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# BREATHING IN A NEW ERA

a comparative analysis of  
lung cancer policies  
across the Asia-Pacific region

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## About this report

“**B**reathing in a new era: a comparative analysis of lung cancer policies across the Asia-Pacific region” is a report by The Economist Intelligence Unit (EIU) that examines the burden of lung cancer across the Asia-Pacific region and how countries and territories are responding to the challenge that this poses.

The research centres on assessing unmet needs within health systems and opportunities for improvement. We analyse how countries can build awareness, improve prevention, early detection, diagnosis and prognosis, and ensure access to high-quality treatment, including supportive and palliative care. Key to good practice for many of these activities is ensuring that patients are part of the process, particularly through patient organisations.

Our goal is to highlight and improve outcomes for people living with lung cancer across the Asia-Pacific region. We hope to do this by helping to provide the impetus for the improvement of cancer plans and national policies. Our research uses a benchmarking scorecard allowing countries to see how they are performing compared to their peers and to use this insight to drive change at home.

The EIU carried out an evidence review and convened an advisory board to help design a scorecard of the key building blocks of good practice in health policy and system development in the field of lung cancer. Alongside this, EIU researchers attended national workshops featuring a mixture of stakeholders to understand national-level challenges. Resulting from these, and published alongside this policy paper, are a series of country profiles.

The research programme was sponsored by MSD. We would like to thank the following individuals who served as our global expert panellists and helped to develop the policy scorecard.

- Mr **Alfonso Aguarón**, Project Manager, Lung Cancer Europe (LUCE), Spain
- Professor **António Araùjo**, Head of Medical Oncology, Centro Hospitalar do Porto, Portugal
- Dr **Ioannis Boukovinas**, MD, PhD, Head of the Bioclinic Oncology Unit of Thessaloniki, Greece
- Professor **John Field**, Director of Research, Roy Castle Lung Cancer Research Programme, University of Liverpool, UK
- Dr **Marina Garassino**, MD, National Cancer Institute of Milan, Italy
- Professor **Pilar Garrido**, Head of Thoracic Tumours Unit, University Hospital Ramón y Cajal (IRYCIS), Spain

We would like to thank the following individuals and organisations for sharing their insight and deep experience on the Asia-Pacific region in particular.

- Dr **Young Tae Kim**, Chair of the Korean Association for Lung Cancer and Professor of Thoracic Surgery at Seoul National University Hospital, Seoul, South Korea
- Dr **Calvin Sze Hang Ng**, Professor of Thoracic Surgery, Chinese University of Hong Kong, Hong Kong
- **Gan Quan**, Director, Tobacco Control Department, The International Union Against Tuberculosis and Lung Disease, New York, New York, USA
- Dr **Hai-rim Shin**, team leader, World Health Organization, Manila, The Philippines
- Dr **Prakit Vathesatogkit**, Executive Secretary, Action on Smoking and Health Foundation (ASH Thailand), Bangkok, Thailand

The Economist Intelligence Unit bears sole responsibility for the content of this report. This research was led by Rohini Omkar with guidance from Alan Lovell and Mary Bussell. The report was written by Andrea Chipman and edited by Paul Tucker, Rohini Omkar and Gerard Dunleavy. Contributing research analysts included Brenda Ngu, Yao Jiang, Darshni Nagaria, Samyukta Balsubramani, Gerard Dunleavy and Keven Sew. The findings and views expressed in the report do not necessarily reflect the views of the sponsor.

## Executive summary

**L**ung cancer is the leading cause of cancer mortality in the Asia-Pacific region, and lung cancer deaths will increase dramatically unless governments take decisive steps to control the disease. Almost a million people in Asia-Pacific countries died of lung cancer in 2018, and annual deaths are expected to increase to over 1.8m by 2040.<sup>1</sup> The main causes of this crisis are tobacco use—both through smoking and exposure to second-hand smoke—air pollution, and weaknesses in health systems and policy.

The fact that almost all of the countries in our research have recently published or updated national cancer control plans in the past five years is a positive sign for the Asia-Pacific region. However, given the burden that lung cancer places on the region, it is discouraging that the majority of the countries studied don't have specific lung cancer control plans. Such plans are needed to help countries to fully prioritise lung cancer at the top of their agenda.

In terms of dealing with the challenge posed by lung cancer, disparities remain across countries in the implementation of bans on public smoking and restrictions on e-cigarettes. In addition, smoking rates in men in the region are among the highest in the world, while air pollution places a disproportionate burden on non-smokers and women.<sup>2</sup> Many other weaknesses are evident in the provision of rapid diagnosis and referral to quality care. Access to targeted therapy and immunotherapy also varies significantly across the countries that we studied. Psychological support for patients is lacking, and shared decision-making is a relatively unfamiliar concept in many countries' lung cancer care pathways.

Finally, comprehensive, high-quality data remains in short supply. This makes it more challenging for health providers to gather evidence about which public health measures are most likely to reduce new lung cancer cases and which treatments are most effective in different populations.

Following an evidence-based approach, incorporating an evidence review and advisory board, we designed a policy scorecard to assess current policy and system performance across five domains:

- **Lung cancer is a strategic priority:** focusing on national cancer control plans and clinical guidelines
- **Lung cancer is a public health issue:** covering aspects of public health, including health literacy, tobacco control and screening
- **Lung cancer is a race against time:** reviewing fast-track referral systems and rapid referral to treatment
- **Lung cancer is at a crossroads:** assessing effective treatment and quality care
- **Lung cancer is a focus for research:** appraising registries and research

Indicators within each domain were selected based on evidence of their association with improved outcomes. After drafting scores for indicators within these five domains from the published and grey literature, we then attended national workshops in selected markets to validate our scores and

flesh out opportunities for improvement in each country. In addition to this report, each country has a country profile detailing national data on epidemiology, scores for each indicator and a list of recommendations.

While the picture was somewhat mixed across the region as a whole, the five domains provide a basis with which to target particular challenges for each country, with the aim to improve lung cancer prevention, detection, referral and treatment.

The report concludes with six regional calls to action:

### **Fill gaps in cancer policymaking and formalise policy implementation**

Countries must ensure that comprehensive, regularly updated, evidence-based, goal-oriented national cancer control plans (NCCPs) are complemented by lung cancer-specific national plans, formalised implementation strategies and clinical guidelines. NCCPs exist in all ten countries included in our research, eight of which were published or updated within the past five years. However, nine of the ten countries that we studied lack a specific lung cancer plan. Key to the success of national plans is the inclusion of detailed implementation plans that map out how to enact plans to keep them on track. Unfortunately, such plans are not commonplace in the Asia-Pacific region.

Lung cancer clinical guidelines exist in nine of the ten countries we studied. However, our analysis revealed significant variation in both quality and coverage, especially in relation to screening and shared decision-making; the latter is a relatively novel concept in some Asian countries. In addition, the guidelines of only four of the countries that we studied include measures to fast-track suspected lung cancer cases for diagnostic testing, likely resulting in an adverse impact on the success of patients' overall treatment.

### **Strengthen action on smoking and air pollution**

As elsewhere, tobacco use is a major cause of lung cancer in the Asia-Pacific region, with second-hand smoke also a significant factor. Tobacco control policies fall short in several countries and tobacco use remains high, especially among men. Although national policies exist on curbing tobacco use, some countries lack national media campaigns or bans on tobacco advertising, while only three—Hong Kong, New Zealand and Thailand—have adopted comprehensive bans on smoking in public places and workplaces. Furthermore, tobacco taxation is only a work in progress in many countries, and conflicts of interest also pose a major challenge. For example, in China, where 28% of adults smoke, the tobacco industry is state-owned, while South Korea's pension system is a major shareholder in the former national tobacco company and a strong tobacco lobby in the Philippines exists alongside high per capita smoking rates. E-cigarettes are fully regulated in less than half of the countries that we studied.

Unique to the Asia-Pacific region, more women and non-smokers are diagnosed with lung cancer than elsewhere in the world. The proportion of female lung cancer patients who are non-smokers is as high as 65% in China, compared with 16-24% (of men and women) in Europe and 19% of women in the US. This is a striking fact.

Air pollution is a major problem, driven by poor waste management, industrialisation, construction, intensive agriculture, large volumes of vehicles and the combustion of dirty energy sources. Although the countries covered in our scorecard have air quality legislation in place, the disproportionate lung cancer burden faced by non-smokers demonstrates that much more must be done to improve air quality.

#### **Improve data quality and establish national cancer registries**

Patient data should be formalised and made available through national registries. Although registries exist in some countries, they rarely extend to national coverage and contain only limited data, leaving healthcare providers, researchers and policymakers deprived of a full picture of the lung cancer situation. Without comprehensive cancer registries, countries are hindered in their efforts to enact cancer control and epidemiological research, public health programme planning, and improvements to patient care. Even putting aside the issue of registries, some countries must take greater steps to improve the quality of broader epidemiological data on lung cancer monitoring. For example, when comparing the incidence and prevalence across the ten countries studied, the lower incidence and prevalence rates of lung cancer in Indonesia and the Philippines is undermined by high rates of tobacco use in both countries—according to WHO, the smoking rate amongst Indonesian men is the highest in the world.

#### **Demonstrate the benefits that widespread population-based screening can have to the Asia-Pacific region**

Lung cancer survival is clearly related to the stage at which it is diagnosed and the speed with which patients can access treatment. Although the topic of screening programmes is somewhat controversial, large-scale studies in Europe and the US have shown clear reductions in lung cancer mortality as a result of screening. A broader evidence base centred specifically on the Asia-Pacific context is likely to provide a more compelling case, especially to health policymakers in less-wealthy countries where the initiation of large screening programmes may seem a daunting prospect in the short term. China is the only middle-income country that we studied that has conducted lung cancer screening trials, revealing the lack of evidence being generated outside of high-income countries.

#### **Improve provision of rapid diagnosis and tackle inequalities in access to care**

The economic divide in the Asia-Pacific region is evident in the difficulties that health systems face in detecting and treating lung cancer cases. Inconsistencies in fast-tracking suspected lung cancer cases to diagnosis and rapid referral to specialised care are key areas where this divide was reflected in our research, a situation not helped by the fact that fast-track referral pathways are not included in many countries' clinical guidelines. Our analysis also showed that countries' success in providing access to the full range of treatments to all patients is largely predicated on the wealth of each country's health system. For example, the unmet need for radiotherapy services in Indonesia is 90%, compared with 17% (itself not an inconsiderable number) in relatively wealthy Japan. Reimbursement decisions on newer treatments such as targeted and immunotherapy medication also reflect overall the wealth of countries: none of the 13 drug and indicator combinations in our study are reimbursed in New Zealand, the Philippines and Thailand, and only one is covered in Indonesia. The reimbursement process is often also too slow and health technology assessment provision is patchy. Stark divisions between the quality and availability of care in the public and private health services have created a two-tier system in some countries. Possible measures to accelerate access to treatments include innovative reimbursement schemes, compassionate use programmes, monitoring systems and special pricing agreements. There are also clear gaps in workforce numbers in terms of specialists such as thoracic surgeons.

While mortality rates from lung cancer have decreased over time in Australia and New Zealand, inequalities persist within sub-populations in each country. Rates of lung cancer are four times higher

among Māori compared to non-Māori, while mortality rates are almost three times higher. Similar disparities in lung cancer are observed between Indigenous and non-Indigenous Australians. This underlines the need for countries in the region to identify at-risk and underserved populations, to develop action plans, not just for, but with these populations in an effort to improve lung cancer care and outcomes in a way that is culturally appropriate and engages people across the treatment pathway.

**Expand support for patients by involving them in decision-making and supporting them through the entire care journey**

Awareness of the psychological burden of lung cancer and the need for adequate support services is still relatively limited in the Asia-Pacific region. Just three of the countries in our analysis—Australia, Indonesia—have guidelines in place that mention the psychological burden of lung cancer, and only Australia and New Zealand have a referral pathway to support services for lung cancer patients. Cultural taboos in Asian countries surrounding the discussion of health issues and death, limited patient involvement in care decisions, and stigma related to lung cancer create barriers to obtaining psychological support as well as supportive and palliative care. A cultural shift is needed to prioritise care for patients' emotional needs and involve them in decisions related to their treatment. To this end, including patient organisations in the development of clinical guidelines will help to prioritise issues that matter to the patient, potentially identifying factors that may otherwise be overlooked by health professionals.

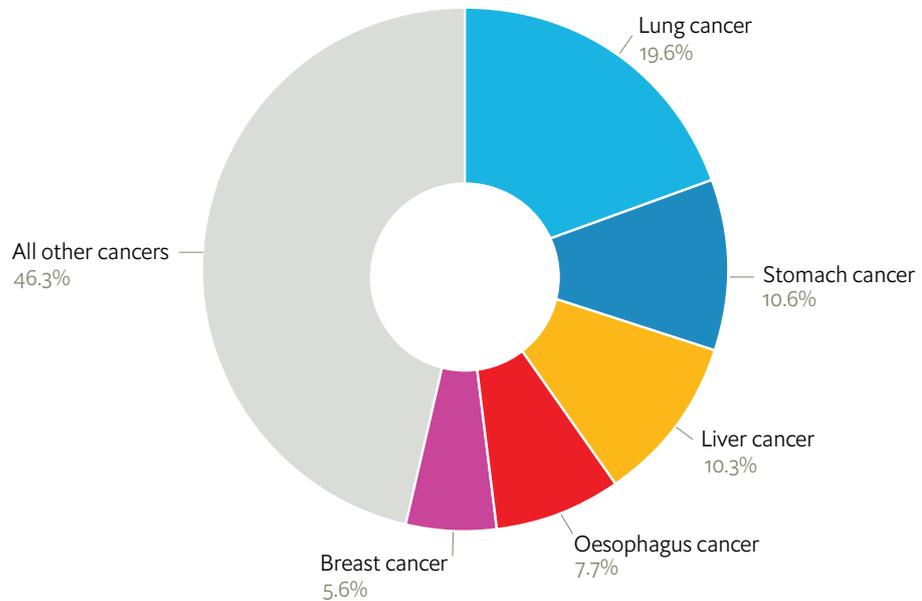
## Introduction

### The world's deadliest cancer

Cancer is the second leading cause of death globally, accounting for an estimated 9.6 million deaths in 2018—one-sixth of the total.<sup>3,4</sup> Lung cancer is the leading cause of cancer death in the Asia-Pacific region (see Figure 1), accounting for one in five cancer deaths, almost as many as stomach and liver cancer deaths, which are the second and third deadliest cancers in the region.<sup>5</sup> The second largest number of new cancer diagnoses, for both sexes, in the World Health Organization's (WHO) Southeast Asia region, in 2018 was due to lung cancer, making up a total of 8% of new cases.<sup>6</sup> In WHO's Western Pacific Region, lung cancer accounted for the largest number of new cancer cases in 2018, making up just over 16% of all new cancer diagnoses that year.<sup>7</sup>

Lung cancer represents a significant economic drain on health systems, with a total annual economic cost of around US\$1.2 trillion in 2010.<sup>8</sup> There is clear evidence that lung cancer is taking a financial toll in the region, especially in China, which has one of the highest incidence rates. Although specific data on lung cancer is hard to come by, total productivity losses from cancer in China have been estimated at US\$30 billion.<sup>9</sup>

**Figure 1: Causes of cancer mortality (%) in the Asia-Pacific region**



Source: GLOBOCAN, 2018

## **Tobacco use is a major factor, but non-smokers and women also face significant risks**

High rates of tobacco use is one key contributor to rising rates of lung cancer in the Asia-Pacific region. Although tobacco control programmes are expanding, there are few regulations on hand-rolled cigarettes or hookahs. There is also little regulation of e-cigarettes, which are popular in many parts of the region and appear to be more attractive to young people in some countries.

Public health campaigns are beginning to show reductions in tobacco use. In Thailand, for instance, only a third of smokers were over 45 years of age ten years ago, this age group now makes up 45% of the total, with less young people taking up the habit. In addition, says Dr Vathesatogkit, executive secretary of Action on Smoking and Health Foundation, a Thai anti-smoking organisation, smoking rates have plateaued in all age groups except those under 24.

Although tobacco use is a significant cause of lung cancer incidence in Asia, the lung cancer burden among non-smokers is higher than elsewhere, with environmental factors thought to play a key role. Most experts cite the role of high pollution levels, a particular scourge in a region with numerous megacities with populations in excess of 10 million people. In China, for instance, where air pollution is frequently in the news, state media recently noted a “rapid increase” in a form of lung cancer not normally associated with tobacco use.<sup>10</sup> Generally speaking, many Asian countries have seen a dramatic increase in air pollution, especially PM<sub>2.5</sub>, or fine particles, which can permeate the bronchus and increase lung cancer risks.<sup>11</sup> Women and girls are particularly susceptible to fumes caused by indoor cooking on coal stoves,<sup>12</sup> while industrial emissions are also a major source of air pollution.<sup>13</sup>

Partly because of these environmental factors, the region’s lung cancer epidemiology differs from other regions of the world, especially in terms of women and non-smokers. Lung cancer rates for women, in some countries like China, are on a par with those observed in Western countries, despite low levels of tobacco use among the region’s women.<sup>14</sup> The proportion of female lung cancer patients who are non-smokers is as high as 65% in China, compared with 16-24% (of men and women) in Europe and 19% of women in the US.<sup>15-18</sup> In addition to pollution-related factors, experts believe that exposure to second-hand smoke is partly to blame.<sup>14</sup>

As well as women, the region’s young people face a greater lung cancer risk. “In the last two decades, we have seen increasing numbers of young non-smokers presenting with lung cancer,” says Calvin Sze Hang Ng, Associate Professor of Thoracic Surgery at the Chinese University of Hong Kong. “Environmental pollution remains the most likely culprit.”

Worldwide, between 10 and 25% of lung cancer occurs in never-smokers, defined as people who have never smoked or smoked less than 100 cigarettes in their lifetime.<sup>19</sup> Never-smokers with lung cancer in Asia are most often diagnosed with lung adenocarcinoma, a variation of the disease resulting from cell mutations that can be successfully managed with targeted therapies.<sup>20</sup> For example, one common driver of lung adenocarcinoma, epidermal growth factor receptor (EGFR) mutations—which are more common among both non-smokers and women—are found in 40-64% of lung cancer patients in Asian countries, compared with only 7-23% of patients in western nations.<sup>21</sup>

In Taiwan, the incidence of lung adenocarcinoma, the form of lung cancer in which EGFR mutations are most commonly found, has been rising among women, despite the proportion of female smokers

remaining around 3-5%.<sup>21</sup> The numbers of never-smokers with lung squamous cell carcinoma (LSCC) and small cell lung cancer (SCLC)—both usually strongly associated with tobacco use—are also higher amongst East Asian patients than non-Asian patients.

Determining how these different factors affect lung cancer rates is especially challenging in the absence of adequate data, as we will discuss below. Looking ahead, broad policy measures should be taken to improve air quality, while better research on the kinds of environmental risks facing Asian-Pacific populations would help health authorities to more easily determine who is most at risk.

## Cash-strapped health systems face challenges in conducting screening, diagnosis and treatment

The economic divide in the Asia-Pacific region is evident in the difficulties that health systems face in rapidly diagnosing and referring lung cancer patients to specialised care. In some countries covered in our research, lung cancer is generally detected at a later stage owing to more fragmented access to health coverage. Screening is also limited in many parts of the region, and opinions remain divided about the cost-effectiveness of mass screening for high-risk individuals, especially those who are asymptomatic, given the potential burden on cash-strapped health systems. Treatment itself can also vary, ranging from basic palliative care, to standard chemotherapy, to state-of-the-art targeted therapy and immunotherapy, depending on the level of access to healthcare in a country.

“People acknowledge that lung cancer is a problem with very poor treatment outcomes, because people usually come to see the doctor quite late,” Dr Vathesatogkit says of the situation in Thailand. “Immunotherapy is quite expensive and in many of the government hospitals, because of budget limitations, many patients may not receive chemotherapy.” While treatment is covered as part of government insurance, he adds, doctors are often pressed to save money for their hospitals.

For middle-income countries such as Thailand, treatment options are better than in some of Asia’s poorest nations, says Dr Vathesatogkit. Yet promptness of treatment and access to state-of-the-art medicines can be even more limited in parts of Asia-Pacific, such as Indonesia and the Philippines, where universal healthcare has only recently been introduced and is not always sufficiently funded. This is especially significant, as recent research has linked advances in treatment such as immunotherapies to improved cancer outcomes, including for lung cancer.<sup>22</sup>

## Our research project and its goals

The goal of our research programme is not to rank countries, but rather to identify opportunities to improve patient outcomes within each country. We hope to provide some impetus for the development of national policies and the encouragement of best practice.

Our research covers ten countries and territories in East Asia, South Asia, South-East Asia and Oceania (Figure 2). We selected the included countries to represent a spectrum of lower-middle-income to high-income countries. One of the studied countries, Hong Kong, is a special administrative region of China, while another, Taiwan, is not recognised by the United Nations. However, for the purposes of this report we follow the practice of the World Bank in using the term “country” interchangeably with “economy” to refer to any territory whose authorities report separate social or

**Figure 2: Map of the Asia-Pacific Region**

economic statistics. Our study encompasses two WHO regions: the Western Pacific Region (WPRO), headquartered in Manila, and the South-East Asia Region (SEARO), based in New Delhi.

The Asia-Pacific region displays stark socio-economic contrasts. According to 2019 data from the World Bank, the countries in our study are a mix of lower middle-income (US\$1,026 – 3,995 GNI per capita), upper middle-income (US\$3,996 – 12,375 GNI per capita) and high-income (US\$12,376 or more GNI per capita) countries.<sup>23</sup> The high-income countries covered in this report include Australia, Japan, New Zealand, South Korea, Taiwan and Hong Kong, alongside upper middle-income nations such as Thailand and China, and lower middle-income countries such as Indonesia and the Philippines. Such contrasts impact healthcare infrastructure, financial resources and the overall organisation of healthcare systems, ultimately affecting how countries are able to treat and care for their patients.

We performed an initial literature review to identify key frameworks and assessments that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. Subsequently, a draft set of indicators was developed, and an expert panel was convened to review and provide advice on the development of the indicator framework. Out of this process, we identified a set of 17 indicators to evaluate each country across five domains:

- **Lung cancer is a strategic priority:** focusing on national cancer control plans and clinical guidelines

- **Lung cancer is a public health issue:** covering aspects of public health, including health literacy, tobacco control and screening
- **Lung cancer is a race against time:** reviewing fast-track diagnostic referral systems and rapid referral to treatment
- **Lung cancer is at a crossroads:** assessing effective treatment and quality care
- **Lung cancer is a focus for research:** appraising registries and research

A range of international and national sources were used for data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecards. Judgements were made based on the best information available. After draft scores were assigned, The EIU attended a workshop in six of the ten countries with external country-based experts to discuss the findings and help develop our recommendations. Throughout the process, The EIU retained editorial control, so that all final decisions and conclusions are ours alone. When we wish to refer to the main emergent themes from one or more workshop, we will refer to input of workshop “participants”.

See the appendices for the full methods, scorecard and list of workshop participants. We describe scorecard results in the country profiles, and domain scores at the beginning of each chapter. An all-country matrix can be seen in the appendices.

## How we know what we are measuring is meaningful

Our scorecard uses indicators to measure policy and system factors associated with improved outcomes. The logical consequence of this is that if countries implement what the scorecard is measuring, over time they will see reduced incidence and improved survival. Of course, outcomes are driven by a number of factors, and there are always numerous confounding variables to consider. Nevertheless, for some indicators, there is good quality evidence that they are associated with improved outcomes.

For example, there is published evidence that access to radiotherapy is significantly associated with improved survival<sup>24</sup> and that smoking cessation can decrease lung cancer risk even among those genetically predisposed to it.<sup>25</sup> Also, a systematic review concluded that lung cancer specific stigma has been associated with lower self-esteem, lower social support, poorer social integration and higher social conflict,<sup>26</sup> all of which are associated with poorer health outcomes. Although early supportive care for lung cancer patients can lead to significant improvements in quality of life, mood and survival,<sup>27</sup> patients are often not referred to supportive and palliative care services until very late in their care.<sup>28</sup> These evidence sources all contribute to the development of our indicators.

For all indicators, and for the structure of the scorecard itself, we leant on the advice and guidance of the advisory panel—although all decisions were ultimately made by The EIU project team.

## Epidemiology

### China has the highest burden; survival rates are highest in Japan and lowest in Thailand

Lung cancer outcomes vary substantially across the countries included in our research, although most countries have seen decreases in prevalence, incidence and disability-adjusted life years (DALYs)—and improved survival rates—over the past 25 years. These positive trends show how impactful national policies can be in improving the survival of cancer patients.

Thailand's experience demonstrates the extraordinary power of effective smoking cessation policies, even if the country may have to strengthen such policies to meet WHO targets for reduction in tobacco use.<sup>29</sup> Less positively, the survival rates for Thai cancer patients is significantly lower than elsewhere, with evidence of a decline. Australia, Japan, South Korea and Taiwan all show the impact of strong health systems on lung cancer survival; Japan, in particular, is a relative high achiever, with a survival rate exceeding 30%. On the negative side, China is a significant standout both on cancer incidence and death rates, both of which have increased alarmingly over the past three decades, in contrast to all the other countries that we studied.

Although Indonesia and the Philippines appear to outperform the other countries on several metrics, this is likely to be related to the relatively poor quality of available data. Indonesia, which has the lowest incidence and prevalence rates and the second-lowest DALY and death rates, also has one of the highest rates of tobacco usage in the world.<sup>30</sup>

The greatest avoidable risk factor for cancer mortality worldwide is tobacco: it is responsible for 22% of all cancers and 85% of lung cancer.<sup>4,31</sup> Lung cancer and other tobacco-related diseases are expected to remain important health problems worldwide for decades. However, additional factors in many of the countries that we have covered, such as air pollution and the proliferation of large, densely populated cities, mean that non-smokers are far more affected by lung cancer than those in Western nations.<sup>15-18</sup>

Table 1 shows 2017 estimates of age-standardised incidence, prevalence, disability-adjusted life years (DALYs) and mortality rates for lung cancer across ten Asia-Pacific countries and territories. A DALY can be thought of as one lost year of "healthy" life; the higher the DALY for a disease, the greater the burden. DALYs take into consideration the years of life lost due to both morbidity (disability and ill-health) and premature mortality. The incidence rate is the number of new cases of lung cancer in a given year. The prevalence rate is the number of lung cancer cases that are present in the general population of a country in a given year. Indonesia has the lowest prevalence rate and the joint-lowest incidence rate (with the Philippines), while Japan has the lowest number of DALYs and the Philippines has the lowest mortality rate. China has the highest incidence rate, number of DALYs and mortality rate, while Australia has the highest prevalence rate.

## BREATHING IN A NEW ERA

### A COMPARATIVE ANALYSIS OF LUNG CANCER POLICIES ACROSS THE ASIA-PACIFIC REGION

**Table 1: Comparative epidemiology of the Asia-Pacific countries and territories included in the study**

Red and green colours show highest and lowest national figures, respectively

Country	Incidence rate (per 100,000)	Prevalence rate (per 100,000)	DALYs rate (per 100,000)	Mortality rate (per 100,000)
Australia	31.8	74.2	448.9	22.1
China	42.1	63.9	757.6	36.3
Indonesia	17.5	14.7	408.8	18.6
New Zealand	27.8	54.9	497.7	21.6
Japan	28.5	64.3	372.7	20.2
Philippines	17.5	18.2	420.9	18.5
South Korea	30.7	62.8	421.7	22.9
Taiwan	30.5	44.1	549.6	27.5
Thailand	19.1	20.8	435.3	20.2
Hong Kong	32.1	–	–	22.2
Global	27.1	41.5	503.1	23.7

Source: Global Burden of Disease, 2017.

Source for Hong Kong: Hong Kong Cancer Registry, Hospital Authority, 2016.

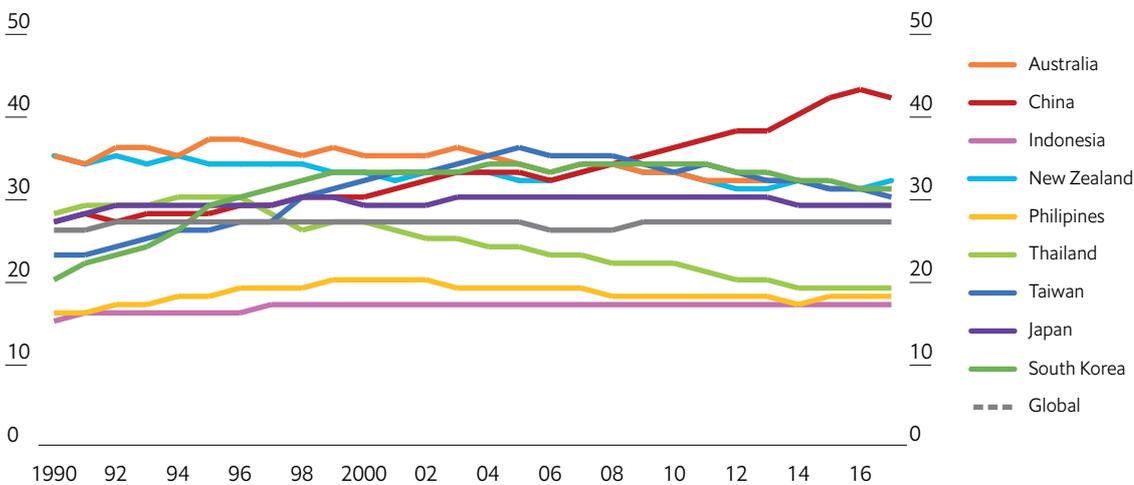
Note: All numbers have been age-standardised to ensure cross-national comparability. No prevalence or DALY data available for Hong Kong.

## Epidemiological trends vary within the Asia-Pacific region

Figure 3 shows lung cancer incidence rates over the past 27 years; our research countries fall within a range of between 15 and 43 cases per 100,000 population annually. Indonesia and the Philippines appear to have consistently low incidence rates in comparison with the other countries; however, this may be more reflective of the relatively poorer data quality in each country. China and Thailand appear to be on opposite trajectories, with incidence rates in Thailand declining steadily since 1996, while incidence in China has increased in almost every year since 1992. Incidence trends were largely similar Australia and New Zealand.

**Figure 3: Lung cancer incidence rates, 1990-2017**

(per 100,000 population)



Note: The data is age-standardised. There is no data available for Hong Kong.  
Source: Global Burden of Disease, 2017.

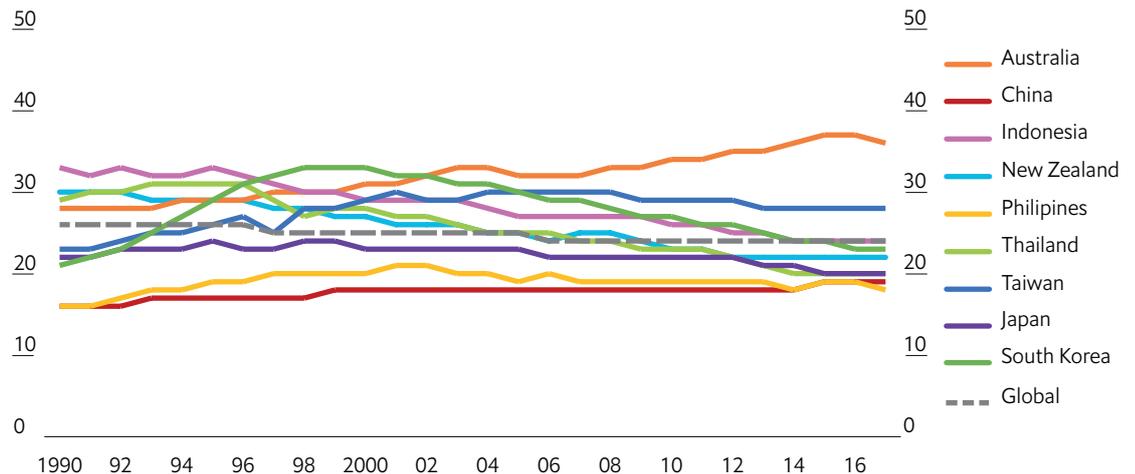
It should also be noted that while population wide figures provide a useful reference point across countries, this approach risks masking some significant inequalities in sub-populations within countries. In New Zealand, for example, there are disparities, with rates of lung cancer among Māori being four times higher than non-Māori.<sup>32</sup> In Australia, while the incidence rate for lung cancer has been relatively stable among the non-Indigenous population, the incidence rate has been rising significantly among Indigenous Australians.

## Outside China, lung cancer mortality is largely in decline

Figure 4 depicts mortality rates. Many countries with previously high mortality rates, such as Australia, New Zealand, South Korea and Thailand, have seen their rates fall over the years, while China has experienced steadily increasing rates and has had the highest death rate from lung cancer since 2003. Indonesia and the Philippines have consistently had the lowest rates, despite rates of tobacco use being high in both countries. This is most likely to be related to issues with the quality of available data for these countries.

**Figure 4: Lung cancer mortality rates, 1990-2017**

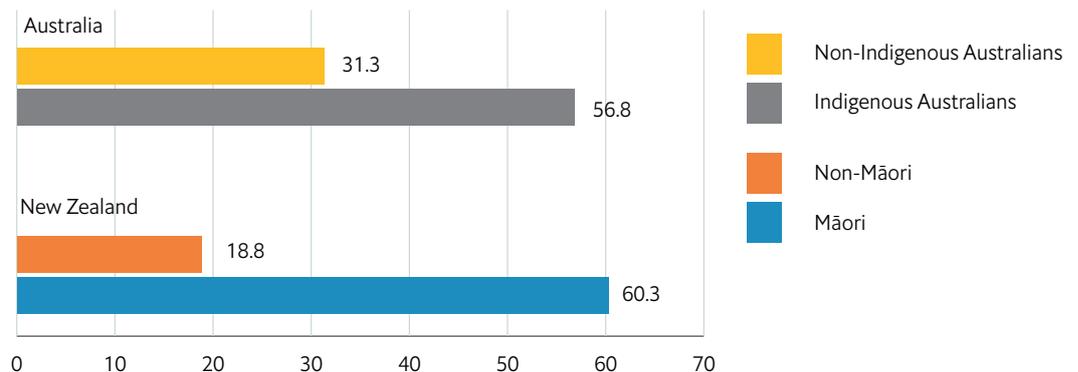
(per 100,000 population)



Note: The data is age-standardised. There is no data available for Hong Kong.  
Source: Global Burden of Disease, 2017.

**Figure 5: Lung cancer mortality rates by sub-populations in New Zealand and Australia**

(rate per 100,000)



Source: Ministry of Health, New Zealand, 2020; Australian Institute of Health and Welfare 2018

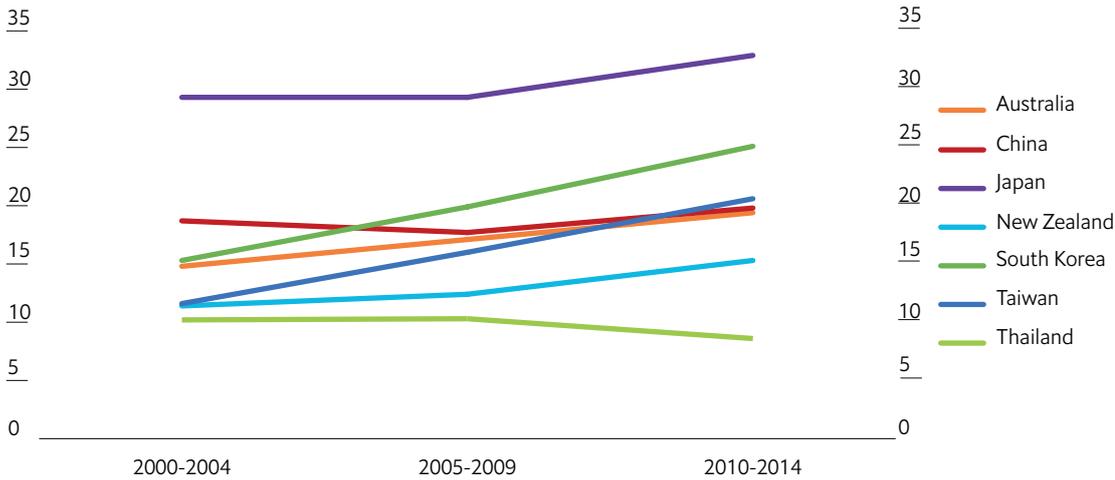
While New Zealand has seen steady decline in mortality rates, large inequalities persist between Māori and non-Māori, with Māori experiencing a mortality rate 3 times that of non-Maori (Figure 5). Similarly, despite the mortality rate for lung cancer decreasing overall in Australia, the mortality rate among Indigenous Australians has actually been increasing.

Figure 6 depicts average five-year survival rates among adults with lung cancer for each country and territory from three time periods: 2000-04, 2005-09 and 2010-14. Except for New Zealand and Thailand, all countries show an upward trend, with South Korea and Taiwan having the steepest increases in survival. Japan has continually had the highest five-year survival results, and Thailand the lowest. In 2010-14, the five-year survival rates for Japan and Thailand were 32.9% and 8.6% respectively, the latter a decline from about 10% in 2005-09. Survival data were not available for Indonesia and the Philippines.

