COPD Index
Companion Report

September 2024

CHRONIC OBSTRUCTIVE PULMONARY DISEASE INDEX

COPENHAGEN INSTITUTE FOR FUTURES STUDIES

Contents

Executive Summary

Chronic obstructive pulmonary disease (COPD) affects between 300 and 400 million people globally,[1] making it the third leading cause of death worldwide. It results in a range of negative impacts on individuals' quality of life and health outcomes, significant social and financial costs, as well as pressure on country health care systems. There is a severe lack of public awareness about COPD, as revealed by an Ipsos poll showing that 45% of people could not correctly identify COPD as a lung disease.[2] This lack of awareness, coupled with a general lack of funding and significant role of socioeconomic inequalities in COPD outcomes, makes the situation even more serious.[3,4] However, with the right policies in place, COPD and its impacts are largely preventable.

COPD is the 3rd cause of death globally

23% of COPD deaths in LMICs are associated with indoor air pollution

45% of the public could not correctly identify COPD as a lung disease despite the fact that it is the third leading cause of death worldwide and kills more people yearly than lung and breast cancer combined.[2]

COPD is a "heterogeneous lung condition characterised by chronic respiratory symptoms due to abnormalities of the airways and/or alveoli that cause persistent, often progressive, airflow obstruction."[5] The most common causes are exposure to tobacco smoke in high income countries and exposure to tobacco smoke and indoor and outdoor air pollution in low- and middle-income countries (LMICs).

COPD is commonly known and stigmatised as a smokers' disease, however, there are many risk factors for the disease, such as household and outdoor air pollutants, occupational exposure, poor nutrition, early life events, childhood asthma, and genetic factors. 23% of all COPD deaths in LMICs are associated with household air pollution.[6]

The human and societal costs of COPD are striking: COPD is estimated to account for over $4 trillion in direct and indirect costs per year between 2020 and 2050.[7] COPD also accounts for a significant portion of health spending: In the European Union, where respiratory diseases represent approximately 6% of the annual health care budget, COPD makes up a substantial 56% (equivalent to 38.6 billion euros) of the total cost associated with respiratory conditions.[8] Additionally, people with COPD often experience comorbidities or multimorbidities, particularly cardiovascular diseases and diabetes, many of which are linked to higher mortality rates.[9] At the same time, spending to address the burden of COPD appears to be disproportionately small, with, for example, only 0.1% of the 2021-2027 EU4Health programme budget allocated to chronic respiratory diseases.[10] Besides direct health care costs, COPD substantially impacts economic productivity, as individuals with COPD face frequent hospitalisations, disability, and early retirement, leading to decreases in workforce participation and consequent economic strains on families and the broader economy.[11]

COPD contributes 56% (€38.6 billion) of the total costs associated with respiratory conditions in the EU, yet spending to address the burden of COPD is only 0.1% of the 2021-2027 EU4Health programme budget allocated to chronic respiratory diseases.

The worldwide prevalence of COPD is likely to increase to 600 million cases by 2050, with the greatest increase among women and in low- and middle-income countries.[12] To compound the issue, COPD is under-reported on death certificates and is widely under-diagnosed, which likely means that COPD is an even greater societal issue than estimates suggest.[13,14] COPD, typically diagnosed in individuals over 40, leads to a productivity loss of approximately 20 years. In Germany, from 2010 to 2019, the annual per-patient cost was €5,735 while in Greece it was found to be €998.[15] This may be further compounded by the effects of climate change on respiratory health.[16,17] The fact that COPD is a largely preventable condition makes these trends especially concerning.

COPD will cost the global economy **INT$4,326 trillion** from 2020-2050

Global COPD prevalence is projected to approach **600 million** cases by 2050

The far-reaching impacts and systemic burden of COPD and its steady, global increase in prevalence underscores the need for policymakers, clinicians, and patient and civil society organisations to raise awareness about COPD, develop a more comprehensive and robust understanding of how health systems manage the condition, and to identify best practices that support COPD prevention and improve COPD patient outcomes through self-management interventions.

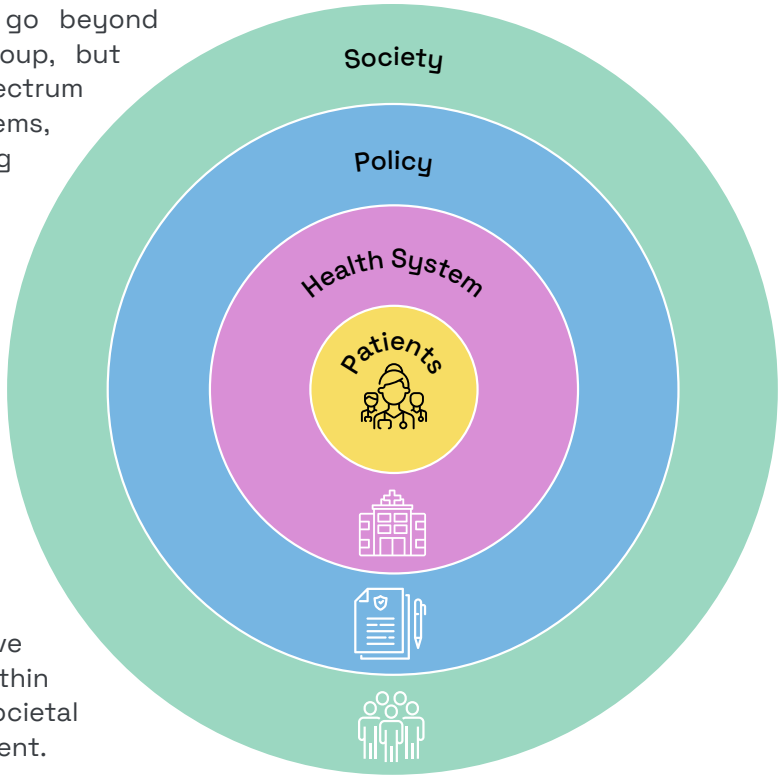
Our findings show COPD self-management interventions are effective and associated with reduced number of exacerbations and hospitalisations, as well as increased health related quality of life.

In response to this imperative, the Copenhagen Institute for Futures Studies, with the support of an independent, expert steering committee, has developed the COPD Index, a unique data tool for assessing both country health systems' approach to preventing and managing COPD as well as other related factors that may impact COPD severity and control. Building on the approach and vision of the previously released Severe Asthma Index, the COPD Index has reviewed, debated and selected parameters linked to health policy, access to and quality of care, clinical indicators, population health indicators, and environmental factors and evaluated 34 countries' approaches to COPD. The Index is a robust attempt to bring together multiple sources of data to support a comprehensive, multinational analysis of approaches to COPD prevention and care. By providing such an overview, it aims to motivate the creation and implementation of more robust policies and strategies related to COPD, support improved access to and quality of care, and assist health system stakeholders in identifying, sharing, adapting, and implementing best practices.

Our Vision

We envision a world where COPD is effectively prevented and managed through innovative policies, equitable care, global collaboration, and heightened public awareness driven by the insights of the COPD Index.

The COPD Index findings go beyond any single stakeholder group, but rather, span the broad spectrum of patients, health systems, and policymakers. Managing the COPD disease burden has implications not only for these former, but is also reliant upon the interaction, coordination and alignment between these groups to achieve the best and most sustainable outcomes. At the heart of the COPD Index, we prioritise patients, emphasising the importance of prevention, diagnosis, and comprehensive health system support, within the broader context of societal impact and policy development.



The first edition of the COPD Index provides the following key findings:

Insufficient implementation of policy and adherence to guidelines

Less than half (16/34) of countries in the COPD Index have a national strategy for COPD prevention, diagnosis, and management, and even fewer report robust implementation of their strategies. The Policy Context category in the COPD Index exhibits the lowest average score at 52.9/100 points and the greatest range at 57 points. Similarly, while only four countries in the COPD Index report that they do not have guidelines for COPD care, the vast majority of countries indicate that adherence to guidelines is far from sufficient. Crucially, even in countries with robust health system capacities and favourable policy conditions, there remain significant barriers to optimal COPD prevention and the delivery of quality care. These issues are compounded in LMICs. Outcomes in the COPD Index underscore that simply having a policy or set of guidelines is a necessary but far from sufficient set of conditions for a robust approach to managing the burden of COPD. Implementation, monitoring, and regular evaluation processes are crucial to ensuring that COPD becomes a priority.

Reported data do not always reflect the real-world experiences of patients and health professionals

Countries generally demonstrate that health systems offer access to and coverage for a wide range of drugs as well as diagnostic and treatment services for COPD. However, indicators specific to drug, treatment, and diagnostics access provide only broad insights into the standard co-payment and reimbursement policies in each country and do not reflect other factors that may impact access, such as individual disability, mis- and underdiagnosis, and fluctuations in the availability of medication. This makes it difficult to ascertain the full impact of COPD on patients as well as health systems and society at large.

The relationships between primary, secondary, and tertiary care in the context of COPD care warrant further exploration

Data in the COPD Index indicate a significant relationship (R = -0.72) between higher respiratory specialist density and lower rates of hospitalisations attributable to COPD, and a weaker but still notable relationship between respiratory specialist density and 365-day readmission rates (R = -0.32). At the same time, all country health systems examined in the COPD Index rely heavily on primary care functions to manage the burden of COPD, while reports notes that primary care physicians generally lack resources and, in some cases, training, to consistently and accurately diagnose and manage COPD. As pressures on primary care continue to increase, these findings suggest that there is a large potential for improvements in diagnosis, care continuity, patient outcomes, and health system efficiency to be found in supporting the development of primary care capabilities and more robust care pathways that highlight the importance of primary care in the context of COPD diagnosis and management.

Tobacco control policies are necessary, but not sufficient

An important finding is the relationship between the scope and implementation of tobacco control policies and adult tobacco use rates in the COPD Index countries. These present a moderate negative correlation (R = -0.50), suggesting that strong tobacco control policies are a key element in securing lower smoking rates and thereby reducing the burden of COPD. However, there are several outliers such as France and Spain, that report relatively high rates of adult tobacco use despite strong tobacco control policies with good implementation. This suggests that other approaches to tobacco control, especially those with a focus on behaviour, early intervention, and smoking cessation are also crucial to reducing tobacco use. It is worth noting that there are on-going efforts in the European Union to update existing guidelines on smoke-free environments, regulating the use of cigarettes and vapes in public spaces, potentially further restricting outdoor smoking and expanding smoke-free spaces. In addition, the EU is expected to launch a revision of its tobacco control rules in 2025 and will potentially increase taxation on cigarettes. At a country level, Spain's introduction of a Comprehensive Tobacco Prevention plan earlier this year is already tackling many of these aspects.

High societal costs, inequity, and knock-on effects of COPD

There is a high estimated societal cost of COPD in many countries. Notably, Germany reports the highest societal cost $2,352 (2017 INT$) per capita annually from 2020 to 2050, followed by the Netherlands ($1,877) and Hungary ($1,816). The estimated societal cost of COPD is based on an aggregated measure of modelled per capita loss, from 2020 to 2050 in 2017 international dollars (INT$). Inequity in access to diagnosis and treatment further

exacerbate these costs, disproportionately affecting vulnerable populations. In addition, due to the underdiagnosis of COPD, acute exacerbations of severe undiagnosed COPD is one of the most common causes of medical hospital admission and is associated with increased mortality and reduced quality of life.[18] The high readmission rates for individuals with COPD, especially within 30 days, are an indicator of both the growing health system burden of COPD and the under-utilisation of time spent under admission. Often, there are underlying mental health diagnoses, such as depression or anxiety, among inpatients with COPD, further compounding the issue.[19] Addressing the burden of COPD stands to create marked improvements in health care resource usage, productivity loss, and health outcomes, even in the medium term (five to ten years). Solutions in this area also stand to have other positive knock-on effects in public health. Crucially, improved country-level monitoring and more consistent analyses of the economic and societal impacts of COPD are needed to drive these efforts.

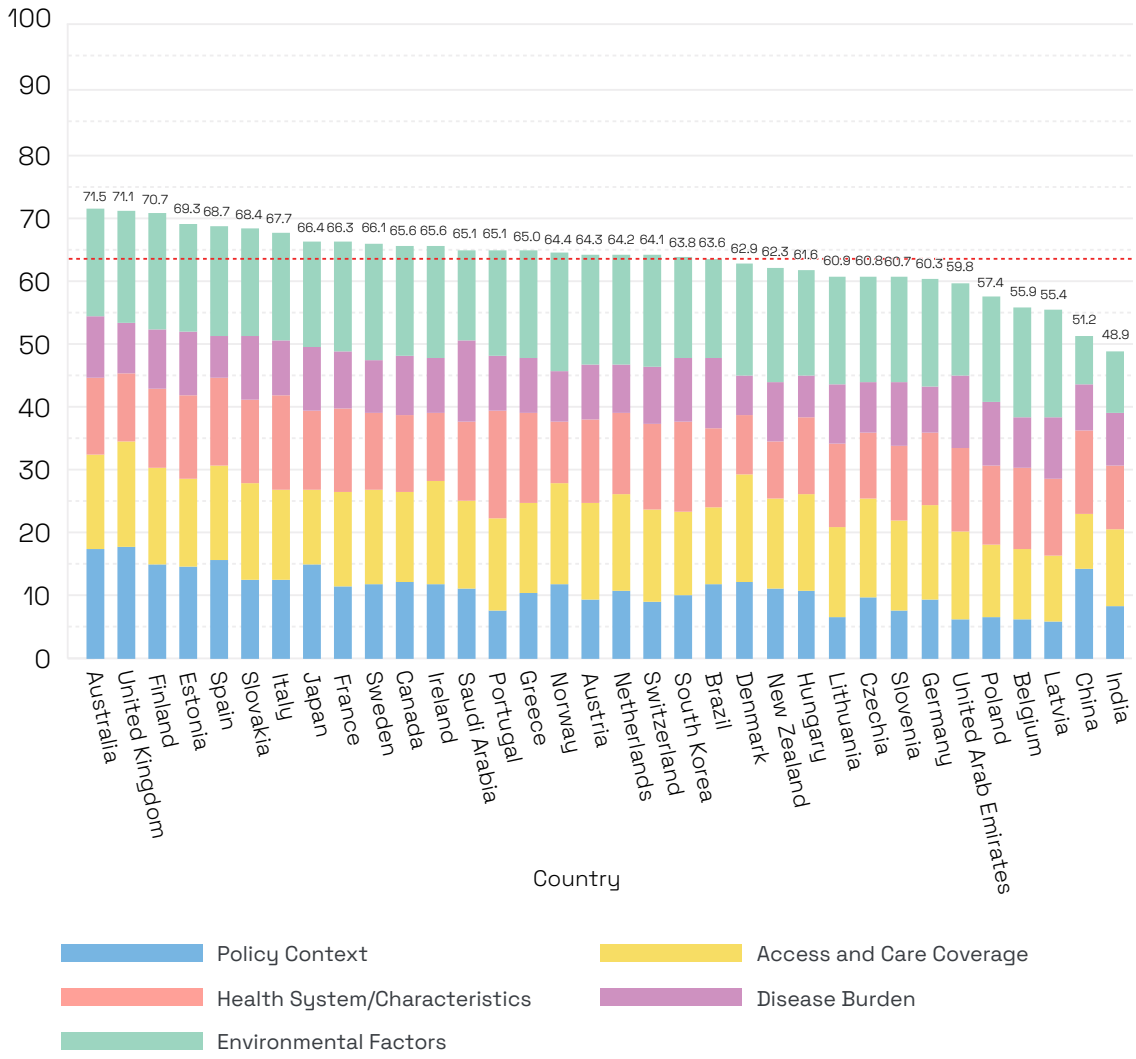
Potential to improve allocative efficiency in health care systems

Access to safe and quality care and patient outcomes vary significantly and independently of factors typically associated with better individual and health system outcomes, such as GDP and health spending. In many cases, care pathways, incentive structures, and reimbursement policies—rather than lack of resources—make the difference in experience and outcomes in COPD care. At 40%, Portugal reports the highest percentage of inequity or unmet health care needs (due to distance from care, financial barriers, and waiting lists) in the Index, despite a relatively strong score in the Access and Care Coverage category. Next in line stands Estonia and Latvia with approximately 37% of unmet health care needs reported. Another aspect is relative poverty (percentage of population below 60% of median income), where Brazil scores highest at 28%, in alignment with the country's low Access and Care Coverage score. On the contrary, Spain scores relatively well in access to care despite having the third highest relative poverty rate (22%), due to the strength of other indicators.

The importance of an integrated approach to COPD prevention, diagnosis, and management

Overall, the COPD Index aims to highlight that COPD is not just a clinical phenomenon. Patient outcomes and experiences both impact and are impacted by a multitude of systemic, policy, and environmental factors. There is a need for a "whole system" approach to effectively manage COPD among country populations. The Health in All Policies (HiAP) approach championed by the WHO provides a basis for future work in this area.

COPD Index - Overall Performance (Indicator and category weights)



Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Next steps

In addition to providing stakeholders working with respiratory disease a tool for building insights and driving informed dialogue and action to improve approaches to COPD prevention and care, the COPD Index aims to strengthen the commitment of both public and private sector decision-makers to take both long- and short-term actions to improve health outcomes and quality of life for COPD patients and ensure the sustainability of health systems. In the short term, the Copenhagen Institute for Futures Studies intends to work directly with COPD stakeholders at the country level to identify how to best build on and activate insights from the COPD Index and ensure greater prioritisation of respiratory health in national and regional health agendas. In the long term, there is an ambition to develop future editions of the Index to explore how country approaches have changed over time and assess the impact those changes have on health outcomes and health system performance.

With this in mind, we propose several recommendations and calls to action that are intended to: (1) Facilitate action and collaboration among relevant stakeholders in addressing the burden of COPD; (2) Support the development of a more robust and comprehensive future edition of the COPD Index, and —most importantly — (3) Enable more comprehensive intra- and cross-country studies in all aspects of COPD research.

All relevant stakeholders are called upon to:

Calls to action

Unite for COPD
Health care experts, patients, and policymakers, collaborate to develop and ensure implementation of strategies for managing COPD.

Prevent COPD
Enforce strict tobacco control laws and reduce exposure to risk factors like air pollution, combined with easy access to smoking cessation services.

Recognise COPD
Individuals with COPD should have access to the right service at the right time, combined with comprehensive support outside of the clinical system in the form of individualised plans and digital tools.

Understand COPD
Consistently and correctly reporting comprehensive COPD-specific hospitalisation and exacerbation data, prescription dispensing data, and patient-reported outcome and experience data.

Empower COPD patients
Empower and educate patients and caregivers to self-advocate for better health and shift the conversation from stigma to health access.

The COPD Index is the second initiative that the Copenhagen Institute for Futures Studies has undertaken within the area of Respiratory Health, following the Severe Asthma Index. We remain committed to engaging, facilitating and collaborating with stakeholders to create an impact within this area.

Introduction

Background

Chronic obstructive pulmonary disease (COPD) is a "heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnoea, cough, sputum production and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction."[20]

It is estimated that COPD affects between 300 and 400 million people globally,[21] resulting in a range of negative impacts on individuals' quality of life and health outcomes, as well as significant pressures on social, financial, and health care systems. The human and societal costs of COPD are striking: It is currently the third leading cause of death worldwide and is estimated to account for over $4 trillion in direct and indirect costs per year between 2020 and 2050.[22] COPD also accounts for a significant portion of health spending: In the European Union, respiratory diseases represent approximately 6% of the annual health care budget. COPD makes up a significant portion of these expenses, responsible for 56% (equivalent to 38.6 billion euros) of the total costs associated with respiratory conditions.[23] At the same time, spending to address the burden of COPD appears to be disproportionately small, with, for example, only 0.1% of the 2021-2027 EU4Health programme budget allocated to chronic respiratory diseases.[24]

Moreover, it is estimated that the worldwide prevalence of COPD cases will increase to 600 million by 2050, with the greatest increases among women and in low- and middle-income countries.[25] This may be further compounded by the effects of climate change on respiratory health.[26,27] The fact that COPD is a largely preventable condition makes these trends especially concerning.

The far-reaching impacts and systemic burden of COPD and its steady, global increase in prevalence underscores the need for policymakers, clinicians, and patient and civil society organisations to raise awareness about COPD, develop a more comprehensive and robust understanding of how health systems manage the condition, and to identify best practices that support COPD prevention and improve COPD patient outcomes.

In response to this imperative, the Copenhagen Institute for Futures Studies (CIFS), with the support of an independent, expert steering committee, has developed the COPD Index, a unique data tool for assessing both country health systems' approach to preventing and managing COPD, as well as other related factors that may impact COPD severity and control. Building on the approach and vision of the previously released Severe Asthma Index, the COPD Index evaluates 34 countries' approaches to COPD across a range of parameters linked to health policy, access to and quality of care, clinical indicators, population health indicators, and environmental factors. The Index marks a robust attempt to bring together various sources of data to support a comprehensive, multinational analysis of approaches to COPD care and prevention. By providing such an overview, it aims to motivate the creation and implementation of more robust policies and strategies related to COPD, support improved access to and quality of care, and assist health system stakeholders in identifying, sharing, adapting, and implementing best practices.

Work on the project began in September 2023. The Index model was developed between November 2023 and June 2024 with the support and input of eight global respiratory disease and health policy experts. The first edition of the COPD Index was finalised in July 2024. Overall, data from this first edition of the COPD Index suggest that COPD remains an underacknowledged, inadequately prioritised, and high-risk condition in many countries. While it has long been acknowledged that COPD constitutes a large economic and social burden,[28] with a high level of unmet health care need reported among COPD patients,[29,30] the lack of comprehensive, coherent, and well-implemented national strategies for chronic respiratory disease—and the even greater lack of focus on COPD—illustrate a significant gap that policymakers and other relevant health system stakeholders should be called upon to address as comprehensively as possible.

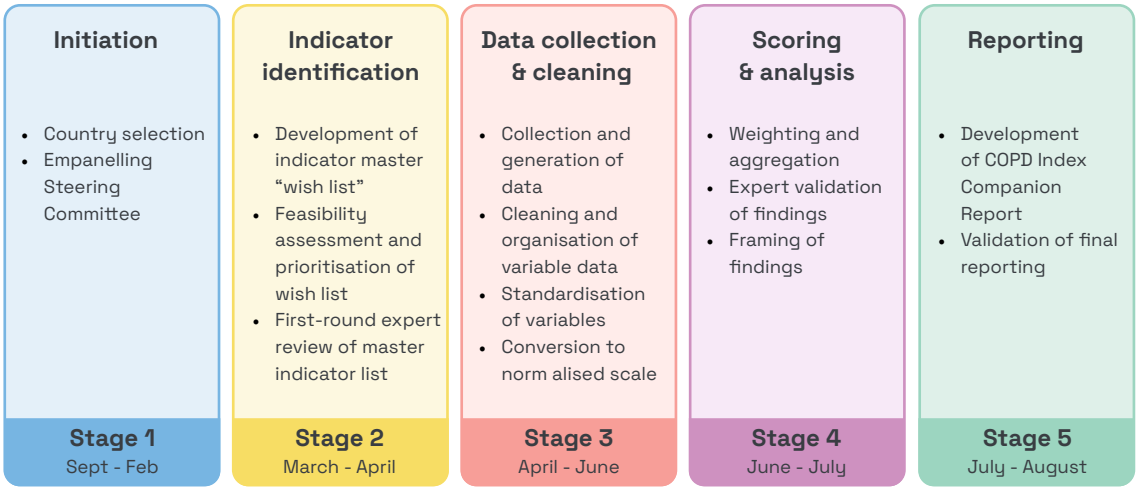
Crucially, the overall Index findings suggest and support existing claims that countries and their relevant health system stakeholders could make progress in COPD control and prevention by undertaking actions that are external to what are often slow and rigid policy processes. These include implementing and strengthening care guidelines,[31] expanding access to diagnostics and patient-oriented services,[32,33] and addressing behavioural factors—with an especial emphasis on the need to reduce smoking rates and support for smoking cessation services. In addition, individual, country-level observations, which are provided at the end of this report, indicate potential best practices and specify areas for improvement that can be addressed on both national and local levels.

Ultimately, the Index findings emphasise the need for a comprehensive, "whole system" approach to COPD. Addressing the COPD burden is not only the responsibility of the health care system, but requires a concerted effort by legislators, policy makers, and the public and private sectors. By encouraging all stakeholders to address and prioritise COPD like the complex chronic condition that it is, the COPD Index aspires to support the creation of innovative, collaborative, cross-border, and comprehensive solutions to a crucial but widely overlooked current global health issue.

Methodology and Delimitation

The development of the COPD index was initiated in September 2023 and followed the process outlined below. The Index was completed in July 2024.

COPD index development process overview



Country selection

Country selection in the COPD Index was informed by the importance of broad geographic representation, as well as the inclusion of countries able to represent the extent of the global COPD burden. A key inclusion criterion was the existence of a de jure or de facto universal health coverage scheme or statutory requirement for health insurance coverage for the national population. Notably, the United States was excluded for this reason.

Data availability also determined the inclusion of countries in order to ensure as complete a dataset as possible. Specifically, we selected countries that regularly publicly report data that has been validated by recognised international or supranational institutions. The number of countries included ensured that the size of the dataset was neither too small (which would not be sufficient to identify trends) nor too large (which would present challenges such as heterogenous availability of data and increased complexity of analysis/results).

Following this approach, 34 countries were selected for inclusion in the COPD Index:

- Australia
- Austria
- Belgium
- Brazil
- Canada
- China
- Czechia
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- India
- Ireland
- Italy
- Japan
- Latvia
- Lithuania
- Netherlands
- New Zealand
- Norway
- Poland
- Portugal
- Saudi Arabia
- Slovakia
- Slovenia
- South Korea
- Spain
- Sweden
- Switzerland
- Switzerland
- United Arab Emirates
- United Kingdom

Empanelling of steering committee

A Steering Committee was established to validate the data and to lead decision-making regarding the design and content of the COPD Index. The committee includes eight global COPD and health policy experts. The members were selected in order to balance clinical knowledge in COPD, patient organisation leadership, and expertise in health policy development and implementation.

Sir David Behan
Chair, King's College Hospital NHS Foundation Trust
Former Chair, Health Education England

Dr MeiLan Han, MD, MS
Professor of Medicine and Chief, Division of Pulmonary and Critical Care, University of Michigan Health
Member of the GOLD Science Committee (2023)

Susanna Palkonen
Director, European Federation of Allergy and Airways Disease Patients' Associations

Prof Dr Chen Rongchang
Deputy Director, Guangzhou Institute of Respiratory Health
Guangzhou Medical University, China

Eric Sutherland
Senior Health Economist, OECD

Dr Ioanna Tsiligianni
Associate Professor in General Practice and Public Health, Faculty of Medicine, University of Crete Director, Clinic of Social and Family Medicine, University of Crete
Chair, International Primary Care Respiratory Group COPD Right Care Strategy Team

Siân Williams
Chief Executive Officer, International Primary Care Respiratory Group

Tonya Winders
President, Global Allergy and Airways Patient Platform

Preliminary literature review and desktop research

CIFS conducted a preliminary review of the literature regarding COPD to:

- Develop a robust understanding of the condition, including its varying definitions, reports on disease incidence and prevalence, risk factors, comorbidities, and overall impact on individuals, societies, and health systems
- Identify usual clinical practice including diagnosis, standard of care, and stratification
- Determine access and reimbursement of COPD management and care
- Identify health policies addressing COPD and associated risk factors

These insights then informed the identification of potentially relevant and viable indicators to be included in the Index, as well as potential sources of data.

Indicator proposal

Insights from the literature review supported the identification of indicators, i.e., qualitative and quantitative variables both directly and indirectly linked to patient health outcomes or impacting the ability of country health systems to manage and prevent COPD among country populations. We identified over 70 potential indicators that were broadly grouped into five categories:

- Policy Context
- Access and Care Coverage
- Health System Characteristics
- Disease Burden
- Environmental Factors

The indicator categories were structured to facilitate a multifaceted analysis of health system performance concerning COPD. As a result, COPD was examined not only as a clinical issue, but also as a disease impacted by public policy, health system design, comorbidities, and environmental factors.

Indicator validation

The draft indicators were prioritised and validated by the COPD Index Steering Committee through two rounds of review. Review of the indicator list first took place in a group workshop with the Steering Committee and then through individual written feedback. The process resulted in a final list of 45 indicators across the five indicator categories (see Appendix II for the list of indicators and category assignments). The exclusion and addition of indicators was based on an assessment of conceptual goodness of fit, data availability, and convertibility, i.e., whether the raw indicator data could be feasibly and meaningfully quantified in the index data model.

Data collection

Data collection commenced upon receiving validation of the prioritised list of indicators. Data collection took place between February and July 2024, and was conducted in several ways:

Desktop research
The research team identified and collected relevant data points from credible, publicly available sources such as the OECD, WHO, World Bank, and Eurostat databases as well as from peer-reviewed articles and reports and other official documents authored or approved by relevant public authorities in each country included in the index.

Expert questionnaire
To supplement desktop research, the research team designed a two-round questionnaire for the collection of a wide range of COPD-specific information. The first round of the questionnaire was a mixed e-Delphi study, i.e., several sections exclusively contained questions and statements seeking the expert opinion of respondents to identity whether a degree of consensus existed among the group (e.g., "The burden of COPD in my country will place significantly more strain on my country's health care system by 2035."), whereas other questions sought to collect information of a purely factual nature (e.g., "Does your country have an action plan for COPD?"). The second round of the questionnaire focused solely on consensus-seeking questions.

The questionnaire forms were validated by the COPD Index Steering Committee before being submitted to respondents (see Appendix IV for the questionnaire form).

The questionnaire was distributed online to over 300 potential respondents. The response period ran from April to August 2024.

Respondents were selected based on the following occupational/professional criteria with the intention of maximising the diversity of responses:

- Civil servant with a role in a national public health institution or equivalent body
- Medical respiratory specialist, preferably with an affiliation or assignment with a national health institution or research institution
- Primary care physician with a background in respiratory health
- COPD patient advocacy group representative
- COPD patient
- Carer for COPD patients

96 responses covering 24 COPD Index countries were received. Responses to the fact-seeking questions in the first round of the e-Delphi were used to support the calculation of selected indicator scores where data from existing sources were assessed as having a low level of reliability or were unavailable. Qualitative data collected in the first round of the e-Delphi, such as examples of challenges to and opportunities for COPD diagnosis, prevention, and management identified by respondents were not used to calculate indicator or country scores. However, they were used to provide additional context for individual country profiles (See Appendix I).

Data scoring, normalisation, and weighting

Raw data from desktop research and the questionnaire were matched with each of the validated indicators and then organised into the approved indicator categories. To maximise conceptual fit with some indicators, several data points were also combined to create compound variables. Qualitative data points were quantified through the application of scorecards designed by the research team. The scorecards associated different point values with a set of standardised qualitative characteristics, for example, whether a country has a set of national guidelines for COPD care and, if so, what

the general level of adherence to the guidelines is among health care professionals. Indicators based on qualitative data have scorecards with different maximum values; these values depend on the characteristics examined in the COPD Index.

Several qualitative indicators are dichotomised in the Index, i.e., 1 point may be assigned if a given condition is fulfilled, while a score of 0 is assigned if the condition is not fulfilled. Following the scoring of the qualitative data, all data points in the Index were normalised on a 0 to 10 scale using the min-max normalisation method. This approach allows for uniform analysis of many different types of data originally recorded on different scales. On the normalised scale, a score of 10 always indicates a high level of fulfilment of the Index model's criteria for a given indicator, while a score of 0 always indicates a low level of fulfilment. Minimum values were set at 0 (the theoretical minimum value of the raw dataset for each indicator), while maximum values were set at either the theoretical maximum (for example, 100 for raw data recorded as percentages), three standard deviations above the mean of the raw dataset for each quantitative indicator (in the case of data recorded as absolute values), or the maximum scorecard value for each qualitative indicator. In the case of extreme outliers in the dataset, the maximum value was set at the value of the greatest outlier.

Following normalisation, country scores for each indicator category were averaged and then multiplied by 10 to produce a score out of 100 points. The purpose of the conversion to a 100-point scale on the category level is to reflect smaller differences in country scores that would otherwise be expressed as decimals.

Weighting

To produce an overall Index score, both individual indicators and indicator categories were weighted. The budget allocation approach was applied to identify indicator and category weights: Each member of the COPD Index Steering Committee was tasked with individually assigning weights to the components. The results of the individual inputs were shared with the Steering Committee during a group workshop in June 2024. CIFS then provided a proposal for the component weighting based on the group discussion, which was approved by the Steering Committee in June 2024. The following weights were applied to each indicator category when calculating the overall Index score for each country:

- Policy Context – 21%
- Access and Care Coverage – 20%
- Health System Characteristics – 22.5%
- Disease Burden – 15.5%
- Environmental Factors – 21%

Individual indicator weights are listed in the Indicator List in Appendix II.

The weighting approach emphasises elements of the Index that can be directly addressed by decisionmakers and key stakeholder groups. The Policy Context, Access and Care Coverage, Health System Characteristics, and Environmental Factors categories are therefore more heavily weighted in the Index because they include indicators that directly reflect factors which a country's decisionmakers and stakeholders have control over. The Disease Burden category is less heavily weighted because it is linked to longer-term health outcomes and indirect factors impacting COPD management and outcomes. The assigned weights aim to reflect the Index's primary ambition to motivate concerted action among health care stakeholders and the adoption of best practices that stand

to improve health outcomes, health system performance, and ultimately address factors affecting prevention, prevalence and severity of COPD among populations. However, all indicator categories are fundamental to supporting a multifaceted analysis of countries' management and prevention of COPD.

Analysis of results

The results yielded by the Index data model were compared using descriptive statistics on both the aggregate and individual country levels. Correlation between several indicators was also investigated to determine whether significant relationships exist between any variables. Additional relationships between country indicator data and data not used to calculate country scores were also explored to further contextualise country results and identify future potential areas of inquiry regarding COPD prevention, diagnosis, and management.

Important note on scoring in the COPD Index data model
The COPD Index is constructed as an ideal and abstract model for COPD care and management. This means that no country is expected to receive a perfect score in the Index. Crucially, the scoring system should not be understood as an expression of how objectively "good" or "bad" a country health system is at managing and preventing COPD. Rather, the overall Index score and category scores should be understood as indications of how well country health system COPD approaches and performance fit the ideal model proposed by the COPD Index. Scores also highlight best practices that country health systems could learn from and adapt to their local needs as well as demonstrate potential areas for improvement.

Limitations

The COPD Index is a powerful tool for identifying best practices in COPD care and analysing country health system performance against an ideal model for COPD care. However, the index is still bounded by several important limitations that must be kept in mind when exploring its insights and the data on which they are built.

Country selection
Country selection is in part informed by data availability, leading to the exclusion of some countries, primarily in Africa, that reduces the global representativeness of the Index results. Furthermore, the key inclusion criterion, i.e., the existence of a de jure or de facto universal health coverage scheme or statutory requirement for health insurance coverage for the national population in the countries led to the notable exclusion of the United States.

Data availability and accuracy
There are significant limitations on the availability, accessibility, and accuracy of COPD-related data. In some cases, differing definitions of COPD and COPD stages may be used, rendering exact comparison between countries difficult and, in some cases, impossible. Data fragmentation and a lack of harmonised rules for data reporting and access across the Index countries creates barriers to collecting COPD-specific information. In addition, several sources of information may be used to build the dataset for a single indicator. It is also crucial to note that country-reported data may, in some cases, reflect a tendency to underreport or misreport some data or outcomes.

Time lag and time series
The inclusion of various kinds of data in the Index has necessitated the use of data that has been collected at different time points. The Index makes use of the latest

data wherever possible, but there is still variance in the time series within and across indicators. Differences in time series in the dataset are always indicated in the COPD Index sources.

Missing data and imputation
Data points for some countries are not reported or non-existent. In such instances, data has been imputed by calculating the average value for the given indicator using the reporting countries' data. Imputed values are indicated in the Index.

Data reliability and inferred data
The reliability of data collected for a small number of indicators is contested. These data points are linked to sources that provide a direct indication of how the country indicator should be scored, but other sources and contextual information indicate that the value may not be accurate. These data points are indicated in the COPD Index data model as having lower reliability. For a small number of selected qualitative indicators, scores have been inferred based on an assessment of identified sources that do not provide direct indications of how a country indicator should be scored but do provide sufficient contextual information. Inferred data points are also explicitly identified in the COPD Index data model.

Proxy indicators and conceptual accuracy
Several proxy indicators have been developed, in part based on input from the Steering Committee, to approximate data that are not currently directly reported. These proxy indicators may, in some cases, be based on a composite of several sources of data. Proxy indicators and their method of calculation are always listed in the Index.

Intra-country differences and generalisation
The whole-country approach of the COPD Index may risk generalising intra-country differences such as urban/rural divides and differences in regional approaches to care, especially in geographically large countries, federalised countries, and countries with highly devolved health care systems.

Policy implementation and lived experience
Nuances related to how countries' policies and conditions for care access function may not be fully expressed, as the Index framework takes a country-wide approach that assesses reported system characteristics rather than the day-to-day operational environment. It is also crucial to note that the lived experiences of patients and health care providers are not directly assessed, as these are reliant on often highly variable and subjective reports that do not lend themselves to reliable cross-country comparisons in the context of a quantitative index data model.

COVID-19
Several data points may be influenced by the impact of the COVID-19 pandemic on health system capacity, performance, planning, and access, especially those recorded between 2020 and 2022.

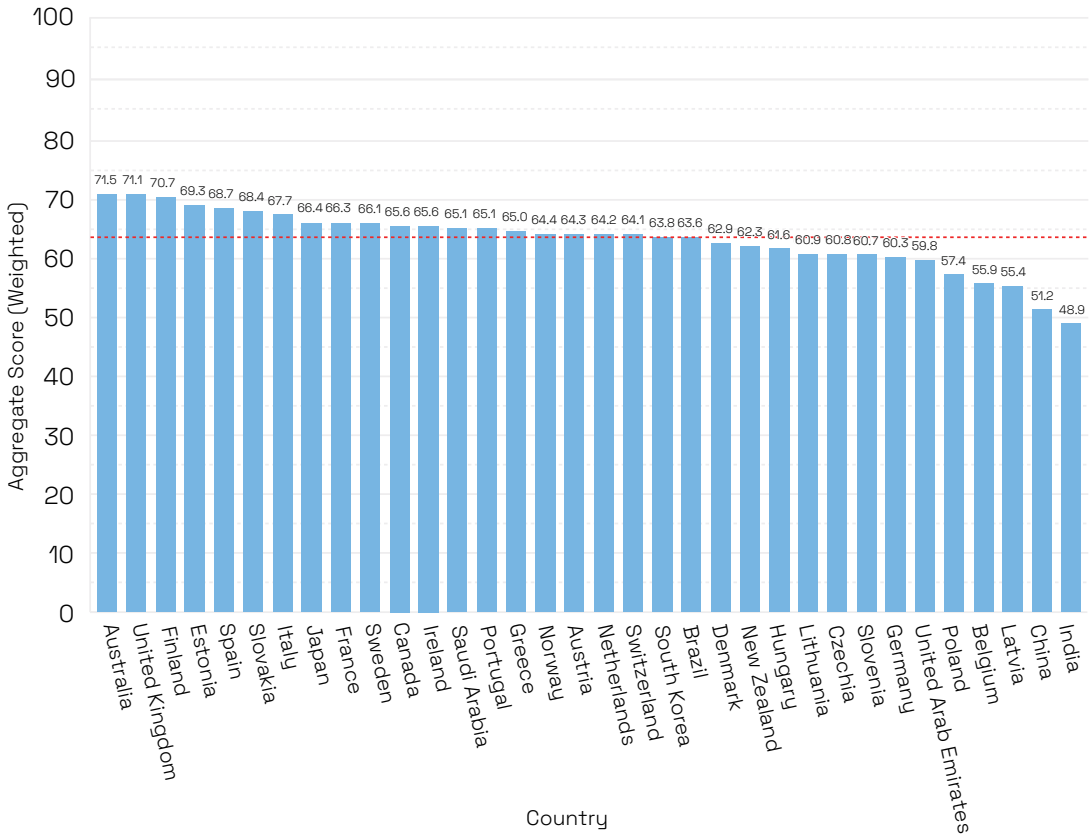
Index Findings

Overall scores

The COPD Index evaluates country health systems' approach to the management and prevention of COPD across five diverse categories of indicators. The weighted overall average score for all countries is 63.4/100, and the range between country scores is a modest 22.6 points. However, there are still clear differences in the Index, with Australia scoring the highest (71.5/100), followed closely by the United Kingdom, Finland, Estonia, and Spain. Conversely, India scored the lowest (48.9/100), followed by China, Latvia, Belgium, and Poland. Importantly, the scores within each indicator category also vary significantly among all countries. Therefore, even the top performers show clear areas for improvement, and there is no consistently high or low scorer across all Index categories.

Overall, all countries demonstrate some major strengths, as well as significant areas for improvement. Notably, a high Policy Context score was the strongest predictor of a high overall score. However, a strong Policy Context score—and, by extension, a more favourable policy environment—is not a guarantor of high scores in the other indicator categories. In addition, a strong policy environment does not universally and consistently imply that policy implementation is successful and uniform in the COPD Index countries. It is important to note that the overall scores and category scores provide only a general indication of countries' goodness of fit with the COPD Index model. The analysis of the category scores in the following pages and country-level observations on Appendix I provide a more detailed overview of individual indicator scores and insights into additional strengths and areas for improvement among the countries.

COPD index, overall performance (Indicator and category weights)



Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Policy context

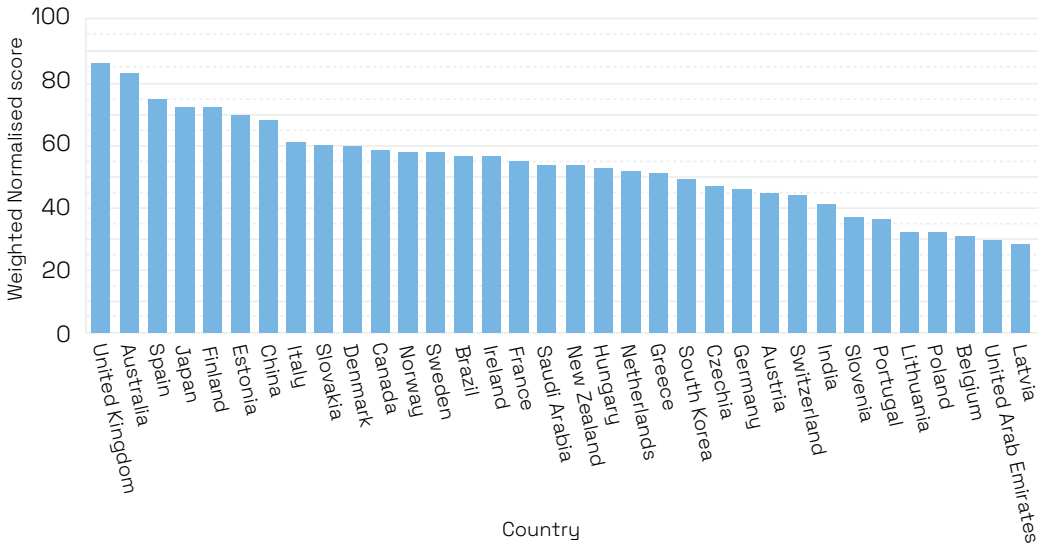
Indicators

- COPD strategy
- Guidelines for COPD care
- Occupational exposure policy
- Personalised COPD care
- Tobacco control policy

The Policy Context category in the COPD Index exhibits the lowest average score at 52.9/100 points and the greatest range at 57 points. The UK (86), Australia, Spain, Japan, and Finland were the top scorers in this category, while Latvia (28), the United Arab Emirates, Belgium, Poland, and Lithuania were the lowest scorers. The Index provides the opportunity to compare data across different countries, while highlighting that each country has opportunities for improvement. Although most countries have some form of guidelines for COPD, less than half have a national strategy for COPD prevention, diagnosis, and management. It should be kept in mind that not all country health systems apply a uniform definition of COPD and there are many different practices concerning clinical data collection and coding of COPD. Crucially, of the countries that do have a national strategy and guidelines for COPD, the levels of implementation and adherence vary considerably.

In addition to the existence and implementation of a national strategy for COPD, another key indicator in the Policy Context category is tobacco control policy. The indicator assesses the robustness and level of implementation of key aspects of national tobacco control legislation and practices, according to the WHO's MPOWER framework.[34] Country scores within this indicator highlight that the implementation of stronger tobacco control laws—principally, more comprehensive smoking bans as well as more support for tobacco cessation—could markedly improve country performance in the Policy Context category and in the Index overall. The approach of the UK and New Zealand demonstrates this most clearly. Performance within this indicator shows ample room for improvement and increased implementation of best practices even among the top scorers in the category.

Policy context - weighted normalised score (out of 100)



Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Access and care coverage

Indicators

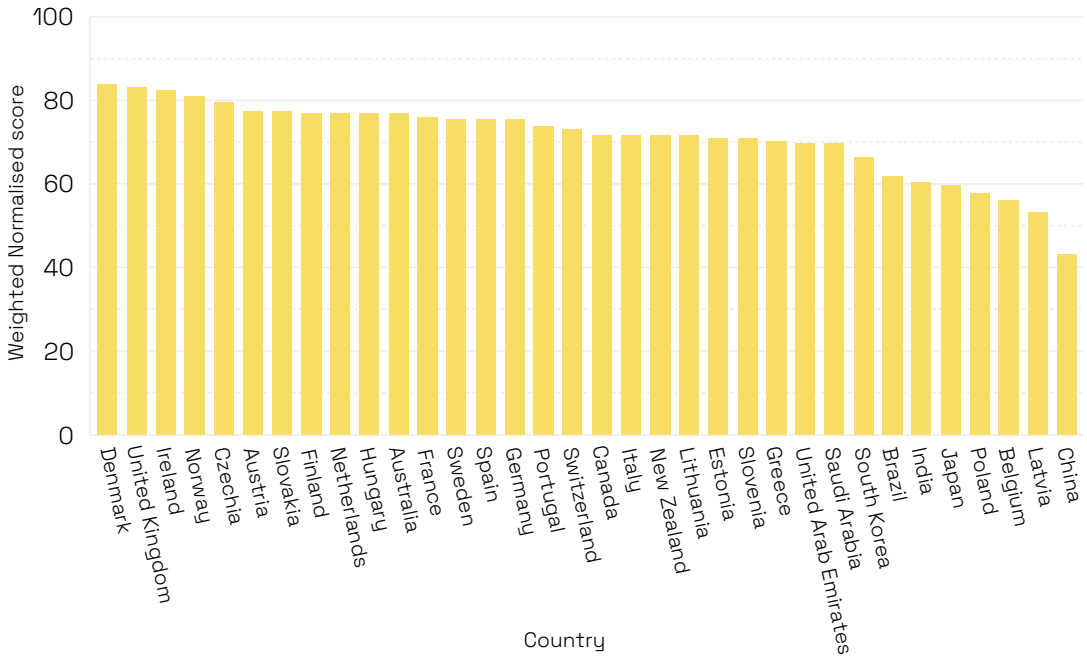
- Treatment and drug access
- Diagnosis
- Spirometry access
- Pulmonary rehabilitation access
- Ambulatory oxygen access
- Home care reimbursement
- Availability of nicotine replacement therapy
- Care referral pathways
- Telemedicine and remote care
- Digital therapeutics
- Health service access and equity
- Universal Health Care Coverage
- Proportion of population in relative poverty

The Access and Care Coverage category has the second-highest average score at 70.9/100 and the second smallest score range at 40 points. Denmark (84), the UK, Ireland, Norway, and Czechia emerge as the top scorers in this category, while China (43), Latvia, Belgium, Poland, and Japan had the lowest scores. Countries generally demonstrate that health systems offer access to and coverage for a wide range of drugs as well as diagnostic and treatment services for COPD. However, indicators specific to drug, treatment, and diagnostics access provide only broad insights into the standard co-payment and reimbursement policies in each country and do not reflect other factors that may impact access such as individual disability, mis- and underdiagnosis, and fluctuations in the availability of pharmaceuticals.

The health service access and equity, universal health care service coverage, and relative poverty indicators aim to address potential gaps left by the treatment and drug access and diagnosis indicators. Together, these indicators suggest that despite relatively comprehensive policies for coverage of costs related to drugs, treatments, and diagnostics in most countries, there remain significant barriers to accessing care. For example, over 25% of country populations, on average, report unmet health care needs due to distance from points of care, financial barriers, or waiting times. This is further supported by existing literature that illustrates the stark relationship between socioeconomic deprivation and poor COPD outcomes.[35,36] In addition, it should be noted that while most countries indicate broad access to spirometry for diagnosis of COPD on the primary care level (25/34 countries in index)[37] and the availability of pulmonary rehabilitation, numerous studies indicate that significant barriers to these elements still exist in practice.[38] Primary care may not be reimbursed for buying spirometers and the calibration equipment required, nor reimbursed for using and interpreting it. Therefore, they may prioritise diagnosing and managing other chronic conditions for which they are reimbursed. In many countries, primary care is also not permitted to prescribe COPD inhaled medicines and therefore there is no incentive to diagnose. Particularly in the case of pulmonary rehabilitation, several studies suggest that access to pulmonary rehabilitation does not guarantee treatment adherence. Rehabilitation is still effective as it increases aerobic fitness and endurance and builds competence to self-manage across multiple domains including breathing techniques, breathing control while active, nutrition, sleep, how to spot exacerbation, help to quit smoking, and how to stay active, among others, which is crucial for achieving improvements in pulmonary function among COPD patients.[39,40,41] Overall, indicator scores in this category suggest that ensuring greater equity in COPD care and outcomes may require greater attention both to other structural elements of health care systems as well as other systemic inequalities.

Other notable observations related to indicators in the Access and Care Coverage category include the generally strong conditions for access to telehealth services, but relatively poor coverage of digital therapeutics for COPD. As digital therapeutics are relatively new services, this finding is expected. In the future it may be beneficial to further examine the extent to which digital therapeutics for COPD (e.g., approved condition management apps/monitoring tools) are available and covered by insurance schemes as well as what concrete benefits these tools yield patients.

Access and care coverage - weighted normalised score (out of 100)



Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Health system characteristics

Indicators

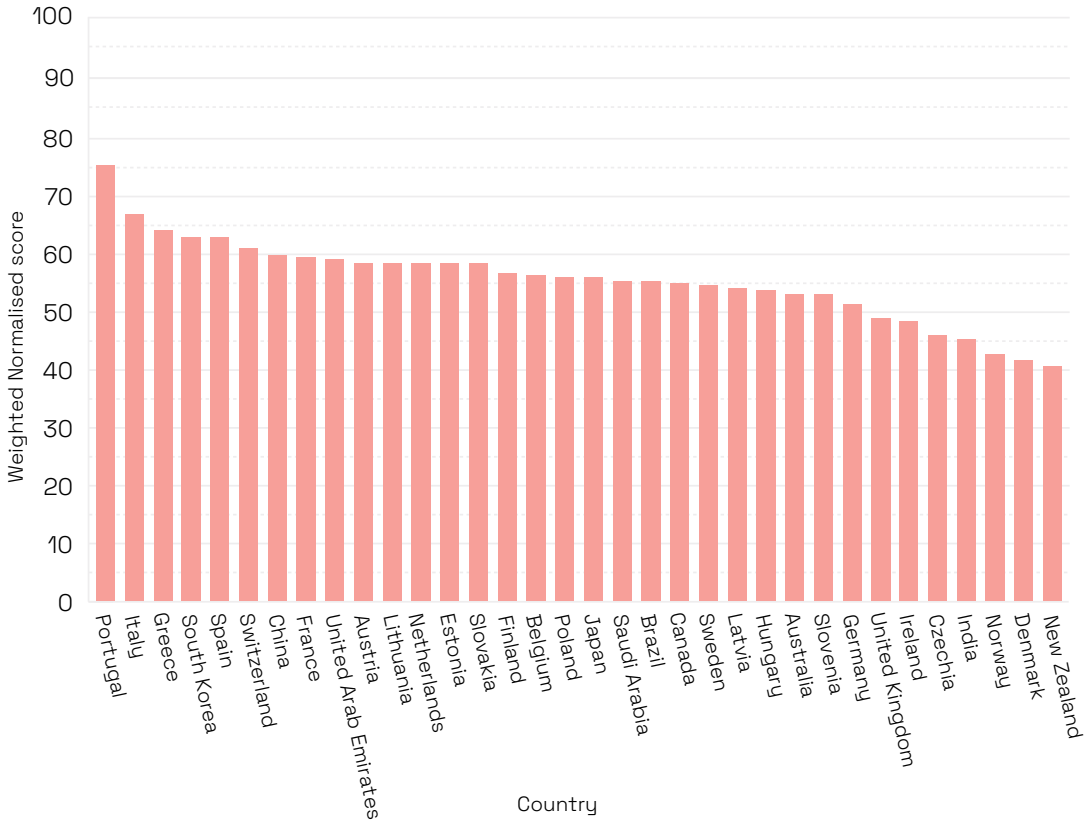
- COPD hospitalisations
- Hospital readmissions
- Health data collection and reporting
- Respiratory specialist density
- Primary care physician density
- Influenza immunisation rate

The Health System Characteristics category displayed the second lowest average score (55.5/100) and the smallest range between scores (35 points). Portugal (75.6), Italy, Greece, South Korea, and Spain were the top performers, while New Zealand (40.8), Denmark, Norway, India, and Czechia scored the lowest. COPD-related hospitalisations per 100,000 population vary widely between countries, with a range of over 300 hospitalisations per 100,000 people between the top and bottom scorers. When New Zealand, the lowest scorer within the hospitalisations indicator and a major outlier compared to the other Index countries, was removed, the range between the remaining countries was still considerable at over 210 hospitalisations per 100,000 people. It should be noted that hospitalisation data represents year-round rates, which do reflect the seasonality of COPD exacerbations and how country health systems handle them.[42]

Hospital readmissions within 365 days related to COPD exacerbations also vary considerably, with a 54.5% difference between the lowest scorer, Norway (64.6% readmission rate) and the top scorer, China (10.1% readmission rate). Notably, there is a strong negative correlation (r = -0.72) between the rate of hospitalisation and the number of respiratory specialists, but only a low correlation (r = -0.32) between readmission rate and the number of respiratory specialists. Similarly, it is noteworthy that a relatively high number of respiratory specialists does not guarantee lower rates of hospitalisation, as evidenced by the performance of countries such as Belgium and Austria, which have an above average level of respiratory specialists but high levels of hospitalisation. There are no significant relationships between the number of primary care doctors and hospitalisation or readmission rates.

