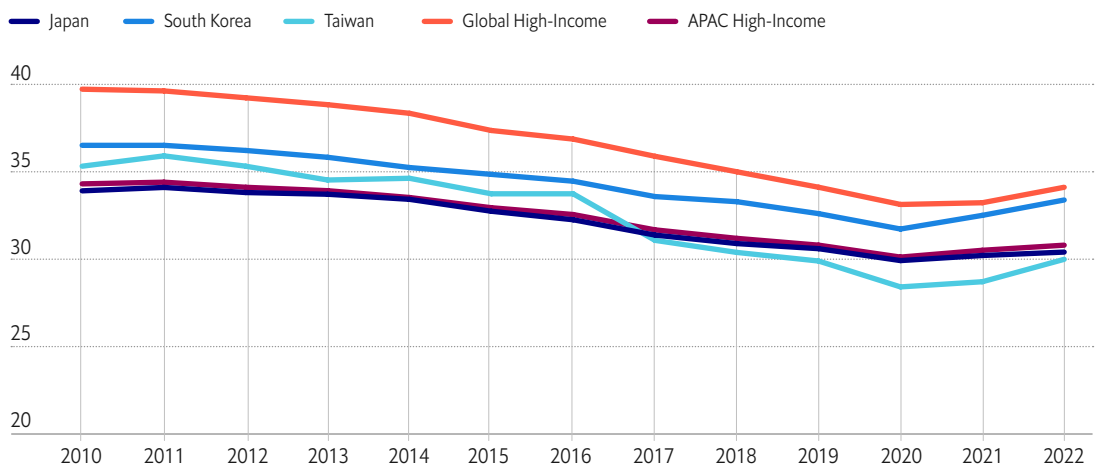
Despite advances in primary prevention, screening and the development of novel therapies, lung cancer remains the leading cause of cancer-related deaths worldwide.¹ The East Asia region experienced the highest lung cancer-related crude incidence and deaths in 2020, and by 2050 the global burden of lung cancer is projected to increase to 3.8m new cases and 3.2m deaths per year, with the greatest burden expected in East Asia, at 1.7m new cases and 1.5m deaths.^{2,3}

Globally, the age-standardised incidence rate (ASIR) and age-standardised death rate (ASDR) due to lung cancer declined between 2010 and

2022.⁴ However, a regional variation is evident. South Korea has notably higher ASIR than the average of APAC high-income countries. On the other hand, Japan consistently reported low ASIR rates, comparable to the APAC high-income average, while Taiwan exhibited a fluctuating ASIR trend during the same period (as shown in Figure 1). All regions and countries experienced a temporary dip in ASIR during the 2020-21 pandemic period. However, by 2022, these rates rebounded to their pre-pandemic range of 2018-19. This variation can likely be attributed to the impact that the covid-19 pandemic had on cancer screening and diagnostic pathways.

Figure 1: Lung cancer incidence rates, 2010-2022

Age-standardised incidence rate per 100,000



Source: Institute for Health Metrics Evaluation. Used with permission. All rights reserved.⁴

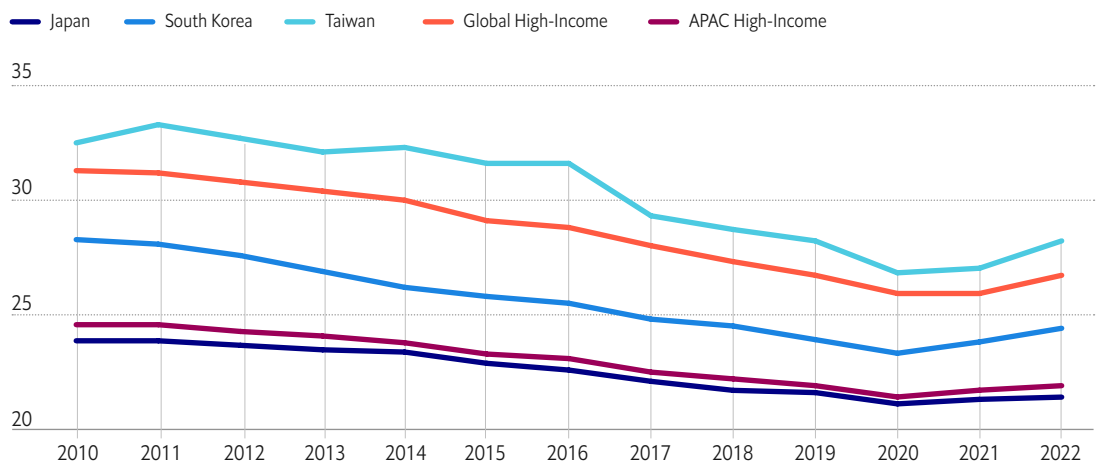


Figure 2 clearly shows that Taiwan has the highest ASDR among high-income countries. Specifically, Taiwan’s ASDR is notably higher when compared to Japan and South Korea, the other two high-income nations in the East Asia region. Moreover, Taiwan’s ASDR significantly surpasses

the average ASDR of high-income countries both globally and within the Asia-Pacific (APAC) region. There is also a noted gender disparity in Taiwan, with the decline being slower among females than males.^{5,6} Japan, meanwhile, maintains the lowest ASDR.

Figure 2: Lung cancer death rates, 2010-2022

Age-standardised death rate per 100,000



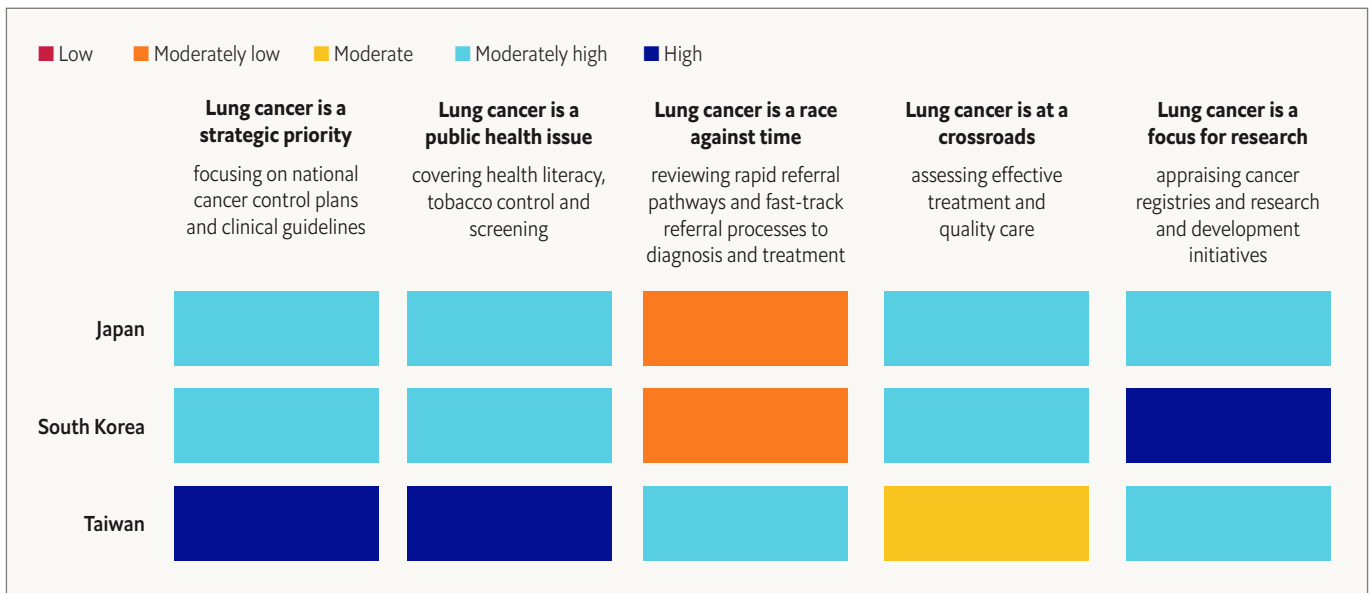
Source: Institute for Health Metrics Evaluation. Used with permission. All rights reserved.⁴

In 2021 Economist Impact authored a study examining the policy and system performance of ten countries across five key domains in lung cancer.⁷ In this report, we focus on three high-income economies in East Asia: Japan, South Korea and Taiwan. A revised policy scorecard is used to assess performance across the same five domains:

- Lung cancer is a strategic priority
- Lung cancer is a public health issue

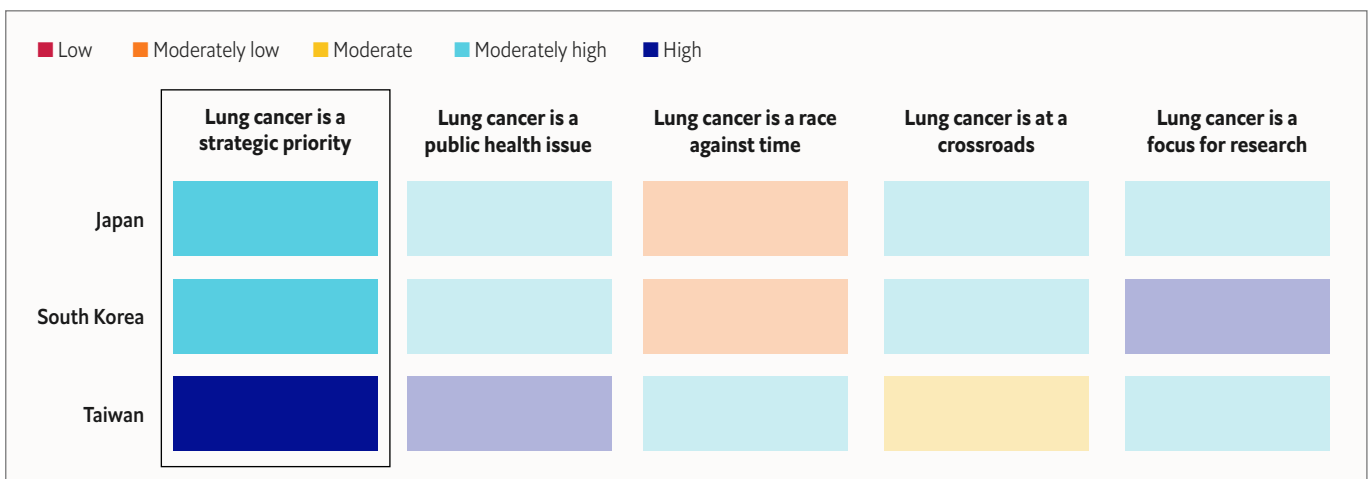
- Lung cancer is a race against time
- Lung cancer is at a crossroads
- Lung cancer is a focus for research

We explore the advancements in lung cancer care and policy changes in these countries since our last report and identify areas for further growth. The selected high-income East Asian countries have risen to the challenge of lung cancer, implementing a range of measures. However, barriers to care persist.



Lung cancer is a strategic priority

This domain covers national cancer control plans and clinical guidelines relating to lung cancer. Taiwan scores highly in this domain, while Japan and South Korea score moderately well.



Strong and concerted national-level policy efforts (in the shape of cancer control plans) are necessary to address disparities in lung cancer care. All three countries have national cancer control plans. However, Taiwan stands out with a dedicated lung cancer control plan launched in 2022, which includes key performance targets as shown in Table 1.⁸ Such dedicated national action plans for lung cancer, as also exemplified by countries like Ireland and

Australia, can facilitate greater political focus and resource allocation.^{9,10}

All three countries have comprehensive lung cancer management guidelines. In Taiwan, a patient has the right to choose and make decisions regarding the treatment options provided by the physician. In 2018, the Taiwan Ministry of Health and Welfare (MOHW) published a decision tool for use by the public titled “Do I need low-dose CT scan screening for lung cancer?” to promote shared decision-making and physician-patient consensus for lung cancer screening.¹¹ However, guidelines regarding shared decision-making are lacking in Japan and South Korea.