A COMPARATIVE ANALYSIS OF LUNG CANCER POLICIES ACROSS THE ASIA-PACIFIC REGION

**Figure 6: Lung cancer 5-year survival rate**

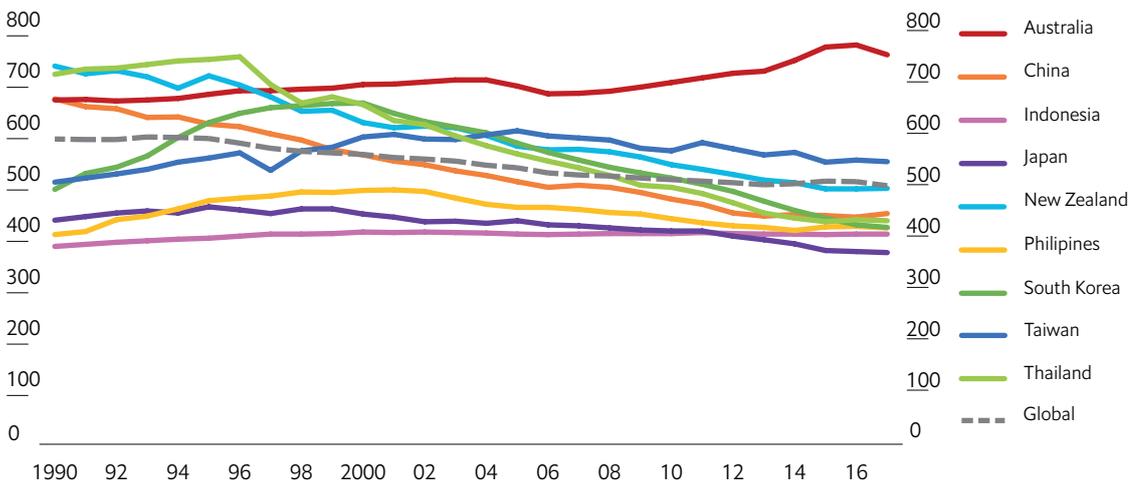
(adults 15-99 years, %)



Note: The data is age-standardised. There is no data available for Hong Kong, Indonesia or the Philippines.  
 Source: Allemani C, Matsuda T, Di Carlo V, et al. Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): analysis of individual records for 37,513,025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. Lancet. 2018; 391(10125):1023-75

**Figure 7: Lung cancer DALY rate, 1990 to 2017**

(rate per 100,000)

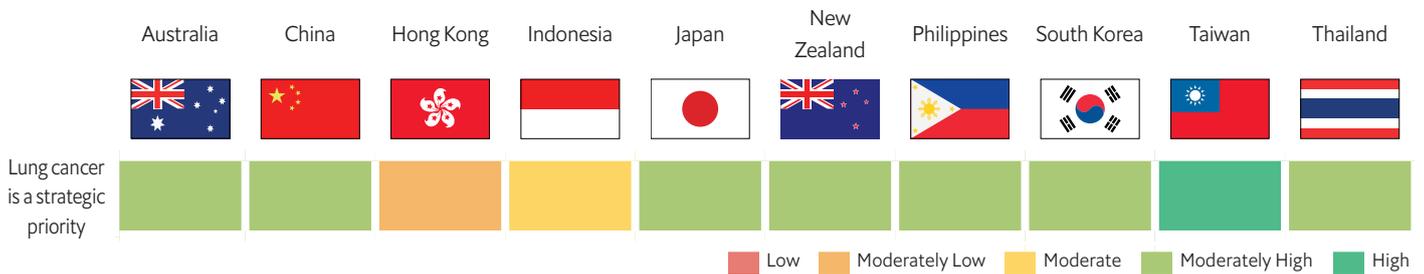


Note: The data is age-standardised. There is no data available for Hong Kong.  
 Source: Global Burden of Disease, 2017.

Lung cancer burden over time, captured via DALYs, is shown in Figure 7. After a steady decline in DALYs, Japan has had the lowest rate since 2012. Thailand and South Korea have seen the steepest declines in DALYs since 2000, while New Zealand has seen a steady decline from 1990. Since overtaking Thailand in 1998, China has consistently reported the highest DALY rates.

## Domain 1: Lung cancer is a strategic priority

**T**he strategic priority domain covers national cancer control plans and the use of guidelines. Although guidelines are arguably operational documents, they are included within this domain as they can be a means of incorporating the use of new technologies for diagnosis and treatment and benchmarking their use among clinicians. Taiwan was the only the high-income country to score high in this domain, while Australia, Japan , New Zealand and South Korea scored moderately high, and Hong Kong performed poorly. Among the middle-income countries studied, China, Thailand and The Philippines score moderately high, with Indonesia scoring moderately.



## National cancer control plans are the basis of coordinated action

A National Cancer Control Plan (NCCP) is a document produced by a government or health ministry that sets out how a country plans to address its cancer burden. There is increasing global recognition of the importance and impact of NCCPs. The 2017 World Health Assembly resolution on cancer prevention and control endorsed the inclusion of NCCPs for all countries globally, considering such plans as essential if governments are to achieve related Sustainable Development Goal targets by 2030. NCCPs detail the strategies taken by a nation to address the burden of cancer through the prioritisation and coordination of programmes including awareness, prevention, early detection and treatment. NCCPs should be evidence-based, regularly updated, realistic and goal-oriented, with a detailed implementation plan, and an appropriate, sufficient and clearly identified source of funding.

NCCPs exist in all ten countries included in our research, nine of which were published or updated within the past five years. Alongside an NCCP, a specific lung cancer control plan can add nuance and detail to a country’s approach to lung cancer. Such a plan also helps to demonstrate a commitment to addressing the burden posed by lung cancer. Nine of the ten countries that we studied do not have a specific lung cancer plan, with Australia being the exception.

Although both an NCCP and a lung cancer specific control plan exist in Australia, their implementation was highlighted as an issue by participants in our country-based workshop. The country’s NCCP and lung cancer specific plan were both developed by Cancer Australia, an agency that falls under the umbrella of the national government. However, it is the responsibility of individual state

and territorial governments to oversee cancer care. Workshop participants told us that this results in differing approaches being adopted, meaning the implementation of the strategies contained within the NCCP and the lung cancer plan can vary greatly.

The majority of the countries studied identified funding sources in their NCCPs, the exceptions being China, Indonesia, and Thailand. The strategic planning that goes into the development of NCCPs should be viewed as an investment in a country's health system, people and economy. As such, the sustained impact and ultimate realisation of an NCCP's goals is reliant on such plans being properly budgeted and funding mechanisms identified.

## Scope of clinical guidelines varies across the region

Based on the best available scientific evidence, clinical guidelines are produced to guide the treatment of a disease and formalise standards of care. When developed at a national level they can help to minimise intraregional discrepancies by establishing national benchmarks. A high-quality, evidence-based clinical guideline covers the continuum of care, ranging from screening and early detection through to diagnosis, treatment and psychological support, as well as supportive and palliative care. Ideally, clinical guidelines also describe the workings of multidisciplinary care teams and ensure that there is a role for patient involvement, for example through shared decision-making. To this end, including patient organisations in the development of clinical guidelines can help to prioritise what matters to the patient, potentially identifying issues that may otherwise be overlooked by health professionals.

Our analysis of national lung cancer clinical guidelines revealed significant variation in both quality and coverage. Lung cancer clinical guidelines exist in nine of the ten countries included in our research, with Hong Kong the only territory without such a guideline. All of the nine other countries' national lung cancer guidelines discuss diagnosis, treatment, and supportive and palliative care.

The nine countries' guidelines diverge in their coverage when it comes to screening and shared decision-making. The latter of these issues is where the majority of countries fall short, with only three countries, Australia, Taiwan and Thailand, including shared decision-making in their lung cancer clinical guidelines. Participants at the workshop in Taiwan told us that shared decision-making is a relatively new concept in Taiwan, but is quickly becoming routine practice for a range of conditions, including lung cancer. This change began in 2015 when a collaboration between Taiwan's Ministry of Health and Welfare, patient groups, and healthcare institutions was formed to develop a shared decision-making policy and promotion programme, which was initiated the following year.<sup>33</sup>

In contrast, participants at the workshop in Japan said that informed choice is absent from Japan's care delivery system, especially for diseases with serious prognosis and high mortality rates, such as lung cancer. It was noted that uncertainty and anxiety around such conditions may impede patients' and caregivers' decision-making capacities. With the constantly evolving nature of medical practice, it is important that care options are presented to patients within the cultural context that they are comfortable and familiar with.

In terms of screening, all but Thailand and the Philippines cover screening in their lung cancer guidelines. However, it should be noted that discussion of screening in national guidelines does not necessarily signal an endorsement of screening or the existence of a national lung cancer screening programme.

Participants at the workshop in New Zealand noted that while guidelines covering screening, diagnosis and palliative care are in place, adherence to the guidelines is variable across the country. A divergence between guidelines and clinical practice may result in suboptimal care, patient safety issues, and variations in outcomes for different patient populations across the country.

#### **Fresh thinking: opportunities for improvement**

##### **Implementation plans are central to success**

Comprehensive and up-to-date NCCPs that address the full spectrum of cancer control, from prevention and screening to diagnosis, treatment, supportive and palliative care, require effective implementation. Key to this is the inclusion of detailed implementation plans that map out how to enact a strategic NCCP, and how to manage and keep it on track. Unfortunately, such implementation plans are not commonplace in the Asia-Pacific region.

##### **Lung cancer specific control plans are missing**

Lung cancer specific control plans help to demonstrate a country's commitment to

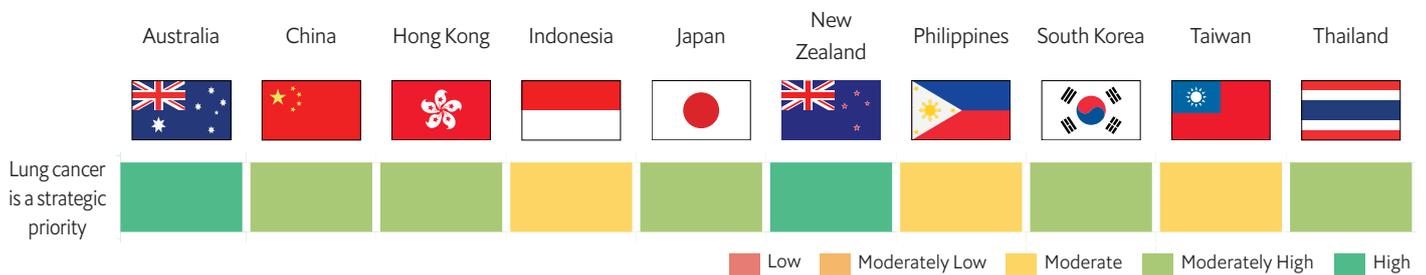
addressing the challenges and burden posed by lung cancer. Given that only one of the studied countries has such a plan, this is a missed opportunity for countries across the region.

##### **Shared decision-making**

The lack of shared decision-making within lung cancer guidelines is a clear regional shortcoming in efforts to provide patient-centred care for lung cancer patients. This gap can be addressed. In some cases, this may require confronting cultural taboos about keeping patients informed about their conditions and encouraging them to express their concerns to healthcare professionals. Regardless of the barriers, strides towards shared decision-making for lung cancer patients are imperative.

## Domain 2: Lung cancer is a public health issue

The public health domain covers awareness, prevention, screening and the role of patient input in policy formation. Five of the six high-income countries performed highly or moderately highly in this domain. This is largely owing to their policies and public health measures on tobacco control and e-cigarettes. Among the middle-income countries studied, Thailand and China score moderately high, with Indonesia and the Philippines scoring moderately.



## Tobacco control measures often fall short

Multifaceted tobacco control policies and public health measures exist in the majority of countries we have studied. Japan and Indonesia, at opposite ends of the income spectrum, are the main underperformers in this respect. Japan lacks a national anti-tobacco mass media campaign and does not have national smoke-free legislation for public spaces. Indonesia, a country with one of the highest rates of tobacco use globally, is yet to officially ratify WHO's Framework Convention on Tobacco Control and has failed thus far to implement a national ban on tobacco advertising.

Gan Quan, the director of the Tobacco Control Department for The International Union Against Tuberculosis and Lung Disease, works with the governments of China, Indonesia and the Philippines on public health initiatives related to smoking, with the primary aim of changing the "norm of smoking" in the region. China, the world's number one producer and consumer of cigarettes, is contending with a population in which 28% of all adults, or around 300 million people, smoke. At the same time, says Mr Gan Quan, the tobacco industry is owned by the state, presenting significant challenges for policymakers looking to restrict the use of tobacco. China has made progress over the past decade largely on the regional level, he adds, mainly in cities where the reach of the tobacco industry is less direct. Bans on smoking in public places have been in place in Beijing, Shanghai and Shenzhen for around five years.

Other countries in the region have similar conflicts of interest. In South Korea, where smoking prevalence is around 23% of the adult population over the age of 19, the national tobacco company also originated as a government enterprise in 1883, before being privatised in 2002. The country's pension system is a major stockholder in the company, meaning that the government has to tread carefully in fighting it, says Young Tae Kim, Chair of the Korean Association for Lung Cancer and Professor of Thoracic Surgery at Seoul National University Hospital.

The tobacco industry's ubiquitous presence in the decision-making process could be the main obstacle in taking effective tobacco control measures to protect the health of Filipinos.

*Bellew B, Antonio M, Limpin M, et al. "Addressing the tobacco epidemic in the Philippines: progress since ratification of the WHO FCTC."*

The tobacco lobby in the Philippines, has been described as the strongest in Asia, and has one of the highest per capita levels of cigarette consumption among ASEAN countries, with a smoking rate of 24% overall and a rate of nearly 42% among men.<sup>34,35</sup> A report by the Joint National Capacity Assessment on the Implementation of Effective Tobacco Control Policies, a group of national, international and WHO health experts working with a team from the Philippines Department of Health, noted that "it was clearly stated by interviewed stakeholders that the tobacco industry's ubiquitous presence in the decision-making process could be the main obstacle in taking effective tobacco control measures to protect the health of the Filipinos."<sup>36</sup>

### Smoking bans are inconsistent

Gaps in both policy and enforcement are seen elsewhere in the region. Only Hong Kong, New Zealand and Thailand have adopted the full slate of smoke-free legislation that we examined, banning smoking in public transport, offices, restaurants, cafes, pubs and bars. Australia has no national-level smoke-free policies; however, smoking bans are covered by state- and territory-level legislation.

Elsewhere, there are gaps in the coverage and implementation of smoking bans. In Thailand, for instance, smoking is not banned at the national airport, although smoking areas have been eliminated in all other public places since 2009. Additionally, in comparison with the capital, Bangkok, and the country's other large cities, smoke-free areas are not as well enforced in the country's provinces, Dr Vathesatogkit says.

Some of the region's middle-income countries have looked to introduce more comprehensive measures for controlling tobacco over the past decade. In 2012, the Philippines launched its first National Tobacco Control Strategy with a vision for a tobacco-free Philippines. In Indonesia, where 76% of men and 3.6% of women are smokers, the government is embracing social media platforms to curb tobacco use.<sup>2</sup> The Ministry of Health has run social media campaigns and established a website where Indonesians can share stories about the harm of tobacco and receive information on quitting and links to smoking cessation programmes.

Hong Kong's government actively "discourages smoking and disseminates warnings about the impact of second-hand smoke, and tobacco advertising is prohibited," says Calvin Sze Hang Ng, Professor of Thoracic Surgery at the Chinese University of Hong Kong. "There are strong warnings and very vivid pictures of harm from cigarette smoking displayed on cigarette packaging and tobacco is taxed, but below the recommended level suggested by WHO."

Taxation, seen by many experts as the most powerful tool for fighting tobacco use, is also a work in progress in many countries. In Thailand, where tobacco taxes were first introduced in 1993, tax rates are comparably high, Dr Vathesatogkit observes, with taxes equivalent to around 70% of the price of cigarettes. Yet levies on rolling tobacco are only 20% of the price; 45% of the country's smokers still smoke hand-rolled cigarettes.

The Philippines dramatically increased tobacco tax through the Republic Act 10351, otherwise known as the "Sin Tax Reform Act of 2012". Perhaps, partly because of this, Mr Quan says, the smoking rate in the country has fallen from 29.7% in 2009 to 23.8% in 2015.<sup>35</sup> But despite increased tobacco taxes in many countries, cigarettes are still quite affordable, Mr Quan says, noting that the medium price per package is still less than US\$2 in countries such as China.

## E-cigarettes pose a new challenge requiring on-going research and control measures

Electronic cigarettes, or e-cigarettes, simulate smoking without burning tobacco. There is some evidence that they help adult smokers to quit smoking, although they have not been shown to be more effective in this regard than smoking cessation medication.<sup>37</sup> The long-term health impact of using e-cigarettes (vaping) is unknown, and some experts worry about their potential to entice a new generation of smokers. This presents several challenges for health professionals and policymakers. Are e-cigarettes to be welcomed or are we in danger of ushering in a new epidemic? The view of our expert panel was the latter; e-cigarette use needs to be strictly regulated.

The lack of clarity over the potential harms or benefits of e-cigarettes may help to explain the variation observed in e-cigarette regulations across the Asia-Pacific region in our analysis. E-cigarettes are fully regulated under public health legislation—with age limits, advertising bans and prohibition of their use in public areas—in half of the studied countries (Australia, Hong Kong, Japan, New Zealand and Thailand).

Smoking e-cigarettes in statutory non-smoking areas in Hong-Kong is prohibited, and a draft law introduced in February 2019 bans the import, sale and manufacture of e-cigarette products, making them much more difficult to obtain.<sup>38</sup> “It will be an effective means to prevent most people from exposure to these products,” Professor Ng says, adding that offenders could face a maximum fine of HK\$50,000 (US\$6,450) and six months in prison.

## Smoking is not the only cause

Although tobacco use may be the leading risk factor for lung cancer,<sup>39</sup> the impact of air pollution, via particulate matter and radon, is clear and warrants action. In the emerging countries of the Asia-Pacific region, expanding population density in rapidly urbanising cities has caused air pollution to become an increasing problem, arising from poor waste management, industrialisation, construction, intensive agriculture, large volumes of vehicles and the combustion of dirty energy sources. According to the World Bank, approximately 87% of the world’s population now live in areas in which ambient pollution levels exceed air quality guidelines set by WHO.<sup>40</sup>

Increasing levels of air pollution are a major public health concern in the Asia-Pacific region, with 2.2 million air pollution-related deaths in the region in 2016, of which 308,000 were due to lung cancer.<sup>41</sup> The most commonly studied and identified form of air pollution is PM<sub>2.5</sub>, also known as fine particulate matter, referring to particles or droplets in the air that measure less than 2.5 micrometres in diameter. Research in mainland China has reported a “significant correlation” between PM<sub>2.5</sub> and lung cancer rates.<sup>11</sup> A recent study in Taiwan found that, despite a decline in the proportion of male smokers from 1995 to 2015 and a low rate of female smoking, rates of lung adenocarcinoma increased over the same period, as did levels of PM<sub>2.5</sub> pollution.<sup>42</sup>

In the case of national policies and programmes to control environmental exposure, all of the countries in our study have air quality strategies in place. However, only six have programmes to control radon: Australia, China, Hong Kong, Japan, New Zealand and South Korea.

Approximately 87% of the world’s population now live in areas in which ambient pollution levels exceed air quality guidelines set by WHO.

*World Bank & Institute for Health Metrics and Evaluation. “The cost of air pollution: strengthening the economic case for action.”*

## Decisions are needed on population-level screening

Screening for disease among people without symptoms or in specific high-risk groups is a controversial topic because of the risk of over-diagnosis and invasive tests with false-positive results. Lung cancer is no exception to these issues.<sup>43</sup> However, surviving lung cancer is clearly related to the stage at which it is diagnosed: the earlier the diagnosis, the better the prognosis.<sup>44</sup>

Recent new evidence shows that investing in earlier diagnosis of cancer is beneficial. The Netherlands–Leuven Longkanker Screenings Onderzoek (NELSON) trial (see box), a large and significant lung cancer screening trial that recruited from registries in Belgium and the Netherlands, demonstrated a large reduction in lung cancer mortality from the use of low-dose computed tomography (LDCT) screening in people at high risk for the disease.<sup>45</sup>

In the US, the National Lung Screening Trial (see box) led to the recommendation of LDCT for lung cancer screening by the American Cancer Society (ACS) and the US Preventive Services Task Force in 2013.<sup>46,47</sup> In January 2020, the ACS announced the largest single-year drop in cancer mortality, driven by improvements in lung cancer.<sup>48</sup> According to the ACS, overall cancer mortality fell by 2.2% from 2016 to 2017, propelled in part by annual reductions in lung cancer mortality of 4–5% since the introduction of lung cancer screening programmes.

Although no such recommendations exist in the Asia-Pacific region, the generation of a greater evidence base from populations within the region may lead to similar recommendations. Our analysis found that four of the six high-income countries studied—Australia, Japan, South Korea and Taiwan—are currently conducting or have previously conducted trials of screening programmes. China is the only one of the middle-income countries that we studied that have conducted such trials.<sup>49</sup>

A recent study simulated the effect of lung cancer screening in four Asian countries in which all four followed the US Centers for Medicare and Medicaid Services recommendations to conduct annual LDCT screening on all current and former smokers aged 55–77 with a smoking history of at least 30 pack-years (equivalent to 30 years of smoking an average of 20 cigarettes per day) and no more than 15 years since they quit. The study determined that if this programme ran through 2040, the reduction in lung cancer mortality would be 4.3% in Japan, 4.7% in South Korea, 4.2% in China and 3.8% in Singapore.<sup>50</sup>

However, there remains a particular disagreement over the cost-effectiveness of broad LDCT screening, especially on a population level. “Most early lung cancers are detected by patients and doctors with a high sense of awareness in clinics and private annual health checks,” says Professor Ng, noting that Hong Kong currently has no national screening programme. “I think we are watching how this plays out in other economies and the impact of screening on the healthcare system before considering [screening],” he adds.

Professor Ng is also wary of the unintended burden that widespread screening may place on the region’s health systems. “In Asia, LDCT screening for lung cancer in high-risk individuals would uncover a huge number of patients with indeterminate small lesions on the lung, many due to scars, previous infections, previous pulmonary tuberculosis, occupational exposures, and so on, that require follow-up scans, biopsies ... that can put a very large strain on any healthcare system.”

The Australian government recently began exploring the feasibility of a national targeted lung cancer screening programme. Last year, the government launched an inquiry, due to conclude in

October 2020, to investigate the potential of such a programme.<sup>51</sup> In 2019, South Korea launched a national lung cancer screening programme for heavy smokers, with a screening interval of two years. The programme will be expanded from 2021 to include ex-smokers with a history of over 30 pack-years.<sup>52</sup>

In Taiwan, LDCT screening is recommended for heavy smokers and those with a family history of lung cancer, based on cost-effectiveness research from a local lung cancer cohort.<sup>53</sup> Research on the benefits of screening non-smokers within the Taiwanese population is ongoing.<sup>54</sup>

In 2013, following the sudden illness of a number of previously healthy doctors, National Taiwan University Hospital ordered all staff physicians over the age of 45 to take a physical examination, including LDCT scans of the lung. Of 300 physicians, 4% were found to have stage 1 lung cancer, all of which were asymptomatic non-smokers in otherwise good health. All were successfully treated with surgery, but the findings suggested that screening could be beneficial to never-smokers in East Asian countries, where people face a number of risk factors for the disease, including genetic mutations, exposure to cooking fumes and air pollution.<sup>55</sup> Given the time that it can take for cancer to develop, environmental exposure can manifest itself even decades later, such as in Taiwan, which experienced especially poor air quality in the 1970s and 1980s.<sup>56</sup>

“Screening is one way to go about controlling lung cancer, especially in Asia where there are many non-smoking females with lung cancer,” says Dr Kim. “We need to find out how to prevent it, and who should be scanned from the non-smoking population.”

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*Calvin Sze Hang Ng,  
Professor of Thoracic  
Surgery, Chinese University  
of Hong Kong*

## Screening: are we approaching a global consensus?

### China

China has been one of the regional leaders in lung cancer screening research. A 2010 study looked at the possibility of conducting national population-based screening, while in 2012 the Ministry of Health launched the Cancer Screening Project in Urban Areas of China, providing free LDCT screening to around 210,000 people over a period of five years.<sup>57,58</sup> Encouraging results from this initial programme led the Chinese National Health and Family Planning Commission to expand eligibility criteria to younger and lighter smokers in 2015.<sup>59</sup>

### Japan

Japan has used LDCT screening since the 1990s, including light smokers and non-smokers, although eligibility can vary by prefecture. A study based in the city of Hitachi examined two groups of smokers and non-smokers between 50 and 74 who

had been screened by either LDCT or x-ray; the study concluded that LDCT screening may be effective for a broad population of smokers and non-smokers.<sup>60</sup>

### Taiwan

In 2014, the Ministry of Health and Welfare conducted a national lung screening programme, Taiwan Lung Cancer Screening for Never-smoker Trial (TALENT), a nationwide, multicentre LDCT screening study of 12,000 people over four years, with a three-year follow up period. All of the subjects were non-smokers with a family history of lung cancer within third-degree relatives, passive smoke exposure, a history of certain lung diseases or exposure to unventilated cooking fumes. The study resulted in a high detection rate compared with the National Lung Screening Trial and suggested that LDCT screening might help to predict lung cancer risk in never-smokers.<sup>61</sup>

### South Korea

The Korean Lung Cancer Screening Project (K-LUCAS) targeted a high-risk population of people aged between 55 and 74 with

## BREATHING IN A NEW ERA

### A COMPARATIVE ANALYSIS OF LUNG CANCER POLICIES ACROSS THE ASIA-PACIFIC REGION

at least a 30 pack-year smoking history. The small pilot project found that LDCT screening was effective and feasible to roll out on a national level, ultimately leading to the launch of a new national lung cancer screening programme in the country in 2019.<sup>62</sup>

#### **Australia**

In 2015, the Department of Health Standing Committee on Screening said that current evidence “does not support an Australian lung cancer screening programme, either for the general population or for high-risk populations”.<sup>63</sup> There have been no changes to policy since; however, in August 2019, the country’s health minister invited Cancer Australia to conduct an inquiry into the prospects, process and delivery of a national screening programme. The inquiry is due to conclude in October 2020. Australia is currently participating in the International Lung Screen Trial, an international, multicentre prospective cohort study involving 4,500 participants, including 2,000 from Australia. The trial, which began in 2017, aims to define the optimal selection criteria for LDCT screening.

#### **International**

The International Early Lung Cancer Action Programme was borne out of the benefits stemming from the Early Lung Cancer Action Programme initiated in New York in 1992.<sup>64,65</sup> The results showed the benefit of annual CT screening for lung cancer by demonstrating that screening identified a high proportion of lung cancer in Stage I.

#### **Belgium and the Netherlands**

The Netherlands–Leuven Longkanker Screenings Onderzoek (NELSON) trial is the largest European randomised controlled

trial to demonstrate a reduction in lung cancer mortality with low dose computed tomography (LDCT) screening in people at high-risk for the disease.<sup>45</sup> Individuals were recruited from population-based registries in Belgium and the Netherlands. The study compared groups offered screening with LDCT with those not screened. Subjects were followed for ten years.

Final results, published in January 2020, showed that the benefits of LDCT screening were even larger in the NELSON trial than demonstrated in the National Lung Screening Trial (NLST; see below). Eligibility for screening in NELSON was broader than in the NLST, and the results showed the NELSON patients benefited from a 24% reduction in lung cancer mortality (in women, the reduction was even higher, at 33%, although the number of women in the study was low).

The issue of false-positives had been a foremost concern in people who had been sceptical of screening. Analysis conducted by modellers have suggested that the lead time of LDCT screening in some cancers can be between 9-12 years for some cancers, suggesting that additional years of follow-up is vital.<sup>66</sup> Indeed, in the final study results, a low rate of referrals due to false-positive results was found (2.1%).<sup>66</sup>

#### **United States**

The NLST is a seminal US-based clinical trial supported by the National Cancer Institute and conducted by the American College of Radiology Imaging Network and Lung Screening Study Group.<sup>67</sup> Over 53,000 people at high-risk for lung cancer were randomised to screening with LDCT or chest x-ray starting in 2002. The results, announced in November 2010 (published in May 2011), demonstrated a 20% reduction in mortality from lung cancer and a 7% all-cause mortality reduction in the LDCT arm.<sup>68</sup>

## Patients need more support and a stronger voice

The importance of the patient voice, through which patients' opinions and experiences can inform medical care, is increasingly recognised as a fundamental component of modern health systems. Until relatively recently, patient engagement has centred on involving patients in making care decisions, or empowering patients to better manage their conditions. However, patient engagement has evolved to include greater participation in the wider healthcare system, including contributing towards reimbursement decisions through the health technology assessment (HTA) process and policy development via collaborations between patient organisations and policymakers.

With greater levels of patient engagement observed in Europe and North America, are patients in the Asia-Pacific region getting the opportunity to have their voices heard? Of the ten countries studied, only Japan and Australia have lung cancer specific patient organisations that contribute to clinical guideline development. There is no evidence of the existence of similar organisations in the other countries we studied. Less than half of the studied countries (Australia, Indonesia, Taiwan and Thailand) provide an opportunity for civil society to comment on HTA recommendations, although this in part reflects the slower adoption of HTA in the region.

The relative lack of patient involvement in healthcare decision-making in Asia may be reflective of cultural underpinnings in Asian societies.<sup>69</sup> However, participants in the workshop in Taiwan spoke of a potential culture shift in this area. Participants discussed the transition occurring in their country from minimal patient involvement to one where patients are much better informed and more willing to engage in decision-making related to their conditions and the wider health system. Since 2015, patients in Taiwan have been encouraged to give their opinions to the National Health Insurance Administration (NHIA) on new medicines and devices through a variety of forums and online platforms. Taiwan was the first health system in Asia to create such a platform for patients to express their opinions for consideration in reimbursement decision-making. In addition to the involvement of patients in such meetings, the NHIA also provides training for patient groups to enable participants to improve how they communicate.

Australia is viewed as another example of a country actively pursuing mechanisms to better involve patients' perspectives in decision-making and policymaking. Although patients are invited to submit comments for consideration in HTAs, there have been calls for greater transparency and clarity in terms of how patient comments and perspectives are utilised in this process.<sup>70</sup>

While civil society has an opportunity to comment on HTA recommendations in New Zealand, participants at the workshop felt that this involvement was limited and insufficient. Workshop participants stated that they would like to see a greater patient voice in Pharmaceutical Management Agency's (PHARMAC) reimbursement decision-making processes, allowing patient organisations and patients with lived experience of lung cancer a meaningful opportunity to contribute towards HTA recommendations.

#### **Fresh thinking: opportunities for improvement**

##### **Strengthen prevention**

There is significant room for improvement when it comes to public health approaches to lung cancer prevention in the region. One tobacco-related measure that governments can take immediately is to ensure that smoke-free legislation is enforced on a national level. With almost half of the countries studied lacking radon control policies, efforts are needed to help minimise exposure to radon among populations across the Asia-Pacific region.

##### **Greater patient involvement**

To give lung cancer patients a stronger role in policymaking and decision-making processes, greater efforts are needed to support and

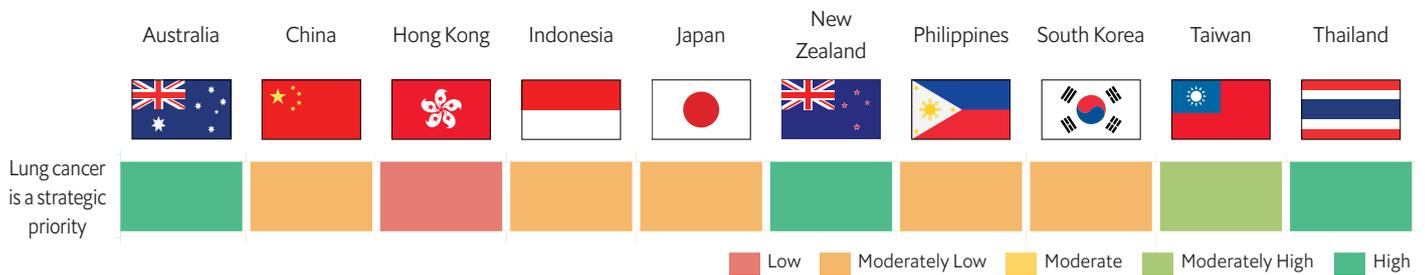
engage patient organisations. Integrating patient organisations into the decision-making process may help to identify issues that health professionals have overlooked, as well as encouraging the development of recommendations from a patient or carer perspective.

##### **Screening for early detection**

Population screening shows potential to improve outcomes, but choosing those to be screened may be controversial. The most important factor is that such decisions are informed by an evidence-based approach. All countries should investigate the potential impact of lung cancer screening. Future research should consider the potential of liquid biopsies and biomarkers to transform lung cancer screening.<sup>71</sup>

## Domain 3: Lung cancer is a race against time

This domain addresses issues around early diagnosis and referral to treatment. These need to be discussed in the clinical guidelines along with specific referral pathways and timelines. Of the high-income countries, Australia, New Zealand and Taiwan scored high or moderately high, while only one of the middle-income countries, Thailand, scored high in this domain. The remaining countries scored moderately low, except for Hong Kong which scored low.



### Quality indicators are needed to measure health system performance

Lung cancer has been associated with poor health outcomes for a variety of reasons, including quality of care, timing of diagnosis, diagnostic methods used, disease staging, initiation and type of treatment. Earlier access to specialist lung cancer care improves survival, highlighting the need for streamlined patient referral. To standardise lung cancer care pathways and improve patients' clinical outcomes, guidelines should incorporate optimal timeframes for diagnosis and referral to specialised care.

In this domain, we focus on the provision of these quality indicators within national clinical guidelines that could ensure that lung cancer is detected early and patients are fast-tracked to treatment. Once defined and measured, such measures can help to hold healthcare delivery systems accountable. The advantage of setting specific timeframes for these indicators is that doing so provides both a structured route through care and a sense of urgency vital to patients with lung cancer. The result is a system focused on providing timely care and management, ultimately helping to improve long-term outcomes.

### Diagnosis and referral to specialised care are particular weak spots

Lung cancer is rarely diagnosed during the earliest stages of the disease, despite early diagnosis being especially urgent, as the disease tends to have a poor prognosis. One of the greatest challenges to early diagnosis is the lack of explicit symptoms, as people with lung cancer present with a range of symptoms, often simultaneously, that can point to a variety of other diseases and conditions that are commonly found in the primary care setting. Symptoms can include cough, shortness of breath,

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haemoptysis (coughing up of blood or blood-stained sputum), chest pain, loss of weight, loss of appetite and fatigue, persistent chest infection, and metastases, particularly to bone or brain.<sup>72</sup>

Incidence rates of tuberculosis (TB), which presents with symptoms very similar to lung cancer, continue to be high in many of the countries we studied, especially the middle-income countries. For example, in the Philippines, the TB incidence rate was 554 per 100,000 population in 2018, while in Indonesia it was 316 per 100,000 population.<sup>73</sup> This further complicates lung cancer diagnosis, as it may often be misdiagnosed as TB in endemic countries.<sup>74</sup> Indeed, both Indonesia and the Philippines ranked highly among the ten countries in our scorecard in terms of the epidemiology of lung cancer (incidence, prevalence, DALY and deaths), despite having high smoking rates and relatively high levels of social deprivation.

Unique to the Asia-Pacific region is that more women and non-smokers are diagnosed with lung cancer than elsewhere in the world, as well as frequently being diagnosed at a more advanced stage of the disease.<sup>75</sup> This is related to many unique characteristics of Asian patients, spread across ethnicity, genetics and histology, working together to give rise to a distinct Asian disease profile. Yet suspicion for lung cancer may not be high when female and non-smoking patients (of which there is a large crossover) first present to a health care professional, resulting in delayed or missed diagnosis.<sup>76</sup>

Delays in diagnosis and subsequent referral are likely to adversely affect outcomes for patients. Inclusion in lung cancer clinical guidelines of a fast-track for diagnosis of suspected lung cancer patients, along with specific timeframes for referral to specialised care, is a critical step to improve health outcomes.

Of our study countries, only Australia, New Zealand, Taiwan and Thailand have guidelines calling for suspected lung cancer patients to be fast-tracked for diagnosis within a set timeframe. The guidelines in Australia and Thailand also establish pathways for rapid referral of lung cancer patients for advanced treatment. However, in practice, regional variations occur, even within countries. In Thailand, for example, implementation is often patchy in rural parts of the country, according to Dr Vathesatogkit. He says that although there are six regional cancer centres in Thailand, referral depends on individual doctors, with patients who live near university hospitals more likely to get the most advanced treatment.

In wealthier Hong Kong, rapid referral is more accessible for those with private health insurance, says Dr Ng, adding that the private sector has many more specialists and appointments, and surgery can be arranged quickly. In the public system, there is often a waiting list to see a specialist and obtain investigations, scans and surgery.