Interestingly, despite a relatively low weighting in the Index scoring framework, there is a moderate correlation (r = 0.5) between countries with robust health data infrastructures and overall category scores. While conclusions about causal relationships cannot be drawn from this dataset, this observation indicates that it may be worthwhile to investigate hypotheses related to the quality of health data infrastructure and COPD outcomes in the future. To be sure, however, while conditions for health data recording and reporting in some countries may be strong, this does not guarantee that health data recording and reporting practices specifically for COPD are of high quality. This may be due to a lack of incentive to record and report information, high administrative burdens, low levels of familiarity and specialisation in chronic respiratory disease among health care professionals, and differing definitions of COPD in the Index countries.[43]

Health system characteristics - weighted normalised score (out of 100)



Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Disease burden

Indicators

- Societal cost of COPD
- Burden of COPD
- COPD deaths
- COPD prevalence
- Sex-based inequality
- Adult tobacco use rate
- Maternal smoking rate
- Prevalence of Tuberculosis
- Prevalence of cardiovascular disease
- Prevalence of HIV

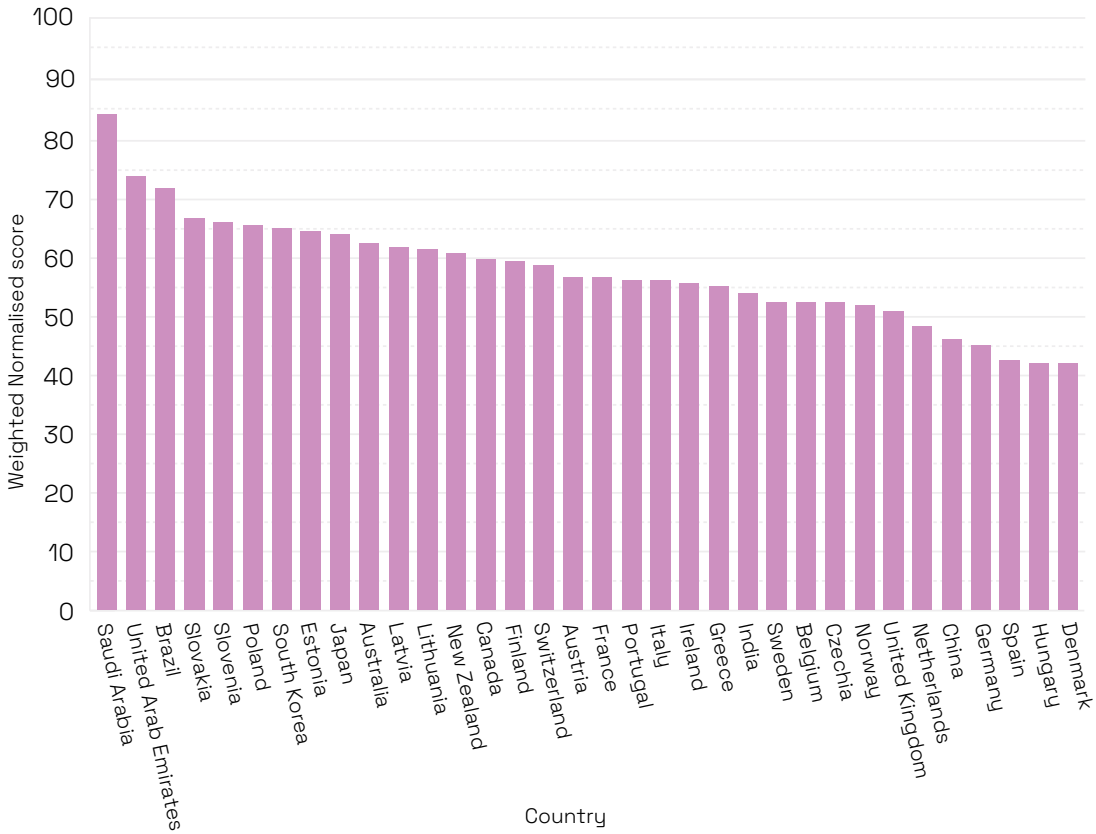
The Disease Burden category has an average score of 58/100 points. Saudi Arabia (85), the United Arab Emirates, Brazil, Slovakia, and Slovenia have the highest scores in this category, while Denmark (42), Hungary, Spain, Germany, and China have the lowest scores. The estimated per capita cost of COPD between the years 2020-2050 among the 34 countries is relatively high, reaching over $2,300 INT (2017), highlighting not only the current burden of COPD but the need for action to address both the immediate and long-term and knock-on effects of the condition.

The rate of disability-adjusted life years (DALYs) attributable to COPD varies greatly among the countries. China has the highest rate with COPD representing 5.88% of all recorded DALYs, while Latvia has the lowest rate at 0.88% of all country DALYs. COPD deaths also range considerably among the countries, with China having over 20 times the rate of estimated COPD deaths compared to the highest-scoring country, the United Arab Emirates. There are also marked gender-based differences in the burden of COPD in several countries, most notably in Japan, Latvia, South Korea, and Lithuania, where there are more than twice the number of DALYs among men than among women. Sweden represents an exceptional case in which there are more than 1.5 times more DALYs among women than among men.

The Index also highlights significant room for improvement in lifestyle and behavioural factors, among almost all countries, that impact COPD development and exacerbation, principally the rate of tobacco use. In most countries, more than one-fifth of the adult population uses tobacco. Notably, there is a moderate correlation between maternal smoking rates and overall country scores in this category ($r = -0.45$). Addressing factors affecting smoking rates stands to make some of the most significant improvements to country scores in this category.

The disease burden category is a negative direction indicator. This means that a low disease burden score demonstrates a high disease burden (e.g., Denmark). Conversely, countries with a high disease burden score perform well and have a low disease burden (e.g., Saudi Arabia).

Disease burden - weighted normalised score (out of 100)



Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Environmental factors

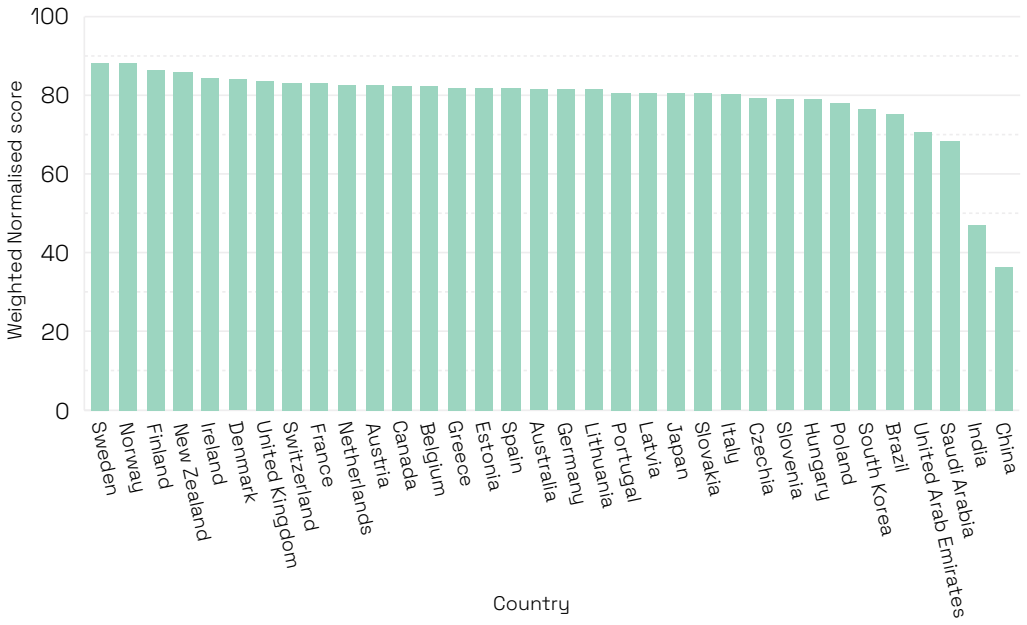
Indicators

- Indoor air quality
- Particulate matter levels
- Surface temperature increase
- Biomass smoke exposure
- Tobacco production
- Mining production
- Share of primary energy consumption from fossil fuels
- Occupational exposure
- Environmental exposure

The Environmental Factors category has the highest average score (79.1/100) and the second-highest range between country scores (53 points). Sweden (89), Norway, Finland, New Zealand, and Ireland have the highest scores in this category, while China (36), India, Saudi Arabia, the United Arab Emirates, and Brazil report the lowest scores.

There are areas where countries can make considerable improvements to their scores, particularly in indoor air quality and population exposure to particulate matter: Over 80% of India's population and over 60% of Saudi Arabia's population report being exposed to dangerous levels of particulate matter outdoors, while one-fifth to one-quarter of some countries' populations report housing conditions linked to poor indoor air quality. It is noteworthy to address that some high-risk occupations are more prevalent in certain countries, for example, mining, arable farming and stubble burning, and tobacco growing and processing. Countries generally perform well in the biomass smoke exposure indicator, with the exception of India, China, and to a lesser extent, Brazil, highlighting the need for improved access to cooking and heating fuels in low- and middle-income countries. There is a strong correlation between particulate matter exposure and the overall category scores (r = -0.84), highlighting that actions to improve air quality stand to significantly increase country scores.

Environmental factors - weighted normalised score (out of 100)

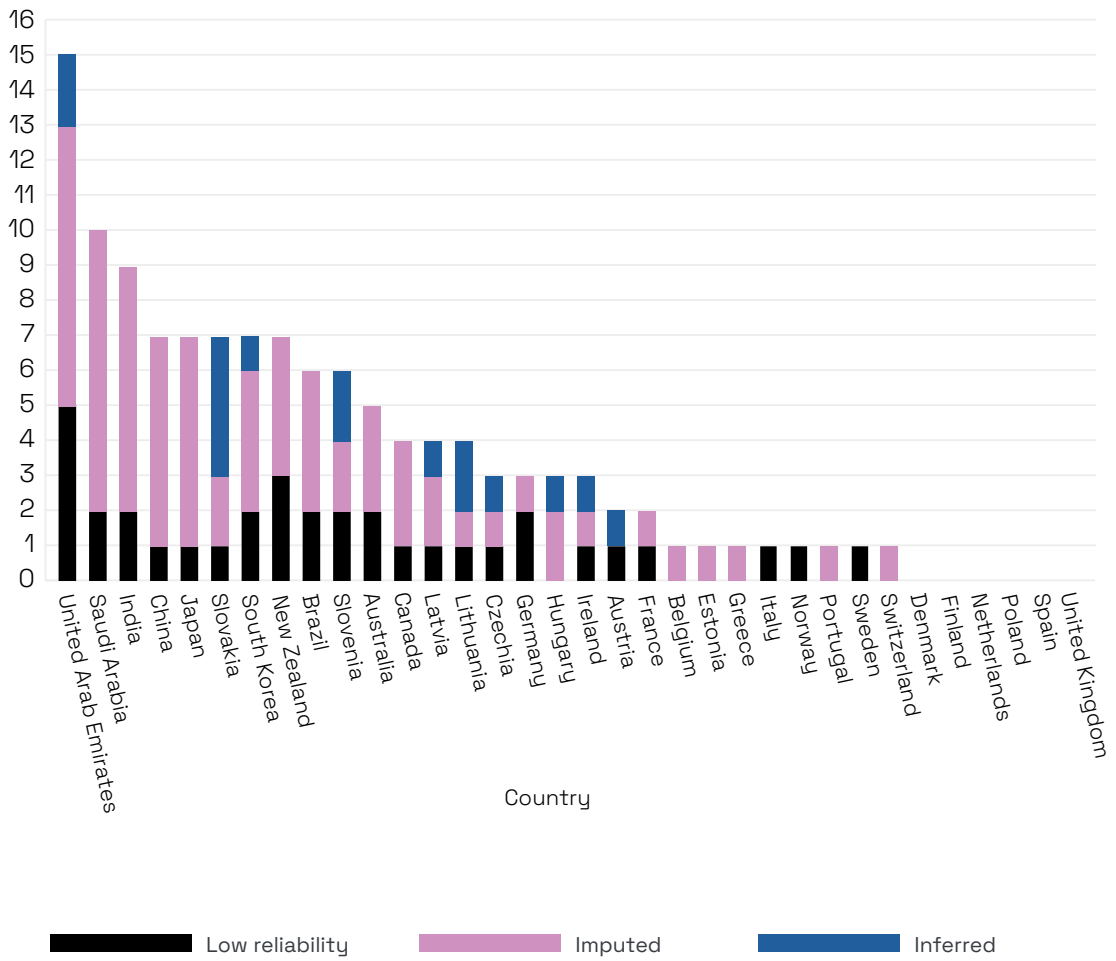


Note: This graph provides an overview of aggregate scores, which may generalise some countries' performance. See Appendix I for more detailed information about country scores within each indicator, as well as notes on where underreporting and misreporting of data may impact results.

Data completenesss

Of 1530 unique datapoints in the COPD Index, 1,408 are fully validated, representing over 92% of the complete dataset. 71 datapoints have been imputed because of a lack of information or verifiable or comparable sources, 35 datapoints are indicated as having low reliability due to their age, method of calculation in the source dataset, or conflicting data found in verified sources, and 16 datapoints have been inferred based on sources providing an indirect indication of a country score for a given indicator. On average, a country had 3.6 imputed, inferred, or low-reliability indicators across the entire COPD Index, representing 8% of country data. The United Arab Emirates has the lowest level of dataset completeness, with 8 imputed datapoints, 2 inferred datapoints, and 5 datapoints indicated as having low reliability. Denmark, Finland, the Netherlands, Poland, Spain, and the United Kingdom have complete, fully validated datasets.

Imputed, inferred, and low validity data in the COPD index



Discussion

Overall, data from the first edition of the COPD Index suggest that COPD remains an inadequately prioritised condition in many, if not all, countries. Despite relatively high scores, there is no country that is the top scorer across all categories, highlighting the fact that there are opportunities for improvement in all countries. While it has long been widely recognised that COPD constitutes a significant economic and social burden to individuals and governments, and that there is a high level of unmet health care need reported among COPD patients, the lack of comprehensive, coherent, and well-implemented national strategies for COPD illustrate a large gap that policymakers and other relevant health system stakeholders should be called upon to fill to the best of their ability.

Crucially, the Index findings also support existing claims that countries and their relevant health system stakeholders could make substantial progress in COPD control and prevention by undertaking actions that are external to what are often slow and rigid policy processes. These include implementing and strengthening of care guidelines, expanding access to more patient-oriented (and increasingly digital) services, and addressing behavioural factors. Improved vaccination rates among high-risk populations, increased access to diagnostic services such as spirometry, and support for smoking cessation and pulmonary rehabilitation are noted as particularly important to achieving better outcomes this area.

Ultimately, the Index findings emphasise the need for a comprehensive, "whole system" approach to COPD. By encouraging all stakeholders—not only health care professionals—to address and prioritise COPD like the complex and burdensome chronic condition it is, the COPD Index aspires to support the creation of innovative, collaborative, cross-border, and comprehensive solutions to a crucial but currently overlooked global health issue.

Finally, it is crucial to note that the Index and its findings are both informed and limited by the highly variable level of data availability between countries, as well as by considerable inconsistencies in how countries report COPD-related data both in clinical and non-clinical settings. In future editions of the Index, there is an ambition to examine additional clinical indicators that are more COPD-specific, track how country approaches have changed over time, identify the impacts those changes have on health outcomes and health system performance, and pinpoint additional non-clinical factors that may have a significant relationship to the improvement of COPD care. Several recommendations and calls to action that aim to address the current limitations of the Index are proposed in the final section of this report.

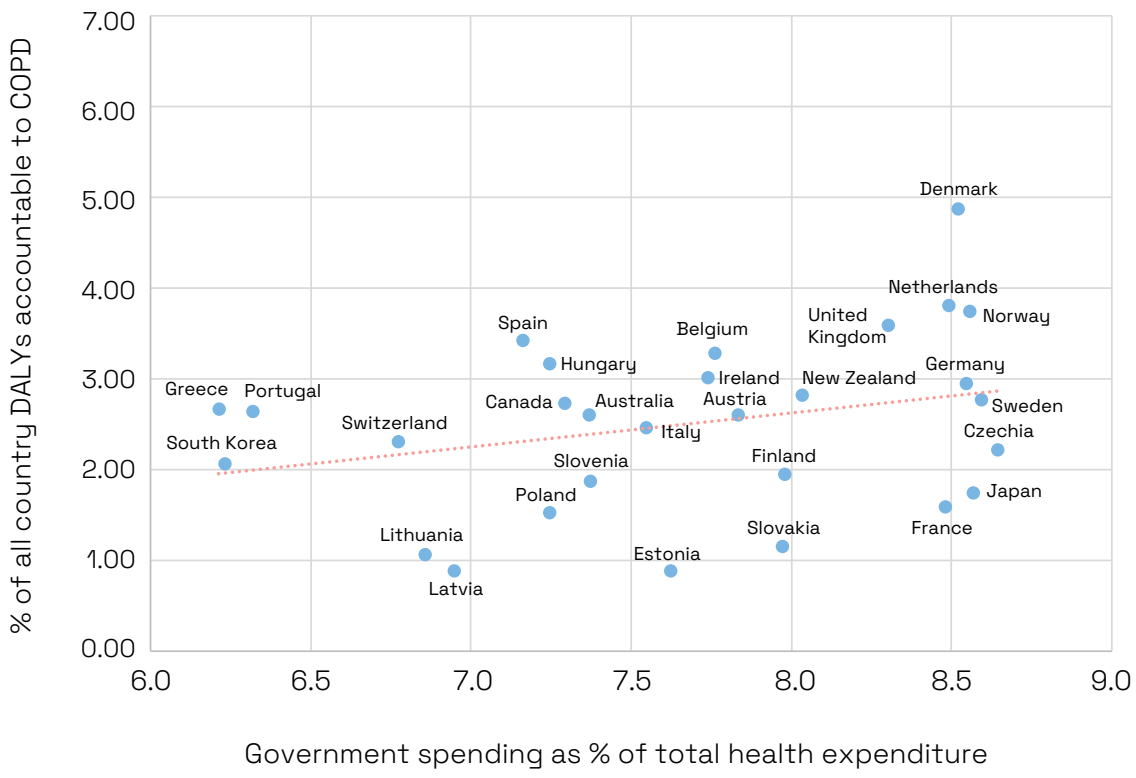
Additional observations based on the COPD index data

There are several noteworthy relationships between COPD Index indicators and other relevant country characteristics. However, it is crucial to note that no definitive conclusions can be drawn from these findings due to the limited number of countries in the COPD Index. Moreover, the small sample size and limited number of factors examined make it impossible to imply causality between any of the relationships explored below.

Health spending, COPD burden, and outcomes

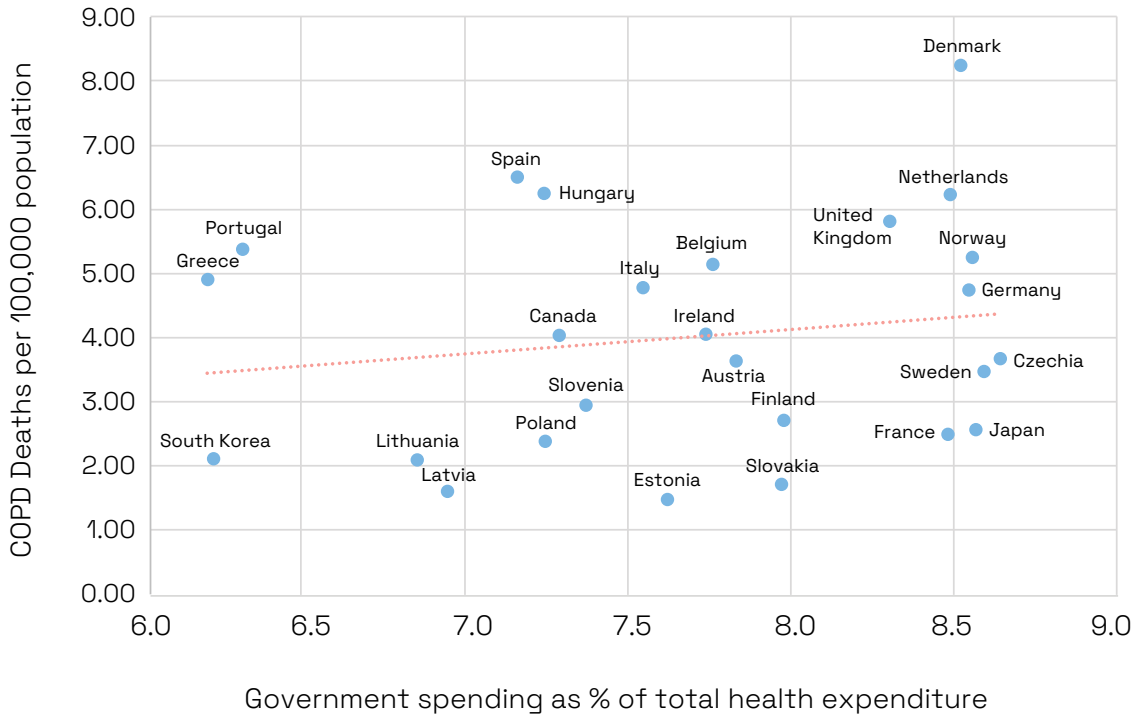
Among the COPD Index countries, there are no substantial correlations between countries' levels of government health spending and COPD-related deaths and recorded DALYs attributable to COPD. However, there is a moderate to strong negative correlation between levels of out-of-pocket spending for health care and hospitalisation rates for COPD (R = -0.59). While conclusions related to causality cannot be drawn from this limited dataset, the finding could suggest that patients in countries with high out-of-pocket spending on health care services are utilising personal financial resources to access more timely and targeted care and are ultimately further from achieving universal health care (UHC). Higher out-of-pocket payments may also entail a higher risk of catastrophic health spending and have a disproportionately negative impact on socioeconomically disadvantaged groups, highlighting a continued need for robust financial protection schemes and a focus on the role of equity in COPD prevention, diagnosis, and management. Overall, these findings indicate improved COPD outcomes may be more likely to be linked to increased resource allocation for COPD prevention, diagnosis, and care rather than an absolute increase in health care resources.

COPD DALYs vs government spending as % of total health expenditure



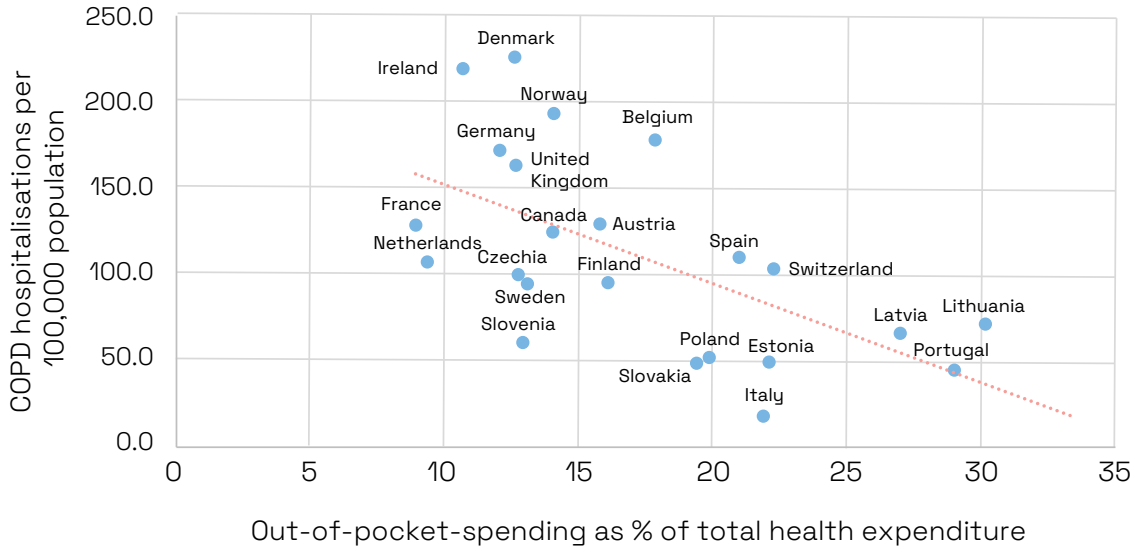
COPD DALYs in relation to government spending as a percentage of total health expenditure in selected COPD Index countries. R = 0.29. Source: OECD. (2024). Health expenditure and financing. OECD Health Statistics. Retrieved from https://data.oecd.org/healthres/health-spending.htm; Institute for Health Metrics and Evaluation. (2024). Retrieved from: https://vizhub.healthdata.org/gbd-results/.

COPD deaths vs government spending as % of total health expenditure



COPD deaths per 100,000 population in relation to government spending as a percentage of total health expenditure in selected COPD Index countries. R = 0.19. Source: OECD. (2024). Health expenditure and financing. OECD Health Statistics. Retrieved from https://data.oecd.org/healthres/health-spending.htm; OECD. (2024). Healthcare quality and outcomes indicators. OECD Health Statistics. Retrieved from https://www.oecd.org/health/healthcare-quality-indicators.htm.

COPD hospitalisations per 100,000 population vs. out-of-pocket spending on healthcare as % of total health expenditure



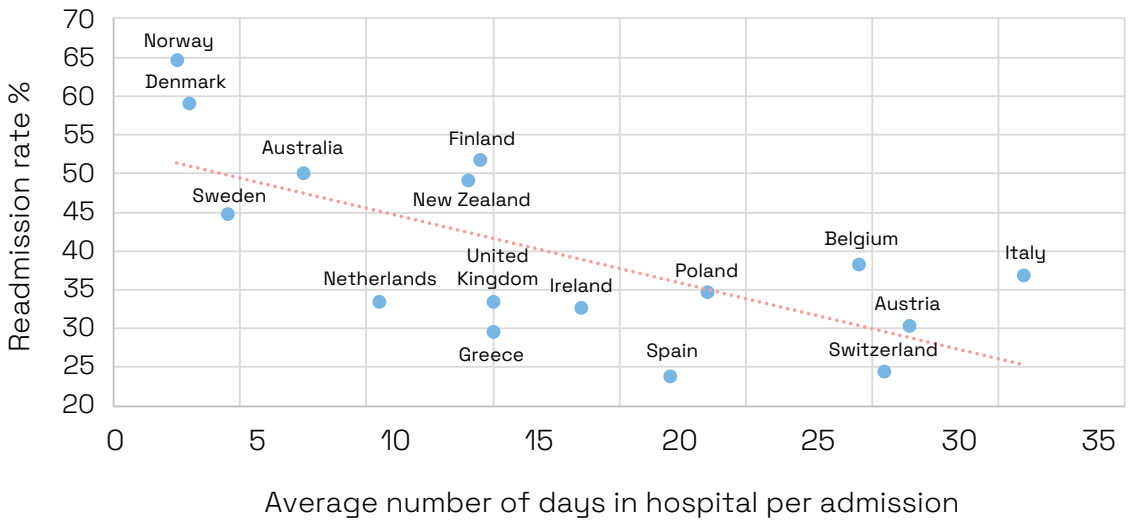
COPD deaths per 100,000 population in relation to out-of-pocket spending as a percentage of total health expenditure in selected COPD Index countries. R = -0.59. Source: OECD. (2024). Health expenditure and financing. OECD Health Statistics. Retrieved from https://data.oecd.org/healthres/health-spending.htm; OECD. (2024). Healthcare quality and outcomes indicators. OECD Health Statistics. Retrieved from https://www.oecd.org/health/healthcare-quality-indicators.htm.

Readmission rates and length of hospital stays

There is a strong negative correlation between 365-day readmission rates and the average length of hospital stays for COPD (R = -0.68). In general, longer hospital stays reflect lower readmission rates. Countries that report fewer than five days spent in hospital due to COPD report average readmission rates that are nearly 1.5 times higher than the average readmission rate of countries recorded in the COPD Index. Although long hospital stays are generally considered unfavourable,[44] this finding suggests that reducing the length of COPD-related hospital stays beyond a certain threshold may have negative effects in the medium to long term, which may outweigh any short-term cost savings made through a reduction in initial length of stay.

People admitted to hospitals with COPD often have multiple problems and could benefit from longer hospital stays to enable multidisciplinary interventions. Health outcomes for patients with respiratory conditions can be significantly affected by psychological wellbeing; those experiencing psychological difficulties are less able to manage symptoms, have a poorer quality of life, and more frequent hospital admissions. Utilising the duration of hospitalisation to provide smoking cessation assistance, educate about self-management (e.g. through inhaler usage), check heart health, etc. can be worthwhile and yield significant positive outcomes.

Average length of hospital stay for COPD vs. 365-day readmission rate



Average length of hospital stay for COPD vs. 365-day readmission rates in selected countries in the COPD Index. R = -0.68. Source: OECD. (2024). Healthcare quality and outcomes indicators. OECD Health Statistics. Retrieved from https://www.oecd.org/health/healthcare-quality-indicators.htm.; Waeijen-Smit K, Jacobsen PA, Houben-Wilke S, Simons SO, Franssen FME, Spruit MA, Pedersen CT, Kragholm KH, Weinreich UM. All-cause admissions following a first ever exacerbation-related hospitalisation in COPD. ERJ Open Res. 2023 Jan 3;9(1):00217-2022. doi: 10.1183/23120541.00217-2022. PMID: 36605904; PMCID: PMC9808537.

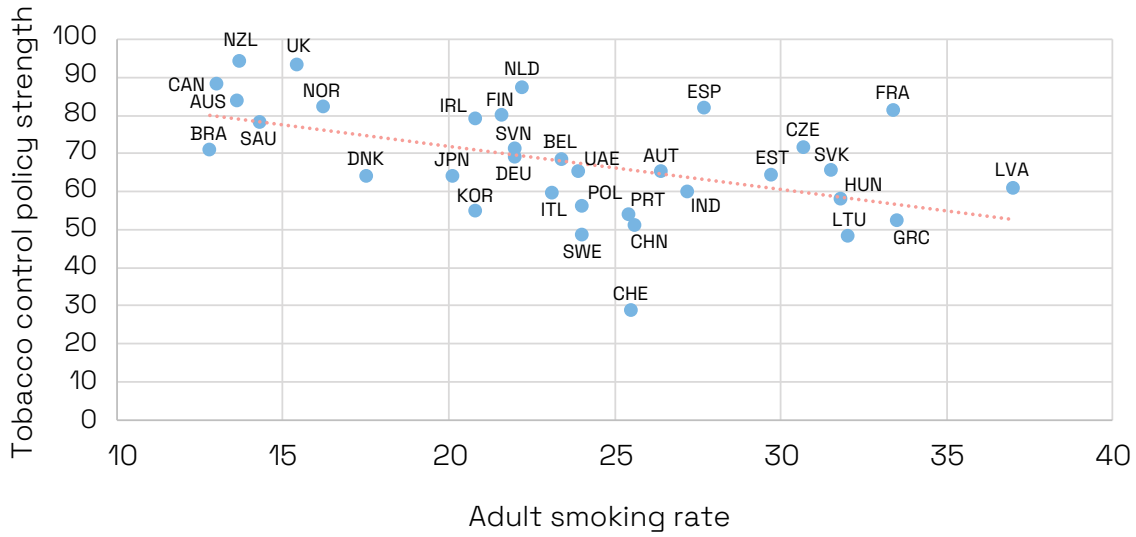
Tobacco control policy and smoking rates

The relationship between the scope and implementation of tobacco control policies and adult tobacco use rates in the COPD Index countries presents a moderate negative correlation (R = -0.50), suggesting that strong tobacco control policies are a key element in securing lower smoking rates and thereby reducing the burden of COPD.

Tobacco control policy requires successful implementation to drive down smoking rates. For example, New Zealand reports the highest tobacco control policy score and a low smoking rate, indicating successful implementation and effectiveness of the policy. In Czechia, the tobacco control policy is relatively good, but poor implementation results in a very high adult tobacco use rate. We see a similar pattern in Australia, which struggles with implementation, as evidenced by one of the highest maternal smoking rates, despite a relatively low adult smoking rate. While these findings are hardly surprising, it is important to note the role different stakeholders play in developing, implementing, and assessing the effectiveness of policy and its real-world implementation.

However, there are several outliers, such as France and Spain, which report relatively high rates of adult tobacco use despite strong tobacco control policies with good implementation, and Switzerland, which reports an only slightly above-average tobacco use rate despite having the weakest tobacco control policies in the COPD Index by a large margin. This suggests that other approaches to tobacco control, especially those with a focus on behaviour early intervention and smoking cessation, are also crucial to reducing tobacco use.

Tobacco control policy strength vs. adult tobacco use rates



Tobacco control policy strength vs. adult tobacco use rates. R = -0.50. Source: World Health Organization, 2023. WHO Report on the Global Tobacco Epidemic.; The World Bank. Prevalence of current tobacco use. 2023.

Conclusion

The COPD Index reveals an urgent need for increased focus and prioritisation of COPD within the examined country health systems. It highlights both strengths and areas for improvement in the prevention, diagnosis, and management of COPD. Despite varying overall performances, no single country excels consistently across all measures. Even the top performers in the COPD Index are far from achieving ideal outcomes. Key observations include:

Insufficient implementation of policy and adherence to guidelines

The Policy Context category scores the lowest on the COPD Index, averaging 52.9/100 points with a range of 57 points. Less than half of the countries (16/34) have a national strategy for COPD prevention, diagnosis, and management, and even fewer report strong implementation of these strategies. Although only four countries lack COPD care guidelines, adherence to these guidelines is generally insufficient. Significant barriers to optimal COPD prevention and quality care exist even in countries with robust health systems and favorable policy conditions. These challenges are even more pronounced in LMICs. The COPD Index also underscores that merely having a policy or set of guidelines is insufficient; effective implementation, monitoring, and regular evaluation are crucial.

Reported data do not always reflect the real-world experiences of patients and health professionals

While health systems generally provide access to a wide range of drugs, diagnostics, and treatment services for COPD, these indicators offer only a broad view of co-payment and reimbursement policies. They do not account for factors like individual disability, mis- and underdiagnosis, and fluctuations in the supply and availability of pharmaceuticals, making it difficult to fully understand COPD's impact on patients and health systems and society at large.

The relationships between primary, secondary, and tertiary care in the context of COPD care warrant further exploration

Data from the COPD Index show a significant relationship (R = -0.72) between higher respiratory specialist density and lower COPD-related hospitalisations, and a weaker but notable relationship with 365-day readmission rates (R = -0.32). Despite this, primary care is heavily relied upon to manage COPD in all examined health systems. Primary care physicians often lack the resources and training necessary for consistent and accurate COPD diagnosis and management. Enhancing primary care capabilities and creating robust care pathways could lead to improvements in diagnosis, care continuity, patient outcomes, and health system efficiency, especially as pressures on primary care continue increasing.

Tobacco control policies: Necessary but not sufficient

A moderate negative correlation (R = -0.50) exists between the scope and implementation of tobacco control policies and adult tobacco use rates in the COPD Index countries. Strong tobacco control policies are essential for reducing smoking rates and the COPD burden. However, outliers like France and Spain, which have high tobacco

use rates despite strong policies, suggest that early intervention and smoking cessation-focused approaches are also crucial to reducing tobacco use.

High societal costs, inequity, and knock-on effects of COPD

COPD incurs high societal costs in many countries. Germany reports the highest estimated societal cost at $2,352 (2017 INT$) per capita annually from 2020 to 2050, followed by the Netherlands ($1,877) and Hungary ($1,816). Inequities in diagnosis and treatment access exacerbate these costs, disproportionately affecting vulnerable populations. Acute exacerbations of undiagnosed COPD lead to frequent hospital admissions, increased mortality, and reduced quality of life. High readmission rates, especially within 30 days, highlight the growing health system burden of COPD and underutilised hospital time. Addressing COPD could improve health care resource usage, productivity loss, and health outcomes even in the medium term (five to ten years), with additional positive public health effects. Improved monitoring and consistent analyses of COPD's economic and societal impacts are essential for these efforts.

Potential to improve allocative efficiency in health care systems

Access to quality care and patient outcomes vary significantly, independent of GDP and health spending. Factors like care pathways, incentive structures, and reimbursement policies often determine COPD care experiences and outcomes. For example, Portugal reports the highest percentage of unmet health care needs (40%) despite a relatively strong score in the Access and Care Coverage category, with Estonia and Latvia following at 37%. Relative poverty also affects access and care coverage, with Brazil scoring highest in relative poverty (28%) and Spain showing good access despite high relative poverty (22%).

The importance of an integrated approach to COPD prevention, diagnosis, and management

The COPD Index emphasizes that COPD is not merely a clinical issue. Patient outcomes and experiences are influenced by systemic, policy, and environmental factors. A "whole system" approach is needed for effective COPD management. The WHO's Health in All Policies (HiAP) approach provides a foundation for future work in this area.

Utilisation of the COPD Index

In addition to providing health care stakeholders with a tool for building insights and driving policy work and advocacy in the COPD space, the COPD Index aims to strengthen the commitment of both public and private sector decisionmakers to take both long- and short-term actions to improve health outcomes and quality of life for COPD patients and ensure the sustainability of health systems.

With this in mind, we propose several recommendations and calls to action that are intended to: (1) Facilitate action and collaboration among relevant stakeholders in addressing the burden of COPD (2) Support the development of a more robust and comprehensive future edition of the COPD Index, and—most importantly — (3) Enable more comprehensive intra- and cross-country studies in all aspects of COPD research.

Calls to action

All relevant stakeholders are called upon to:

Unite for COPD

Health care experts, patients and their representatives, policymakers, and civil society representatives should collaborate not only to develop robust, comprehensive strategies for managing and preventing COPD but to ensure the consistent implementation of them. Aligning on a uniform definition of COPD and prioritising, cross-country, interdisciplinary, and public-private collaborations should also underpin these efforts.

Prevent COPD

Stakeholders should prevent COPD by enforcing strict tobacco control laws and reducing exposure to risk factors like air pollution, while also improving access to diagnostics and health care through equitable funding models and mobile and digital solutions. Concretely, one approach is to address barriers to the utilisation of spirometry and the availability of pulmonary rehabilitation at the primary care level.

Recognise COPD

Health policymakers should focus on increasing awareness of screening programmes for at-risk populations and increasing access to diagnostic tools such as spirometry. Individuals should have easy access to smoking cessation services and pulmonary rehabilitation as they are comparatively low-cost investments that have the potential to greatly reduce the burden of COPD in the long term and improve patient outcomes and quality of life in the short term.

Understand COPD

Health policymakers and stakeholders should ensure data is consistently and correctly reported and made publicly accessible (while protecting patient privacy) to support academic research, bolster policymaking, and improve resource allocation. This could include, but is not limited to, more comprehensive COPD-specific hospitalisation and exacerbation data, prescription dispensing data, and patient-reported outcome and experience data.

Empower COPD patients

Policy initiatives should boost support for patient organisations, address inequities by prioritizing vulnerable populations, implement patient-centric care models, enhance self-management opportunities, and improve care quality monitoring. Individuals with COPD should have comprehensive support outside of the clinical system in the form of individualised plans after discharge from hospitals but also through digital tools at home. At the same time, there is a critical need to educate the public about the condition, its widespread impacts and, most notably, its highly preventable nature to garner support for increased investment in COPD prevention, diagnosis, and care.

Disclosures

Sanofi and Regeneron provided unrestricted support for the development of the COPD Index. The Copenhagen Institute for Futures Studies independently researched and subsequently developed all the insights and recommendations contained within the Index.

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Sanofi and Regeneron provided unrestricted support for the development of the COPD Index.

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Please scan these QR codes to view the COPD Index website and the sources.

Website

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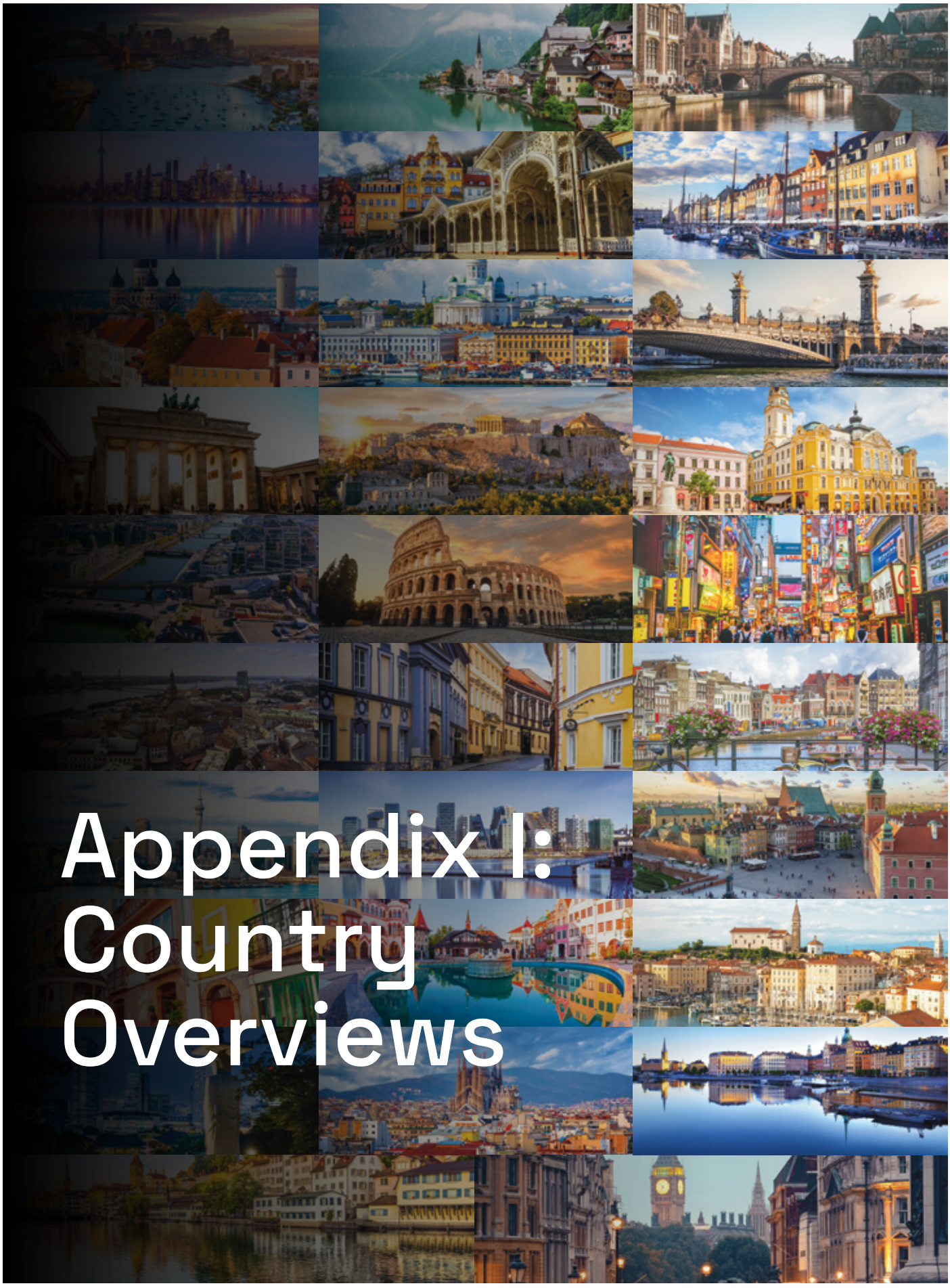

Appendix I: Country Overviews

Australia

Australia is the second highest scorer in the Policy Context category, only slightly below the United Kingdom and above Spain, due to the implementation of a comprehensive COPD strategy, care guidelines, and tobacco control laws. The Disease Burden score is above average, with an about average societal cost and low prevalence, but a high maternal smoking rate. Australia scores below average in Health System Characteristics, with among the highest rates of COPD hospitalisations and readmissions. On the other hand, Australia's score in Access and Care Coverage is relatively high, primarily due to the accessibility of telemedicine and remote care, strong care referral pathways, access to diagnosis, and universal health care coverage. Similarly, Australia presents an above-average score in the Environmental Factors category.

Country Score
71.5

Rank
1

COPD Death Rate (% of all deaths)
5.4%

Smoking Rate (%)
13.6%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,157

KEY TAKEAWAYS

- Comprehensive COPD national strategy and strong COPD care guidelines, relatively high access to care
- Strong tobacco control laws, but need for improvement in maternal smoking rate
- Room for improvements in Health System Characteristics, indicating a need for more integrated care

Insights

Challenges

- Despite indications that spirometry is available at the primary care level, there are reports that access to spirometry is still limited, which may delay diagnosis
- Pulmonary rehabilitation support is insufficient, delayed diagnosis, disease management challenges

Opportunities

- Incentivise spirometry to improve accuracy and timing of diagnosis
- More support for patient empowerment in self-management
- Improve service coordination and referral structures

Priorities

- Address the fragmented care structure
- Reduce health inequalities
- Gain and train more human resources for respiratory care

Best practices in COPD care

- Comprehensive and well implemented COPD-X guidelines and adherence
- Funding for spirometry to be conducted by general practitioners
- Robust and well-implemented tobacco control policies

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[Strongest health care practices for COPD that are currently implemented include.] ... UHC; funding for GP spirometry; national organisations committed to primary care education re COPD (LFA); primary care guidelines and resources to improve diagnosis... Subsidised access to wide variety of inhaled medications to improve management."

> "[One of the most significant weaknesses is] ... The fragmentation of care and the variation that exists across health services and across different regions with people living in the more remote areas being at highest risk."

Resources

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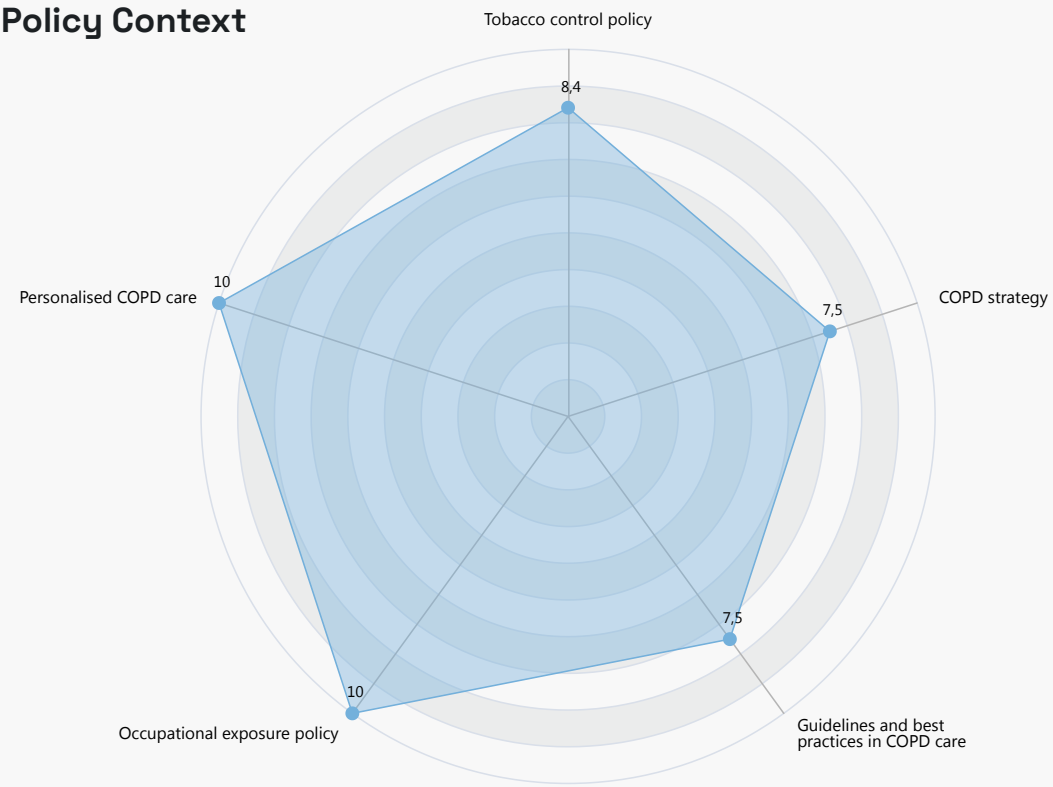
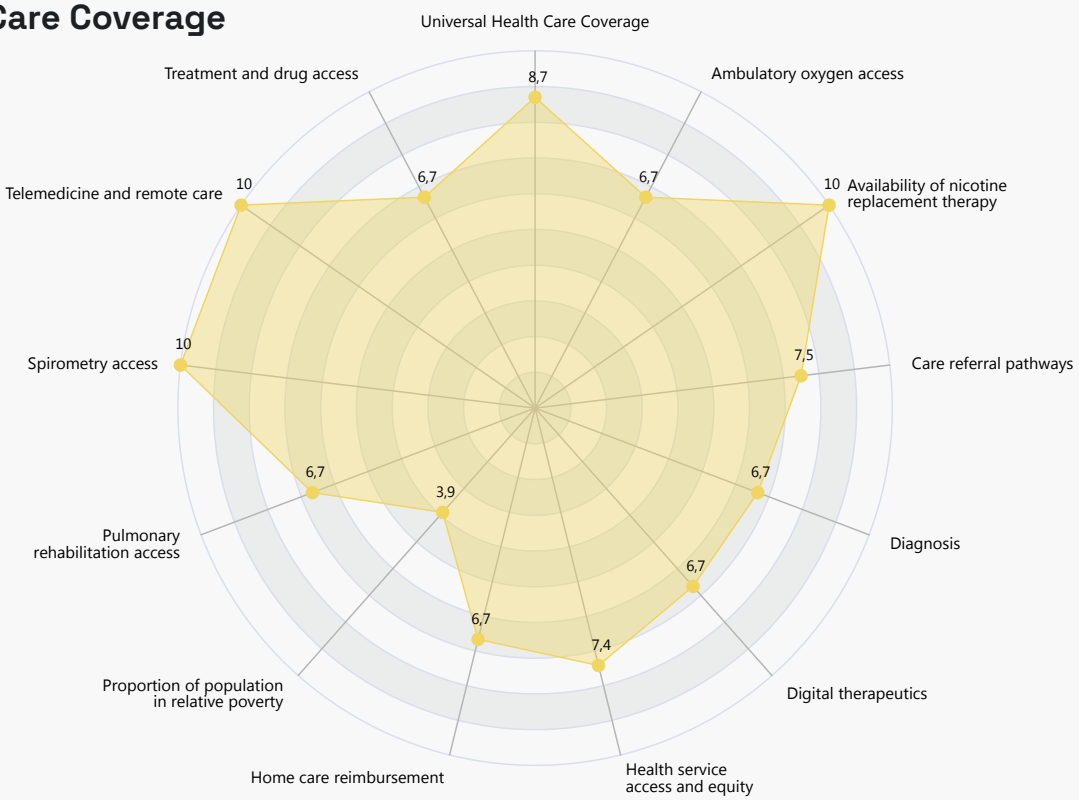
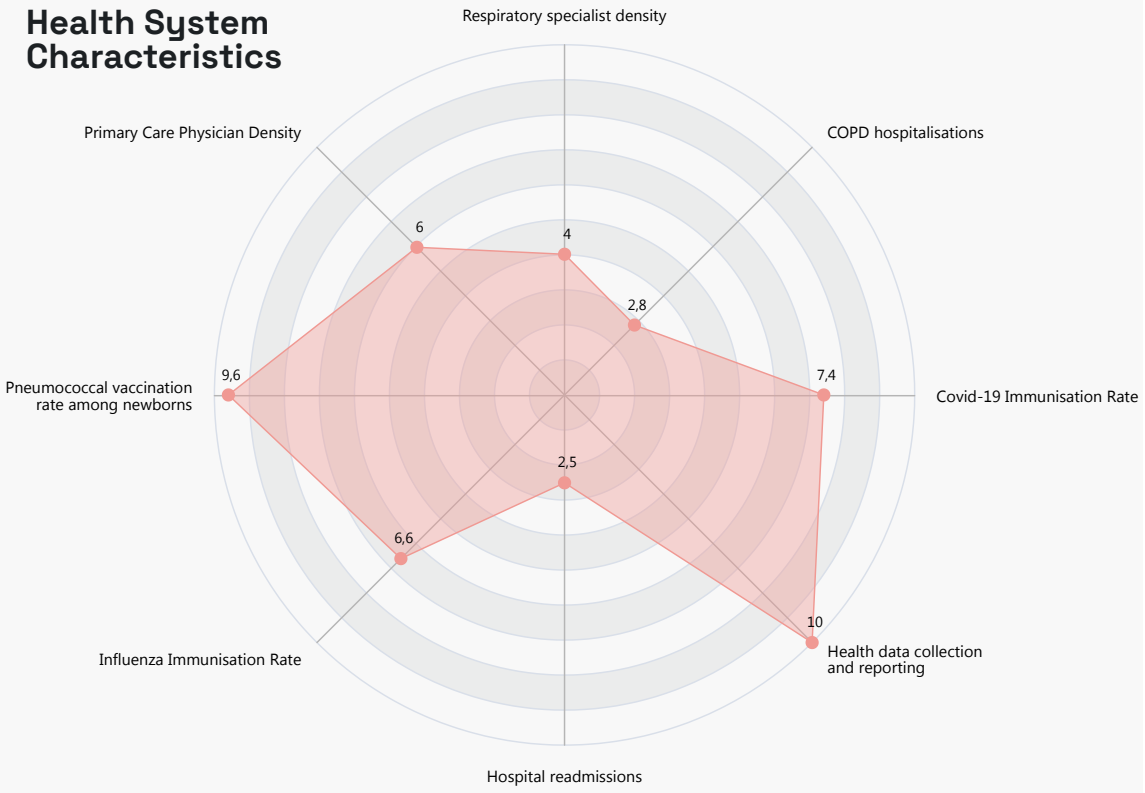
Policy Context



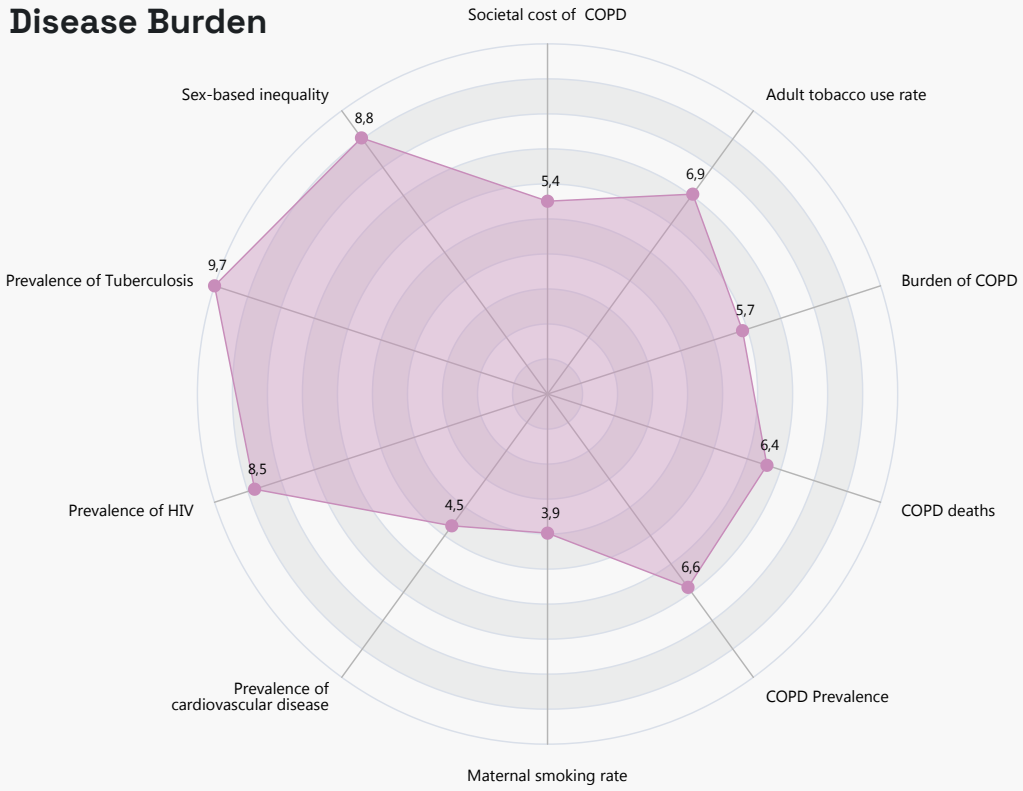
Access and Care Coverage

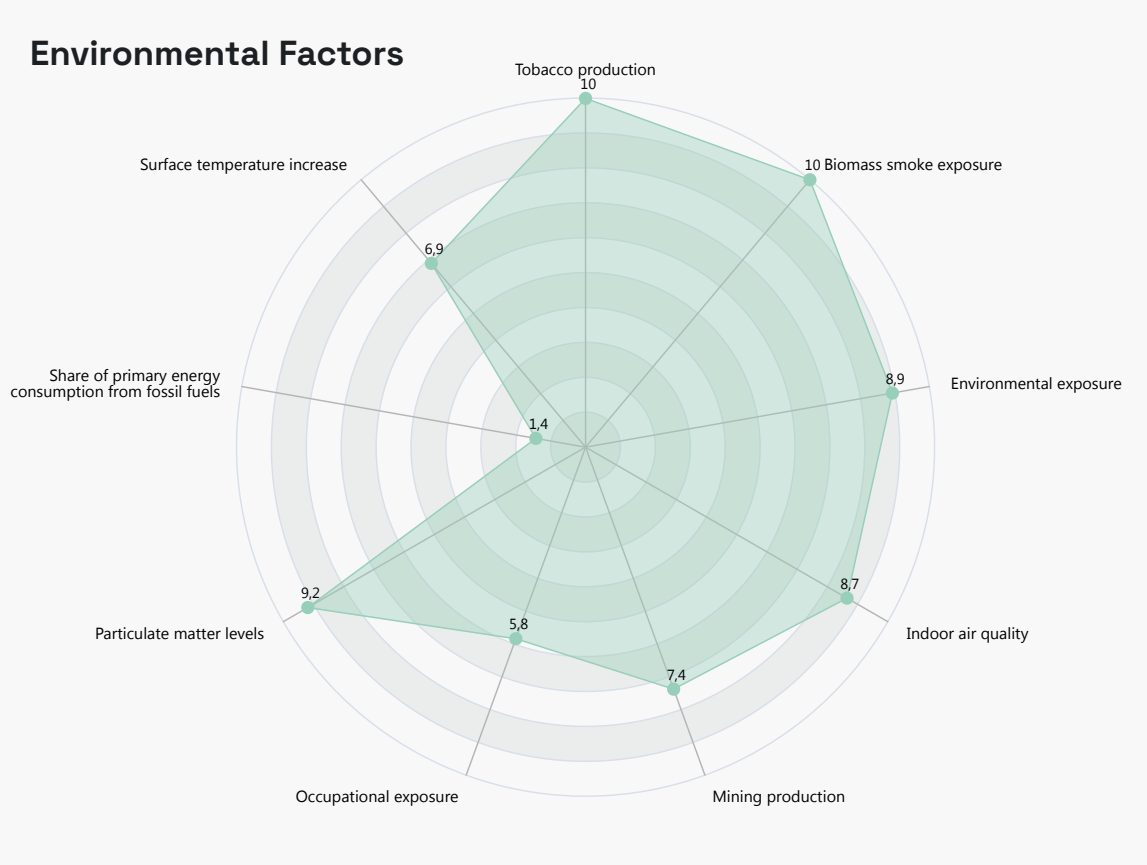


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,9
Indoor air quality
8,7
Mining production
7,4
Occupational exposure
5,8
Particulate matter levels
9,2
Share of primary energy consumption from fossil fuels
1,4
Surface temperature increase
6,9

Austria

Access and Care Coverage in Austria is relatively high, due to strong conditions for COPD diagnosis, universal health care coverage, and telemedicine. Austria scores above average in the Environmental Factors category, due in part to a high score in the Indoor Air Quality indicator. Austria's score in the Policy Context category is below average, mostly due to a lack of strong COPD guidelines and practices. However, Austria does report good performance in the Occupational Exposure Policy indicator. Austria scores above average in Health System Characteristics, mainly due to good health data collection and reporting, as well as a relatively good density of respiratory specialists and primary care physicians.