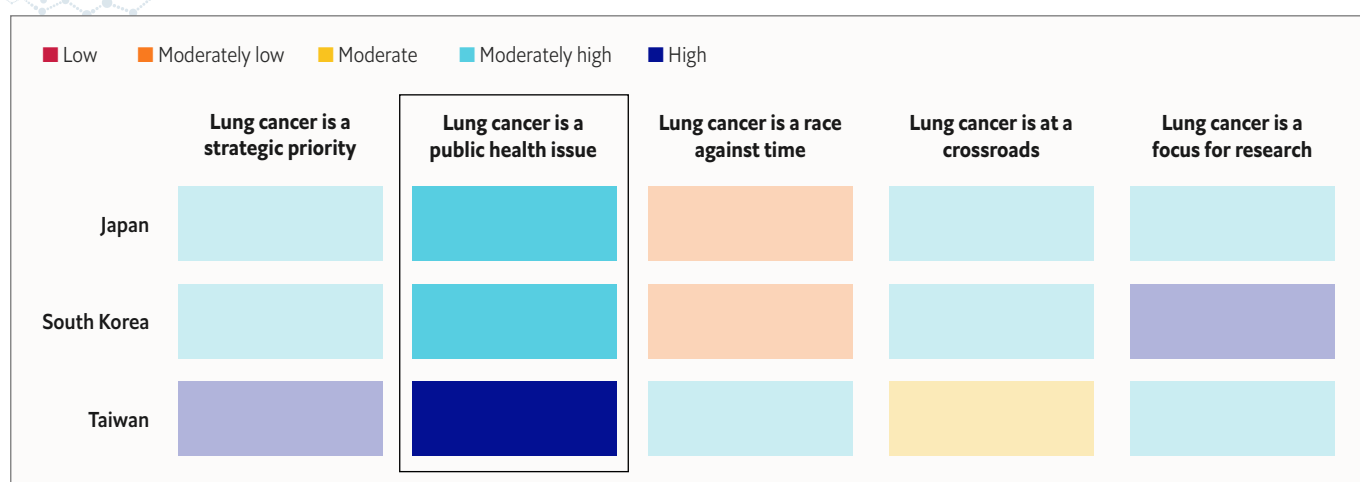
Dedicated national action plans for lung cancer can facilitate greater political focus and resource allocation.

Table 1: Performance Indicators in the Taiwan National Lung Cancer Plan⁸

| Lung cancer health outcomes | 2015 (baseline) | 2025 (short-term target) | 2030 (long-term target) |
|--|------------------|------------------------------|-------------------------------|
| Proportion of early-stage (stage 1) lung cancer diagnosis | 21% | 42% | 54% |
| Premature death rate of lung cancer among persons aged 30-70 years | 1.42% | 1.07% (a decrease of 25%) | 0.95% (a decrease of ~33%) |
| The five-year relative survival rate | 24% (2011-15) | 48% (2021-25) | 60% (2026-30) |

Lung cancer is a public health issue

This domain focuses on tobacco control, air pollution and lung cancer screening. Taiwan scores highly in this domain, and Japan and South Korea score moderately well.



Tobacco control

Since our last study, Japan has made significant progress in tobacco control.¹² However, smoking prevalence in the country remains high with estimates in 2019 placing the prevalence at 27% among men.¹³ Japan's Health Promotion Law prohibits smoking in all indoor public spaces, but outdoor public spaces and indoor private spaces are exempt.¹³ Better protection for people from active and passive tobacco exposure is necessary. South Korea has taken the lead in implementing cigarette taxation, levying 73.8% of the retail price, closely aligned with the WHO recommendation of 75%.¹⁴ In Japan and Taiwan, taxes are lower, at 59.9% and

53% respectively.^{15,16} On a positive note, Taiwan and South Korea have a ring-fenced funding mechanism where a proportion of tobacco taxes are reinvested into cancer prevention and control.^{17,18}

Novel delivery systems for tobacco have made the landscape more complex. A concerning trend of increasing e-cigarette use among adolescents has been noted in Japan and South Korea, and the two countries are the world's largest and second largest markets for heated tobacco products (HTP).¹⁹⁻²⁴ Examples of stringent control over alternative tobacco products can be drawn from Taiwan, where e-cigarettes were banned entirely in March 2023 and HTPs

must be assessed by health authorities before manufacture and sale.^{25,26}

Environmental factors

Outdoor air pollution is the second biggest risk factor for lung cancer deaths globally and has a disproportionate impact on women.²⁷ The WHO Air Quality Guidelines of 2021 lowered the annual recommended limit for PM2.5 (particles that are 2.5 microns or less in diameter) to 5 µg/m³ and provided four interim targets.²⁸ Experts note that the annual national average target for PM2.5 concentration in Japan, South Korea and Taiwan is around 15 µg/m³ (which aligns with the WHO interim target 3) to keep more realistic goals and encourage measurable progress.²⁸

Lung cancer in East Asia is notable for a unique segment of never-smokers with early onset disease.²⁹ Pan-Chyr Yang, chair professor in

the Department of Internal Medicine at National Taiwan University Hospital, says that East Asian women appear to have a greater genetic susceptibility to the development of lung cancer in response to environmental carcinogens. “In people with a family history of lung cancer, the ten-year cumulative incidence of lung cancer can be as high as 4.5%,” says Prof Yang. These findings highlight the need for region-specific lung cancer screening guidelines with broader inclusion criteria.

Screening

“Early diagnosis and stage shift are the most important factors that can improve overall survival of lung cancer,” says Prof Yang. All three countries have lung cancer screening programmes, though they differ from each other (Table 2).

“Early diagnosis and stage shift are the most important factors that can improve overall survival of lung cancer.”

Pan-Chyr Yang, Chair Professor in the Department of Internal Medicine at National Taiwan University Hospital

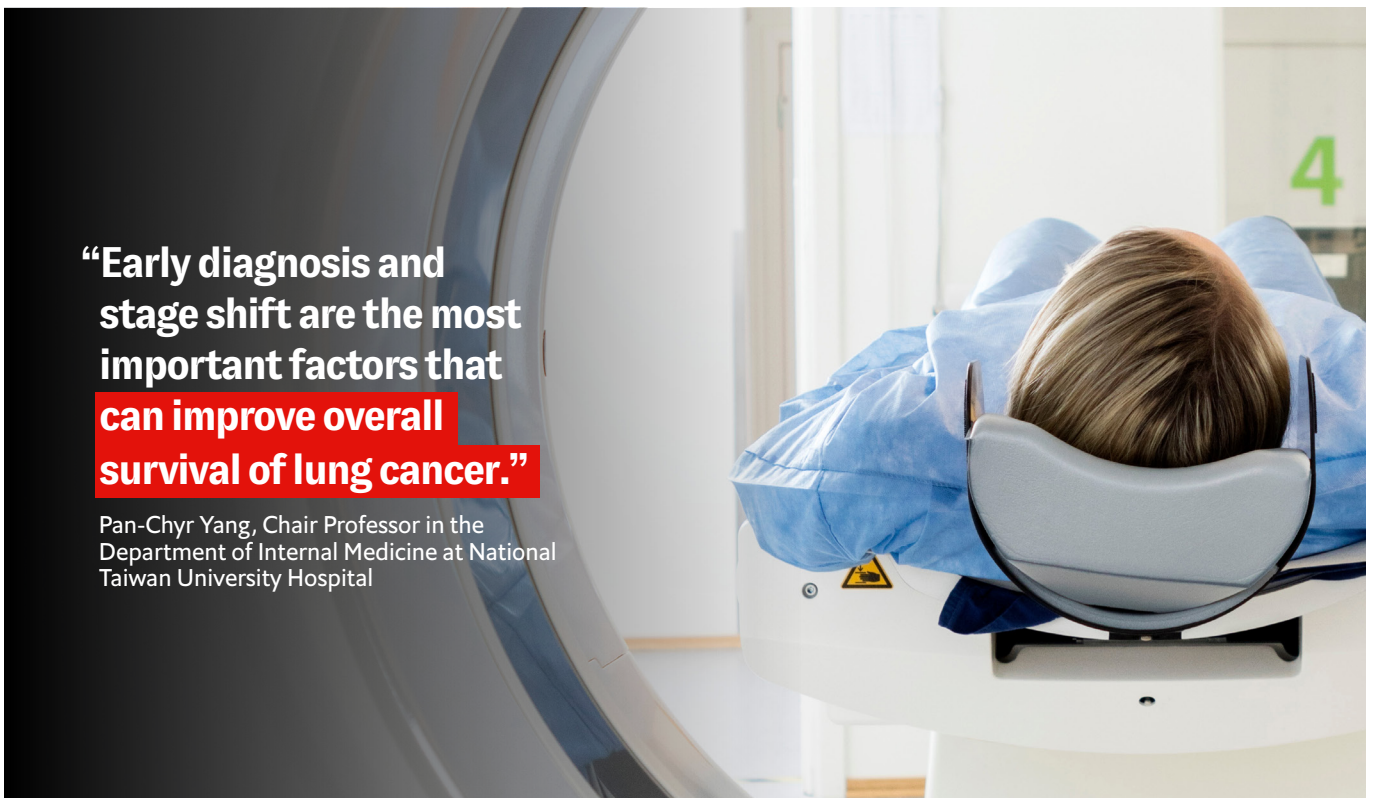


Table 2: Lung cancer screening programmes³⁰⁻³⁴

| Country | Inclusion criteria for screening | Frequency of screening | Type and modality of screening | Insurance coverage | Screening rate |
|-------------|--|------------------------|--|--|--|
| Japan | Smokers or non-smokers aged ≥ 40 years | Annually | Population-based screening programme since 1987; chest X-ray and sputum cytology | Covered by National Health Insurance (NHI) | Men: 53.4% Women: 45.6%. (data from 2019) |
| South Korea | Adults aged 55-74 who are: <ul style="list-style-type: none"> current smokers or ex-smokers (within 15 years) that have ≥ 30 pack-year smoking history | Annually | Organised low-dose computed tomography (LDCT) (since 2019) | The National Health Insurance Service (NHIS) covers 90% of the cost of the Korean National Cancer Screening Programme (KNCSPP). LDCT costs approximately US\$100, of which patients pay 10%. The full cost is covered for people in low-income groups (the bottom half of income distribution) | 23% of eligible people underwent screening in 2019 and 2020 |
| Taiwan | Adults between 50 and 74 years of age who are: <ul style="list-style-type: none"> current smokers or ex-smokers (within 15 years) that have ≥ 30 pack-year smoking history Men aged 50-74 and women aged 45-74 who are non-smokers or light smokers with a family history of lung cancer | Biennially | Organised LDCT (since 2022) | Covered by Health Promotion Administration (HPA) funding | Data are not available, but experts note that the screening rate should be more than 50% |

Japan takes pride in having a higher detection rate of early-stage lung cancer compared to its neighbours, which may be attributed to the country having the highest number of computed tomography (CT) scanners per capita among the Organization for Economic Cooperation and Development (OECD) nations.³⁵ As explained by Hidehito Horinouchi, Assistant Chief in the Department of Thoracic Oncology at the

National Cancer Center Hospital in Tokyo, given the widespread availability and reimbursement by national health insurance, a large number of patients undergo chest CT scans even for minor symptoms, thereby increasing the chances of diagnosing lung cancer at an early stage. However, the lung cancer screening rates (i.e. the screening by chest x-ray; LDCT is not included in Japan's national lung cancer screening

programme) are lower for women than men, at 45.6% versus 53.4% in 2019.³⁶ Dr Horinouchi says, “In the working population, I think the lung cancer screening [by chest x-ray] is not so bad because the companies implement the rules that mandate screenings for all employees. However, as a larger number of females do not work outside their homes, we see that the screening among them is a little bit lower.” There is a need to improve screening rates in Japan, especially among women, and develop a more systematic approach to LDCT screening to reduce indiscriminate use and radiation exposure.