A multidisciplinary care system can alleviate some of the challenges and delays that newly diagnosed patients may face in obtaining and coordinating appointments with multiple specialists. Clinics organised around multidisciplinary care teams improve both time to diagnosis and initiation of treatment.<sup>73</sup> Multidisciplinary care teams guide patient treatment in nine of the ten countries studied, Hong Kong being the only exception.

A recent Lung Cancer Quality Improvement Monitoring Report by New Zealand's Cancer Control Agency highlighted a key issue in lung cancer care in New Zealand: route to diagnosis.<sup>77</sup> Of the 8,577 people diagnosed with lung cancer in New Zealand between 2015 and 2018, almost half (45%) were

diagnosed following a presentation to an emergency department. A worrying statistic given that patients presenting via an emergency department have a poorer prognosis. The report also showed a wide variation of this occurrence across the twenty District Health Board's (DHBs) in New Zealand, ranging from 31% to 63%. Participants at the workshop expressed a hope that such reports would facilitate an opportunity for DHBs to gain insights of better practices and processes within New Zealand to reduce such variation, and ultimately improve care and outcomes.

One of the weakest areas for countries in our scorecard is diagnosis and referral for treatment. Setting timeframes for fast-tracking suspected cases, and rapid referral to treatment, are the first essential steps towards improved care for most of the countries in the region. Once the disease has been detected, rapid referral pathways need to be embedded within the guidelines to ensure that patients receive specialised care without delay. Making sure that these guidelines are then followed will require more significant investment in capacity, monitoring and definition of treatment pathways, as we will see in the next section.

### **Fresh thinking: opportunities for improvement**

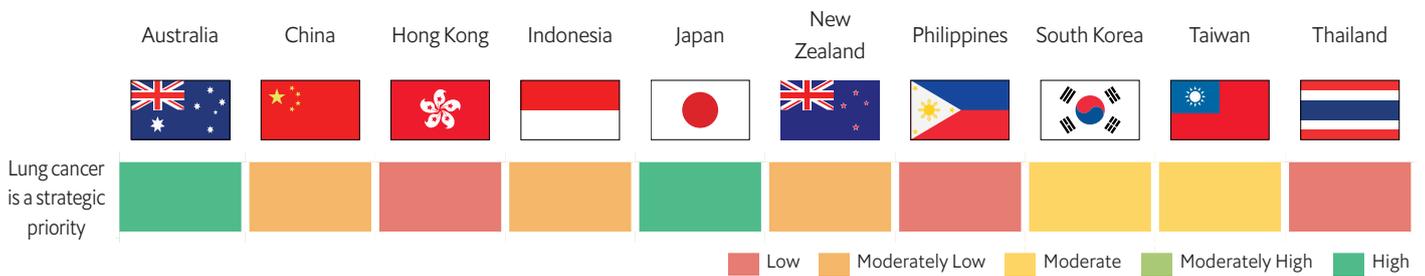
#### **Fast-tracking is essential**

One of the weakest areas for countries in our scorecard is diagnosis and referral for treatment. Setting timeframes for fast-tracking suspected cases, and rapid referral to treatment, are the first

essential steps towards improved care for most of the countries in the region. Once the disease has been detected, rapid referral pathways need to be embedded within the guidelines to ensure that patients receive specialised care without delay. Making sure that these guidelines are then followed will require more significant investment in capacity, monitoring and definition of treatment pathways, as we will see in the next section.

## Domain 4: Lung cancer is at a crossroads

This domain covers all aspects involved in lung cancer treatment, from surgery to radiotherapy and chemotherapy, in addition to newer targeted therapies and immunotherapy. As part of the complete care and management of lung cancer, this domain also covers biomarker testing, psychological support, and supportive and palliative care. Only two of the high-income countries, Australia and Japan, scored high in this domain, while Taiwan and South Korea scored moderately, and Hong Kong performed poorly. The middle-income countries scored moderately low or low in this domain, reflecting the various challenges faced by their health systems in delivering the most up-to-date treatments.



### New paradigms of lung cancer care

With recent advances in the way that lung cancer is diagnosed and treated, patients’ chances of survival are higher than before. The treatment that a lung cancer patient receives is typically dictated by the stage at which diagnosis is made, the individual’s personal profile, and treatment choices available to patients at different stages. As cancer severity ranges from stage 0, a small non-invasive tumour, to stage IV, the most advanced form of the disease, in which the cancer has spread far and wide to other parts of the body, so do treatment options, which include surgery, chemotherapy, radiotherapy, targeted drug therapy and immunotherapy.

Surgery, chemotherapy and radiotherapy have long been the backbone of cancer treatment. The two common surgical procedures for lung cancer are lobectomy (the removal of an entire lobe of a lung) and a wedge resection (removing only a portion of the lobe). Chemotherapy is drug treatment using agents that are systemic, not specific to a particular type of cancer; platinum-based chemotherapy is the recommended treatment for many lung cancer patients.<sup>73</sup> Radiotherapy uses radiation to kill cancer cells. Our research found significant variability in access to radiotherapy between countries (see Table 2). In the case of available radiotherapy megavoltage machines, the number ranges from just 35 in the Philippines to 1,582 in more populous China. In both the Philippines and Indonesia, the percentage of unmet need for radiotherapy exceeded 70%, almost reaching 90% in the latter. Even in relatively well-equipped Japan, there is an unmet need of close to 17%.

A 2015 report in *The Lancet Oncology* noted that around half of all cancer patients would benefit from radiotherapy, both to treat localised disease and provide palliative care. Yet a worldwide shortage of radiotherapy services means that 90% of the population in low-income countries lacks access to the treatment, while middle-income countries also struggle to provide it, owing to a lack of trained personnel and facilities.<sup>78</sup> *The Lancet Oncology* report forecast that growth of radiotherapy capacity between 2015 and 2035 could save 26.9 million life-years in low- and middle-income countries over the lifetime of the patients receiving treatment. The report also found that such an increase in capacity could produce an economic benefit of as much as US\$1 billion for low-income countries and US\$38.5 billion in lower-middle-income countries over the same period.

**Table 2: Demand vs supply of radiotherapy megavoltage machines (MVM)**

	2012 MVM demand	2013 MVM supply	% of unmet need
Australia	205	137	-33.2
Japan	1092	912	-16.5
Korea, Republic of	276	125	-54.7
New Zealand	36	28	-22.2
Thailand	141	68	-51.7
Philippines	127	35	-72.4
Indonesia	393	40	-89.8
China	3446	1582	-54.1

Source: Yap et al. Global access to radiotherapy services: have we made progress during the past decade?, *Journal of Global Oncology*, 2016, 2(4):207-215.

Note: Data unavailable for Hong Kong and Taiwan.

An increase in radiotherapy capacity could produce economic benefits of as much as US\$1bn for low-income countries and US\$38.5bn in lower-middle-income countries in 2015-35.

Atun R, Jaffray DA, Barton MB, et al. "Expanding Global Access to Radiotherapy – The Lancet Oncology Commission."

Advances in science have seen new treatment options emerge, including targeted therapy and immunotherapy. Targeted therapy consists of medications that specifically target certain cellular changes; they are more focused than systemic chemotherapy drugs and often have less severe side effects as a result. Targeted therapies are typically used for patients with advanced lung cancer, either on their own or in combination with chemotherapy.<sup>79</sup>

Immunotherapy, which leverages the body’s own immune system to fight cancer has quickly emerged as a cornerstone of oncology treatment.<sup>79</sup> Immunotherapy medication targets a protein receptor on a group of white blood cells called T-lymphocytes, also known as T-cells.<sup>80</sup> This process enables T-cells to recognise cancer cells and kill them.<sup>80</sup> As with targeted therapy, it is possible to use immunotherapy alone or in combination with chemotherapy.

A prerequisite to accessing surgery is having the workforce to deliver the necessary procedures. In terms of access to surgical care, the number of surgeons varies widely from country to country in the Asia-Pacific region. However, there is a clear shortage of specialist thoracic surgeons in many countries—less than one per 100,000 people in Australia, Hong Kong, the Philippines and Thailand. Japan performs slightly better, with just over one thoracic surgeon per 100,000 people; South Korea and Taiwan, the best performers, respectively have two and three surgeons per 100,000 people. There were no data available for China or Indonesia.

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**Table 3: Reimbursement statement for 13 drug and indication combinations for seven targeted lung cancer therapies**

Drug name	Indication	Australia	China	Hong Kong	Indonesia	Japan	New Zealand	Philippines	South Korea	Taiwan	Thailand
Afatinib	As monotherapy indicated for the treatment of Epidermal Growth Factor Receptor (EGFR) TKI-naïve adult patients with locally advanced or metastatic NSCLC with activating EGFR mutation(s).	1	1	0	1	1	0	0	1	1	0
Afatinib	As monotherapy indicated for the treatment of locally advanced or metastatic NSCLC of squamous histology progressing on or after platinum-based chemotherapy.	0	1	0	0	1	0	0	0	1	0
Crizotinib	For the first-line treatment of adults with anaplastic lymphoma kinase (ALK) positive advanced NSCLC	1	1	0	0	1	0	0	1	1	0
Crizotinib	For the treatment of adults with previously treated anaplastic lymphoma kinase (ALK) positive advanced NSCLC.	1	1	0	0	1	0	0	1	1	0
Crizotinib	For the treatment of adults with ROS1-positive advanced NSCLC	1	1	0	0	1	0	0	1	1	0
Pembrolizumab	As monotherapy for the first-line treatment of metastatic NSCLC in adults whose tumours express PD-L1 with a $\geq$ 50% tumour proportion score (TPS) with no EGFR or ALK positive tumour mutations	1	0	0	0	1	0	0	0	1	0
Pembrolizumab	In combination with pemetrexed and platinum chemotherapy, for the first-line treatment of metastatic non-squamous NSCLC in adults whose tumours have no EGFR or ALK positive mutations	1	0	0	0	1	0	0	0	0	0
Pembrolizumab	In combination with carboplatin and either paclitaxel or nab-paclitaxel, for the first-line treatment of metastatic squamous NSCLC in adults	1	0	0	0	1	0	0	0	0	0
Pembrolizumab	As monotherapy for the treatment of locally advanced or metastatic NSCLC in adults whose tumours express PD-L1 with a $\geq$ 1% TPS and who have received at least one prior chemotherapy regimen. Patients with EGFR or ALK positive tumour mutations should also have received targeted therapy before receiving Pembrolizumab	1	0	0	0	1	0	0	0	0	0
Nivolumab	As monotherapy for the treatment of locally advanced or metastatic NSCLC after prior chemotherapy in adults	1	0	0	0	1	0	0	1	1	0
Atezolizumab	As monotherapy is indicated for the treatment of adult patients with locally advanced or metastatic NSCLC after prior chemotherapy	1	0	0	0	1	0	0	1	1	0
Durvalumab	For the treatment of locally advanced, unresectable NSCLC in adults whose tumours express PD-L1 on $\geq$ 1% of tumour cells and whose disease has not progressed following platinum-based chemoradiation therapy	0	0	0	0	1	0	0	0	0	0
Osimertinib	For the treatment of adult patients with locally advanced or metastatic epidermal growth factor receptor (EGFR) T790M mutation-positive NSCLC	1	1	0	0	1	0	0	1	1	0

One of the challenges in evaluating the accessibility of treatment is the difficulty in compiling data. With the exception of Australia, Hong Kong, New Zealand, South Korea and Taiwan, data on the number of general surgeons per 100,000 population are sparse, at best. Apart from Hong Kong, New Zealand and Japan, no country data are available on the number of pulmonologists per population.

In addition to the need for a sufficient healthcare workforce, the availability of treatments is also crucial. In order to estimate the availability of targeted and immunotherapy drugs, we looked at the reimbursement status of 13 drug and indication combinations for a range of tyrosine kinase inhibitors and anti-PD1 antibodies (Table 3). Japan scores highest in our analysis, followed by Australia, Taiwan and South Korea, all of which are among the higher-income countries included in our research. Neither Hong Kong nor New Zealand provide coverage to the therapies that we have included in this research via their public health system. However, the Hospital Authority in Hong Kong provides access to some of these drugs via two medical assistance programmes, the Samaritan Fund and the Community Care Fund, with patient eligibility decided based on household means-testing. In New Zealand, reimbursement is available for other lung cancer treatments, including Gefitinib and Alectinib.

Of the middle-income countries, availability is highest in China. While Indonesia includes one of the assessed indications in the country's national formulary, none of the studied indications are covered by the public health systems of the Philippines or Thailand.

## **Tumour testing is critical to determine that patients receive the right treatment**

With the rise of targeted and immune therapies in lung cancer, tumour testing or biomarker testing has become increasingly important to ensure that patients receive the therapy for which they are most likely to respond to, in relation to their specific tumour. There are four tests commonly used in lung cancer: anaplastic lymphoma kinase (ALK), epidermal growth factor receptor (EGFR), ROS proto-oncogene 1 receptor tyrosine kinase (ROS1), and programmed death-ligand 1 (PD-L1).

Access to newer, targeted therapies is often limited because of the unavailability of molecular companion diagnostic tests. High levels of pathogenic mutations of EGFR in advanced non-small-cell lung carcinoma (NSCLC) patients have been observed in Asian populations, potentially indicating the need for the use of EGFR-targeting therapies.<sup>81</sup> The lack of molecular testing could limit the appropriate use of these therapies. Interestingly, another survey of specialists mapping EGFR tests and EGFR-TKI availability in countries across the world found the affordability of the companion diagnostic test for EGFR to be correlated to the Human Development Index, which ranks countries on life expectancy, education and per capita income.<sup>82</sup> Those countries with lower per capita income faced higher out-of-pocket expenses related to the cost of the diagnostic test.<sup>82</sup>

Perhaps surprisingly, most of the countries in our study have systems in place for testing tumours for specific markers. With the exception of Hong Kong and the Philippines, all of the countries in the scorecard conduct histological and molecular testing of tumours, as well as identifying specific histological markers in lung cancer guidelines or pathways.

## Innovation holds promise, but access lags

Access to new treatments can be a challenge for health systems with limited resources. Attaining market approval is only the first hurdle: if and how a treatment will be reimbursed creates its own significant challenges. Decisions on reimbursement (and the duration of the process to reach such decisions) vary substantially across the Asia-Pacific region.

Delay in access results from a variety of reasons, including pricing negotiations, varying HTA processes (in some cases, there is almost a complete lack of such processes), and unclear or undefined timelines. Japan, which has the shortest delay, follows a rule that drugs must be reimbursed within 90 days of market approval. Although health authorities in Japan conduct HTAs, which can sometimes lengthen the time to patient access, they do so in order to guide the pricing adjustment of the drug after listing, rather than for reimbursement decisions, as is commonly the practice elsewhere.<sup>83</sup>

Conducting a structured HTA is a vital part of the reimbursement decision-making process in those countries that have a publicly funded payer system. Faced with new and innovative treatments, governments struggle to provide timely access while at the same time demonstrating evidence of value for patients at the population level. Both aspects have to be taken into consideration by public payers when making reimbursement decisions. Although the need for timely access is uncontroversial, the lack of robust data makes it difficult to determine value-for-money for patients and taxpayers alike. Balancing a new medication's price with its value to the patient and wider society is challenging. This is a multidisciplinary process in which economic, social, organisational and ethical issues are used to aid decision-making while also considering fiscal costs and expected impact.

HTA agencies in the Asia-Pacific region are at evolving stages of development. Some countries, such as Australia, New Zealand, Taiwan and South Korea, have more mature systems, while others, such as Japan and Thailand, are evolving. Others, namely Indonesia and the Philippines, are at a very early stage in this process.

Globally, the need for information to assess a new therapy's value has resulted in the development of scales such as the European Society for Medical Oncology Magnitude of Clinical Benefit Scale, the Amélioration du Service Médical Rendu in France, the patient benefit scale in Germany, and estimates of improvements in quality-adjusted life years (QALY) used in Sweden and the UK, which help clinicians and reimbursement authorities to measure the value of new treatments.<sup>84</sup>

Similar scales have not yet been specifically developed for the Asia-Pacific region. Workshop participants from Taiwan and South Korea were especially concerned about the lack of region-specific clinical benefit scales leading to uninformed or misinformed decision-making by reimbursement authorities. In South Korea, insurance covers immunotherapy under strict indications, but defining eligibility is challenging in the absence of evidence about who is likely to benefit, said Dr Kim. Patients resort to private insurance or pay for their treatment out of pocket, but in cases or countries where optimal treatments are often only available at full price, catastrophic personal health expenditure is a significant risk.<sup>85</sup>

Some short-term measures could be employed to accelerate access to new treatments. Such measures include innovative reimbursement schemes, compassionate use programmes, monitoring systems and special pricing agreements made with the pharmaceutical and medical device industry.

Compassionate use programmes, while helpful, are only available in certain countries and are often limited to specific patient populations. Monitoring systems for newly approved treatments can help to answer effectiveness questions over time, particularly when evidence is scarce during the HTA process. Special pricing arrangements consist of legal agreements between payers and the industry to align on value, speed to market and/or risk in relation to specific treatments. Such agreements enable access to and/or reimbursement for medicines for specified conditions, over time.

Fundamentally, governments must ensure that sufficient funding is allocated to systematic HTA processes that support informed decision-making. Only then can they give patients access to innovative and life-saving therapies in a timely and cost-effective manner.

Just three countries—Australia, New Zealand and Indonesia—have guidelines in place that mention the psychological burden of lung cancer, and only Australia and New Zealand have a referral pathway to support services for lung cancer patients.

## Patient support is lacking

WHO defines palliative care as “an approach that improves the quality of life for patients and their families facing the problems associated with life-threatening illness through the prevention and relief of suffering by means of early identification, impeccable assessment, and treatment of pain and other problems, physical, psychosocial and spiritual.”<sup>86</sup> Sometimes the term “supportive care” is used for those services provided during the course of active treatment and “palliative care” is used for end-of-life care. We treat supportive and palliative care as one continuum.

Emphasis on the supportive and palliative care needs of lung cancer patients is a basic standard of care in international guidelines developed by the European Society for Medical Oncology, the American Society of Clinical Oncology and the National Comprehensive Cancer Network (NCCN, a US-based non-profit network of cancer care providers).<sup>87-89</sup> Yet, awareness of the psychological burden of lung cancer and the need for adequate support services is still relatively new in many parts of the world, and the Asia-Pacific region is no exception. Just three countries—Australia, Indonesia and New Zealand—have guidelines in place that mention the psychological burden of lung cancer, and only Australia and New Zealand have a referral pathway to support services for lung cancer patients.

However, participants in our workshop in Australia raised concerns about the provision of psychological services to lung cancer patients. Although a referral pathway exists in principle, the services are under-resourced, and variability exists in referral practices. In addition, there is a lack of healthcare providers trained in psychological support, and where such support does exist, few lung cancer patients are making use of it, owing to inadequate reimbursement.

The NCCN guidelines that are followed in Taiwan do not acknowledge the psychological burden of lung cancer or describe referral pathways to appropriate services. However, examples of high-quality psychological support can be found in the country. Participants at the workshop in Taiwan mentioned the presence of psycho-oncology clinical services at speciality care hospitals dealing with advanced cases of cancer. These services work alongside a multidisciplinary team—including surgeons and radiotherapists—to provide individual patients with psychosocial care.

The physical pain associated with lung cancer is often better recognised and understood. However, three of the countries we studied—Hong Kong, Indonesia and Thailand—do not have lung cancer guidelines that include referral pathways for supportive or palliative care. In Thailand and China, oncologists do not receive training in palliative care.

#### **Fresh thinking: opportunities for improvement**

##### **Improved access to radiotherapy.**

All the countries that we studied have a higher demand for radiotherapy services than supply. In spite of recent promising advances in drug therapy, radiotherapy remains a backbone of cancer treatment. Investment in radiologists and radiotherapy equipment is needed.

##### **Developing proactive approaches to manage innovation.**

There is a clear need to improve access to state-of-the-art treatment for cancer patients around the Asia-Pacific region, although doing so is clearly going to require a significant financial

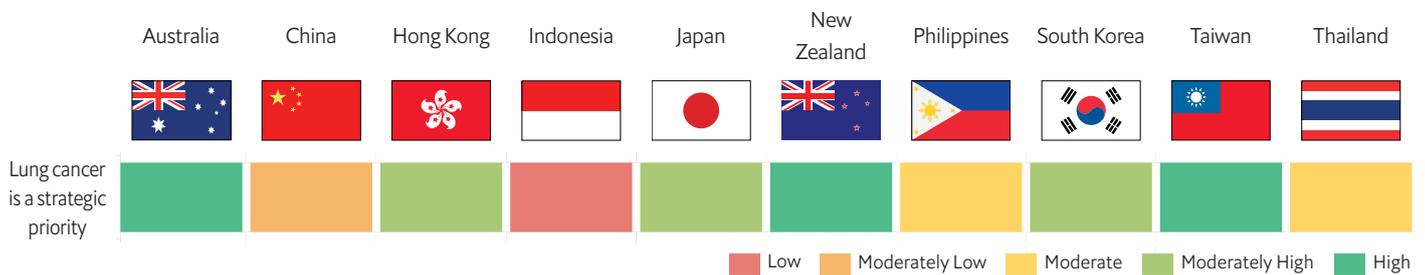
investment. Policymakers in a number of countries in the region are looking at innovative funding mechanisms to help alleviate the economic burden on health systems. Investment in treatment options needs to be supported by investment in data and monitoring systems, and HTA processes, that facilitate informed decision-making by reimbursement authorities.

##### **Patients need greater support**

Patients clearly need better access to psychological support as well as supportive and palliative care. Participants in some of our workshops in the region have suggested that specific guidelines and referral pathways be introduced into existing national guidelines to ensure that patients receive the same standard of care across the nation.

## Domain 5: Lung cancer is a focus for research

This domain examines funding for research and the use of cancer registries. These registries can support a wide range of activities, one of which is the facilitation of high-quality research. All of the high-income countries scored high or moderately high for this domain. There was greater variation in how the middle-income countries scored. The Philippines and Thailand scored moderately, followed by China, scoring moderately low, with Indonesia achieving the lowest possible score.



### High-quality registries are largely in place, but more national coverage is needed

Population-based cancer registries collect and collate data on cancer diagnoses in a defined geographic area over time. There are over 700 cancer registries worldwide, but together they only cover about 21% of the global population; at 8%, Asia has the lowest rate of coverage.<sup>90</sup> Given the burden of lung cancer in Asia, and the unique nature of the disease in Asian populations, the importance of improving knowledge about the disease and its pathways in the region cannot be underestimated. Better data can help healthcare providers to understand more about the genetic mutations that can predispose some people in the Asia-Pacific region—especially non-smoking women—to lung cancer. It also has the potential to provide more information about environmental factors and the best ways of treating patients.

We used the Cancer Atlas, a global resource produced by the American Cancer Society, to report on each country's cancer registry, as well as their vital registration systems (the system by which a country records the vital statistics of its population). This includes data on live births, foetal deaths, marriages, divorces and mortality. Most of the countries in our scorecard have made some progress in establishing cancer registries: five (Australia, Hong Kong, New Zealand, South Korea and Taiwan) have high-quality national cancer registries, while another four (China, Japan, the Philippines and Thailand) have good regional registries. Only Indonesia lacks a population-based cancer registry. Of the countries that we studied, four (Australia, Japan, New Zealand and Taiwan) have high-quality, complete vital registration, and a further three (Hong Kong, the Philippines and South Korea) have medium-quality registration. China has incomplete or sample vital registration, while Thailand has low quality complete vital registration and Indonesia has no data.

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Although the Cancer Atlas considers Australia to have high-quality national cancer registries, participants at the workshop in Australia highlighted several practical limitations of these registries. One participant pointed out that the registries are funded by different sources, and stated that “it’s great to have these registries but the registries don’t talk to each other”, emphasising that they should interact with one central registry to maximise their utility. The participants acknowledged that the registries are capturing people with a specific cancer, in terms of collecting incidence and mortality data; however, details relating to treatment specifics (such as whether patients have had surgery or radiotherapy; how long it took for a patient to go from one stage of the disease to another) are “completely patchy” and left to individual jurisdictions, again highlighting the missed opportunities implicit in Australia’s registry landscape.

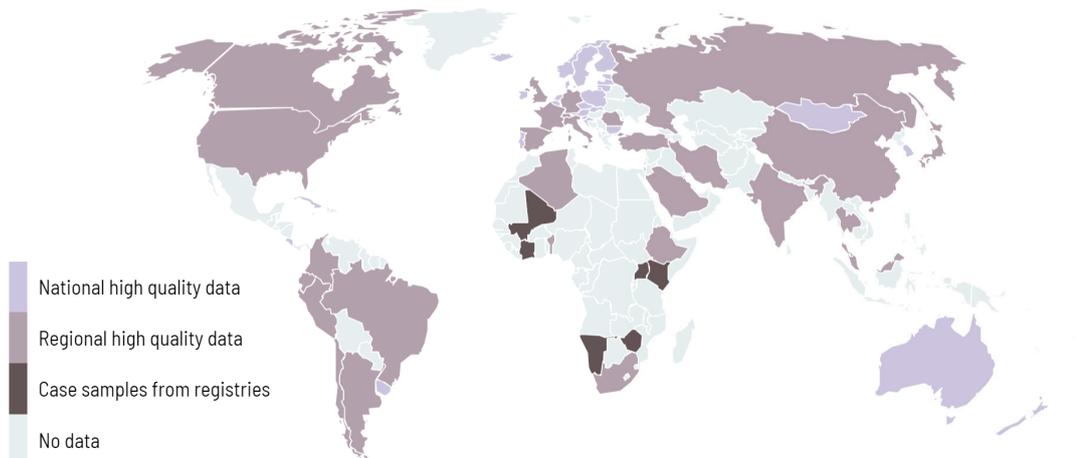
Availability of population-based cancer registry (PBCR) data, 2019



Source: <https://canceratlas.cancer.org/data/map/>

## High-quality survival data

Availability of high-quality cancer data for survival statistics, 2008–2014



Source: <https://canceratlas.cancer.org/data/map/>

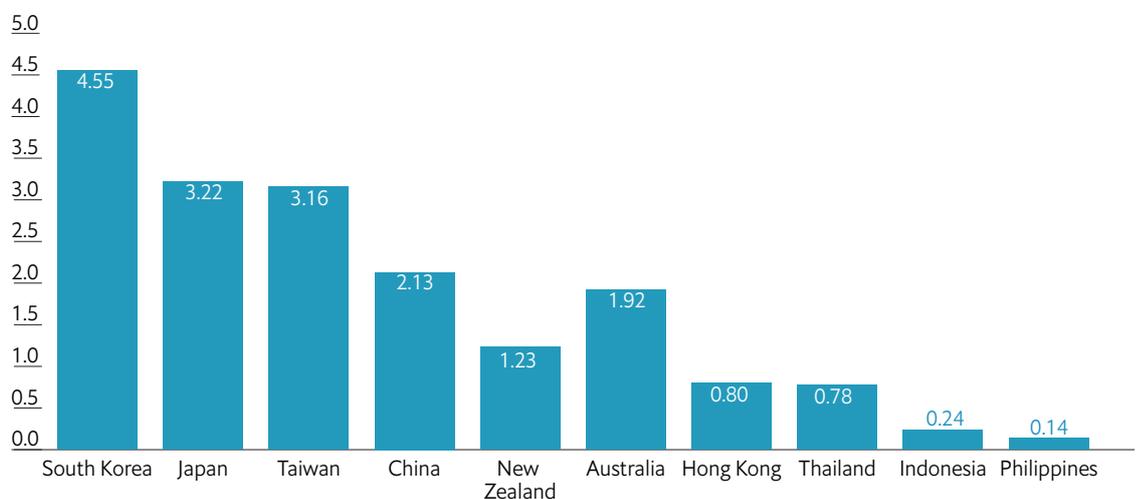
In New Zealand, similar concerns were raised by participants at the workshop. They highlighted that the New Zealand Cancer Registry does not capture date on staging or outcomes, information that participants felt was key to providing a better understanding of lung cancer in the country. Participants also reported variation in the presence and use of registries across DHBs.

## Today's research is tomorrow's care

There is a positive association between health expenditure on cancer and survival, although efficiency varies both internationally and within a country's borders.<sup>91</sup> Research is an essential component in improving cancer care. Obtaining reliable, comparable figures on national research spending on lung cancer specifically, or cancer in general, is challenging. To gain an understanding of how research is prioritised across the countries in our study, we looked at the percentage of GDP used to fund research in general (that is, not just pharmaceutical or clinical research). We found that only three countries (Japan, South Korea and Taiwan) spend over 3% of GDP on research, with South Korea leading the pack. In fact, South Korea has consistently had one of the highest ratios of research spending to GDP in the world. China and Australia each invest around 2% of GDP, New Zealand devotes a little over 1%, while Hong Kong, Thailand, the Philippines and Indonesia each spend less than 1% of GDP on research.

It has long been argued that lung cancer research has been historically underfunded when compared with work on other cancers and diseases.<sup>92-94</sup> Participants at our workshops in Taiwan and Australia echoed this sentiment. In the Australian workshop, participants stated that one of the reasons that lung cancer is the recipient of disproportionately low levels of funding is the societal stigma around the condition. A lung cancer diagnosis may be viewed as self-inflicted, the patient's own fault, and not deserving of the sympathy that is seen for other conditions. Such stigmatisation can insidiously influence policymakers and funding decisions.

**Figure 8: R&D spending**  
(% of GDP)



Source: World Bank, 2019.

#### **Fresh thinking: opportunities for improvement**

##### **Improve cancer registries**

One of the biggest problems facing both policymakers and clinicians looking to reduce the lung cancer burden is the paucity of data on the subject, owing to the absence of national cancer registries and a lack of high-quality data in parts of the region. A lack of adequate data makes it more difficult to decide the most cost-effective ways to diagnose and treat lung cancer,

although data collection is improving. Better data could also provide more insight into the unique histopathology of lung cancer in Asia, which can affect the treatments that healthcare practitioners use and the degree to which patients respond.

##### **Ensure that funding matches the burden**

Improvements in lung cancer outcomes are heavily dependent on research, which is wholly dependent on funding. Given the burden of the condition, lung cancer should be placed higher up the research priority list for governments across the Asia-Pacific region.

## Conclusions and a call to action

Countries in the Asia-Pacific region are increasingly looking to address the growing threat of lung cancer to their populations and health systems. The disease is on the radar of policymakers, as is the realisation that a more coordinated public health response, including more informed policymaking and better access to a variety of treatment and support are vital to addressing the crisis. Yet, many countries continue to confront obstacles, including limited funding and access to healthcare, incomplete implementation of existing guidelines and a need for strengthening tobacco control measures. Uneven enforcement of anti-smoking regulations remains an issue in most countries, and there is still a lack of consensus around the benefits of screening programmes. In addition to the public health measures outlined in this paper, we suggest that policymakers look at policies to tackle environmental pollution.

In the meantime, as governments determine where to invest limited funds to address the lung cancer crisis, they need to look at areas that are likely to bring the most benefits. Health systems in the Asia-Pacific region would benefit from better development of lung cancer-specific control plans and clinical practice guidelines, and patients need access not only to cutting-edge cancer therapies but also to fundamental oncological services such as radiotherapy, chemotherapy, psychological support as well as supportive and palliative care.

To be sure, our scorecard has revealed a number of areas where a majority of governments are making headway, including regulation of e-cigarettes, delivery of multidisciplinary care and the use of histological and molecular testing of tumours. This report also highlights that progress is not just limited to the wealthiest countries. But there is much work to be done—and many gains to be had—in all of the countries that we studied.

We have identified six calls to action:

### **Fill gaps in cancer policymaking and formalise policy implementation**

Countries must ensure that comprehensive, regularly updated, evidence-based, goal-oriented National Cancer Control Plans (NCCPs) are complemented by lung cancer-specific national plans, formalised implementation strategies and clinical guidelines. NCCPs exist in all ten countries included in our research, eight of which were published or updated within the past five years. However, nine of the ten countries that we studied lack a specific lung cancer plan. Key to the success of national plans is the inclusion of detailed implementation plans that map out how to enact plans to keep them on track. Unfortunately, such plans are not commonplace in the Asia-Pacific region.

Lung cancer clinical guidelines exist in nine of the ten countries we studied. However, our analysis revealed significant variation in both quality and coverage, especially in relation to screening and shared decision-making; the latter is a relatively novel concept in some Asian countries. In addition, the guidelines of only four of the countries that we studied include measures to fast-track suspected lung cancer cases for diagnostic testing, likely resulting in an adverse impact on the success of patients' overall treatment.

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#### **Strengthen action on smoking and air pollution**

As elsewhere, tobacco use is a major cause of lung cancer in the Asia-Pacific region, with second-hand smoke also a significant factor. Tobacco control policies fall short in several countries and tobacco use remains high, especially among men. Although national policies exist on curbing tobacco use, some countries lack national media campaigns or bans on tobacco advertising, while only three—Hong Kong, New Zealand and Thailand—have adopted comprehensive bans on smoking in public places and workplaces. Furthermore, tobacco taxation is only a work in progress in many countries, and conflicts of interest also pose a major challenge. For example, in China, where 28% of adults smoke, the tobacco industry is state-owned, while South Korea's pension system is a major shareholder in the former national tobacco company and a strong tobacco lobby in the Philippines exists alongside high per capita smoking rates. E-cigarettes are fully regulated in less than half of the countries that we studied.

Unique to the Asia-Pacific region, more women and non-smokers are diagnosed with lung cancer than elsewhere in the world. The proportion of female lung cancer patients who are non-smokers is as high as 65% in China, compared with 16-24% (of men and women) in Europe and 19% of women in the US. This is a striking fact.

Air pollution is a major problem, driven by poor waste management, industrialisation, construction, intensive agriculture, large volumes of vehicles and the combustion of dirty energy sources. Although the countries covered in our scorecard have air quality legislation in place, the disproportionate lung cancer burden faced by non-smokers demonstrates that much more must be done to improve air quality.

#### **Improve data quality and establish national cancer registries**

Patient data should be formalised and made available in national registries. Although registries exist in some countries, they rarely extend to national coverage and contain only limited data, leaving healthcare providers, researchers and policymakers deprived of a full picture of the lung cancer situation. Without comprehensive cancer registries, countries are hindered in their efforts to enact cancer control and epidemiological research, public health programme planning, and improvements to patient care. Even putting aside the issue of registries, some countries must take greater steps to improve the quality of broader epidemiological data on lung cancer monitoring. For example, when comparing the incidence and prevalence across the ten countries studied, the lower incidence and prevalence rates of lung cancer in Indonesia and the Philippines is undermined by high rates of tobacco use in both countries—according to WHO, the smoking rate amongst Indonesian men is the highest in the world.

#### **Demonstrate the benefits that widespread population-based screening can have to the Asia-Pacific region**

Lung cancer survival is clearly related to the stage at which it is diagnosed and the speed at which patients can access treatment. Although the topic of screening programmes is somewhat controversial, large-scale studies in Europe and the US have shown clear reductions in lung cancer mortality as a result of screening. A broader evidence base centred specifically on the Asia-Pacific context is likely to provide a more compelling case, especially to health policymakers in less-wealthy countries where the initiation of large screening programmes may seem a daunting prospect in the short term. China is the

only middle-income country that we studied that has conducted lung cancer screening trials, revealing the lack of evidence being generated outside of high-income countries.

### **Improve provision of rapid diagnosis and tackle inequalities in access to care**

The economic divide in the Asia-Pacific region is evident in the difficulties that health systems face in detecting and treating lung cancer cases. Inconsistencies in fast-tracking suspected lung cancer cases to diagnosis and rapid referral to specialised care are key areas where this divide was reflected in our research, a situation not helped by the fact that fast-track referral pathways are not included in many countries' clinical guidelines. Our analysis also showed that countries' success in providing access to the full range of treatments to all patients is largely predicated on the wealth of each country's health system. For example, the unmet need for radiotherapy services in Indonesia is 90%, compared with 17% (itself not an inconsiderable number) in relatively wealthy Japan. Reimbursement decisions on newer treatments such as targeted and immunotherapy medication also reflect overall the wealth of countries: none of the 13 drug and indicator combinations in our study are reimbursed in New Zealand, the Philippines and Thailand, and only one is covered in Indonesia. The reimbursement process is often also too slow and health technology assessment provision is patchy. Stark divisions between the quality and availability of care in the public and private health services have created a two-tier system in some countries. Possible measures to accelerate access to treatments include innovative reimbursement schemes, compassionate use programmes, monitoring systems and special pricing agreements. There are also clear gaps in workforce numbers in terms of specialists such as thoracic surgeons.

While mortality rates from lung cancer have decreased over time in Australia and New Zealand, inequalities persist within sub-populations in each country. Rates of lung cancer are four times higher among Māori compared to non-Māori, while mortality rates are almost three times higher. Similar disparities in lung cancer are observed between Indigenous and non-Indigenous Australians. This underlines the need for countries in the region to identify at-risk and underserved populations, to develop action plans, not just for, but with these populations in an effort to improve lung cancer care and outcomes in a way that is culturally appropriate and engages people across the treatment pathway.