Country Score
64.3

Rank
17

COPD Death Rate (% of all deaths)
3.7%

Smoking Rate (%)
26.4%

Estimated Societal Cost of COPD per capita (2017 INT$)
$812

KEY TAKEAWAYS

- Highly accessible COPD diagnosis and management – 6th highest Access and Care Coverage score
- Better adherence to COPD care guidelines and the development of a national plan for COPD would greatly improve Austria's management of COPD
- Lower than average disease burden score, which is aligned with a low COPD prevalence

Insights

Challenges

- Need for more smoking cessation programs
- Early diagnosis of COPD and case-finding
- Mandatory spirometry is not available on general practitioner level
- Availability of post-exacerbation rehab and out of hospital NIV service

Opportunities

- Increase international focus on lung health, patient support groups
- Increase costs of tobacco products
- More adherence to international guidelines
- Add COPD screening to existing lung cancer screening approaches
- Telemedicine

Priorities

- Need for more public information about COPD (cause and burden)
- Early detection with yearly spirometry for smokers
- Increase price of tobacco products
- Respiratory intensive care units

Best practices in COPD care

- Outpatient rehabilitation
- Lung transplantation
- Respiratory care in specialised units

Resources

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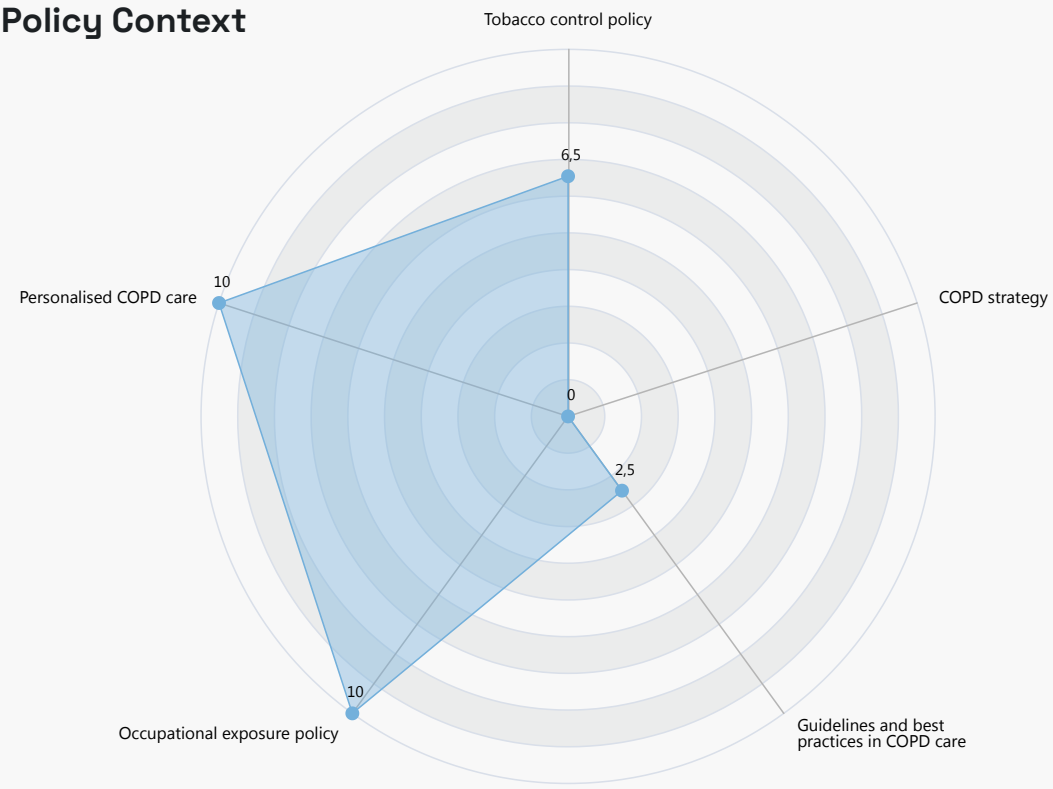
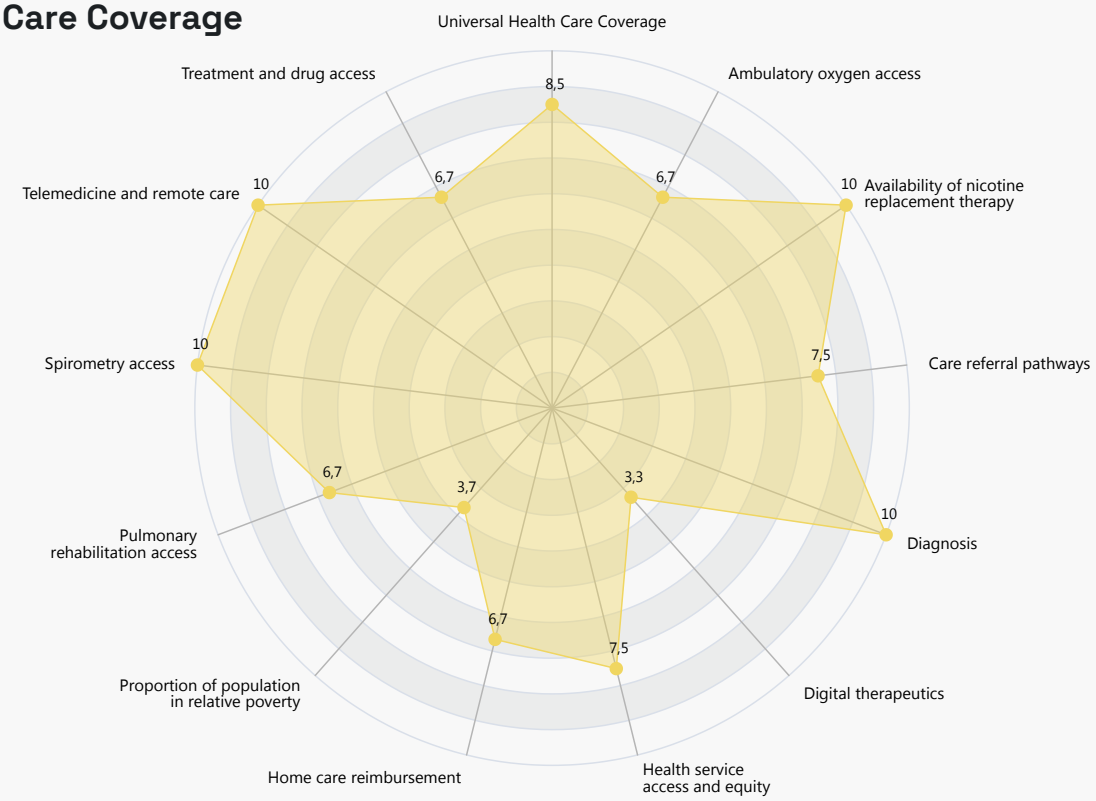
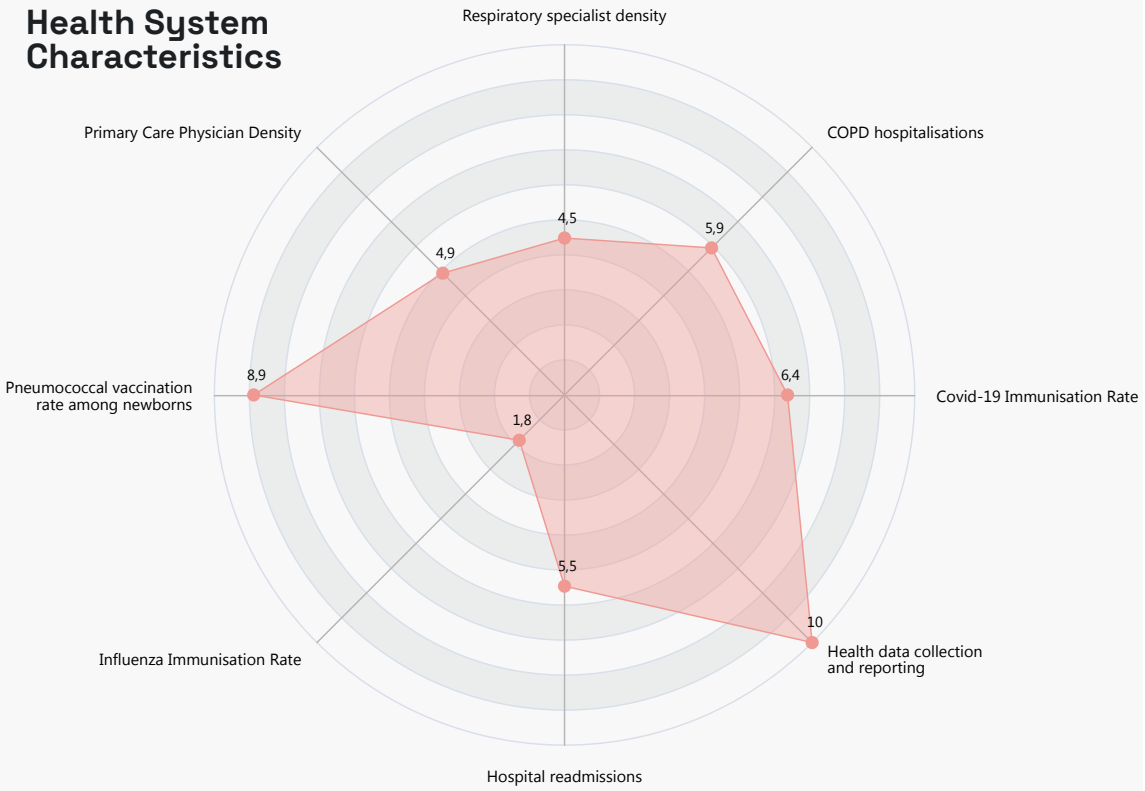
Policy Context



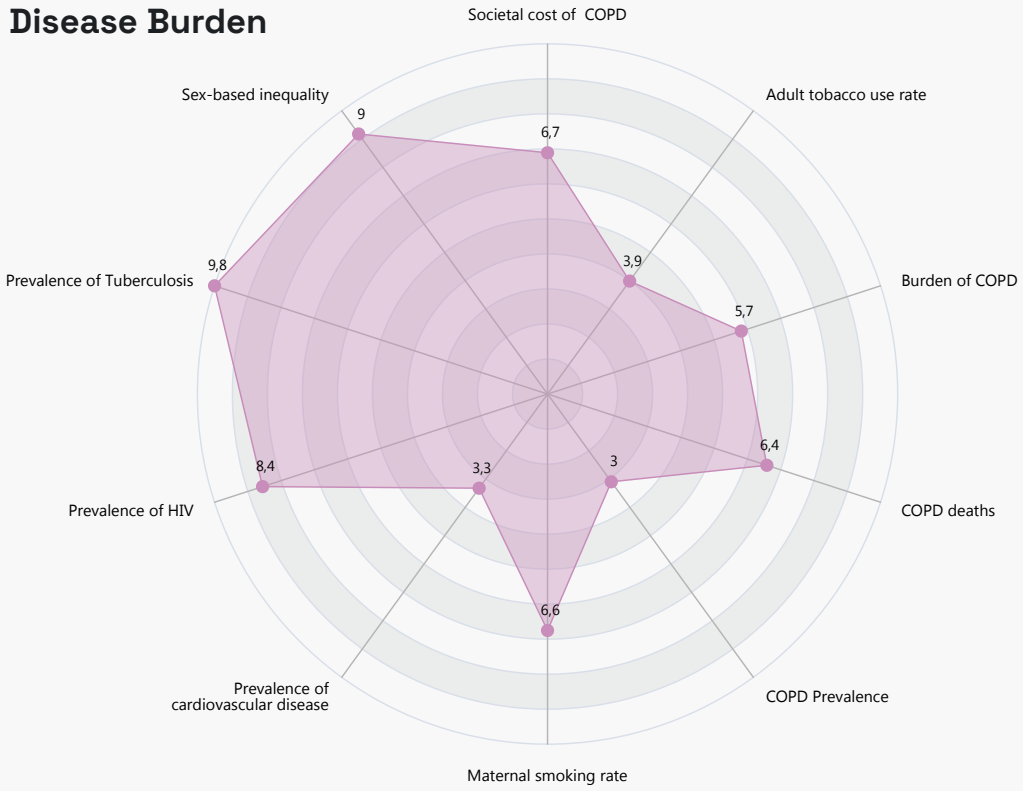
Access and Care Coverage

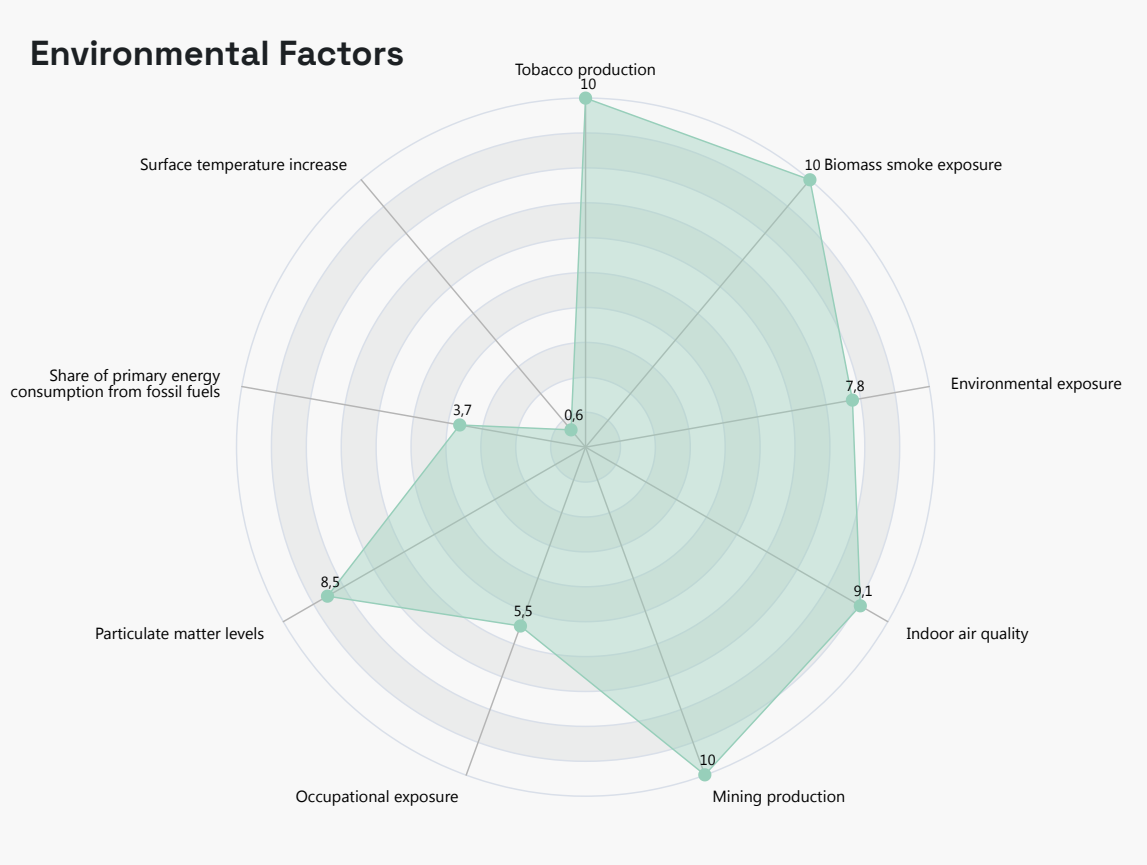


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
Indoor air quality
Mining production
Occupational exposure
Particulate matter levels
Share of primary energy consumption from fossil fuels
Surface temperature increase
0,6
7,8
9,1
10
5,5
8,5
3,7

Belgium

Belgium's score in the Access and Care Coverage category is among the lowest, with gaps in care referral pathways and conditions for COPD diagnosis, but highly accessible universal health care coverage, treatment, and drug access. Belgium's score in the Disease Burden category is below the average, with relatively high COPD death and prevalence rates and a marginally below-average rate of tobacco use. Belgium scores relatively low in the Policy Context category, due to a lack of COPD guidelines and national strategy for COPD. Belgium presents an above-average score in the Health System Characteristics category, with good quality health care data and reporting, and average number of respiratory specialists. Belgium also scores above average in the Environmental Factors category, with relatively low particulate matter levels.

Country Score
55.9

Rank
31

COPD Death Rate (% of all deaths)
5.3%

Smoking Rate (%)
23.4%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,044

KEY TAKEAWAYS

- Despite highly accessible universal health care, there are high unmet needs for COPD diagnosis and care
- Lack of policy and guidelines despite a relatively high burden of COPD
- Above-average performance in the Health System Characteristics category

Insights

Challenges

- Delayed diagnosis, especially due to lack of spirometry in primary care
- General lack of awareness of COPD
- Inadequate epidemiological data to support the management of COPD

Opportunities

- Increase early detection through more integrated care and screening
- Improve focus on patient empowerment in nurse-led COPD clinics

Priorities

- Increase access to spirometry
- Focus on strategies to improve adherence to guidelines and patient adherence to treatment
- Development of more integrated care

Best practices in COPD care

- Easily available and accessible smoking cessation counsellors
- Reimbursement of pulmonary rehabilitation in primary care for severe patients
- Good availability of pharmaceuticals and tertiary care treatments

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "Late diagnosis of COPD [is a challenge]. This is related to the fact that spirometry is still not utilised enough by GPs, even if patients present with chronic respiratory symptoms or recurrent infections, and the awareness of COPD is still too low in general population."

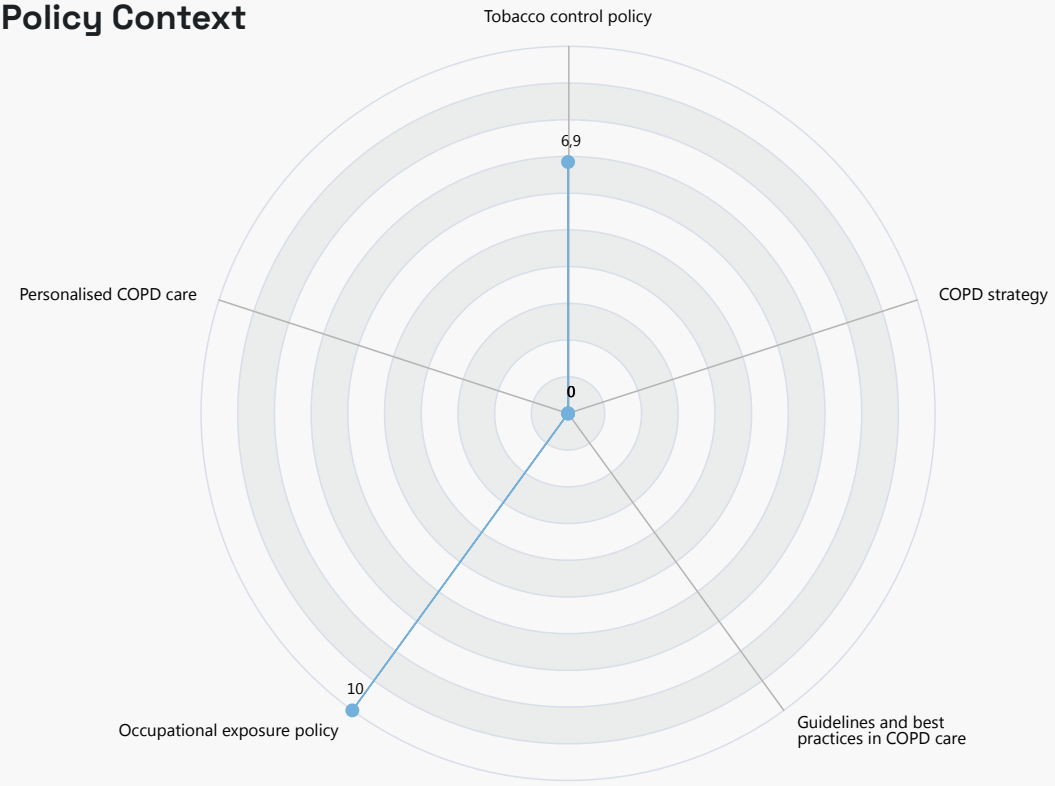
> "[There are] problems related to inhaled medications: Compliance of use of inhaler medications from pharmacies is not visible for physicians and inhaler technique is not reimbursed for hospitals and hence often not checked. No COPD nurses are available as financial system does not encourage this, hence not enough focus on patient education."

> "There is no nationwide epidemiological data on COPD prevalence and management available."

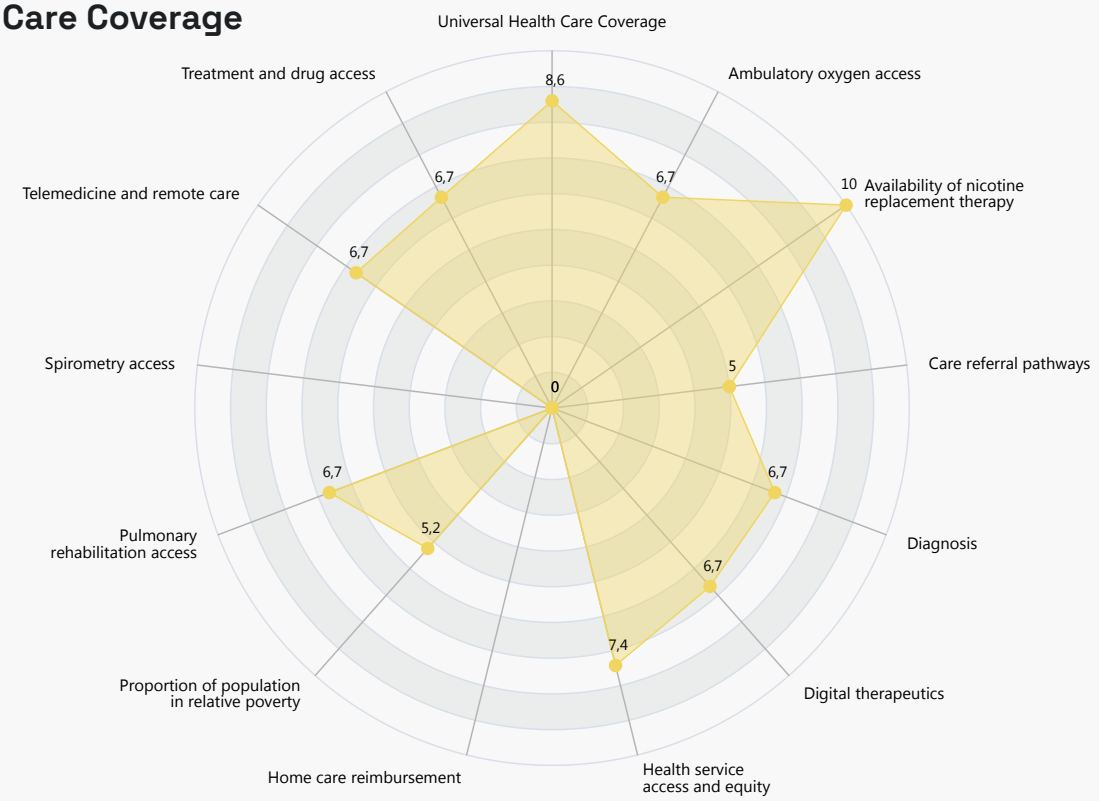
Resources

Please scan this QR code to view the sources.

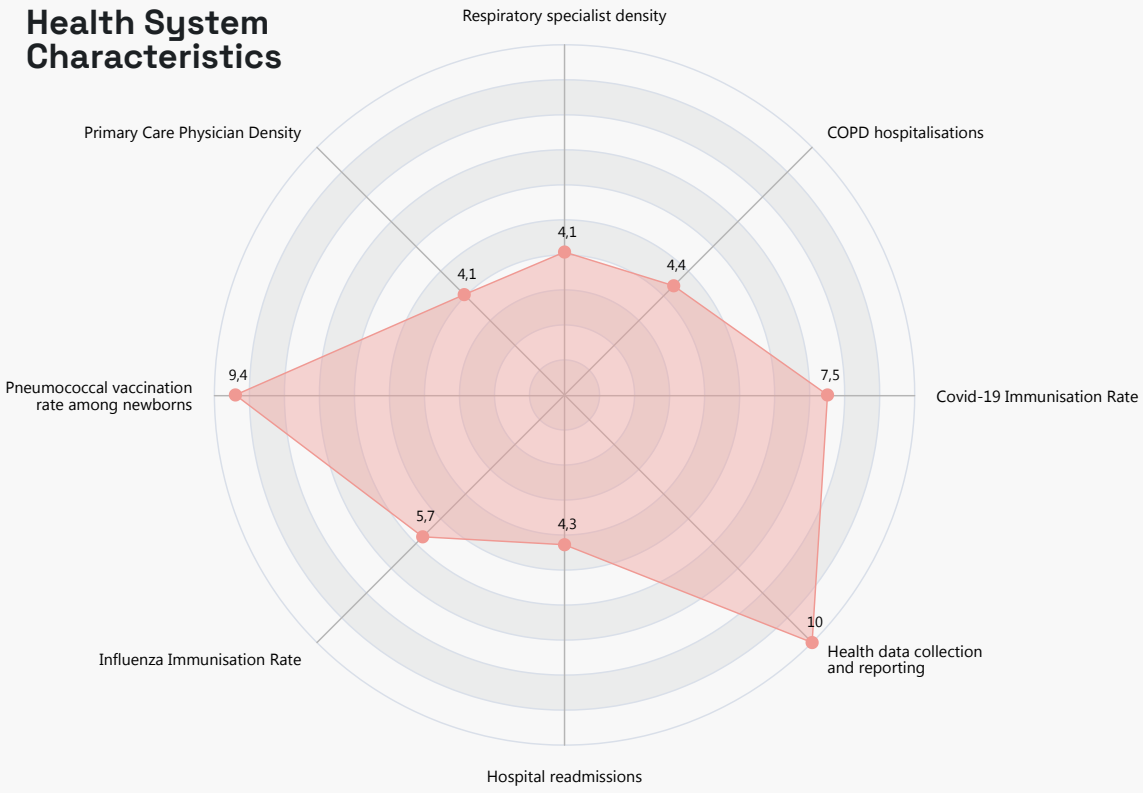
Policy Context



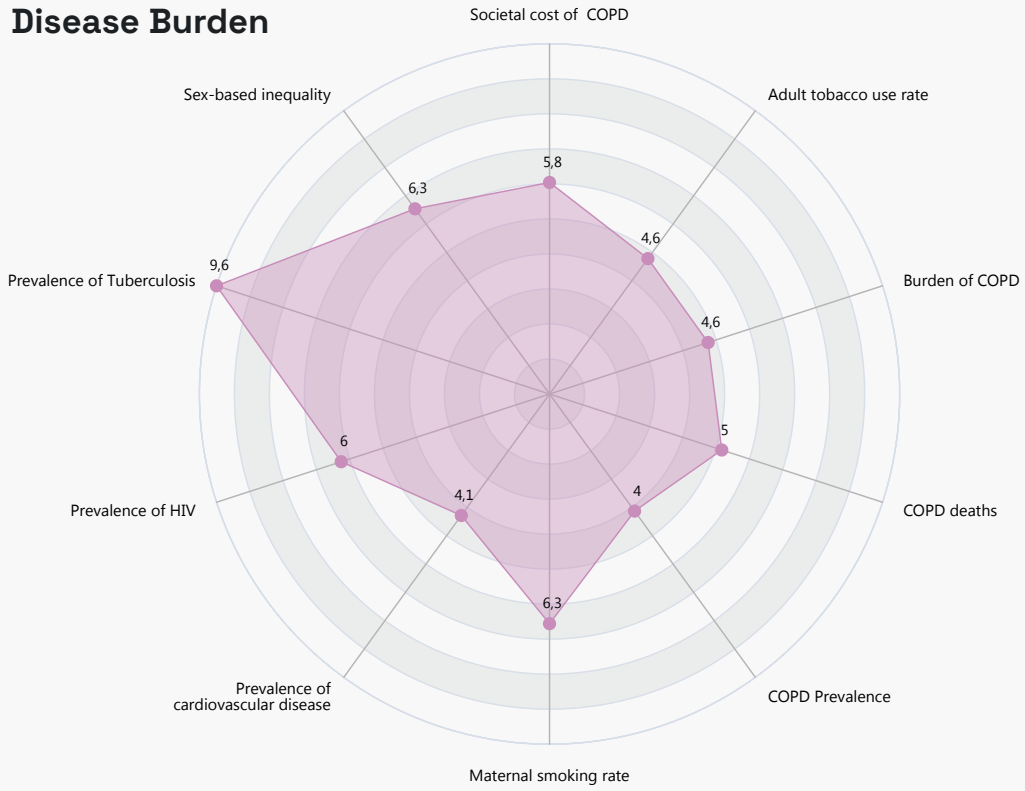
Access and Care Coverage

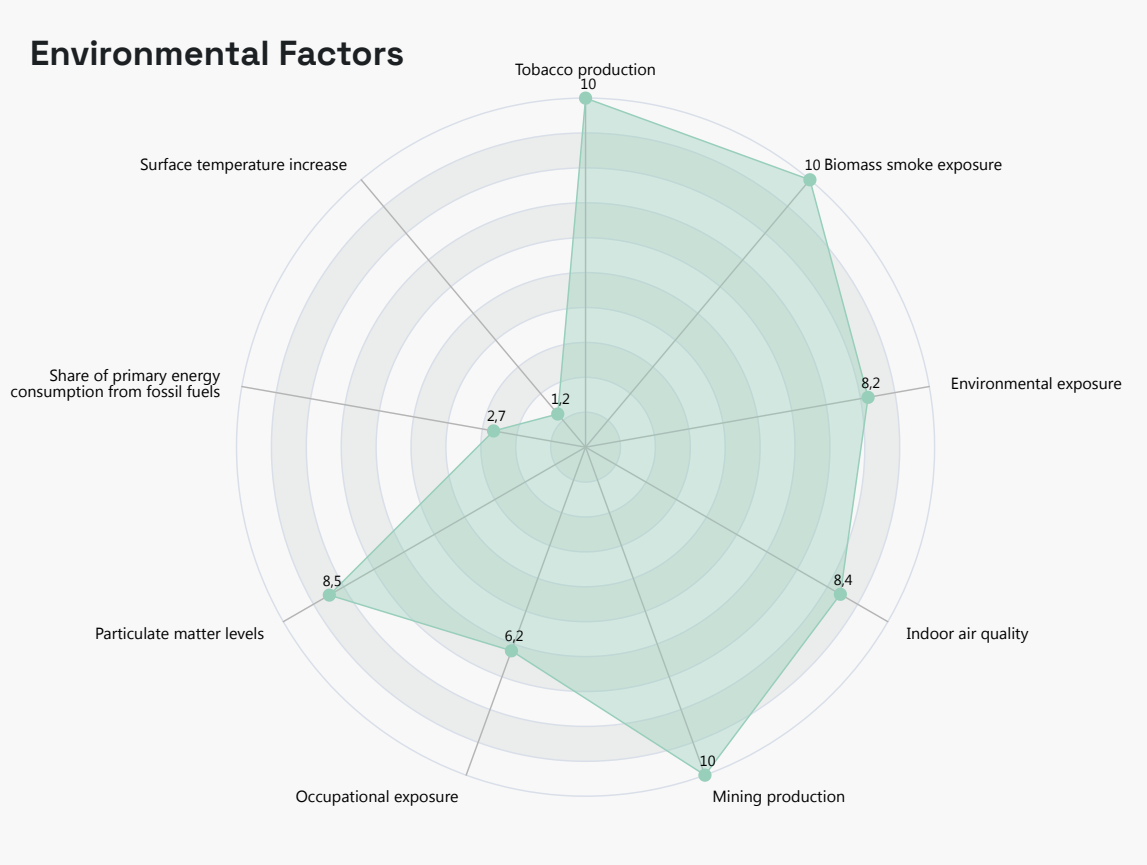


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,2
Indoor air quality
8,4
Mining production
10
Occupational exposure
6,2
Particulate matter levels
8,5
Share of primary energy consumption from fossil fuels
2,7
Surface temperature increase
1,2

Brazil

Brazil presents one of the lowest disease burdens of COPD, with the lowest estimated societal cost of COPD in the Index. However, this may be partly explained by high levels of underdiagnosis. Brazil presents a low score in the Environmental Factors category, most notably due to high levels of occupational exposure to COPD risk factors. Brazil has a slightly below-average score in the Health System Characteristics category, mostly due to a lack of primary care physicians. Brazil's score for Access and Care Coverage is among the lowest, with comparatively good conditions for access to telemedicine, but low access to diagnostic services, treatment and drugs, and home care services. It should be noted that Brazil's vast size reduces the generalisability of the country results, as there are significant urban-rural divides across the country.

Country Score
63.6

Rank
21

COPD Death Rate (% of all deaths)
3.5%

Smoking Rate (%)
12.8%

Estimated Societal Cost of COPD per capita (2017 INT$)
$113

KEY TAKEAWAYS

- Relatively good conditions for access to telemedicine, but there remain significant gaps in access to and coverage for COPD diagnosis and care
- COPD care and management could be improved by further implementing its COPD plan and strengthening adherence to COPD guidelines
- 3rd lowest burden of disease for COPD, with the lowest estimated societal costs from 2020-2050 potentially due to high levels of underdiagnosis

Insights

Challenges

- Lack of COPD awareness, education, and training among health care professionals
- Lack of access to medicines
- High rates of underdiagnosis

Opportunities

- Increase support for a national smoking cessation program
- Capacity building in primary care

Priorities

- Increase COPD guidelines and policy implementation
- Improve access to diagnosis and treatment

Best practices in COPD care

- COPD prevention, diagnosis and management based on GOLD recommendations
- Specialised secondary or tertiary care centres with full access to COPD diagnosis and treatment services

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "The COPD prevalence in our province (7 million) is 9%. Underdiagnosis is 80%. Most of the patients are symptomatic. Management has improved with marked decrease in hospital admissions in the last 10 years."

> "[It is a challenge that] ... We do not have an engaged public respiratory health system to achieve early diagnosis of COPD by spirometry for all heterogeneity inside of the country and the lack of knowledge of primary care professionals about the disease."

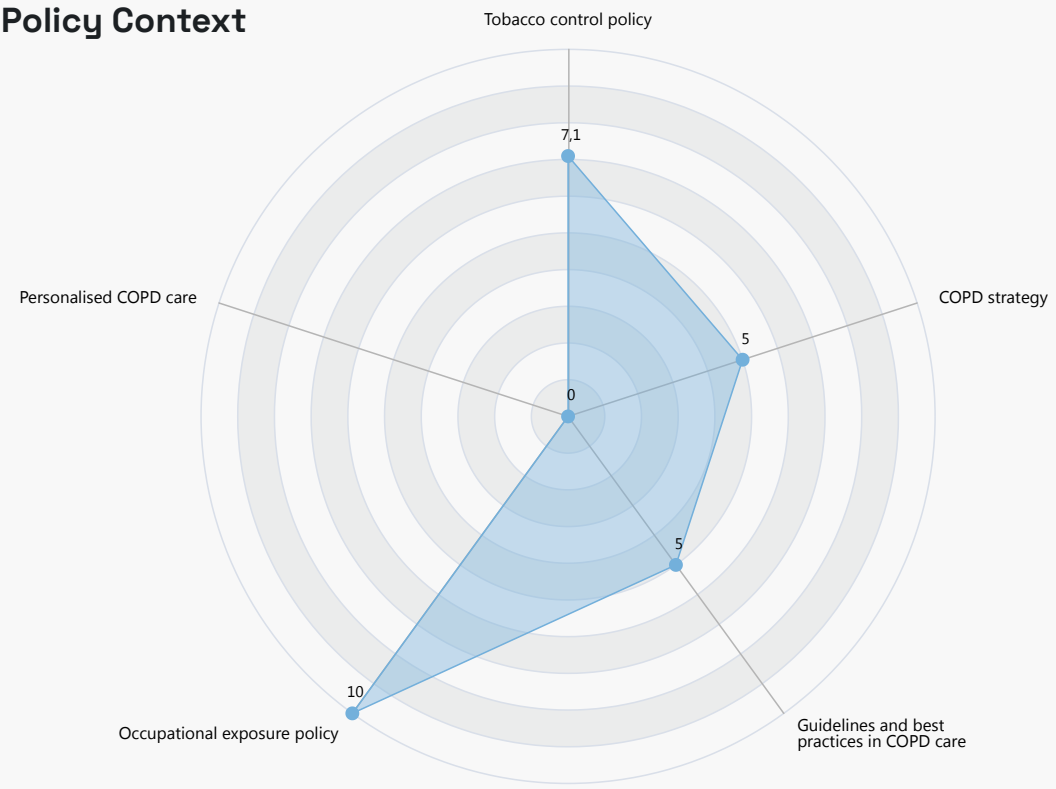
> "[The] COVID-19 pandemic brought light to lungs ... In 2021, the publication of new COPD recommendation from national government was released, but we don't have the implementation..."

> "We now have dual BD therapy available for more severe patients, and vast majority of COPD patients. Vaccination is increasing. Smoking has decreased over the years. Pollution is still marked in some areas."

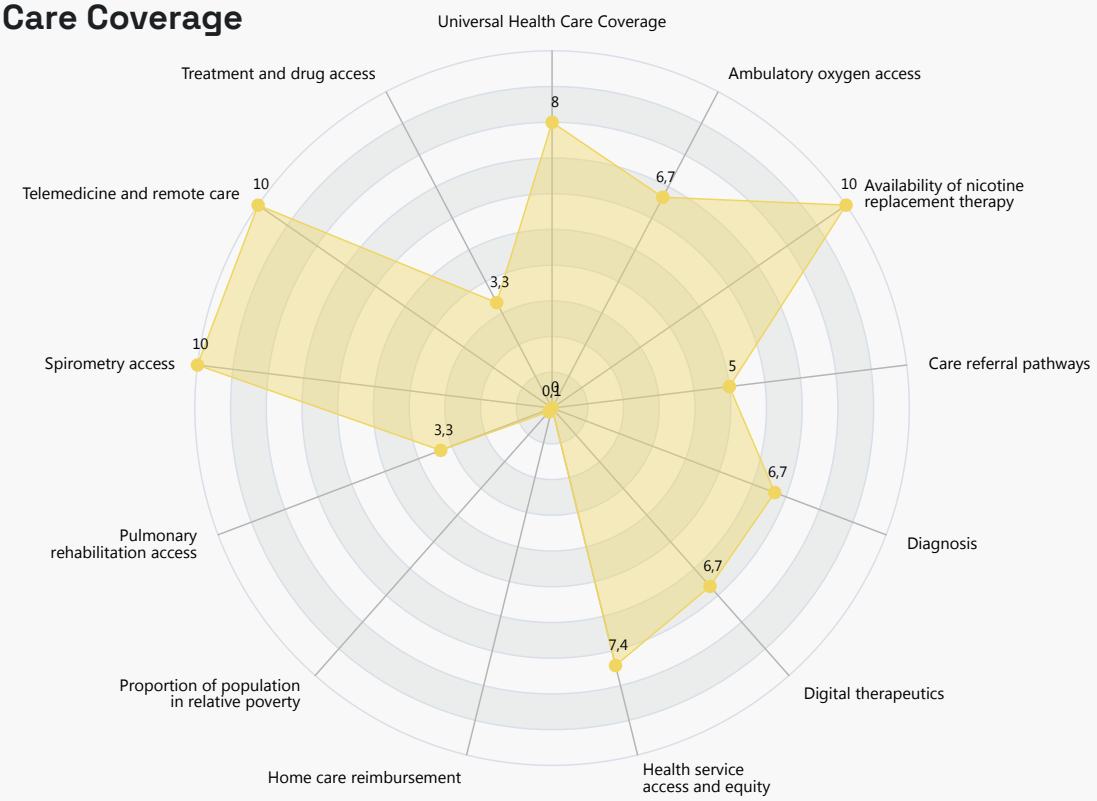
Resources

Please scan this QR code to view the sources.

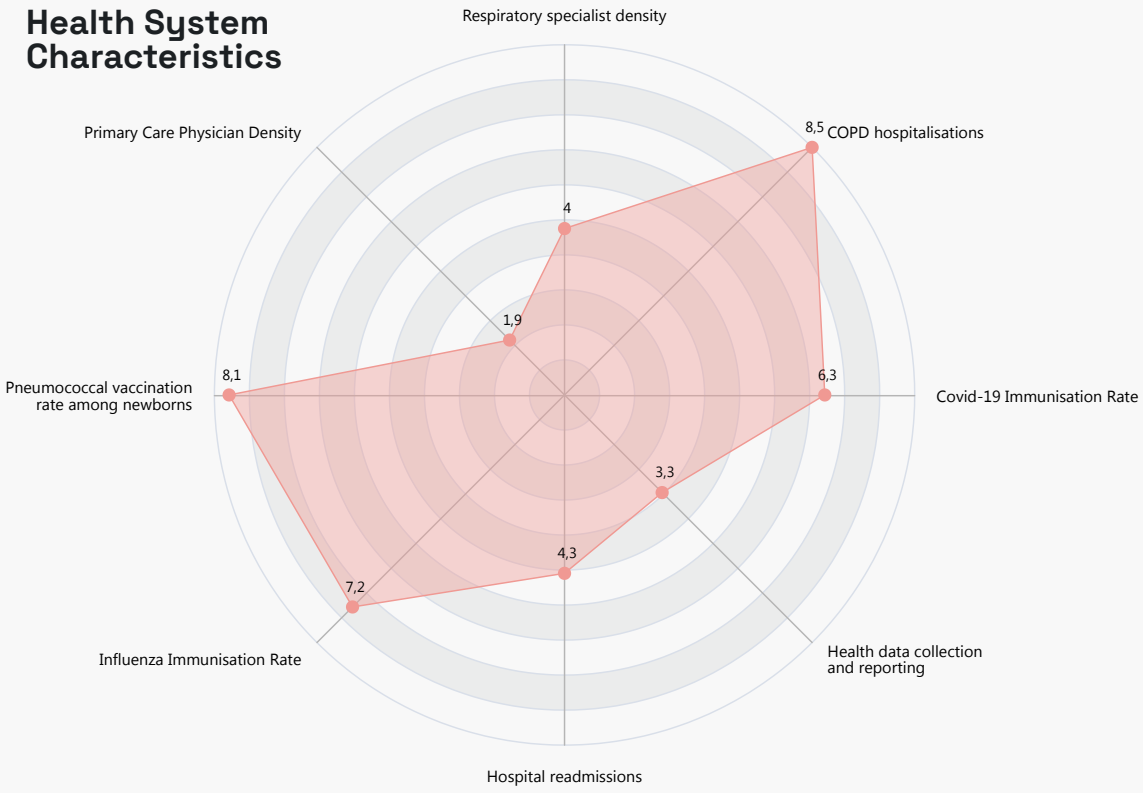
Policy Context



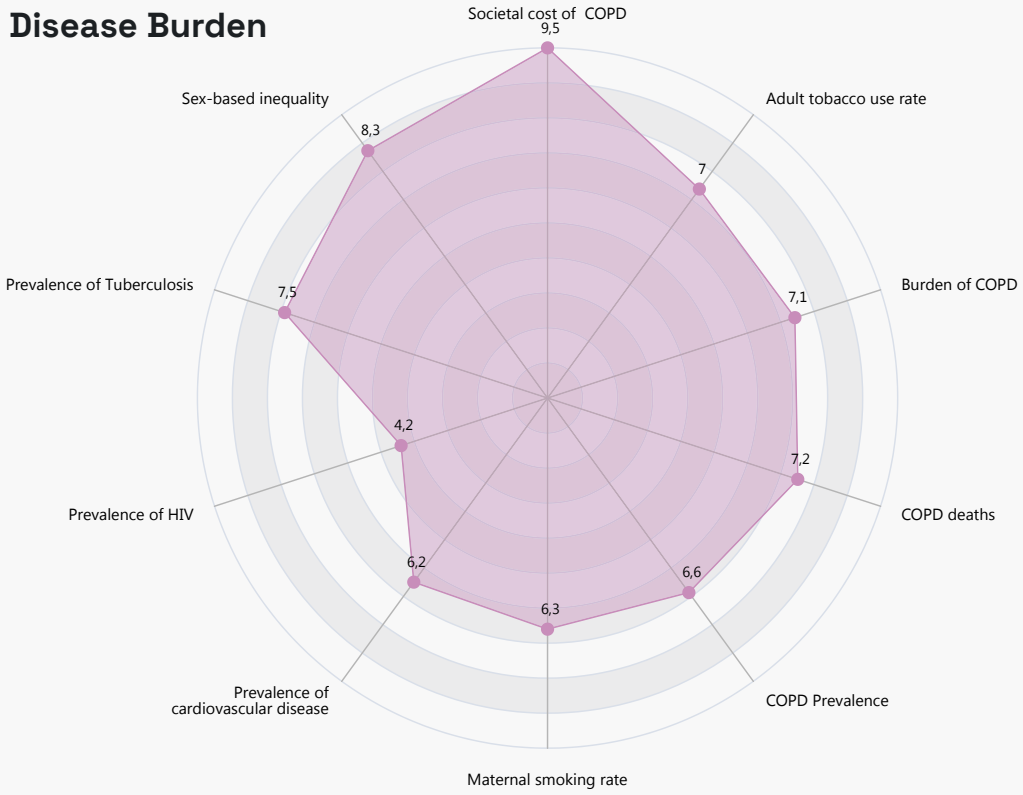
Access and Care Coverage



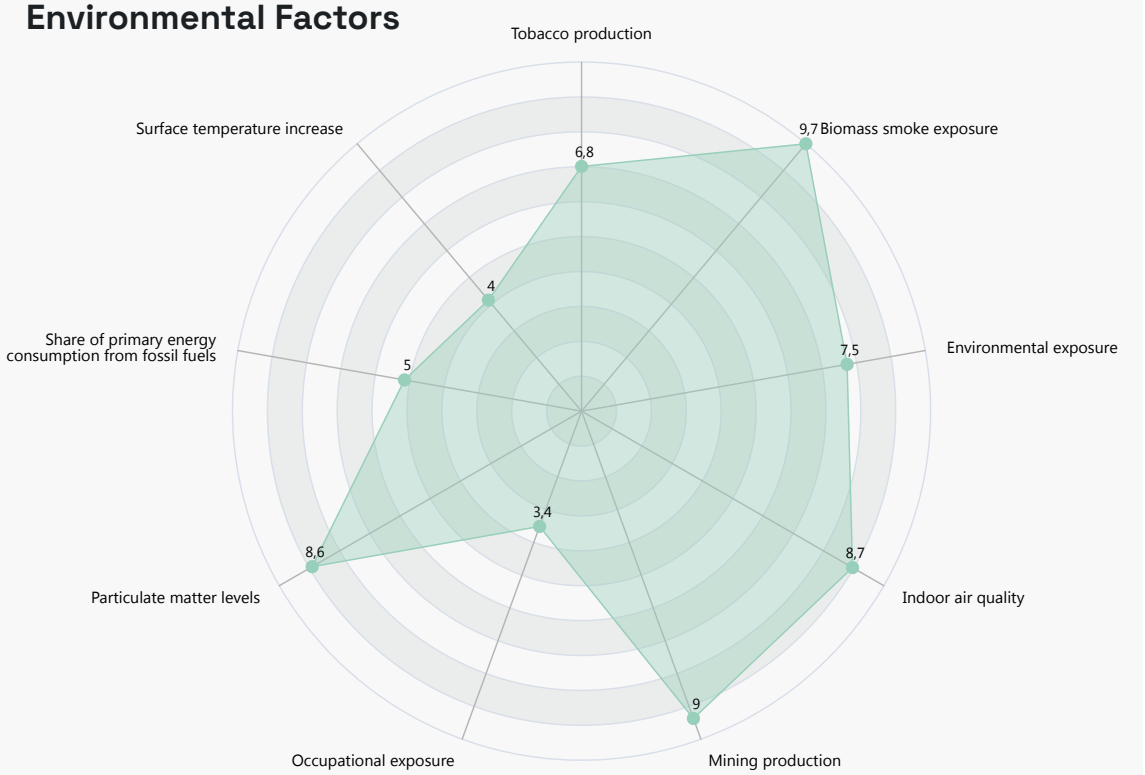
Health System Characteristics



Disease Burden



Environmental Factors



Canada

Canada scores significantly above average in the Policy Context category, with strong tobacco control policies and relatively strong COPD care guidelines and practices. Canada's performance in the Environmental Factors category is also above average, with good outdoor air quality, but some notable occupational exposure to COPD risk factors. Canada scores slightly below average in the Health System Characteristics category, mainly due to a low number of respiratory specialists, but also a relatively high number of COPD hospitalisations. Conversely, Canada's score in Access and Care Coverage is above average, with the highest level of Universal Health Care Service Coverage, but weak conditions for access to telemedicine and digital therapeutics, as well as weaker than average care referral pathways.

Country Score
65.6

Rank
11

COPD Death Rate (% of all deaths)
4.9%

Smoking Rate (%)
20.9%

Estimated Societal Cost of COPD per capita (2017 INT$)
$848

KEY TAKEAWAYS

- Strong tobacco control policies, a key to reducing the burden of COPD
- There is a relatively low number of respiratory specialists
- Gaps in access to COPD care, but the highest level of Universal Health Care Service Coverage

Insights

Challenges

- Lack of awareness of COPD
- Access to spirometry is limited
- Pulmonary rehabilitation is underutilised

Opportunities

- Increase support for specialist respiratory clinics
- Leverage the Canadian Thoracic Society's COPD guidelines to improve care and medication access

Priorities

- Increase COPD awareness
- Support improved access to primary care
- Health care capacity building for COPD

Best practices in COPD care

- Strong anti-smoking legislation
- Excellent national COPD guidelines
- Comprehensive case-management

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "Universal access to spirometry testing and interpretation should be a priority."

> "All multi-practice clinics should have a Respiratory Educator on staff to assist GPs in administering spirometry to any current or former smokers."

> "Lung function testing (CT, X-ray, etc.) should be promoted for all people over 50 who have ever smoked or work in toxic (polluted) environments (i.e., welders, firefighters, etc.). The attitude toward these lung/health tests should be similar to the promotion of colonoscopy screening for men over 50 or for breast cancer screening for women."

> "Simple COPD guidelines are widely known to physicians, and they are not fully implemented in practice."