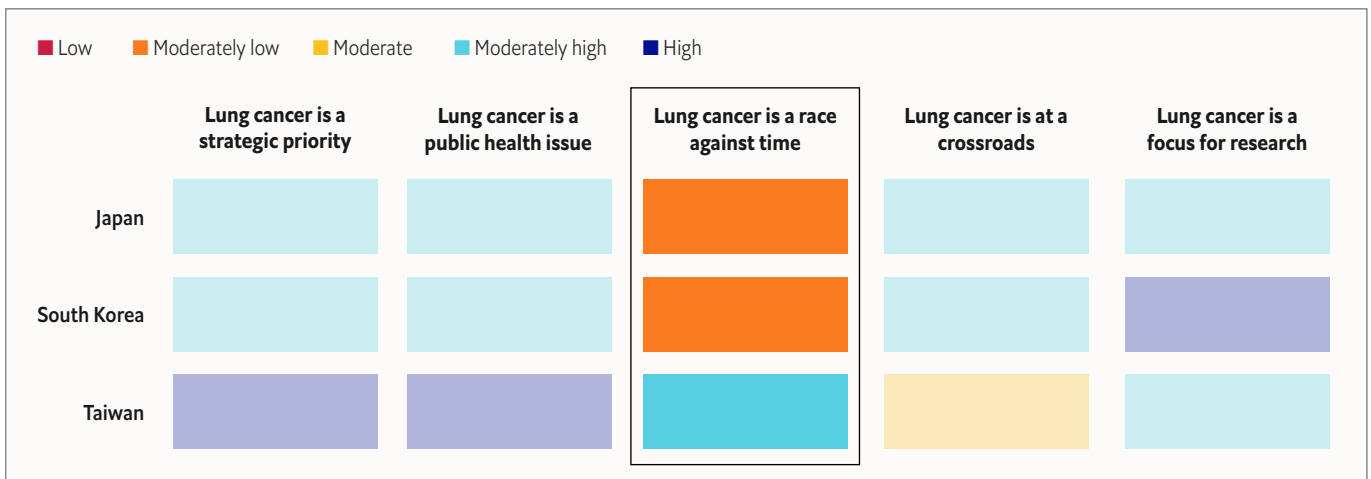
In South Korea, the National Lung Cancer Screening Programme (NLCSP) was launched in 2019, but it does not include high-risk non-smokers.³⁷ In Kyu Park, professor at Seoul National University Hospital and chief of the Lung Cancer Center at Seoul National University

Cancer Hospital, notes that coverage of screening has been modest; people are recruited through postal mail, and about 50% of eligible patients who receive the invitation undergo lung cancer screening.

Taiwan has emerged as the forerunner in its comprehensive population-based LDCT screening programme for lung cancer, which was implemented in July 2022 and includes both smokers and non-smokers.^{32,33} “Since July 2022, a total of 78,000 subjects have been screened until Dec 2023, and the detection rate of lung cancer is up to 1.2%, with 85% of these cases detected at stages 0-I,” says Prof Yang. According to Prof Yang, it is important to include individuals with a family history of lung cancer in the screening programme, as the detection rate is 1.6% for individuals with a family history of lung cancer, compared to 0.7% for heavy smokers.

Lung cancer is a race against time

Delays between diagnosis, speciality referral and treatment result in poor lung cancer outcomes.³⁸ This domain looks at guidelines regarding referral pathways and timelines to ensure early diagnosis and timely treatment. Japan and South Korea score moderately low in this domain, whereas Taiwan scores moderately high.



In Taiwan, recommendations exist for abnormalities identified by screening but not for symptomatic disease. “The national lung cancer screening programme in Taiwan recommends hospitals establish green channels to expedite the follow-up of abnormalities identified on screening,” says John Wen-Cheng Chang, associate professor of internal medicine within the Division of Hematology-Oncology at Chang

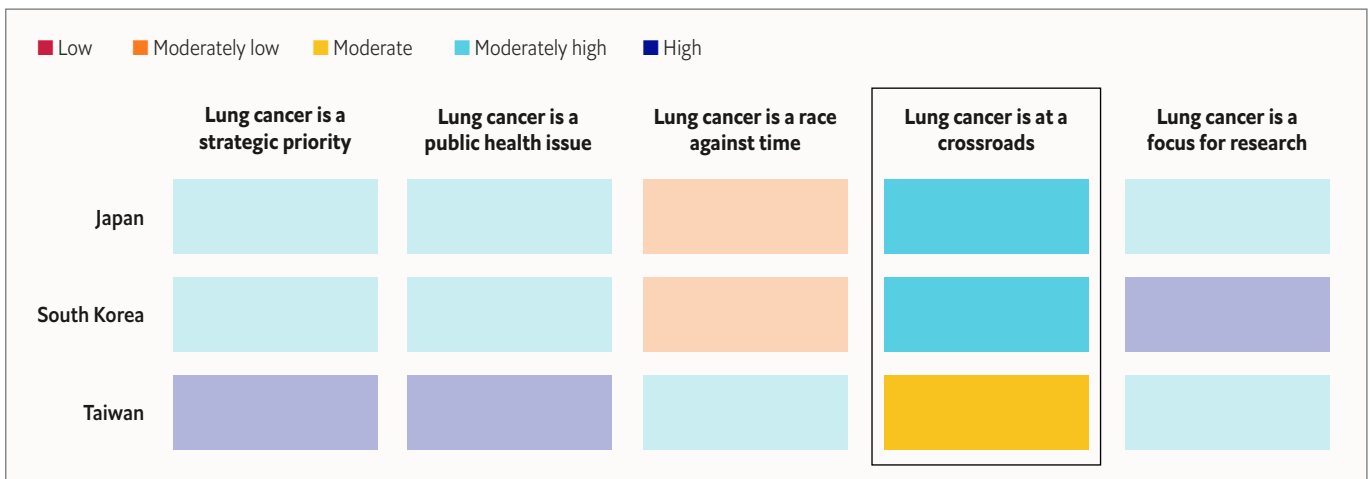
Gung Memorial Hospital in Taiwan. In Japan and South Korea, guidelines do not specify a timeline for referral or treatment. Examples can be drawn from the UK, Australia and New Zealand that have developed fast-track lung cancer pathways advising optimal timeframes for diagnosis and management.^{39,40}

All three countries in our study emphasise the need for multidisciplinary-team (MDT) care after diagnosis. MDT-based decision-making for cancer patients in South Korea has been officially introduced and encouraged by the National Health Insurance Service since August 2014.⁴¹ In Japan, the Cancer Control Act encourages an MDT-based approach and professional training, including training and appointment of specialist nurses⁴²

“Examples can be drawn from the UK, Australia and New Zealand that have developed fast-track lung cancer pathways advising optimal timeframes for diagnosis and management.”

Lung cancer is at a crossroads

This domain offers a broad view of comprehensive lung cancer treatment. Japan and South Korea score moderately high, while Taiwan has room for improvement with a moderate score.

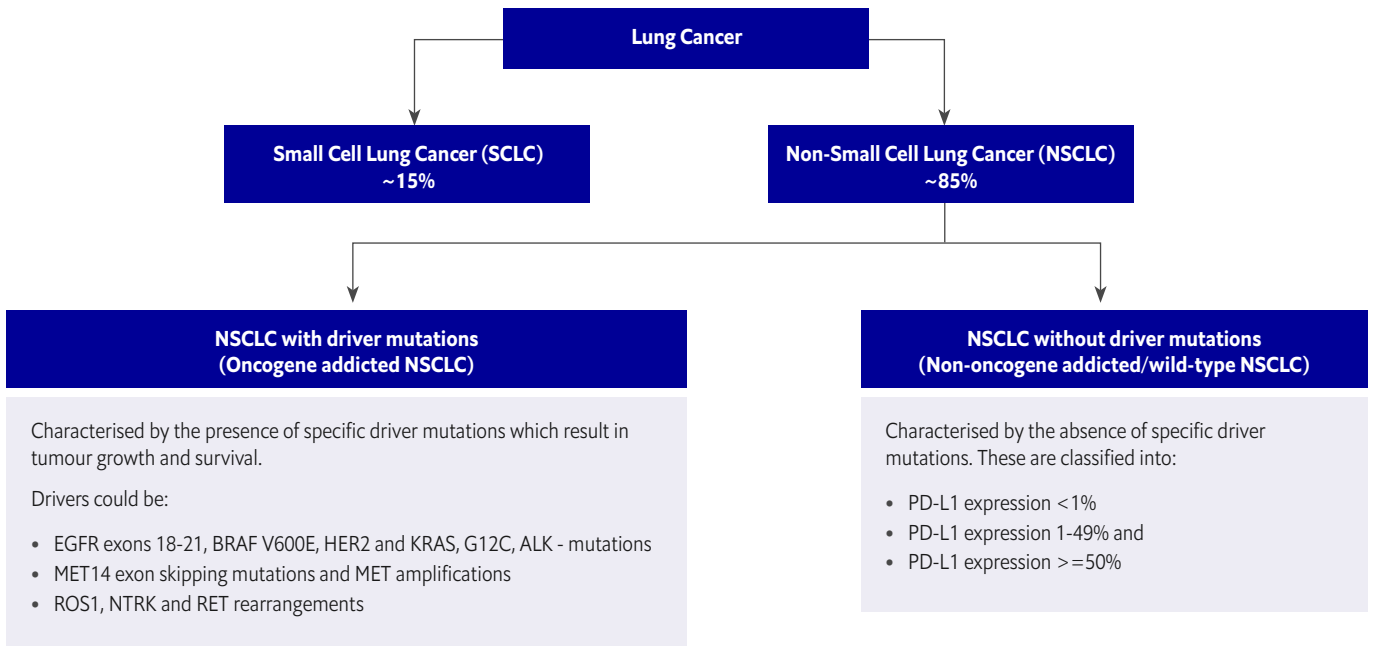


Significant revisions have been made from the prior version of the scorecard regarding testing for biomarkers and PD-L1 (a protein that helps to regulate immune response) as well as approval and reimbursement of several innovative therapies, in line with the latest guidelines produced by the US National Comprehensive Cancer Network (NCCN). As a result, the scores have changed significantly compared to the previous study.

Innovations in treatment and comprehensive care

New targeted therapies for lung cancer with specific driver mutations and immunotherapy for lung cancer without specific driver mutations

(wild-type) have resulted in significantly improved outcomes (Figure 3).⁴³⁻⁴⁵ The targeted therapies rely on diagnostic tests to identify specific mutations. However, access to these tests in our countries is not comprehensive. In Japan, next-generation sequencing (NGS) for the EGFR, ALK, ROS1, BRAF and RET mutations is approved as companion diagnostics.^{46,47} Prof Yang notes that Taiwan only reimburses testing for the EGFR, ROS1 and ALK mutations, although an extended panel of molecular testing by NGS is likely to be reimbursed later this year.⁴⁸ South Korea only reimburses 50% of the cost of NGS testing.⁴⁹ Experts also allude to a slow drug approval process and gaps in reimbursement for targeted agents.⁵⁰

Figure 3: Classification of lung cancer to aid treatment approach^{51,52}




Although PD-L1 testing (to assess eligibility for immunotherapy) is reimbursed in the three countries, the approval and reimbursement for immune checkpoint inhibitors is less robust. Japan has broader coverage and reimburses immunotherapy in neoadjuvant (before surgery) and adjuvant (after surgery) settings as consolidation after definitive chemo-radiation and as first-line treatment for metastatic disease with further maintenance, in line with NCCN guidelines.⁵³ South Korea only reimburses immune checkpoint

inhibitors as first-line therapy in metastatic disease. Prof. Park explained that Korean physicians carefully select patients for each immunotherapy regimen not based on evidence but on the reimbursement criteria set by the reimbursement authority. Similarly, in Taiwan, immunotherapy reimbursement as the first line is restricted to patients with metastatic disease who are ineligible for or have failed chemotherapy.⁵⁴ “[In Taiwan,] due to insufficient budget, immunotherapy reimbursement for wild-type lung cancer does not align with local and global guidelines,” says Prof Chang. “The current reimbursement criteria may not meet all patients’ needs and physicians’ expectations.” The key aspects to improving disease outcomes in this region are faster drug approvals, better reimbursement options and an equitable focus on emerging therapies with comprehensive care.