### **Expand support for patients by involving them in decision-making and supporting them through the entire care journey**

Awareness of the psychological burden of lung cancer and the need for adequate support services is still relatively limited in the Asia-Pacific region. Just three of the countries in our analysis—Australia, Indonesia and New Zealand—have guidelines in place that mention the psychological burden of lung cancer, and only Australia and New Zealand have a referral pathway to support services for lung cancer patients. Cultural taboos in Asian countries surrounding discussion of health issues and death, limited patient involvement in care decisions, and stigma related to lung cancer create barriers to supportive and palliative care. A cultural shift is needed to prioritise care for patients' emotional needs and involve them in decisions related to their own treatment. To this end, including patient organisations in the development of clinical guidelines will help to prioritise the issues matters to the patient, potentially identifying factors that may otherwise be overlooked by health professionals.

## Appendices

### Methods

At the heart of this research project is a benchmarking exercise of scoring policies, programmes, guidelines and approaches for patient-centred care. Its goal is to spur debate around the need for a transformative change in lung cancer screening, diagnosis, treatment, and supportive and palliative care. An initial literature review, conducted via Embase.com, identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. Search results were limited to reviews and systematic reviews published in the past five years. The 379 retrieved articles were first sifted based on title and abstract, followed by full text appraisal.

From analysis of the most relevant articles identified, we derived a draft set of indicators with which to benchmark policy and systems in European and Asia-Pacific countries. The goal was to identify those policy and system “building blocks” that are associated with high-quality care and good patient outcomes. These form the basis of the indicators, which are clustered into domains.

An editorial advisory board was convened to review and advise on the development of the indicator framework and the organising domains. Out of this process, we identified a set of 17 indicators to evaluate each selected country across five domains. We created scoring schema, then researched, assessed and scored countries. A range of international and national sources were used for the data collection, and both primary and secondary research used to populate the country scorecard.

Scoring judgements were made based on the best information available. 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. After draft scores were assigned, the EIU attended six workshops of external country-based experts (Australia, Japan, New Zealand, South Korea, Taiwan, Thailand), hosted by the sponsor, in order to discuss the scores and help develop recommendations. The EIU retained editorial independence throughout the process.

## The scorecard

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	<ul style="list-style-type: none"> <li>1 = operational national cancer control plan exists</li> <li>1 = cancer control plan was updated within the last 5 years</li> <li>1 = cancer control plan includes implementation plan</li> <li>1 = cancer control plan identifies funding source</li> <li>1 = lung cancer specific control plan exists</li> </ul>
	2	Comprehensive, clinical guidelines for lung cancer exist	Individual country documents	<ul style="list-style-type: none"> <li>1 = lung cancer clinical guidelines exist*</li> <li>1 = guidelines cover screening for lung cancer</li> <li>1 = guidelines cover diagnosis for lung cancer</li> <li>1 = guidelines cover treatment for lung cancer</li> <li>1 = guidelines cover supportive/palliative care for lung cancer</li> <li>1 = guidelines cover shared decision making for patients with lung cancer</li> </ul> <p><i>* one point for guidelines will be given whether the country has developed their own guidelines or if they have adopted international guidelines</i></p>
Lung cancer is a public health issue	3	Tobacco control policies and public health measures are in place	WHO / UN	<ul style="list-style-type: none"> <li>1 = government objectives on tobacco control exist</li> <li>1 = national agency for tobacco control exists</li> <li>1 = advertising tobacco on national TV and radio is banned</li> <li>1 = at least one national anti-tobacco mass media campaign has been aired between 2014 and 2016</li> <li>1 = law mandates that health warnings appear on tobacco packages</li> <li>1 = country is a party to the WHO Framework Convention on Tobacco Control</li> <li>1 x 3 = national smoke-free legislation exists for indoor offices, restaurants/cafes/pubs/bars, and public transport</li> </ul>
	4	E-cigarettes are regulated and covered by public health measures	Individual country documents	<ul style="list-style-type: none"> <li>1 = regulation for e-cigarettes exists</li> <li>1 = e-cigarette sales subject to an age limit</li> <li>1 = e-cigarette advertising is banned</li> <li>1 = e-cigarettes are banned in public areas (e.g. public transport, civic buildings, restaurants, cafes, pubs and/or bars)</li> </ul>
	5	National policies and programmes to control environmental exposure exist	Individual country documents / WHO	<ul style="list-style-type: none"> <li>1 = an air quality strategy exists</li> <li>1 = a national radon control programme / policy exists</li> </ul>
	6	An evidence-based approach to lung cancer screening has been followed	Scientific literature	1 = a study has been / is currently being conducted in this country and / or a trial screening programme is in place (demonstration/pilot)
	7	Patient organisations have a voice in policy development	Individual country documents / WHO	<ul style="list-style-type: none"> <li>1 = one or more independent lung cancer patient organisations exist</li> <li>1 = one or more independent lung cancer patient organisations are listed as contributors in clinical guideline</li> <li>1 = civil society has the opportunity to comment on Health Technology Assessment (HTA) recommendations</li> </ul>
Lung cancer is race against time	8	Suspected lung cancer patients are diagnosed within a specific timeframe	Individual country documents	<ul style="list-style-type: none"> <li>1 = guidelines mention suspected lung cancer patients are to be fast-tracked to diagnosis</li> <li>1 = guidelines mention a specific timeframe for diagnostic referral in suspected lung cancer patients</li> </ul>
	9	A pathway for rapid referral to quality care exists	Individual country documents	<ul style="list-style-type: none"> <li>1 = national guidelines / pathways for rapid referral for lung cancer patients are in place</li> <li>1 = guidelines recommend that patients are treated by a multidisciplinary team</li> </ul>

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Domain	Number	Indicator	Source	Scoring criteria
Lung cancer is at a crossroads	10	Access to medical and surgical specialists	Scientific literature / Individual country documents	number of (per 100,000) pulmonologists thoracic surgeons general surgeons unscored
	11	Radiotherapy is accessible	Scientific literature	unscored
	12	Tumour testing is recommended and accessible	Individual country documents	1 = biomarker testing is mentioned in guidelines or pathways for lung cancer 1 = specific markers are identified in guidelines or pathways for lung cancer 1 x 4 = tests (EGFR, ALK, ROS1 and PD-L1) are reimbursed under national public health system
	13	Key targeted medicines are accessible and reimbursed	Individual country documents	1 X 13* = drug and indication combinations for targeted lung cancer therapies reimbursed *scoring transformed from 0-13 to 0-10
	14	Psychological burden of lung cancer is understood and support services are in place	Individual country documents	1 = guidelines mention psychological burden of lung cancer 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
Lung cancer is a focus for research	16	Clinical and outcomes data is collected	Cancer Atlas / Individual country documents	Population-based cancer registry 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	Research is supported and funded	World Bank	unscored

## Matrix of domain scores for all countries

Country or territory	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
 Australia	Green	Green	Green	Green	Green
 China	Green	Green	Orange	Orange	Orange
 Hong Kong	Orange	Green	Red	Red	Green
 Indonesia	Yellow	Yellow	Orange	Orange	Red
 Japan	Green	Green	Orange	Green	Green
 New Zealand	Green	Green	Green	Orange	Green
 Philippines	Green	Yellow	Orange	Red	Yellow
 South Korea	Green	Green	Orange	Yellow	Green
 Taiwan	Green	Yellow	Green	Yellow	Green
 Thailand	Green	Green	Green	Red	Yellow

## Workshop participants

We thank the following experts—from various fields of study and points of view—who kindly contributed to the research by sharing their knowledge and experience. These country workshop participants consented to their names, job titles and organisations being included in the final report as a confirmation of their participation.

It is important to note that the participants listed here have not seen the final report before publication and had no input to it (beyond their contribution to a workshop). Therefore, inclusion on this list is no endorsement of this report or its conclusions.

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# Australia: Lung Cancer Country Profile

## Scorecard Summary

Australia scores 'high' in four domains and 'moderately high' in the remaining domain. The strong performance can be attributed to their comprehensive clinical guidelines, multidisciplinary teams, robust tobacco control policies and investments in high-quality population-based cancer registries. While scoring well overall, there are some things that can still be done to improve lung cancer care. We discuss opportunities for improvement at the end of this country profile.

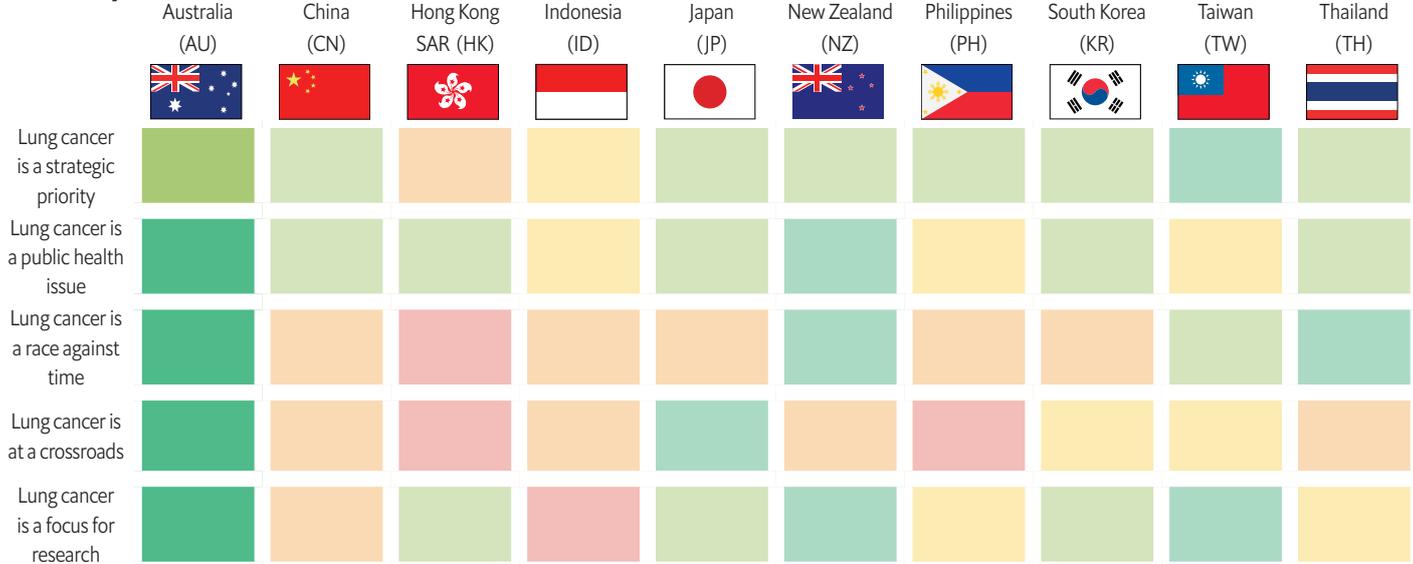
## Policies exist but...

While Australia scores well on the scorecard, participants at the workshop raised a series of concerns about implementation. All country panels had similar discussions, but some of the gaps between the policy scores and "on the ground" experience in Australia were so wide that we decided to cover these in a dedicated box opposite. Another theme that emerged from the workshop was the impact of stigma that people with lung cancer and their carers face, and the resulting need for psychosocial support. In addition to this, we note that a targeted national lung cancer screening program is being considered and is the subject of an ongoing national inquiry which is expected to release its results in October 2020.

**... significant concerns remain**

Workshop participants discussed the gap between policy and implementation. For example, although guidelines recommend treatment by multidisciplinary teams and referral pathways to psychological support exist, reimbursement is limited and there are neither enough trained staff nor care coordinators. Timely access to pathology services in regional areas need to improve, where lung cancer outcomes are poorer.<sup>1</sup> There is furthermore a need for the healthcare system to recruit more specialist lung cancer nurses and adopt national benchmarks for lung cancer policies to ensure standardised implementation across the country. Finally, funding for lung cancer research remains disproportionate to the burden of the disease.

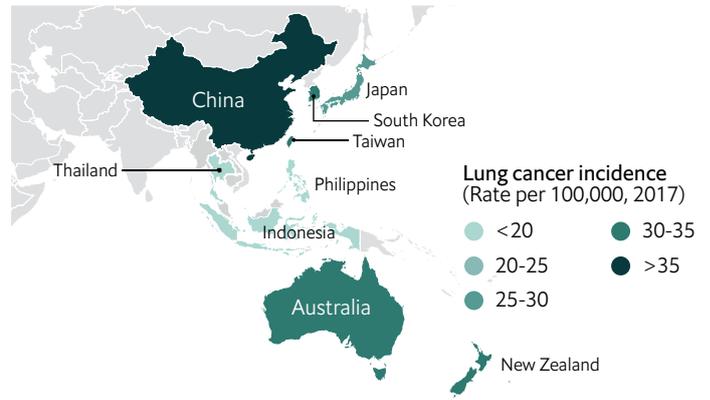
## Summary scorecard



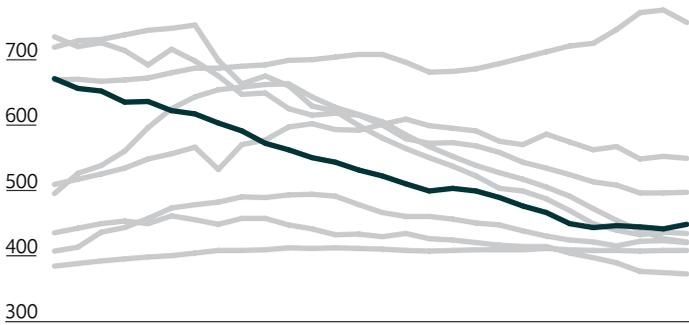
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Australia	Asia	Global
Incidence	32	28	27
Prevalence	74	41	41
Mortality	22	25	24
Disability-Adjusted Life Years (DALYs)	449	510	503
Years Lived with Disability (YLDs)	9	7	7
Years of Life Lost (YLLs)	440	503	496

Source: Global Burden of Disease, 2017<sup>2</sup> All figures are age-standardized.

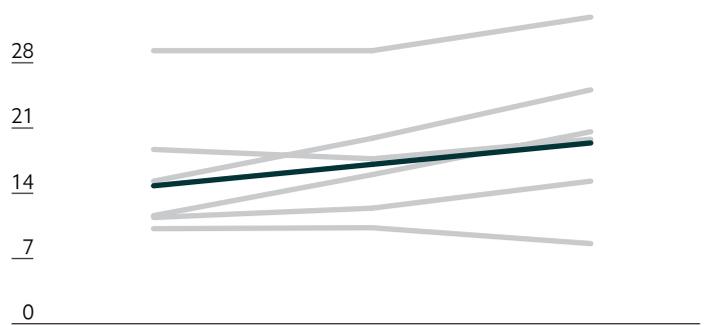


## Burden trend (DALY rate per 100,000, 1990-2017)



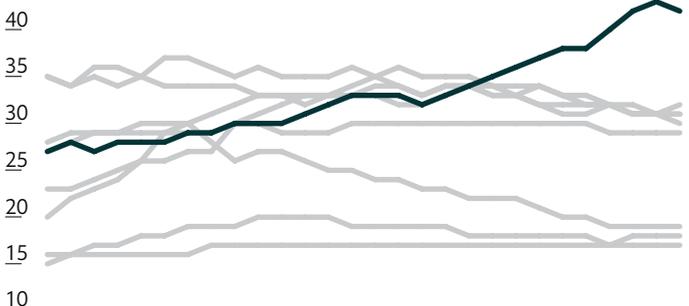
Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



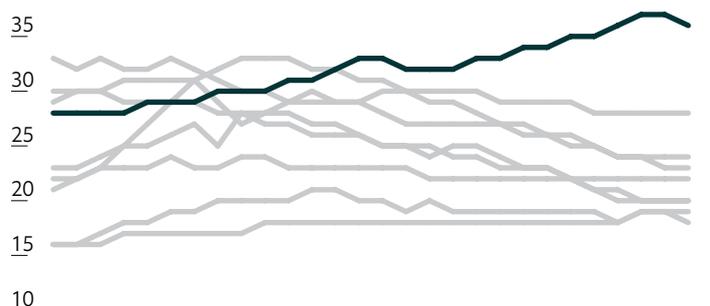
Source: CONCORD-3, 2018.<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

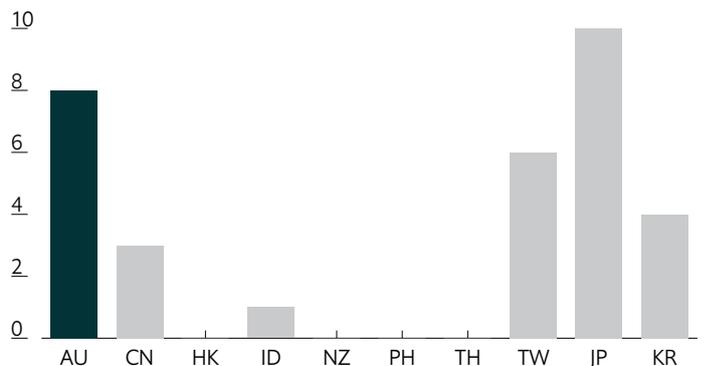


Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 14,101 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 22,200 premature deaths in Australia.<sup>4</sup>

**Healthcare spending**  
In 2018, GDP = US\$ 1,418 billion and healthcare spending amounted to 9.2% of GDP.<sup>5</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification	
<b>Lung cancer is a strategic priority</b>				
1	Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>3</b>	<ul style="list-style-type: none"> <li>+1 The Cancer Australia Strategic Plan 2014-2019 was published in 2014 and needs updating.<sup>6</sup></li> <li>+1 Lung Cancer Framework, principles for best practice lung cancer care in Australia, exists and was released by Cancer Australia in 2018.</li> <li>+1 A funding source has been identified; the plan is funded by the Australian government.</li> <li>0 The cancer control plan does not include specific implementation plans.</li> </ul>
2	Comprehensive clinical guidelines for lung cancer	0 – 6	<b>6</b>	<ul style="list-style-type: none"> <li>+1 Clinical practice guidelines for the treatment of lung cancer were published in 2017, these guidelines are undergoing a staged revision and updating process. In addition to these guidelines, 'The optimal care pathway for people with lung cancer' was released in June 2016 and endorsed by Cancer Australia and Cancer Council.</li> <li>+5 The guidelines cover screening, diagnosis, treatment, palliative care and shared decision making.</li> </ul>
<b>Lung cancer is a public health issue</b>				
3	Tobacco control policies and public health measures	0 – 9	<b>6</b>	<ul style="list-style-type: none"> <li>+2 National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li>+1 Advertising is banned on national TV and radio.</li> <li>+1 A national anti-tobacco mass media campaign exists.</li> <li>+1 Law mandates that health warnings appear on tobacco packages.</li> <li>+1 Australia is party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li>0 National smoke-free legislation does not exist for indoor offices, public transport, restaurants, cafes, pubs and bars.</li> <li>● <b>However, state-level legislation means that indoor offices, public transport, restaurants, cafes, pubs and bars are covered by smoke-free regulations.</b></li> </ul>
4	E-cigarettes regulation and public health measures	0 – 4	<b>4</b>	<ul style="list-style-type: none"> <li>+1 E-cigarette regulation is a shared responsibility between the Commonwealth, state and territory governments. The current regulatory framework draws on existing legislation and regulations that may apply to tobacco products, therapeutic goods, poisons and consumer goods.<sup>8</sup></li> <li>+1 The sale of e-cigarettes is prohibited to people under 18 years of age in most states.</li> <li>+1 Advertising, promotion and sponsorship of e-cigarettes are regulated in Australia.</li> <li>+1 Restrictions exist on e-cigarette use in public places.</li> </ul>
5	National policies and programmes for environmental exposure control	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 The National Clean Air Agreement is the main legislation concerning air pollution in Australia.<sup>9</sup></li> <li>+1 The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has conducted a national survey of radon in homes and the results showed that the average concentration of radon in Australian homes is low and is about one quarter of the worldwide average.</li> </ul>
6	Evidence-based approach to lung cancer screening	0 – 1	<b>1</b>	<ul style="list-style-type: none"> <li>+1 Australia is taking part in the International Lung Screen Trial (ILST).</li> </ul>
7	Patient organisations involvement in policy development	0 – 3	<b>3</b>	<ul style="list-style-type: none"> <li>+2 Lung Foundation Australia, a national organisation that provides support to people who have a lung disease, worked with the Australian Government Department of Health to develop the first ever National Strategic Action Plan for Lung Conditions.<sup>10</sup></li> <li>+1 Civil society has the opportunity to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>

Indicator	Range	Score	Justification	
<b>Lung cancer is a race against time</b>				
8	Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>2</b>	<b>+2</b> 'The optimal care pathway for people with lung cancer' mentions fast-tracking and a specific timeframe for diagnostic referral in suspected lung cancer patients.
9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>2</b>	<b>+1</b> There is a pathway for rapid referral for lung cancer patients to secondary/ tertiary care. <b>+1</b> Guidelines recommend that patients are treated by a multidisciplinary team. <b>● The workshop participants noted that while guidelines recommended treatment by multidisciplinary teams, whether and to what degree this is implemented can vary from clinic to clinic.</b>
<b>Lung cancer is at a crossroads</b>				
10	Medical and surgical specialists	number per 100,000	unscored	<b>●</b> 153 cardiothoracic surgeons in 2010. <sup>11</sup> <b>●</b> 6.24 general surgeons in 2010. <sup>11</sup> <b>●</b> No data on number of pulmonologists.
11	Radiotherapy accessibility	unmet need	unscored	<b>●</b> -68 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit) <sup>12</sup> <b>●</b> There is an insufficient supply of radiotherapy megavoltage machines in relation to demand. <b>●</b> Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -33.17%.
12	Tumour testing recommendations and accessibility	0 – 6	<b>6</b>	<b>+2</b> Histological and molecular testing is mentioned in the diagnostic guideline for lung cancer and specific biomarkers are identified. <b>+4</b> EGFR, ALK, ROS1 and PD-L1 are reimbursed under the national public health system based on Medicare Benefits Schedule.
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>8</b>	<b>+8</b> Of the 13 drug and indication combinations we looked at, 11 were reimbursed: Afatinib (indication 1), Crizotinib (indications 1-3), Pembrolizumab (indications 1-4), Nivolumab (indication 1), Atezolizumab (indication 1), Osimertinib (indication 1). See matrix on page 35 of the regional report for full details.
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>2</b>	<b>+2</b> Psychological needs are specifically explained in the guidelines' and relevant conditions when a patient should be referred to a psychologist, psychiatrist or social worker are also stated. <b>● The workshop participants noted that reimbursement for psychological support services is limited. They also reported that there is a lack of trained staff and care coordinators to ensure the recommended care is delivered.</b>
15	Patient access to supportive/ palliative care services	0 – 2	<b>2</b>	<b>+1</b> Lung cancer guidelines mention a referral pathway to supportive / palliative care services. <sup>13</sup> <b>+1</b> Training in supportive/palliative care is provided under the Physician Readiness for Expert Practice Program (PREP). <sup>14</sup>
<b>Lung cancer is a focus for research</b>				
16	Clinical and outcomes data collection	0 – 7	<b>7</b>	<b>+3</b> High quality population-based cancer registry (national). <sup>15</sup> <b>+4</b> High quality complete vital registration. <sup>15</sup> <b>● The workshop participants noted that while there are examples of high quality data collection in some states, such as in Victoria and Queensland, elsewhere data collection can be patchy.</b>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored	<b>●</b> 1.92% of GDP spent on research and development in 2015. <sup>16</sup> <b>●</b> Number of clinical trials between 2009 and 2018 = 348. <sup>17</sup> <b>●</b> The ratio of 2009-2018 clinical trials to GDP (billions) = 0.26. <sup>16,17</sup>

# Top opportunities and the way forward

## Opportunity 1

### **Australia needs an updated National Cancer Control Plan.**

Australia's National Cancer Control Plan was published in 2014. The plan needs to be updated. An updated national cancer control plan should ideally include the following elements: discussion of prevention, screening and early detection, red flags and symptoms to look for in primary care, diagnosis, an implementation plan and a funding source.

## Opportunity 2

### **Develop national campaigns to reshape the public perception of lung cancer and the stigma associated with it.**

Awareness-raising campaigns are needed to tackle the negative perceptions and stigma associated with lung cancer. The Lung Foundation Australia 'Free from Stigma' campaign is a great example of efforts to reduce the stigma associated with lung cancer, however, more is needed. Participants at the workshop discussed the negative and multi-layered effects of stigma and how addressing it may positively impact patients with lung cancer at an individual level, and influence funding decisions and policymakers at a societal level. Participants highlighted that lung cancer research is greatly underfunded compared to other cancers, especially considering the immense burden of lung cancer, the stigma associated with lung cancer is considered to be one of the main contributing factors to its disproportionate level of funding.<sup>18</sup>

## Opportunity 3

### **Invest in the health workforce to improve outcomes for patients with lung cancer.**

Participants at the workshop discussed the need for capacity building of healthcare professionals for lung cancer care delivery, with participants again highlighting the lack of healthcare resources dedicated to lung cancer. Participants emphasised the need for greater access to lung cancer clinical nurse specialists or care coordinators, as patients with access to a lung cancer nurse are significantly more likely to receive anticancer treatment than those who do not.<sup>19</sup> Another shortfall in access to care occurs with regards to multidisciplinary teams. While Australia has guidelines that recommend that patients are treated by a multidisciplinary team, this is not happening in practice for patients with lung cancer. Greater access to such teams is needed to ensure that best practice care is delivered to patients with lung cancer.

## Opportunity 4

### **Adopt national benchmarks for lung cancer policies to ensure standardised implementation across the country.**

Measuring the outcomes of a policy or a programme is an important way to understand how effective or successful the policy has been in bringing about change. Participants at the workshop in Australia acknowledged that though there were policies in place, there was no systematic outcome measurement taking place in the country. Adopting national benchmarks for different aspects of implementation, for instance, fast tracking suspected cases for diagnosis and rapid referral of cases to specialised care, could help to ensure that standards are being met across the country in lung cancer care. This was especially important for vulnerable populations such as the Aboriginal and Torres Islanders and in the regional areas where access to care coordination, pathology testing and other care services was lacking.

### **Ensure that research funding matches the burden.**

Participants at the workshop noted that the amount of funding for lung cancer research is grossly disproportionate to the burden of lung cancer disease: other cancers are better funded, and have better outcomes. While lung cancer is listed as a priority by the Government's Priority-driven Collaborative Cancer Research Scheme, this does not necessarily result in better funding. The Scheme promotes collaborative research programmes and hence provides "matched funding", but because it does not and never has had a lung cancer partner, funding is rarely released.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended a workshop of external country-based experts, hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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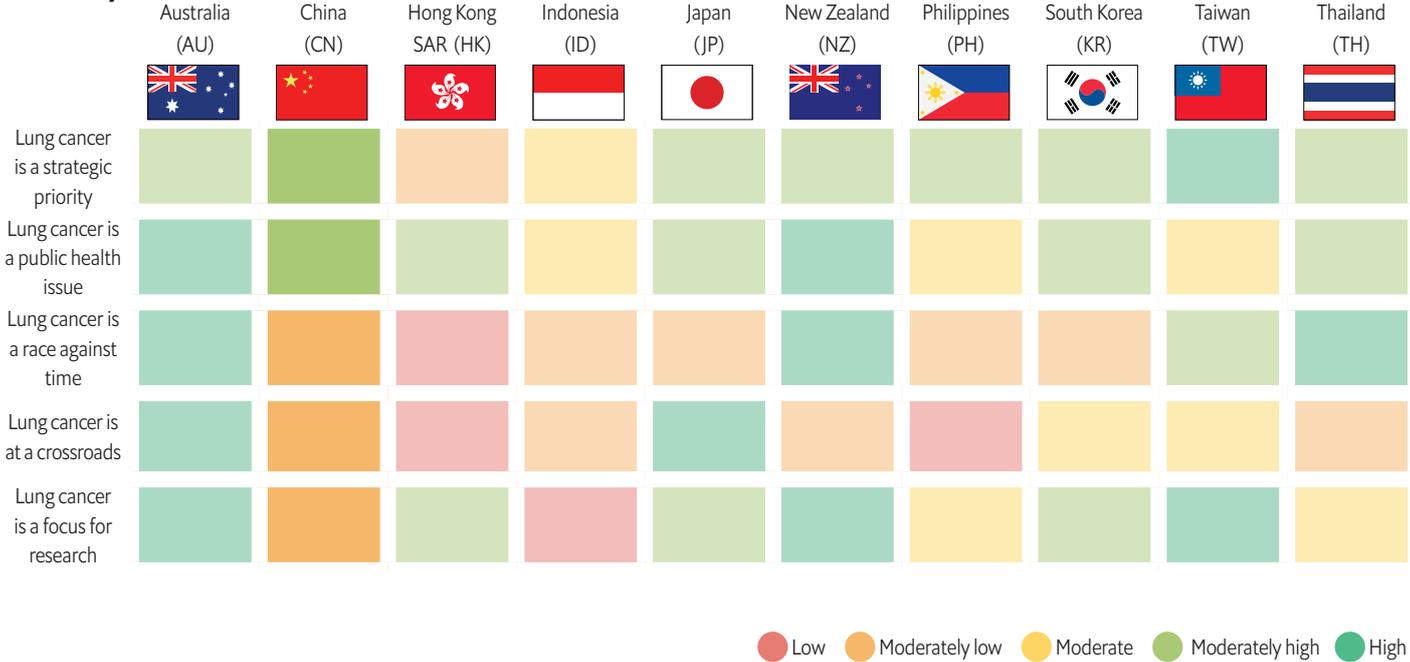


# China: Lung Cancer Country Profile

## Scorecard Summary

China performed either 'moderately low' and 'moderately high' across all five domains in the scorecard. The country's best score, 'moderately high', was achieved in the strategic priority and public health domains. While scoring well in these domains, they could improve their care of patients with lung cancer by incorporating shared-decision making into their clinical guidelines. Within the public health domain China scored well for its strong policies on tobacco control and environmental exposure limitation. However, the deficiency of regulations on e-cigarettes, the absence of a lung cancer specific patient organisation and the lack of involvement of civil society in the health technology assessment process are key areas for improvement in this domain. The country scored 'moderately low' in the other three domains. In the lung cancer is a race against time domain, their modest scoring is due to the clinical guidelines lacking timeframes and fast-tracking for diagnostic testing. Scores in the lung cancer is at a crossroads domain would improve if the guidelines addressed the psychological burden of lung cancer and included a pathway to obtain psychological support for lung cancer patients. China could improve its performance in the final domain, lung cancer is a focus for research, by enhancing the quality of its vital registration data. We discuss opportunities for improvement at the end of this country profile.

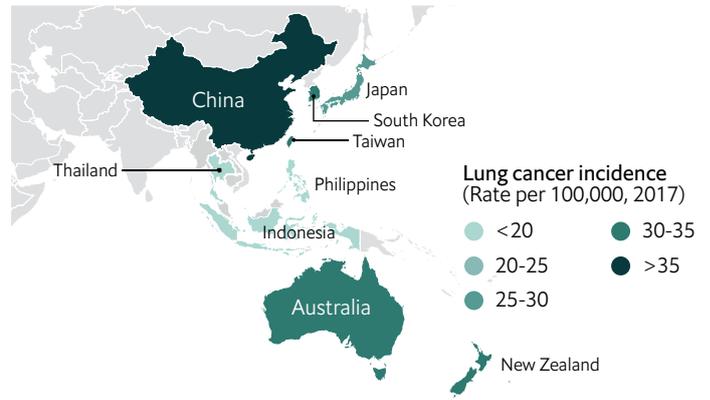
### Summary scorecard



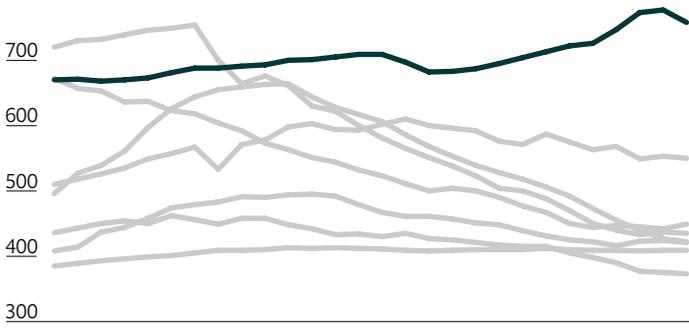
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	China	Asia	Global
Incidence	42	28	27
Prevalence	64	41	41
Mortality	36	25	24
Disability-Adjusted Life Years (DALYs)	758	510	503
Years Lived with Disability (YLDs)	10	7	7
Years of Life Lost (YLLs)	747	503	496

Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

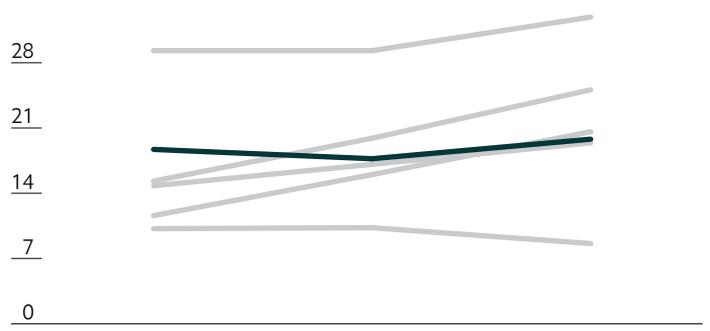


## Burden trend (DALY rate per 100,000, 1990-2017)



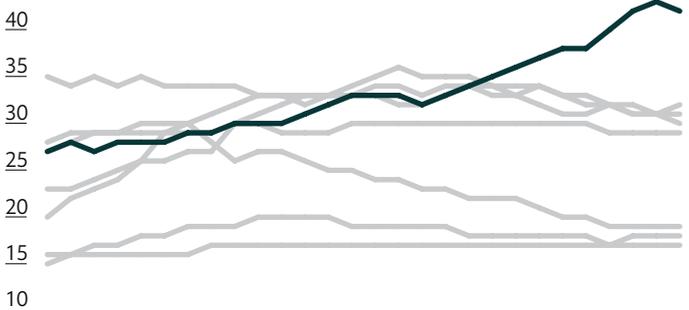
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



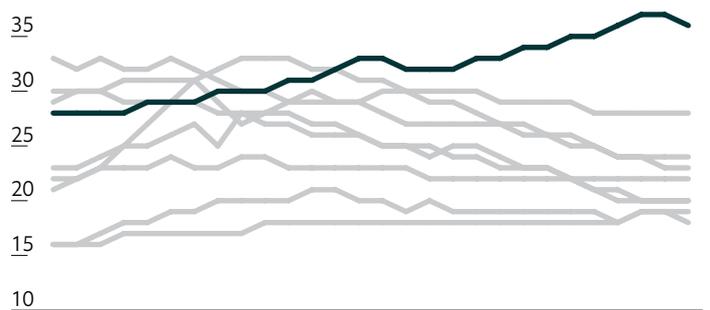
Source: CONCORD-3, 2018.<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

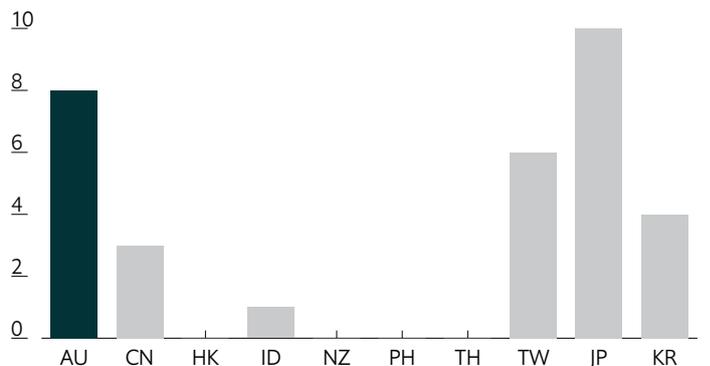


Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 55,268 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 1,952,200 premature deaths in China.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$ 13,424 billion and healthcare spending amounted to 5.0% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification	
<b>Lung cancer is a strategic priority</b>				
1	Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>3</b>	<ul style="list-style-type: none"> <li><b>+2</b> China's latest national cancer control plan was published in 2019. The plan is known as 'Healthy China Action - China's Cancer Prevention and Treatment Plan (2019-2022).<sup>5</sup></li> <li><b>+1</b> China's Cancer Prevention and Treatment Plan (2019-2022) mentions an implementation plan.</li> <li><b>0</b> The plan does not identify specific funding sources but mentions the need to 'establish a diversified funding mechanism' to 'ensure the realization of various objectives' of the plan.</li> <li><b>0</b> A specific lung cancer control plan has neither been published nor discussed by the government or health ministry.</li> </ul>
2	Comprehensive clinical guidelines for lung cancer	0 – 6	<b>5</b>	<ul style="list-style-type: none"> <li><b>+1</b> The Chinese Society of Clinical Oncology endorsed the Pan-Asian adapted European Society for Medical Oncology (ESMO) Clinical Practice Guidelines for the management of patients with metastatic non-small cell lung cancer. In addition, China has national lung cancer guidelines.<sup>6,7</sup></li> <li><b>+4</b> China's national guidelines and the Pan-Asian adapted ESMO guidelines cover screening, diagnosis, treatment and palliative care.</li> <li><b>0</b> Shared decision making is not covered in China's national guidelines or the Pan-Asian adapted ESMO guidelines.</li> </ul>
<b>Lung cancer is a public health issue</b>				
3	Tobacco control policies and public health measures	0 – 9	<b>7</b>	<ul style="list-style-type: none"> <li><b>+2</b> National objectives on tobacco control and a national agency for tobacco control exist.<sup>8</sup></li> <li><b>+1</b> Advertising is banned on national TV and radio.</li> <li><b>+1</b> At least one national mass media campaign ran during the survey period (up to 2016).</li> <li><b>+1</b> Law mandates that health warnings appear on tobacco packages.</li> <li><b>+1</b> China is party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li><b>+1</b> National smoke-free legislation exists for public transport but not for indoor offices, restaurants, cafes, pubs and bars.</li> </ul>
4	E-cigarettes regulation and public health measures	0 – 4	<b>2</b>	<ul style="list-style-type: none"> <li><b>0</b> E-cigarettes are not currently regulated. However, in May 2019, the World Trade Organization (WTO) announced that China has drawn up standards for regulating e-cigarette and filed them with WTO without specifying any date for adoption of the rules as yet.<sup>9</sup></li> <li><b>+1</b> Sale of e-cigarettes to people under 18 years is prohibited.</li> <li><b>0</b> China does not have an advertising ban on E-cigarettes.</li> <li><b>+1</b> Use of e-cigarettes in certain public places is prohibited.</li> </ul>
5	National policies and programmes for environmental exposure control	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li><b>+1</b> Air quality strategies were first included in China's 'Air Pollution Prevention and Control Action Plan' that was issued by the State Council of China in 2013.</li> <li><b>+1</b> There is a national radon control programme.</li> </ul>
6	Evidence-based approach to lung cancer screening	0 – 1	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> A number of large-scale lung cancer screening trials have been conducted in China.</li> </ul>
7	Patient organisations involvement in policy development	0 – 3	<b>0</b>	<ul style="list-style-type: none"> <li><b>0</b> No specific lung cancer patient organisations have been identified in China.</li> <li><b>0</b> There is no clear evidence of an opportunity for civil society to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>

Indicator	Range	Score	Justification	
<b>Lung cancer is a race against time</b>				
8	Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 No mention of patients to be fast tracked in lung cancer clinical guidelines.</li> <li>0 No mention of a specific timeframe for diagnostic referral in suspected lung cancer patients.</li> </ul>
9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li>0 Guidelines do not specifically mention rapid referral for lung cancer patients to secondary or tertiary care.</li> <li>+1 Guidelines recommend care with a multidisciplinary team.</li> </ul>
<b>Lung cancer is at a crossroads</b>				
10	Medical and surgical specialists	number per 100,000	unscored	<ul style="list-style-type: none"> <li>● No data on the number of oncologists, thoracic or general surgeons.</li> </ul>
11	Radiotherapy accessibility	unmet need	unscored	<ul style="list-style-type: none"> <li>● -1,864 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit)<sup>10</sup></li> <li>● There is an insufficient supply of radiotherapy megavoltage machines in relation to demand.</li> <li>● Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -54.1%.</li> </ul>
12	Tumour testing recommendations and accessibility	0 – 6	<b>2</b>	<ul style="list-style-type: none"> <li>+2 Histological and molecular testing are mentioned throughout the guidelines and specific biomarkers are identified. The specific markers identified are EGFR, ALK, ROS1 and PD-L1.</li> <li>0 EGFR, ALK, ROS1 and PD-L1 are not reimbursed under the national public health system.</li> </ul>
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>3</b>	<ul style="list-style-type: none"> <li>+3 Of the 13 drug and indication combinations we looked at, 6 were reimbursed: Afatinib (indications 1, 2), Crizotinib (indications 1-3), Osimertinib (indication 1). See matrix on page 35 of the regional report for full details.</li> </ul>
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 Guidelines do not acknowledge the psychological burden of lung cancer.</li> <li>0 Guidelines do not specify a referral pathway for psychological support.</li> </ul>
15	Patient access to supportive / palliative care services	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li>+1 The ESMO guidelines do not mention a specific referral pathway, however, they do mention situations when palliative interventions are recommended.</li> <li>0 There is limited palliative care training available in China. A recent study reported that the majority (69%) of oncologists have never received any formal education in palliative care.<sup>11</sup></li> </ul>
<b>Lung cancer is a focus for research</b>				
16	Clinical and outcomes data collection	0 – 7	<b>3</b>	<ul style="list-style-type: none"> <li>+2 High quality population-based cancer registry (regional).<sup>12</sup></li> <li>+1 Incomplete or sample vital registration.<sup>12</sup></li> </ul>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>● 2.11% of GDP spent on research and development in 2016.<sup>13</sup></li> <li>● Number of clinical trials between 2009 and 2018 = 1138.<sup>14</sup></li> <li>● The ratio of 2009-2018 clinical trials to GDP (billions) = 0.093.<sup>13,14</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

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### **Involvement of patient organisations in national assessments of disease and policy development can help to build consensus.**

A specific lung cancer patient organisation has not been identified in China, and there is no evidence that patients were represented in clinical guideline development. Involving patients in the development of clinical guidelines can help to identify issues that may be overlooked by health professionals, influence the development of recommendations from a patient and carer perspective, and emphasise the importance of including shared decision making.