Resources

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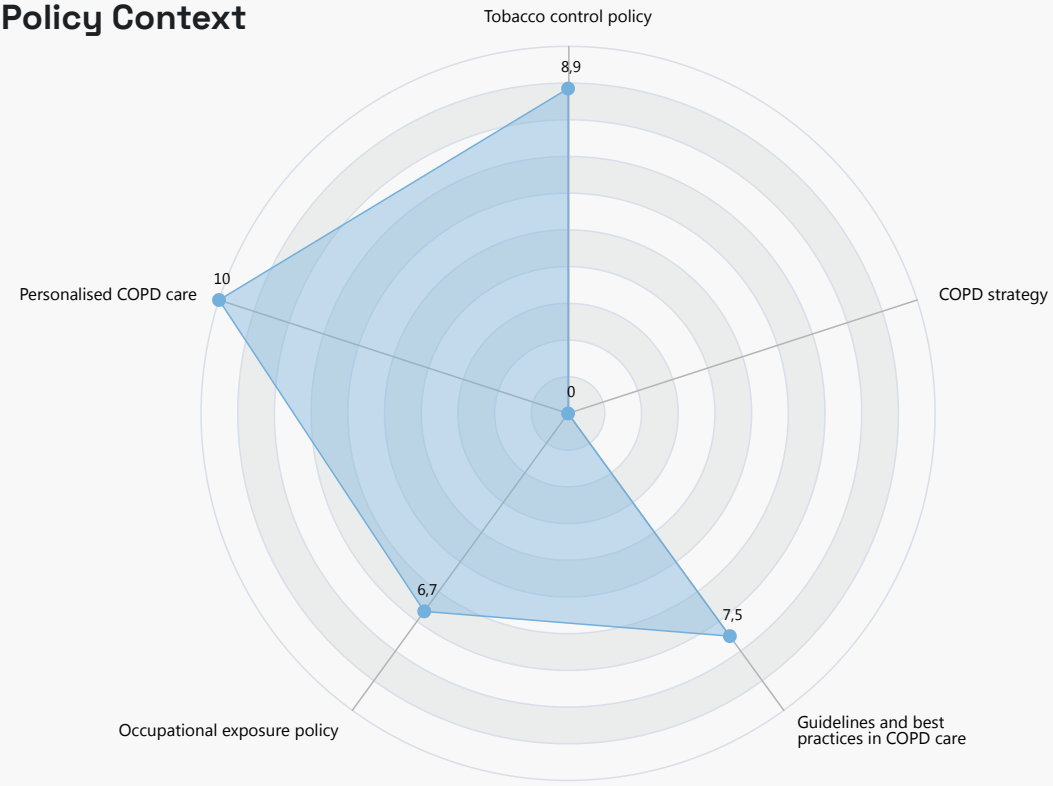
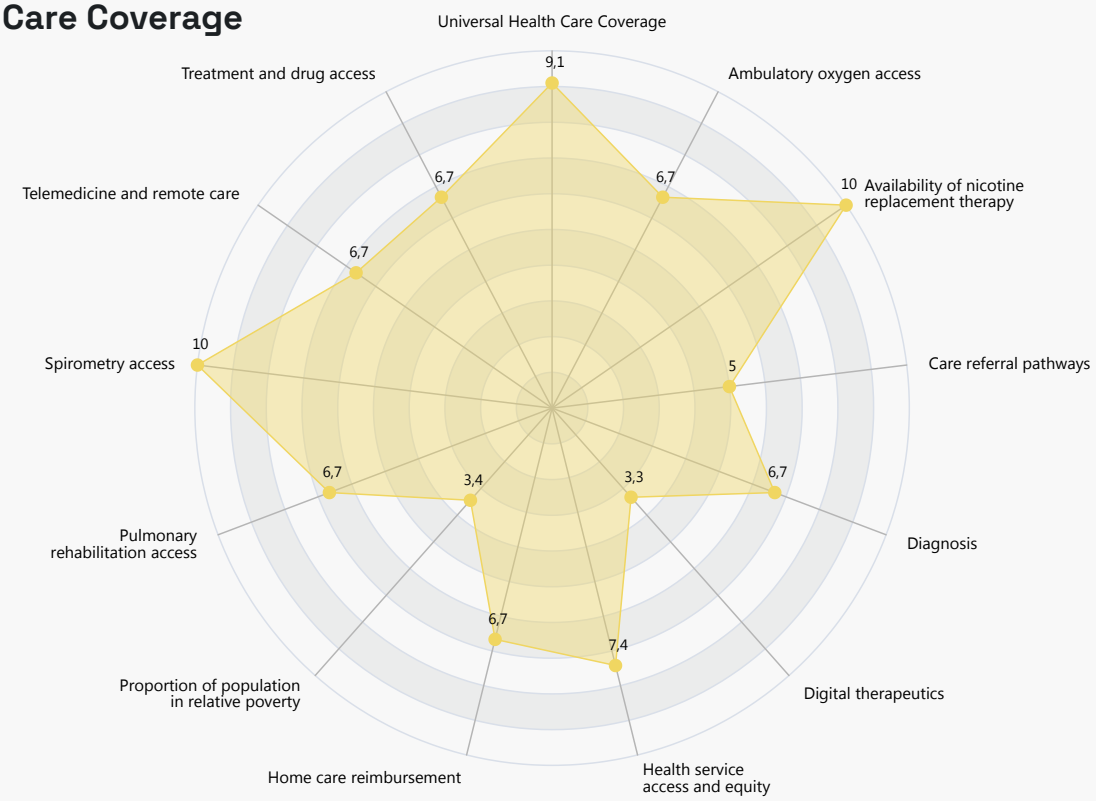
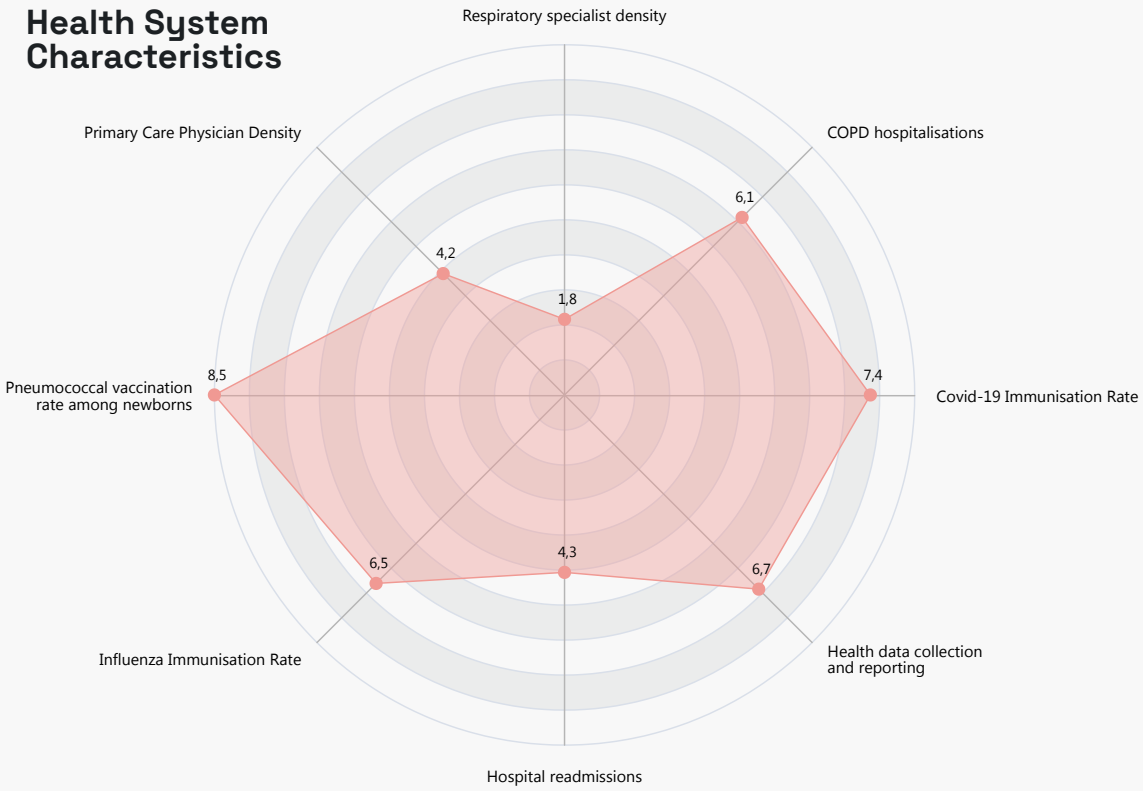
Policy Context



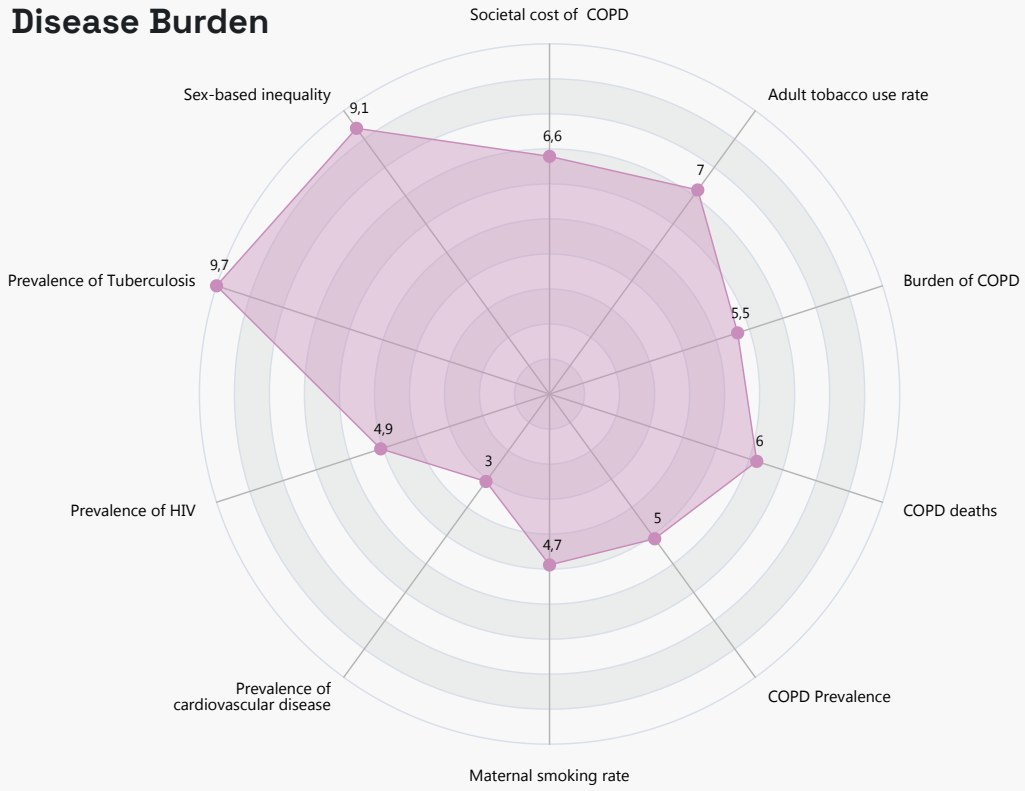
Access and Care Coverage

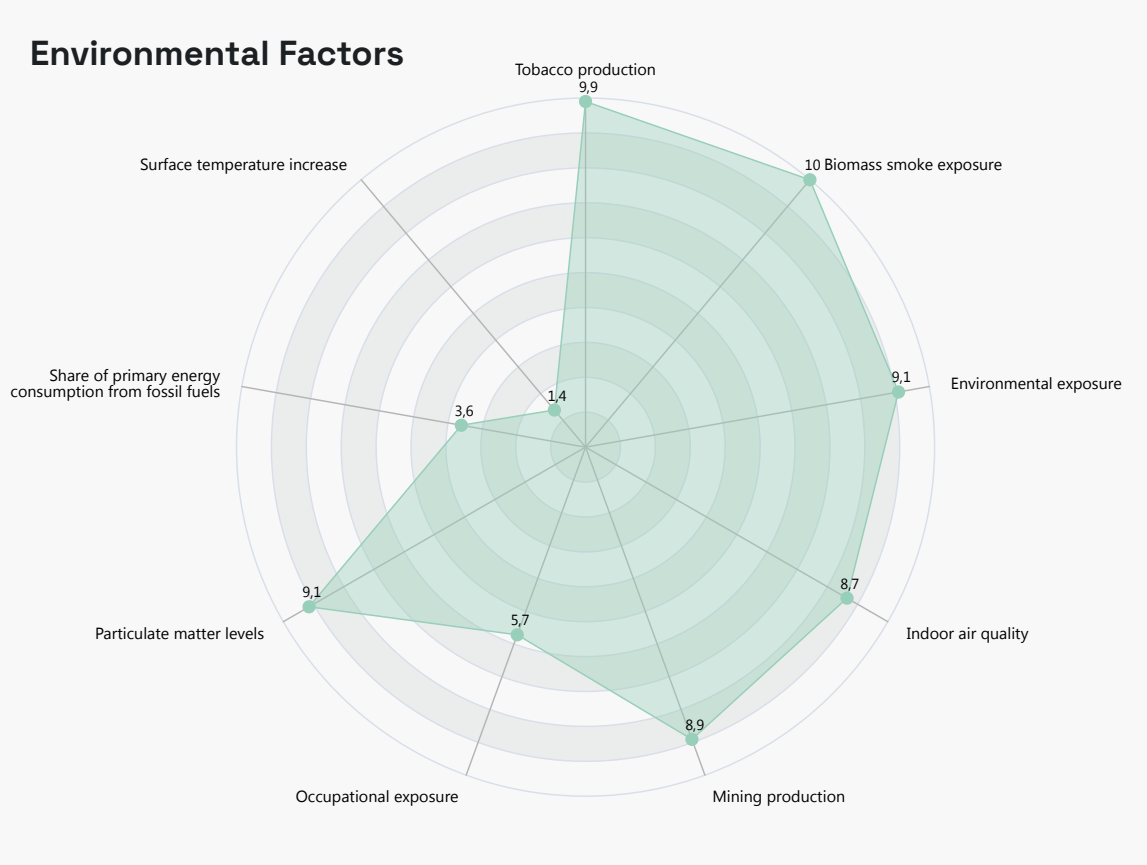


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
9,9
10 Biomass smoke exposure
Environmental exposure
9,1
Indoor air quality
8,7
Mining production
8,9
Occupational exposure
5,7
Particulate matter levels
9,1
Share of primary energy consumption from fossil fuels
3,6
Surface temperature increase
1,4

China

China scores relatively high in the Policy Context category due to a strong national COPD strategy. However, China is among the lowest scorers in the Tobacco Control Policy indicator. China scores highly in the Health System Characteristics category, which is due to its low 365-day readmission rate for COPD. China reports the fifth lowest score in the Disease Burden category, which is characterised by the highest COPD death rate, the highest rate of disability-adjusted life years attributable to COPD, very high sex-based inequality in COPD burden, and a high rate of tobacco use. Moreover, China has the lowest score in the Access and Care Coverage category, mainly due to a lack of diagnosis, treatment, and drug access, despite strong care referral pathways. China also reports the lowest score in the Environmental Factors category, which is primarily explained by the highest level of occupational exposure to COPD risk factors, high particulate matter levels, and exposure to biomass smoke. It should be noted that China's vast size reduces the generalisability of the country results as there are significant urban-rural divides across the country.

Country Score
51.2

Rank
33

COPD Death Rate (% of all deaths)
11.0%

Smoking Rate (%)
25.6%

Estimated Societal Cost of COPD per capita (2017 INT$)
$942

KEY TAKEAWAYS

- Strong Policy Context and Health System Characteristics
- There is very little access to COPD diagnosis and management services
- Highest COPD death rate in the COPD Index

Insights

Challenges

- High smoking rate
- Lack of access to spirometry, which makes early diagnosis and intervention difficult

Opportunities

- Increase public and professional education
- Improve the availability of spirometry

Priorities

- Improve support for tobacco cessation services
- Increase vaccination rates
- Increase availability of pulmonary rehabilitation

Best practices in COPD care

- Affordable medical services

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[Opportunities to improve consist of] ... Promoting an integrated care approach that combines pharmacological treatment, pulmonary rehabilitation, patient education, and self-management support could significantly enhance COPD outcomes. This would require better coordination between health care providers, increased access to medications and pulmonary rehabilitation, and more emphasis on patient empowerment."

Resources

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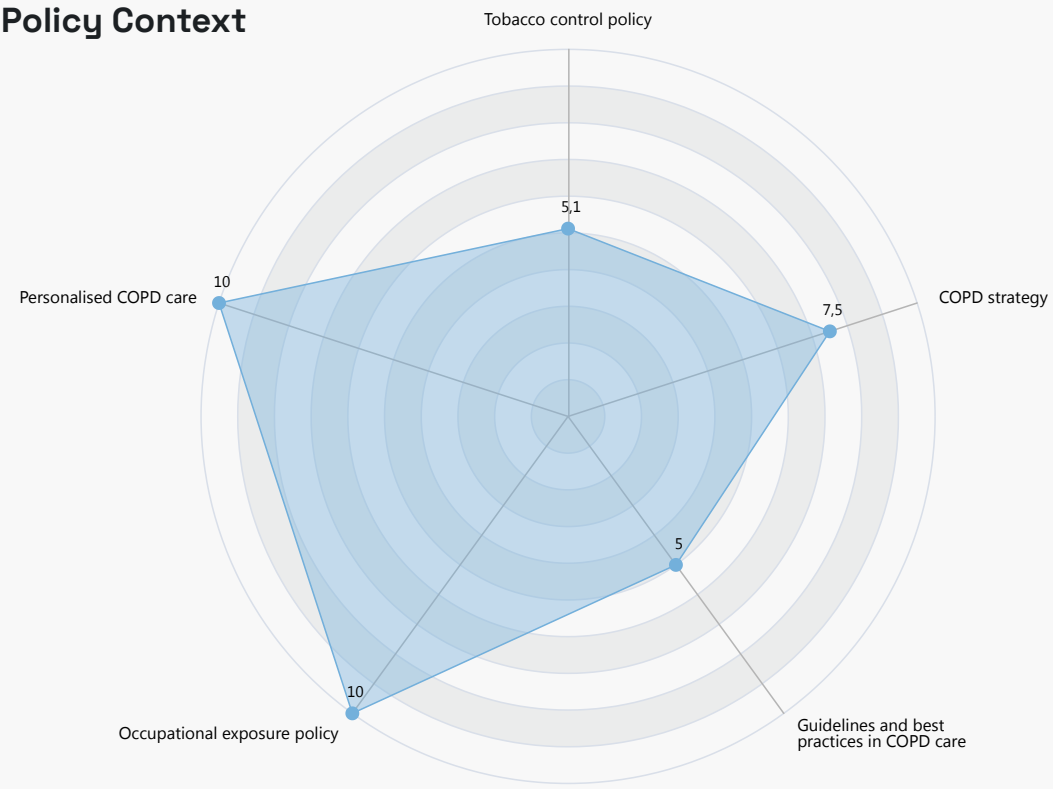
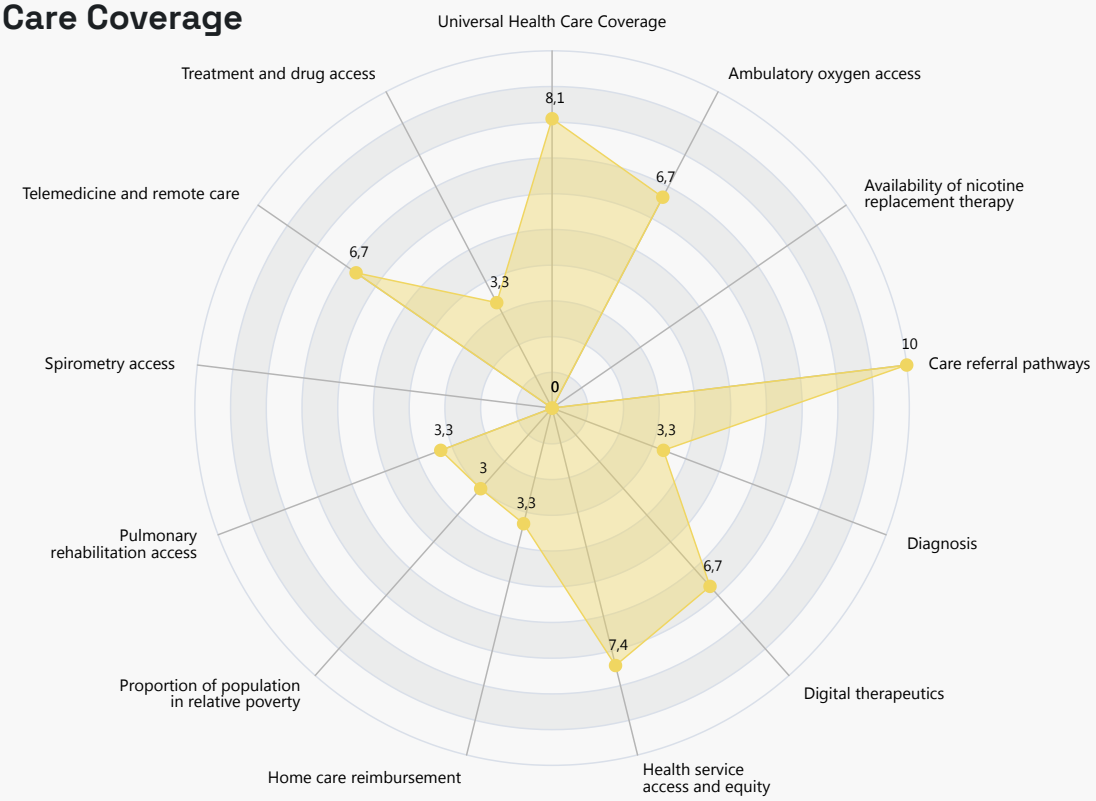
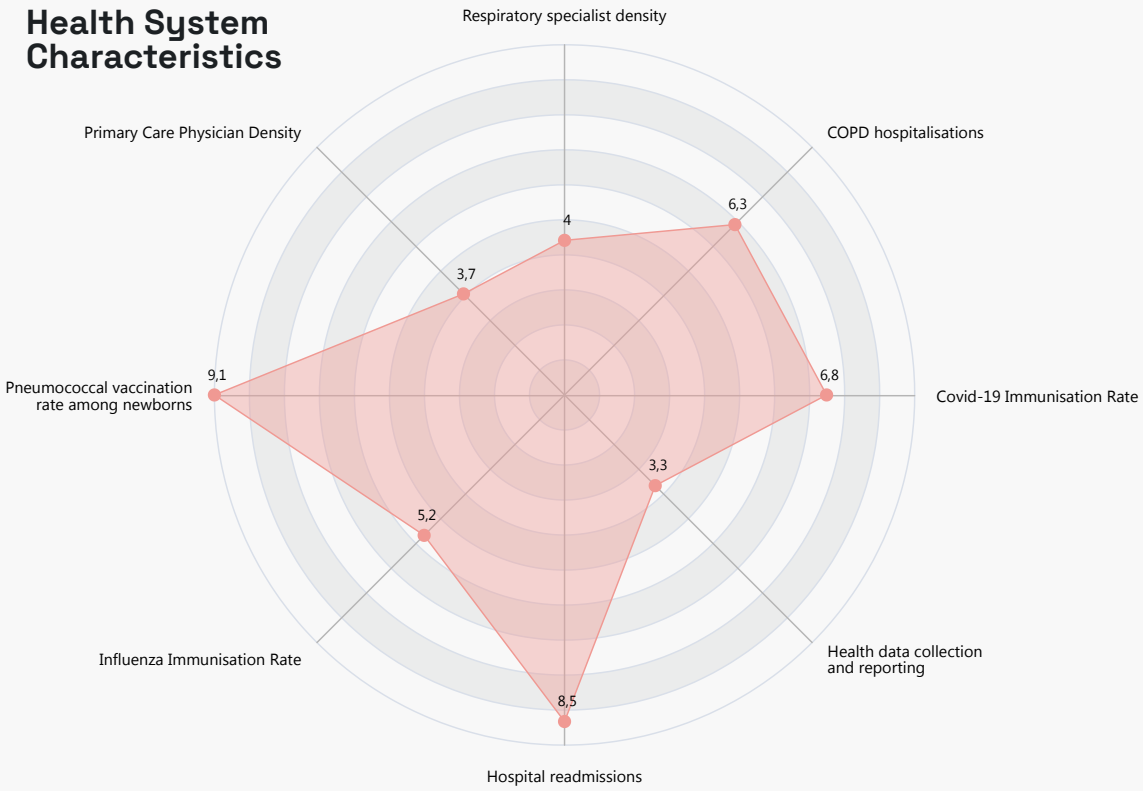
Policy Context



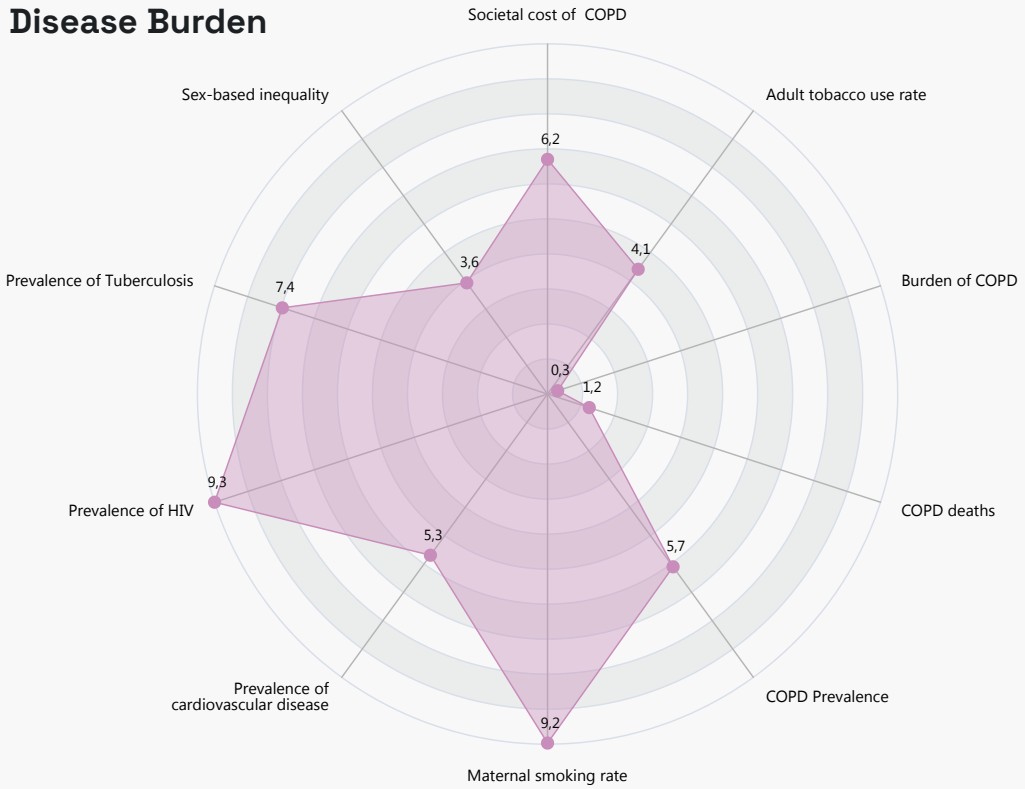
Access and Care Coverage

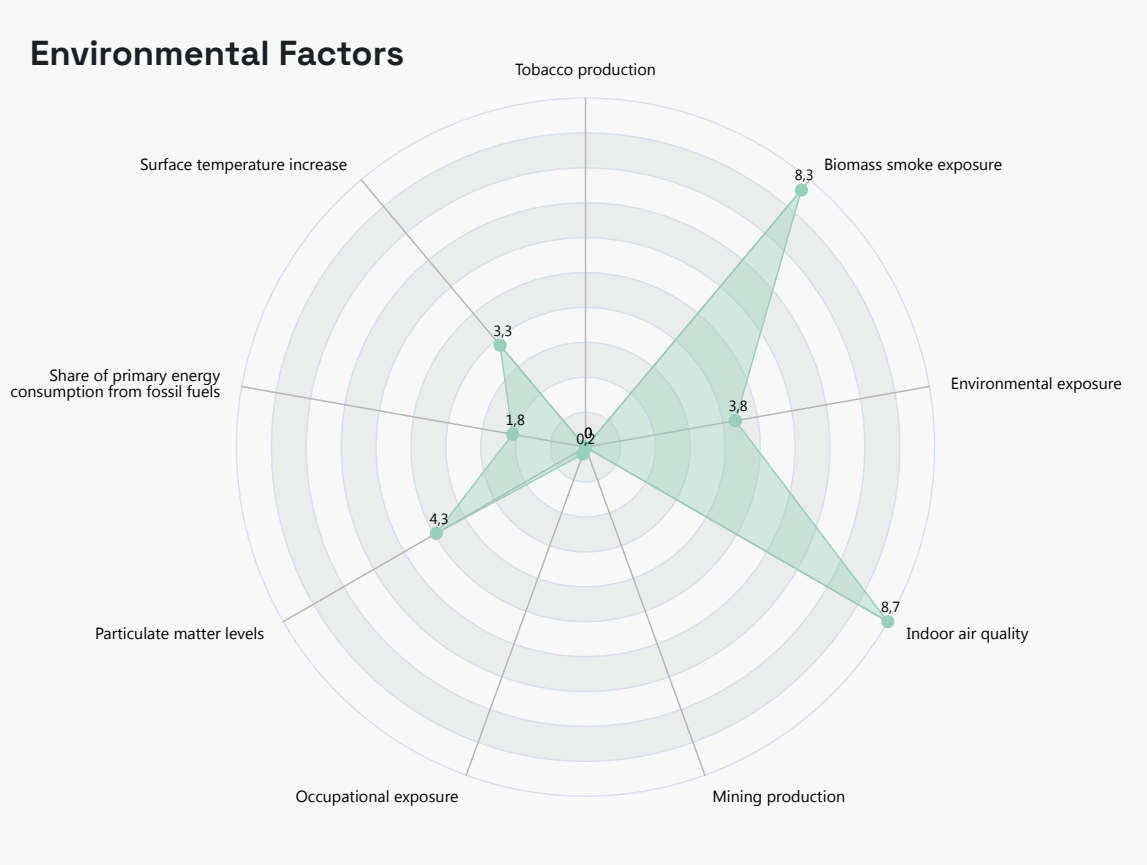


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
Biomass smoke exposure
8,3
Environmental exposure
3,8
Indoor air quality
8,7
Mining production
0,2
Occupational exposure
4,3
Particulate matter levels
1,8
Share of primary energy consumption from fossil fuels
3,3
Surface temperature increase
0

Czechia

Czechia has the 5th highest score in the Access and Care Coverage category, with good conditions for COPD diagnosis, universal health care coverage, and strong care referral pathways. It also scores slightly above average in the Environmental Factors category, with good indoor air quality and relatively low particulate matter levels. However, in the Policy Context category, Czechia reports a below-average score, mainly due to weak adherence to COPD guidelines and the lack of a national strategy for COPD. However, Czechia reports relatively strong tobacco control policies. The disease burden of COPD is relatively high in Czechia, with a high smoking rate as well as a high COPD prevalence and estimated societal cost of COPD. Czechia's score in the Health System Characteristics category is among the lowest due to a lack of health data infrastructure and a low density of primary care physicians.

Country Score
60.8

Rank
26

COPD Death Rate (% of all deaths)
2.8%

Smoking Rate (%)
30.7%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,363

KEY TAKEAWAYS

- Good conditions for COPD diagnosis, universal health care coverage, and strong care referral pathways
- Improvement in COPD guideline adherence and the development of a national strategy for COPD would significantly improve Czechia's score
- Poor conditions for health data collection and reporting

Insights

Challenges

- Only slowly decreasing exposure to cigarette smoke, outdoor air pollution (not meeting current WHO criteria, especially for PM2.5)
- Low COPD awareness among the public
- Significant levels of underdiagnosis and unmet medical needs (very few middle-aged oligosymptomatic persons at risk seek medical attention)

Opportunities

- The planned and upcoming national Lung Health programme, including a case finding approach to the diagnosis of serious respiratory diseases (especially bronchogenic carcinoma and COPD)
- Measures aimed at reducing air pollution and continuing the campaign against active smoking, not only of conventional cigarettes
- An upcoming project aimed at comprehensive training of inhalation techniques among health care professionals and patients

Priorities

- Improve allocation of the health care budget
- Include COPD prevention in the national health care strategy towards 2030
- Support approval of innovative treatments

Best practices in COPD care

- Education of general practitioners and regional specialists
- Cooperation between GPs and respiratory specialists in the functional diagnosis of COPD may be gradually improving
- Information campaign about COPD

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> **"Respiratory specialists (of which there are 600) are the main prescribers of inhaled and oral medication, including the indication of other targeted therapeutic interventions (bronchoscopic interventions, augmentation therapy, surgical lung volume reduction, long-term oxygen, non-invasive ventilation, etc.). General practitioners (of which there are 5,000) have not been very involved in the care of COPD patients so far (there were limitations on reimbursement by health insurance and others)."**

Resources

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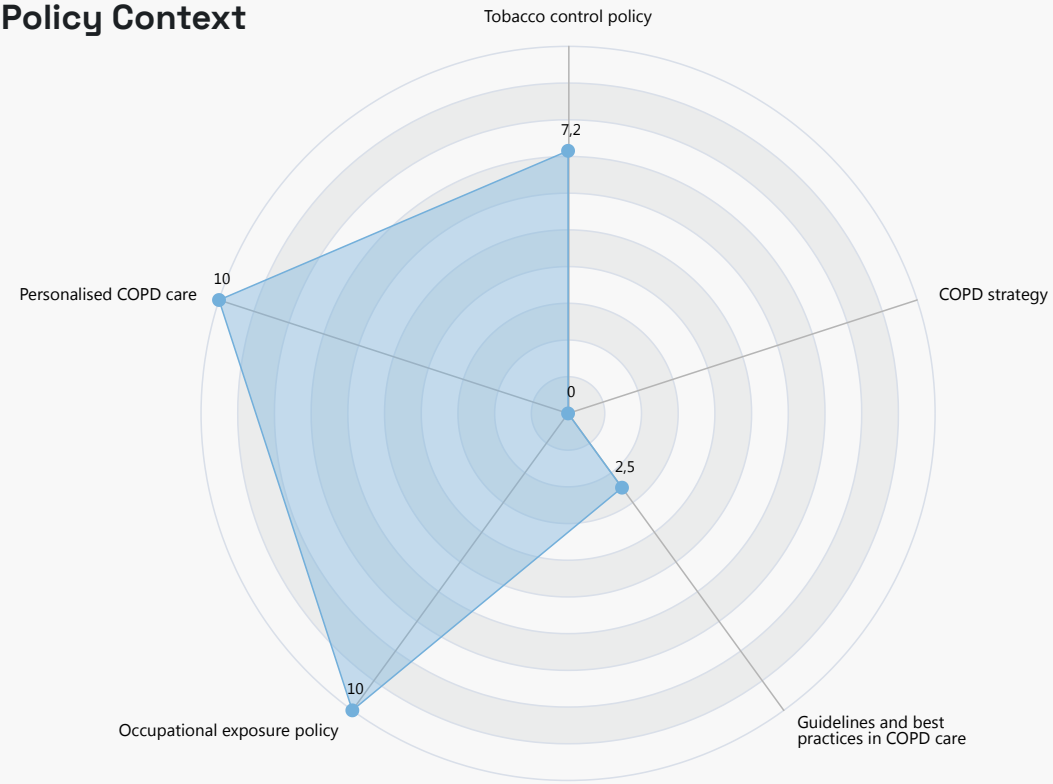
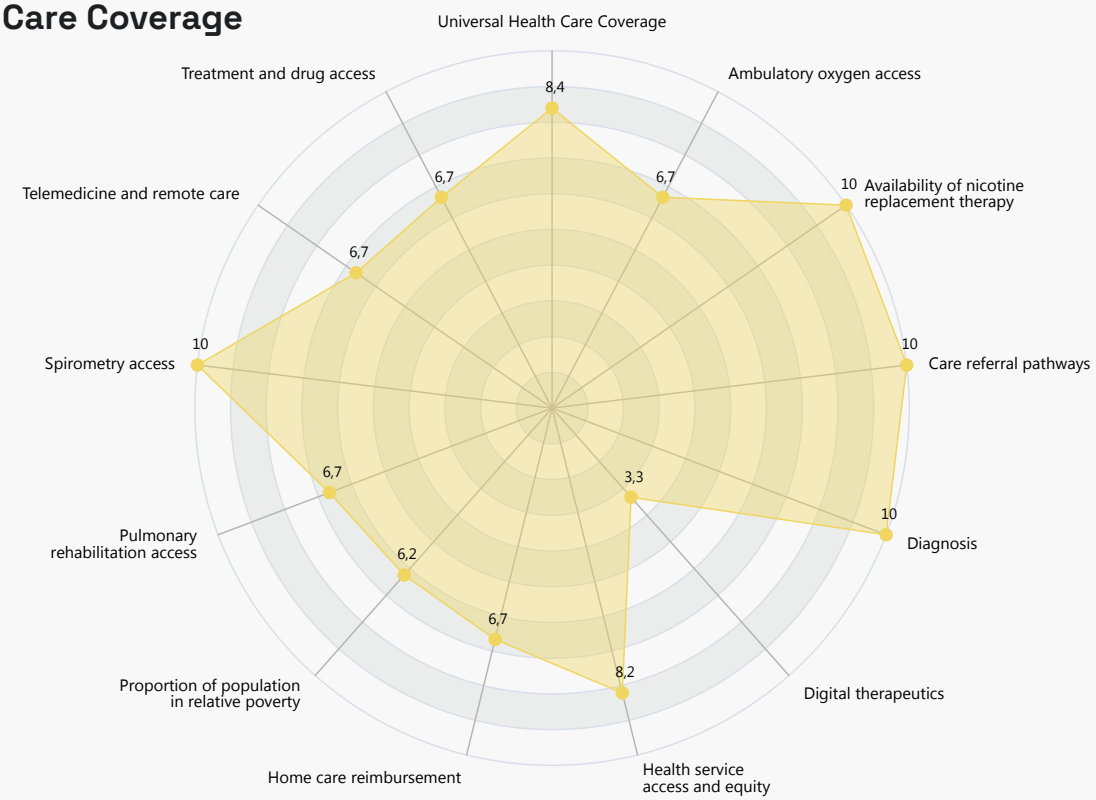
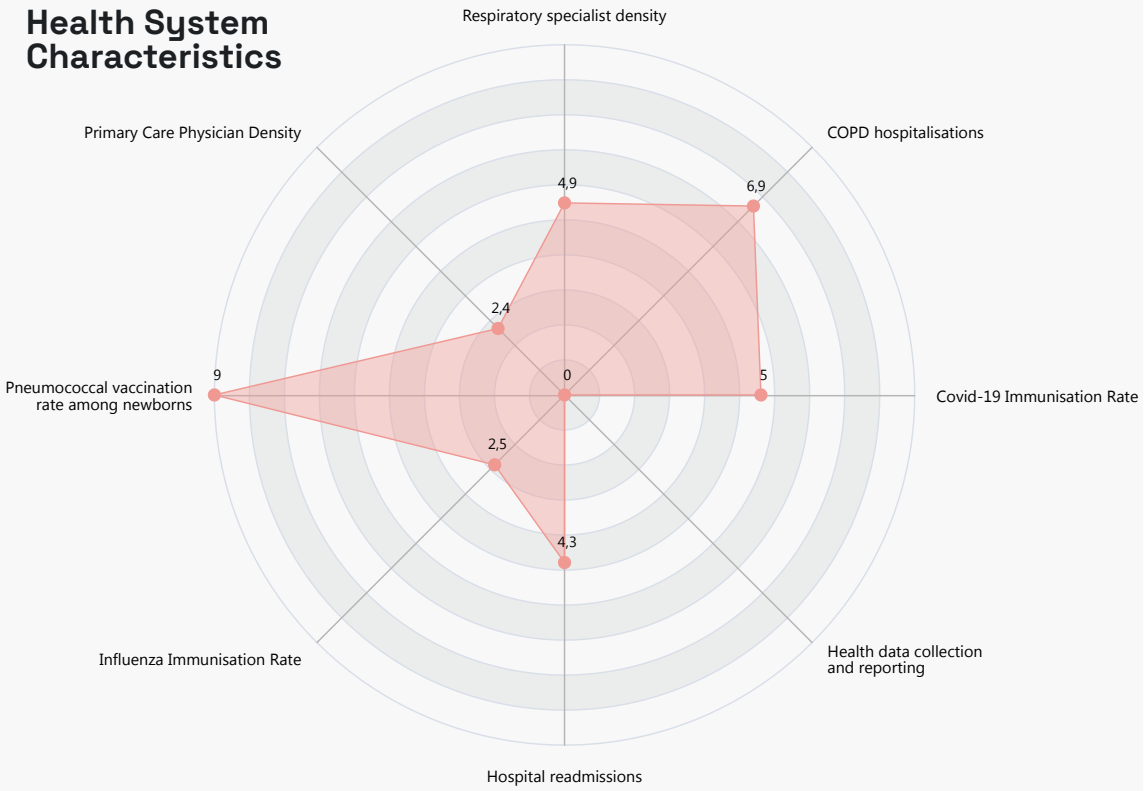
Policy Context



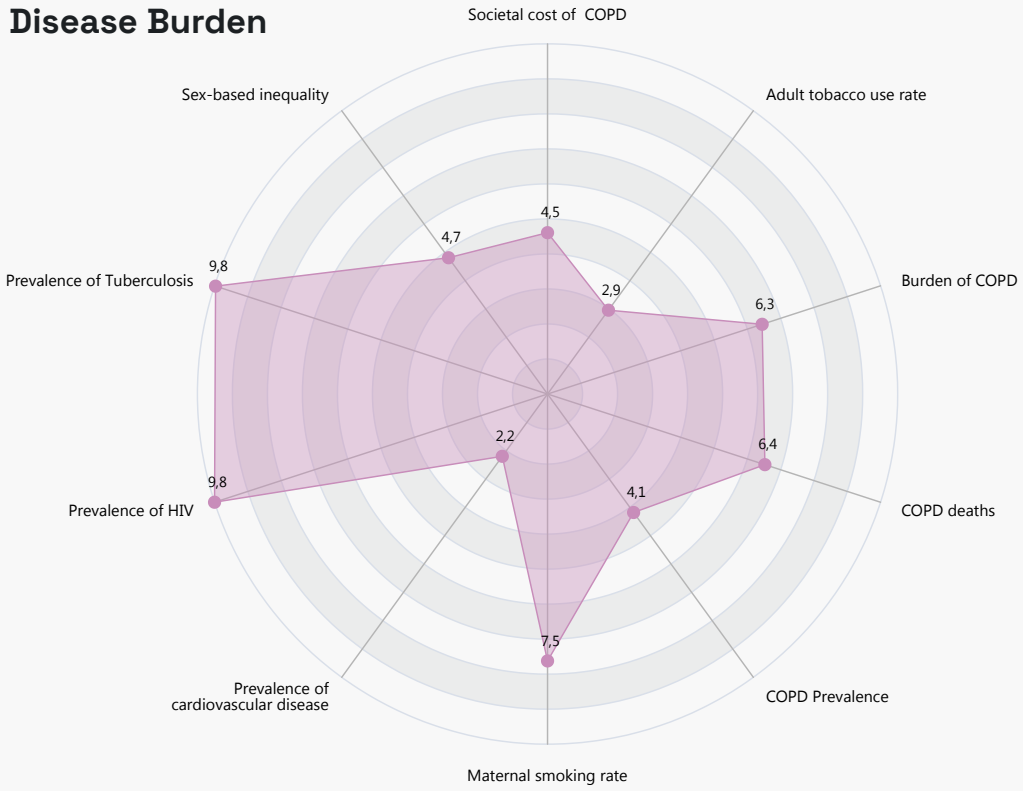
Access and Care Coverage

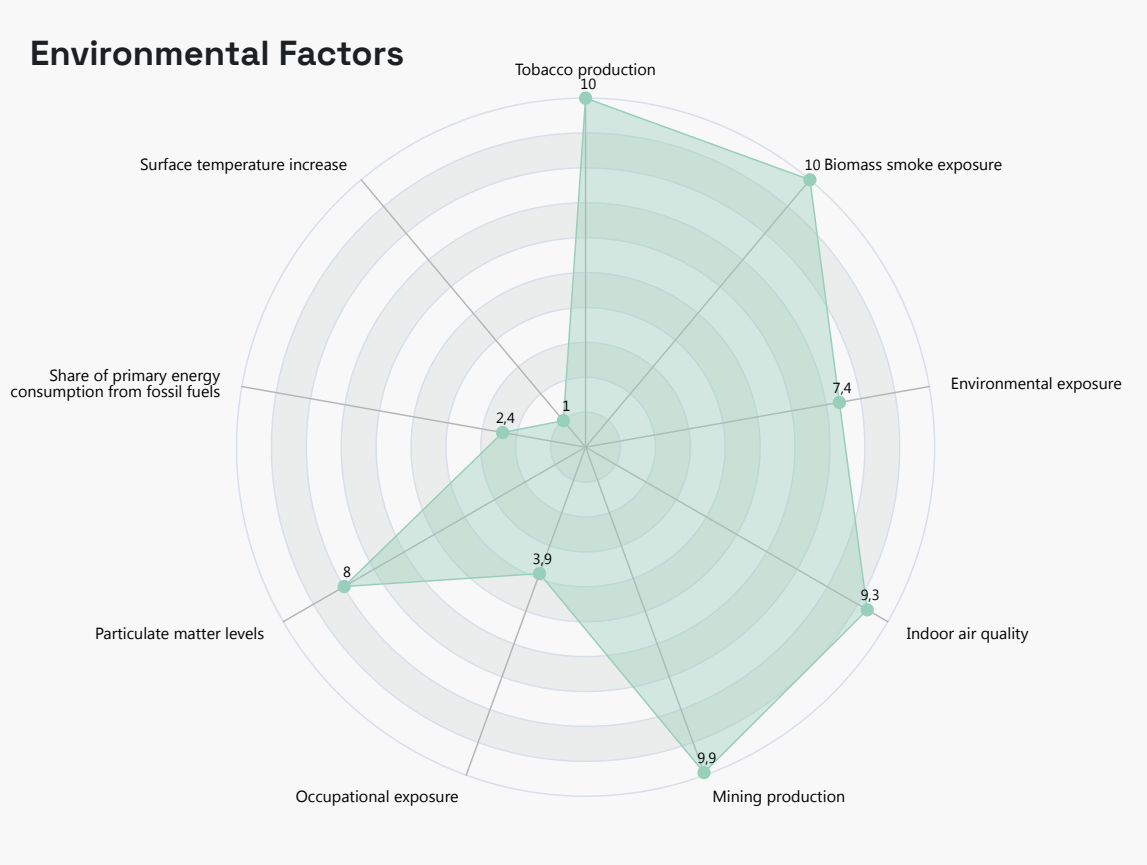


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
Indoor air quality
Mining production
Occupational exposure
Particulate matter levels
Share of primary energy consumption from fossil fuels
Surface temperature increase
1
7,4
9,3
9,9
3,9
8
2,4

Denmark

Denmark scores low in the Health System Characteristics category, with low specialist and primary care doctor density, high hospitalisation rates, and frequent annual COPD hospital readmissions. Denmark is the lowest scorer in the Disease Burden category, which is driven by high estimated societal costs, high COPD prevalence, COPD-related deaths, and maternal smoking rates. Denmark has the highest score in the Access and Care Coverage category, primarily due to good diagnostic conditions, robust care referral pathways, and access to telemedicine. It also scores relatively high in the Policy Context category, thanks to clear COPD guidelines and high levels of general adherence, despite the lack of a comprehensive COPD strategy. Denmark ranks 6th in Environmental Factors, benefiting from good indoor air quality and low levels of particulate matter exposure. Denmark's relatively low overall index score despite robust Policy Context can be partly explained by the limited strength and scope of the tobacco policy and its implementation, as high maternal smoking rates are observed, while a comprehensive COPD strategy is also lacking.

Country Score
62.9

Rank
22

COPD Death Rate (% of all deaths)
8.5%

Smoking Rate (%)
17.5%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,655

KEY TAKEAWAYS

- Highest burden of COPD and the 2nd highest rate of COPD deaths
- Good diagnostic conditions, robust care referral pathways, and access to telemedicine
- Improved access to specialist care would improve Denmark's overall score

Insights

Challenges

- Late diagnosis and lack of specialists once diagnosis is made
- Prioritisation of and support for smoking cessation is less robust than it could be
- Perceived social stigmatization of COPD patients

Priorities

- Develop and implement more multidisciplinary, personalised, and integrated COPD care
- Higher levels of tobacco taxation to support COPD prevention
- Implement a standardised approach to COPD screening

Best practices in COPD care

- Low barriers to accessing care (e.g., no copays for consultations)
- Strong adherence to evidence-based guidelines
- Good utilisation of diagnostics and follow-up protocols

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[strong healthcare practices include] ...equal opportunity for everyone and easy accessibility via general practice"

> "[The challenge is that] ... COPD patients are diagnosed pretty late (partially due to themselves, not searching for medical help), vaping is a threat for COPD in the future (not enough prevention efforts for this), management needs for more individualised treatment..."

> "[The challenge is that] ... GPs lack of insight in the complexity of the disease; quality of spirometry..."

Resources

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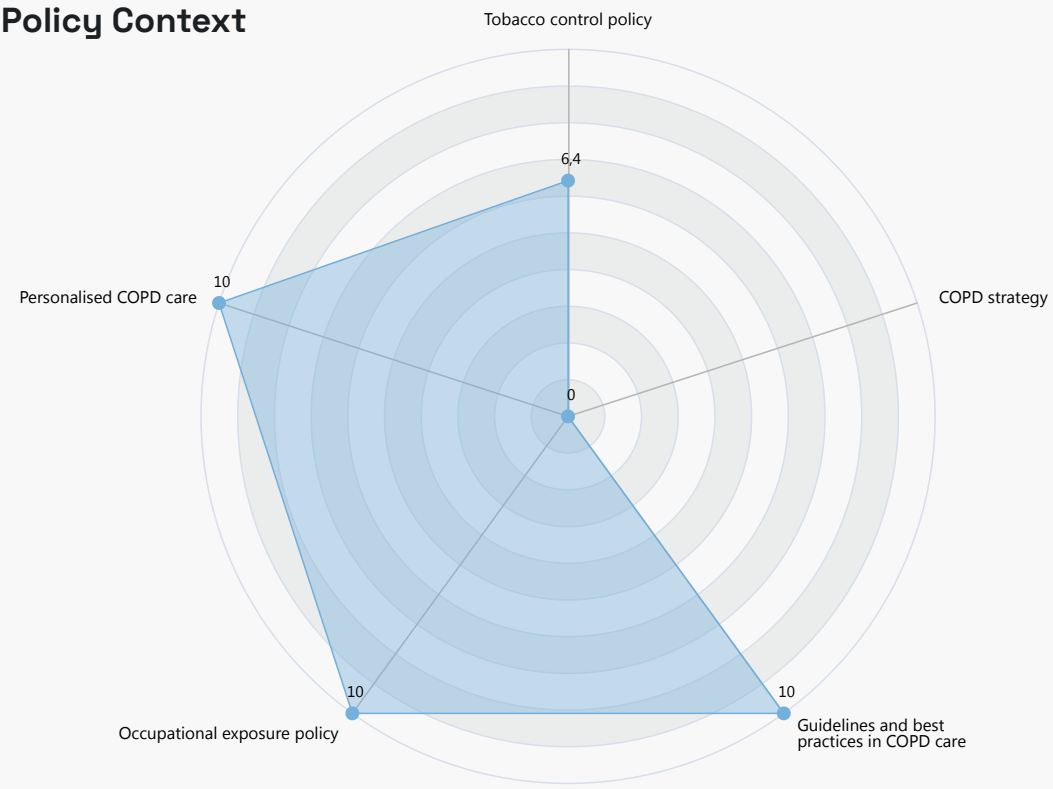
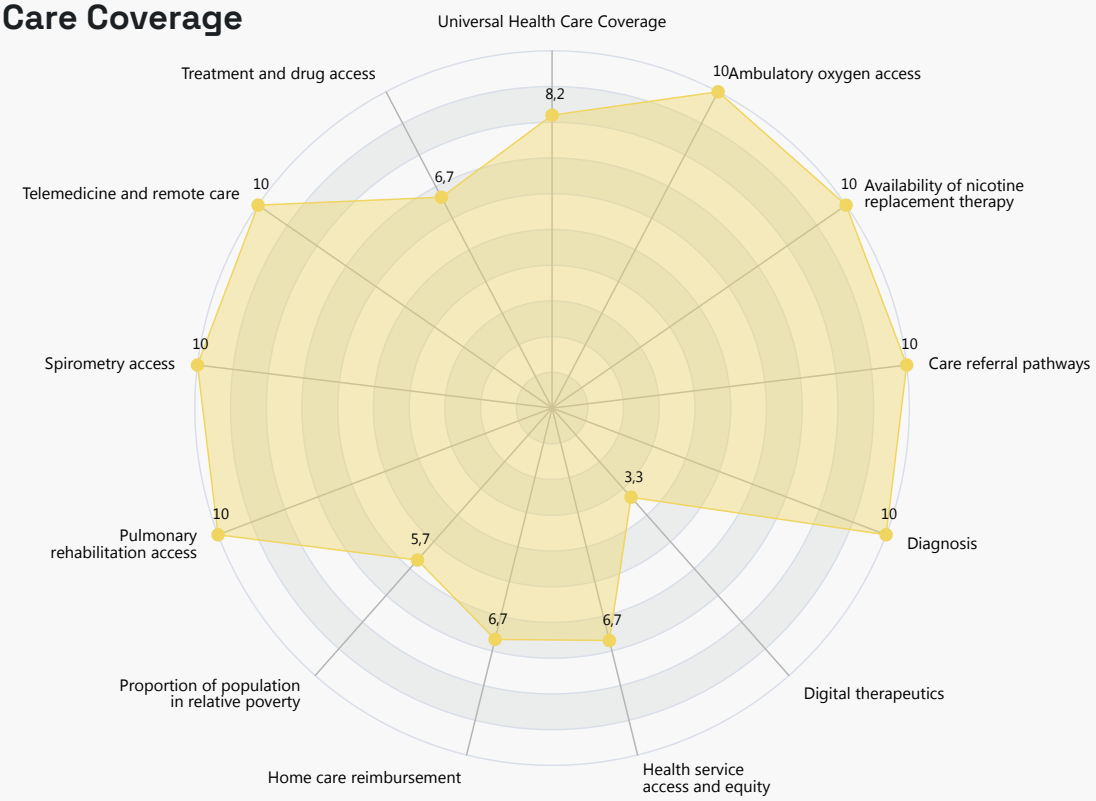
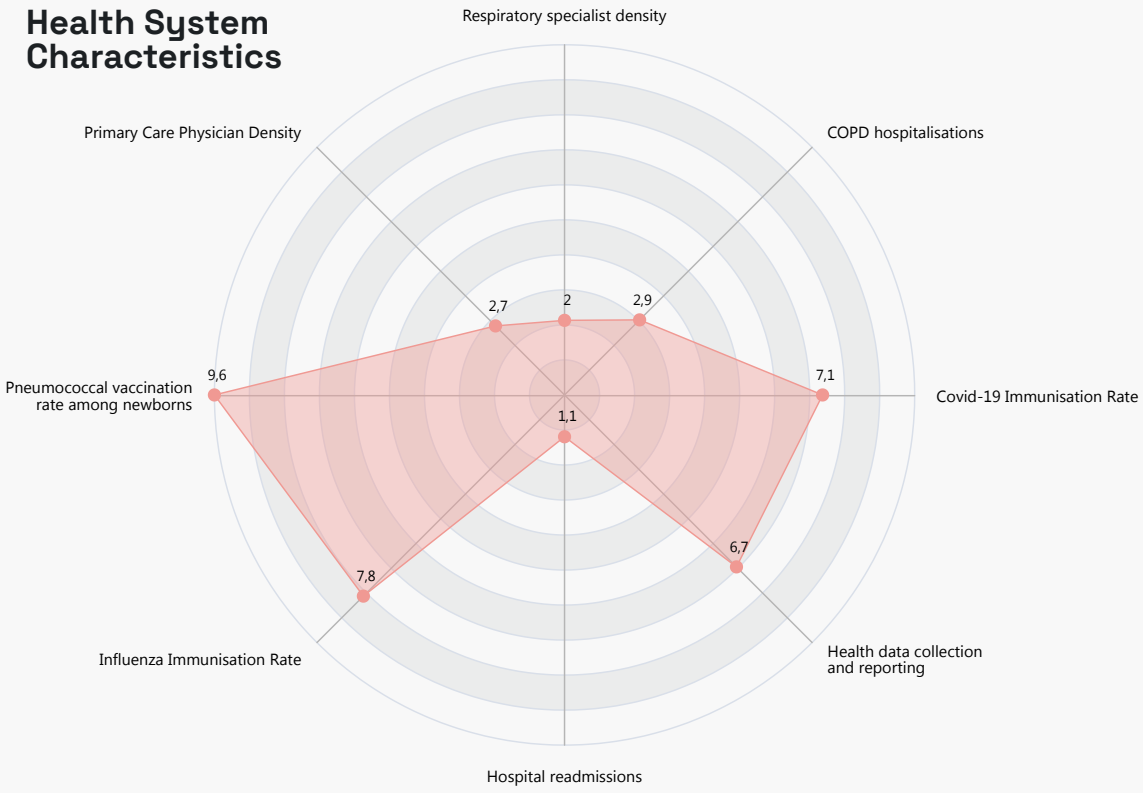
Policy Context



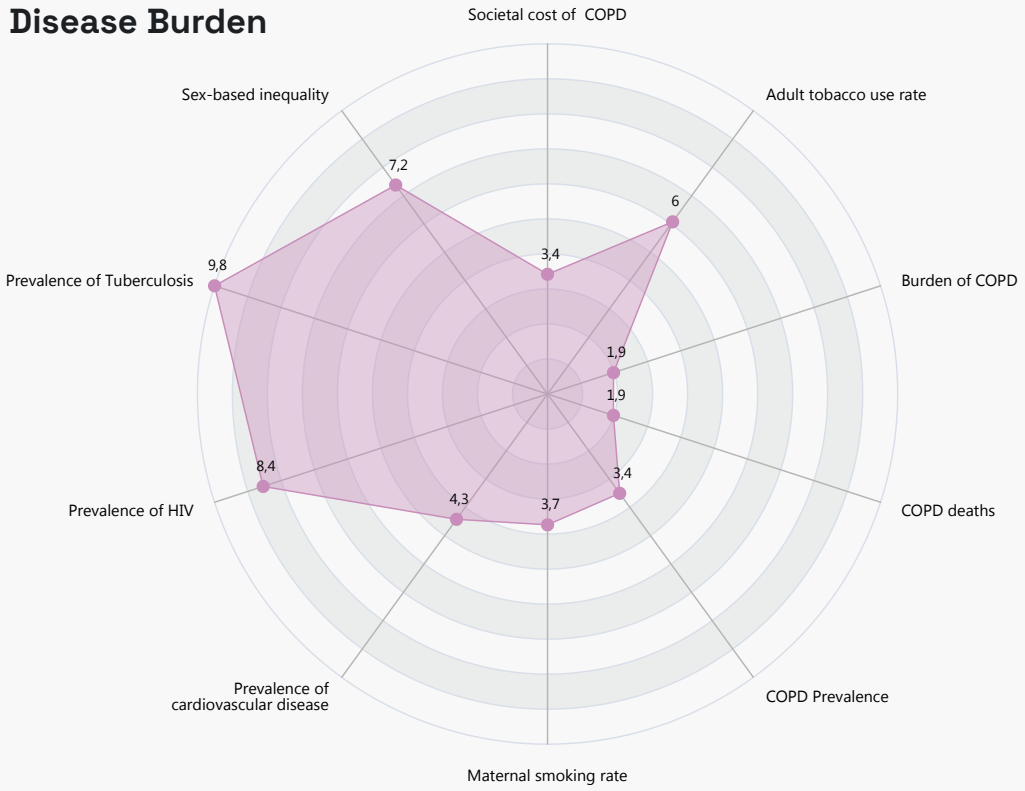
Access and Care Coverage

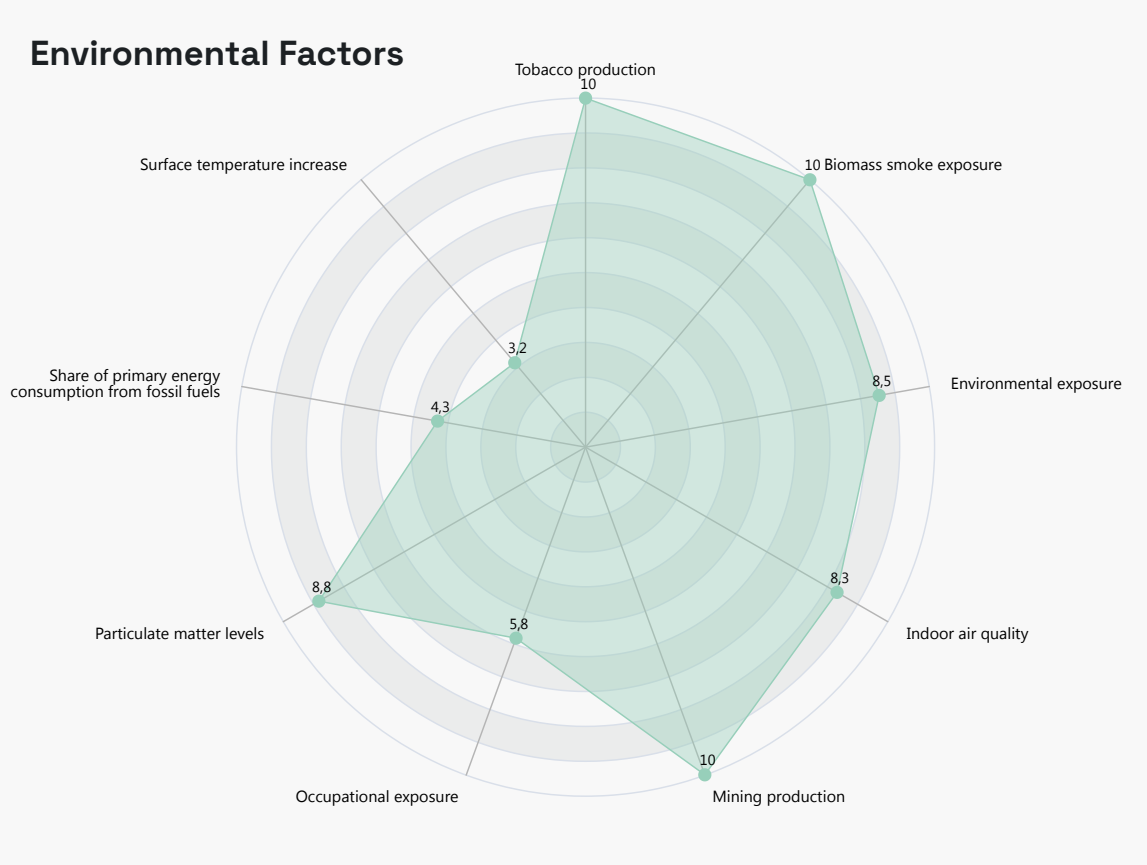


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
8,5
Environmental exposure
8,3
Indoor air quality
10
Mining production
5,8
Occupational exposure
8,8
Particulate matter levels
4,3
Share of primary energy consumption from fossil fuels
3,2
Surface temperature increase

Estonia

Estonia is among the top overall scorers in the COPD Index. It has the 6th highest score in the Policy Context category due to strong tobacco control policies, COPD guidelines and practices, and a relatively strong COPD strategy. Estonia's score in the Health System Characteristics category is above average, primarily due to good health data collection and reporting, despite a lack of primary care physicians. Estonia's score in the Access and Care Coverage category is only slightly above average, with good conditions for diagnosis and relatively good access to treatment and drugs, but with gaps in care referral pathways and telemedicine. Estonia scores above average in the Environmental Factors category, with good indoor air quality, very low particulate matter levels, and low air pollution. Estonia's score in the Disease Burden category is above average, with a relatively low COPD death rate, but a high smoking rate.