“[In Taiwan] The current reimbursement criteria may not meet all patients’ needs and physicians’ expectations.”

John Wen-Cheng Chang, Associate professor of internal medicine within the Division of Hematology-Oncology at Chang Gung Memorial Hospital in Taiwan

Table 3: Drug approval and reimbursement processes in countries of interest⁵⁵⁻⁵⁹

| |  |  |  |
|-------------------------------|--|---|--|
| Drug approval | All new drugs are evaluated and get approved by the Taiwan Food and Drug Administration (TFDA) | Ministry of Food and Drug Safety (MFDS) | Ministry of Health, Labour and Welfare (MHLW)* with support from Pharmaceutical and Medical Devices Agency (PMDA) |
| Drug reimbursement | Taiwan National Health Insurance (NHI)-funded by premiums | The Health Insurance Review and Assessment Service (HIRA) supported by Pharmaceutical Benefit Coverage Assessment Committee | All new drugs approved by the PMDA are reimbursed by the National Health Insurance (NHI) |
| Drug pricing | Pharmaceutical Benefit and Reimbursement Scheme joint committee (PBRS) | National Health Insurance Service (NHIS) | MHLW determines official reimbursement prices, which is approved by the Central Social Insurance Medical Council (Chuikyo) |
| Co-payment[†] | No co-payment for innovative cancer therapies added to reimbursement list | Co-payment 5% for patients with cancer, with a cap | Co-payment ranges from 10-30% based on age & earning status, with a monthly cap. |

*On the basis of the review reports submitted from Pharmaceuticals and Medical Devices Agency (PMDA), MHLW makes a decision on the approval of the new drugs after seeking advice from the Pharmaceutical Affairs and Food Sanitation Council (PAFSC)

[†]Copayments in Japan vary depending on age with those over 70 years of age having lower copayments. Copayments in Korea are lower for patients with cancer (5%) and compared to those with other diseases (20-30%)

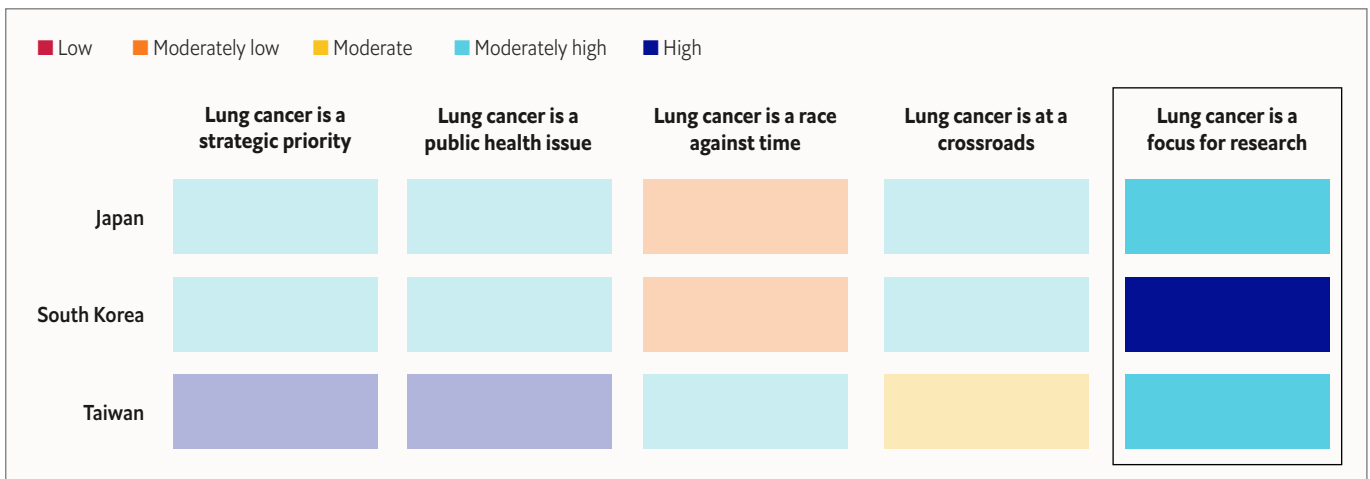
Psychological and supportive care

All three countries have guidelines that include referral pathways to supportive and palliative care services for lung cancer patients, and oncologists receive training in palliative care. In 2020, Taiwan introduced psycho-oncology clinical care guidelines for lung cancer. These guidelines outline a referral pathway for lung cancer patients

to access psychological support services. There is also evidence of psychological support for patients in Japan. “[In Japan,] the government offers financial incentives to cancer centres to appoint psychologists and social workers for patients,” says Dr Horinouchi. However, in South Korea, there remains a pressing need to enhance psychological support and establish effective referral pathways for lung cancer patients.

Lung cancer is a focus for research

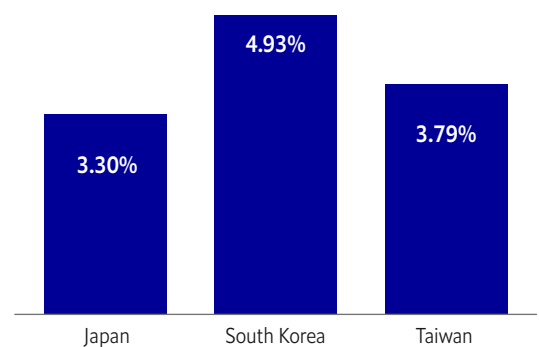
This domain focuses on the utilisation of cancer registries, allocation of research funding, and the local development of innovative therapies. South Korea excels in this domain, achieving a high score. Japan and Taiwan also perform well, with moderately high scores.



All three countries maintain high-quality cancer registries and comprehensive registration systems.⁶⁰⁻⁶² In Taiwan, the registry data is used to evaluate the progress made on the targets set in the National Lung Cancer Plan.

To understand how research is prioritised across the countries in our study, we looked at the gross domestic expenditures on research and development (R&D), expressed as a percent of GDP.* As seen in Figure 4, South Korea spends the maximum on R&D as a percentage of GDP.

Figure 3: R&D spending (% of GDP)



Source: World Bank data and Research and Development Funding, Ministry of Economic Affairs, Taiwan⁶³⁻⁶⁵

*According to World Bank the gross domestic expenditures on research and development (R&D), expressed as a percent of GDP, include both capital and current expenditures in the four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development. Available at: <https://databank.worldbank.org/metadataglossary/jobs/series/GB.XPD.RSDV.GD.ZS>

Dr Horinouchi says, “In Japan, the government supports clinical trials [by Japan Clinical Oncology Group (JCOG)] not only in medical oncology but also multimodality trial, especially in the surgical space. This enables innovation beyond novel therapies.” In South Korea, heavy government investment in the

biomedical space have resulted in the successful development of locally grown targeted therapies for lung cancer. As the saying goes, “today’s investment is tomorrow’s care.” This approach ensures continuous progress in the fight against lung cancer. Taiwan could improve in this domain.



Looking ahead

Big strides have been made, but much more remains to be done to improve lung cancer outcomes across East Asia. Through reviewing current evidence and speaking with experts in the field, we have identified four calls to action that countries in the region could consider.

Improve tobacco control and air quality management

Dedicated efforts are necessary to tackle the two main risk factors for lung cancer—tobacco and air pollution. Towards tobacco control, greater emphasis needs to be placed on protecting people from tobacco smoke and offering people help to quit tobacco.¹³ Japan and Taiwan must consider raising tobacco taxes in line with WHO recommendations.¹⁴⁻¹⁶ Regulation of alternative tobacco products like HTPs and e-cigarettes are a priority, especially for Japan and Korea.¹⁹⁻²⁴ All three countries could look towards investments in green energy sources, adoption of greener household appliances, better recycling of waste and taxation of emissions to move closer to WHO air quality targets.⁶⁶

Identify the truly high-risk population for targeted screening

Asian guidelines for lung cancer screening encompass both smokers and non-smokers with

a high-risk family history.³² However, benefits reaped by including non-smokers and the long-term cost-effectiveness of such an approach remains to be studied. Real-world evidence from the South Korean (includes only smokers) and Taiwanese (includes high-risk non-smokers) lung cancer screening programmes will improve our understanding.

Other studies are evaluating various lung cancer development prediction models to focus screening programmes on the truly high-risk population, thereby limiting over diagnosis, radiation exposure and the financial burden on the health system.³² The Taiwan Biobank and the National Biobank of Korea are prospectively collecting samples from healthy individuals for genomic studies and longitudinal follow-up.^{67,68} Such efforts can be expanded to include individuals being screened for lung cancer to develop genomic models for prediction.

Bridge inequities and improve access to comprehensive care

Our research highlights gaps in access to innovative therapies across all three countries. Experts allude to the need to expedite approval processes for new drugs, particularly in South Korea and Taiwan. Reimbursement also needs to be streamlined. Prof Park recommends that

academics or reimbursement authorities from the three countries work together to develop a unified cost-effectiveness analysis tool to help support reimbursement. In addition, methods should be identified to mitigate the financial burden. Risk-sharing and managed entry agreements (MEAs) for reimbursement have been beneficial in this regard. But they are also fraught with limitations as evidenced by the South Korean experience. Originally intended to be an exceptional pathway for drugs treating rare diseases, MEAs have gradually become the standard for reimbursing high-cost cancer drugs in South Korea. This shift has led to an increase in the listing of drugs whose cost-effectiveness is uncertain. Furthermore, the effectiveness of these drugs and their budgetary impact are not sufficiently monitored, raising concerns about the system's efficiency.^{69,70}

In Japan, universal coverage pays for high-cost therapies with a co-payment that is subject to age and income status. However, experts recommend that the government focus on sustainable financing solutions. For Taiwan, efforts should be directed at improving the robustness of national health insurance funds and developing better

co-payment systems. The NHI funds essentially all cancer care, but the increase in premiums has not kept pace with the increased spending demands. Experts suggest several solutions, including the need for rising premiums, greater GDP allocation to healthcare spending, increased government budget for NHI, and the development of a cancer drug fund to improve funding to meet the cancer patients' needs. A co-payment system with an increased role of private insurance to bridge financing gaps is being discussed, but challenges in ensuring compliance of private companies with government rules have been an impediment.

Both South Korea and Taiwan have made efforts to earmark budgets to reinvest a portion of tobacco taxes into cancer prevention and control.^{17,18} In Taiwan, there is a scope to ring-fence the carbon tax and air pollution funds to address the medical costs of lung cancer.⁷¹ This would require intersectoral collaboration. The experts advocate for a lung cancer office involving stakeholders from the Ministry of Environment, Ministry of Health and Welfare, National Science and Technology Council, cancer experts, and NGOs. This intersectoral agency would shoulder



the responsibility of formulating and executing a comprehensive range of policies to tackle lung cancer in Taiwan.⁷¹

In addition to improving access to novel therapies, enhancing comprehensive multidisciplinary care should be on the agenda. Japan has one of the lowest mortality rates for lung cancer at the country level. A greater proportion of Stage I disease, accessibility to cancer centres offering comprehensive care and better access to novel treatments are major drivers of these outcomes. According to our experts, the development of better psychosocial support services in South Korea and a more robust palliative care programme in Taiwan are needed to improve lung cancer care. There is limited focus on shared decision-making across all three countries, highlighting the need to move to a more patient-centric model of care.