## Opportunity 2

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### **Referral for diagnostic assessment for patients suspected of having lung cancer should be prioritised within a specified time period as there is currently no mention of a rapid referral for diagnostic testing.**

Providing a timeframe within which patients suspected of having lung cancer should be tested is an important milestone for delivery of care as well as having a timeframe for confirmed lung cancer patients to receive secondary or tertiary care. China does not provide such timeframes, nor does it have dedicated fast track referral processes in its lung cancer guidelines.

## Opportunity 3

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### **Ensure that the psychological burden faced by lung cancer patients is addressed with pathways to access psychological support services.**

China neither includes psychological assessment, mentions the psychological burden of lung cancer nor provides a referral pathway for psychological support services in their lung cancer guidelines. Providing a pathway in the guidelines provides clear and practical steps to ensure that patients can receive the support that they need.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

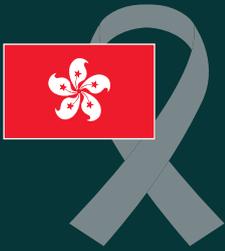
A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. Because of the nature of scoring—wherein complex matters are collapsed into simple scores—we note that not all readers will agree with all scores. After draft scores were assigned, the EIU attended four workshops of external country-based experts (Australia, Japan, South Korea, Taiwan), hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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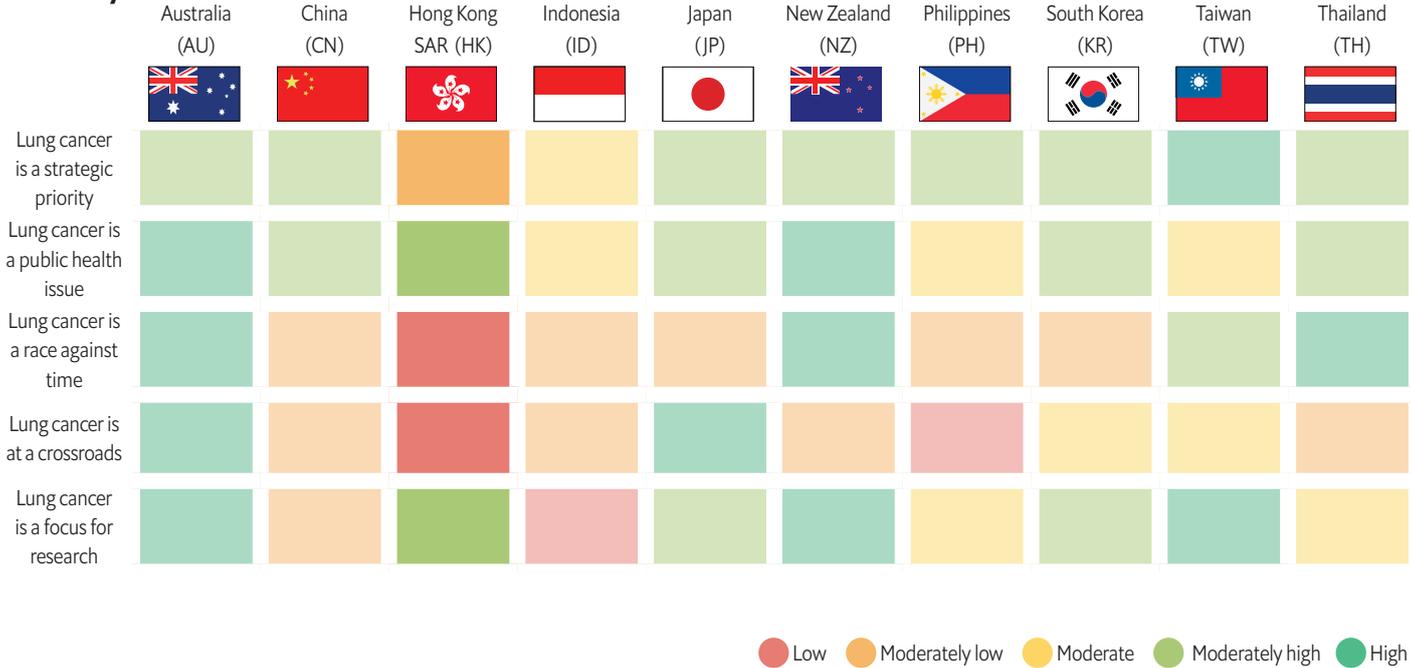


# Hong Kong: Lung Cancer Country Profile

## Scorecard Summary

Hong Kong's scores range between 'low' and 'moderately high' across the five scorecard domains. Hong Kong performed 'moderately low' in the strategic priority domain, and 'low' in both the race against time and crossroads domains. The low scoring across these domains is due to the lack of clinical practice guidelines for the treatment of lung cancer. Hong Kong scored 'moderately high' in the public health domain. The strong performance in this domain is attributed to the presence of tobacco control policies and public health measures, regulation of e-cigarettes and the existence of national policies and programmes to control environmental exposure. Hong Kong also scored 'moderately high' in the research domain. The strong performance in this domain is because Hong Kong's cancer registry is rated as high quality on a national basis, and the complete vital registration component is of medium quality. We discuss opportunities for improvement at the end of this country profile.

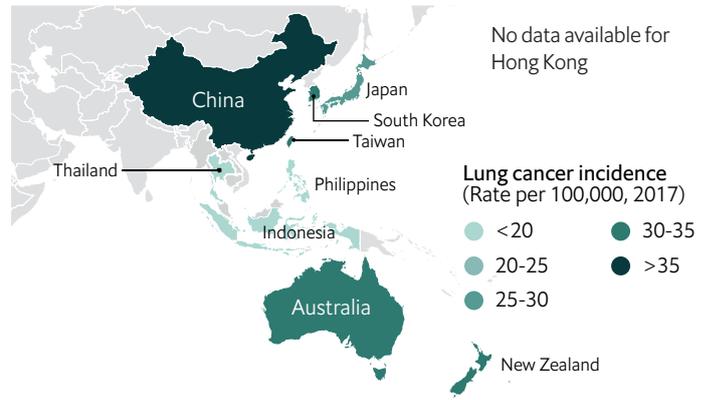
### Summary scorecard



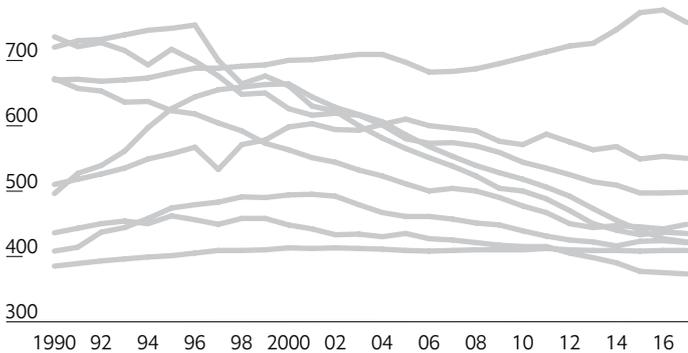
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Hong Kong	Asia	Global
Incidence	no data	28	27
Prevalence	no data	41	41
Mortality	no data	25	24
Disability-Adjusted Life Years (DALYs)	no data	510	503
Years Lived with Disability (YLDs)	no data	7	7
Years of Life Lost (YLLs)	no data	503	496

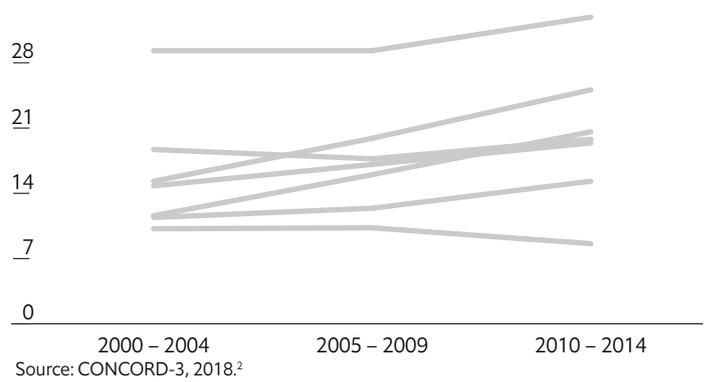
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.



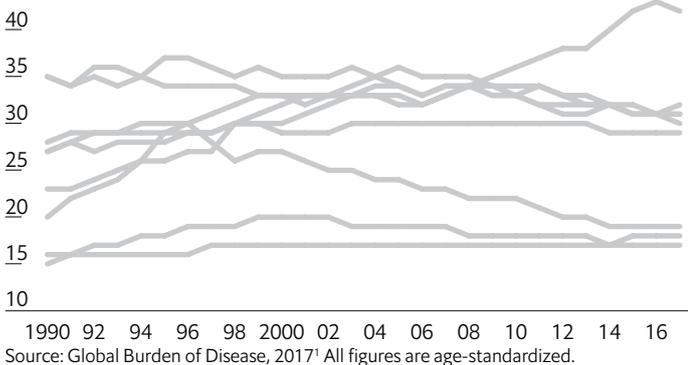
## Burden trend (DALY rate per 100,000, 1990-2017)



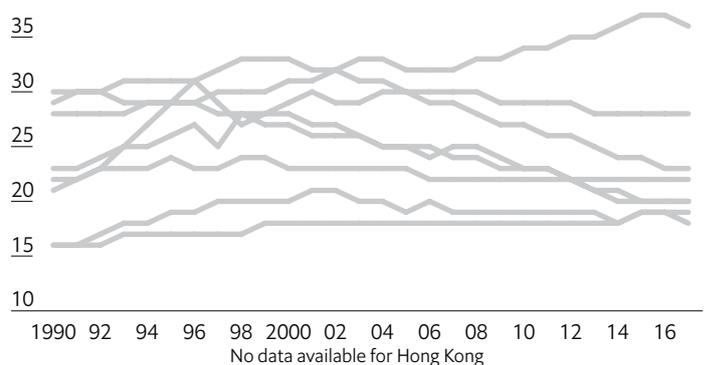
## Survival trend (% 5 year survival)



## Incidence trend (Incidence rate per 100,000, 1990-2017)

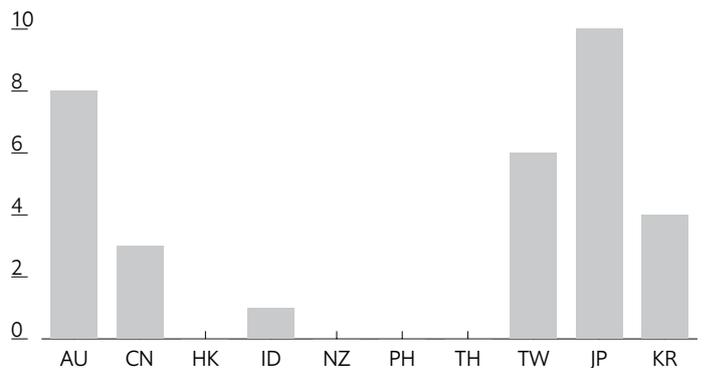


## Mortality trend (Mortality rate per 100,000, 1990-2017)



**Healthcare spending**  
In 2018, GDP = US\$ 362 billion and healthcare spending amounted to 6.2% of GDP.<sup>2</sup>

**Access to medicines**  
National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>3</b>	<ul style="list-style-type: none"> <li>+2 The Hong Kong Cancer Strategy was published by the Department of Health in July 2019.<sup>3</sup></li> <li>0 The Hong Kong Cancer Strategy does not include a detailed implementation plan.</li> <li>+1 A funding source has been identified; different aspects of the plan are funded by different groups like the Department of Health, Health and Medical Research Fund and Hospital Authority.</li> <li>0 A specific lung cancer control plan has neither been published nor discussed by the government or health ministry.</li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>1</b>	<ul style="list-style-type: none"> <li>+1 There are no lung cancer specific guidelines that cover diagnosis, treatment, support/palliative care and shared decision making for patients with lung cancer. However, the Centre for Health Protection has released recommendations for health professionals on prevention and screening.<sup>4</sup></li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>9</b>	<ul style="list-style-type: none"> <li>+2 Government objectives on tobacco control and a national agency for tobacco control exist.<sup>5</sup></li> <li>+1 Advertising is banned on national TV and radio.</li> <li>+1 At least one national mass media campaign ran during the survey period (up to 2016).</li> <li>+1 Law mandates that health warnings appear on tobacco packages.</li> <li>+1 Hong Kong is a party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li>+3 National smoke-free legislation exists for indoor offices, public transport, restaurants, cafes, pubs and bars.</li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>4</b>	<ul style="list-style-type: none"> <li>+4 There are no nicotine-containing e-cigarettes approved for sale or distribution in Hong Kong.<sup>6</sup></li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 Hong Kong has air quality objectives set by the Environment Protection Department.</li> <li>+1 An environmental radiation monitoring programme exists.</li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>0</b>	<ul style="list-style-type: none"> <li>0 There is no evidence of an on-going or previously conducted clinical trial examining lung cancer screening.</li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>0</b>	<ul style="list-style-type: none"> <li>0 No lung cancer specific patient organisations have been identified in Hong Kong.</li> <li>0 There is no evidence of an opportunity for civil society to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>
<b>Lung cancer is a race against time</b>			
8 Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 There are no lung cancer specific guidelines in Hong Kong.</li> </ul>
9 Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 There are no lung cancer specific guidelines in Hong Kong.</li> </ul>

Indicator	Range	Score	Justification
<b>Lung cancer is at a crossroads</b>			
10	Medical and surgical specialists number per 100,000	unscored	<ul style="list-style-type: none"> <li>● 14 cardiothoracic specialist (0.187 per 100,000).<sup>7</sup></li> <li>● 214 general surgeons (2.857 per 100,000).</li> <li>● No data on the number of oncologists.</li> </ul>
11	Radiotherapy accessibility	unmet need	<ul style="list-style-type: none"> <li>● No data on the number of available radiotherapy megavoltage machines (MVM).</li> </ul>
12	Tumour testing recommendations and accessibility	0 – 6	<b>0</b> There are no lung cancer specific guidelines in Hong Kong.
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>0</b> Of the 13 drug and indication combinations we looked at, 0 were reimbursed. See matrix on page 35 of the regional report for full details.
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>0</b> There are no lung cancer specific guidelines in Hong Kong.
15	Patient access to supportive / palliative care services	0 – 2	<b>0</b> There are no lung cancer specific guidelines in Hong Kong. <b>+1</b> Hong Kong's Hospital Authority developed its Strategic Service Framework for Palliative Care in 2017. The strategy includes "advanced training for non-palliative care teams working directly with patients suffering from life-threatening or life-limiting illnesses to build up their competency in implementing the shared care model". <sup>8</sup>
<b>Lung cancer is a focus for research</b>			
16	Clinical and outcomes data collection	0 – 7	<b>6</b> <b>+3</b> High quality population-based cancer registry (regional). <sup>9</sup> <b>+3</b> Medium quality complete vital registration. <sup>9</sup>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored <ul style="list-style-type: none"> <li>● 0.8% of GDP spent on research and development in 2017.<sup>10</sup></li> <li>● Number of clinical trials between 2009 and 2018 = 149.<sup>10</sup></li> <li>● The ratio of 2009-2018 clinical trials to GDP (billions) = 0.44.<sup>10,11</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

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### **Enable civil society to participate in the health technology assessments.**

There is no clear evidence of an opportunity for patients or the public to comment on Health Technology Assessment (HTA) recommendations in Hong Kong. Engaging patients and the public in HTAs leads to more informed, transparent, accountable and legitimate decisions.

## Opportunity 2

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### **Develop and/or participate in lung cancer screening trials in Hong Kong.**

There is no evidence to show that Hong Kong has participated in a lung cancer screening study or clinical trial. Lung cancer screening in Hong Kong may potentially improve treatment outcomes by identifying lung cancer early, however, evidence-based approaches to lung cancer screening are required. Lung cancer screening studies may enable Hong Kong to determine whether screening is appropriate for its population.

## Opportunity 3

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### **Develop clinical practice guidelines for the treatment of lung cancer.**

There are no clinical practice guidelines for the treatment of lung cancer in Hong Kong. High-quality, evidence-based clinical guideline should cover the continuum of care, ranging from screening and early detection through to diagnosis, treatment and psychological support, as well as supportive and palliative care. Patients or their representatives should be involved in the development of clinical practice guidelines to help to prioritise what matters to the patient and identify issues that may otherwise be overlooked by health profession.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advice on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains. The EIU researched, assessed and scored the following countries: Australia, China, Hong Kong, Indonesia, Japan, Philippines, South Korea, Taiwan and Thailand.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended four workshops of external country-based experts (Australia, Japan, South Korea, Taiwan), hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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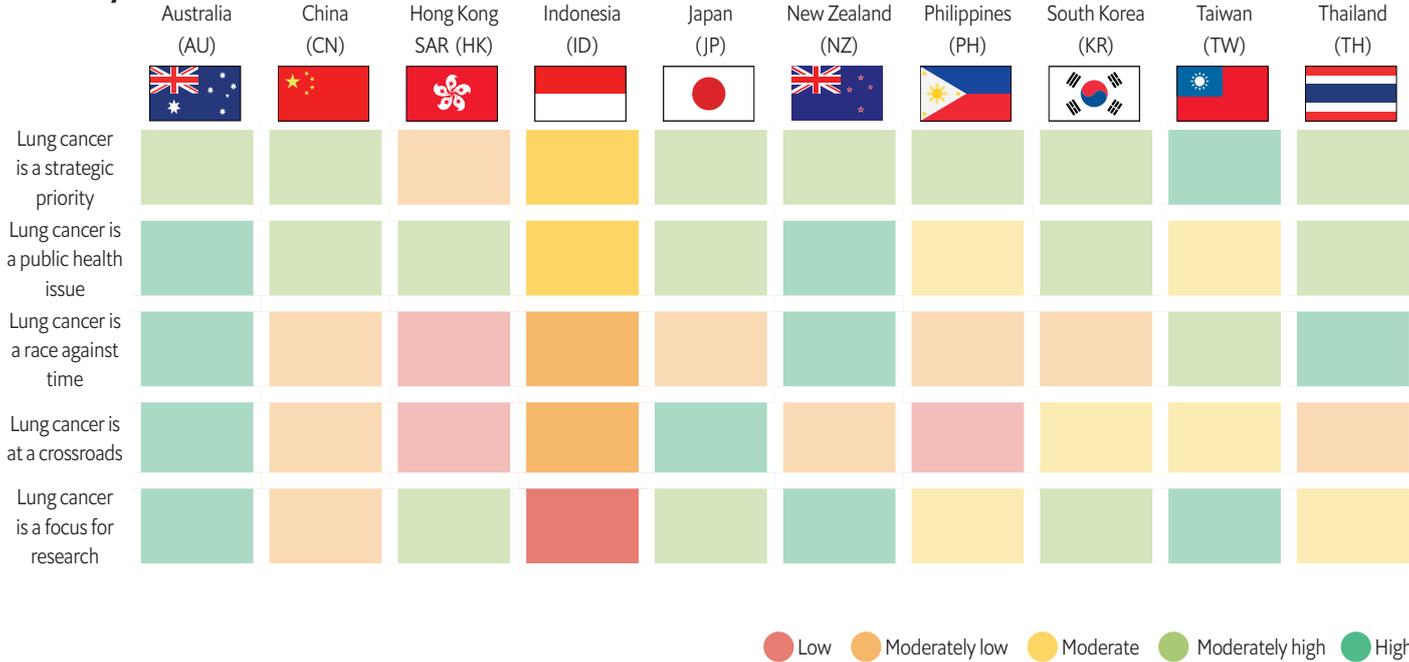


# Indonesia: Lung Cancer Country Profile

## Scorecard Summary

Indonesia scores 'moderately' and below throughout all domains. Indonesia's modest scoring in the lung cancer is a strategic priority and public health issue domains reflects the need for their National Cancer Control Plan to include an implementation plan and clearly identified funding sources as well as the country's lack of comprehensive national smoke-free laws and e-cigarette regulations. Indonesia performs 'moderately low' in the lung cancer is a race against time and lung cancer at a crossroads domains, which assess aspects of diagnosis & treatment for lung cancer. The lower scoring here is due to the absence of timeframes or any mention of fast-tracking of diagnostic testing for patients suspected to have lung cancer in the clinical guidelines for lung cancer. The guidelines also do not include a rapid referral pathway to specialised care for patients. The inclusion of the psychological burden of lung cancer in their guidelines and a referral pathway to psychological support services are other areas where the guidelines could be improved. Indonesia's lowest scoring domain was lung cancer is a focus for research as the country lacks a population-based cancer registry and national vital registration data. We discuss opportunities for improvement at the end of this country profile.

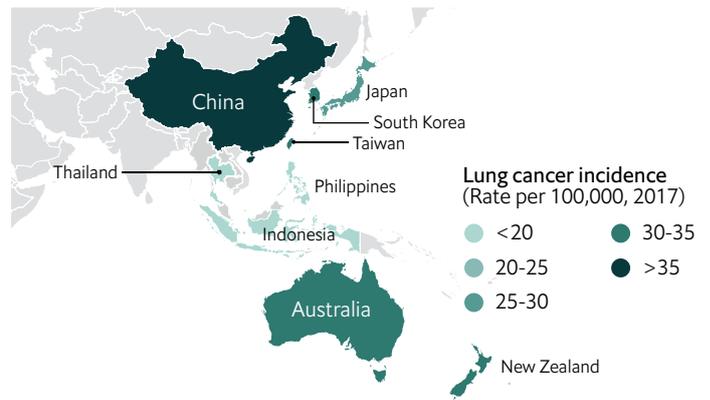
### Summary scorecard



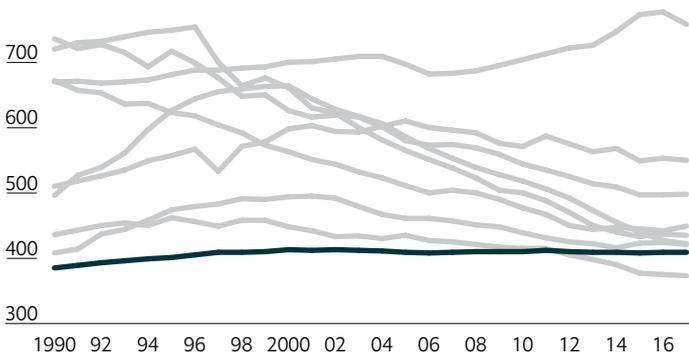
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Indonesia	Asia	Global
Incidence	42	28	27
Prevalence	64	41	41
Mortality	36	25	24
Disability-Adjusted Life Years (DALYs)	758	510	503
Years Lived with Disability (YLDs)	10	7	7
Years of Life Lost (YLLs)	747	503	496

Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

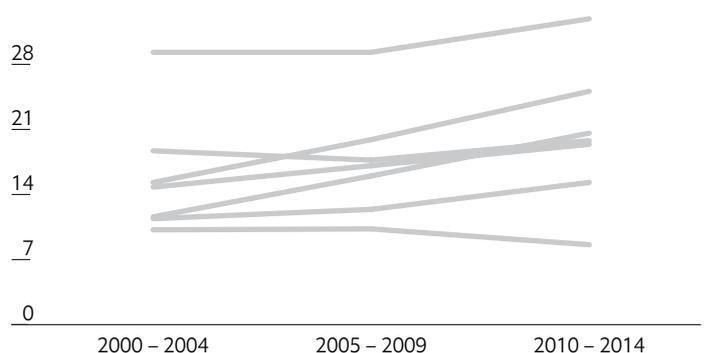


## Burden trend (DALY rate per 100,000, 1990-2017)



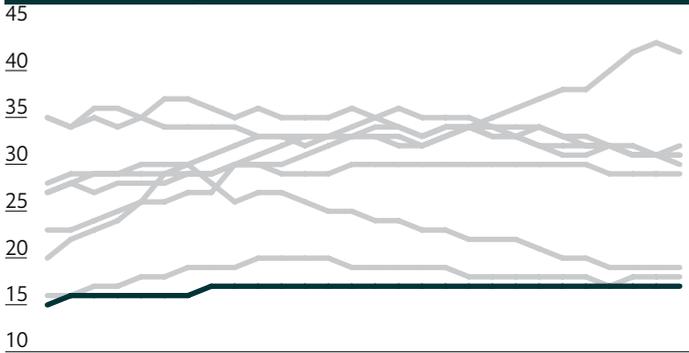
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



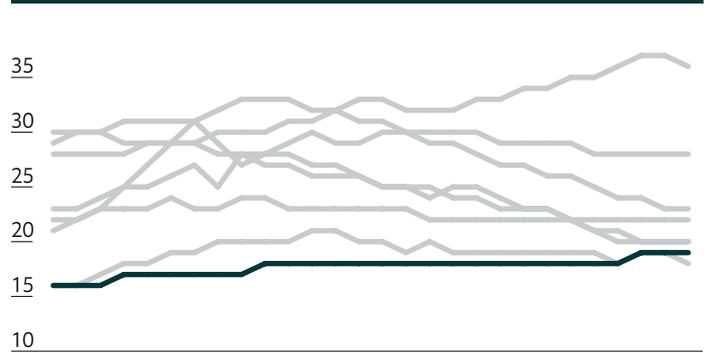
Source: CONCORD-3, 2018.<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

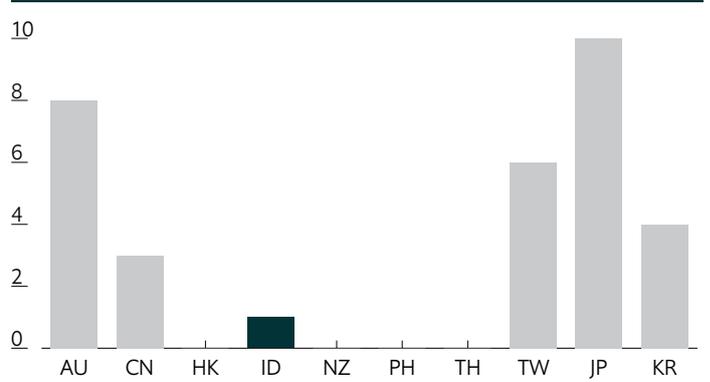


Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 44,626 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 225,700 premature deaths in Indonesia.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$ 1,042 billion and healthcare spending amounted to 3.2% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>2</b>	<ul style="list-style-type: none"> <li><b>+2</b> The National Cancer Control Committee introduced the 2015-2019 National Cancer Control Plan.<sup>5</sup></li> <li><b>0</b> The National Cancer Control Plan has areas to support the implementation of the plan, however, the National Cancer Control Plan does not include a detailed implementation plan.</li> <li><b>0</b> The National Cancer Control Plan does not identify a funding source.</li> <li><b>0</b> A specific lung cancer control plan has neither been published nor discussed by the government or health ministry.</li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>5</b>	<ul style="list-style-type: none"> <li><b>+1</b> Lung cancer clinical guidelines published by Indonesia's Ministry of Health in July 2017.<sup>6</sup></li> <li><b>+4</b> Guidelines cover screening, diagnosis, treatment and palliative care.</li> <li><b>0</b> Guidelines do not cover shared decision making.</li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>5</b>	<ul style="list-style-type: none"> <li><b>+2</b> National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li><b>+1</b> At least one national mass media campaign ran during the survey period (up to 2016).</li> <li><b>+1</b> Law generally mandates that health warnings appear on tobacco packages.</li> <li><b>+1</b> National smoke-free legislation exists for public transport but not for indoor offices or restaurants, cafes, pubs and bars.</li> <li><b>0</b> Advertising for tobacco on national TV and radio is allowed.</li> <li><b>0</b> Indonesia is not party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> According to the 2017 Ministry of Finance regulation on tobacco products, nicotine-containing e-cigarettes are regarded as "other processed tobacco" or products that contain "extract and essence of tobacco."<sup>8</sup></li> <li><b>0</b> There is no clear evidence to suggest that there is an advertising ban on E-cigarettes or that the sale of e-cigarettes is subject to age restrictions. Similarly, there is no information on whether or where the use of e-cigarettes is restricted.</li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> Indonesia has specific air quality legislation/programs where the provincial governments can set air quality and emission standards for industrial activities and motor vehicles.<sup>9</sup></li> <li><b>0</b> There are no policies or programs in place to control radon.</li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>0</b>	<ul style="list-style-type: none"> <li><b>0</b> There is no evidence of an on-going or previously conducted clinical trial examining lung cancer screening.</li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>1</b>	<ul style="list-style-type: none"> <li><b>0</b> No specific lung cancer patient organisations have been identified in Indonesia.</li> <li><b>+1</b> Civil society has the opportunity to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>
<b>Lung cancer is a race against time</b>			
8 Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li><b>0</b> Guidelines do not mention that suspected patients are to be fast-tracked.</li> <li><b>0</b> While the guidelines specify the appropriate timeframe from scanning to radiation planning, it does not specify a timeframe for diagnostic referral.</li> </ul>
9 Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li><b>0</b> Guidelines do not mention rapid referral to treatment for lung cancer patients.</li> <li><b>+1</b> Guidelines discuss care delivery with multidisciplinary teams from the time of diagnosis.</li> </ul>

Indicator	Range	Score	Justification
<b>Lung cancer is at a crossroads</b>			
10	Medical and surgical specialists number per 100,000	unscored	<ul style="list-style-type: none"> <li>No data on the number of pulmonologists, thoracic or general surgeons.</li> </ul>
11	Radiotherapy accessibility unmet need	unscored	<ul style="list-style-type: none"> <li>-353 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit)<sup>10</sup></li> <li>There is an insufficient supply of radiotherapy megavoltage machines in relation to demand.</li> <li>Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -89.8%.</li> </ul>
12	Tumour testing recommendations and accessibility 0 – 6	<b>2</b>	<ul style="list-style-type: none"> <li><b>+2</b> Histological and molecular testing are mentioned in the diagnostic guideline for lung cancer and specific biomarkers are identified.</li> <li><b>0</b> Tests for ALK, EGFR, ROS1 and PD-L1 are not currently reimbursed in Indonesia.</li> </ul>
13	Key personalised medicines reimbursement and accessibility 0 – 10	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> Of the 13 drug and indication combinations we looked at, only 1 was reimbursed: Afatinib (indication 1). See matrix on page 35 of the regional report for full details.</li> </ul>
14	Understanding psychological burden of lung cancer and access to support services 0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> Guidelines briefly refer to the psychological burden of lung cancer.</li> <li><b>0</b> Guidelines do not specify a referral pathway to psychological support services for lung cancer patients.</li> </ul>
15	Patient access to supportive / palliative care services 0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li><b>0</b> Guidelines do not specify a referral pathway to palliative care services.</li> <li><b>+1</b> New palliative care centres are under development and palliative care has been integrated in the National Cancer Control Program 2014 – 2019. Palliative care has become a training module in some faculties of medicine and nursing.<sup>11</sup></li> </ul>
<b>Lung cancer is a focus for research</b>			
16	Clinical and outcomes data collection 0 – 7	<b>0</b>	<ul style="list-style-type: none"> <li><b>0</b> Indonesia has no population-based cancer registry or vital registration data collection system.<sup>12</sup></li> </ul>
17	Research support and funding R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>0.08% of GDP spent on research and development in 2013.<sup>13</sup></li> <li>Number of clinical trials between 2009 and 2018 = 10.<sup>14</sup></li> <li>The ratio of 2009-2018 clinical trials to GDP (billions) = 0.0098.<sup>13,14</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

### **Indonesia needs an updated National Cancer Control Plan.**

While Indonesia's National Cancer Control Committee (NCCC) instituted the 2015-2019 national cancer control plan, an updated and more comprehensive control plan is warranted. An updated national cancer control plan should ideally include the following elements—which were only weakly covered at best in the current plan: discussion of prevention, screening and early detection, red flags and symptoms to look for in primary care, diagnosis, an implementation plan and a funding source. A specific lung cancer control plan has not been published by the government or health ministry.