Country Score
69.3

Rank
4

COPD Death Rate (% of all deaths)
1.0%

Smoking Rate (%)
29.7%

Estimated Societal Cost of COPD per capita (2017 INT$)
$788

KEY TAKEAWAYS

- Robust tobacco control policies, but their high smoking rate indicates a need for better implementation
- There are strong conditions for diagnosis, but limited access to telemedicine
- Good environmental factors and a relatively low disease burden

Insights

Challenges

- Vaccination aversion
- Lack of access to proper pulmonary rehabilitation programs

Opportunities

- More comprehensive prevention strategies (e.g., limitations on smoking and vaping, improve vaccination rates)

Priorities

- Improve case finding
- Better access to pulmonary rehabilitation

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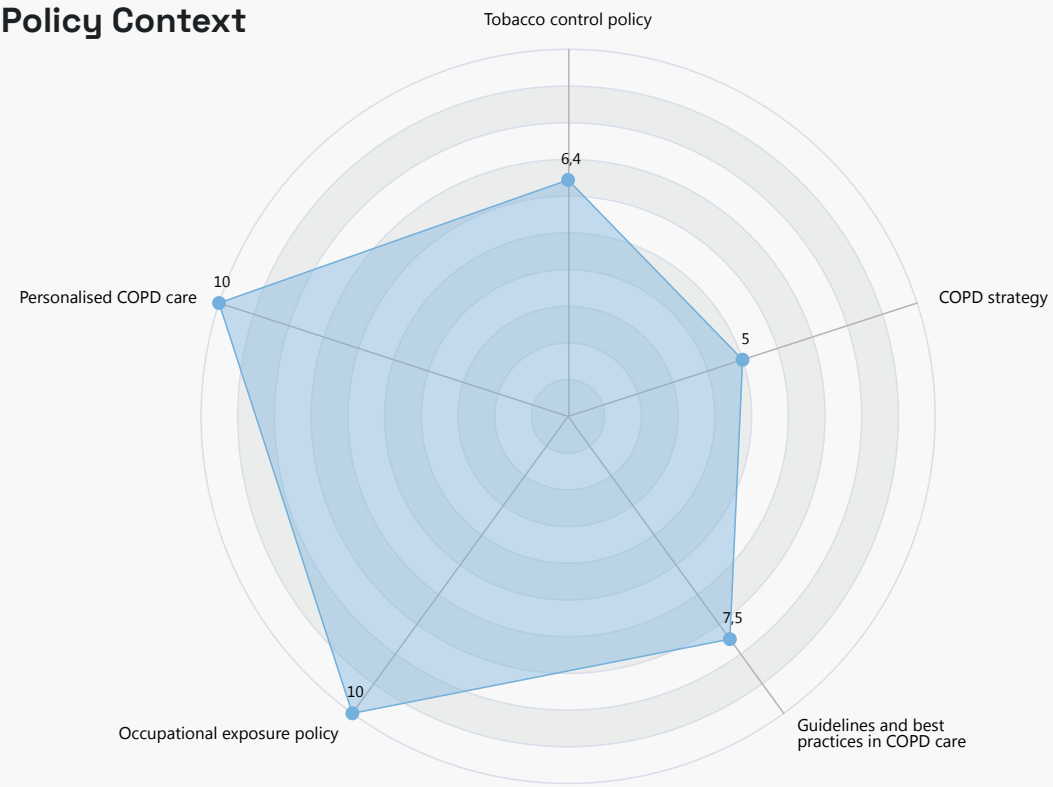
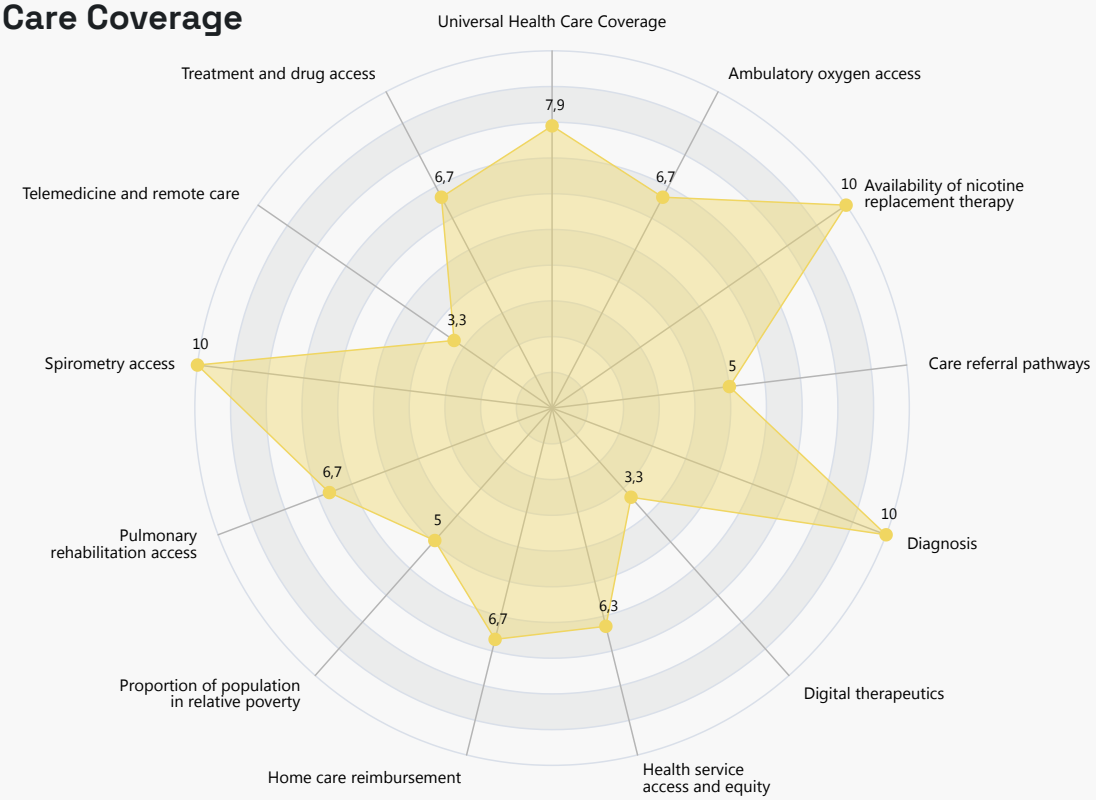
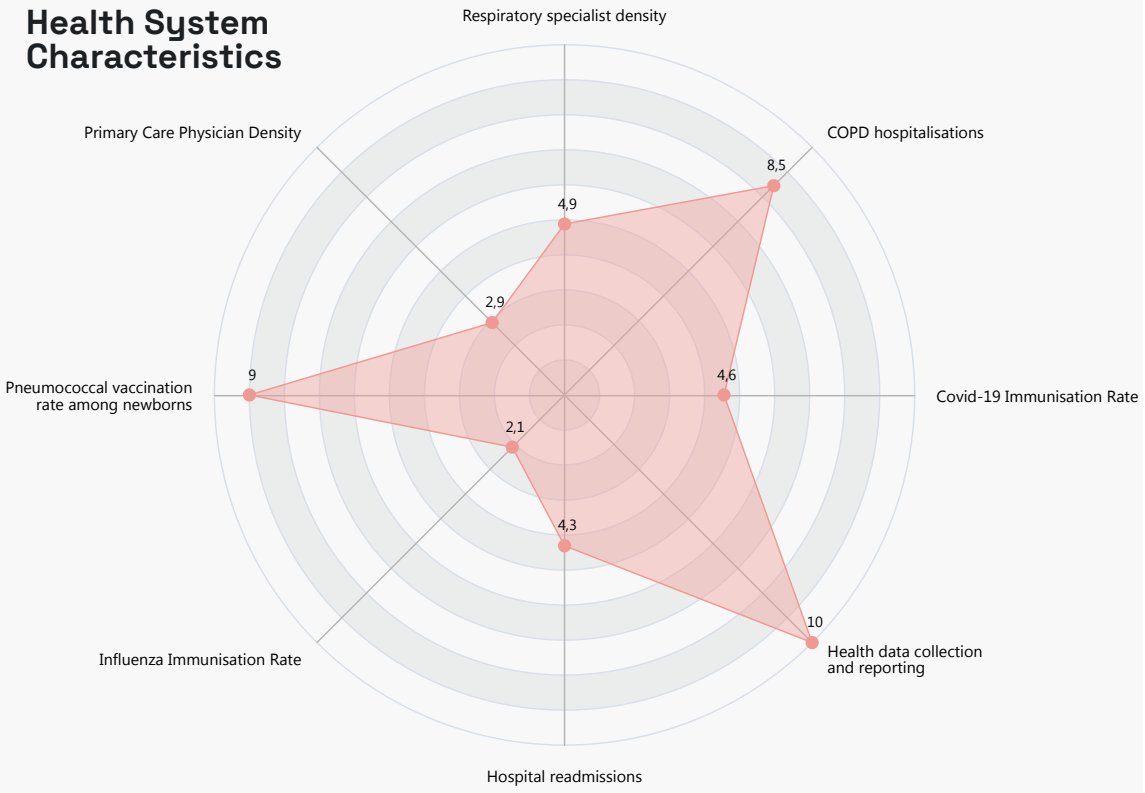
Policy Context



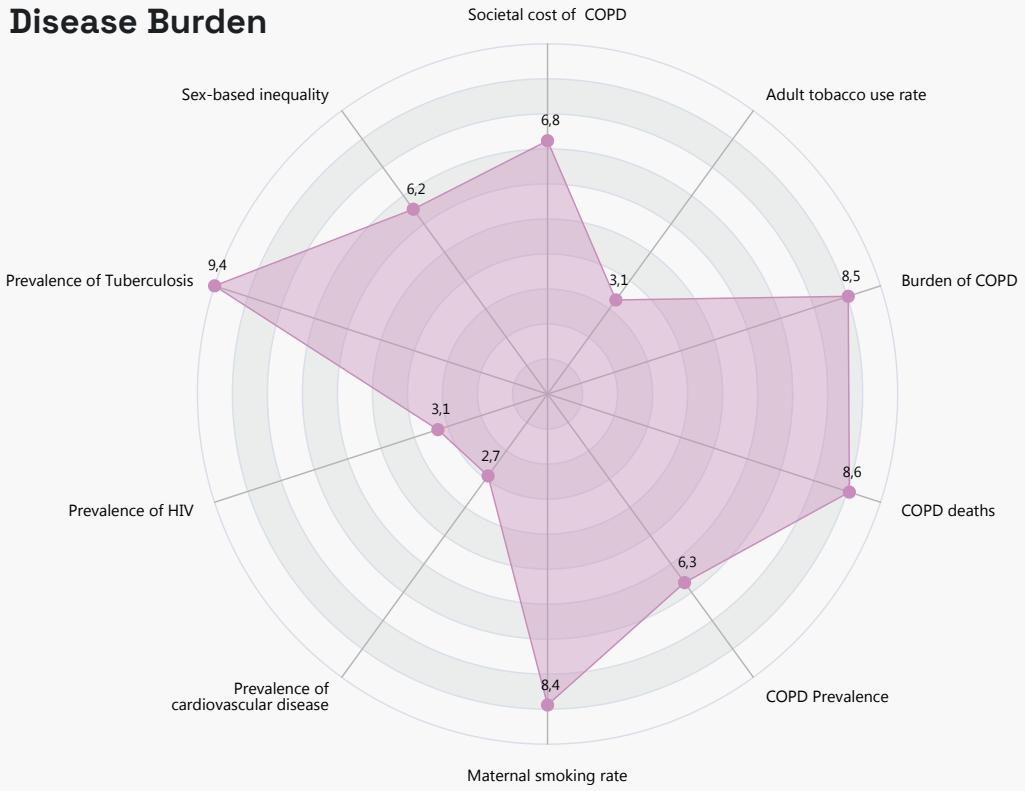
Access and Care Coverage

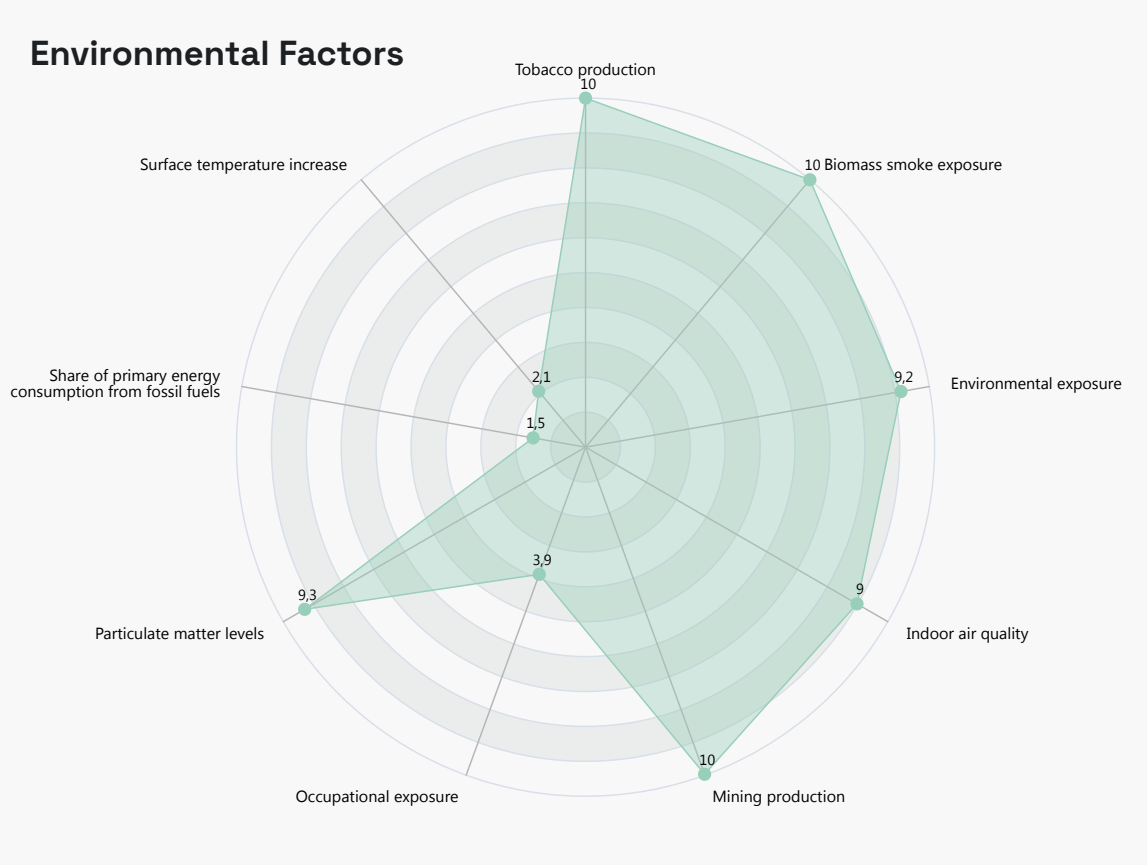


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
9,2
Environmental exposure
9
Indoor air quality
10
Mining production
Occupational exposure
3,9
9,3
Particulate matter levels
Share of primary energy consumption from fossil fuels
1,5
2,1
Surface temperature increase

Finland

Finland is among the top scorers in the COPD Index. Finland has the third highest score in the Environmental Factors category, boasting the highest indoor air quality and the lowest level of environmental exposure to COPD risk factors. Finland also reports a high score in the Policy Context category, with very strong guidelines for COPD care and high adherence to them, as well as strong tobacco control policies. However, an increased implementation of COPD strategies would improve its score. In the Health System Characteristics category, Finland scores above average primarily due to excellent health data reporting, a relatively high number of primary care doctors, and a slightly lower density of respiratory specialists. Finland's score in the Access and Care Coverage category is relatively high, with strong conditions for diagnosis, high universal health care coverage, telemedicine care, and good treatment and drug access. Finland's score in the Disease Burden category is just above average, with relatively high sex-based inequality and maternal smoking rates.

Country Score
70.7

Rank
3

COPD Death Rate (% of all deaths)
2.6%

Smoking Rate (%)
21.6%

Estimated Societal Cost of COPD per capita (2017 INT$)
$557

KEY TAKEAWAYS

- Strong Policy Context, with improvements needed in COPD national strategy and tobacco policy implementation based on smoking rate data
- High Access and Care Coverage with a need for stronger care referral pathways
- Relatively few respiratory specialists

Insights

Challenges

- Lack of respiratory specialists
- Late diagnosis due to low patient awareness and insufficient preventive measures

Opportunities

- Improve collaboration on comorbidities (e.g., between cardiologists and respiratory specialists)

Priorities

- Increase availability of health care professionals (specifically respiratory specialists) in public health care
- Increase allocation of resources and shifting health system focus to the respiratory area

Best practices in COPD care

- Smoking cessation practices (e.g., Smoking is banned inside public spaces)
- Good use of spirometry for diagnosis
- Strong national guidelines for primary care (highly known and implemented), new COPD program

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[Best practices are that] ... We have a national guideline specifically aimed for primary care, it is available to all primary care physicians and is part of large common national guideline system known to every Finnish doctor."

> "[The challenge is that] ... We got a new health care system, the welfare areas, and at least the beginning seems that everything is just closed down and stopped because lack of money."

Resources

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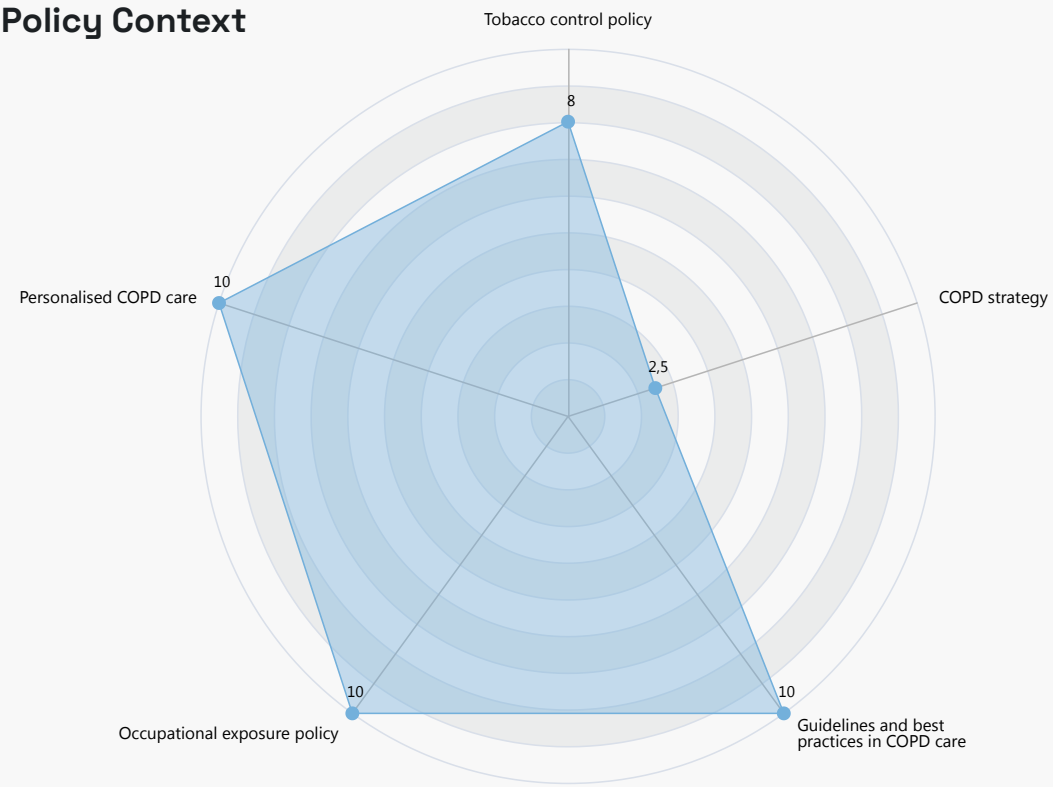
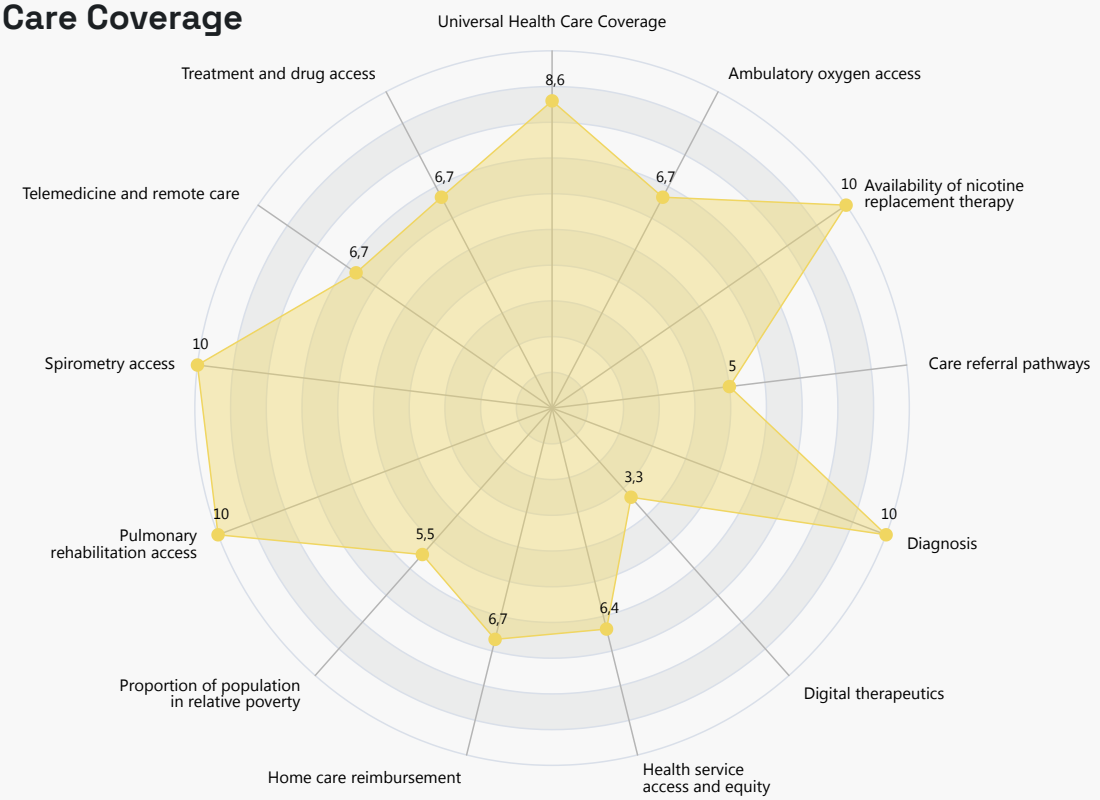
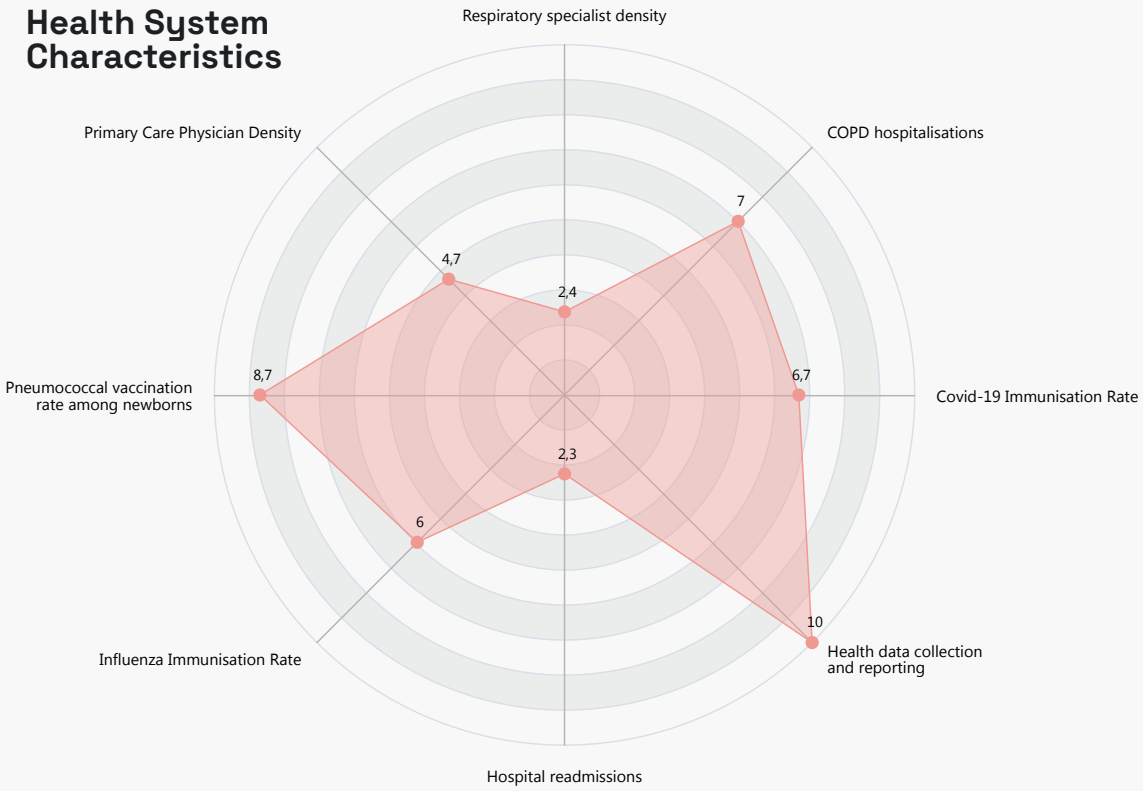
Policy Context



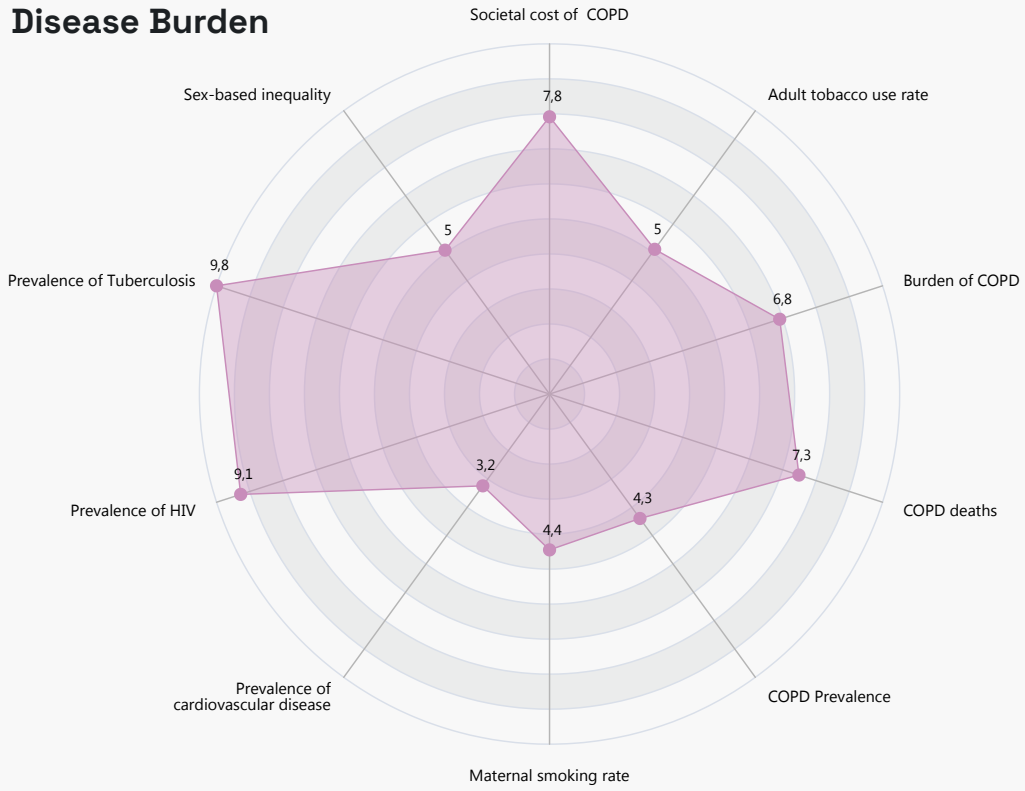
Access and Care Coverage

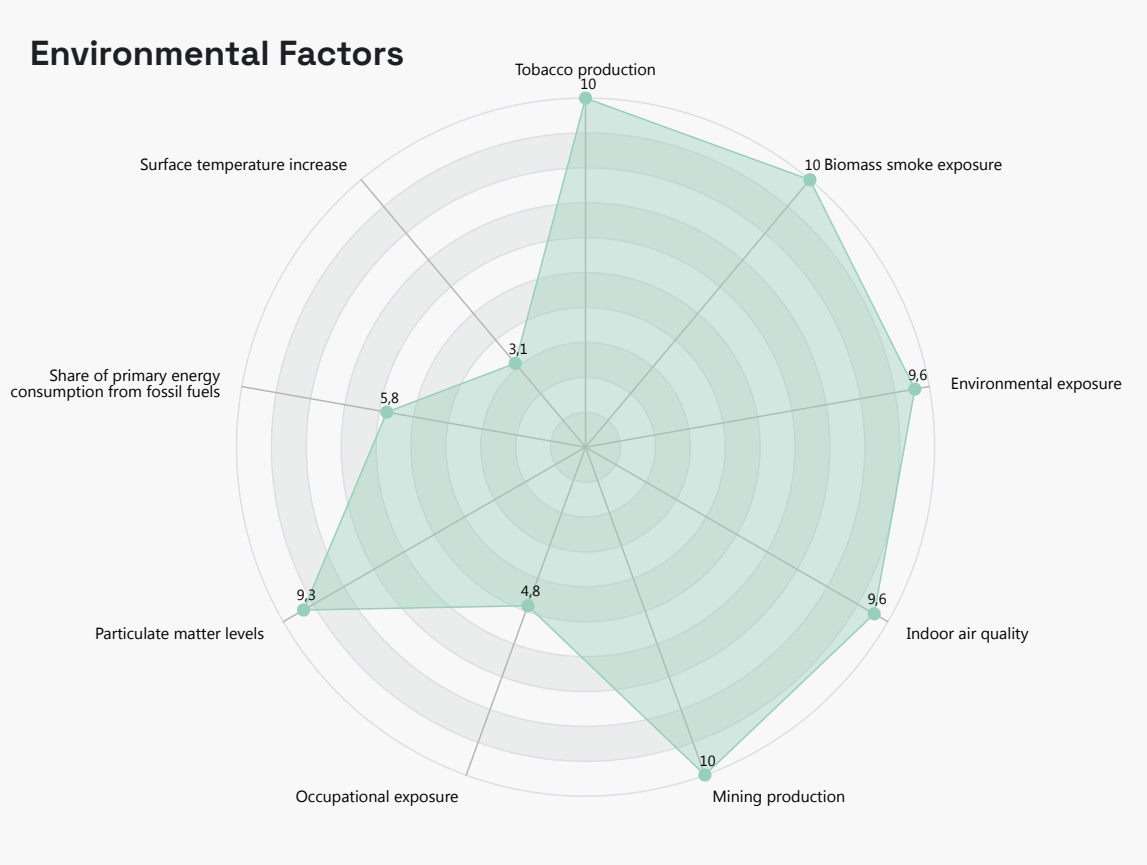


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
9,6
Environmental exposure
9,6
Indoor air quality
10
Mining production
4,8
Occupational exposure
9,3
Particulate matter levels
5,8
Share of primary energy consumption from fossil fuels
3,1
Surface temperature increase

France

France scores relatively high in the Health System Characteristics category, mainly due to high-quality health data reporting, an average number of respiratory specialists, and a slightly above-average density of primary care physicians. France also performs well in the Access and Care Coverage category, with good conditions for access to telemedicine, a high level of universal health care service coverage, good treatment and drug access, and diagnostic conditions, despite above-average relative poverty. France scores relatively high in the Environmental Factors category, with low occupational and relatively low environmental exposure to COPD risk factors. France's score in the Policy Context category is above average, primarily due to a strong tobacco control policy and the existence of a COPD strategy, though there is a low adherence to COPD guidelines. France scores lower than average in the Disease Burden category, with one of the highest smoking rates, but relatively low societal costs and disability-adjusted life years attributable to COPD.

Country Score
66.3

Rank
9

COPD Death Rate (% of all deaths)
2.6%

Smoking Rate (%)
33.4%

Estimated Societal Cost of COPD per capita (2017 INT$)
$502

KEY TAKEAWAYS

- Low societal cost, in line with COPD prevalence
- Strong Policy Context with a strong tobacco policy, but a lack of implementation, as seen by high smoking rates
- Good treatment, drug access, and diagnostic conditions, despite above-average inequality

Insights

Challenges

- Delayed and underdiagnosis in primary care
- Underutilisation of spirometry and lack of follow-ups
- Lack of knowledge among the general population

Opportunities

- Grow awareness of the medical and economic stakes by the supervisory authorities
- Increase prevention

Priorities

- Gain the attention of politicians to support a better screening policy
- Support awareness raising and advocacy on a European level

Best practices in COPD care

- Carers are supposed to apply the recommendations of the Haute Autorité de Santé, which date from 2019
- Current work on policy maker awareness to improve screening policy

Resources

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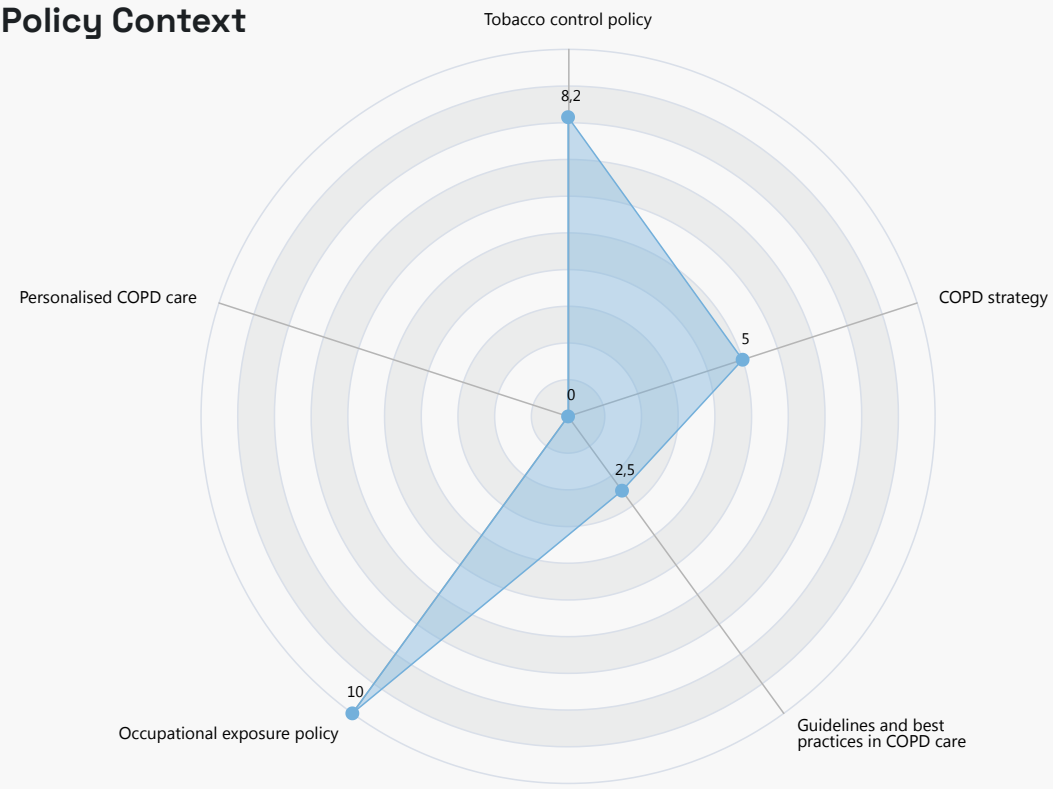
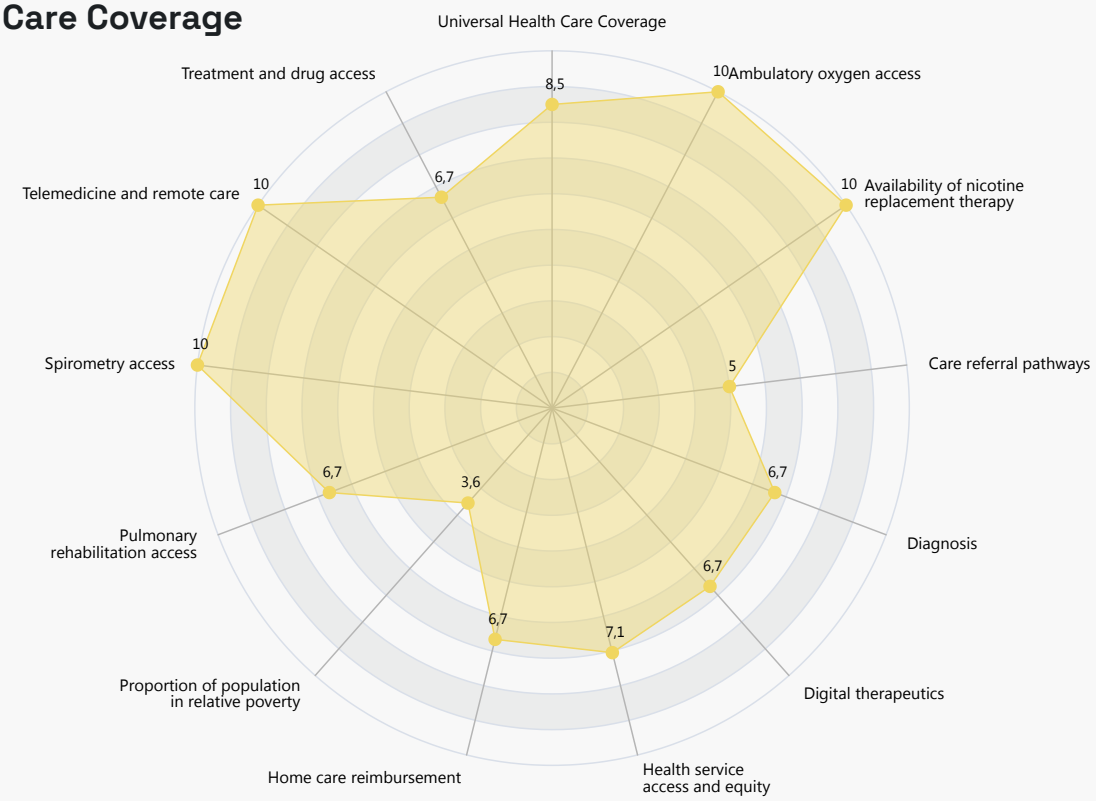
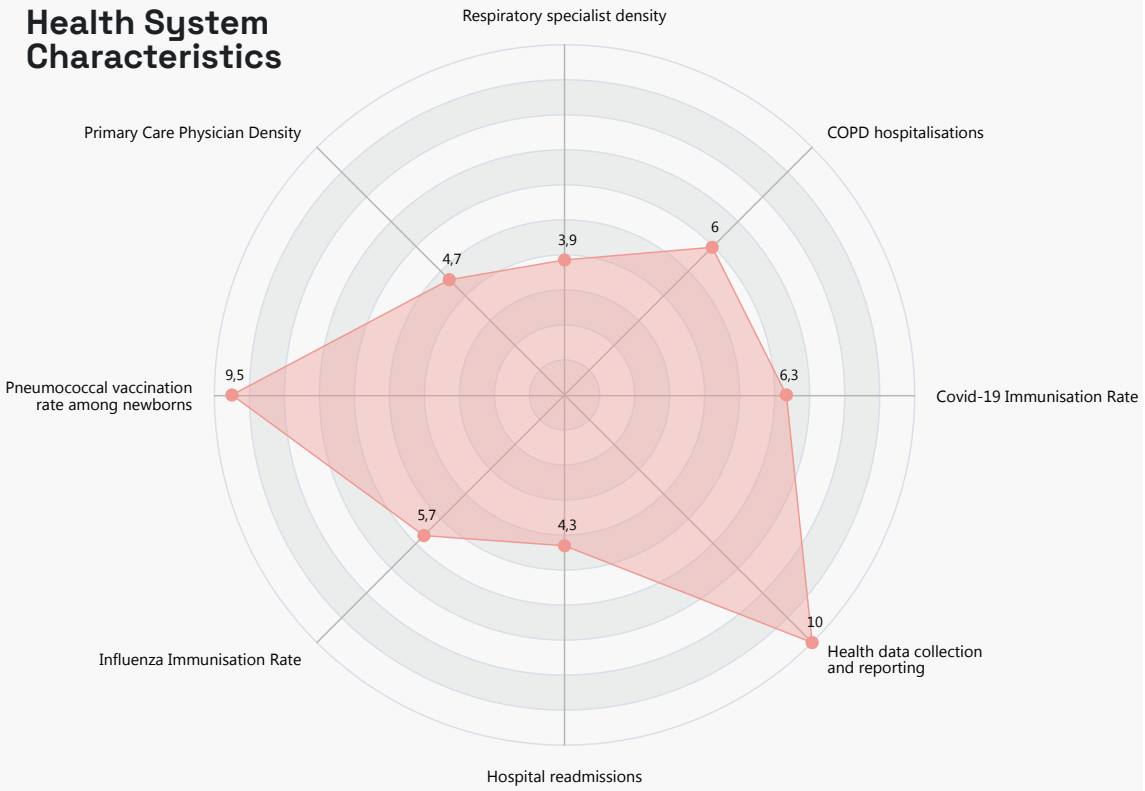
Policy Context



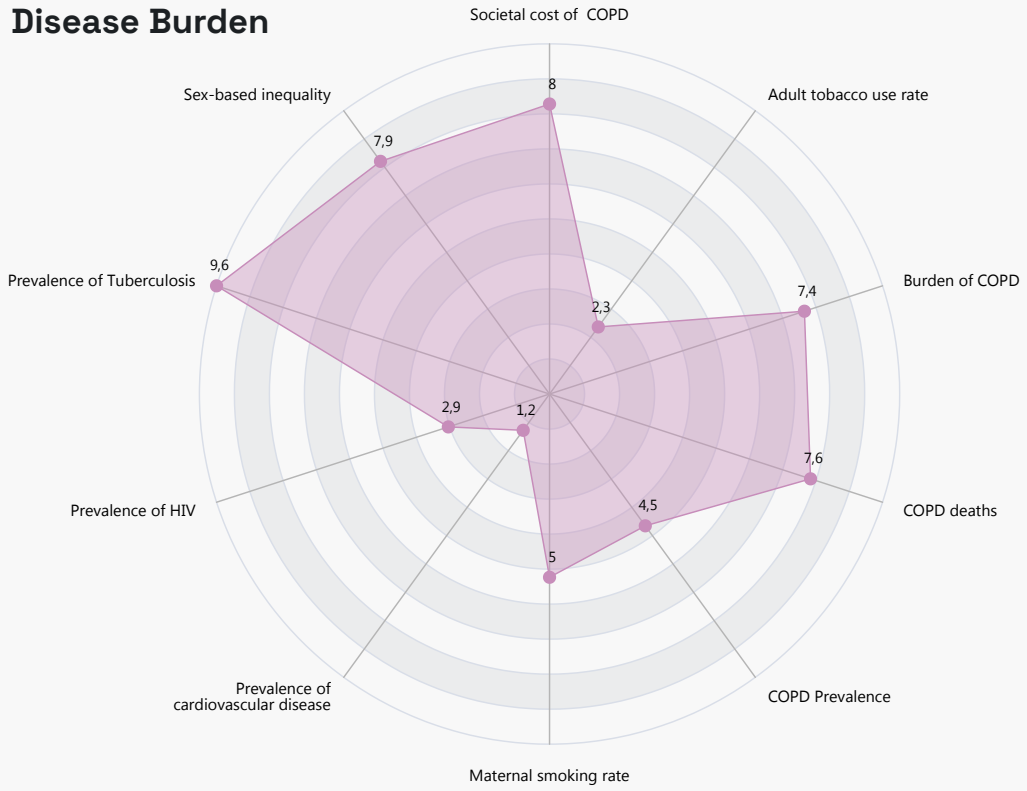
Access and Care Coverage

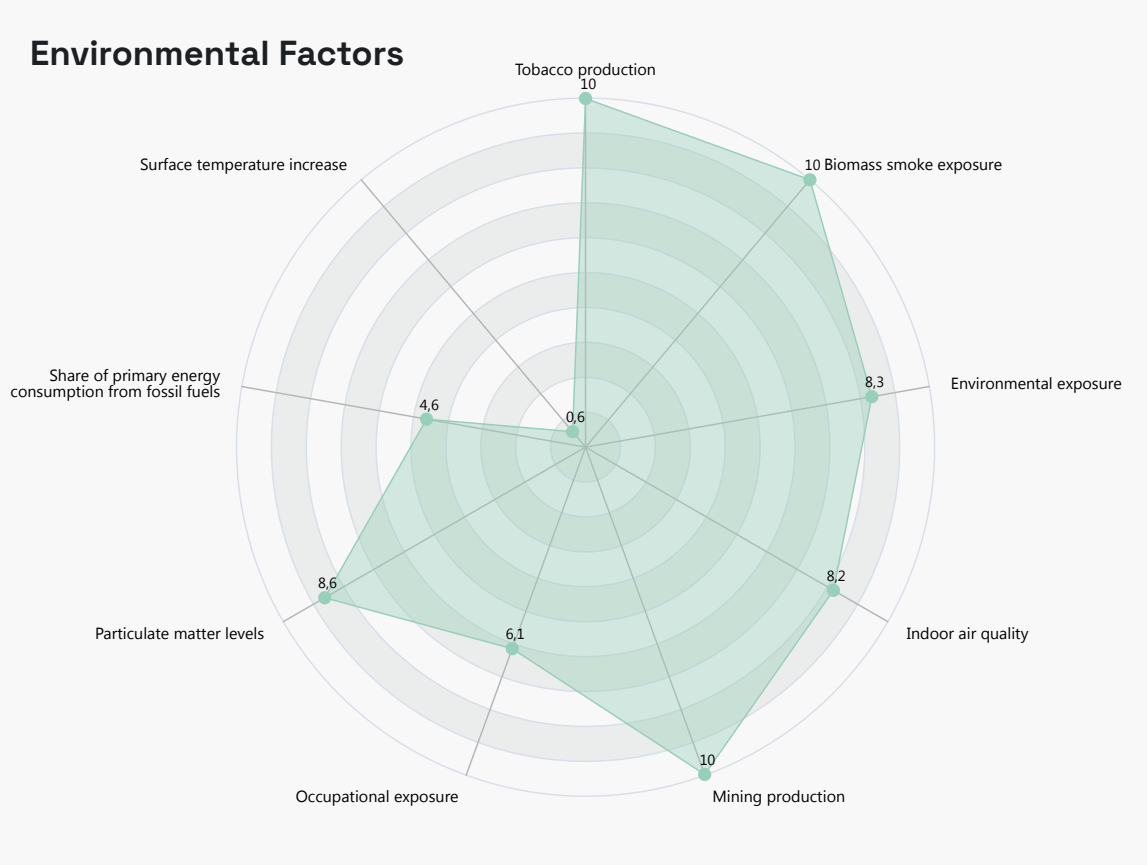


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,3
Indoor air quality
8,2
Mining production
10
Occupational exposure
6,1
Particulate matter levels
8,6
Share of primary energy consumption from fossil fuels
4,6
Surface temperature increase
0,6

Germany

In the Policy Context category, Germany scores below average, primarily due to the lack of a national COPD strategy and low adherence to COPD guidelines. Germany reports a close to average score in the Health System Characteristics category, mainly due to a relatively high number of COPD hospitalisations and somewhat low respiratory specialist density, but good health data reporting. Germany has one of the highest disease burdens, with the highest societal cost, a high prevalence of COPD, and a relatively high death rate. Germany scores above average in the Access and Care Coverage category, with high universal health care service coverage, good conditions for diagnosis, and strong care referral pathways, though improvements could be made in telemedicine and remote care access. Similarly, Germany scores above average in the Environmental Factors category, mainly due to good indoor air quality and low occupational exposure to COPD risk factors. Germany's low overall performance in index can be explained by the country's disease burden, and particularly by the highest estimated societal cost, as well as a relatively weak COPD Policy Context, despite strong Environmental Factors, and good Access and Care Coverage.