Lung cancer continues to be the most lethal cancer worldwide and in East Asia, despite advances in prevention and care. A policy-level approach with a long-term vision, based on effectively implementing existing advances and actively seeking new ones, is the only path to reversing the tide.

Advance translational research in lung cancer among never-smokers

Although smoking continues to be the biggest risk factor for lung cancer, never-smokers with lung cancer in East Asia warrant further study.²⁹ There are limited data on genetic mechanisms underpinning the risk of lung cancer in this cohort. Translational research in this space will be pivotal in advancing primary prevention and narrowing gender differences in outcomes.

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Appendix



Methodology

At the heart of this study is a benchmarking exercise that evaluates policies, programmes, guidelines and patient-centred care approaches.

In 2021 an Economist Impact research initiative spanning ten Asia Pacific (APAC) nations employed a scorecard framework derived from an initial literature review of established frameworks and programmes in global lung cancer prevention and control policy prioritisation. Following this, we crafted a set of 17 indicators across five domains and refined them with input from an editorial advisory board to assess each country.

In this study, while retaining the same framework, we updated indicators and sub-indicators based on a recent literature review to ensure relevance.

We ensured that our scoring decisions were informed by the most reliable information available, drawing on native language sources for the latest data. The data collection phase for this study extended up to February 2024. While we did incorporate some additional data from March 2024, it's important to note that the majority of the findings presented in this report are based on the data collected up until February 2024. Because of the nature of scoring—wherein complex matters are collapsed into simple scores—we note that not all readers will agree with all scores.

Country experts validated data related to drug access and biomolecular testing, with adjustments made based on their input to enhance accuracy. However, data from South Korea are limited, particularly in drug access and biomolecular testing; they reflect the best available public information at the time of collection. Despite the meticulous methodology, potential discrepancies may arise owing to data dynamics and limitations in public data accessibility.

Scoring approach

Table with domains, indicators, sub-indicators and scoring criteria

| Domain | Number | Indicator | Source | Scoring criteria |
|--------------------------------------|--------|--|--|---|
| Lung cancer is a strategic priority | 1 | A comprehensive, up to date national cancer control plan is in operation | Cancer Atlas/WHO/ individual country documents | 1 = operational national cancer control plan exists |
| | | | | 1 = cancer control plan updated within the past five years |
| | | | | 1 = cancer control plan includes implementation plan |
| | | | | 1 = cancer control plan identifies funding source |
| | | | | 1 = lung cancer specific control plan exists |
| | | | | 1 = lung cancer specific plans include and monitor KPIs (this criteria is only be applicable for countries that score 1 in the above scoring criteria on lung cancer specific plans) |
| | 2 | Comprehensive, clinical guidelines for lung cancer exist | Individual country documents | 1 = lung cancer clinical guidelines exist |
| | | | | 1 = guidelines cover screening for lung cancer |
| | | | | 1 = guidelines cover molecular testing on tumour sample where indicated |
| | | | | 1 = guidelines cover PD-L1 testing on tumour sample where indicated |
| | | | | 1 = guidelines cover treatment for lung cancer |
| | | | | 1 = guidelines cover supportive/palliative care for lung cancer |
| | | | | 1 = guidelines cover shared decision-making for patients with lung cancer |
| | | | | 1 = guidelines cover lung cancer educational awareness (e.g. publish booklet, conduct community-level promotion) |
| Lung cancer is a public health issue | 3 | Tobacco and e-cigarette control policies and public health measures are in place | Individual country documents/WHO | 1 = monitoring framework is in place for tobacco consumption |
| | | | | 1 = tobacco taxes are in line with WHO recommendations |
| | | | | 1 = advertising tobacco on national TV and radio is banned |
| | | | | 1 = law mandates that health warnings appear on tobacco packages |
| | | | | Age restrictions are in place for smoking, legal age for smoking (unscored) |
| | | | | 1 = national smoke-free legislation exists for indoor offices |
| | | | | 1 = national smoke-free legislation exists for restaurants/cafes/pubs/bars |
| | | | | 1 = national smoke-free legislation exists for public transport |
| | | | | 1 = heated tobacco products (HTPs) are banned in public areas (e.g. public transport, civic buildings, restaurants, cafes, pubs and/or bars) (If HTPs are entirely banned in a particular country, this information will be included in the narrative, and the indicator will automatically be scored as '1'.) |
| | | | | 1 = e-cigarettes are banned in public areas (e.g. public transport, civic buildings, restaurants, cafes, pubs and/or bars) (If e-cigarettes are entirely banned in a particular country, this information will be included in the narrative, and the indicator will automatically be scored as '1'.) |

Scoring approach (cont.)

Table with domains, indicators, sub-indicators and scoring criteria

| Domain | Number | Indicator | Source | Scoring criteria |
|---|--------|--|--|--|
| Lung cancer is a public health issue (cont.) | 4 | National policies and programmes to control environmental exposure exist that could potentially prevent lung cancer | Individual country documents/WHO | 1 = an air quality strategy exists |
| | | | | Last update of the air quality strategy (unscored) |
| | | | | 1 = a national radon control programme/policy exists |
| | | | | Most recent national radon survey (unscored) |
| | 5 | Patient organisations have a voice in policy development | Individual country documents/WHO | 5= PM2.5 average annual levels are 5 µg/m ³ 4= PM2.5 average annual levels are 10 µg/m ³ 3= PM2.5 average annual levels are 15 µg/m ³ 2= PM2.5 average annual levels are 25 µg/m ³ 1= PM2.5 average annual levels are 35 µg/m ³ 0= PM2.5 average annual levels do not meet WHO interim/air quality guideline targets |
| | | | | 1 = one or more independent lung cancer patient organisations exist |
| | | | | 1 = one or more independent lung cancer patient organisations are listed as contributors in clinical guideline |
| | 6 | Lung cancer screening for early detection and timely treatment | Individual country documents | 1 = civil society has the opportunity to comment on health technology assessment (HTA) recommendations |
| | | | | 1 = national level screening programme—eligibility criteria: smokers |
| Lung cancer is a race against time | 7 | Suspected lung cancer patients are diagnosed within a specific timeframe | Individual country documents | 1 = national level screening programme—eligibility criteria: non-smokers with risk factor |
| | | | | 1 = national level screening programme—eligibility criteria: non-smokers with risk factor |
| | 8 | A pathway for rapid referral to quality care exists, including comprehensive care with innovative and appropriate treatments | Individual country documents | 1 = guidelines mention a specific timeframe for diagnostic referral of suspected lung cancer patients/the suspected patients are fast-tracked |
| | | | | 1 = guidelines mention a specific time frame from first diagnosis to commencement of treatment in diagnosed lung cancer patients |
| | | | | 1 = national guidelines/pathways for rapid referral for lung cancer patients are in place |
| | | | | 1 = guidelines recommend that patients are treated by a multidisciplinary team |
| | | | Lung cancer patients with early adoption for innovative treatment under the national reimbursement system (unscored) | |
| Lung cancer is at a crossroads | 9 | Access to imaging for screening and diagnosis covered by reimbursement | Scientific literature/ individual country documents | 1 = CT reimbursed for lung cancer screening |
| | | | | 1 = CT reimbursed for lung cancer diagnosis |
| | | | | 1 = MRI reimbursed for lung cancer diagnosis |
| | | | | CT scanners per capita (unscored) |
| | | | | MRI machines per capita (unscored) |

Scoring approach (cont.)

Table with domains, indicators, sub-indicators and scoring criteria

| Domain | Number | Indicator | Source | Scoring criteria |
|--|---|---|---|--|
| Lung cancer is at a crossroads (cont.) | 10 | Access to medical, surgical specialists | Scientific literature/ individual country documents | number of pathologists per 100,000 (unscored) |
| | | | | number of radiologists per 100,000 (unscored) |
| | | | | number of pulmonologists per 100,000 (unscored) |
| | | | | number of thoracic surgeons per 100,000 (unscored) |
| | | | | number of medical oncologists per 100,000 (unscored) |
| | | | | number of radiation oncologists per 100,000 (unscored) |
| | 11 | Radiotherapy is accessible | Scientific literature | Number of radiotherapy units per million population (unscored) |
| | 12 | Biomarker testing, a cornerstone of precision medicine, is recommended and accessible | Individual country documents | PCR-based testing is reimbursed under national public health system |
| | | | | 1 x 9 = tests (EGFR exons 18-21, BRAF V600E, HER2 and KRAS G12C ALK; MET14 exon skipping mutations and MET amplifications; ROS1, NTRK and RET rearrangements) |
| | | | | Broad-molecular profiling with next-generation sequencing-based testing is reimbursed under the national public health system (panel coverage rate) |
| | | | | 1 x 9 = tests (EGFR exons 18-21, BRAF V600E, HER2 and KRAS G12C ALK; MET14 exon skipping mutations and MET amplifications; ROS1, NTRK and RET rearrangements) |
| | | | | 1 = PD-L1 IHC testing for patients with localised non-small-cell lung cancer (NSCLC) planned for neoadjuvant, adjuvant or definitive chemoradiotherapy is reimbursed under the national public health system |
| | 1 = PD-L1 immunohistochemistry (IHC) testing for patients with advanced or metastatic NSCLC is reimbursed under national public health system | | | |
| | 13 | Key innovative medicines are accessible and reimbursed | Individual country documents | See section below titled Lung cancer drug approval and reimbursement table |
| | 14 | Psychological burden of lung cancer is understood and support services are in place | Individual country documents | 1 = evidence suggests addressing psychological burden in lung cancer care |
| 1 = guidelines include a referral pathway to psychological support services for lung cancer patients | | | | |
| 15 | Patients have access to supportive/palliative care services | Individual country documents | 1 = guidelines include referral pathway to supportive/palliative care services for lung cancer patients | |
| | | | 1 = oncologists receive training in supportive/palliative care | |

Scoring approach (cont.)

Table with domains, indicators, sub-indicators and scoring criteria

| Domain | Number | Indicator | Source | Scoring criteria |
|--|---|--|---|--|
| Lung cancer is a focus for research | 16 | Clinical and outcomes data are collected | Cancer Atlas/ individual country documents | Population-based cancer registry (PBCR) |
| | | | | 0 = no data/status unknown |
| | | | | 1 = PBCR (national or regional) |
| | | | | 2 = high-quality PBCR (regional) |
| | | | | 3 = high-quality PBCR (national) |
| | | | | Vital registration data |
| | | | | 0 = no data/status unknown |
| | | | | 1 = incomplete or sample vital registration |
| | | | | 2 = low-quality complete vital registration |
| | | | | 3 = medium-quality complete vital registration |
| | | | | 4 = high-quality complete vital registration |
| | | | | 17 |
| Number of lung cancer clinical trials between 2014 and 2023 (unscored) | | | | |
| Individual country documents | 1 = Innovative lung cancer therapies locally developed in the country | | | |

Lung cancer drug approval and reimbursement table

We have identified 17 key indications from the National Comprehensive Cancer Network (NCCN) guidelines for lung cancer treatment. Each indication has one or more recommended therapies. The overall scores, ranging from 0 to 34, are determined by the approval and reimbursement status of these therapies. Here's how we score:

Score 0: Assigned when the recommended therapies are neither approved nor reimbursed for respective indication.

Score 1: Assigned when at least one (or more) recommended therapy(ies) is approved, but none are reimbursed for respective indication.

Score 2: Assigned when at least one (or more) recommended therapy(ies) is both approved and reimbursed for respective indication.

Our scoring system is designed to assess the coverage of indications, rather than the number of approved and reimbursed therapies, ensuring a more accurate measure of access. However, it's important to note a limitation of our methodology. We have focused solely on reimbursements under national health insurance schemes. Consequently, we may not fully capture the constraints associated with reimbursement coverage due to specific eligibility criteria set by individual countries. These criteria could potentially affect access to innovative therapies.