## Opportunity 2

### **Develop greater tobacco control policies and e-cigarette legislation.**

The costs to Indonesian society from tobacco have not been fully addressed. National smoke-free legislation in Indonesia should be strengthened by including a ban on smoking in indoor offices and on public transportation. Policymakers should reconsider their current legislation which permits tobacco advertising on TV and radio and consider committing to the World Health Organization Framework Convention on Tobacco Control. Indonesia would also benefit from greater legislation around e-cigarettes.

## Opportunity 3

### **Improved diagnostic testing (including increased capacity) is needed for people suspected of having lung cancer.**

Streamlining the time to diagnosis through improved diagnostic testing will improve the ability to identify people with the disease in earlier stages and help to ensure treatment is started sooner in the disease process.

## Opportunity 4

### **Ensure that the psychological burden faced by lung cancer patients is addressed with pathways to access psychological support services.**

While the Indonesian guidelines mention the psychological burden of lung cancer, they do not provide a pathway for obtaining relevant support services in their lung cancer guidelines. Providing a pathway in the guidelines provides clear and practical steps to ensure that patients can receive the support that they need.

## Opportunity 5

### **Cancer registries lack clinical data. In Indonesia, a clinical cancer registry could provide helpful data.**

Indonesia has no population-based cancer registry or vital registration data collection system. Clinicians may find that a detailed, clinical cancer registry could help to improve the overall care that lung cancer patients receive; it may also help ensure equity between regions.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended four workshops of external country-based experts (Australia, Japan, South Korea, Taiwan), hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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# Japan: Lung Cancer Country Profile

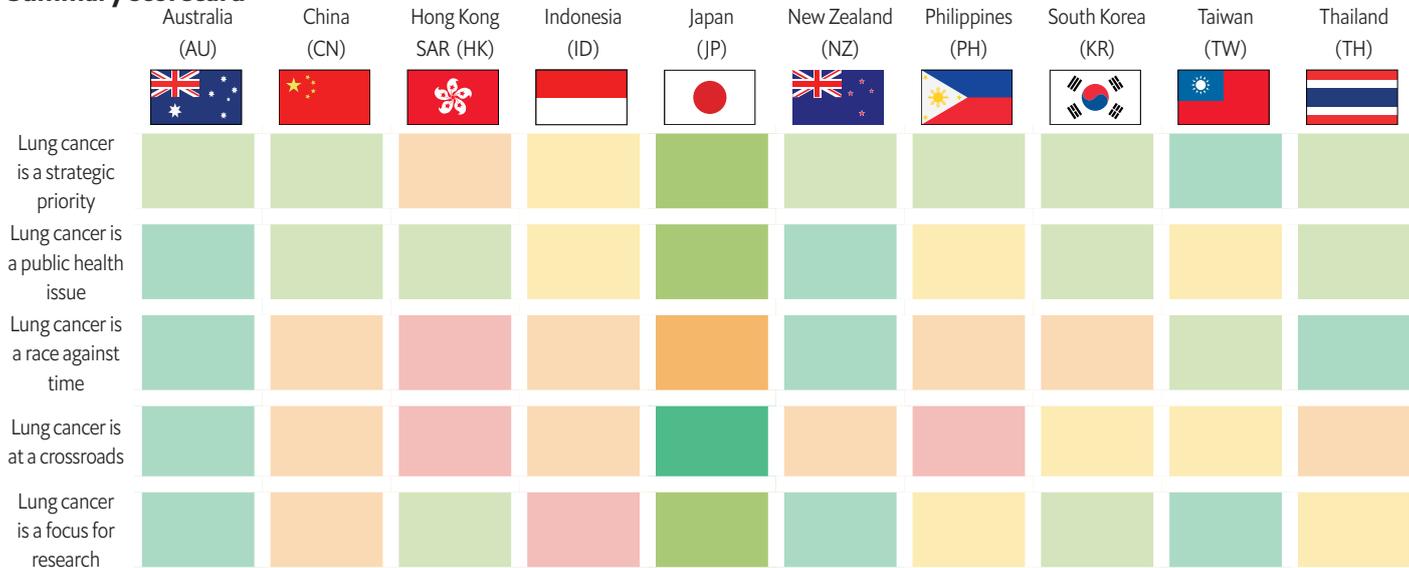
## Scorecard Summary

Japan performs strongly in most of the domains, scoring 'moderately high' and above throughout except for the third domain—which examines lung cancer as a race against time—where it scores 'moderately low'. Japan's strong showing is mainly due to its comprehensive lung cancer clinical guidelines that cover screening, diagnosis, treatment and palliative care, good use of histological/molecular testing and availability of treatment. The reason for the slight dip in performance in the race against time domain is that the lung cancer guidelines do not mention a specific time frame for diagnosis of suspected lung cancer patients and there is no referral pathway mentioned for rapid referral to specialized care. While scoring well overall, challenges remain, including the need for the development of national level smoke-free environments, for example in indoor offices, public transport, restaurants, and cafes. Guidelines could also be improved. For example, they should specifically address the psychological burden of lung cancer and describe a referral pathway for psychological support services, and they should also cover shared decision making. We discuss opportunities for improvement at the end of this country profile.

## Patients should be well-informed and be given a voice in their treatment

Workshop participants highlighted shared decision making as an area for improvement within Japan's care delivery system. Participants expressed the need for supporting informed choices by the patient and caregivers within the socio-cultural context, especially for diseases with serious prognosis and high mortality rates, such as lung cancer. Empowering lung cancer patients with greater opportunities in treatment decision making may improve their care experience and lead to better patient-reported outcomes. Workshop participants also highlighted the need for specific Asian screening guidelines to be developed, because of the unique biophysical and pathological characteristics reported in tumours found in the region.

### Summary scorecard

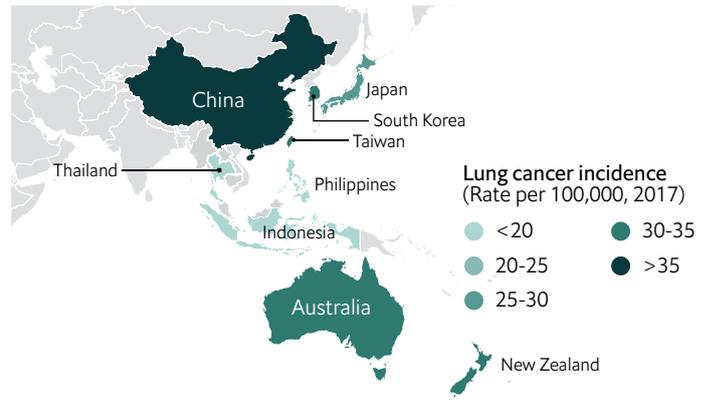


Low Moderately low Moderate Moderately high High

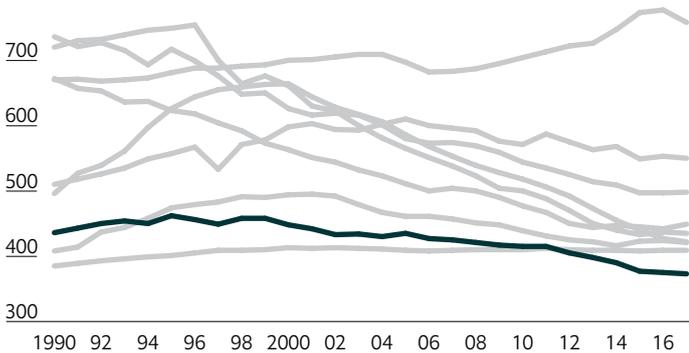
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Japan	Asia	Global
Incidence	29	28	27
Prevalence	64	41	41
Mortality	20	25	24
Disability-Adjusted Life Years (DALYs)	373	510	503
Years Lived with Disability (YLDs)	8	7	7
Years of Life Lost (YLLs)	365	503	496

Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

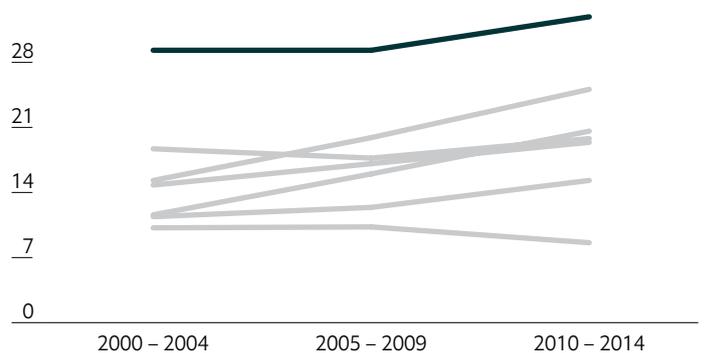


## Burden trend (DALY rate per 100,000, 1990-2017)



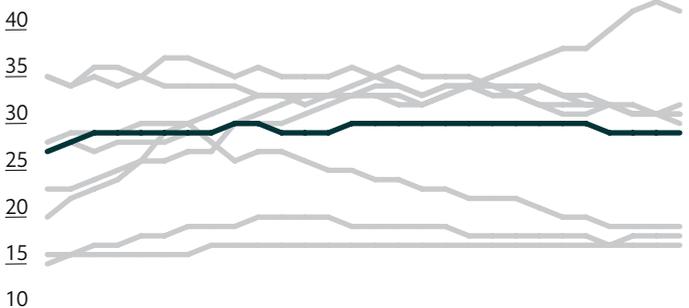
Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



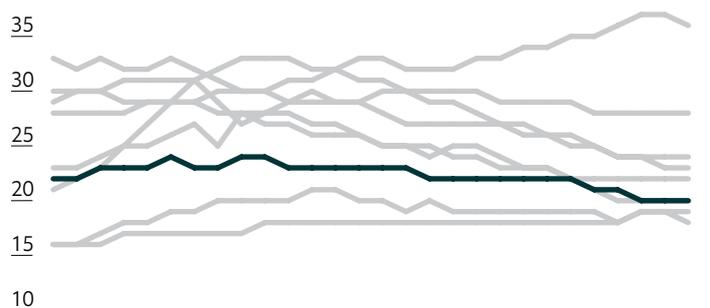
Source: CONCORD-3, 2018<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

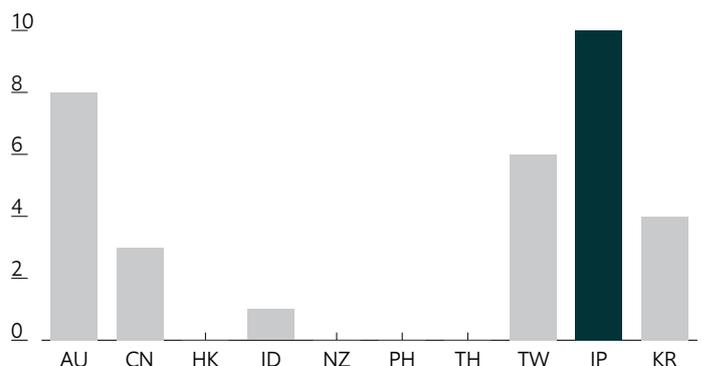


Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 38,393 million in terms of direct costs to health expenditures and indirect costs due to lost productivity and early mortality. Every year, tobacco related diseases cause more than 157,800 premature deaths in Japan.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$4970.6 billion and healthcare spending amounted to 10.8% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification	
<b>Lung cancer is a strategic priority</b>				
1	Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>4</b>	<ul style="list-style-type: none"> <li><b>+2</b> The Basic Plan to Promote Cancer Control was approved by the Japanese Cabinet and revised by the Cancer Control Promotion Council in 2012. The Acceleration Plan for Cancer Control was formulated in 2015.<sup>5</sup></li> <li><b>+1</b> The plan includes an implementation plan.</li> <li><b>+1</b> A funding source has been identified; the Ministry of Health, Labour and Welfare will finance the plan.</li> <li><b>0</b> A specific lung cancer control plan has not been published by the government or health ministry.</li> </ul>
2	Comprehensive clinical guidelines for lung cancer	0 – 6	<b>5</b>	<ul style="list-style-type: none"> <li><b>+1</b> The Japanese Society of Medical Oncology (JSMO) endorsed the Pan-Asian adapted ESMO (European Society for Medical Oncology) Clinical Practice Guidelines. The Japan Lung Cancer Society (JLCS) has also released local Lung Cancer Practice Guidelines.</li> <li><b>+4</b> The guidelines mention screening, diagnosis, treatment and palliative care.<sup>5</sup></li> <li><b>0</b> The guidelines by JLCS do not mention shared decision making.</li> </ul>
<b>Lung cancer is a public health issue</b>				
3	Tobacco control policies and public health measures	0 – 9	<b>5</b>	<ul style="list-style-type: none"> <li><b>+2</b> National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li><b>+1</b> Advertising is banned on national TV and radio.</li> <li><b>+1</b> Law mandates that health warnings appear on tobacco packages.</li> <li><b>+1</b> Japan is a party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li><b>0</b> National smoke-free legislation does not exist for indoor offices, public transport, restaurants, cafes, pubs and bars.</li> <li><b>0</b> According to WHO, no materials were submitted to verify whether a national mass media campaign ran during the survey period (up to 2016).</li> </ul>
4	E-cigarettes regulation and public health measures	0 – 4	<b>4</b>	<ul style="list-style-type: none"> <li><b>+1</b> Nicotine-containing e-cigarettes are classified as medicinal products and are regulated under the Japanese Pharmaceutical Affairs Law.<sup>8</sup></li> <li><b>+1</b> The sale or distribution of e-cigarettes is prohibited to people under 20 years of age.</li> <li><b>+1</b> Advertising, promotion and sponsorship related to e-cigarettes is banned.</li> <li><b>+1</b> Restrictions exist on e-cigarette use in public places.</li> </ul>
5	National policies and programmes for environmental exposure control	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li><b>+1</b> The Air Pollution Control Act is the main legislation concerning air pollution in Japan.<sup>9</sup></li> <li><b>+1</b> Radon control programmes exist in Japan.<sup>10</sup></li> </ul>
6	Evidence-based approach to lung cancer screening	0 – 1	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> A randomised controlled trial on lung cancer screening has taken place.<sup>11</sup></li> </ul>
7	Patient organisations involvement in policy development	0 – 3	<b>2</b>	<ul style="list-style-type: none"> <li><b>+2</b> A number of cancer related non-governmental organisations exist in Japan such as Japan Cancer Society, Japan Lung Cancer Society and Zenganren (All Japan Cancer Federation). Members of the specific lung cancer patient organisation named One Step were also actively involved in lung cancer guideline development.</li> <li><b>0</b> Civil society has no opportunity to comment on HTA recommendations.</li> </ul>

Indicator	Range	Score	Justification	
<b>Lung cancer is a race against time</b>				
8	Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>0</b>	<b>0</b> Both the lung cancer guidelines issued by The Japan Lung Cancer Society and the ESMO guidelines do not mention a specific time frame for diagnostic referral of suspected cancer patients.
9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>1</b>	<b>0</b> Both the lung cancer guidelines issued by The Japan Lung Cancer Society and the ESMO guidelines do not include a referral pathway for rapid referral to secondary or tertiary care. <b>+1</b> The lung cancer guidelines issued by ESMO recommend that patients are treated by a multidisciplinary care team.
<b>Lung cancer is at a crossroads</b>				
10	Medical and surgical specialists	number per 100,000	unscored	<ul style="list-style-type: none"> <li>● 1.03 thoracic surgeons in 2015.<sup>12</sup></li> <li>● 9.87 pulmonologists in 2019.<sup>13</sup></li> <li>● No data on the number of general surgeons.</li> </ul>
11	Radiotherapy accessibility	unmet need	unscored	<ul style="list-style-type: none"> <li>● -180 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit)<sup>14</sup></li> <li>● There is an insufficient supply of radiotherapy megavoltage machines in relation to demand.</li> <li>● Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -16.48%.</li> </ul>
12	Tumour testing recommendations and accessibility	0 – 6	<b>6</b>	<b>+2</b> Histological and molecular testing is mentioned in the diagnostic guideline for lung cancer and specific biomarkers are identified. <b>+4</b> EGFR, ALK, ROS1 and PD-L1 are reimbursed under the national public health system.
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>10</b>	<b>+10</b> Of the 13 drug and indication combinations we looked at, all were reimbursed: Afatinib (indications 1, 2), Crizotinib (indications 1-3), Pembrolizumab (indications 1-4), Nivolumab (indication 1), Atezolizumab (indication 1), Durvalumab (indication 1), Osimertinib (indication 1). See matrix on page 35 of the regional report for full details.
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>0</b>	<b>0</b> Lung cancer guidelines do not mention the psychological burden of lung cancer. <b>0</b> Lung cancer guidelines do not mention a referral pathway to psychological support services.
15	Patient access to supportive/ palliative care services	0 – 2	<b>2</b>	<b>+1</b> While mentioned in the lung cancer guidelines no specific referral pathway to supportive/ palliative care services is described. <b>+1</b> Training in supportive/palliative care is supported by the health ministry.
<b>Lung cancer is a focus for research</b>				
16	Clinical and outcomes data collection	0 – 7	<b>6</b>	<b>+2</b> High quality population-based cancer registry (regional). <sup>15</sup> <b>+4</b> High quality complete vital registration. <sup>15</sup>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>● 3.15% of GDP spent on research and development in 2016.<sup>16</sup></li> <li>● Number of clinical trials between 2009 and 2018 = 1499.<sup>17</sup></li> <li>● The ratio of 2009-2018 clinical trials to GDP (billions) = 0.31.<sup>16,17</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

### **Implement National smoke-free legislation in public places like restaurants, cafes, pubs, indoor offices, and public transportation to reduce second-hand exposure to cigarette smoke.**

Japan does not have national smoke-free legislation for public spaces, although regulations do exist in some prefectures and for certain provincial capital cities. Workshop participants were of the opinion that, though certain forms of regulations do exist, these are not strictly enforced or implemented.

The upcoming Summer Olympics, to be held in Tokyo in 2021, has been widely hailed as a promising opportunity to improve the health of the city's population. Smoking, including e-cigarettes, will be outlawed at all indoor and outdoor Olympic and Paralympic venues.<sup>18</sup> It is hoped that the beneficial effects of the ban will continue long after the games for Tokyo itself, and will also trickle down to other prefectures in Japan.

Finally, it was suggested that regulations around the sale, marketing and advertising of tobacco products, should be targeted specifically at young people. This would help stop the initiation of smoking at a vulnerable age and avoid habit-formation.

## Opportunity 2

### **Consider adopting a screening program using low-dose computed tomography (LDCT) among high-risk groups to improve early detection and survival rates for lung cancer patients.**

Japan adopted a combination of early x-ray and sputum examination based screening programs for lung cancer many years ago. Despite initial positive outcomes the program did not appear to significantly reduce long-term mortality rates. This corresponded with multiple international studies on x-ray screening for lung cancer. More recently, the NLST<sup>19</sup> trial and the NELSON<sup>20</sup> trial, have shown reductions in mortality with the use of LDCT screening. On the back of these results, Japan is considering adopting LDCT into their screening programs.

Workshop participants suggested that specific Asian screening guidelines needed to be developed, because of the unique biophysical and pathological characteristics reported in tumours found in the region.

## Opportunity 3

### **Apply the principles of shared decision making and support informed choice to provide holistic cancer care to lung cancer patients in Japan.**

Involving patients in healthcare policy decision making can help to identify issues that are overlooked by health professionals and encourage the development of recommendations from a patient or carer perspective. Their involvement also emphasises the importance of including shared decision making within the guidelines and can help to build consensus.

Participants at the workshop highlighted the need for informed choice within Japan's care delivery system, especially for diseases with serious prognosis and high mortality rates, such as lung cancer. It was noted that, for such diseases, uncertainty and anxiety may impede patients' and caregivers' decision-making capacities. Yet, with the constantly evolving nature of medical practice, it is important that care options are presented to patients within the cultural context they are comfortable and familiar with. Patients and their families also need to be given space and time to make their decisions.

The implementation of shared decision making and informed choice tools would need to be supported by the multidisciplinary-team; its value could further be enhanced if localised quality decision metrics were used to measure outcomes of any interventions.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended a workshop of external country-based experts, hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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# New Zealand: Lung Cancer Country Profile

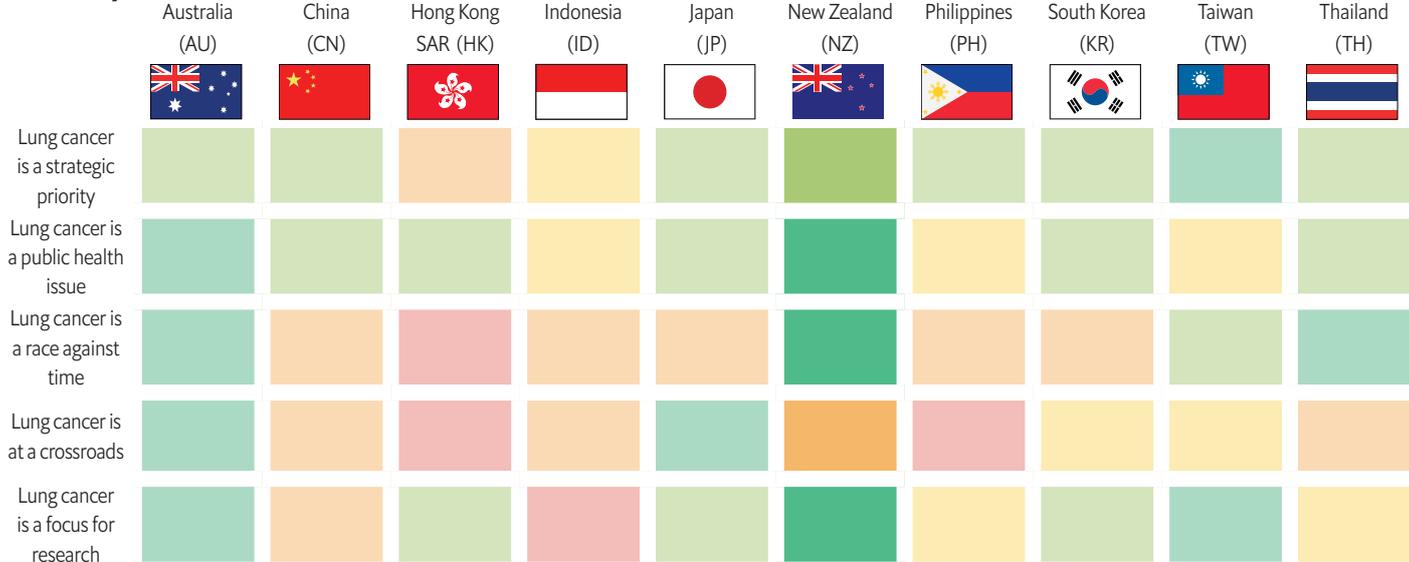
## Scorecard Summary

New Zealand performs well across most of the scorecard domains, scoring 'moderately high' or 'high' except in the fourth domain which examines access to biomarker testing, lung cancer treatment, psychological support, as well as supportive and palliative care. One reason for New Zealand's low scoring in this domain is related to limited access and funding for tests and targeted therapies or immunotherapies in the public health system. New Zealand's strong performance in the public health issue domain can be attributed to their robust tobacco and e-cigarette control policies. High scores in the race against time domain reflect having comprehensive guidelines that incorporate fast-tracking suspected lung cancer patients within specific timeframes for diagnostic and rapid referral to treatment. While scoring 'moderately high' in the strategic priority domain, there are some things that can still be done to improve lung cancer care, including developing a lung cancer specific control plan and incorporating shared decision-making into their clinical guidelines for lung cancer. We discuss opportunities for improvement at the end of this country profile.

## Inequalities in lung cancer care and outcomes are a key priority

Given the disparities in lung cancer outcomes experienced by Māori, addressing this inequality was a priority for participants at the workshop in New Zealand. Participants reflected on the importance of having the Māori world view incorporated into discussions about lung cancer, and the need to design systems and processes that are responsive to Māori. Workshop participants also stated there were no public campaigns raising awareness around symptoms of lung cancer in New Zealand, suggesting that better symptom recognition among the general population is needed. Some participants at the workshop expressed that, while smoking may be the single most significant risk factor for developing lung cancer, the focus on an individual's smoking status can lead some people to feel stigmatised when thinking about seeking medical advice for lung cancer symptoms. Workshop participants emphasised a number of issues with the utility of cancer registries in New Zealand, including the lack of data on cancer staging and outcomes.

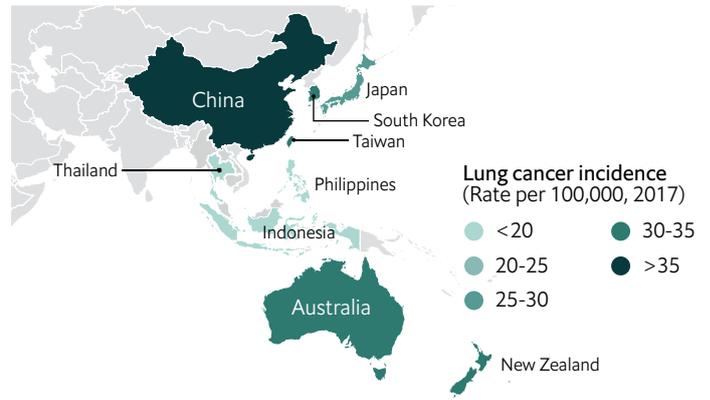
### Summary scorecard



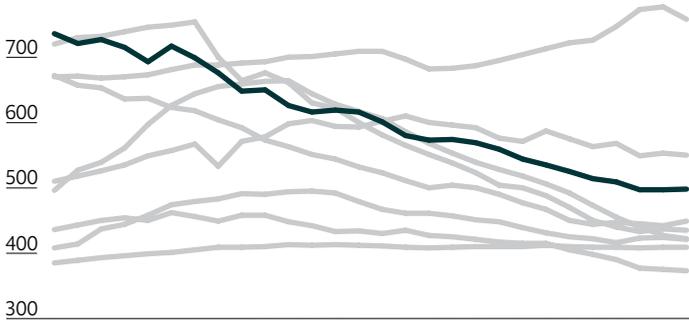
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	New Zealand	Asia	Global
Incidence	28*	28	27
Prevalence	102	41	41
Mortality	22*	25	24
Disability-Adjusted Life Years (DALYs)	435	510	503
Years Lived with Disability (YLDs)	4	7	7
Years of Life Lost (YLLs)	431	503	496

Source: Global Burden of Disease, 2017.<sup>1</sup> New Zealand Cancer Registry, 2017.<sup>2</sup> All figures are age-standardized.

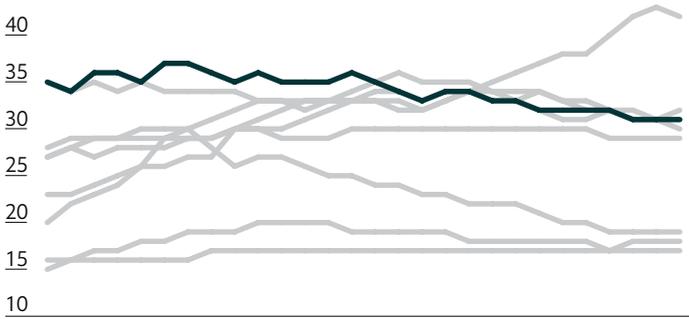


## Burden trend (DALY rate per 100,000, 1990-2017)



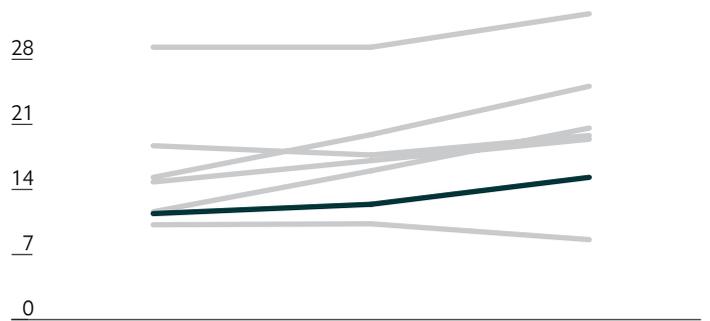
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Incidence trend (Incidence rate per 100,000, 1990-2017)



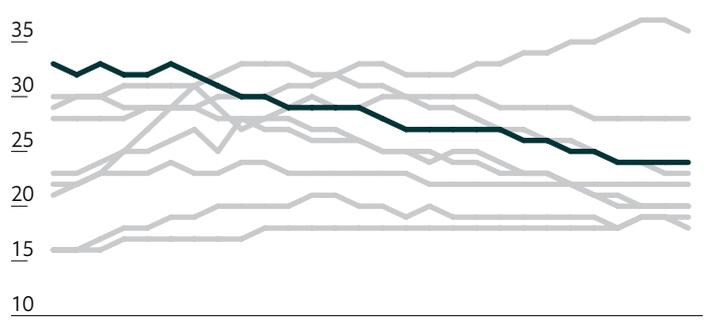
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



Source: CONCORD-3, 2018.<sup>3</sup>

## Mortality trend (Mortality rate per 100,000, 1990-2017)



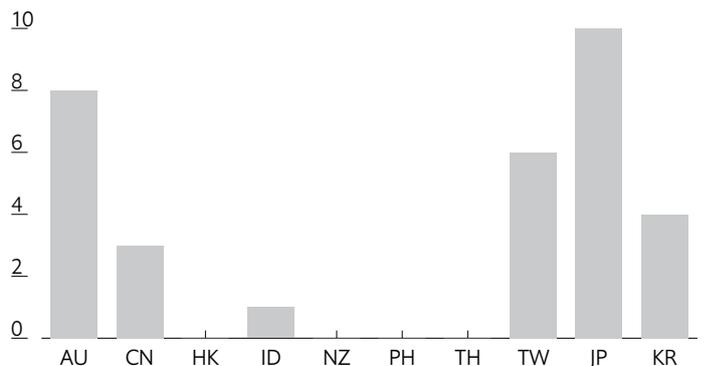
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 3,257 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 4,500 premature deaths in New Zealand.<sup>4</sup>

**Healthcare spending**  
In 2018, GDP = US\$ 205 billion and healthcare spending amounted to 9.3% of GDP.<sup>5</sup>

## Access to medicines

National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>4</b>	<ul style="list-style-type: none"> <li>+2 The New Zealand Government launched the Cancer Control Agency to lead the implementation of the New Zealand Cancer Action Plan 2019 - 2029.<sup>6</sup></li> <li>+1 The Cancer Control Agency is leading the implementation of the New Zealand Cancer Action Plan 2019 - 2029.</li> <li>+1 The Cancer Action Plan is directly funded by MOH through the Cancer Control Agency.</li> <li>0 A specific lung cancer control plan has not been published.</li> <li>● <b>However, a plan is currently being developed by the National Lung Cancer Working Group.</b></li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>4</b>	<ul style="list-style-type: none"> <li>+1 New Zealand does not have its own lung cancer clinical guidelines, however, the New Zealand Society for Oncology endorses the guidelines developed by ESMO (European Society of Medical Oncology). Additionally, the National Lung Cancer Working group (NLCWG) developed the Standards of Service Provision for Lung Cancer Patients in New Zealand in 2011 and these were updated in 2016. The NLCWG is currently reviewing and revising the 2016 version of the standards.</li> <li>+3 The guidelines cover screening, diagnosis and palliative care.</li> <li>0 The guidelines do not cover treatment or shared decision making.</li> <li>● <b>Participants at the workshop noted that while guidelines may be in place in New Zealand, they are not always followed and there are differences in the application of guidelines across the country.</b></li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>9</b>	<ul style="list-style-type: none"> <li>+2 National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li>+1 Advertising is banned on national TV and radio.</li> <li>+1 A national anti-tobacco mass media campaign exists.</li> <li>+1 Law mandates that health warnings appear on tobacco packages.</li> <li>+1 New Zealand is a party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li>+3 National smoke-free legislation exist for indoor offices, public transport and restaurants, cafes, pubs and bars.</li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>4</b>	<ul style="list-style-type: none"> <li>+1 E-cigarettes are prohibited under the Smoke-free Environment Act.<sup>8</sup></li> <li>+1 Sale of e-cigarettes is prohibited to those under 18.</li> <li>+1 Advertising of e-cigarettes is prohibited.</li> <li>+1 Use of e-cigarettes in legislated smoke-free areas is prohibited.</li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 New Zealand has the Resource Management Act 1991 that encompasses land use, forestry, pollution, traffic, zoning, water and air.<sup>9</sup></li> <li>+1 The New Zealand government carries out Radon Surveys to measure radon levels.</li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>0</b>	<ul style="list-style-type: none"> <li>0 There is no evidence of RCT studies or trial screening programs for Lung Cancer.</li> <li>● <b>However, a modelling study has been conducted to examine the cost-effectiveness of LDCT screening.<sup>10</sup></b></li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>1</b>	<ul style="list-style-type: none"> <li>+1 Lung Foundation New Zealand is an independent non-governmental organisation (NGO) dedicated to promoting healthy lungs and early detection of lung disease. There is no clear evidence to suggest that patients were represented in clinical guideline development.</li> <li>● <b>Other cancer-related NGOs such as Cancer Society are also active in New Zealand.</b></li> <li>0 Limited meaningful opportunity for patient organisations to comment on Health Technology Assessment (HTA) recommendations or to provide lived experience feedback as part of reimbursement decision making.<sup>11</sup></li> </ul>

Indicator	Range	Score	Justification	
<b>Lung cancer is a race against time</b>				
8	Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>2</b>	<p><b>+2</b> Under Standard 2.2 of the Standards of Service Provision, “Patients with clinical and/or radiological signs and symptoms suggestive of lung cancer should be seen by a specialist with an interest in respiratory medicine within 14 calendar days of secondary care receiving a referral.</p> <ul style="list-style-type: none"> <li>● <b>However, participants at the workshop highlighted that the suggested timeframes are not always met and there are significant variations across the country.</b></li> </ul>
9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>2</b>	<p><b>+1</b> Under Standard 2.1 of the Standards of Service Provision, “Patients requiring treatment for lung cancer, irrespective of route of referral, should start treatment within 62 days of secondary care receiving a referral.”</p> <p><b>+1</b> Under Standard 5.1 of the Standards of Service Provision, “All patients with lung cancer should be discussed/registered at a Multidisciplinary meeting (MDM).”</p>
<b>Lung cancer is at a crossroads</b>				
10	Medical and surgical specialists	number per 100,000	unscored	<ul style="list-style-type: none"> <li>● There are 48 cardiothoracic surgeons in the register of doctors by the Medical Council of New Zealand. (0.96 per 100,000).</li> <li>● There are 429 general surgeons in the registry of doctors by the Medical Council of New Zealand. (8.57 per 100,000).</li> <li>● There are 72 medical oncologists. (1.44 per 100,000).</li> <li>● There are 38 radiation oncologists. (0.76 per 100,000).</li> </ul>
11	Radiotherapy accessibility	unmet need	unscored	<ul style="list-style-type: none"> <li>● -8 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit)<sup>12</sup></li> <li>● There is an insufficient supply of radiotherapy megavoltage machines in relation to demand.</li> <li>● Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -22.2%.</li> </ul>
12	Tumour testing recommendations and accessibility	0 – 6	<b>4</b>	<p><b>+2</b> Histological and molecular testing are mentioned in the Standards of Service Provision for lung cancer and specific biomarkers are identified. The specific markers identified are EGFR and ALK inhibitors.</p> <p><b>+2</b> EGFR and ALK tests are reimbursed while ROS1 and PD-L1 tests are self-funded.</p> <ul style="list-style-type: none"> <li>● <b>Participants at the workshop acknowledged that while some testing is available in New Zealand, that there are variations in practice and access to testing across the country.</b></li> </ul>
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>0</b>	<p><b>0</b> Of the 13 drug / indication combinations included in our study, none were reimbursed.</p> <ul style="list-style-type: none"> <li>● <b>However, Gefitinib and Alectinib are reimbursed by the public health system.</b></li> </ul>
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>2</b>	<p><b>+1</b> The Standards of Service Provision mention the psychological burden of lung cancer in Standard 6.</p> <p><b>+1</b> The Standards of Service Provision specify a referral pathway for psychological support in Standard 7.</p>
15	Patient access to supportive / palliative care services	0 – 2	<b>2</b>	<p><b>+1</b> The Standards of Service Provision include referral pathways to palliative care or supportive care services in Standard 8.</p> <p><b>+1</b> Recognised Specialists/Oncologists in New Zealand must receive structured training in supportive care for patients with neoplasm including pain management, social and psychological support.</p>
<b>Lung cancer is a focus for research</b>				
16	Clinical and outcomes data collection	0 – 7	<b>7</b>	<p><b>+3</b> High quality population-based cancer registry.<sup>13</sup></p> <p><b>+4</b> High quality complete registration.</p> <ul style="list-style-type: none"> <li>● <b>The registry does not capture staging or outcomes.</b></li> </ul>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>● 1.23% of GDP spent on research and development in 2015.<sup>14</sup></li> <li>● Number of clinical trials between 2013 and 2018 = 777.<sup>15</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

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### **More targeted efforts are needed to address ethnic inequalities in lung cancer.**

Māori have much poorer survival rates from lung cancer than non-Māori. The poorer lung cancer outcomes experienced by Māori are largely due to late-stage diagnosis (often in emergency department settings), delays in or lack of access to treatments and low surgical rates for early-stage disease. Greater efforts are needed to prevent lung cancer among Māori, to reduce the barriers to care (e.g. financial, cultural and geographic), and ensure that culturally appropriate and respectful lung cancer care is then delivered to Māori across the treatment pathway.