Country Score
60.3

Rank
28

COPD Death Rate (% of all deaths)
4.0%

Smoking Rate (%)
22.0%

Estimated Societal Cost of COPD per capita (2017 INT$)
$2,352

KEY TAKEAWAYS

- 4th highest disease burden and the highest estimated societal cost of COPD
- Strong Access and Care Coverage, but high COPD hospitalisation rate
- Germany could significantly improve its COPD care and management with better adherence to COPD guidelines and the development of a national strategy for COPD

Insights

Challenges

- No reimbursed smoking cessation programs
- Poor case finding in primary care because of insufficient COPD screening by general practitioners
- No COPD screening for patients with smoking associated heart diseases
- Supportive measures (such as training and vaccinations) are not done as needed

Opportunities

- Smoking cessation unique infrastructure, simple reimbursement and political pressure against smoking and vaping
- Raise awareness in cardiology care for COPD and primary care
- Regular screening of smokers by lung function
- For management: Better describing COPD (Bronchitis or COPD) of all patients

Priorities

- Smoking cessation reimbursement, improve strategies against smoking and vaping
- Mandatory presentation of all patients with serious COPD to the pulmonologist
- Patient incentives for regular physical activity

Best practices in COPD care

- Free access to secondary care (but with waiting time)
- Pulmonologist in own practice have a broad spectrum of lung function tests (like Bodyplethysmography or DLCO) to differentiate (e.g. Emphysema, Bronchitis, Exacerbations, Asthma)

Resources

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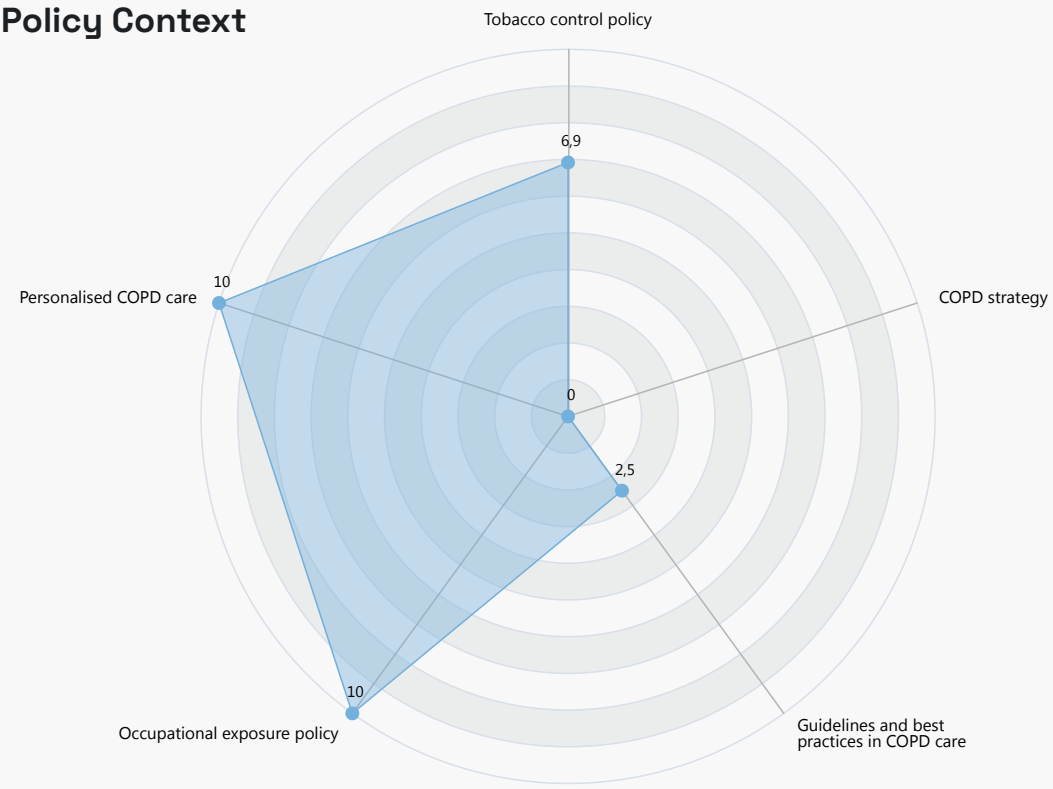
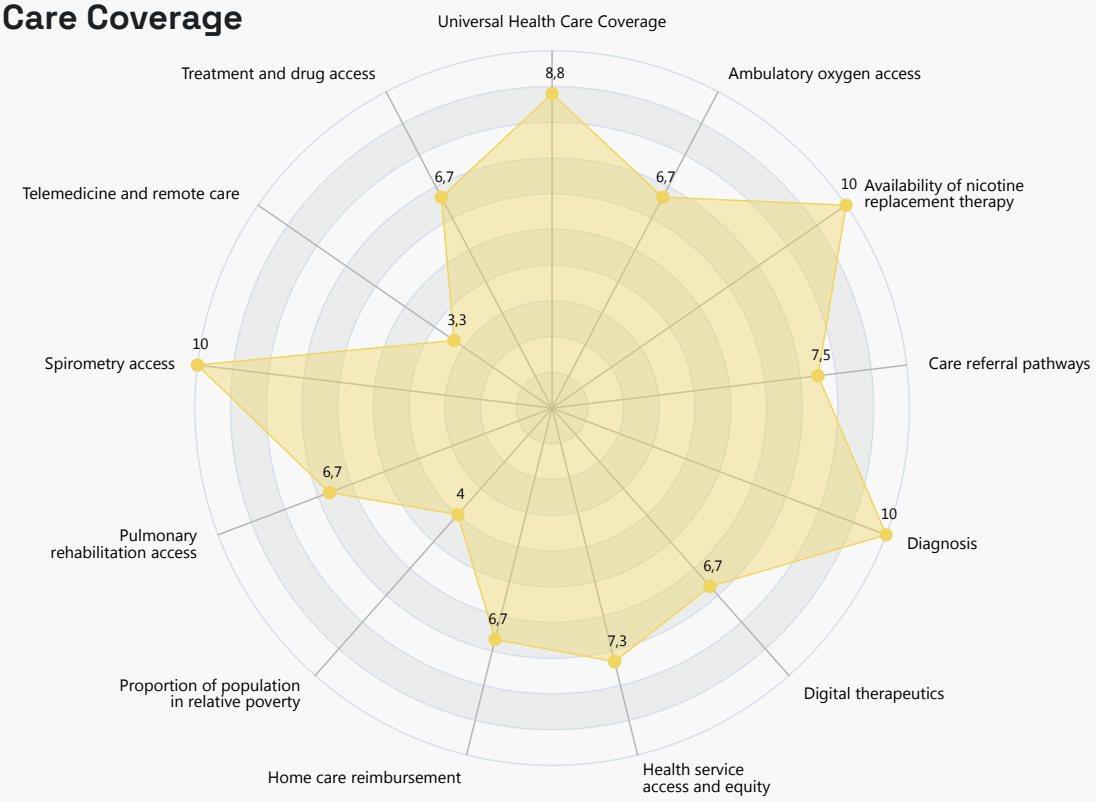
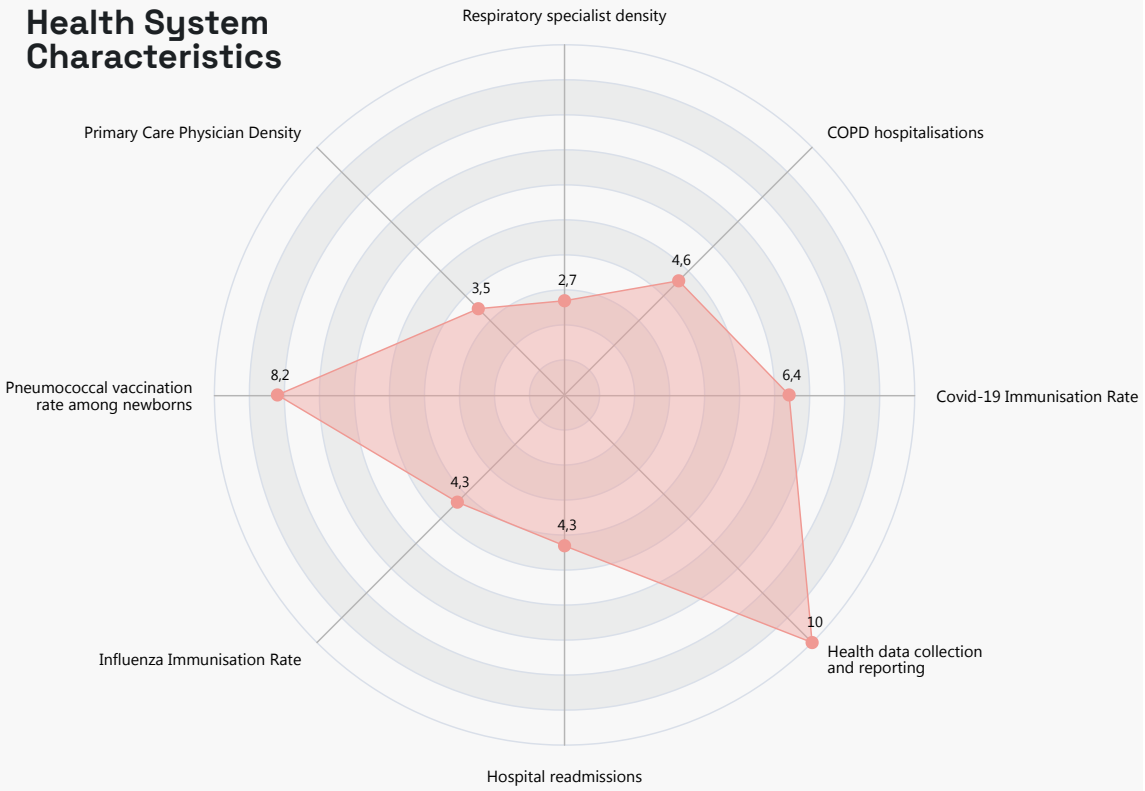
Policy Context



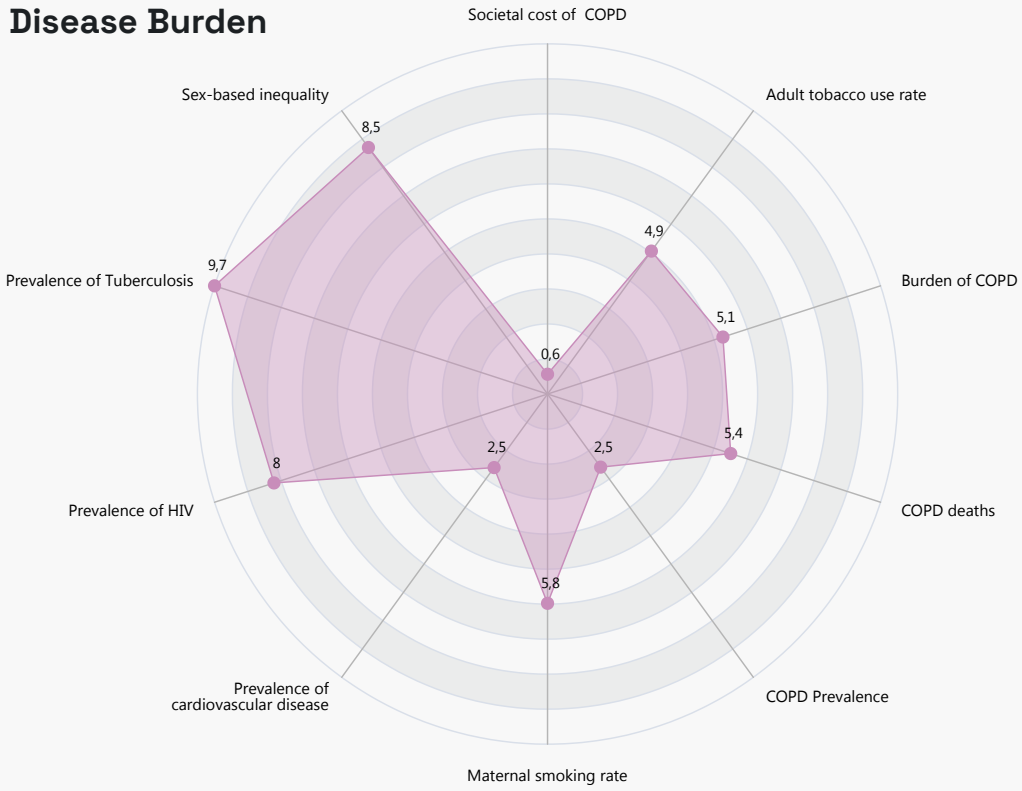
Access and Care Coverage

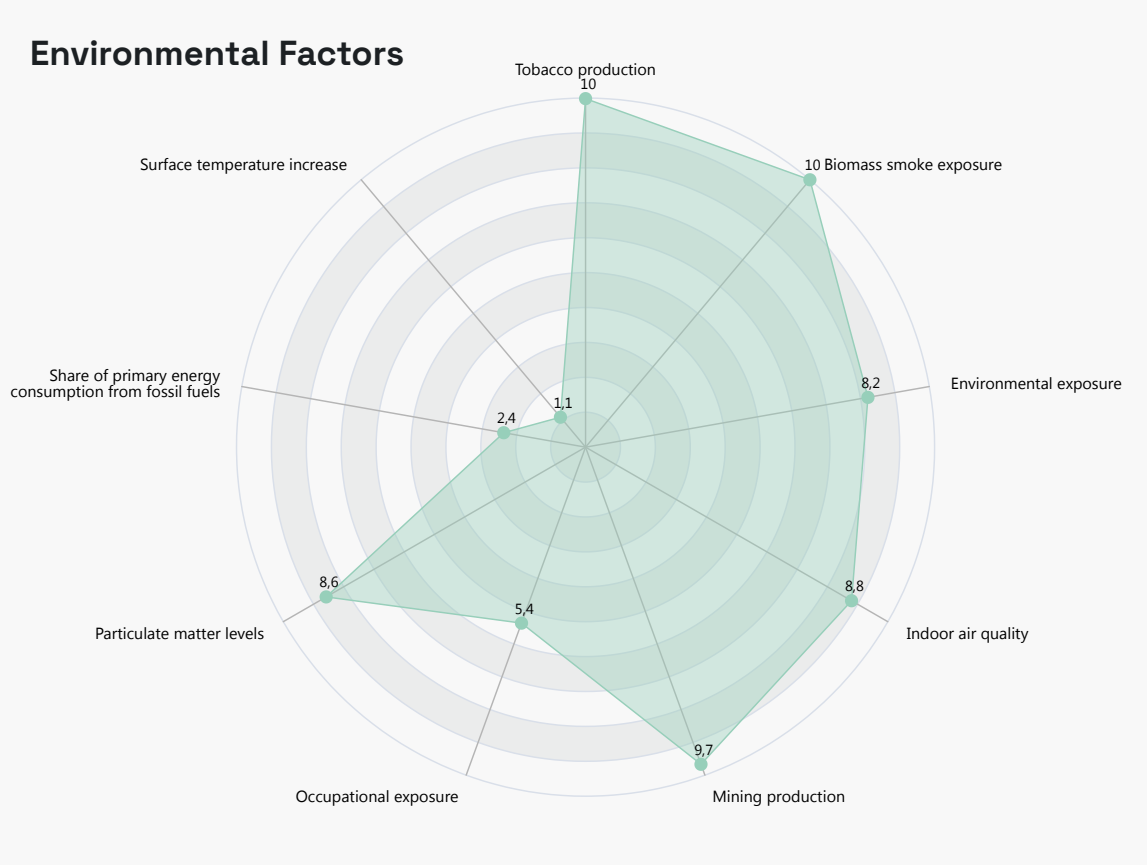


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,2
Indoor air quality
8,8
Mining production
9,7
Occupational exposure
5,4
Particulate matter levels
8,6
Share of primary energy consumption from fossil fuels
2,4
Surface temperature increase
1,1

Greece

Greece is among the top scorers in the Health System Characteristics category, with the highest number of respiratory specialists, good conditions for health data recording, and a low 365-day readmission for COPD. However, Greece reports a low primary care physician density. Greece's performance in the Access and Care Coverage category score is slightly above average, with strong referral care pathways and relatively good conditions for diagnosis, treatment, and drug access, but it could be significantly improved through better access to telemedicine and addressing the high level of relative poverty. Greece scores above average in the Environmental Factors category due to low occupational exposure to COPD risk factors and relatively good indoor air quality. In the Policy Context category, Greece scores below average, mainly due to the lack of a national COPD strategy and the comparatively small scope and weak implementation of tobacco control policy, despite relatively good adherence to COPD guidelines. Similarly, Greece's score in the Disease Burden category is above average, with the second highest tobacco use rate and a relatively high COPD prevalence and COPD death rate.

Country Score
65.0

Rank
15

COPD Death Rate (% of all deaths)
3.5%

Smoking Rate (%)
33.5%

Estimated Societal Cost of COPD per capita (2017 INT$)
$272

KEY TAKEAWAYS

- Strong Health System Characteristics, mostly attributable to the highest reported density of respiratory specialists
- Relatively weak tobacco control policy
- 2nd highest tobacco use rate among the COPD Index countries

Insights

Challenges

- Low smoking cessation rates
- Access to good quality spirometry
- Delayed diagnosis and underdiagnosis in primary care

Opportunities

- Early use of case-finding strategies
- Increase staff training in primary care spirometry
- Raise COPD awareness and knowledge among primary care professionals, patients, and communities

Priorities

- Increase number of specialist referral centres

Best practices in COPD care

- Universal access to medication
- Reimbursement for spirometry
- Social media-driven initiatives with influencers to motivate smokers and COPD patients to seek treatment

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[The challenge is that] ... Diagnosis and treatment of COPD is not always consistent with GOLD guidelines, especially in the primary care setting in Greece. Nowadays studies show that up to 50% of the patients with COPD are underdiagnosed, COPD patients are usually overtreated and subjects with respiratory symptoms in the primary care setting are incorrectly diagnosed and treated as severe COPD."

> "[Strong country practice is that] ... Currently, there are outpatient clinics and pulmonary departments throughout the country. Smokers without COPD and COPD patients can be examined in these settings. In case of an emergency, COPD patients can visit the emergency departments of public hospitals."

Resources

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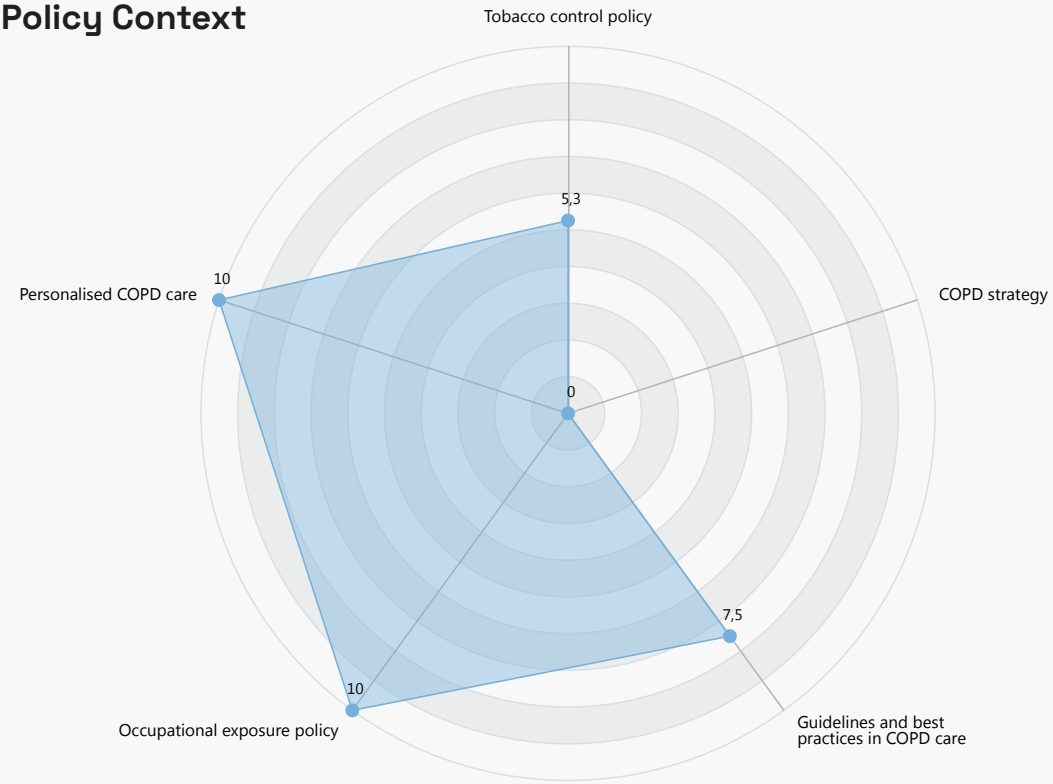
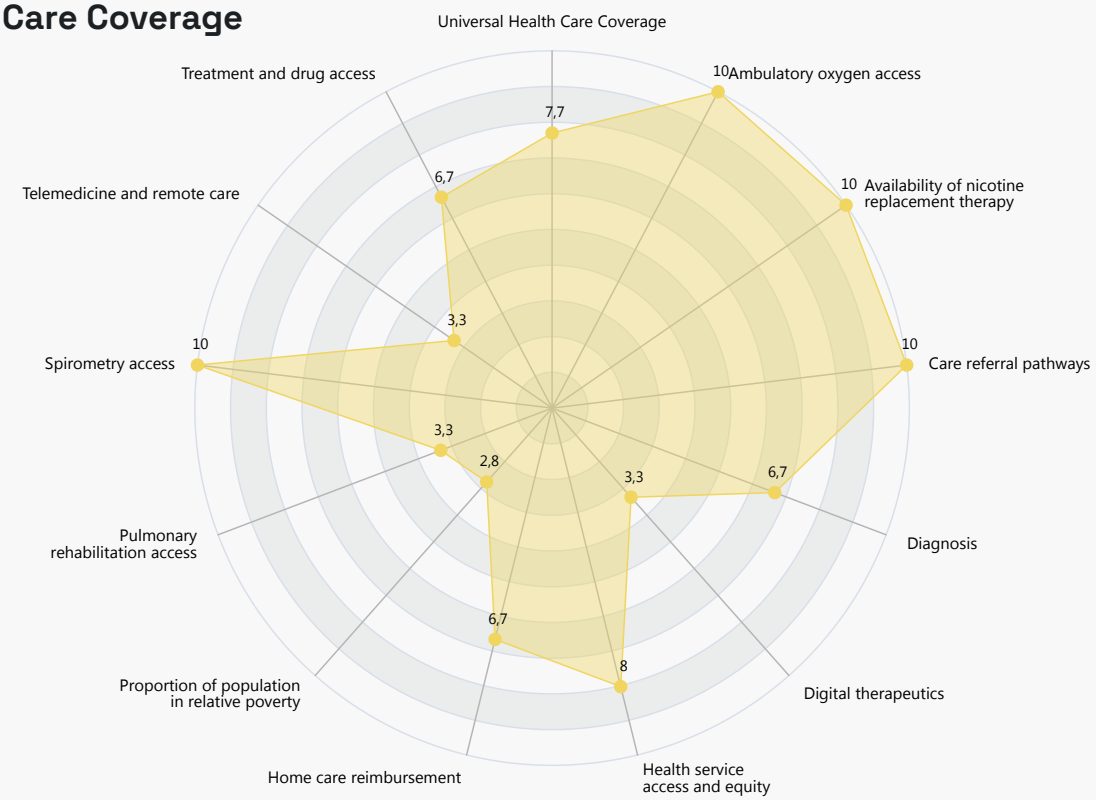
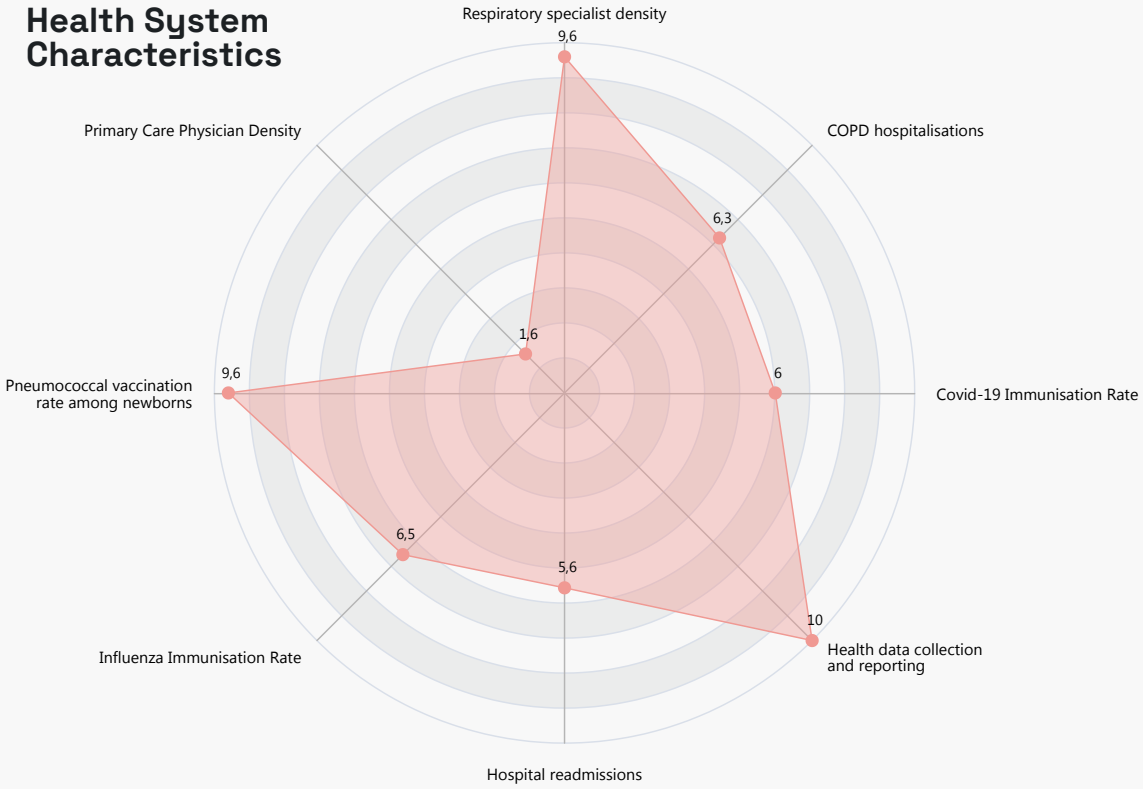
Policy Context



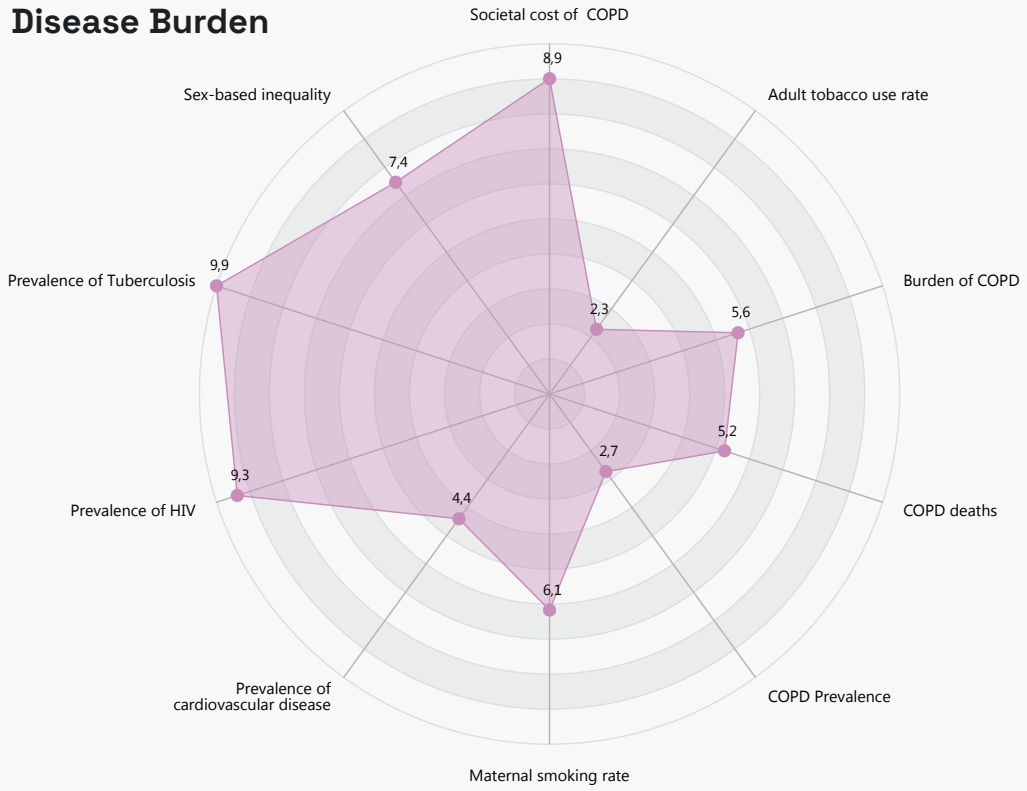
Access and Care Coverage

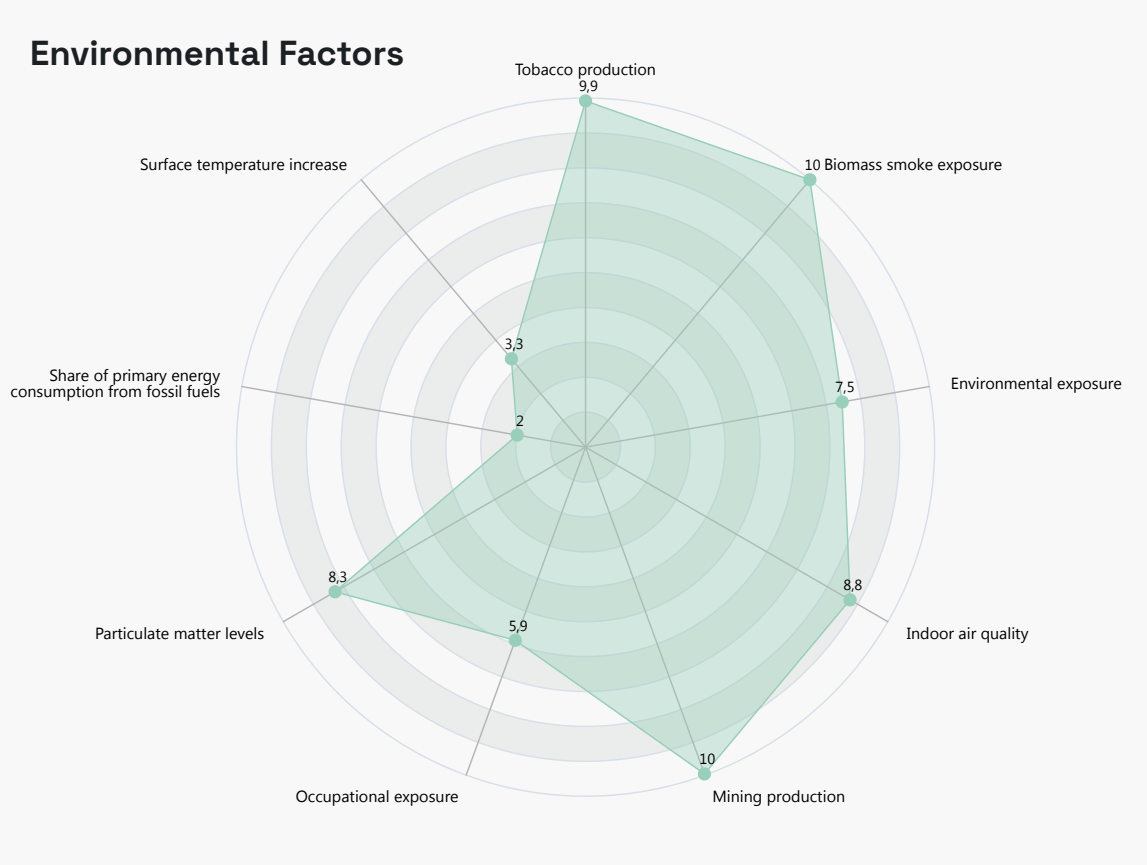


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
9,9
10 Biomass smoke exposure
Environmental exposure
7,5
Indoor air quality
8,8
Mining production
10
Occupational exposure
5,9
Particulate matter levels
8,3
Share of primary energy consumption from fossil fuels
2
Surface temperature increase
3,3

Hungary

Hungary scores above average in the Access and Care Coverage category, with good conditions for diagnosis, treatment, and drug access, strong care referral pathways, and telemedicine access. However, Hungary's score could be improved by increasing universal health care service coverage. Hungary reports a robustly average score in the Environmental Factors category score, mainly due to below-average indoor air quality and particulate matter exposure. In the Policy Context category, Hungary scores just below average, with good adherence to COPD guidelines but a lack of a comprehensive COPD strategy. Improvements in the scope and implementation of tobacco control policy in Hungary would also improve its score. In the Health System Characteristics category, Hungary scores below average, with good conditions for health data collection and reporting and a relatively high number of respiratory specialists, but a low density of primary care physicians. Hungary has the second lowest score in the Disease Burden category, mainly due to high COPD sex-based inequality, comparatively high estimated societal cost of COPD, and high COPD death and tobacco use rates.

Country Score
61.6

Rank
24

COPD Death Rate (% of all deaths)
3.9%

Smoking Rate (%)
31.8%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,816

KEY TAKEAWAYS

- Second highest COPD disease burden
- Good conditions for Access and Care Coverage, but significant gaps in universal health coverage
- Low density of primary care physicians

Insights

Challenges

- Lack of prevention strategies
- Underdiagnosis
- Low medication adherence

Opportunities

- Improve medication adherence to prevent exacerbation
- Emphasis on screening and early diagnosis of COPD
- Increase support for smoking cessation and pulmonary rehabilitation services

Priorities

- Reduce the burden from the National Pulmonology Network
- Faster diagnosis
- Improve medication adherence

Best practices in COPD care

- "National Pulmonology Network" (Országos Tüdögondozó Hálózat)

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> **"[The challenge is that] ... The National Pulmonology Network system is heavily overburdened. Patients often face long waiting lists for diagnostic tests, specialist consultations, and treatment procedures."**

Resources

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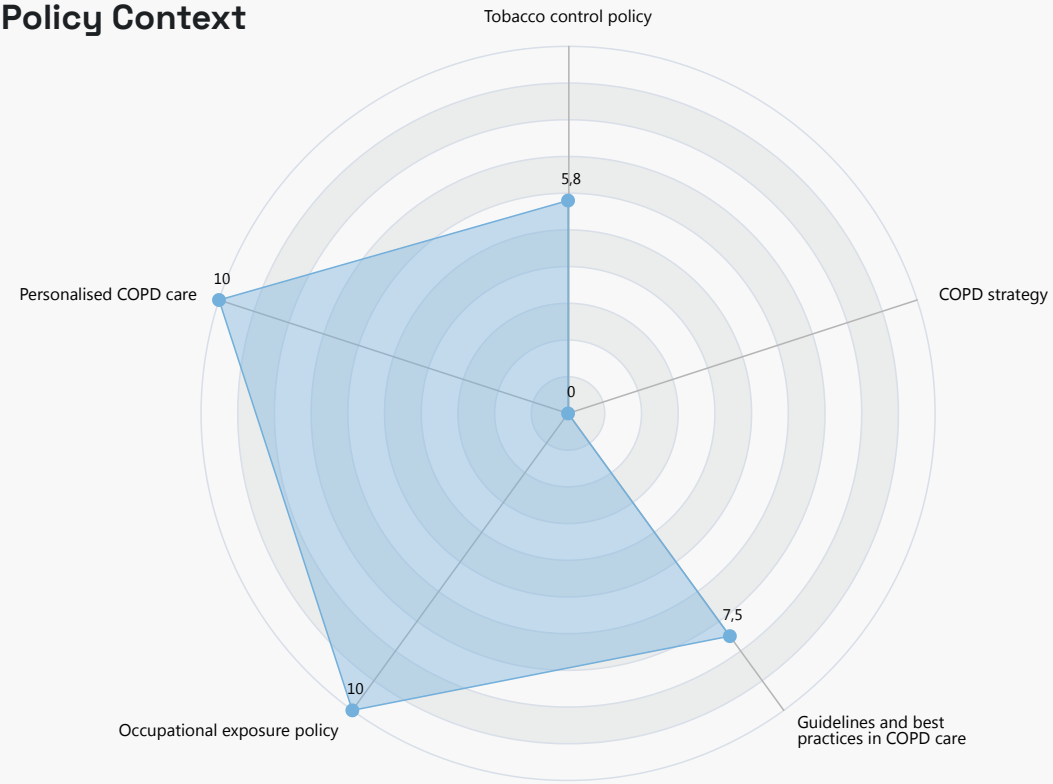
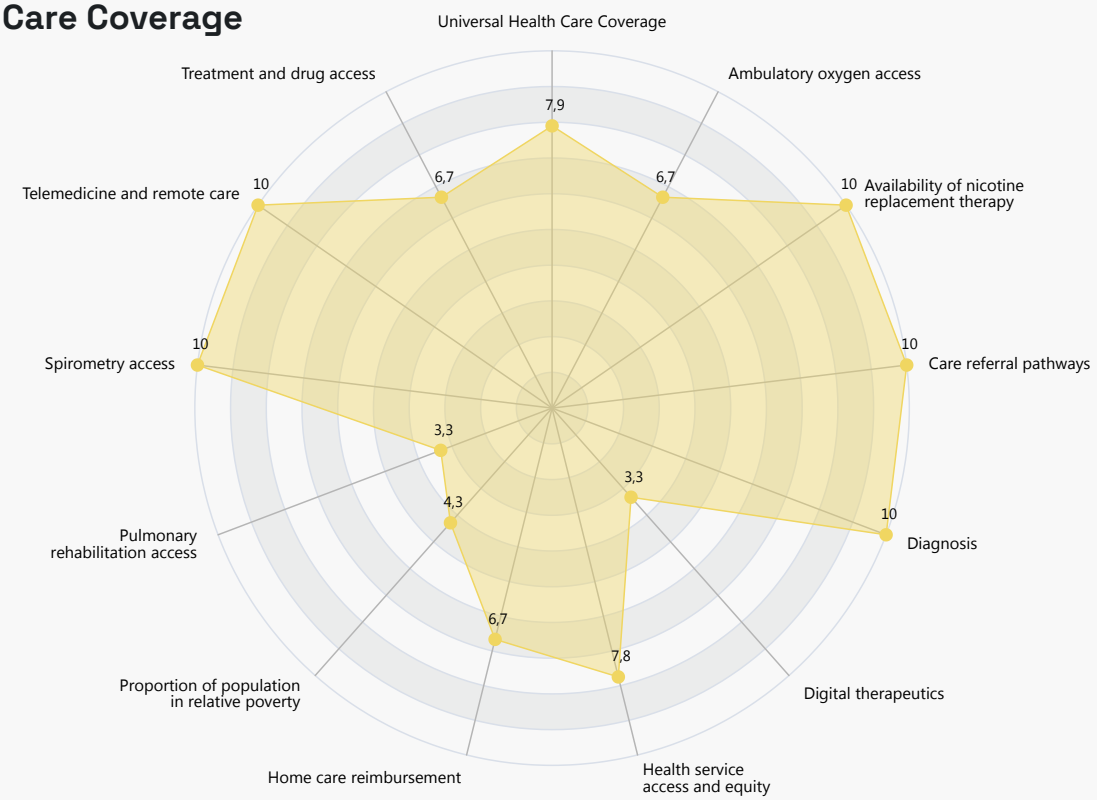
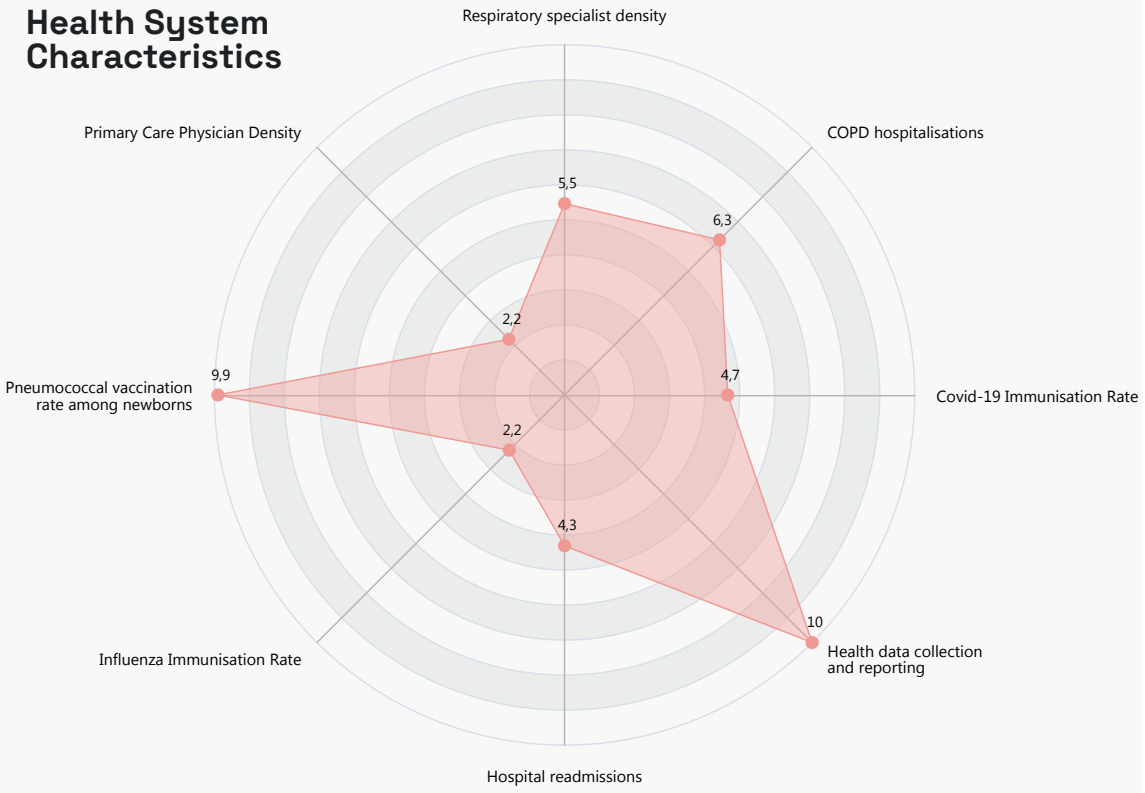
Policy Context



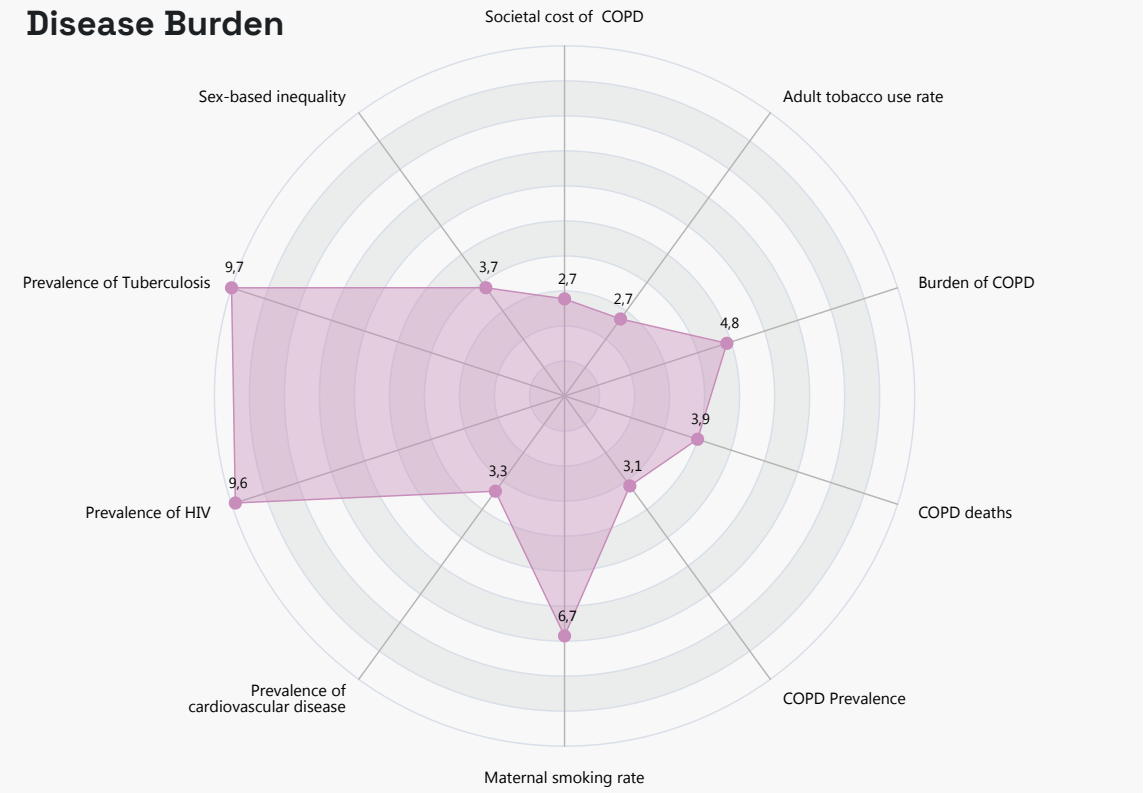
Access and Care Coverage

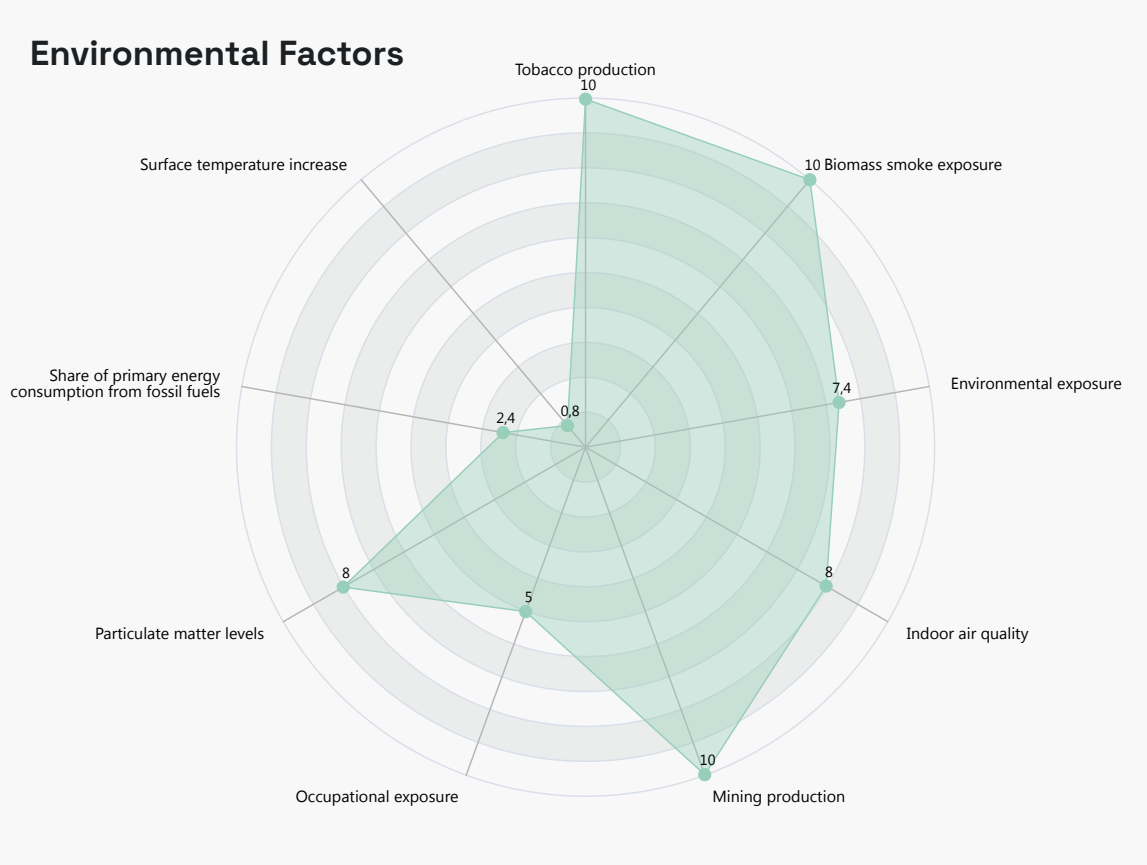


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
7,4
Indoor air quality
8
Mining production
10
Occupational exposure
5
Particulate matter levels
8
Share of primary energy consumption from fossil fuels
2,4
Surface temperature increase
0,8

India

India scores low in the Policy Context category, despite the existence of a national strategy for COPD and COPD guidelines. Increasing strategy implementation and adherence to guidelines would greatly improve India's overall score. Similarly, while India has tobacco control policies in place, greater implementation and monitoring would further improve its overall score. India is among the lowest scorers in the Access and Care Coverage category, mainly due to a lack of access to treatment, diagnostics, and low universal health care service coverage. However, there are good conditions for access to telemedicine. India's score in the Health System Characteristics category is low, compounded by a lack of conditions for health data collection and sharing. India also reports a low score in the Environmental Factors category, mainly due to high particulate matter and biomass smoke exposure, which contribute to high levels of environmental exposure to COPD risk factors. India also reports an above-average burden of COPD with a very high death rate. Given the size, developmental diversity, and mixed health care system of India it is crucial to note that these scores may not be generalisable to the whole country.

Country Score
48.9

Rank
34

COPD Death Rate (% of all deaths)
9.1%

Smoking Rate (%)
27.2%

Estimated Societal Cost of COPD per capita (2017 INT$)
$272

KEY TAKEAWAYS

- Implementation of policy and improved adherence to guidelines would greatly improve India's COPD care and management
- There is limited access to care and diagnostic services, which may be largely explained by India's size, urban-rural divides, and socioeconomic inequalities
- Among the highest burden of disease in the COPD Index, but with a relatively low estimated societal cost

Resources

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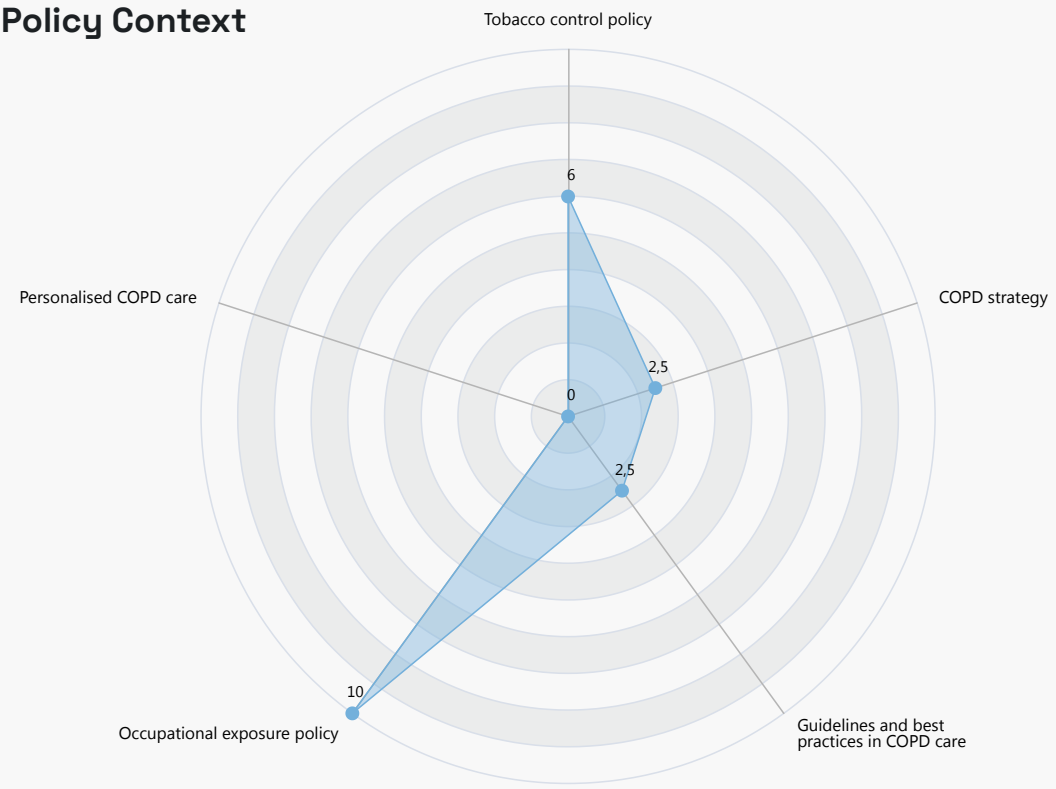
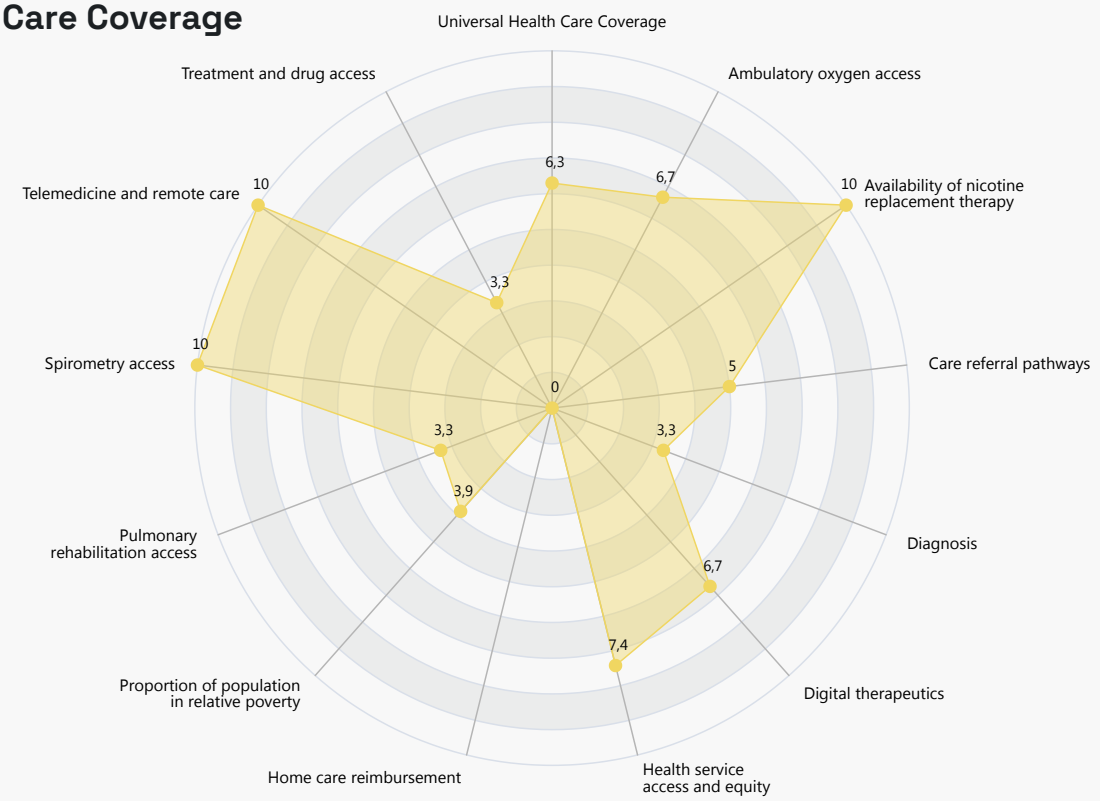
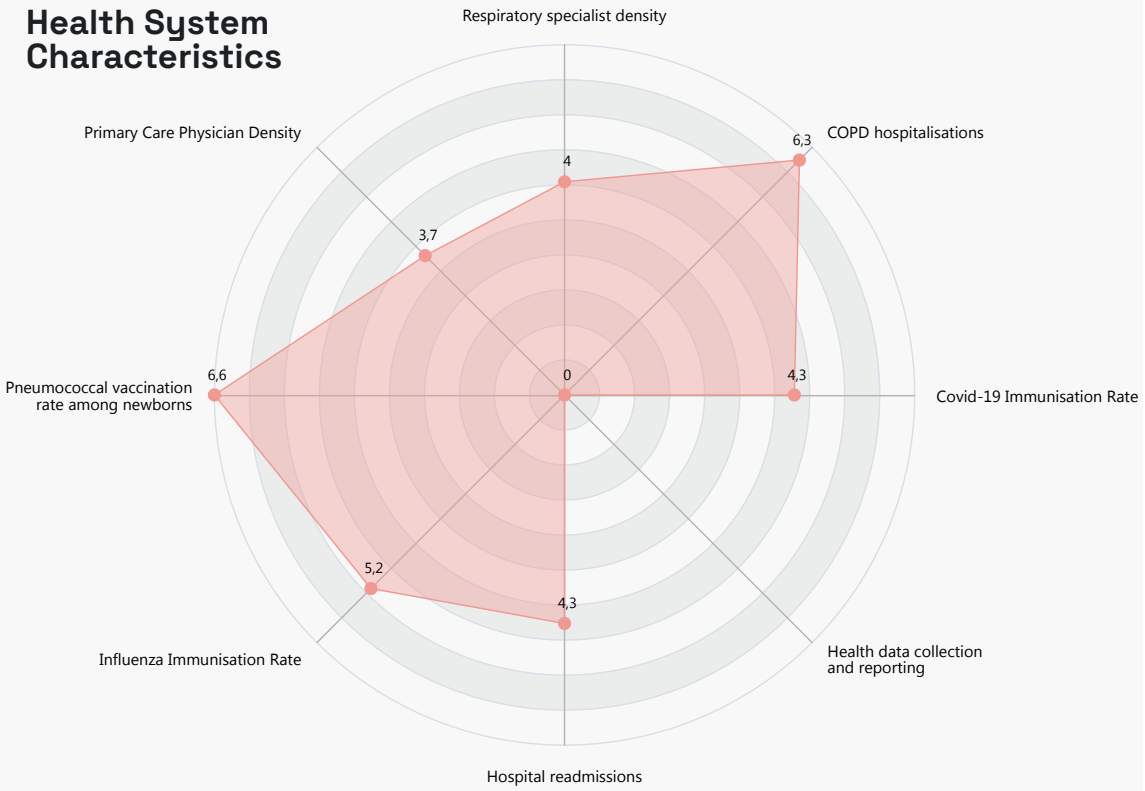
Policy Context



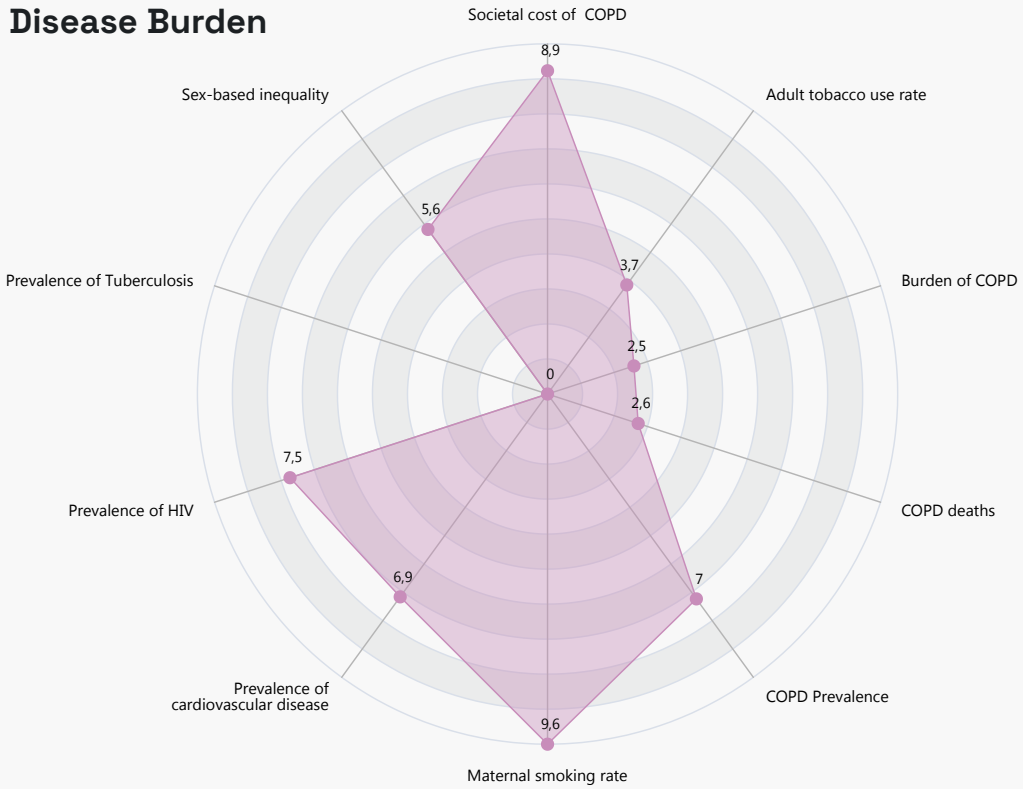
Access and Care Coverage

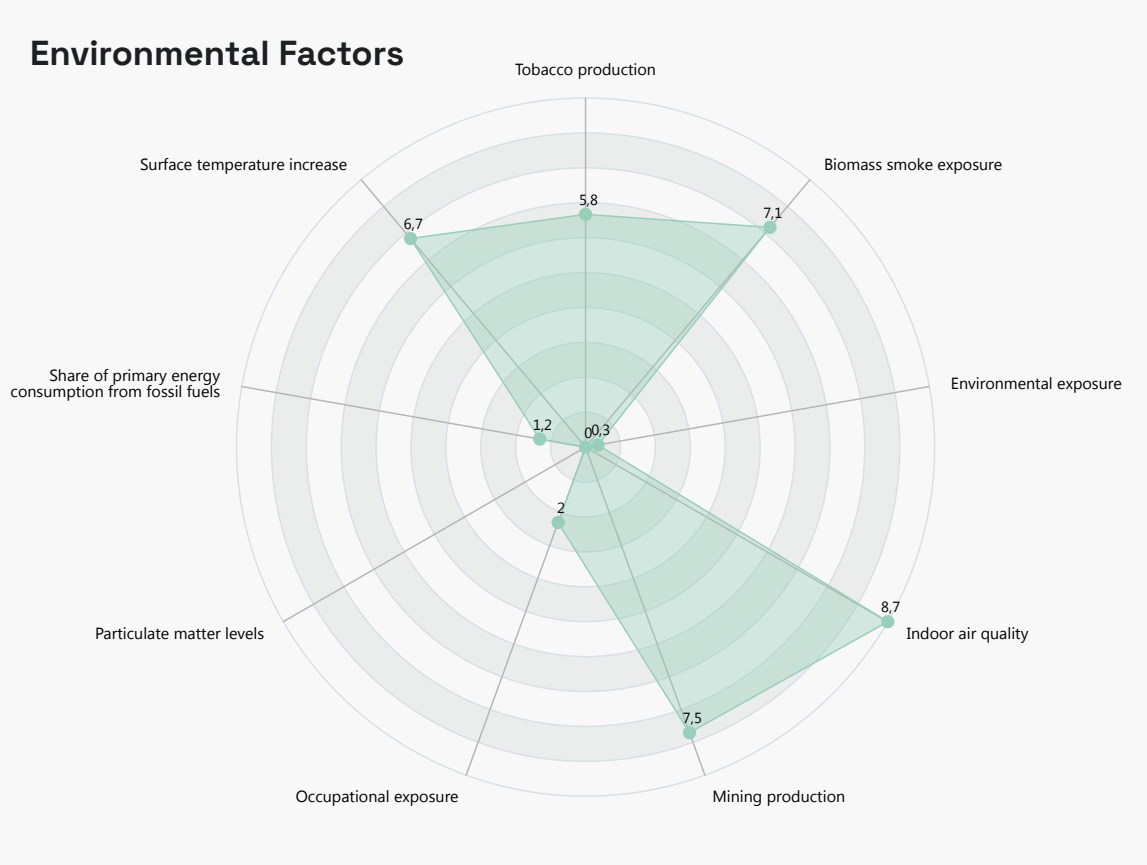


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
Biomass smoke exposure
Environmental exposure
Indoor air quality
Mining production
Occupational exposure
Particulate matter levels
Share of primary energy consumption from fossil fuels
Surface temperature increase
5,8
7,1
0,3
8,7
7,5
2
1,2
6,7

Ireland

Ireland scores high in Access and Care Coverage, mainly due to good conditions for diagnosis, universal health coverage, and access to treatment and drugs, with minor improvements possible in telemedicine and care referral pathways. Similarly, their Environmental Factors score is high, with low particulate matter levels and low environmental and occupational exposure. In Policy Context, Ireland scores above the average, mainly due to their strong tobacco control policy, COPD strategy and guidelines. However, improvements in strategy implementation and increased guideline adherence would improve Ireland's Policy Context score. On the other hand, Ireland scores below average in Health System Characteristics, most likely due to the high number of COPD hospitalisations and a lack of health data, despite a relatively high number of primary care physicians. The burden of COPD is above average, with the highest maternal smoking rate, indicating a need for stricter tobacco policy implementation.