■ Not approved ■ Approved but not reimbursed ■ Approved and reimbursed

| Indication | New drug list | Japan | South Korea | Taiwan |
|--|-------------------------|-------------------------|-----------------------------|-----------------------------|
| Anti-PD-L1 therapies recommended by NCCN guidelines as category 1 for neoadjuvant treatment of non-small-cell lung cancer (NSCLC) in eligible patients | Nivolumab | Approved and reimbursed | Approved but not reimbursed | Approved but not reimbursed |
| | Pembrolizumab | Not approved | Not approved | Approved but not reimbursed |
| Anti-PD-L1 therapies recommended by NCCN guidelines as category 1 for adjuvant treatment of resected NSCLC in eligible patients | Pembrolizumab | Not approved | Not approved | Approved but not reimbursed |
| | Atezolizumab | Approved and reimbursed | Approved but not reimbursed | Approved but not reimbursed |
| Consolidation immunotherapy for patients with Stage II/III who have received definitive chemo-radiation | Durvalumab | Approved and reimbursed | Approved and reimbursed | Approved but not reimbursed |
| Immunotherapy single-agent or combination options recommended by NCCN as category 1 options for first-line treatment of metastatic, non-oncogene-addicted (wild-type) NSCLC in eligible patients | Pembrolizumab | Approved and reimbursed | * | * |
| | Atezolizumab | Approved and reimbursed | * | * |
| | Nivolumab-iplimumab | Approved and reimbursed | Approved but not reimbursed | Approved but not reimbursed |
| | Durvalumab-tremelimumab | * | Not approved | Not approved |
| | Cemiplimab | Not approved | Not approved | Approved but not reimbursed |
| Anti-PD-L1 therapy included as NCCN category 1 options for continuation maintenance treatment in metastatic, non-oncogene-addicted (wild-type) NSCLC receiving immunotherapy in first-line setting | Pembrolizumab | Approved and reimbursed | * | * |
| | Atezolizumab | Approved and reimbursed | * | Approved but not reimbursed |
| | Nivolumab-iplimumab | Approved and reimbursed | Approved but not reimbursed | Approved but not reimbursed |
| | Cemiplimab | Not approved | Not approved | Approved but not reimbursed |
| Systemic therapy for patients with surgically resected Stage IB-III A or IIIB (T3N2) NSCLC with either EGFR exon 19 or exon 21 L858R mutations | Osimertinib | Approved and reimbursed | Not approved | Approved but not reimbursed |

■ Not approved ■ Approved but not reimbursed ■ Approved and reimbursed

| Indication | New drug list | Japan | South Korea | Taiwan |
|--|-------------------------|-------|-------------|--------|
| NCCN category 1 treatment option for first-line preferred treatment of metastatic NSCLC (mNSCLC) with either EGFR exon 19 or exon 21 L858R mutations | Osimertinib | ■ | ■ | ■ |
| NCCN category 1 recommended treatment options for first-line treatment of mNSCLC with either EGFR exon 19 or exon 21 L858R mutations | Afatinib | ■ | ■ | ■ |
| | Gefitinib | ■ | ■ | ■ |
| | Erlotinib | ■ | ■ | ■ |
| | Dacomitinib | ■ | ■ | ■* |
| NCCN category 1 preferred treatment options for first-line treatment of ALK rearranged mNSCLC | Alectinib | ■ | ■ | ■ |
| | Brigatinib | ■ | ■ | ■ |
| | Lorlatinib | ■ | ■ | ■ |
| NCCN category 1 recommended treatment options for first-line treatment of ALK rearranged metastatic NSCLC | Crizotinib | ■ | ■ | ■ |
| | Ceritinib | ■ | ■ | ■ |
| NCCN preferred treatment options for first-line treatment of mNSCLC with NTRK1/2/3 gene fusion | Larotrectinib | ■ | ■ | ■* |
| | Entrectinib | ■ | ■* | ■ |
| NCCN preferred treatment options for first-line treatment of mNSCLC with MET ex-14 skipping | Capmatinib | ■ | ■ | ■ |
| | Tepotinib | ■ | ■ | ■ |
| NCCN preferred treatment options for first-line treatment of mNSCLC with RET rearrangements | Selpercatinib | ■ | ■ | ■ |
| | Pralsetinib | ■ | ■ | ■ |
| NCCN preferred treatment options for first-line treatment of mNSCLC with ROS1 rearrangements | Crizotinib | ■ | ■ | ■ |
| | Entrectinib | ■ | ■ | ■ |
| | Repotrectinib | ■ | ■ | ■ |
| NCCN category 1 recommended treatment option for metastatic NSCLC with ROS1 rearrangement | Ceritinib | ■ | ■ | ■ |
| NCCN category 1 preferred treatment options for mNSCLC with BRAF V600E mutation | Dabrafenib–trametinib | ■ | ■ | ■ |
| | Encorafenib+binimetinib | ■ | ■ | ■ |
| NCCN category 1 recommended anti-PD-L1 therapies for first-line management of extensive-stage small-cell lung cancer (SCLC) in combination with chemotherapy | Durvalumab | ■ | ■ | ■ |
| | Atezolizumab | ■ | ■* | ■* |

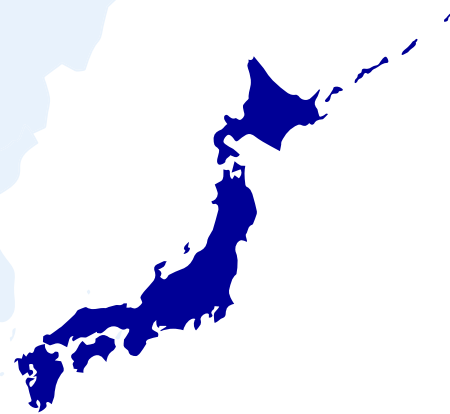
*The drug is approved and reimbursed. However, strict eligibility criteria for reimbursement criteria potentially limit drug access.

The information on the drug approval and reimbursement status for Japan and Taiwan is based on expert feedback, and SK is based on desktop research. For details of eligibility criteria for please refer: [Details on application standards and methods of nursing care benefits 2022 for South Korea](#) and [The latest version of drug payment regulations - updated on 113.04.22 for Taiwan](#)

Detailed country scorecard with explanation



Japan lung cancer country profile



■ Low
 ■ Moderately low
 ■ Moderate
 ■ Moderately high
 ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|--|--|------------------------------------|-------|---|
| Domain 1: Lung cancer is a strategic priority: focusing on national cancer control plans and clinical guidelines | A comprehensive, up to date national cancer control plan is in operation | Indicator 1 scoring (0-6) | 4 | <p>+2 The 4th Basic Plan for the Promotion of Cancer Control Programs was finalised by cabinet approval in March 2020. This includes implementation plans.¹</p> <p>+2 A government budget is set aside for the implementation of the cancer control plan.¹</p> <p>0 No specific lung cancer control plan is available.</p> |
| | Comprehensive, clinical guidelines for lung cancer exist | Indicator 2 scoring (0-8) | 7 | <p>+4 The Japan Lung Cancer Society publishes guidelines for diagnosis and treatment of lung cancer. The guidelines include screening, diagnosis, molecular diagnosis, treatment and palliative care.²</p> <p>+1 PD-L1 immunohistochemistry (IHC) is recommended for all patients with non-small-cell lung cancer (NSCLC) who have undergone surgical resection and are being evaluated for adjuvant therapy as well as patients with advanced or recurrent NSCLC.³</p> <p>+1 The guidelines cover treatment for lung cancer and cover supportive/palliative care for lung cancer.²</p> <p>+1 The Japan Lung Cancer Society publishes a guidebook on lung cancer for public awareness.⁴</p> <p>0 The lung cancer guidelines do not explicitly cover and describe shared decision making for patients with lung cancer.</p> |
| Domain 2: Lung cancer is a public health issue: covering aspects of public health, including health literacy, tobacco control and screening | Tobacco and e-cigarette control policies and public health measures are in place | Indicator 3 scoring (0-9) | 6 | <p>+1 Japan was among the four countries that enhanced their national tobacco control programmes between 2020 and 2022 to reach the highest level of adoption.⁵</p> <p>0 In Japan, The tobacco tax rate is 59.9%, which is lower than the minimum tax rate of 75% recommended by the WHO.⁵</p> <p>0 Tobacco advertising is not banned. It is self-regulated by tobacco companies at their discretion.⁶</p> <p>+1 The Tobacco Business Act mandates that health warnings appear on tobacco packages.⁷</p> |

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|---|---|------------------------------------|----------|--|
| Domain 2 : Lung cancer is a public health issue: covering aspects of public health, including health literacy, tobacco control and screening (cont.) | Tobacco and e-cigarette control policies and public health measures are in place (cont.) | Indicator 3 scoring (0-9) (cont.) | | <p>Japan has a specific law that bans smoking by people younger than 20 years.⁸</p> <p>+2 In 2018, the Health Promotion Law (HPL) of Japan was revised and effective from 2019 all indoor areas of public facilities and government offices became smoke-free, although smoking is still permitted outdoors.⁹ Japan has separate smoking and smoke-free sections in restaurants.⁹</p> <p>+1 National smoke-free legislation exists for public transport.¹⁰</p> <p>+1 Local governments have rules regulating the use of HTPs (heated tobacco products), including a ban in public areas.¹¹</p> <p>0 The transfer and sale of electronic cigarettes containing nicotine is prohibited by law in Japan. However, electronic cigarettes sold in Japan do not contain nicotine and thus are not subject to regulation.¹¹</p> |
| | National policies and programmes to control environmental exposure exist that could potentially prevent lung cancer | Indicator 4 scoring (0-7) | 5 | <p>+1 The Ministry of Environment in Japan passed the Air Pollution Control Act in 1968, and since then amendments have been made to set standards for volume control of various gases.¹²</p> <p>Indoor air quality standards were last updated in December 2021.¹³</p> <p>+1 Japan has a national radon programme, however, the last was conducted in 2007-2010 covering 3500 dwellings.¹⁴</p> <p>+3 Japan's annual average target for PM2.5 concentration is under <math>15 \mu\text{g}/\text{m}^3</math>, which is equal to WHO recommended interim target 3 (and short of WHO's 2021 actual set target of annual average PM2.5 of <math>5 \mu\text{g}/\text{m}^3</math>).¹⁵</p> |
| | Patient organisations have a voice in policy development | Indicator 5 scoring (0-3) | 2 | <p>+1 A number of lung cancer organisations exist, including One Step.¹⁶</p> <p>+1 The Japan Lung Cancer Society's Lung Cancer Awareness committee provides a platform for sharing medical information among stakeholders, including patient organisations and clinical research organisations.¹⁷</p> <p>0 The current HTA system lacks a mechanism for attracting comments from civil society.</p> |
| | Lung cancer screening for early detection and timely treatment | Indicator 6 scoring (0-2) | 2 | <p>+2 Japan has offered an annual routine CXR and sputum cytology in adults aged 40 years or above as population-based screening programmes for lung cancer since 1987. Both smokers and non-smokers are included.¹⁸</p> |