## Opportunity 2

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### **Cancer registries lack data on staging and outcomes. Better data could lead to improved cancer care in New Zealand.**

Participants at the workshop highlighted that the New Zealand Cancer Registry does not capture staging or outcomes, information that participants felt was key to providing a better understanding of lung cancer. Clinicians may find that a detailed, clinical cancer registry could help to improve the overall care that lung cancer patients receive; it may also help ensure equity between regions.

## Opportunity 3

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### **Participation in lung cancer screening trials and studies may enable New Zealand to determine whether screening is appropriate for its population.**

Indicator 6: There is no evidence to show that New Zealand has participated in a lung cancer screening study or clinical trial, though workshop participants did note that efforts are underway to address this.

## Opportunity 4

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### **Involvement of patient organisations in national assessments of disease and policy development can help to build consensus.**

Indicator 7: While a specific lung cancer patient organisation has been identified in New Zealand, there is no evidence that patients were represented in clinical guideline development. Involving patients in the development of clinical guidelines can 1) help to identify issues that may be overlooked by health professionals, 2) influence the development of recommendations from a patient and carer perspective, and 3) emphasise the importance of including shared decision-making.

## Opportunity 5

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### **Create systems to ensure sustainable and equitable access to innovations.**

While medical innovations and technological developments have improved options for lung cancer patients across the Asia-Pacific region, many of the newer treatments are not reimbursed in New Zealand leading to a lack of access to targeted therapies and immunotherapies through the public health system for patients with lung cancer. Patients may access modern treatments through the private health sector depending on their ability to pay.

## Opportunity 6

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### **Spread greater awareness of lung cancer prevention, symptoms and early detection through public mass media campaigns.**

Workshop participants in New Zealand felt that there was a lack of awareness among the general population on the symptoms of lung cancer and the importance of early detection. Awareness about lung cancer and its risk factors are important; however, participants at the workshop highlighted that a focus on smoking can lead to unintended consequences, such as stigmatisation and misinforms the public on the impact of other risk factors, including secondhand smoke, radon gas exposure, air pollution and family history. Campaigns should incorporate appropriate messaging which educates the public and eliminates stigma.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended six workshops of external country-based experts (Australia, Japan, New Zealand, South Korea, Taiwan, Thailand), hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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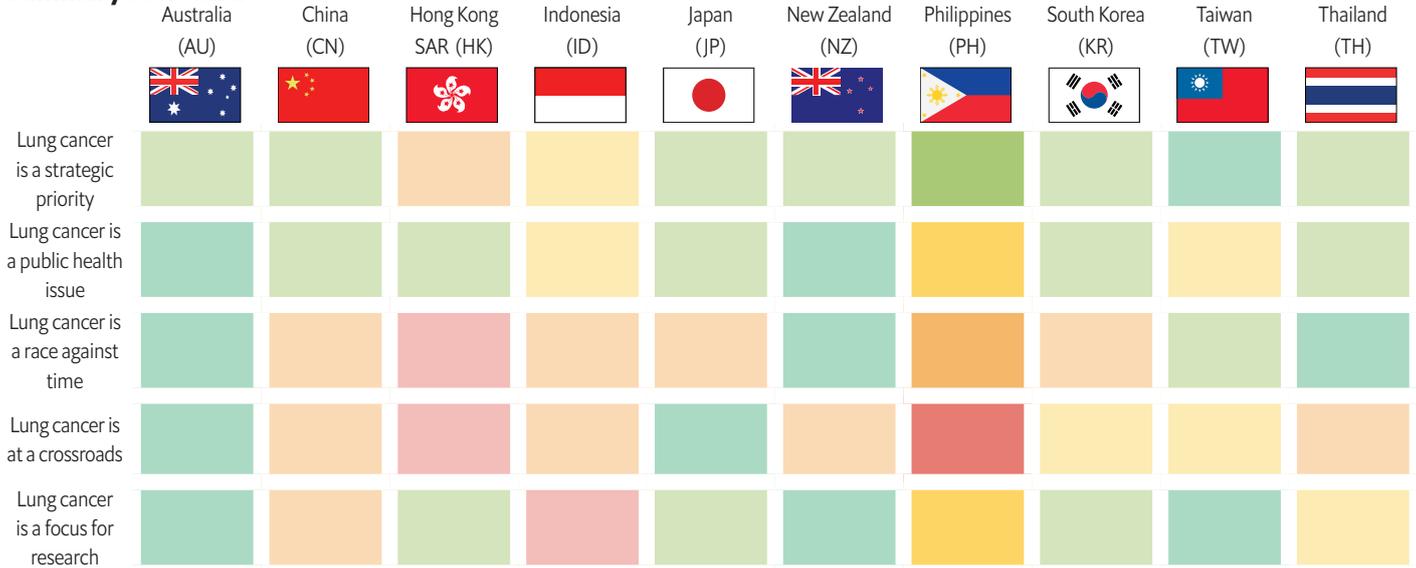


# Philippines: Lung Cancer Country Profile

## Scorecard Summary

The Philippines' performance varies considerably across domains, ranging from scores of 'moderately high' in the lung cancer is a strategic priority domain to 'low' in the lung cancer is at a crossroads domain. The Philippines strong performance in the strategic priority domain can be attributed to their comprehensive and up to date National Cancer Prevention and Control Action Plan. However, their scoring in this domain could be further improved by developing a control plan specific to lung cancer. A lack of national smoke-free legislation in public areas like indoor offices, restaurants, cafes, and bars or pubs led to a 'moderate' scoring for the Philippines in the lung cancer is a public health issue domain. Furthermore, the advertisement of e-cigarettes is not regulated and e-cigarette sales are not subject to an age limit. The country scored 'moderately low' in the lung cancer is a race against time domain as guidelines do not include timeframes or fast-tracking for diagnostic testing, nor do they include a rapid referral pathway to specialized care. The country's 'low' scoring in the lung cancer is at a crossroads domain would improve if guidelines included the psychological burden of lung cancer and a pathway for psychological support services. Access to targeted therapy and immunotherapy through the country's public health system is also limited. The Philippines' cancer registry is rated high quality on a regional basis, not national, and the complete vital registration component is medium quality, leading to a moderate scoring in the research domain. We discuss opportunities for improvement at the end of this country profile.

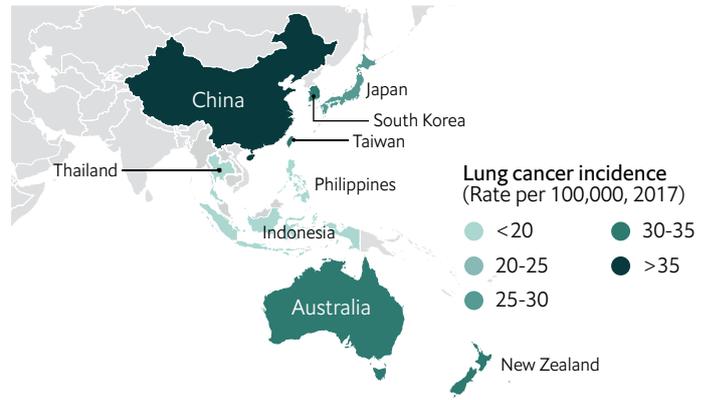
### Summary scorecard



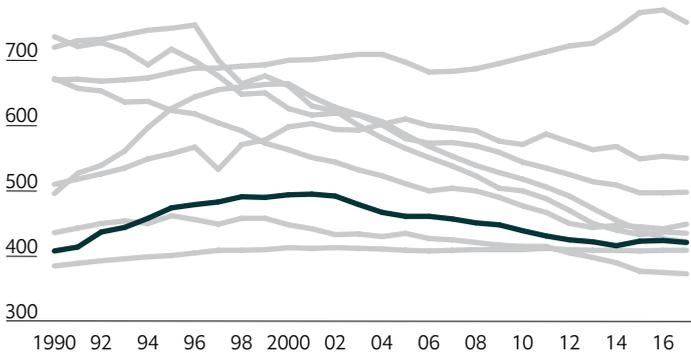
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Philippines	Asia	Global
Incidence	16	28	27
Prevalence	18	41	41
Mortality	19	25	24
Disability-Adjusted Life Years (DALYs)	421	510	503
Years Lived with Disability (YLDs)	4	7	7
Years of Life Lost (YLLs)	417	503	496

Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

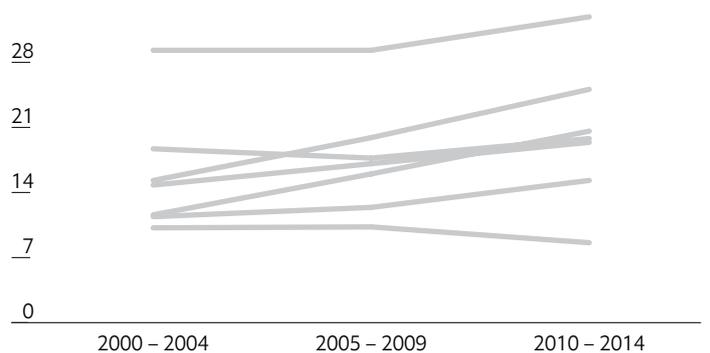


## Burden trend (DALY rate per 100,000, 1990-2017)



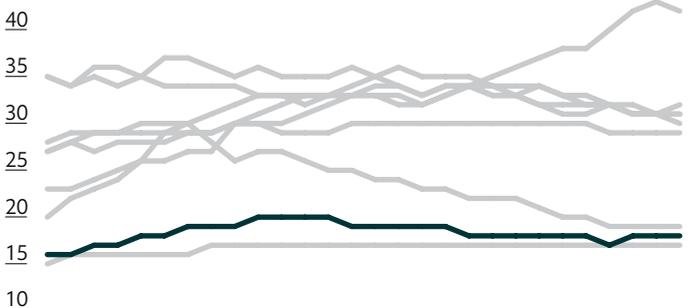
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



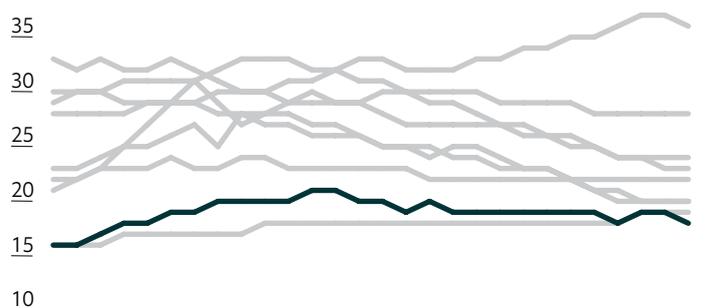
Source: CONCORD-3, 2018.<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

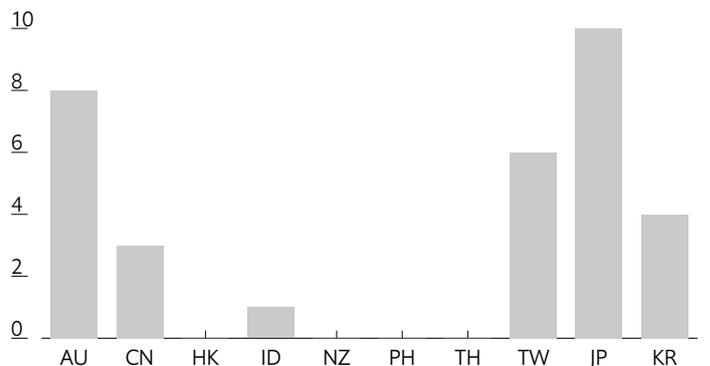


Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 5,248 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 117,700 premature deaths in the Philippines.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$ 330 billion and healthcare spending amounted to 4.5% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>4</b>	<ul style="list-style-type: none"> <li>+2 The five year National Cancer Prevention and Control Action Plan (NCPCAP) 2015-2020 was developed by the National Cancer Control Committee.<sup>5</sup></li> <li>+1 The National Cancer Control Committee ensures the implementation of the NCPCAP at the grassroots level.</li> <li>+1 The NCPCAP is funded by the Department of Health.</li> <li>0 A specific lung cancer control plan has neither been published nor discussed by the government or health ministry</li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>4</b>	<ul style="list-style-type: none"> <li>+1 The lung cancer guidelines were published by the Philippine Society of Medical Oncology.<sup>6</sup></li> <li>+3 Guidelines cover diagnosis, treatment and palliative care.</li> <li>0 Guidelines do not cover screening or shared decision making.</li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>7</b>	<ul style="list-style-type: none"> <li>+2 National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li>+1 Advertising is banned on national TV and radio.</li> <li>+1 At least one national mass media campaign ran during the survey period (up to 2016).</li> <li>+1 Law mandates that health warnings appear on tobacco packages.</li> <li>+1 The Philippines is party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li>+1 National smoke-free legislation exists for public transport but not for indoor offices or restaurants, cafes, pubs and bars.</li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>2</b>	<ul style="list-style-type: none"> <li>+1 E-cigarettes are classified as medical products and devices in the Philippines.<sup>8</sup></li> <li>+1 The use of E-cigarettes is prohibited in public places and restricted in public transportation.</li> <li>0 The Philippines does not have a minimum age or advertising ban on E-cigarettes.</li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li>+1 Air quality strategies are included in Philippines Clean Air Act that was published in 1999.<sup>9</sup></li> <li>0 There is no evidence of policies or programs in place to control radon.</li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>0</b>	<ul style="list-style-type: none"> <li>0 There is no evidence of an on-going or previously conducted clinical trial examining lung cancer screening.</li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>0</b>	<ul style="list-style-type: none"> <li>0 No specific lung cancer patient organisations have been identified in the Philippines.</li> <li>0 There is no opportunity for civil society to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>
<b>Lung cancer is a race against time</b>			
8 Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 While the guidelines state that suspected lung cancer patients are sent for a chest x-ray, there is no evidence of fast tracking.</li> <li>0 Guidelines do not mention a specific timeframe for diagnostic referral for suspected lung cancer patients.</li> </ul>
9 Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li>0 Guidelines do not specifically mention rapid referral for lung cancer patients to secondary or tertiary care.</li> <li>+1 Guidelines state that 'the management of lung cancer must be multi-disciplinary and interdisciplinary, with each discipline respecting the specialty expertise of the other, all for the benefit of the cancer patient'.</li> </ul>

Indicator	Range	Score	Justification
<b>Lung cancer is at a crossroads</b>			
10	Medical and surgical specialists number per 100,000	unscored	<ul style="list-style-type: none"> <li>● 129 members of the Philippine Association of Thoracic and Cardiovascular Surgeons (0.12 per 100,000).<sup>10</sup></li> <li>● No data on number of oncologists or general surgeons.</li> </ul>
11	Radiotherapy accessibility unmet need	unscored	<ul style="list-style-type: none"> <li>● -92 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit)<sup>11</sup></li> <li>● There is an insufficient supply of radiotherapy megavoltage machines in relation to demand.</li> <li>● Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -72.4%.</li> </ul>
12	Tumour testing recommendations and accessibility 0 – 6	<b>0</b>	<ul style="list-style-type: none"> <li>0 The guidelines do not include molecular testing.</li> <li>0 There is no evidence that tests for EGFR, ALK, ROS1 and PD-L1 are reimbursed under national public health system.</li> </ul>
13	Key personalised medicines reimbursement and accessibility 0 – 10	<b>0</b>	<ul style="list-style-type: none"> <li>0 Of the 13 drug and indication combinations we looked at, 0 were reimbursed. See matrix on page 35 of the regional report for full details.</li> </ul>
14	Understanding psychological burden of lung cancer and access to support services 0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 Guidelines do not mention the psychological burden of lung cancer.</li> <li>0 Guidelines do not specify a referral pathway for psychological support.</li> </ul>
15	Patient access to supportive / palliative care services 0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 Guidelines include a referral pathway to supportive / palliative care services for lung cancer patients.</li> <li>+1 Palliative care concepts and principles are part of the curriculum in major medical and nursing schools in the Philippines, and palliative care training programmes are delivered to health providers and volunteers.<sup>12,13</sup></li> </ul>
<b>Lung cancer is a focus for research</b>			
16	Clinical and outcomes data collection 0 – 7	<b>5</b>	<ul style="list-style-type: none"> <li>+2 High quality population-based cancer registry (regional).<sup>14</sup></li> <li>+3 Medium quality complete vital registration.<sup>14</sup></li> </ul>
17	Research support and funding R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>● 0.14% of GDP spent on research and development in 2013.<sup>15</sup></li> <li>● Number of clinical trials between 2009 and 2018 = 66.<sup>16</sup></li> <li>● The ratio of 2009-2018 clinical trials to GDP (billions) = 0.21.<sup>15,16</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

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### **Involvement of patient organisations in national assessments of disease and policy development can help to build consensus.**

A specific lung cancer patient organisation has not been identified in the Philippines, and there is no evidence that patients were represented in clinical guideline development. Involving patients in the development of clinical guidelines can help to identify issues that may be overlooked by health professionals, influence the development of recommendations from a patient and carer perspective, and emphasise the importance of including shared decision making.

## Opportunity 2

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### **Referral for diagnostic assessment for patients suspected of having lung cancer should be prioritised within a specified time period as there is currently no mention of a rapid referral for diagnostic testing.**

Providing a timeframe within which patients suspected of having lung cancer should be tested is an important milestone for delivery of care as well as having a timeframe for confirmed lung cancer patients to receive secondary or tertiary care. The Philippines does not provide such timeframes, nor does it have dedicated fast track referral processes in its lung cancer guidelines.

## Opportunity 3

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### **Ensure that the psychological burden faced by lung cancer patients is addressed with pathways to access psychological support services.**

The Philippines neither includes psychological assessment, mentions the psychological burden of lung cancer nor provides a referral pathway for psychological support services in their lung cancer guidelines. Providing a pathway in the guidelines provides clear and practical steps to ensure that patients can receive the support that they need.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended four workshops of external country-based experts (Australia, Japan, South Korea, Taiwan), hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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# South Korea: Lung Cancer Country Profile

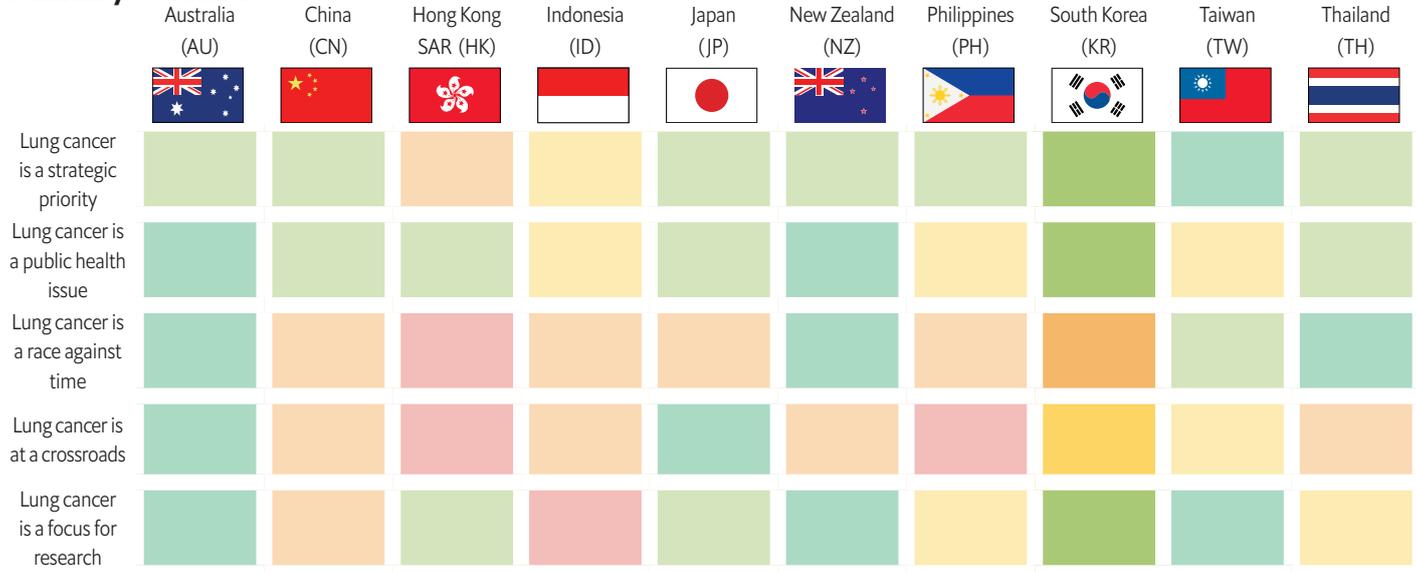
## Scorecard Summary

South Korea performs well in most of the domains, scoring 'moderately high' and above throughout except for the third domain – which examines lung cancer is a race against time – where it scores 'moderately low'. South Korea's strong showing is due to its own comprehensive lung cancer clinical guidelines that cover screening, diagnosis, treatment and palliative care, as well as good use of histological testing and access to treatment. The reason for the dip in the race against time domain is because the lung cancer guidelines do not mention a specific time frame for diagnosis of suspected lung cancer patients. While scoring well overall, there are challenges in South Korea, including the need for the guidelines to; recognise the psychological burden of lung cancer, describe a clear referral pathway for supportive and palliative services and prioritise shared decision making with the patient. Additionally, there is no specific lung cancer patient organisation and no involvement of civil society in the HTA process in the country. We discuss opportunities for improvement at the end of this country profile.

## Increase access to medicines and uptake of supportive services

In South Korea, supportive services are available in cancer centres across the country, however, patients only utilise these resources to a limited extent. Participants at the workshop suggested that the inclusion of supportive care in treatment guidelines and the promotion of these services to patients with lung cancer would ensure that the services are more appropriately utilised. Access to treatment was highlighted as a key issue by workshop participants. While they noted that newer treatments like immunotherapies are reimbursed in the public health system, the reimbursement criteria are strict and results in extremely limited access. Workshop participants discussed the need to create a cancer fund as one of the measures to expand access for those who may not be able to afford treatments not wholly reimbursed by the public health system.

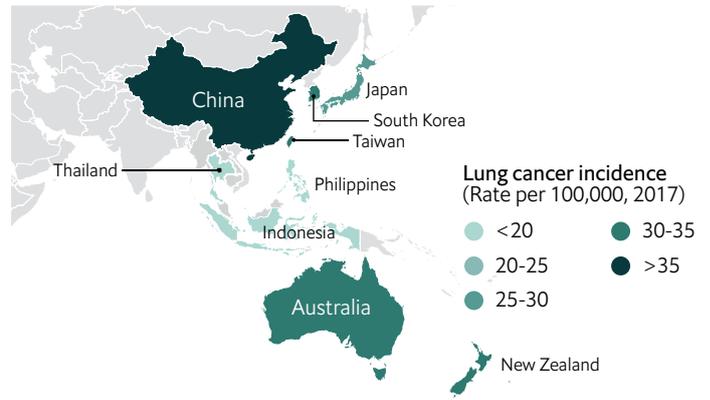
### Summary scorecard



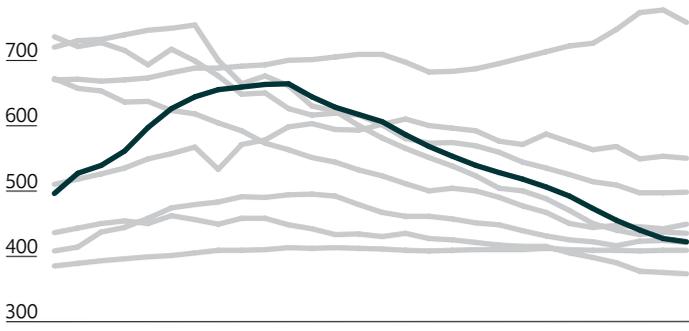
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	South Korea	Asia	Global
Incidence	31	28	27
Prevalence	63	41	41
Mortality	23	25	24
Disability-Adjusted Life Years (DALYs)	422	510	503
Years Lived with Disability (YLDs)	8	7	7
Years of Life Lost (YLLs)	413	503	496

Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

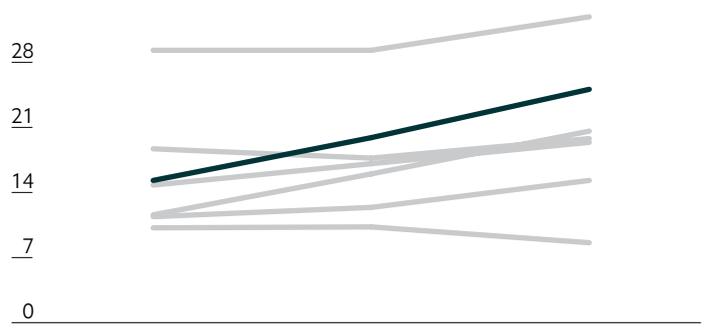


## Burden trend (DALY rate per 100,000, 1990-2017)



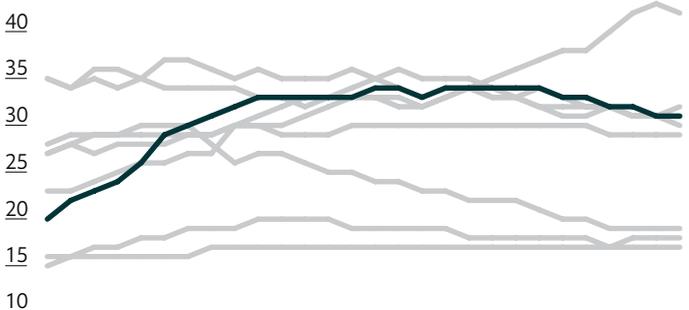
Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



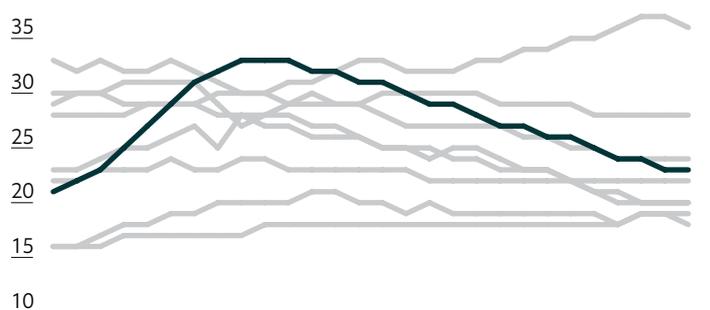
Source: CONCORD-3, 2018<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

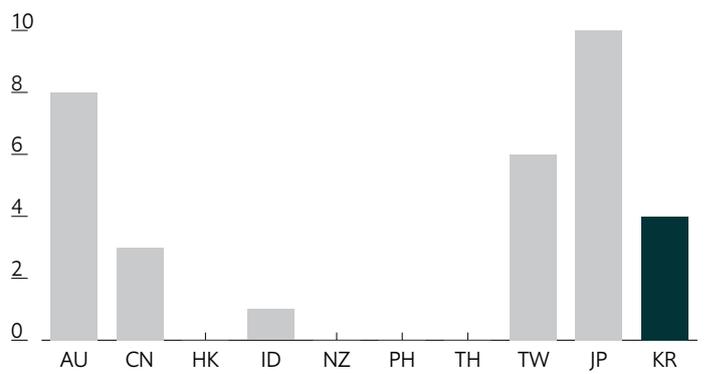


Source: Global Burden of Disease, 2017<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 11,915 million in terms of direct costs to health expenditures and indirect costs due to lost productivity and early mortality. Every year, tobacco related diseases cause more than 46,700 premature deaths in South Korea.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$1,620 billion and healthcare spending amounted to 7.8% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>4</b>	<ul style="list-style-type: none"> <li>+2 The National Cancer Control Plan (2016-2020) was released by the National Cancer Control Institute (NCCI) in 2016.<sup>5</sup></li> <li>+1 The plan includes an implementation plan.</li> <li>+1 The plan is funded by the Ministry of Health and Welfare.</li> <li>0 A specific lung cancer control plan has neither been published nor discussed by the government or health ministry.</li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>5</b>	<ul style="list-style-type: none"> <li>+1 The Korean Society of Medical Oncology (KSMO) endorsed the Pan-Asian adapted ESMO Clinical Practice Guidelines for the management of patients with metastatic non-small cell lung cancer. The Korean Association for the Study of Lung Cancer (KASLC) had also released lung cancer treatment guidelines in 2010.</li> <li>+4 The ESMO guidelines cover screening, diagnosis, treatment and palliative care.<sup>6</sup></li> <li>0 The ESMO guidelines do not cover shared decision making.</li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>8</b>	<ul style="list-style-type: none"> <li>+2 National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li>+1 Tobacco advertising is banned on national TV and radio.</li> <li>+1 The law mandates that health warnings appear on tobacco packages.</li> <li>+1 South Korea is a party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li>+2 National smoke-free legislation exists for indoor offices and public transportation.</li> <li>+1 At least one national anti-tobacco mass media campaign has been aired in South Korea (up to 2016).</li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>3</b>	<ul style="list-style-type: none"> <li>+1 Nicotine-containing e-cigarettes are classified as tobacco products and are regulated.<sup>8</sup></li> <li>+1 Sale or distribution of e-cigarettes is prohibited to people under 19 years.</li> <li>0 Advertising of e-cigarettes is allowed but nicotine-containing e-cigarette adverts can only be featured a maximum of 10 times per magazine per year.</li> <li>+1 The use of e-cigarettes is banned in public places and on public transport with the exception of designated smoking areas.</li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 The Clean Air Conservation Act is the main legislation concerning air pollution in South Korea.<sup>9</sup></li> <li>+1 Radon control programmes exist in South Korea.<sup>10</sup></li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>1</b>	<ul style="list-style-type: none"> <li>+1 A randomised controlled trial on lung cancer screening is taking place.<sup>11</sup></li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>0</b>	<ul style="list-style-type: none"> <li>0 Although cancer related academic organisations exist such as the Korean Association of Lung Cancer, a specific lung cancer patient organisation has not been identified in South Korea.</li> <li>0 Civil society has no opportunity to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>

Indicator	Range	Score	Justification
<b>Lung cancer is a race against time</b>			
8	Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>0</b> Both the lung cancer guidelines issued by the KASLC and the ESMO guidelines do not mention a specific time frame for diagnosis of suspected cancer patients. <b>● Although there is no specific time frame for diagnosis of suspected lung cancer mentioned in the lung cancer clinical guidelines, patients have easy access to hospitals and the waiting time for referral is relatively short in general.</b>
9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>0</b> Neither the KASLC or the ESMO guidelines include a referral pathway for rapid referral to advanced care. <b>+1</b> The ESMO guidelines recommend that lung cancer patients are treated by a multidisciplinary care team.
<b>Lung cancer is at a crossroads</b>			
10	Medical and surgical specialists	number per 100,000	unscored <b>●</b> 2.08 thoracic surgeons in 2017. <sup>12</sup> <b>●</b> 11.65 general surgeons in 2017. <sup>12</sup> <b>●</b> No data on number of pulmonologists.
11	Radiotherapy accessibility	unmet need	unscored <b>●</b> -151 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit) <sup>13</sup> <b>●</b> There is an insufficient supply of radiotherapy megavoltage machines in relation to demand. <b>●</b> Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -54.71%.
12	Tumour testing recommendations and accessibility	0 – 6	<b>6</b> <b>+2</b> Histological and molecular testing is mentioned in the diagnostic guideline for lung cancer and specific biomarkers are identified. <b>+4</b> EGFR, ALK, ROS1 and PD-L1 are reimbursed under the national public health system.
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>4</b> <b>+4</b> Of the 13 drug and indication combinations we looked at, 7 were reimbursed: Afatinib (indications 1, 2), Crizotinib (indications 1, 2), Pembrolizumab (indication 1), Nivolumab (indication 1), Atezolizumab (indication 1). See matrix on page 35 of the regional report for full details.
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>0</b> Guidelines do not acknowledge the psychological burden of lung cancer. The KASLC guidelines briefly mention the burden of mental stress that patients may experience when waiting for diagnostic results of lung cancer. <b>0</b> Guidelines do not mention a referral pathway to psychological support services.
15	Patient access to supportive / palliative care services	0 – 2	<b>2</b> <b>+1</b> The ESMO guidelines do not mention a specific referral pathway, however, they do mention situations when palliative interventions are recommended. <b>+1</b> Oncologists do receive training in supportive/palliative care however training is not mandatory.
<b>Lung cancer is a focus for research</b>			
16	Clinical and outcomes data collection	0 – 7	<b>6</b> <b>+3</b> High quality population-based cancer registry (regional). <sup>14</sup> <b>+3</b> Medium quality complete vital registration. <sup>14</sup>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored <b>●</b> 4.24% of GDP spent on research and development in 2016. <sup>15</sup> <b>●</b> Number of clinical trials between 2009 and 2018 = 456. <sup>16</sup> <b>●</b> The ratio of 2009-2018 clinical trials to GDP (billions) = 0.30. <sup>15,16</sup>

# Top opportunities and the way forward

## Opportunity 1

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**Encourage active involvement of patient organisations in national guideline development, health technology assessment processes and policy-decision making to include recommendations from patients' and carers' perspectives and to help build consensus.**

There is some evidence that independent patient organisations are represented in Health Insurance Review and Assessment in South Korea. However, there is no clear evidence that lung cancer patients specifically were represented in guideline development or HTA processes in South Korea. Involving patients within such processes can help to identify issues that are overlooked by health professionals, can influence the development of recommendations from a patient / carer perspective, and may also emphasise the importance of including shared decision making within the guidelines and can help to build consensus.

## Opportunity 2

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**Develop guidelines and referral pathways to psychological care to support the burden imposed by lung cancer on patients, their families and caregivers.**

The guidelines do not acknowledge the psychological burden of lung cancer, nor do they describe referral pathways to appropriate services. However, good examples of psychological support can be found in South Korea. Participants at the workshop highlighted the presence of support services at various cancer centres. Unfortunately, these services are not often utilised or actively promoted to lung cancer patients. It was suggested that specific guidelines and referral pathways to psychological support services, should be formally introduced into the national guidelines to ensure patients from across the country consistently receive the same standard and quality of care.

## Opportunity 3

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**Create systems to ensure sustainable and equitable access to innovations.**

While medical innovations and technological developments have improved diagnostic and treatment options for lung cancer patients, many of the newer treatments are expensive and therefore inaccessible to patients if not reimbursed. Alternative funding solutions need to be found to ensure that high-quality care is available for patients. One funding solution proposed by participants at the workshop was the creation of a cancer fund to provide financial assistance to expand access. Such a fund would help to protect patients with lung cancer against the financial risks posed by accessing expensive treatments for the disease. Innovative funding solutions will be needed to ensure patients with lung cancer have access to the latest treatments while balancing the burden such costs place on the national payers.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

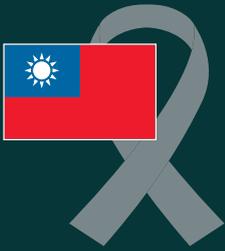
A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. Because of the nature of scoring—wherein complex matters are collapsed into simple scores—we note that not all readers will agree with all scores. After draft scores were assigned, the EIU attended a workshop of external country-based experts, hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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# Taiwan: Lung Cancer Country Profile

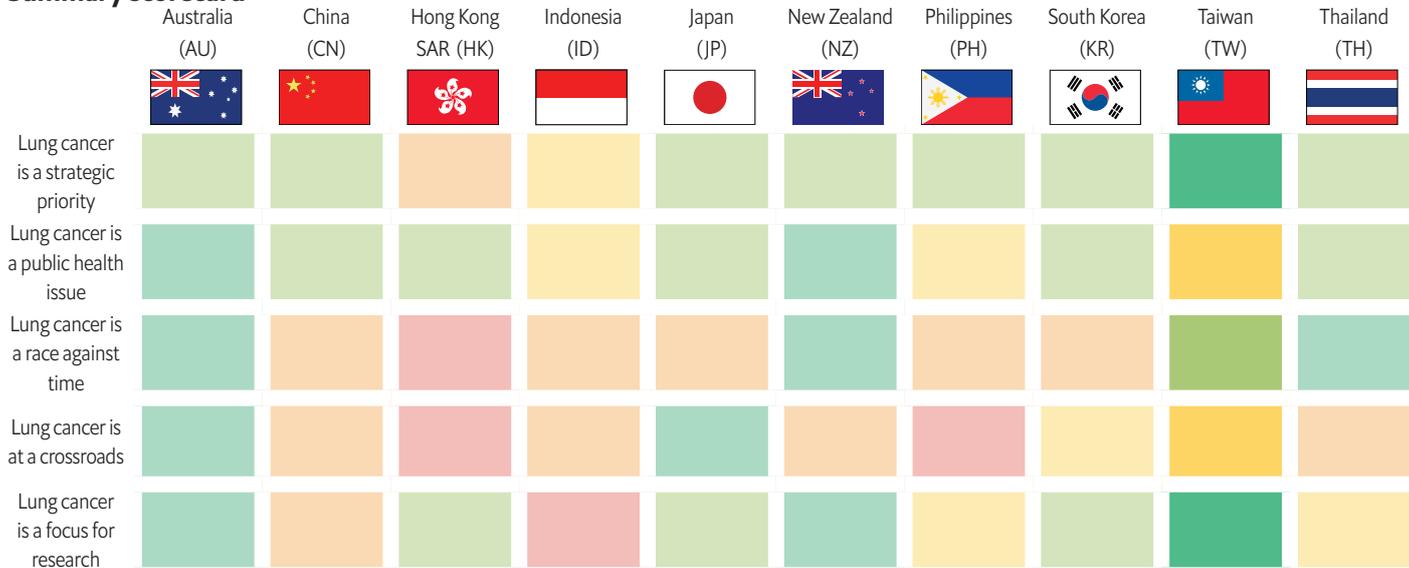
## Scorecard Summary

Taiwan performs moderately well across all five domains, scoring 'high' in the strategic and R&D domains, 'moderately high' in the rapid referral domain, and 'moderate' in the public health and treatment domains. Taiwan's strong showing reflects its robust tobacco control policies, as well as its investment in a high-quality population-based cancer registry and vital registration systems. Despite scoring well in these domains, improvements can be made, for example, with the development of local lung cancer clinical guidelines that specifically address the psychological burden of lung cancer and describe referral pathways to psychological support services. The reason for the slight dip in the public health domain is because there remains a need to ban the supply and advertisement of e-cigarettes to young people. In the lung cancer is at a crossroads domain, Taiwan scored well in terms of tumour testing guidelines and reimbursement but scored more modestly in their access and reimbursement of key medicines. Lastly, though there are cancer organisations, we found no evidence of specific lung cancer patient organisations in the territory.