Country Score
65.6

Rank
12

COPD Death Rate (% of all deaths)
6.2%

Smoking Rate (%)
20.8%

Estimated Societal Cost of COPD per capita (2017 INT$)
$926

KEY TAKEAWAYS

- High performer in the Access and Care Coverage category due to good conditions for diagnosis, universal health coverage, and access to treatment and drugs
- Strong performance in the Environmental Factors and Policy Context categories
- Lack of rigorous health data, which prevents an in-depth understanding of health system characteristics and their impact on COPD management

Resources

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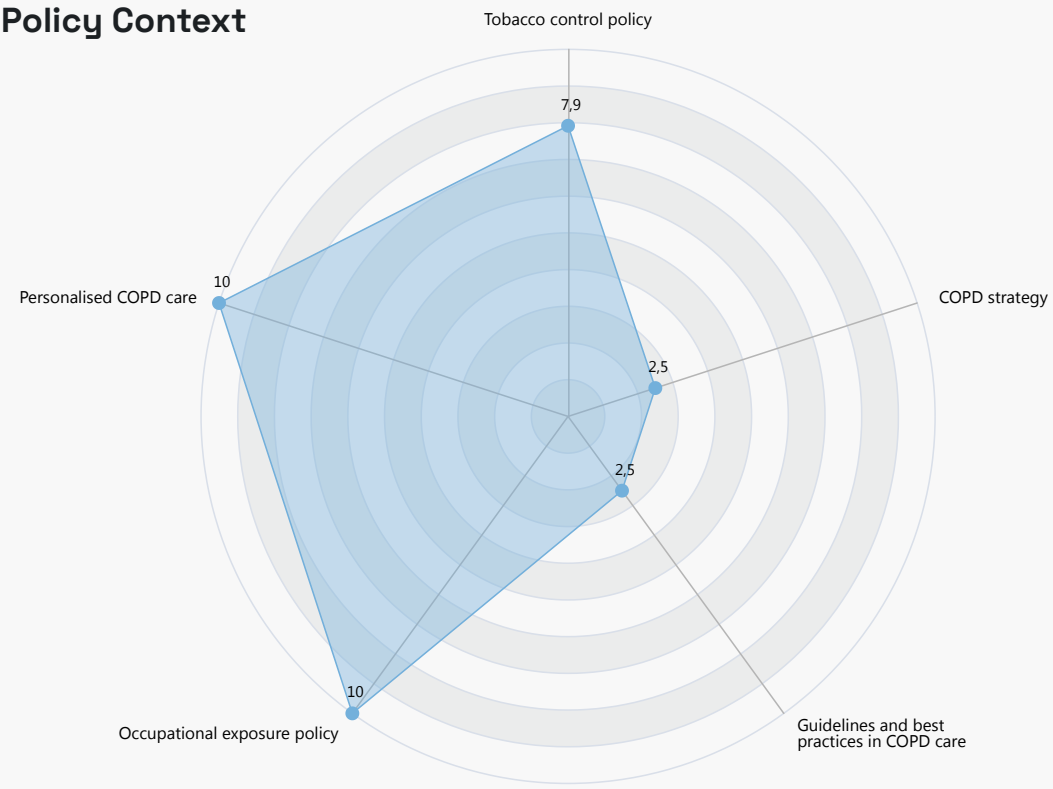
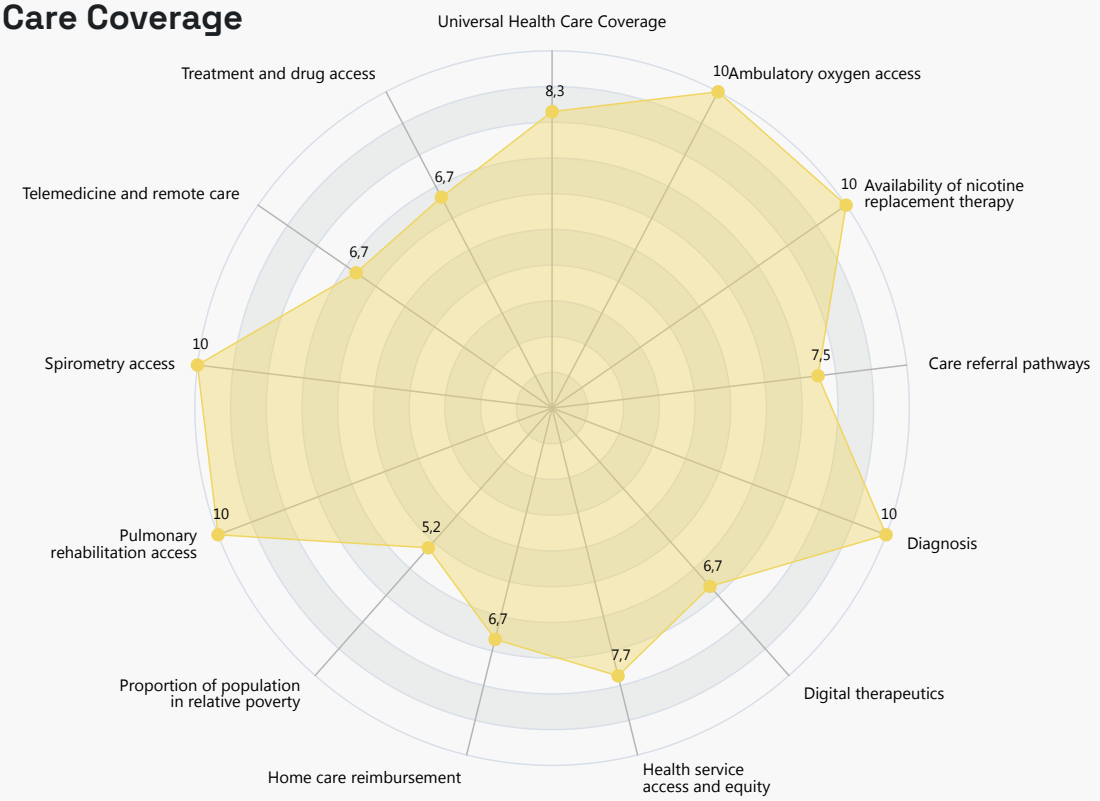
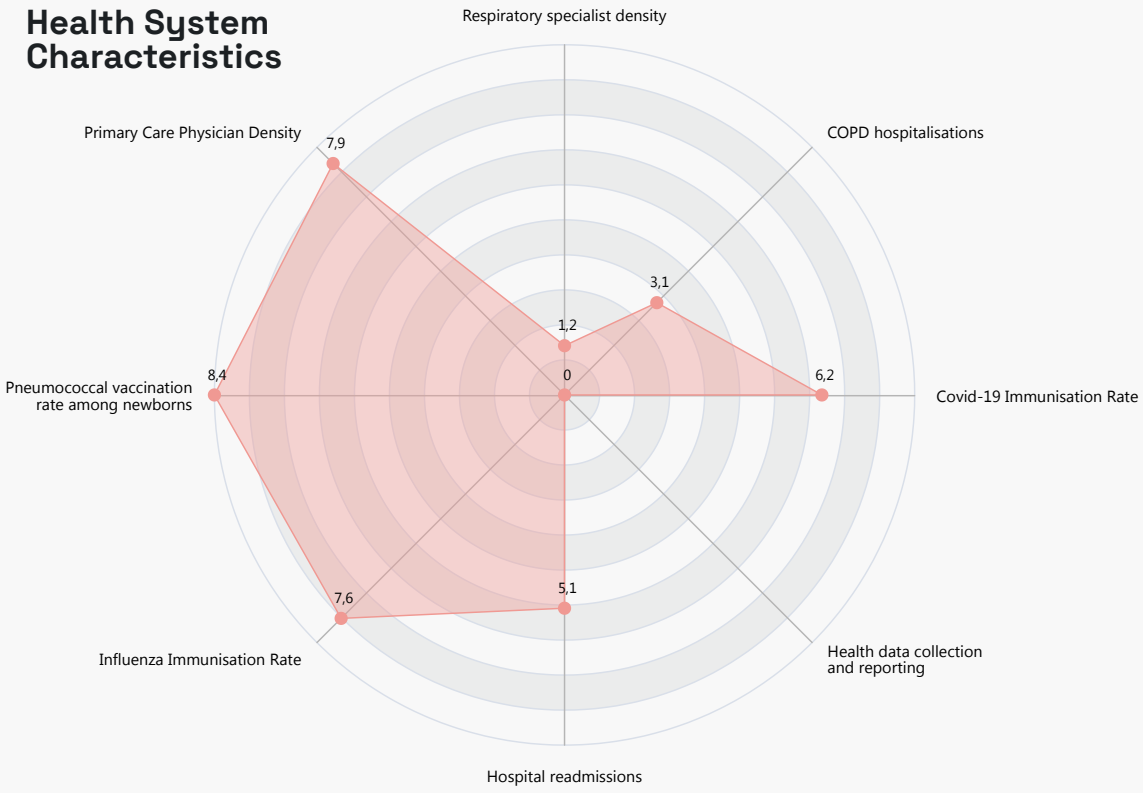
Policy Context



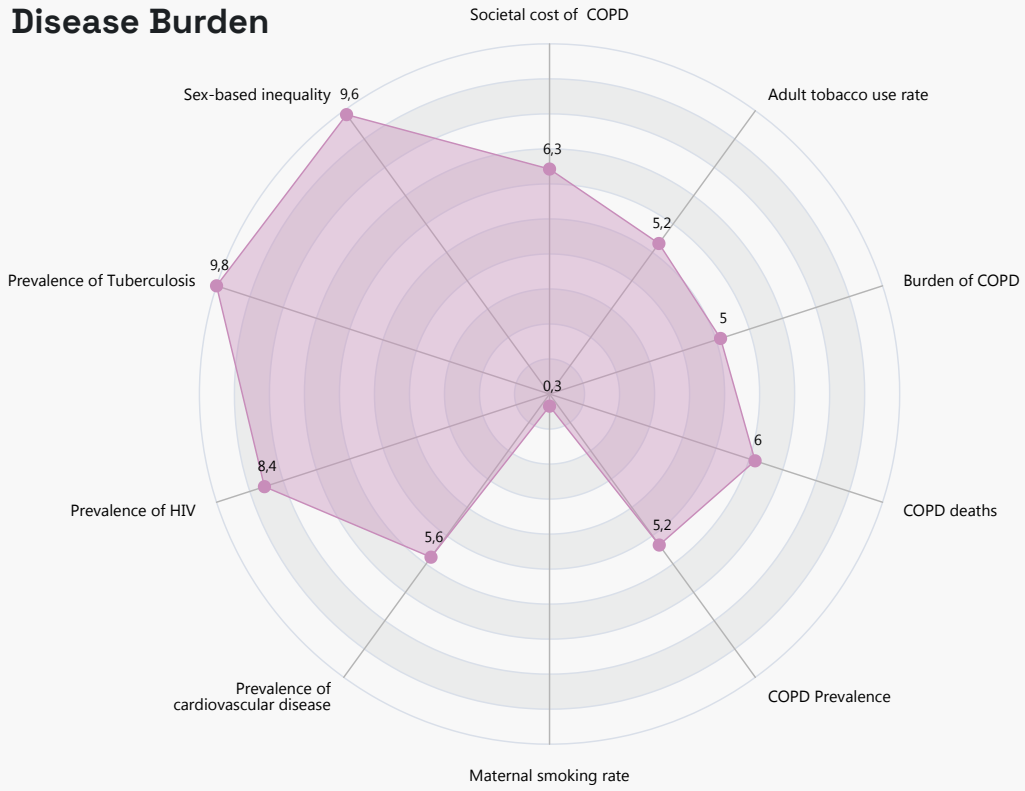
Access and Care Coverage

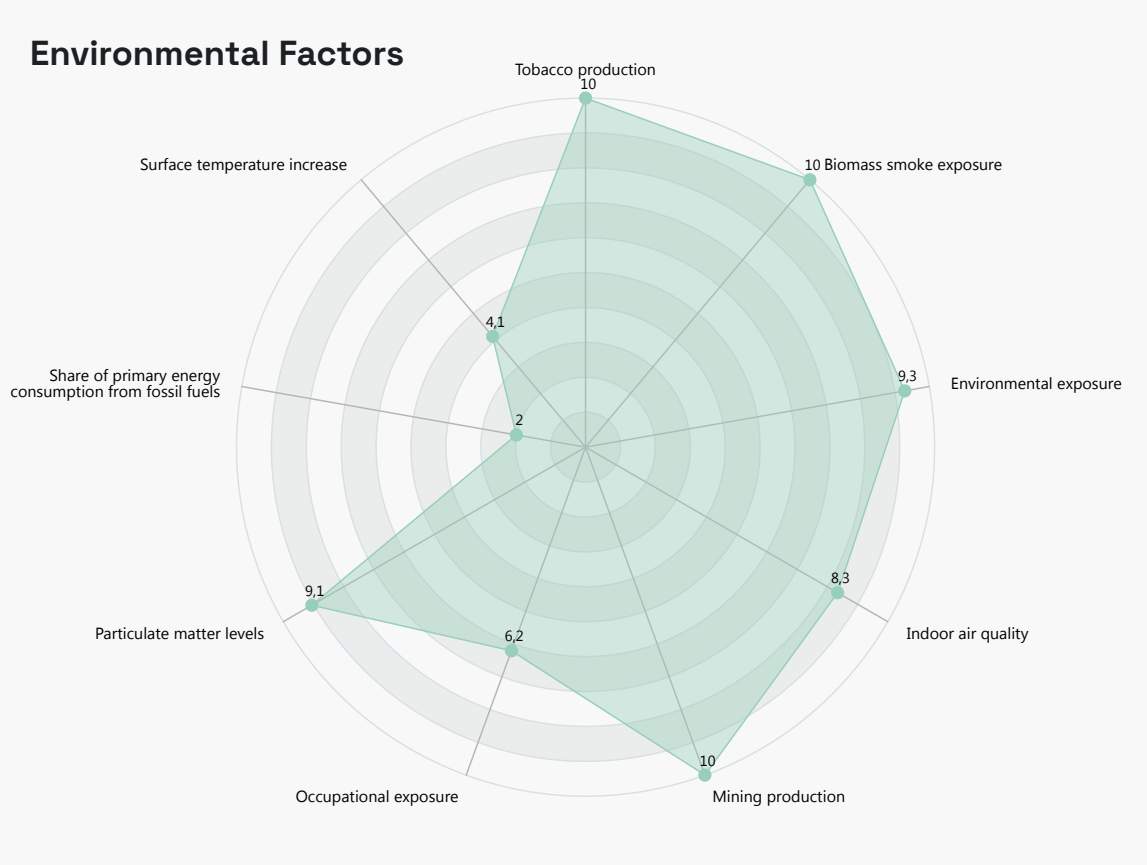


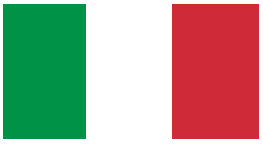
Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
9,3
Environmental exposure
8,3
Indoor air quality
10
Mining production
6,2
Occupational exposure
9,1
Particulate matter levels
2
Share of primary energy consumption from fossil fuels
4,1
Surface temperature increase



Italy

Italy scores very high in Health System Characteristics, mainly due to a low number of annual COPD hospitalisations, a high number of respiratory specialists and good health data reporting. Italy would benefit from slightly more primary care physicians. For Policy Context Italy scores relatively high, mainly due to a highly implemented COPD strategy, and relatively strong guidelines and adherence. Italy's score for Access and Care Coverage is slightly above the average, with relatively good treatment, drug access, and conditions for diagnosis, with some improvements needed in care referral pathways. Italy's Environmental Factors score is just above average while its Disease Burden is above average, due to a relatively high death rate and COPD prevalence, although relatively low societal cost. Italy's disease burden can be partly explained by improvements needed in care referral pathways and primary care physicians' density.

Country Score
67.7

Rank
7

COPD Death Rate (% of all deaths)
4.1%

Smoking Rate (%)
23.1%

Estimated Societal Cost of COPD per capita (2017 INT$)
$441

KEY TAKEAWAYS

- 2nd highest performer in Health System Characteristics with low hospitalisation rate for COPD
- Well implemented COPD strategy indicating alignment between policy and practice
- Above average COPD death rate

Insights

Challenges

- Lack of case-finding among physicians
- Inadequate COPD awareness and prevention despite plans and guidelines
- Lack of integrated care and treatment adherence

Opportunities

- Innovative drugs (new anti-inflammatory drugs, triple therapy)
- Prevention of cardiovascular events as critical comorbidities
- Public health campaigns to raise awareness

Priorities

- Increase public awareness and education
- Address geographic disparities in health care access
- Address lack of standardised clinical follow-up, long waiting times, and delayed diagnosis

Best practices in COPD care

- Advanced diagnostic protocols (i.e. standardised spirometry) supported by guidelines from the Italian Society of Pulmonology (SIP)
- Promotion of integrated care and a multidisciplinary approach to COPD

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> **"[A strong country practice is] Advanced Diagnostic Protocols in particular the use of spirometry is standardised and widespread, supported by guidelines from the Italian Society of Pulmonology (SIP). This should ensure early and accurate diagnosis of COPD across the country."**

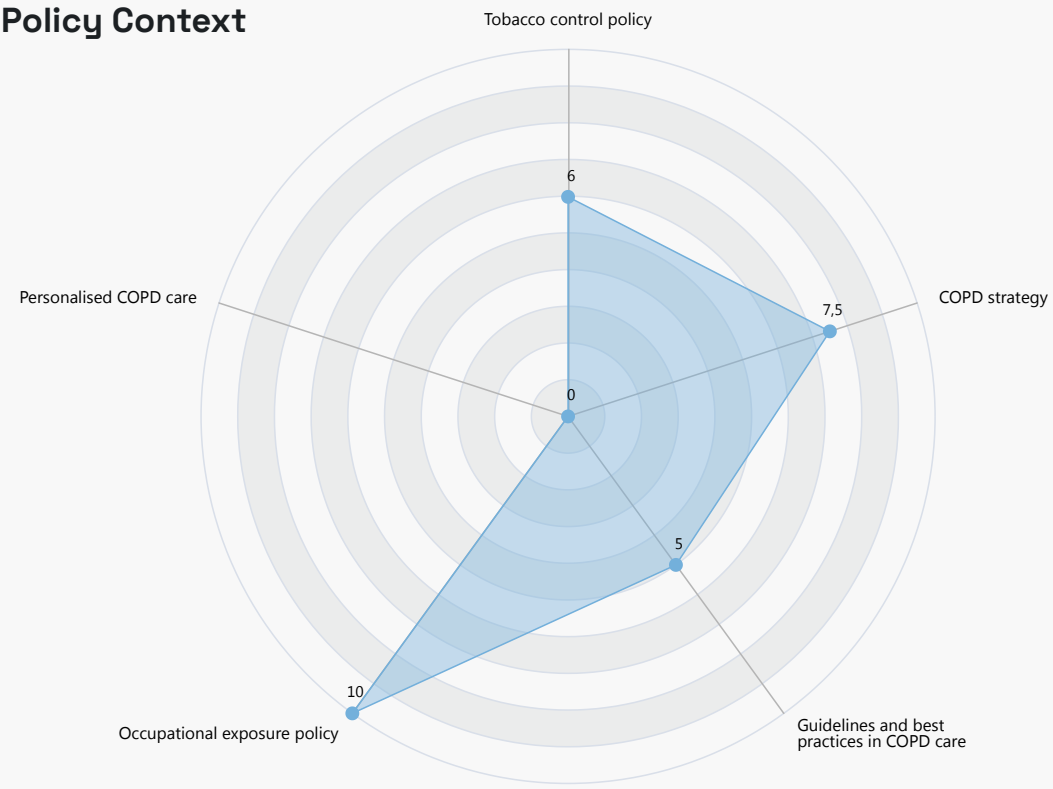
> **"Italy promotes integrated care models and pulmonary rehabilitation programs, providing a multidisciplinary approach to COPD management."**

> **"The path ahead remains long, and there is significant room for improvement."**

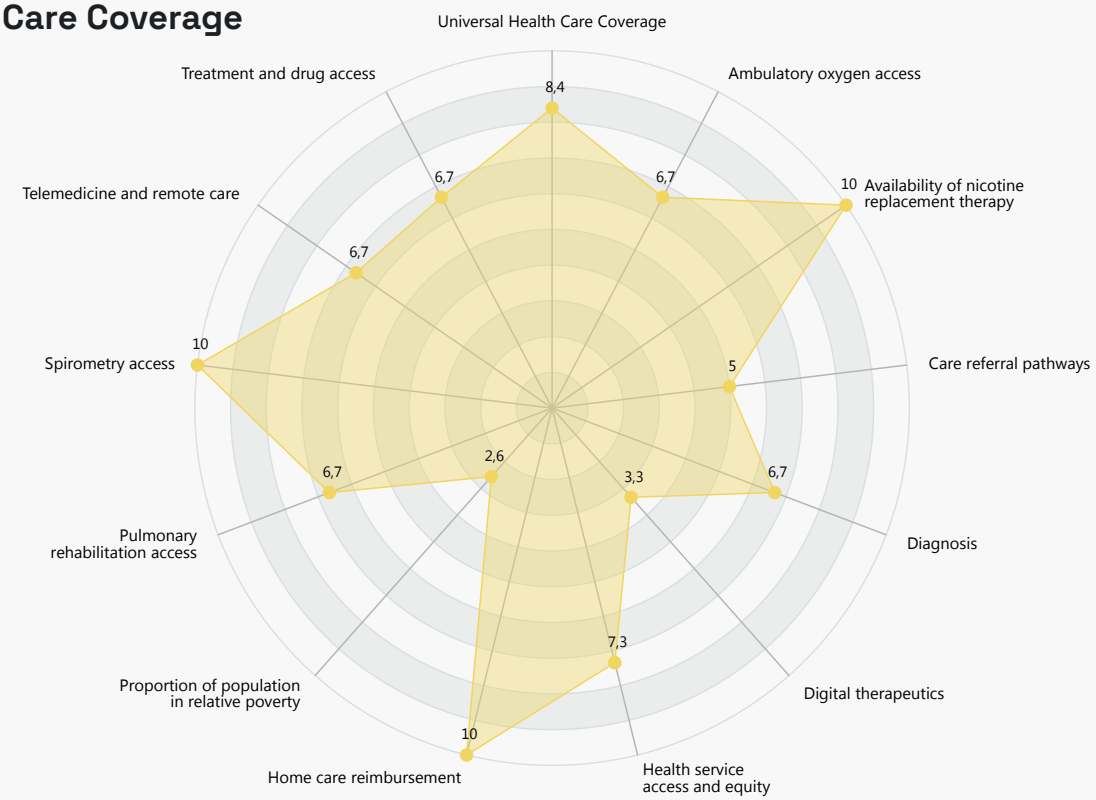
Resources

Please scan this QR code to view the sources.

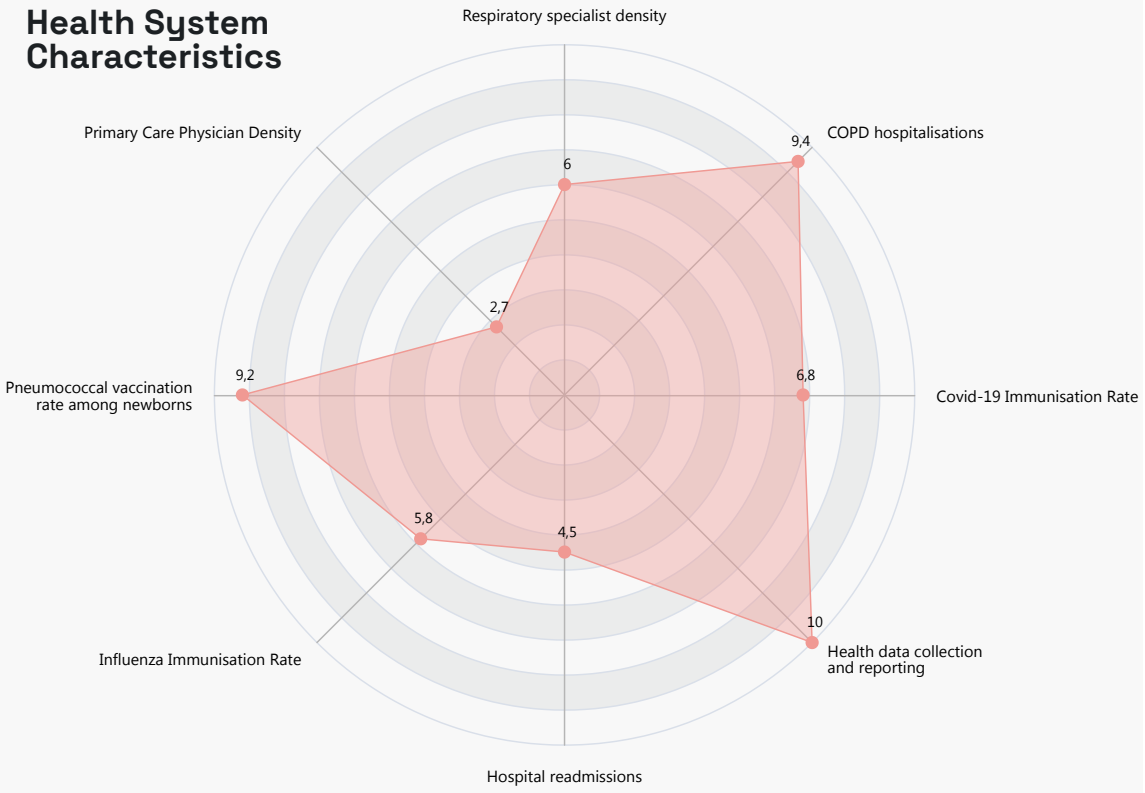
Policy Context



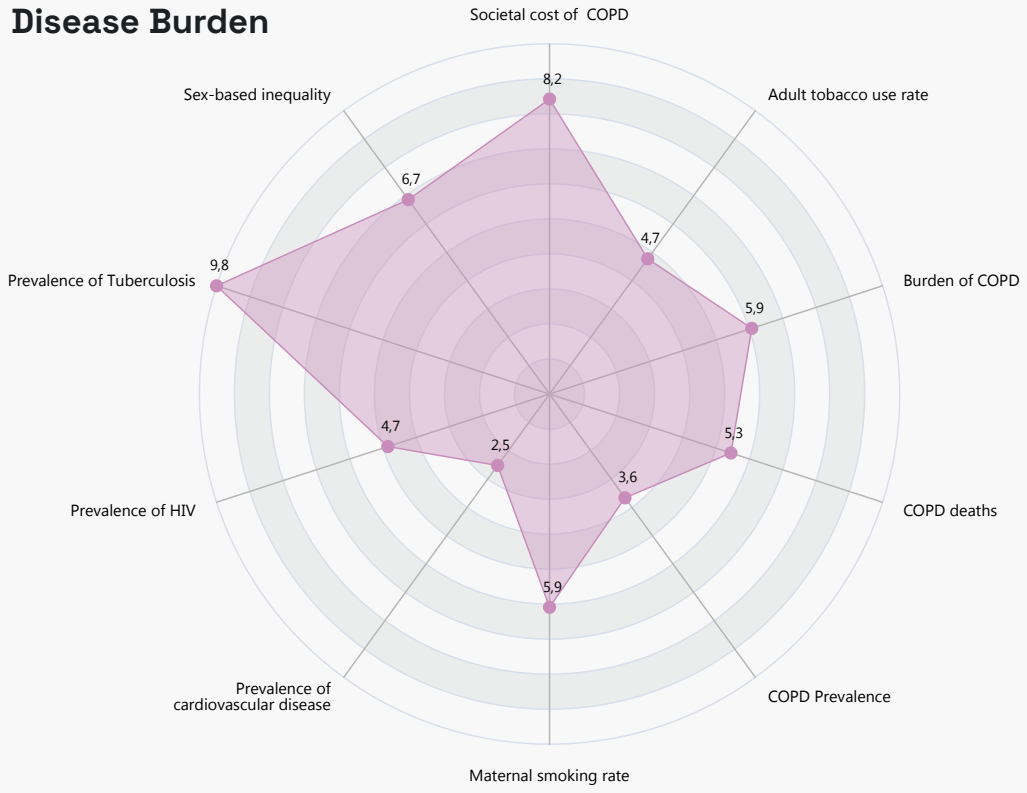
Access and Care Coverage

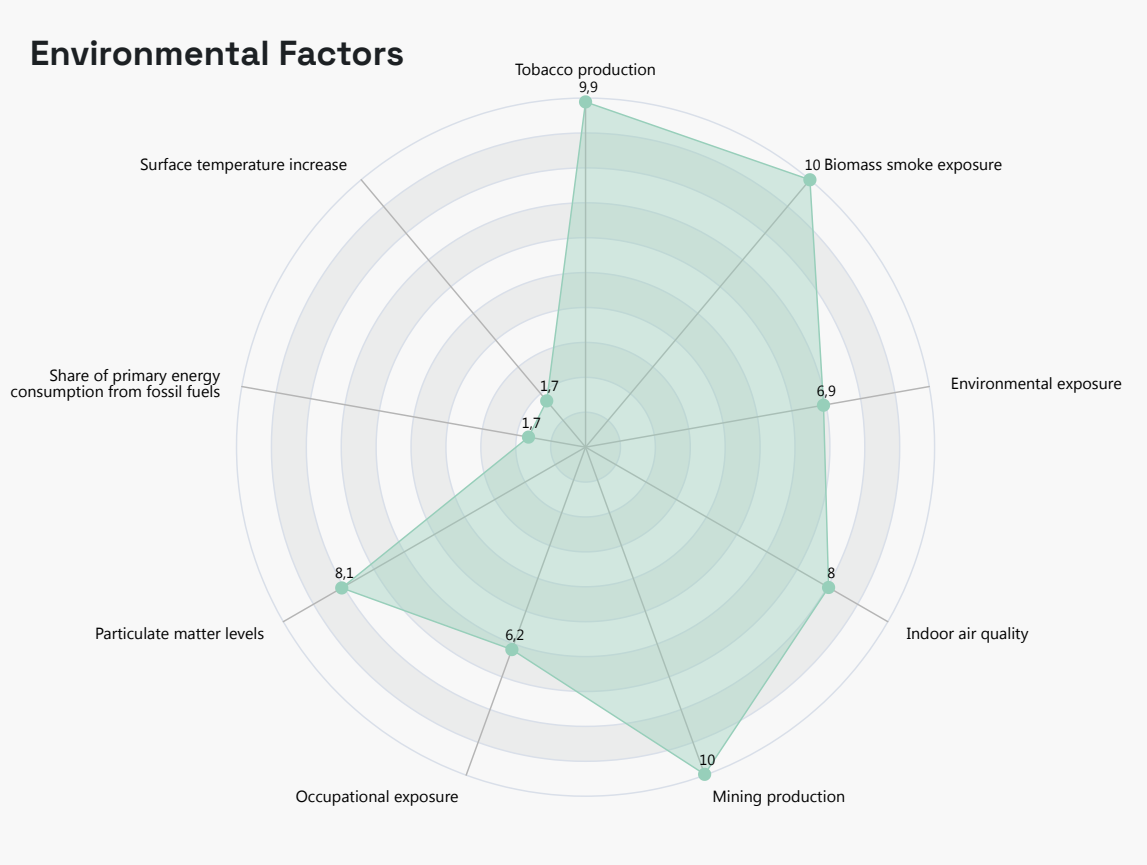


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
9,9
10 Biomass smoke exposure
Environmental exposure
Indoor air quality
Mining production
Occupational exposure
Particulate matter levels
Share of primary energy consumption from fossil fuels
Surface temperature increase
1,7
6,9
1,7
8,1
6,2
8
10

Japan

Japan scores high in the Policy Context category, primarily due to strong adherence to COPD guidelines and a well-implemented national strategy, though it would benefit from strengthening its tobacco control policy. Japan's score in the Health System Characteristics category is slightly above average, with the highest overall rate of COVID-19 vaccination, though this indicator should be interpreted cautiously due to data limitations. Japan's score is above average in the Environmental Factors category, with relatively low occupational exposure to COPD risk factors and particulate matter exposure levels. The Disease Burden score in Japan is above average, with a relatively low death rate, but high sex-based inequality in the burden of COPD. Japan reports one of the lowest scores in the Access and Care Coverage category, due to only partial access to most services, despite relatively strong care referral pathways.

Country Score
66.4

Rank
8

COPD Death Rate (% of all deaths)
2.3%

Smoking Rate (%)
20.1%

Estimated Societal Cost of COPD per capita (2017 INT$)
$662

KEY TAKEAWAYS

- 4th highest performer in the Policy Context category due to strong adherence to COPD guidelines and a well-implemented national strategy
- Highest rate of COVID-19 vaccination
- Comparatively low levels of Access and Care Coverage

Insights

Challenges

- Ensure early detection in health check-ups at the primary care level
- Low public and primary care awareness of COPD
- Low use of spirometry

Opportunities

- Better detection of COPD at health check-ups to support early diagnosis and intervention

Priorities

- Increase public awareness— people experience symptoms but do not report them when coming for check-ups as they see them as signs of ageing rather than disease

Best practices in COPD care

- High-risk groups are selected with a medical questionnaire and asked to undergo spirometry

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[The challenge is that] … COPD may be missed despite health checkups. Many doctors are unaware that COPD is present in patients who see a general practitioner for hypertension, diabetes and so on. The disease COPD is not well recognised by the people. It is very important to raise awareness of COPD among doctors in charge of medical health checkup, general practitioners, and the public as a whole in Japan."

> "[The challenge is that] … The general public does not come to the hospital because they think cough, sputum and shortness of breath are unavoidable because of their age. They do not report such symptoms even though they regularly visit the doctor for hypertension or diabetes."

Resources

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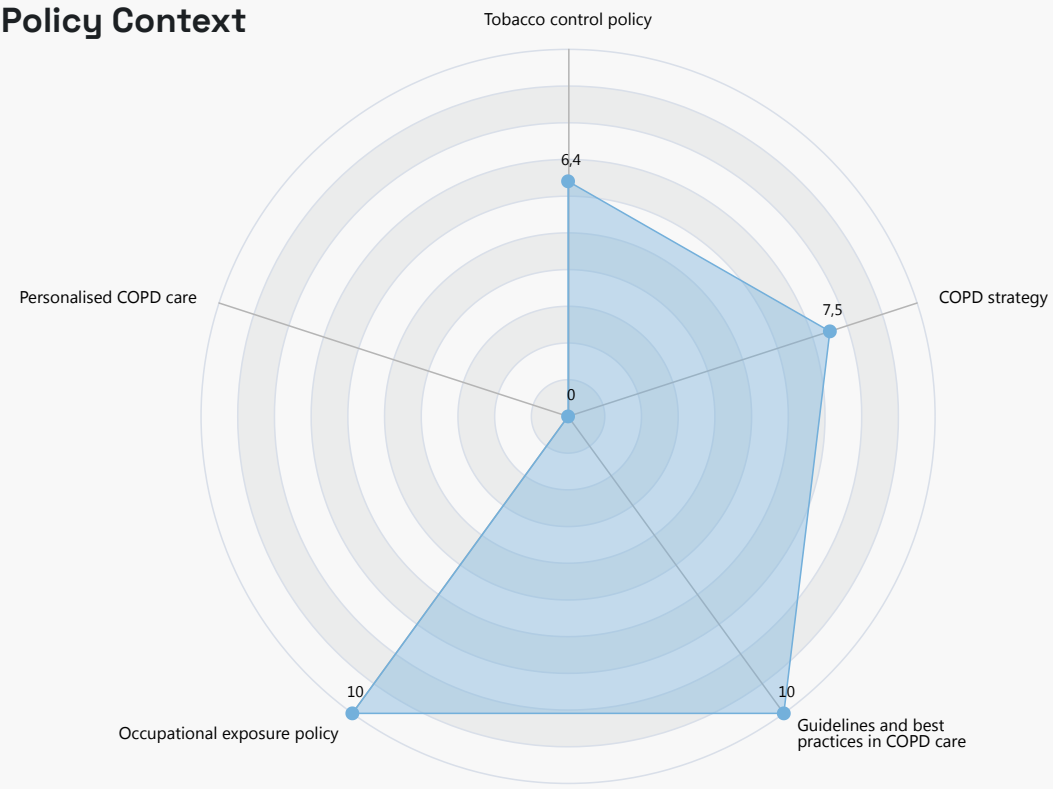
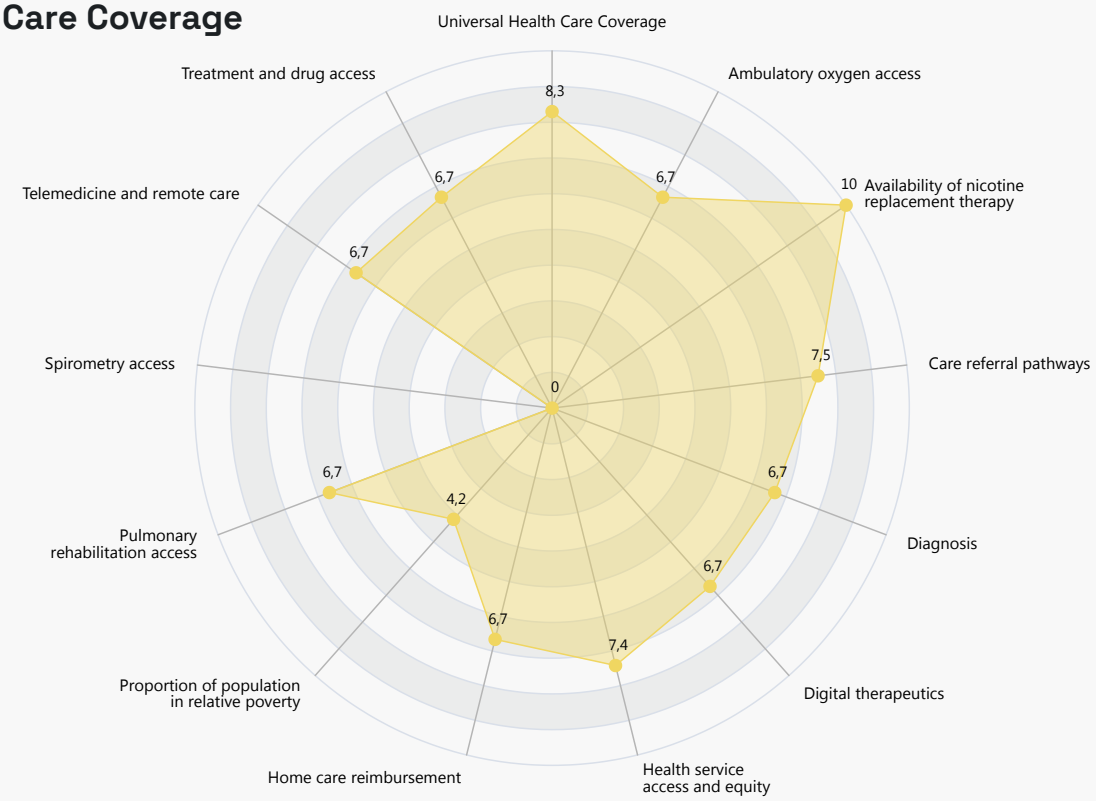
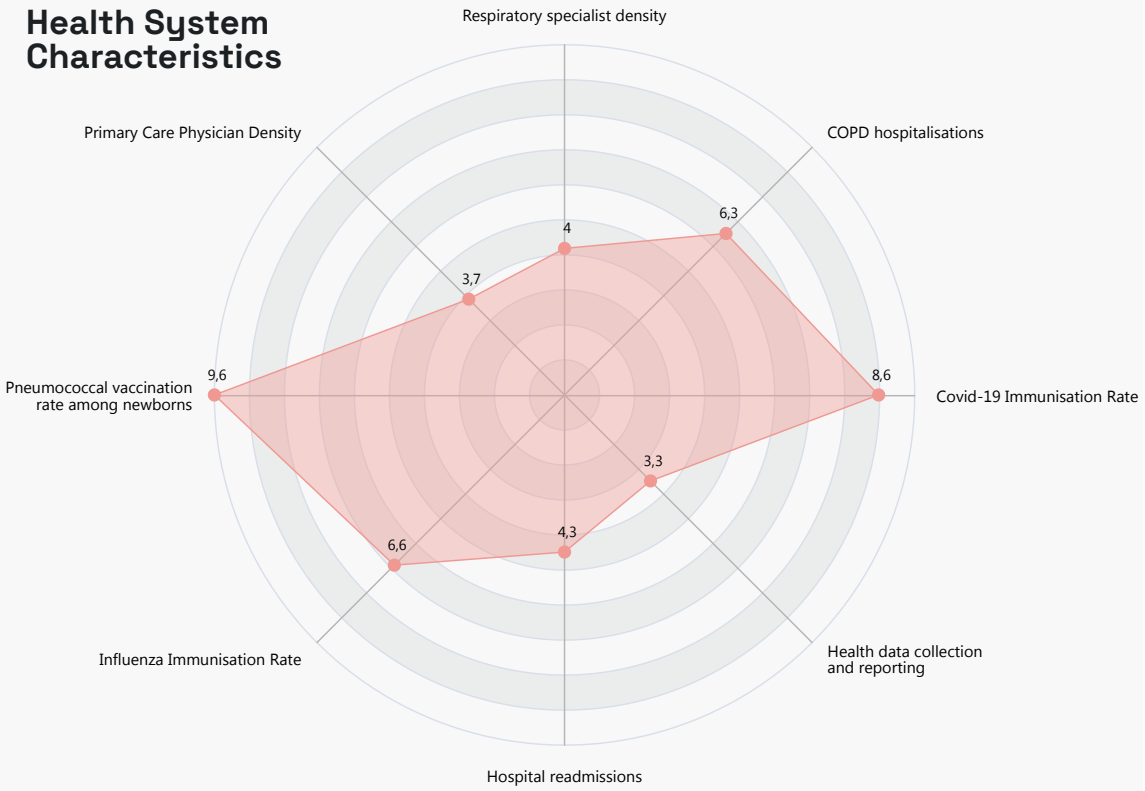
Policy Context



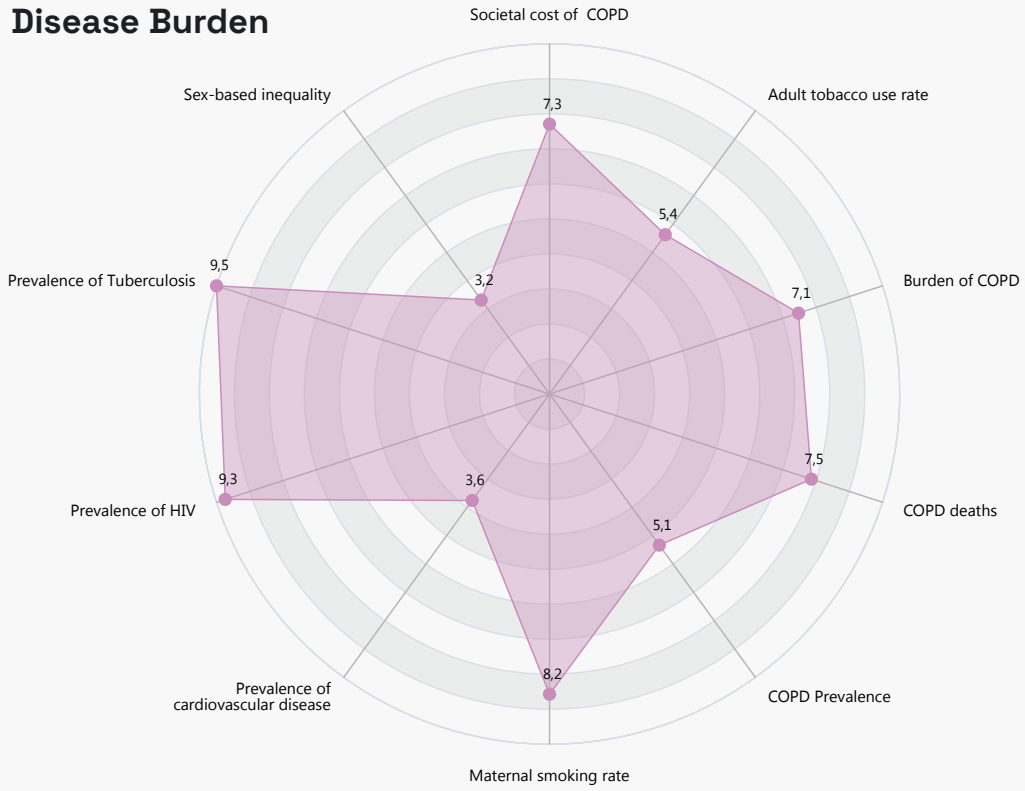
Access and Care Coverage

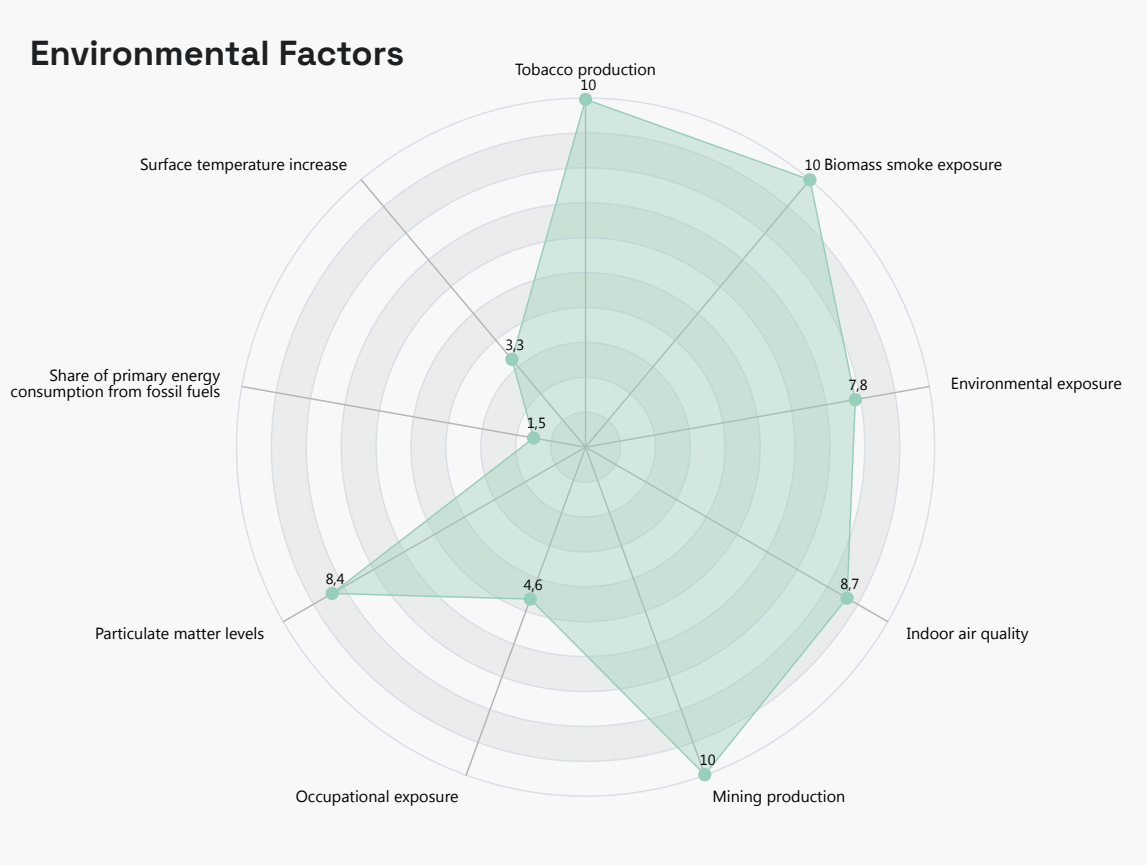


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
7,8
Indoor air quality
8,7
Mining production
10
Occupational exposure
4,6
Particulate matter levels
8,4
Share of primary energy consumption from fossil fuels
1,5
Surface temperature increase
3,3

Latvia

Latvia scores above average in the Environmental Factors category, with relatively low occupational exposure to COPD risk factors. In the Health System Characteristics category, Latvia scores just below average, with a relatively low number of primary care physicians, despite low annual COPD hospitalizations and good conditions for health data collection and reporting. Latvia scores low in the Access and Care Coverage category, mainly due to very high levels of unmet health care needs, high relative poverty, and relatively low universal health care service coverage. However, Latvia reports good conditions for treatment and drug access. Latvia's score in the Disease Burden category is slightly above average, with a low COPD death rate, despite the highest smoking rate among the COPD Index countries. Latvia has the lowest score in the Policy Context category, highlighting a need for a COPD strategy, national guidelines, and stronger tobacco control policies.