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|--|---|---|----------|---|
| Domain 3: Lung cancer is a race against time: reviewing fast-track referral systems and rapid referral to treatment | Suspected lung cancer patients are diagnosed within a specific timeframe | Indicator 7 scoring (0-2) | 0 | 0 The Japan Lung Cancer Society's clinical guidelines do not mention a specific timeframe for diagnostic referral of suspected lung cancer patients. |
| | A pathway for rapid referral to quality care exists including comprehensive care with innovative and appropriate treatments | Indicator 8 scoring (0-2) | 1 | 0 National guidelines/pathways for rapid referral for lung cancer patients do not exist. +1 Guidelines recommend that patients are treated by a multidisciplinary team. ¹⁹ |
| Domain 4: Lung cancer is at crossroads: assessing effective treatment and quality care | Access to imaging for screening and diagnosis covered by reimbursement | Indicator 9 scoring (0-3) | 2 | 0 In Japan LDCT is not used for lung cancer screening. Chest x-ray and sputum cytology are used, instead. ²⁰ +2 Both CT and MRI are reimbursed for diagnosis. ²¹ |
| | Access to medical, surgical specialists | Indicator 10 (number of healthcare professionals) | unscored | 2,120 total pathologists in 2020 ²² 7,112 total radiologists in 2020 ²² 6,728 total pulmonologists in 2020 ²² 2,075 total thoracic surgeons in 2020 ²² 18,009 total medical oncologists in 2023 ²³ 1,332 board-certified radiation oncologists and 1,337 medical physicists were registered in Japan in 2021. ²⁴ |
| | Radiotherapy is accessible | Indicator 11 | unscored | In Japan, the number of megavoltage machines per million is around 8.7. ²⁵ <30% of patients with cancer have access to radiotherapy and only 11.1% of the patients are initially treated in Japan. ²⁶ |
| | Biomarker testing, a cornerstone of precision medicine, is recommended and accessible | Indicator 12 (0-40) | 28 | PCR-based and NGS testing are reimbursed under national public health system for EGFR, BRAF, ALK, ROS1. ²⁷ PCR-based testing is reimbursed under national public health system for KRAS, MET 14 and RET rearrangement ^ NGS testing are reimbursed under national public health system for HER2, RET rearrangement ^ PCR-based testing not approved for HER2, MET amplification, NTRK rearrangement ^ NGS testing is not approved for KRAS, MET 14, MET amplification, NTRK rearrangement ^ PDL1 testing are reimbursed under national public health system ^ |
| | Drug approval and reimbursement | Indicator 13 (0-34) | 32 | For details please refer the Lung cancer drug approval and reimbursement table above |

^ Expert feedback

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|---|---|------------------------------------|-------|--|
| Domain 4: Lung cancer is at crossroads: assessing effective treatment and quality care (cont.) | Psychological burden of lung cancer is understood and support services are in place | Indicator 14 (0-2) | 1 | +1 Evidence suggests that support exists to addressing the psychological burden in lung cancer care, however, their utilisation rate is low. ²⁸ The guidelines do not include a referral pathway to psychological support services for lung cancer patients. |
| | Patients have access to supportive / palliative care services | Indicator 15 (0-2) | 2 | Guidelines include referral pathways to supportive/ palliative care services for lung cancer patients. ²⁹ The National Cancer Centre provides training in supportive/palliative care for oncologists. ³⁰ |
| Domain 5: Lung cancer is a focus for research: appraising registries and research | Clinical and outcome data are collected | Indicator 16 scoring (0-7) | 6 | +2 There is a high-quality regional population-based cancer registry PBCR cancer registry. ³¹ Vital registration data is collected by the MOHW Ministry of Health, Labour and Welfare and considered high-quality. ³² |
| | Research is supported and funded | Indicator 17 scoring (0-1) | 0 | 0 Innovative lung cancer therapies locally developed in the country. 3.3% of GDP was spent on research and development in 2021. ³³ Number of lung cancer clinical trials between 1/1/2014-31/12/2023: ³⁴ Phase 1: 11 Phase 2: 24 Phase 3: 26 Phase 4: 0 |

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Detailed country scorecard with explanation



South Korea lung cancer country profile

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|--|--|------------------------------------|-------|---|
| Domain 1: Lung cancer is a strategic priority: focusing on national cancer control plans and clinical guidelines | A comprehensive, up to date national cancer control plan is in operation | Indicator 1 scoring (0-6) | 4 | <p>+4 The 4th National Cancer Control Plan was launched in March 2021 to cover 2021-25.1 It contains an annual implementation plan and is funded by the government.¹</p> <p>No specific lung cancer control plan is available</p> |
| | Comprehensive, clinical guidelines for lung cancer exist | Indicator 2 scoring (0-8) | 7 | <p>+1 South Korea has adopted the Pan-Asian guidelines for lung cancer management.²</p> <p>+1 The guidelines recommend annual LDCT screening for adults aged 55-74 years who are current or ex-smokers that quit less than 15 years ago and have a 30-pack-year smoking history or more.³</p> <p>+1 The Korean Cardiopulmonary Pathology Study Group and the Korean Molecular Pathology Study Group published a consensus statement in 2021 on molecular biomarker testing in non-small-cell lung cancer (NSCLC).⁴</p> <p>+1 Guidelines recommend PDL1 testing on tumour samples where indicated and also cover treatment for lung cancer.⁴</p> <p>+1 The Korean lung cancer treatment guidelines cover treatment for lung cancer.⁵</p> <p>+1 Guidelines cover supportive/palliative care for lung cancer but do not cover shared decision-making for patients with lung cancer.⁶</p> <p>+1 The National Cancer Information Centre provides lung cancer education awareness guidelines, including booklets and reports.⁷</p> |
| Domain 2: Lung cancer is a public health issue: covering aspects of public health, including health literacy, tobacco control and screening | Tobacco and e-cigarette control policies and public health measures are in place | Indicator 3 scoring (0-9) | 8 | <p>+1 The Korea Disease Control and Prevention Agency has a monitoring framework in place for tobacco consumption.⁸</p> <p>0 The tobacco tax rate is 73.8%, marginally lower than the WHO recommendation (75%).⁹</p> <p>+1 Advertising tobacco on national TV and radio is banned.¹⁰</p> |

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|---|---|------------------------------------|-------|---|
| Domain 2 : Lung cancer is a public health issue: covering aspects of public health, including health literacy, tobacco control and screening (cont.) | Tobacco and e-cigarette control policies and public health measures are in place (cont.) | Indicator 3 scoring (0-9) (cont.) | | <p>+1 Graphic warning labels on tobacco products came into effect in 2017.¹¹</p> <p>The National Health Promotion Act protects adolescents aged ≤ 19 from smoking and regulates tobacco companies' advertising and promotion, which targets youth, young adults, and females.¹¹</p> <p>+1 National smoke-free legislation exists for indoor offices. For the period of 2021–2025, a roadmap was announced in 2019 to gradually expand smoke-free zones by banning smoking in all indoor buildings and eliminating all indoor smoking rooms by 2025.¹¹</p> <p>+1 National Health Plan 2020 (HP2020) bans smoking in all restaurants and bars.¹¹</p> <p>+1 National smoke-free legislation exists for public transport.¹¹</p> <p>+1 Heated tobacco products are banned in public areas under the National Health Promotion Act.¹²</p> <p>+1 Vaping is banned in public places and on public transport, but is allowed in designated smoking areas.¹³</p> |
| | National policies and programmes to control environmental exposure exist that could potentially prevent lung cancer | Indicator 4 scoring (0-7) | 5 | <p>+1 The Indoor Air Quality Control Act exists as a dedicated law and mandates the Ministry of Environment to implement a national air quality strategy.¹⁴</p> <p>The 4th Basic Plan for Indoor Air Quality Management was released in January 2020 for the 2020-24 planning period.¹⁴</p> <p>+1 The Korea Institute of Nuclear Safety has conducted four nationwide radon surveys, in 1989, 1999-00, 2002-05 and 2008-09.¹⁵</p> <p>+3 South Korea's target for annual average PM2.5 concentration is $< 15 \mu\text{g}/\text{m}^3$, which is equal to WHO recommended interim target 3 (and short of WHO's 2021 actual set target of annual average PM2.5 of $5 \mu\text{g}/\text{m}^3$).¹⁶</p> |
| | Patient organisations have a voice in policy development | Indicator 5 scoring (0-3) | 2 | <p>+1 A national lung cancer patient organisation has been active since its inauguration in May 2020.¹⁷ However there is no evidence of this organisation's contribution to clinical guidance.</p> <p>+1 The National Evidence-based Healthcare Collaborating Agency, which operates South Korea's HTA system, has a permanent programme facilitating the public's participation.¹⁸</p> |
| | Lung cancer screening for early detection and timely treatment | Indicator 6 scoring (0-2) | 1 | <p>+1 The National Lung Cancer Screening Programme (NLCSPP) provides LDCT screening for only smokers and ex-smokers.¹⁹</p> <p>0 Screening is currently not recommended for high-risk non-smokers.</p> |

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|--|---|---|----------|---|
| Domain 3: Lung cancer is a race against time: reviewing fast-track referral systems and rapid referral to treatment | Suspected lung cancer patients are diagnosed within a specific timeframe | Indicator 7 scoring (0-2) | 0 | 0 The Korean Association for Lung Cancer's clinical guidelines neither mention a specific timeframe for diagnostic referral of suspected lung cancer patients nor a specific timeframe for diagnostic referral of suspected lung cancer patients. ⁶ |
| | A pathway for rapid referral to quality care exists including comprehensive care with innovative and appropriate treatments | Indicator 8 scoring (0-2) | 1 | 0 National guidelines/pathways for rapid referral for lung cancer patients do not exist. ⁶ +1 A multidisciplinary team is required for lung cancer care. ²⁰ |
| Domain 4: Lung cancer is at crossroads: assessing effective treatment and quality care | Access to imaging for screening and diagnosis covered by reimbursement | Indicator 9 scoring (0-3) | 3 | +2 CT is reimbursed for lung cancer screening and diagnosis. ^{21,22} +1 MRI is reimbursed for cancer diagnosis. ²² |
| | Access to medical, surgical specialists | Indicator 10 (number of healthcare professionals) | unscored | 1,078 total pathologists in 2018 ²³ 220 total radiologists in 2018 ²³ 1,267 total thoracic surgeons in 2018 ²³ 321 total radiation oncologists in 2021 ²⁰ |
| | Radiotherapy is accessible | Indicator 11 | unscored | In 2018 South Korea had 6.8 radiotherapy machines per 1 million population. ²⁴ In South Korea, the percentage of patients who received radiotherapy as the initial treatment increased from 25% in 2010 to 30% in 2015. ²⁵ |
| | Biomarker testing, a cornerstone of precision medicine, is recommended and accessible | Indicator 12 (0-40) | 29 | PCR-based and NGS testing are reimbursed under national public health system for EGFR, BRAF, ALK, ROS1, KRAS. ^{20,26} NGS testing are reimbursed under national public health system for HER2. ²⁶ PDL1 testing reimbursed under the national public health system. |
| | Drug approval and reimbursement | Indicator 13 (0-34) | 26 | For details please refer the Lung cancer drug approval and reimbursement table above |
| Domain 4: Lung cancer is at crossroads: assessing effective treatment and quality care (cont.) | Psychological burden of lung cancer is understood and support services are in place | Indicator 14 (0-2) | 0 | The Korean Association for Lung Cancer's clinical guidelines neither mention the psychological burden of lung cancer nor include a referral pathway to psychological support services for lung cancer patients. ⁶ |
| | Patients have access to supportive / palliative care services | Indicator 15 (0-2) | 2 | +1 Guidelines include referral pathways to supportive/ palliative care services for lung cancer patients. ⁶ +1 The Act on Hospice and Palliative Care and Decisions on Life-sustaining Treatment for Patients at the End of Life states legal requirements for oncologists to receive training in supportive/palliative care. ²⁷ |