## Patient involvement and access to treatment remain a priority

An important priority for workshop participants is the availability of treatment. While they noted that immunotherapies and targeted therapies are reimbursed in the public health system in Taiwan, they added that the reimbursement criteria are strict and hinders access to treatment. Participants acknowledged that progress has been made in terms of patient's involvement in HTA processes, with greater representation at meetings for reimbursement decision making. It should be noted that while public health measures restricting e-cigarettes are lacking, legislation has been proposed to the Legislative Yuan that would bring about greater regulation of e-cigarettes. We discuss opportunities for improvement at the end of this country profile.

### Summary scorecard

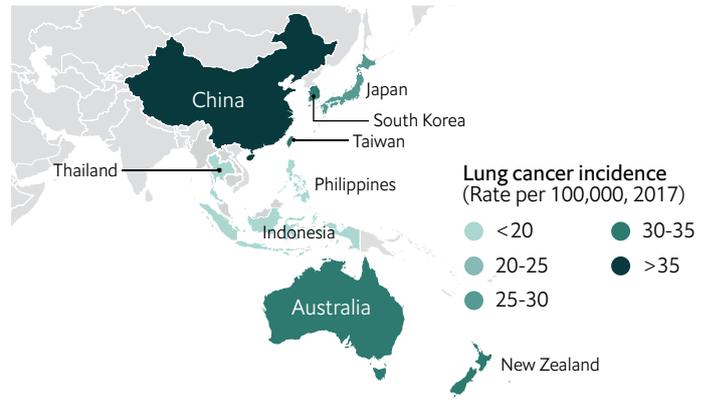


Low Moderately low Moderate Moderately high High

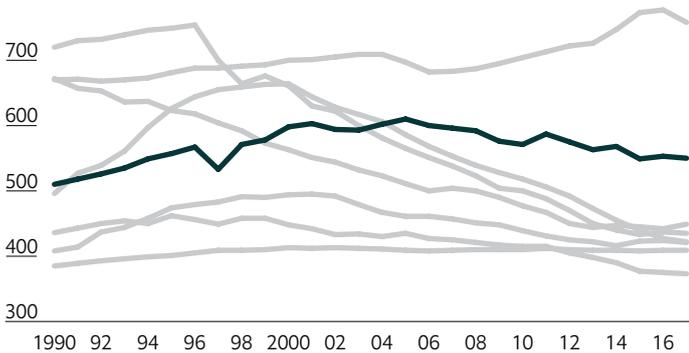
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Taiwan	Asia	Global
Incidence	31	28	27
Prevalence	44	41	41
Mortality	28	25	24
Disability-Adjusted Life Years (DALYs)	550	510	503
Years Lived with Disability (YLDs)	7	7	7
Years of Life Lost (YLLs)	542	503	496

Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

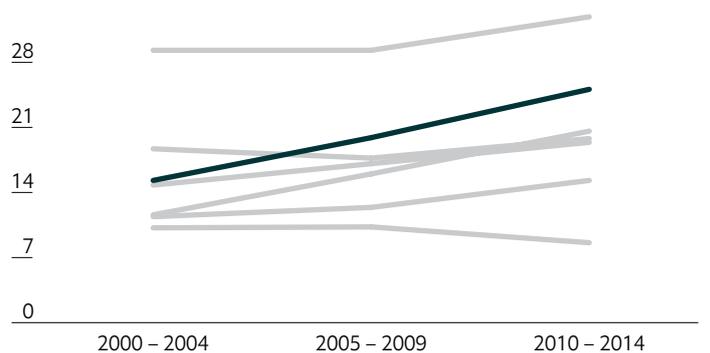


## Burden trend (DALY rate per 100,000, 1990-2017)



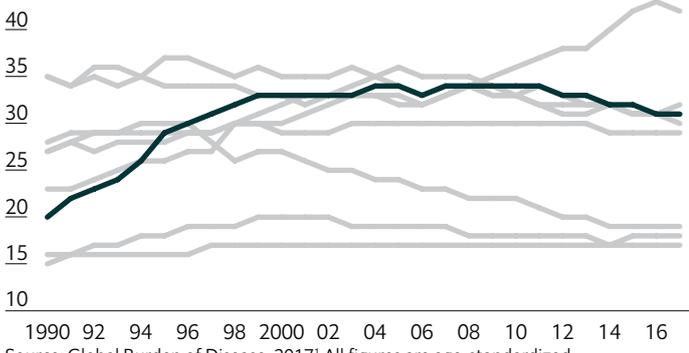
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



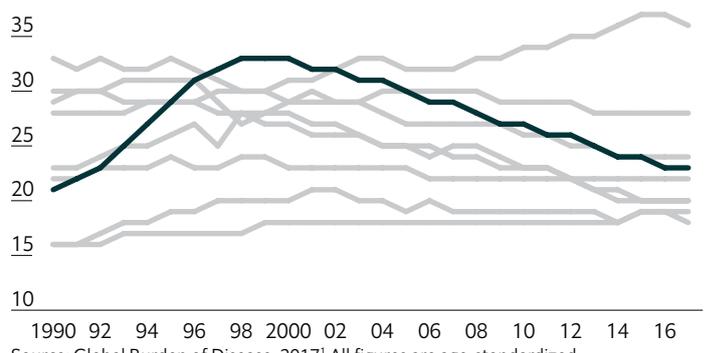
Source: CONCORD-3, 2018.<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

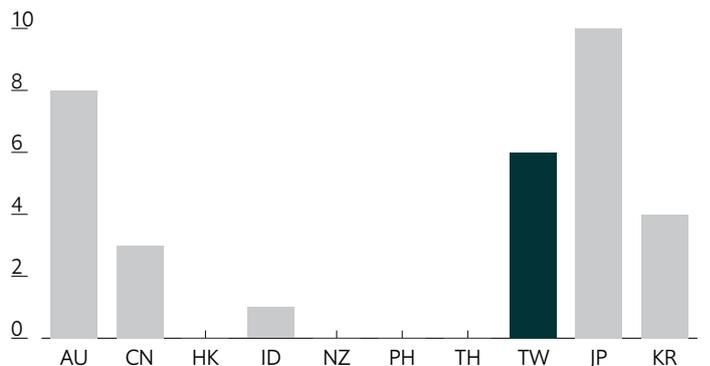


Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 850 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 15,500 premature deaths in Taiwan.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$589 billion and healthcare spending amounted to 6.1% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>4</b>	<ul style="list-style-type: none"> <li>+2 The third phase of an operational cancer control plan, The National Cancer Prevention and Control plan was published by the Ministry of Health and Welfare in 2015.<sup>5</sup></li> <li>+1 The plan includes an implementation plan.</li> <li>+1 The plan is funded by the Health Promotion Administration.</li> <li>0 A specific lung cancer control plan has neither been published nor discussed by the government or health ministry.</li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>6</b>	<ul style="list-style-type: none"> <li>+1 In Taiwan hospitals and cancer centres follow the National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines in the treatment of lung cancer.</li> <li>+5 The NCCN Guidelines cover screening, diagnosis, treatment, shared decision making and palliative care.<sup>6</sup></li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>7</b>	<ul style="list-style-type: none"> <li>+2 National objectives on tobacco control and a national agency for tobacco control exist.<sup>7</sup></li> <li>+1 At least one national mass media campaign ran during the survey period (up to 2016).</li> <li>+1 Advertising is banned on national TV and radio.</li> <li>+1 Law mandates that health warnings appear on tobacco packages.</li> <li>+2 National smoke-free legislation exists for indoor offices, public transportation restaurants and cafes but not for pubs/bars.</li> <li>● <b>Taiwan is not a party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) as it is not a member of the WHO. However, the EIU understands that internally Taiwan's Legislative Yuan has passed the FCTC convention and follows the principles of the FCTC in its various prevention measures.</b></li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>1</b>	<ul style="list-style-type: none"> <li>+1 E-cigarettes are classified as a drug and are regulated by the Ministry of Health and Welfare.<sup>8</sup></li> <li>0 E-cigarette sales are not subject to an age limit.</li> <li>0 E-cigarette advertising is restricted but is not banned.</li> <li>0 E-cigarettes are not currently banned in public places.</li> <li>● <b>An amendment is in process with the Legislative Yuan that if passed would bring further restrictions on e-cigarette sales, advertising and smoking in public areas.</b></li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li>+1 There is a section on air quality maintenance within the National Protection Plan.<sup>9</sup></li> <li>0 There is no evidence of a national policy or programme for radon control.</li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>1</b>	<ul style="list-style-type: none"> <li>+1 A randomised controlled trial on lung cancer screening is taking place.<sup>10</sup></li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>1</b>	<ul style="list-style-type: none"> <li>+1 Patients in Taiwan have been encouraged to give their opinions to the National Health Insurance Administration on new medicines and devices through various forums such as online platforms etc. since 2015. More recently patient representatives from Taiwan Alliance of Patient's Organization and Formosa Cancer Foundation have been invited to participate and give feedback to be considered in the decision making process at NHI PBRS meetings as of June 2019.</li> <li>0 A specific lung cancer patient organisation has not been identified in Taiwan.</li> <li>● <b>However, cancer related non-governmental organisations (NGOs) exist such as the Hope Foundation for Cancer Care, Formosa Cancer Foundation and Taiwan Association of Cancer Patients. Furthermore, some cancer related NGOs have specific lung cancer programs.</b></li> </ul>

Indicator	Range	Score	Justification	
<b>Lung cancer is a race against time</b>				
8	Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 The NCCN Guidelines recommend specific time frames for diagnosis of patients with low and high suspicion of lung cancer.</li> <li>+1 The NCCN Guidelines mention a specific timeframe for diagnostic referral.</li> </ul>
9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li>0 The NCCN Guidelines do not include a referral pathway for rapid referral to secondary or tertiary care.</li> <li>+1 The NCCN Guidelines recommend that lung cancer patients are treated by a multidisciplinary care team.</li> </ul>
<b>Lung cancer is at a crossroads</b>				
10	Medical and surgical specialists	number per 100,000	unscored	<ul style="list-style-type: none"> <li>● 3.4 thoracic surgeons in 2017.<sup>11</sup></li> <li>● 15.6 general surgeons in 2017.<sup>12</sup></li> <li>● No data on number of pulmonologists.</li> </ul>
11	Radiotherapy accessibility	unmet need	unscored	<ul style="list-style-type: none"> <li>● No data on the number of megavoltage machines and unmet need.</li> </ul>
12	Tumour testing recommendations and accessibility	0 – 6	<b>4</b>	<ul style="list-style-type: none"> <li>+2 Histological and molecular testing is mentioned in the diagnostic guideline for lung cancer and specific biomarkers are identified.</li> <li>+2 EGFR and PD-L1 are reimbursed under the national public health system based on online website sources. There is no clear evidence indicating that specific ALK and ROS1 testing are reimbursed under the national public health system.<sup>13</sup></li> </ul>
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>6</b>	<ul style="list-style-type: none"> <li>+6 Of the 13 drug and indication combinations we looked at, 9 were reimbursed: Afatinib (indications 1, 2), Crizotinib (indications 1-3), Pembrolizumab (indication 1), Nivolumab (indication 1), Atezolizumab (indication 1), Osimertinib (indication 1). See matrix on page 35 of the regional report for full details.</li> </ul>
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 The NCCN Guidelines do not mention the psychological burden of lung cancer.</li> <li>0 The NCCN Guidelines do not mention a referral pathway to psychological support services.</li> <li>● <b>In practice, psychological support services are available at specialised centres where advanced cases of cancer are treated. The Government oversees the quality of cancer care services through a national accreditation program that each medical centre has to renew periodically. Psychological support services are also part of the accreditation criteria.</b></li> </ul>
15	Patient access to supportive / palliative care services	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 The NCCN Guidelines include referral pathway to palliative care services for cancer patients which include lung cancer.</li> <li>+1 Training in supportive/palliative care is supported by the health ministry.</li> </ul>
<b>Lung cancer is a focus for research</b>				
16	Clinical and outcomes data collection	0 – 7	<b>7</b>	<ul style="list-style-type: none"> <li>+3 High quality population-based cancer registry (national).<sup>14</sup></li> <li>+4 High quality complete vital registration.<sup>15</sup></li> </ul>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>● 3.16% of GDP spent on research and development in 2016.<sup>16</sup></li> <li>● Number of clinical trials between 2009 and 2018 = 327.<sup>17</sup></li> <li>● The ratio of 2009-2018 clinical trials to GDP (billions) = 0.57.<sup>16,17</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

### **Spread greater awareness of lung cancer symptoms, screening, diagnosis and treatment through public mass media campaigns targeted at never-smokers to help tackle the rising incidence of cancer in this group.**

The proportion of never-smokers with lung cancer in Taiwan is higher than that of smokers at 55% and 45% respectively<sup>18</sup>. A large proportion of these lifetime never-smokers are women.

Workshop participants in Taiwan felt this was an area of particular concern and an important opportunity for future policy development. As a first step the initiation of a media campaign to spread awareness of lung cancer and its symptoms targeted specifically at never-smokers was suggested. This would help with early detection and diagnosis of lung cancer. It would be important to emphasise through this campaign the access to, and availability of, treatment options through Taiwan's comprehensive National Health Insurance System.

## Opportunity 2

### **Encourage active involvement of patient organisations in national guideline development, health technology assessment processes and policy-decision making to include recommendations from patients' and carers' perspectives and to help build consensus.**

There is some evidence that independent patient organisations are represented in healthcare policy decision making in Taiwan. However, the National Health Insurance Agency in Taiwan has been making progressive attempts to promote public participation in their processes through various forums such as websites<sup>19</sup>, patient-related seminars and briefings.

Also, the latest renewal of the National Health Insurance Act (NHIA) in May 2019 saw two patient representatives participate in the NHI Pharmaceutical Benefits Review Session joint meetings: they were from the Taiwan Alliance of Patient's Organization and Formosa Cancer Foundation. The involvement of patient organisations in decision making in Taiwan is evolving and as it does so will continue to benefit patients and their carers.

## Opportunity 3

### **Develop guidelines and referral pathways to psychological care to support the burden imposed by lung cancer on patients, their families and care givers.**

Taiwan has no locally developed clinical guidelines for lung cancer, but follows the NCCN guidelines which do not acknowledge the psychological burden of lung cancer, nor do they describe referral pathways to appropriate services. However, examples of high quality psychological support can be found in Taiwan. Participants at the workshop highlighted the presence of psycho-oncology clinical services at specialty care hospitals that deal with advanced cases of cancer. This service works with the multidisciplinary team treating the patient, including surgeons and radiotherapists, to provide psychosocial care to the patients. It was suggested that specific guidelines and referral pathways to psychological support services, should be formally introduced into the national guidelines to ensure patients from across the country consistently receive the same standard and quality of care.

## Opportunity 4

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### **Embolden medical societies to initiate and lead a conversation exploring the possibility of co-payment and private insurance for new technologies.**

Workshop participants mentioned that it is necessary for Taiwan to have a national conversation about the role of co-payment and/or supplemental private medical insurance for certain technologies. Cancer cases are increasing, and this is placing an immense burden on the NHIA. It is reported that many patients are willing to pay for some of their medical expenses. However, because of political sensitivities, the government is hesitant to implement co-payments. There is a need for all stakeholders—including patients groups, government and industry—to work together with medical societies for the public good.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

A range of international and national sources were used for the data collection. The EIU team carried out both primary and secondary research to identify recent authoritative data to populate the country scorecard. Judgments were made based on the best information available. 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. After draft scores were assigned, the EIU attended a workshop of external country-based experts, hosted by the sponsor, in order to discuss the scores and help develop recommendations.

The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

See the regional paper for the full methodology.

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# Thailand: Lung Cancer Country Profile

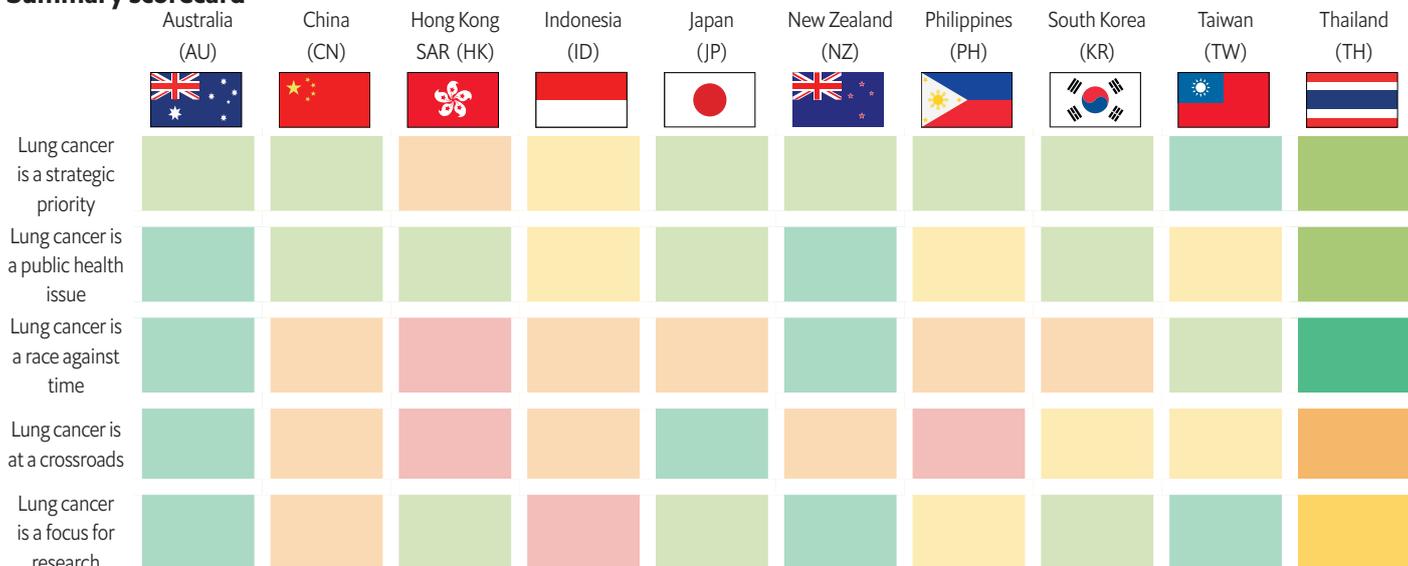
## Scorecard Summary

Thailand performs strongly in most of the domains, scoring 'moderately high' and above in the lung cancer is a strategic priority, public health issue and race against time domains. The strong performance can be attributed to their robust tobacco and e-cigarette control policies, and to the presence of quality indicators for fast-tracking for diagnosis and treatment of suspected lung cancer patients in their care pathways. While scoring 'moderately high' in the strategic priority domain, there are some things that can still be done to improve lung cancer care, including developing a lung cancer specific control plan, identifying funding sources in their National Cancer Control Care plan and adding screening to their clinical guidelines for lung cancer. Thailand scored 'moderately low' and 'moderately' in the lung cancer is at a crossroads and a focus for research domains, respectively. We discuss opportunities for improvement at the end of this country profile.

## The need to improve health literacy, access to health services and treatment

Access and availability to treatment was a concern for workshop participants. They discussed the need for innovative funding mechanisms to ensure that patients with lung cancer have access to state-of-the-art treatments. Participants also touched upon the limited accessibility to health services for those living in remote areas. While screening for lung cancer was considered an important part of early detection programs, participants want to see robust evidence on the impact and cost-effectiveness of screening in Asian populations. Low health literacy was considered a key contributing factor to poorer outcomes and inadequate use of preventative services. Participants spoke of the need to raise awareness of the signs and symptoms of lung cancer. While acknowledging Thailand's positive results from introducing tobacco controls in 1992, participants discussed how smoking rates plateaued, and that more measures were needed to address this. Participants also discussed the need to tackle environmental causes of lung cancer, highlighting detrimental air quality in some cities.

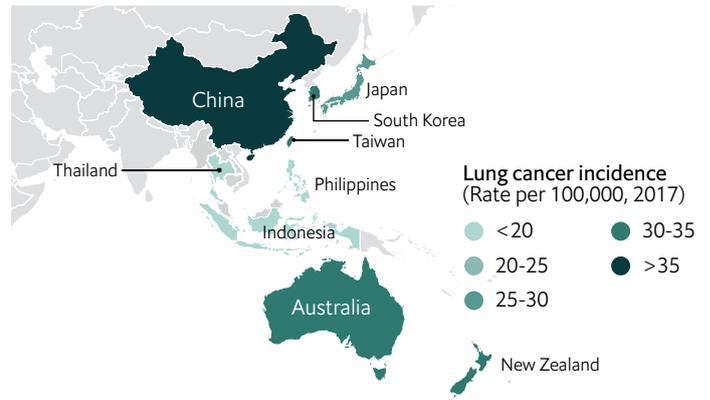
### Summary scorecard



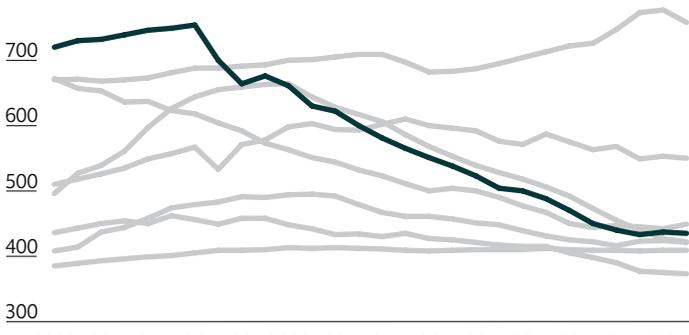
# Lung cancer in numbers

Lung cancer statistics (Rate per 100,000, 2017)	Thailand	Asia	Global
Incidence	19	28	27
Prevalence	21	41	41
Mortality	20	25	24
Disability-Adjusted Life Years (DALYs)	435	510	503
Years Lived with Disability (YLDs)	4	7	7
Years of Life Lost (YLLs)	431	503	496

Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

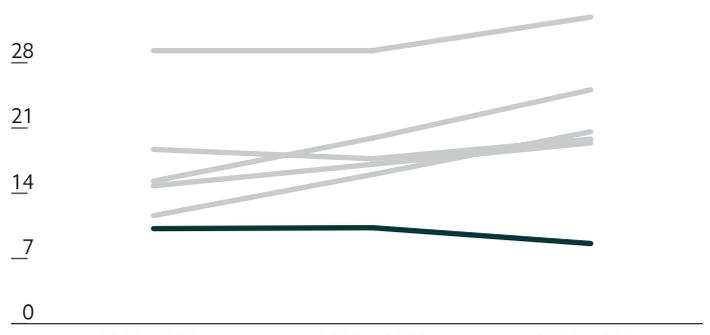


## Burden trend (DALY rate per 100,000, 1990-2017)



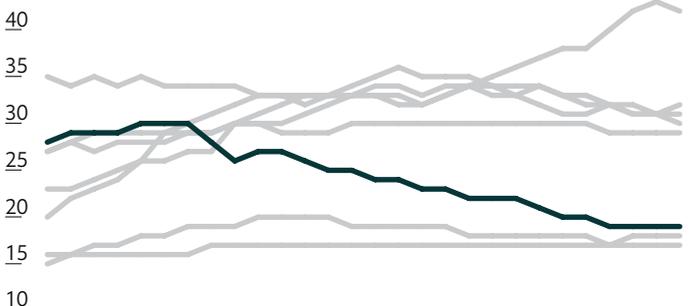
Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Survival trend (% 5 year survival)



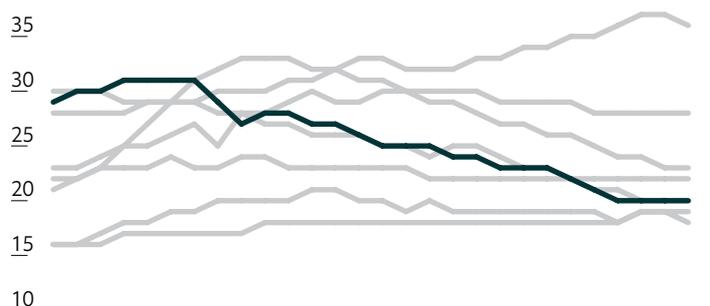
Source: CONCORD-3, 2018.<sup>2</sup>

## Incidence trend (Incidence rate per 100,000, 1990-2017)



Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

## Mortality trend (Mortality rate per 100,000, 1990-2017)

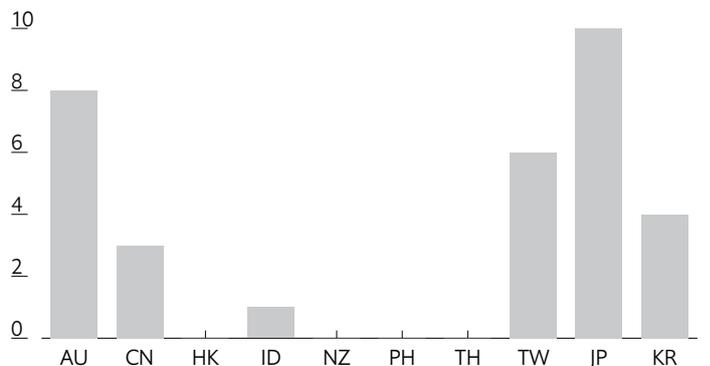


Source: Global Burden of Disease, 2017.<sup>1</sup> All figures are age-standardized.

**The costs of tobacco**  
Tobacco cost the economy US\$ 6,853 million in terms of direct costs to health expenditures and indirect costs due to lost productivity from morbidity and early mortality. Every year, tobacco-related diseases cause more than 81,400 premature deaths in Thailand.<sup>3</sup>

**Healthcare spending**  
In 2018, GDP = US\$ 505 billion and healthcare spending amounted to 3.8% of GDP.<sup>4</sup>

## Access to medicines National score for indicator 13 of the scorecard, which measures reimbursement status for a basket of drug/indication combinations



# Scorecard results

Indicator	Range	Score	Justification
<b>Lung cancer is a strategic priority</b>			
1 Operational, comprehensive, up to date national cancer control plan	0 – 5	<b>3</b>	<ul style="list-style-type: none"> <li><b>+2</b> The five-year National Cancer Control Plan (2018-2022) was established and is governed by the Thailand National Cancer Institute.<sup>5</sup></li> <li><b>+1</b> The National Cancer Control Plan includes detailed information on indicators to assess and quantify its success rate along with dedicated timelines for policy implementation.</li> <li><b>0</b> The National Cancer Control Plan does not mention a funding source.</li> <li><b>0</b> A specific lung cancer control plan has neither been published nor discussed by the government or health ministry.</li> </ul>
2 Comprehensive clinical guidelines for lung cancer	0 – 6	<b>5</b>	<ul style="list-style-type: none"> <li><b>+1</b> The clinical guidelines were published by National Cancer Institute in 2008.</li> <li><b>+4</b> Guidelines cover diagnosis, treatment, palliative care and shared decision making.</li> <li><b>0</b> Guidelines do not cover screening.</li> </ul>
<b>Lung cancer is a public health issue</b>			
3 Tobacco control policies and public health measures	0 – 9	<b>9</b>	<ul style="list-style-type: none"> <li><b>+2</b> National objectives on tobacco control and a national agency for tobacco control exist.<sup>6</sup></li> <li><b>+1</b> Advertising is banned on national TV and radio.</li> <li><b>+1</b> At least one national anti-tobacco mass media campaign has been aired in Thailand (up to 2016).</li> <li><b>+1</b> Law mandates that health warnings appear on tobacco packages.</li> <li><b>+1</b> Thailand is party to the World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC).</li> <li><b>+3</b> National smoke-free legislation exist for indoor offices, public transport and restaurants, cafes, pubs and bars.</li> </ul>
4 E-cigarettes regulation and public health measures	0 – 4	<b>4</b>	<ul style="list-style-type: none"> <li><b>+1</b> E-cigarettes are prohibited under several regulatory mechanisms.<sup>7</sup></li> <li><b>+3</b> The use of e-cigarettes is completely banned in Thailand.</li> </ul>
5 National policies and programmes for environmental exposure control	0 – 2	<b>1</b>	<ul style="list-style-type: none"> <li><b>+1</b> While Thailand does not have a specific air quality strategy, there are broad national ambient air quality standards.<sup>8</sup></li> <li><b>0</b> There is no evidence of policies or programs in place to control radon.</li> </ul>
6 Evidence-based approach to lung cancer screening	0 – 1	<b>0</b>	<ul style="list-style-type: none"> <li><b>0</b> There is no evidence of on-going or previously conducted clinical trial examining lung cancer screening.</li> </ul>
7 Patient organisations involvement in policy development	0 – 3	<b>1</b>	<ul style="list-style-type: none"> <li><b>0</b> No specific lung cancer patient organisations have been identified in Thailand.</li> <li><b>+1</b> Civil society has the opportunity to comment on Health Technology Assessment (HTA) recommendations.</li> </ul>
<b>Lung cancer is a race against time</b>			
8 Suspected lung cancer patient diagnosis within a specific time frame	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li><b>+1</b> The Service Plan for Cancer (2018-2022) was published by the Ministry of Public Health and it mentions that suspected lung cancer patients are to be fast tracked for diagnosis.</li> <li><b>+1</b> The guidelines also include a specific time frames for a diagnostic referral.</li> </ul>

9	Guidelines/ pathways for rapid referral to quality care	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 The Service Plan for Cancer (2018-2022) has a strategy related to quick and timely diagnostic and treatment of cancer. Patients must receive treatment within the specified time period. For example, access to surgery must be within 4 weeks (28 days).</li> <li>+1 The Service Plan for Cancer (2018-2022) recommends that patients are treated by a multidisciplinary team.</li> </ul>
Indicator		Range	Score	Justification
<b>Lung cancer is at a crossroads</b>				
10	Medical and surgical specialists	number per 100,000	unscored	<ul style="list-style-type: none"> <li>● 154 members of the Society of Association of Thoracic Surgeons of Thailand (0.22 per 100,000).<sup>9</sup></li> <li>● No data on the number of pulmonologists or general surgeons.</li> </ul>
11	Radiotherapy accessibility	unmet need	unscored	<ul style="list-style-type: none"> <li>● -73 = the difference between demand and supply of radiotherapy megavoltage machines (MVM). (minus sign = deficit)<sup>11</sup></li> <li>● There is an insufficient supply of radiotherapy megavoltage machines in relation to demand.<sup>10</sup></li> <li>● Percent of unmet need between observed and expected number of radiotherapy megavoltage machines is -51.7%.</li> </ul>
12	Tumour testing recommendations and accessibility	0 – 6	<b>3</b>	<ul style="list-style-type: none"> <li>+2 Histological and molecular testing are mentioned in the guidelines for lung cancer and specific biomarkers are identified. The specific markers identified are EGFR, TKIs and ALK inhibitors.</li> <li>+1 EGFR is reimbursed under the national public health system.</li> </ul>
13	Key personalised medicines reimbursement and accessibility	0 – 10	<b>0</b>	<ul style="list-style-type: none"> <li>0 Of the 13 drug and indication combinations we looked at, 0 were reimbursed. See matrix on page 35 of the regional report for full details.</li> <li>● <b>However, two of the drug and indication combinations are reimbursed for people covered under the Civil Servant Medical Benefit Scheme (CSMBS).</b></li> </ul>
14	Understanding psychological burden of lung cancer and access to support services	0 – 2	<b>0</b>	<ul style="list-style-type: none"> <li>0 Guidelines do not mention the psychological burden of lung cancer.</li> <li>0 Guidelines do not specify a referral pathway for psychological support.</li> </ul>
15	Patient access to supportive / palliative care services	0 – 2	<b>2</b>	<ul style="list-style-type: none"> <li>+1 There are referral pathways to palliative care or supportive care services mentioned in the Service Plan for Cancer (2018-2022).<sup>5</sup></li> <li>+1 Healthcare professionals receive structured training in palliative care.</li> </ul>
<b>Lung cancer is a focus for research</b>				
16	Clinical and outcomes data collection	0 – 7	<b>4</b>	<ul style="list-style-type: none"> <li>+2 High quality population-based cancer registry (national).<sup>11</sup></li> <li>+2 Low quality complete vital registration.<sup>11</sup></li> </ul>
17	Research support and funding	R&D as % of GDP; ratio of clinical trials	unscored	<ul style="list-style-type: none"> <li>● 0.78% of GDP spent on research and development in 2016.<sup>12</sup></li> <li>● Number of clinical trials between 2009 and 2018 = 133.<sup>13</sup></li> <li>● The ratio of 2009-2018 clinical trials to GDP (billions) = 0.292.<sup>12,13</sup></li> </ul>

# Top opportunities and the way forward

## Opportunity 1

### **Create systems to ensure sustainable and equitable access to innovations.**

While medical innovations and technological developments have improved diagnostic and treatment options for lung cancer patients, many of the newer treatments are expensive and therefore inaccessible to patients if not reimbursed by the public health system. Alternative funding solutions have to be considered in order to ensure that high-quality care is available for patients that are likely to benefit from them. Participants at the workshop considered the possibility of creating a cancer fund similar to the Samaritan Fund and Community Care Fund in Hong Kong. The presence of such a fund in Thailand would increase access to state-of-the-art treatments for patients who would otherwise not be able to afford such treatments. Other potential mechanisms discussed in the workshop included a revision of the current co-payment insurance schemes and redeploying funds from other related sources e.g. taxes from smoking to lung cancer care. Innovative funding solutions are needed to ensure patients with lung cancer have access to the latest treatments while balancing the burden such costs place on the national payers.

## Opportunity 2

### **Ensure that the psychological burden faced by lung cancer patients is addressed with pathways to access psychological support services. Supportive and palliative care should be included in the lung cancer guidelines.**

Thailand neither includes psychological assessment nor mentions the psychological burden of lung cancer in their lung cancer guidelines. Additionally, there is no referral pathway for either psychological support or supportive and palliative care services.

## Opportunity 3

### **Involvement of patient organisations in national assessments of disease and policy development can help to build consensus.**

A specific lung cancer patient organisation has not been identified in Thailand. Therefore, we have no evidence that patients were represented in clinical guideline development. Involving patients in the development of clinical guidelines can help to identify issues that may be overlooked by health professionals, influence the development of recommendations from a patient and carer perspective, and emphasise the importance of including shared decision making.

## Opportunity 4

### **Cancer registries lack clinical data. In Thailand, a clinical cancer registry could provide helpful data.**

Thailand's cancer registry has been evaluated to be at a high quality at a regional basis (though not at a national level), and its vital registration data collection systems have been evaluated as being of low quality. Clinicians may find that a detailed, clinical cancer registry could help to improve the overall care that lung cancer patients receive; it may also help ensure equity between regions.

## Opportunity 5

### **Lung cancer screening studies could enable Thailand to determine whether national screening is appropriate for its population.**

While there are no nationwide screening programs for lung cancer in Thailand, screening was highlighted as an important factor in lung cancer care for Thailand by workshop participants. Participation in lung cancer screening studies would help build an evidence base on the efficacy of screening in local and regional Asian populations.

## Methods

An initial literature review identified key frameworks and programmes that have been previously used to prioritise policy approaches for the prevention and control of lung cancer in a range of countries. From this a draft set of indicators was developed. An editorial advisory board was then convened to review and advise on the development of the indicator framework. Out of this process, The EIU identified a set of 17 indicators to evaluate each selected country across five domains.

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The focus of the research programme is not to rank countries but rather to identify opportunities to improve patient outcomes in each country.

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