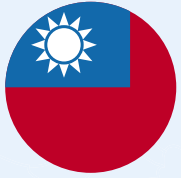
■ Low
 ■ Moderately low
 ■ Moderate
 ■ Moderately high
 ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|--|---|------------------------------------|-------|---|
| Domain 5: Lung cancer is a focus for research: appraising registries and research | Clinical and outcome data are collected | Indicator 16 scoring (0-7) | 7 | <p>+3 There is a high-quality national population-based cancer registry.²⁸</p> <p>+4 Vital registration data is collected by the Ministry of Health and Welfare and considered high-quality.²⁹</p> |
| | Research is supported and funded | Indicator 17 scoring (0-1) | 1 | <p>+1 Innovative lung cancer therapies is locally developed in the country. The Ministry of Food and Drug Safety has given its approval for a broader use of Yuhan Corp's Leclaza (active ingredient: lazertinib) as a primary treatment.³⁰</p> <p>4.93% of GDP was spent on research and development in 2021.³¹</p> <p>Number of lung cancer clinical trials between 1/1/2014-31/12/2023:³²</p> <ul style="list-style-type: none"> Phase 1: 15 Phase 2: 100 Phase 3: 37 Phase 4: 5 |

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Detailed country scorecard with explanation



Taiwan lung cancer country profile

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|---|--|------------------------------------|-------|---|
| Domain 1: Lung cancer is a strategic priority: focusing on national cancer control plans and clinical guidelines | A comprehensive, up to date national cancer control plan is in operation | Indicator 1 scoring (0-6) | 6 | <p>+2 The Taiwan National Cancer Control policy is in place and was last amended on April 26th 2023.¹</p> <p>+1 The 4th phase of the National Cancer Prevention and Control Plan (2019-23) specifies annual implementation strategies.²</p> <p>+3 The cancer control plan is funded by the Ministry of Health and Welfare (MOHW) and specifies short-term (2025) and long-term (2030) targets.^{1,3}</p> |
| | Comprehensive, clinical guidelines for lung cancer exist | Indicator 2 scoring (0-8) | 8 | <p>+1 Taiwan adopted the Pan-Asian adapted European Society for Medical Oncology (ESMO) guidelines and National Comprehensive Cancer Network (NCCN) guidelines.^{4,5}</p> <p>+1 Taiwan has lung cancer screening guidelines.⁶</p> <p>+3 Lung Cancer Treatment Guidelines cover molecular testing, PDL1 testing on tumour samples where indicated and treatment for lung cancer.⁷</p> <p>+1 In 2000, palliative care regulations were put into practice in Taiwan. The same year NHI subsidised hospice in-patient care, with per capita and per diem programmes.⁸</p> <p>+1 The Patient Right to Autonomy Act states a patient has the right to choose and make decisions regarding the treatment options provided by the physician.⁹ In 2018, the MOHW also published a decision tool for public titled "Do I need low-dose CT scan screening for lung cancer?" to promote shared decision-making and physician-patient consensus.¹⁰</p> <p>+1 Lung cancer prevention booklet published by MOHW.¹¹</p> |

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|---|---|------------------------------------|-------|---|
| Domain 2 : Lung cancer is a public health issue: covering aspects of public health, including health literacy, tobacco control and screening | Tobacco and e-cigarette control policies and public health measures are in place | Indicator 3 scoring (0-9) | 8 | <p>+1 Taiwan Tobacco Hazards Prevention Act includes a monitoring framework for tobacco consumption.¹²</p> <p>0 In Taiwan, the tobacco tax rate is 53%, which is lower than the minimum tax rate of 75% recommended by the WHO.¹³</p> <p>+1 Advertisement through television and radio is banned.¹²</p> <p>+1 Law mandates that health warnings appear on tobacco packages and persons under the age of 20 shall not smoke.¹²</p> <p>+3 National smoke-free legislation exists for indoor offices, public transport and restaurants/cafes/pubs/bars.¹²</p> <p>+1 Heated tobacco products HTPs are banned in public areas.¹⁴</p> <p>+1 E-cigarettes are banned entirely in Taiwan.¹⁴</p> |
| | National policies and programmes to control environmental exposure exist that could potentially prevent lung cancer | Indicator 4 scoring (0-7) | 5 | <p>+1 The 2nd National Air Pollution improvement implementation plan (2024-2027) exists and was last updated on November 2023/11.¹⁵</p> <p>+1 The Nuclear Safety Commission conducts household radon surveys and the most recent one was conducted in 2015-2017.^{16,17}</p> <p>+3 Taiwan's target for annual average PM2.5 concentration target is under $<13 \mu\text{g}/\text{m}^3$, which is lower than the WHO interim target 3 i.e. $15 \mu\text{g}/\text{m}^3$ (and short of WHO's 2021 actual set target of annual average PM2.5 of $5 \mu\text{g}/\text{m}^3$).¹⁸</p> |
| | Patient organisations have a voice in policy development | Indicator 5 scoring (0-3) | 3 | <p>+1 Diagnostics, Therapeutics & Care Education of Lung Cancer in Taiwan is a lung cancer patient support society.¹⁹</p> <p>+1 The current members of the Journal of Cancer Prevention and Treatment and the Cancer Policy Committee include representatives of social justice individuals and civil society groups, including patient groups, which will help promote cancer prevention and treatment policies.²⁰</p> <p>+1 Civil society has the opportunity to comment on Health Technology Assessment (HTA) recommendations.²¹ However, the number of patient representatives is small and they attend the meeting but do not have the rights to vote.[^]</p> |
| | Lung cancer screening for early detection and timely treatment | Indicator 6 scoring (0-2) | 2 | Biannual screening with LDCT is recommended for high-risk individuals, including smokers and people with family history of lung cancer. ⁶ |

^ Expert feedback

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|--|---|---|----------|---|
| Domain 3: Lung cancer is a race against time: reviewing fast-track referral systems and rapid referral to treatment | Suspected lung cancer patients are diagnosed within a specific timeframe | Indicator 7 scoring (0-2) | 1 | <p>+1 Taiwan adheres to the modified American College of Radiology Lung-RADS guidelines by the American College of Radiology (ACR) for nodule management and has set up a case management system for consistent follow-up of positive screening results, it does not specify a particular timeframe within these guidelines for when diagnostic referrals should occur.²² However, the experts mentioned that there are green channels for the suspected patients for to enable timely final diagnosis.</p> <p>0 There are no specific timeframe from 1st diagnosis to commencement of treatment in diagnosed lung cancer patients. The median time interval from diagnosis to treatment initiation for NSCLC patients in Taiwan was around 8-14 days. Efforts should be made to minimise the interval from diagnosis to treatment in Taiwan.²³</p> |
| | A pathway for rapid referral to quality care exists including comprehensive care with innovative and appropriate treatments | Indicator 8 scoring (0-2) | 2 | <p>+1 National guidelines/pathways for rapid referral for lung cancer patients are in place.²⁴</p> <p>+1 Guidelines recommend that patients are treated by a multidisciplinary team.⁷</p> |
| Domain 4: Lung cancer is at crossroads: assessing effective treatment and quality care | Access to imaging for screening and diagnosis covered by reimbursement | Indicator 9 scoring (0-3) | 3 | <p>+2 CT is reimbursed for lung cancer screening and diagnosis.^{25,26}</p> <p>+1 MRI is reimbursed for cancer diagnosis.²⁶</p> |
| | Access to medical, surgical specialists | Indicator 10 (number of healthcare professionals) | unscored | <p>230 licensed clinical pathologists in 2022.²⁷</p> <p>1,354 licensed diagnostic radiologists in 2022.²⁷</p> <p>7,367 of radiologists in 2023.²⁷</p> <p>12,051 licensed medical specialists in internal medicine.²⁷</p> <p>7,971 licensed medical specialists in surgery in 2022.²⁷</p> <p>402 licensed radiation oncologists in 2022.²⁷</p> |
| | Radiotherapy is accessible | Indicator 11 | unscored | <p>95 radiation oncology units in 2020 and 7.5 therapy machines with MV/MeV beams per million population in Taiwan.^{28,29}</p> |
| | Biomarker testing, a cornerstone of precision medicine, is recommended and accessible | Indicator 12 (0-40) | 24 | <p>PCR-based testing are reimbursed under national public health system for EGFR, ALK, KRAS.[^]</p> <p>PCR-based and NGS testing are approved for but not covered by national public health system BRAF, HER2, MET 14, MET amplification, ROS1, NTRK and RET rearrangement[^]</p> <p>NGS testing are approved for but not covered by national public health system for EGFR, KRAS, ALK.[^]</p> |

[^] Expert feedback

■ Low ■ Moderately low ■ Moderate ■ Moderately high ■ High

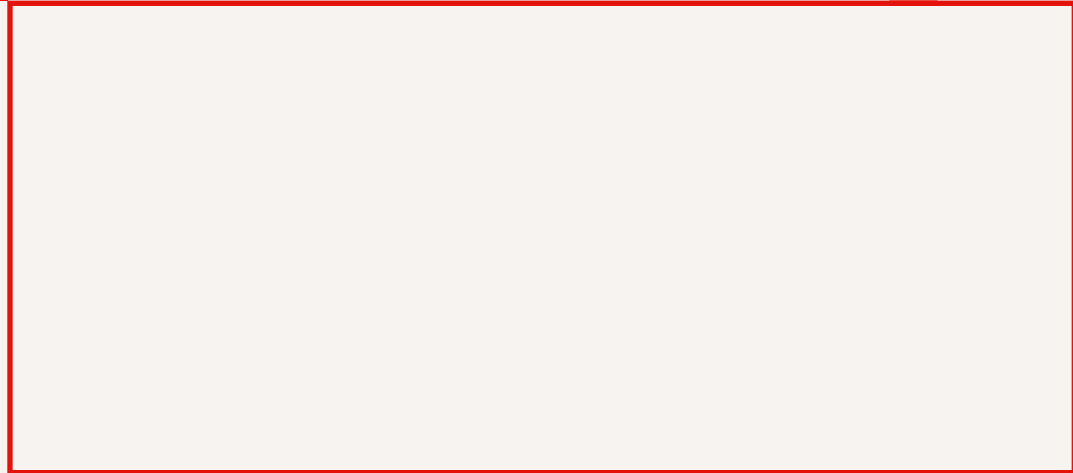
| Domain | Indicator name | Indicator number and scoring range | Score | Justification |
|---|---|------------------------------------|-------|---|
| Domain 4: Lung cancer is at crossroads: assessing effective treatment and quality care (cont.) | Biomarker testing, a cornerstone of precision medicine, is recommended and accessible (cont.) | Indicator 12 (0-40) (cont.) | | PDL1 testing are reimbursed under national public health system ^ The National Health Insurance Administration plans to include coverage for next-generation sequencing (NGS) testing upon cancer diagnosis or when second-line or third-line therapies are unsuccessful. Under this plan, the NHI will cover one NGS test per cancer type for each insured individual by May 2024. ³⁰ |
| | Drug approval and reimbursement | Indicator 13 (0-34) | 25 | For details please refer the Lung cancer drug approval and reimbursement table above |
| | Psychological burden of lung cancer is understood and support services are in place | Indicator 14 (0-2) | 2 | +1 Evidence suggests that support exists to addressing the psychological burden in lung cancer care. ³¹ +1 Guidelines include referral pathway to psychological support services for lung cancer patients. ³¹ |
| | Patients have access to supportive / palliative care services | Indicator 15 (0-2) | 2 | +1 The NCCN Guidelines followed in Taiwan include a referral pathway to palliative care services for cancer patients, which includes lung cancer. +1 Oncologists receive training in supportive/palliative care. ³² |
| Domain 5: Lung cancer is a focus for research: appraising registries and research | Clinical and outcome data are collected | Indicator 16 scoring (0-7) | 7 | +3 There is a high-quality national population-based cancer registry (PBCR). ³³ +4 Vital registration data is collected by the MOHW and considered high-quality. ³⁴ |
| | Research is supported and funded | Indicator 17 scoring (0-1) | 0 | 0 Innovative lung cancer therapies locally developed in the country. 3.96% of GDP spent on research and development in 2022. ³⁵ Number of lung cancer clinical trials between 1/1/2014-31/12/2023: ³⁶ Phase 1: 10 Phase 2: 30 Phase 3: 34 Phase 4: 0 |

^ Expert feedback

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