Country Score
55.4

Rank
32

COPD Death Rate (% of all deaths)
0.88%

Smoking Rate (%)
37.0%

Estimated Societal Cost of COPD per capita (2017 INT$)
$481

KEY TAKEAWAYS

- Good conditions for health data collection
- Low level of annual COPD hospitalisations
- Smoking rate could be greatly improved with stronger implementation tobacco control policies

Resources

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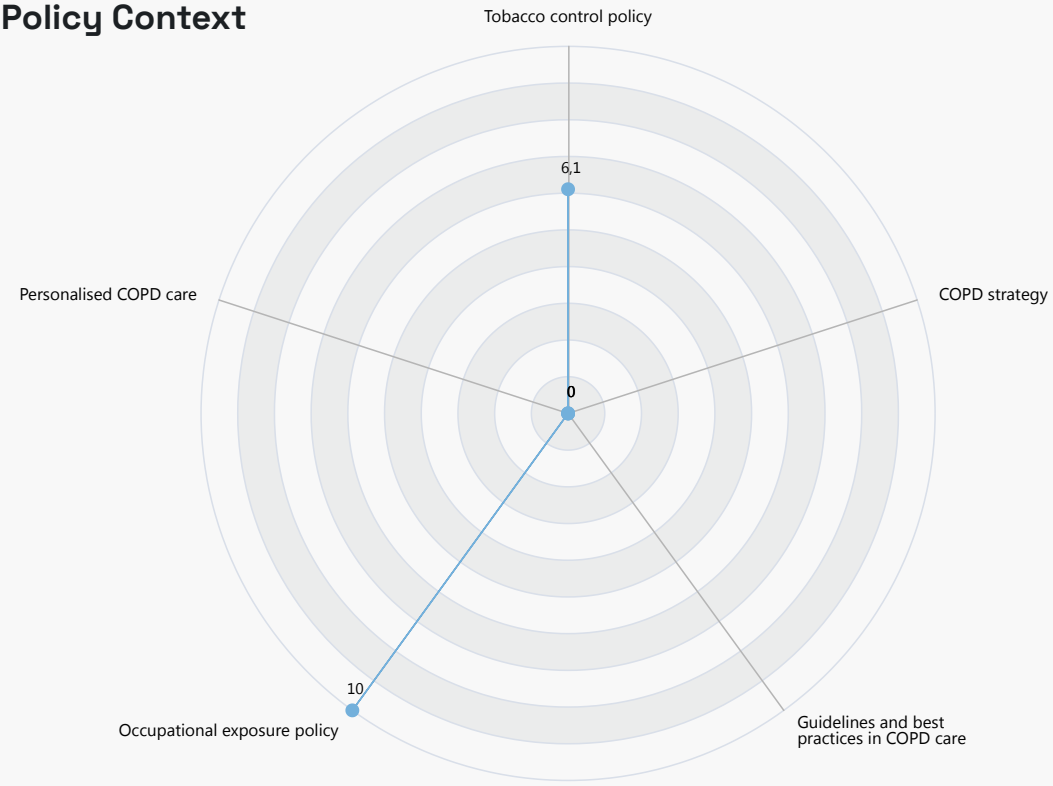
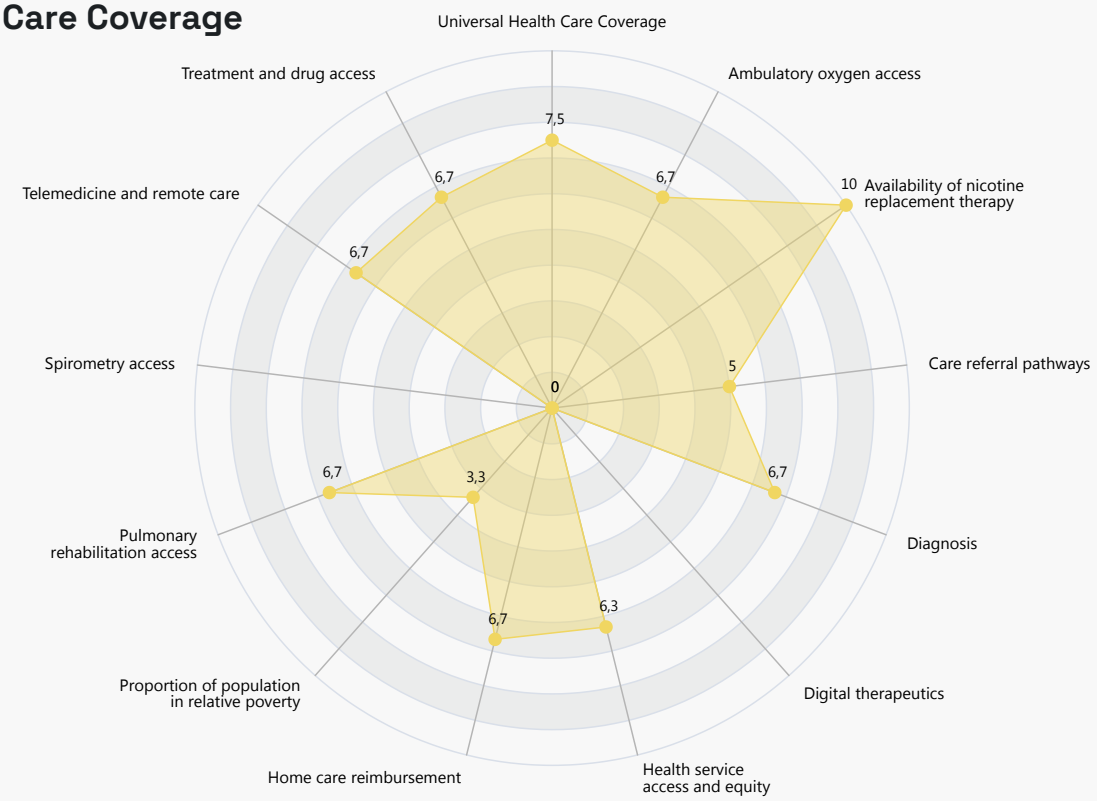
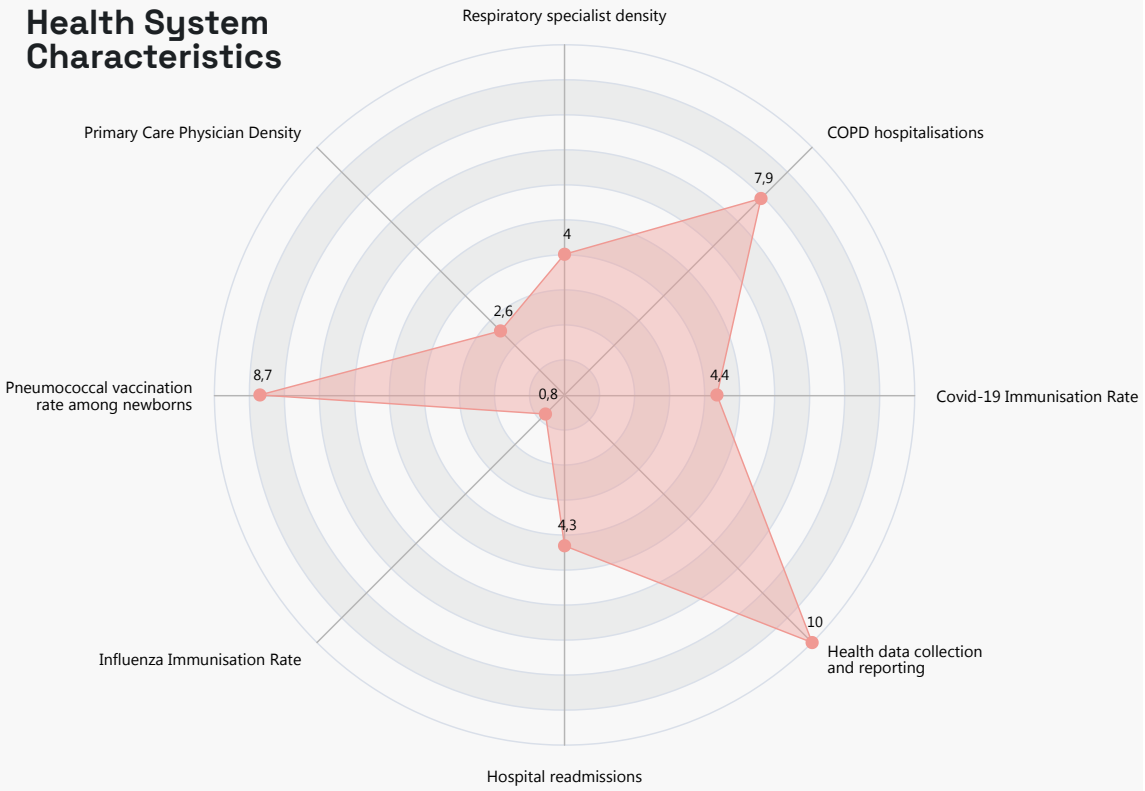
Policy Context



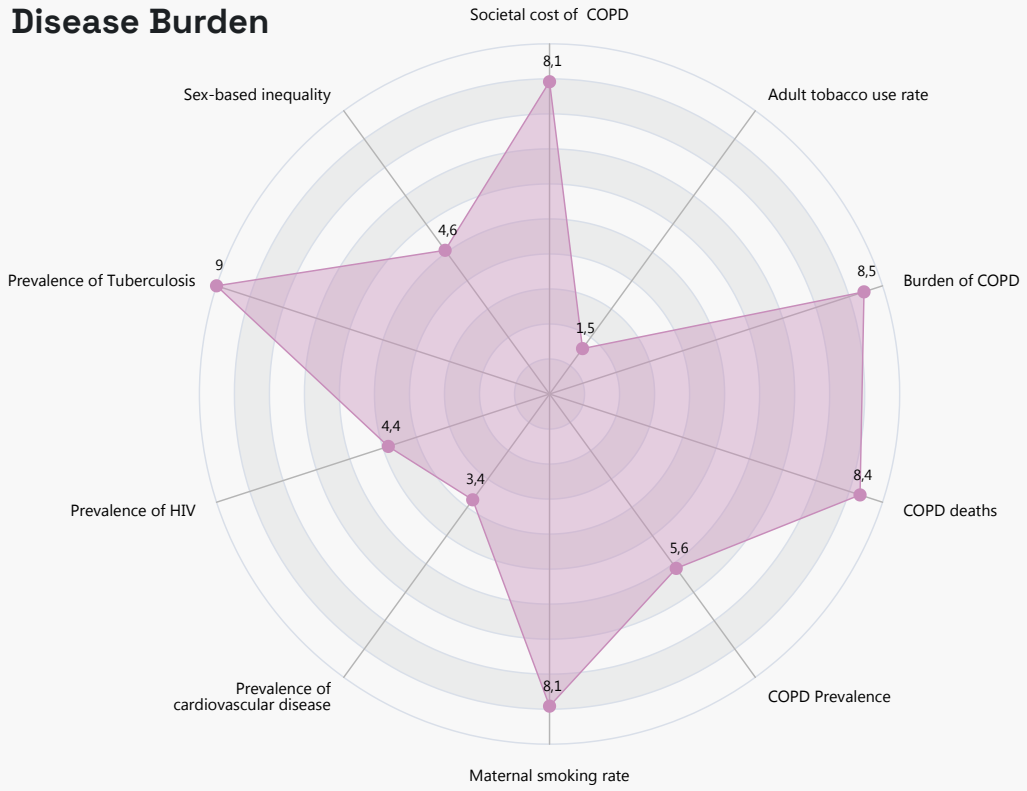
Access and Care Coverage

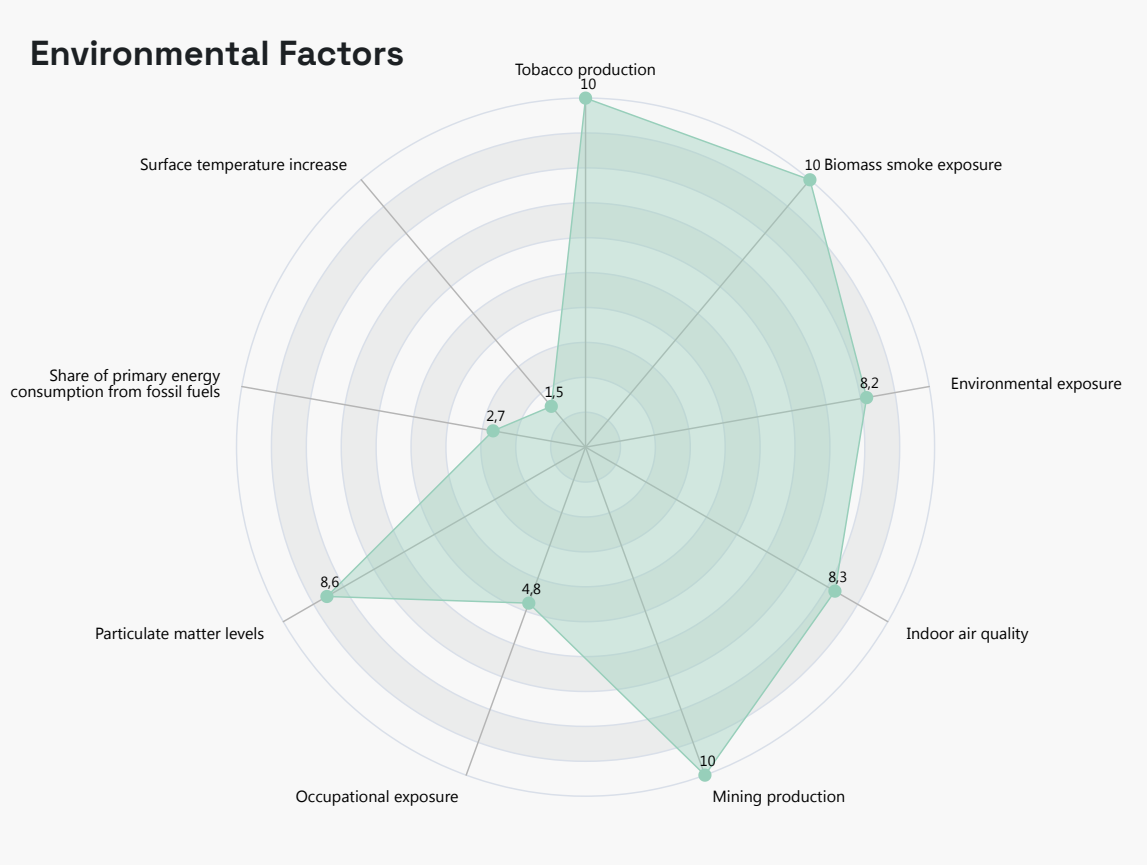


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,2
Indoor air quality
8,3
Mining production
10
Occupational exposure
4,8
Particulate matter levels
8,6
Share of primary energy consumption from fossil fuels
2,7
Surface temperature increase
1,5

Lithuania

Lithuania scores above average in the Health System Characteristics category, with a low number of annual COPD hospitalisations, good conditions for health data collection and reporting, and one of the highest numbers of respiratory specialists. Similarly, Lithuania has an above-average score in the Environmental Factors category, with good air quality and low environmental exposure to COPD risk factors. In the Access and Care Coverage category, Lithuania scores slightly above average, with good conditions for diagnosis, treatment, and drug access, despite relatively high poverty and a need for stronger care referral pathways. Lithuania's score in the Disease Burden category is also slightly above average, with relatively low COPD prevalence despite a high smoking rate and sex-based inequality. Lithuania has a low score in the Policy Context category, indicating a need for a stronger COPD strategy, national guidelines, and more robust implementation of tobacco control policies.

Country Score
60.9

Rank
25

COPD Death Rate (% of all deaths)
1.2%

Smoking Rate (%)
32.0%

Estimated Societal Cost of COPD per capita (2017 INT$)
$730

KEY TAKEAWAYS

- Low number of annual hospitalisations with a high number of respiratory specialists
- Relatively good conditions for access to COPD care
- COPD prevention could be greatly improved by further implementing its COPD strategy and tobacco control policies, as well as developing guidelines for COPD care

Resources

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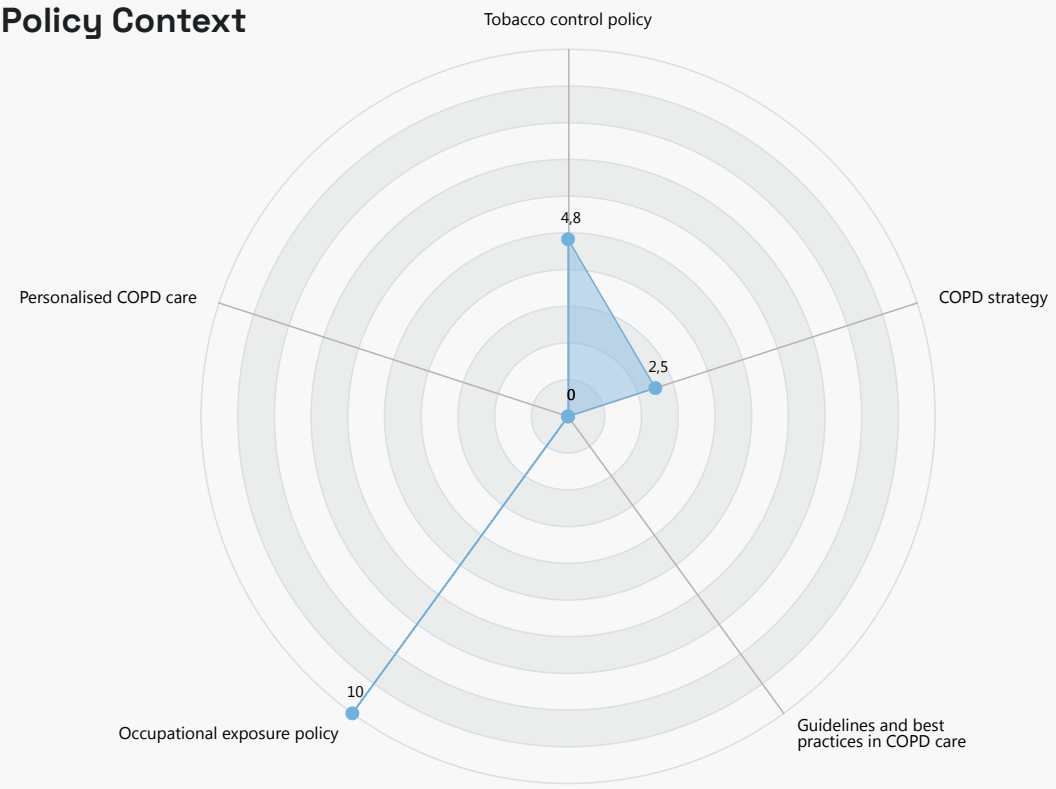
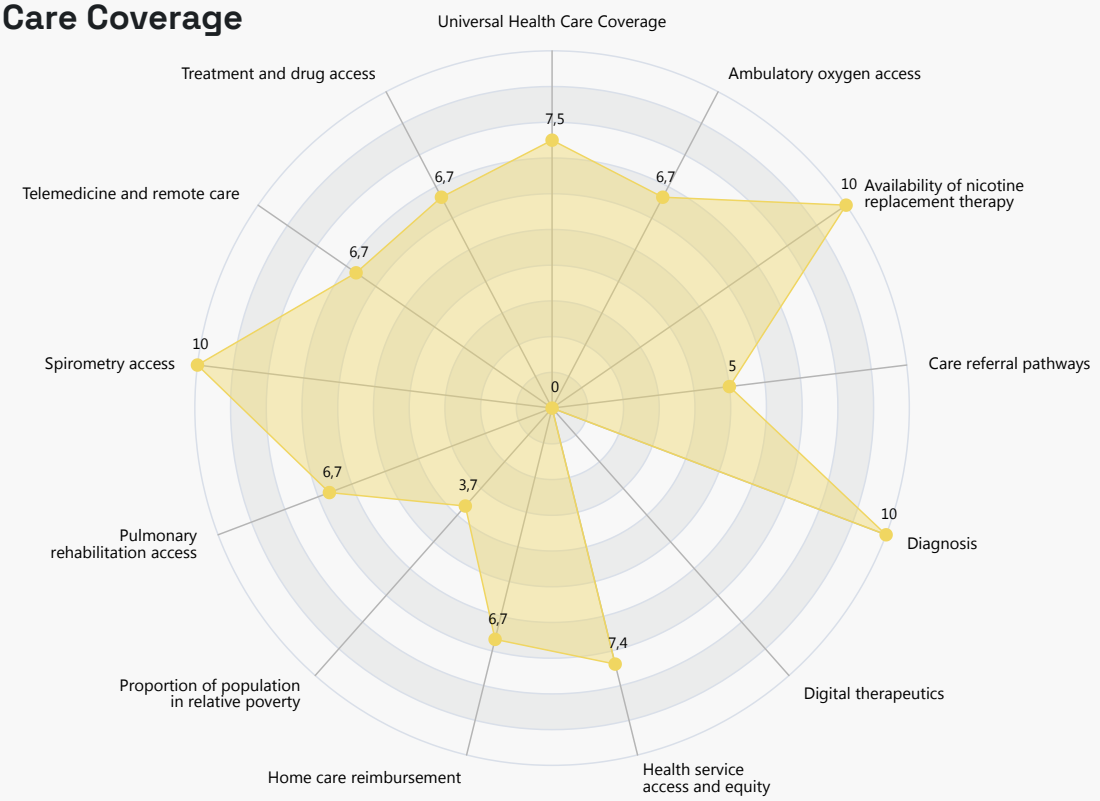
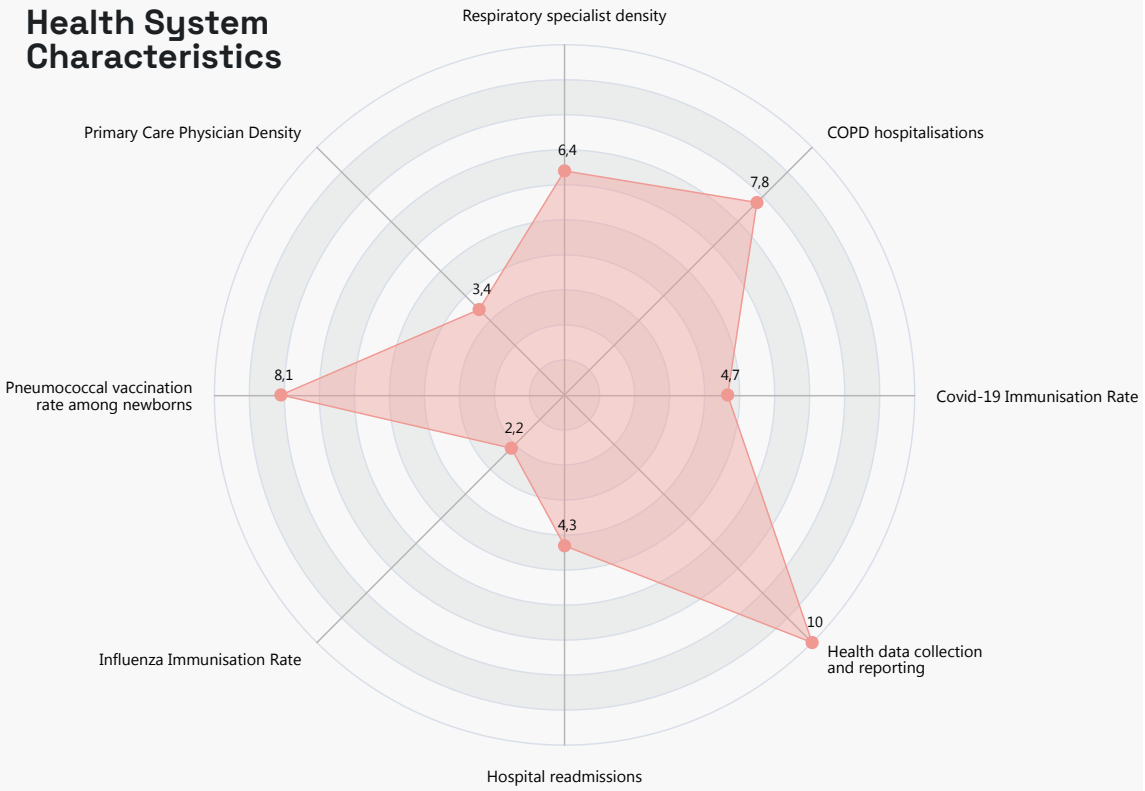
Policy Context



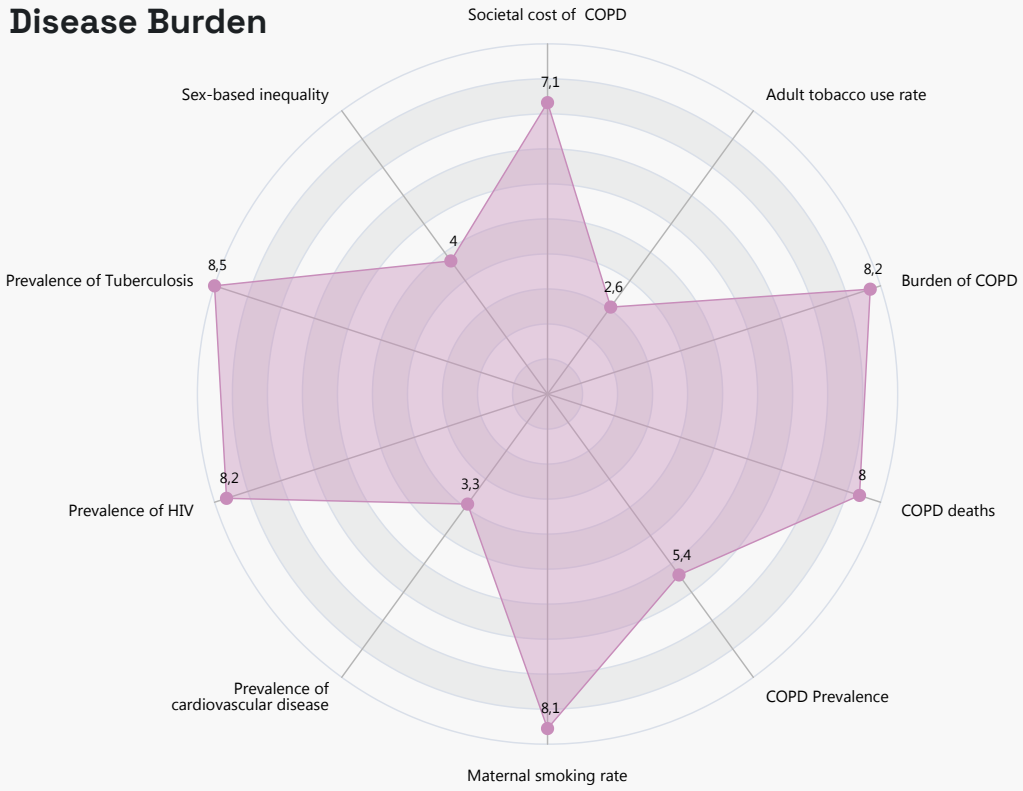
Access and Care Coverage

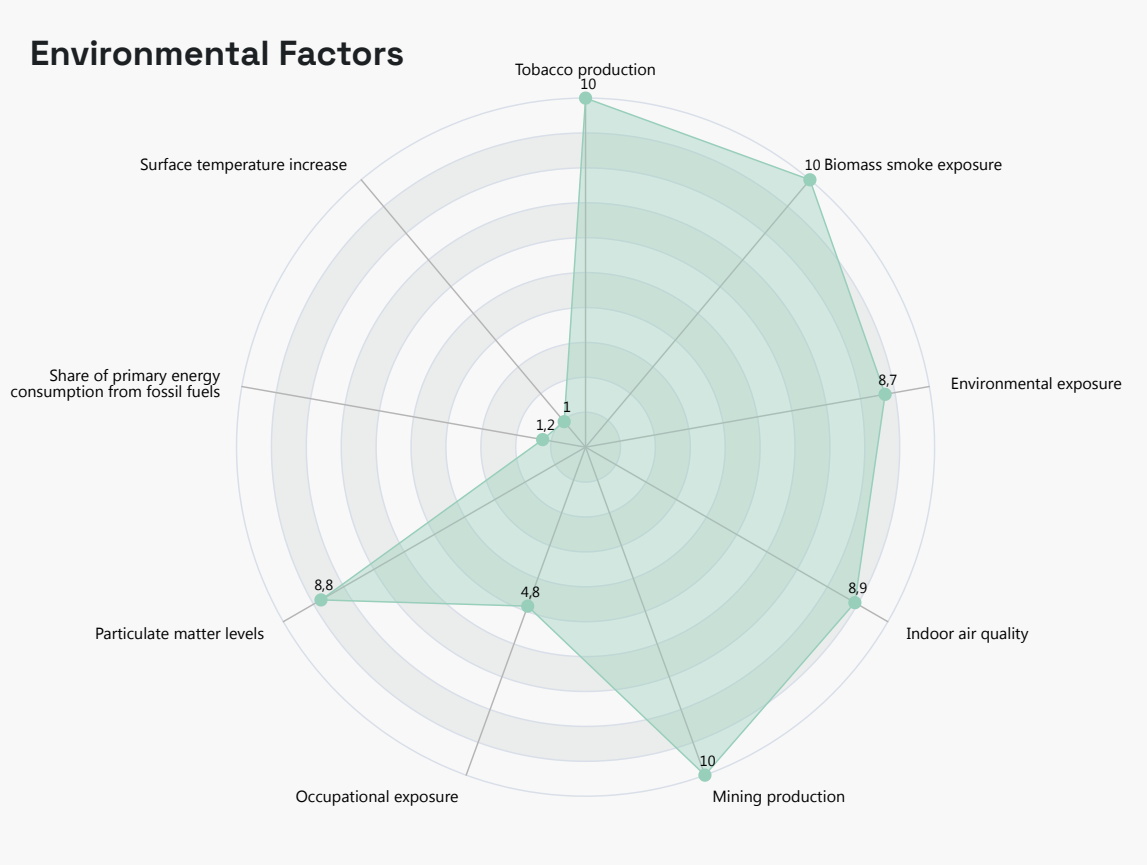


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,7
Indoor air quality
8,9
Mining production
10
Occupational exposure
4,8
Particulate matter levels
8,8
Share of primary energy consumption from fossil fuels
1,2
Surface temperature increase
1

The Netherlands

The Netherlands' score in the Access and Care Coverage category is high, with good conditions for access to treatment, drugs, and diagnosis. However, the Netherlands could further improve its score by addressing its approach to care referral pathways. The Netherlands' score in the Health System Characteristics category is above average, with a relatively high number of primary care doctors, but a need for better health data collection and reporting and an increased density of respiratory specialists. In the Environmental Factors category, the Netherlands scores above average, presenting the lowest level of occupational exposure to COPD risk factors. However, the Netherlands score in the Disease Burden category is below average, with a high COPD death rate and estimated societal cost. The Netherlands scores below average in the Policy Context category due to its lack of a COPD strategy, despite good adherence to COPD guidelines and strong tobacco control policies.

Country Score
64.2

Rank
18

COPD Death Rate (% of all deaths)
6.3%

Smoking Rate (%)
22.2%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,877

KEY TAKEAWAYS

- Good conditions for access to diagnosis and treatment
- High COPD societal cost and high death rate, suggesting underdiagnosis or late diagnosis remains an issue
- Strong adherence to COPD guidelines, but overall score could be significantly improved by a national strategy for COPD

Insights

Challenges

- Lack of awareness of COPD
- Need for integrated and interdisciplinary care
- Lack of comprehensive prevention approaches

Opportunities

- Early diagnosis and standardised screenings at the primary care level
- Interdisciplinary collaboration in care (primary, secondary, home care, and rehabilitation)
- Early action on lung attacks to prevent readmissions

Best practices in COPD care

- Assessment of Burden of COPD (ABC) tool (Ziektelastmeter COPD)
- Establishment of the quality standard for COPD lung attacks by Dutch Lung Alliance
- Conversation tool "I-HARP for COPD" for early identification of palliative care needs in patients with chronic obstructive pulmonary disease

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[Good practices in country are that] ... Accessibility seems no issue, as there are sufficient GP's and pulmonologists available, as well as health care professionals. Also, facilities, including lung function equipment, CT scan etc are all availabe throughout the country."

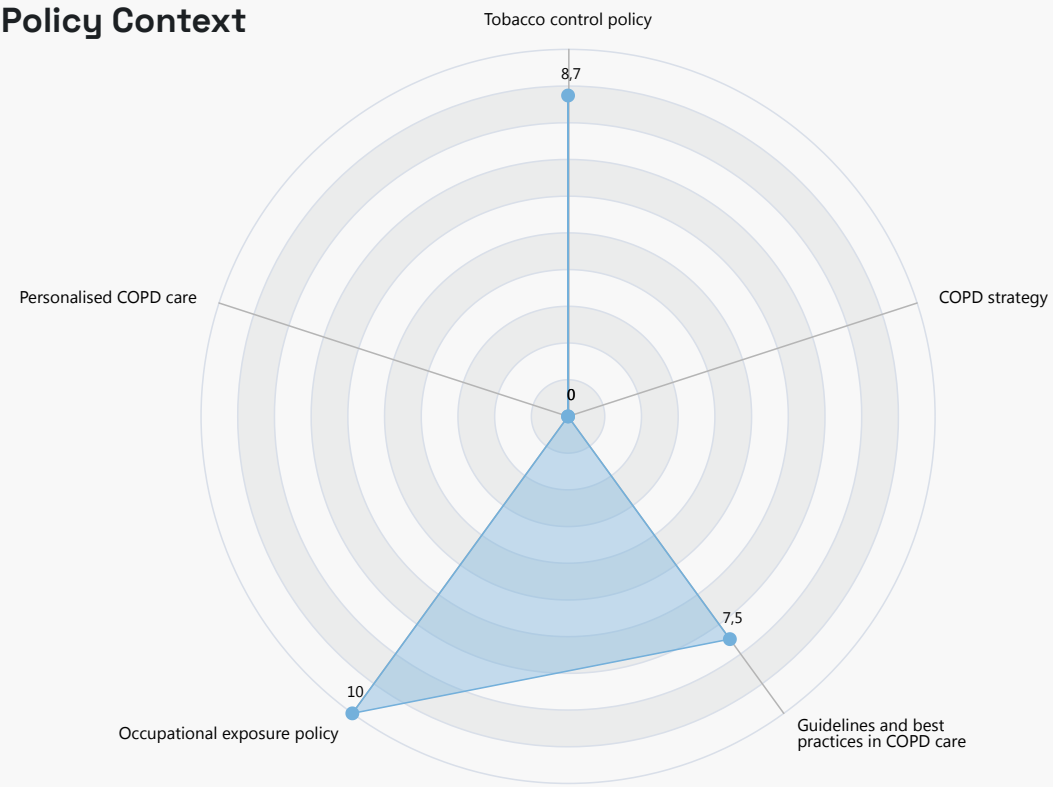
> "[The challenge is that] ... In primary care where the majority of the COPD population is treated, including patients with a significant disease burden, the main care trajectory is mostly carried out monodisciplinary by a general practitioner. Referral of symptomatic patients with obstructive lung disease to physiotherapy, occupational therapy, respiratory nurse or other allied health care by the general practitioner occurs hardly."

> "[The challenge is that] ... Financing for procedures, not outcomes (reducing the burden of disease/COPD patients/hospital admissions)...provides an unwanted financial incentive... Reimbursement system not designed for interdisciplinary collaboration"

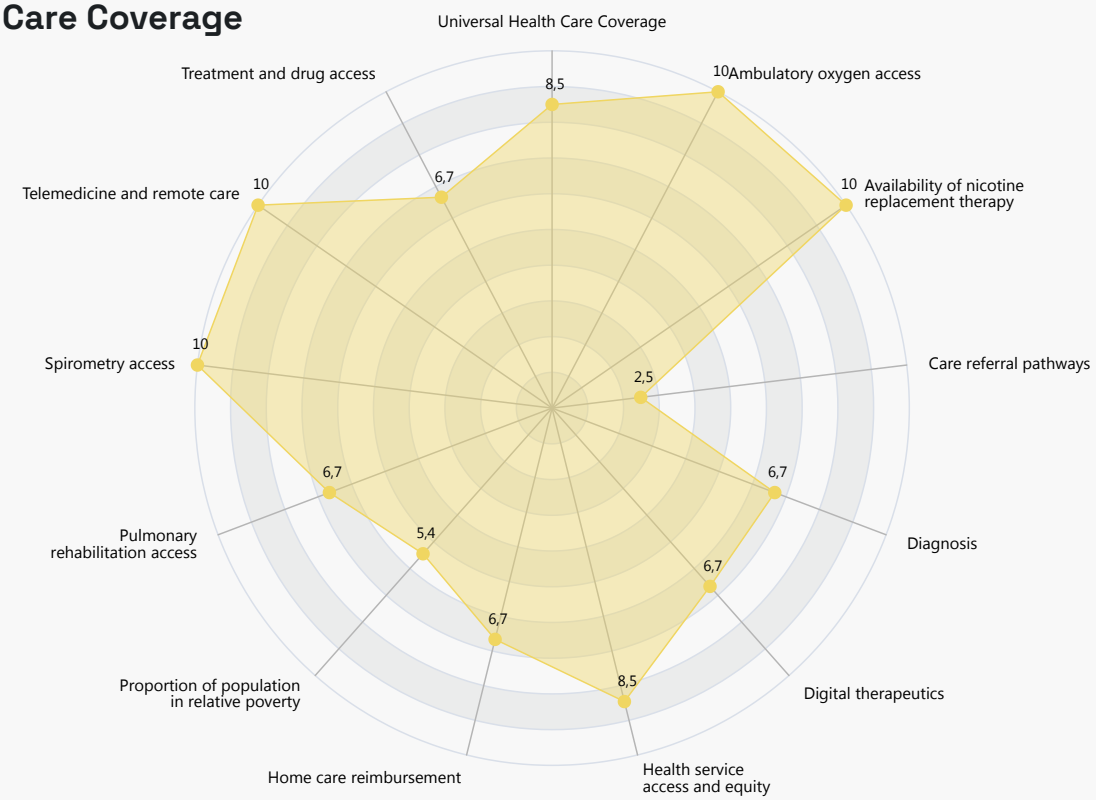
Resources

Please scan this QR code to view the sources.

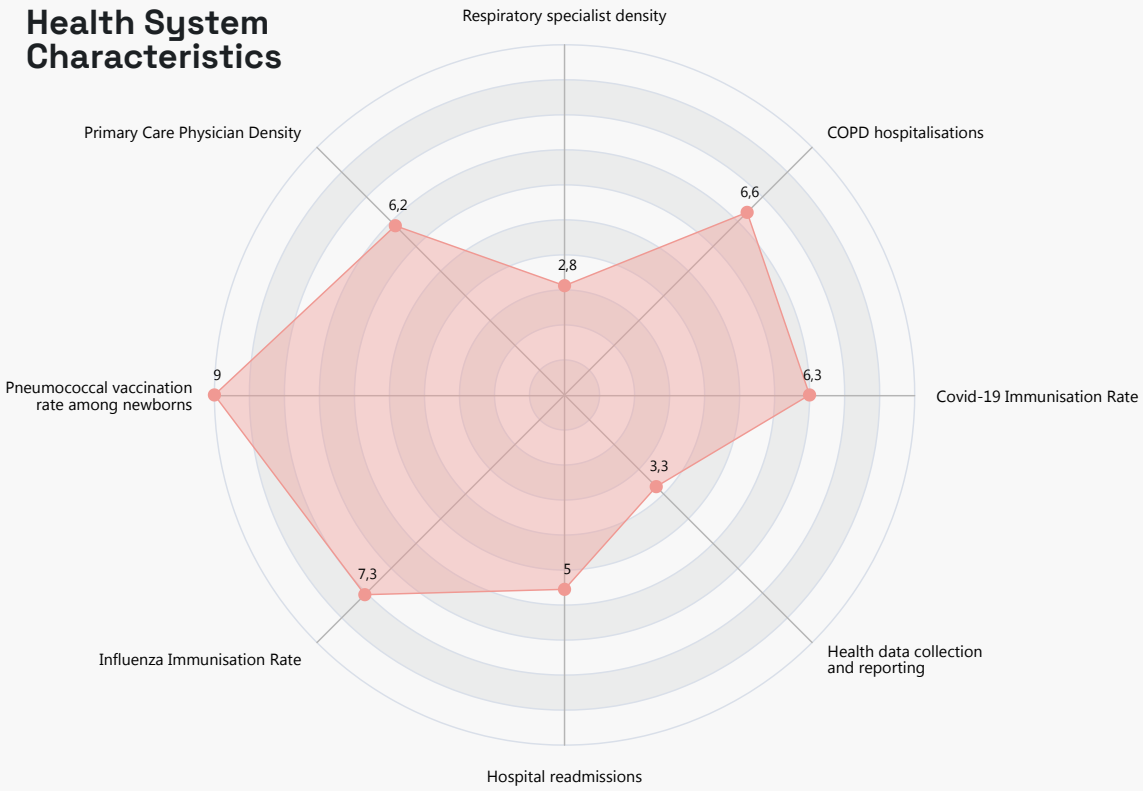
Policy Context



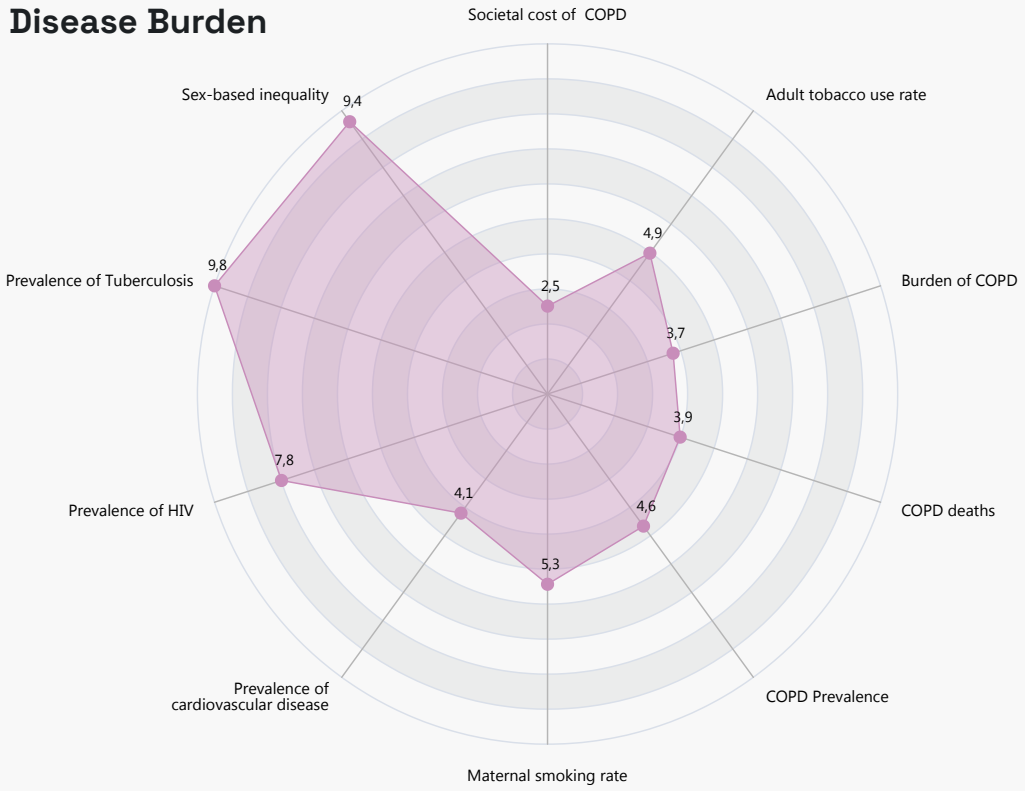
Access and Care Coverage

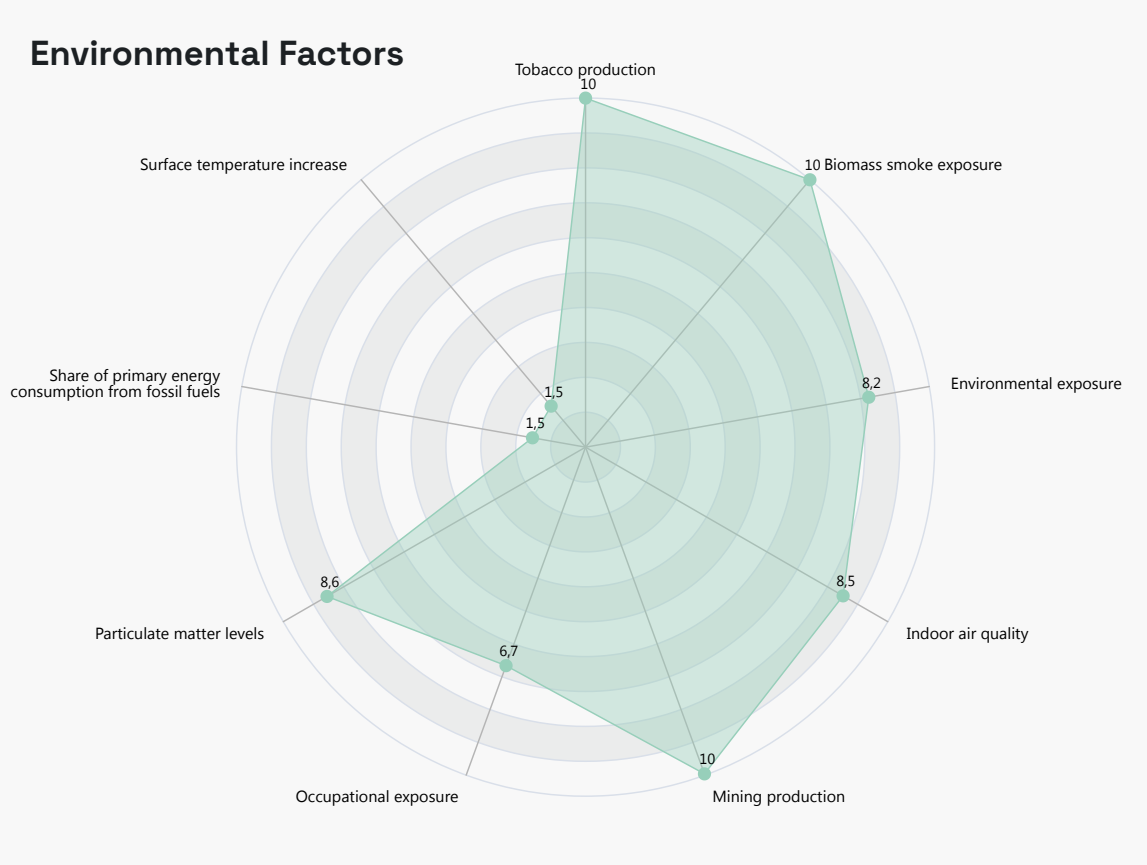


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,2
Indoor air quality
8,5
Mining production
10
Occupational exposure
6,7
Particulate matter levels
8,6
Share of primary energy consumption from fossil fuels
1,5
Surface temperature increase
1,5

New Zealand

New Zealand has the fourth highest score in the Environmental Factors category, mainly due to low particulate matter exposure levels and environmental exposure to COPD risk factors. New Zealand's Policy Context category score is slightly above average, primarily due to the absence of a COPD strategy and low adherence to care guidelines, despite having the strongest tobacco control policies in the COPD Index. New Zealand scores slightly above average in the Access and Care Coverage category, with good conditions for access to treatment and drugs and diagnostic services, as well as good universal health care service coverage. New Zealand could improve its score in this category with stronger care referral pathways. New Zealand's score in the Disease Burden category is slightly above average, despite a relatively high estimated societal cost of COPD. New Zealand scores the lowest in the Health System Characteristics category, mainly due to a very high number of annual COPD hospitalisations— the highest in the COPD Index.

Country Score
62.3

Rank
23

COPD Death Rate (% of all deaths)
5.9%

Smoking Rate (%)
13.7%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,477

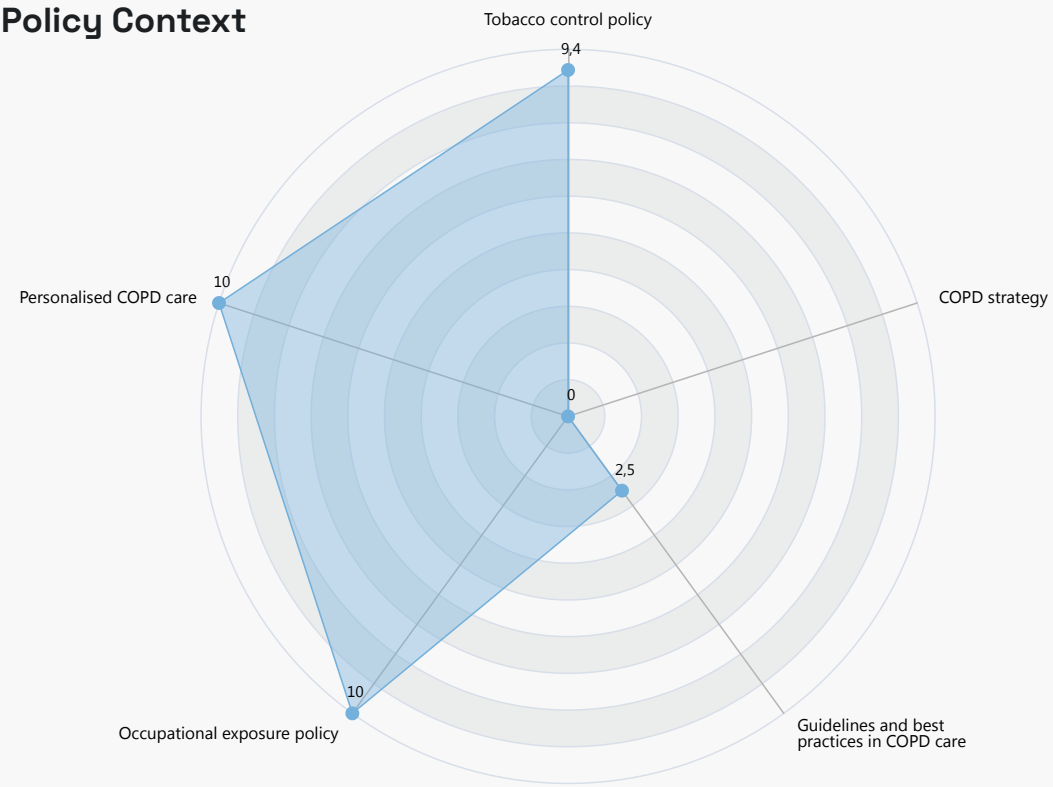
KEY TAKEAWAYS

- 4th best performance in the Environmental Factors category
- Relatively good conditions for access to diagnostic and care services
- Highest number of annual COPD hospitalisations in the COPD Index

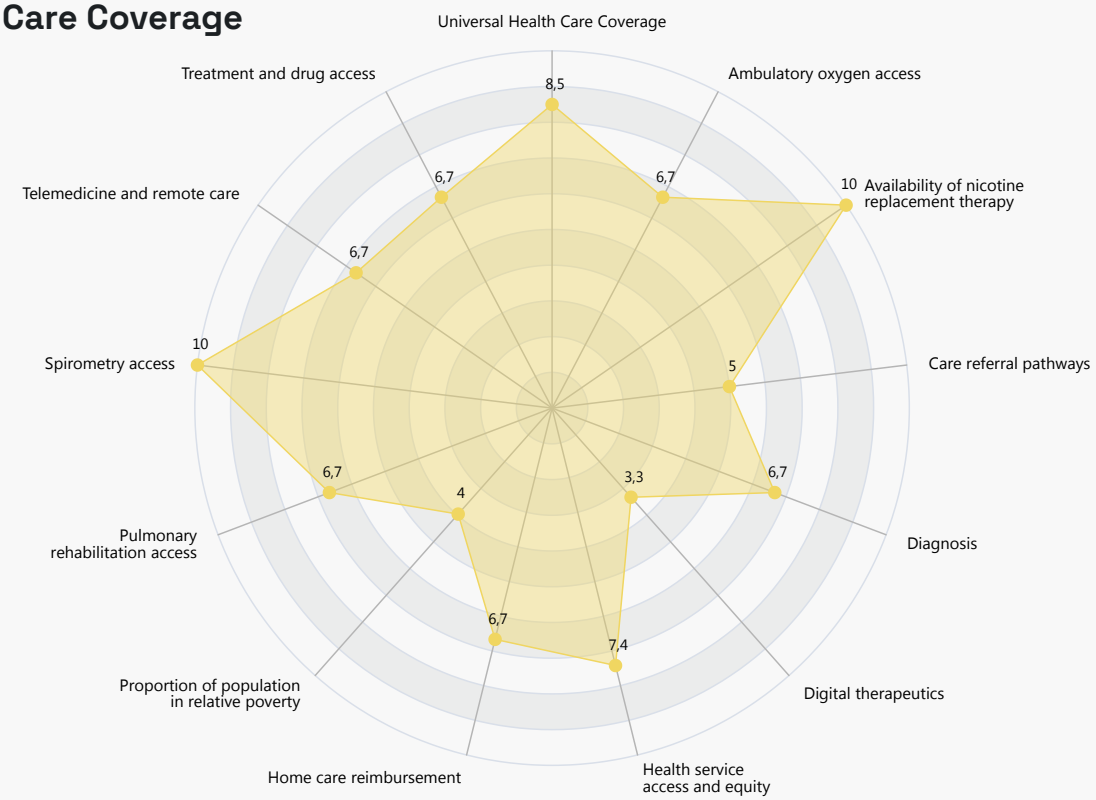
Resources

Please scan this QR code to view the sources.

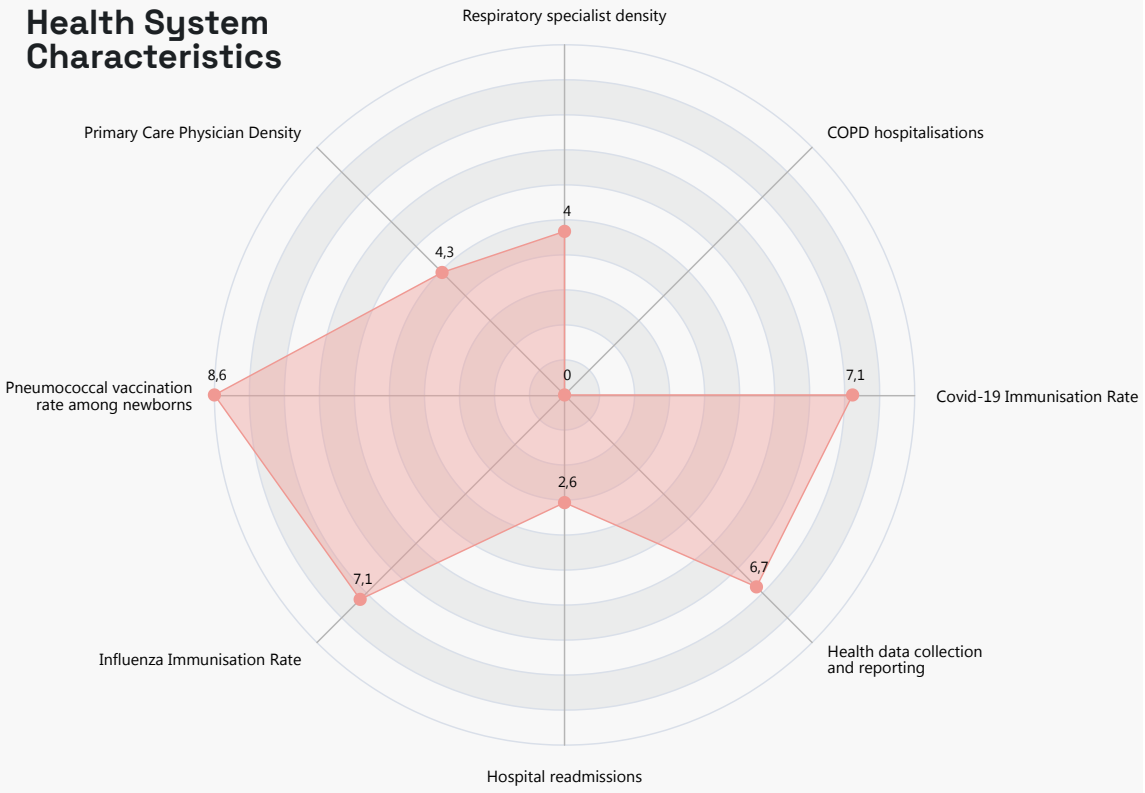
Policy Context



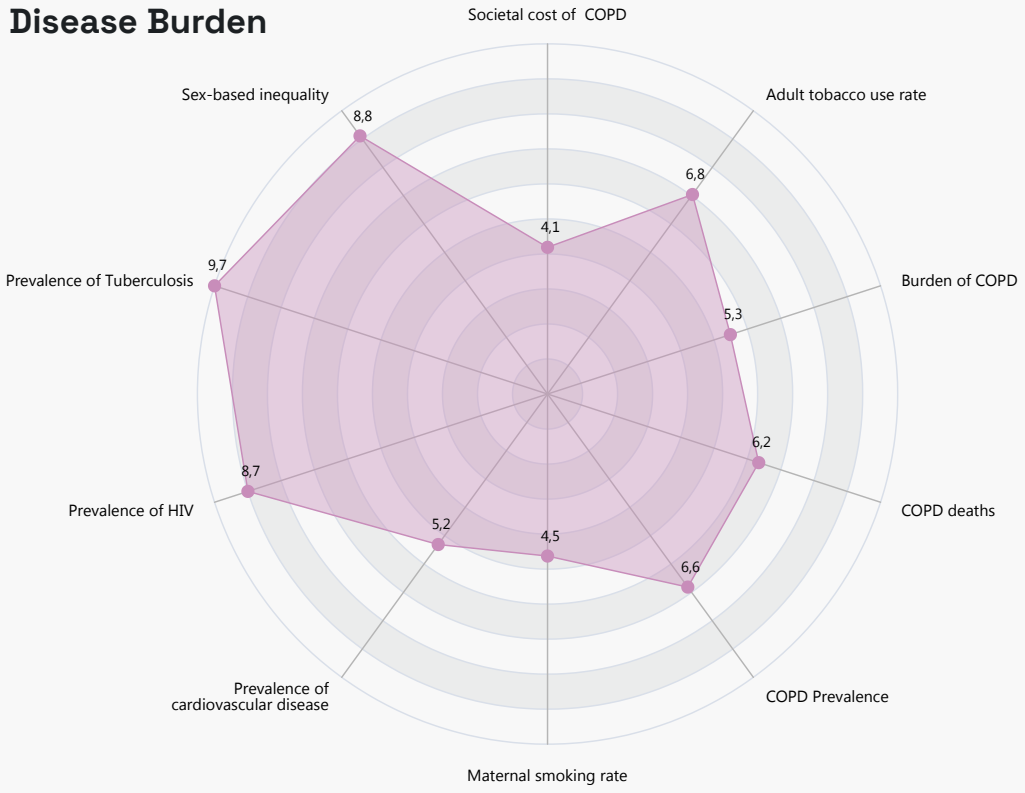
Access and Care Coverage

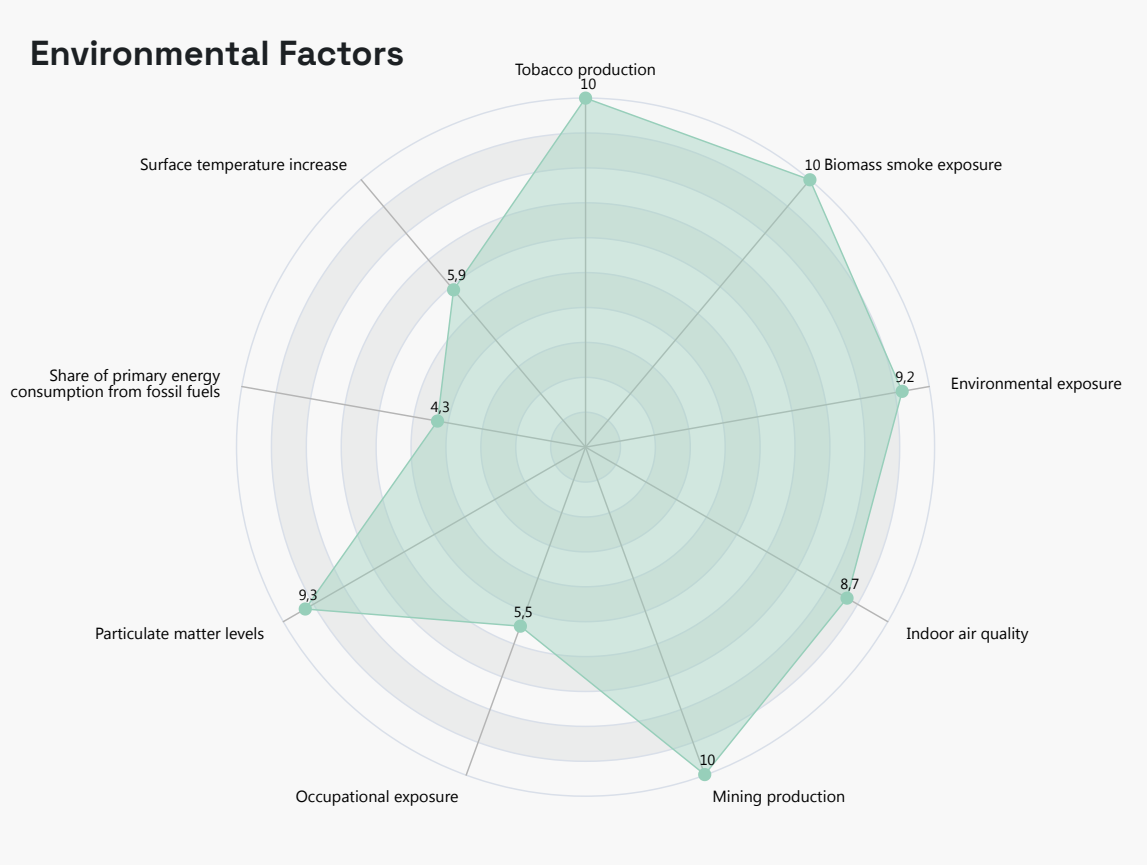


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
9,2
Environmental exposure
8,7
Indoor air quality
10
Mining production
5,5
Occupational exposure
9,3
Particulate matter levels
4,3
Share of primary energy consumption from fossil fuels
5,9
Surface temperature increase

Norway

Norway scores high in the Access and Care Coverage category, mainly due to good conditions for access to diagnosis, treatments, and drugs, as well as high universal health care coverage. Norway's score in the Environmental Factors category score is the second highest, with excellent indoor air quality, low environmental exposure to COPD risk factors, and low particulate matter exposure levels. In the Policy Context category, Norway scores above average, with a strong tobacco control policy, although improved implementation of its COPD strategy and better adherence to care guidelines would further improve its score. Norway scores relatively low in the Disease Burden category, with a significant estimated societal cost of COPD, high death rate, and above-average prevalence of COPD. Similarly, Norway has the third lowest score in the Health System Characteristics category, mainly due to a high number of annual COPD hospitalisations and the highest 365-day readmission rate, despite relatively good conditions for health data collection and reporting.

Country Score
64.4

Rank
16

COPD Death Rate (% of all deaths)
6.8%

Smoking Rate (%)
16.2%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,425

KEY TAKEAWAYS

- Excellent indoor air quality, low environmental exposure to COPD risk factors, and low particulate matter exposure levels
- Good conditions for access to diagnostic and treatment services
- Highest 365-day readmission rate for COPD

Resources

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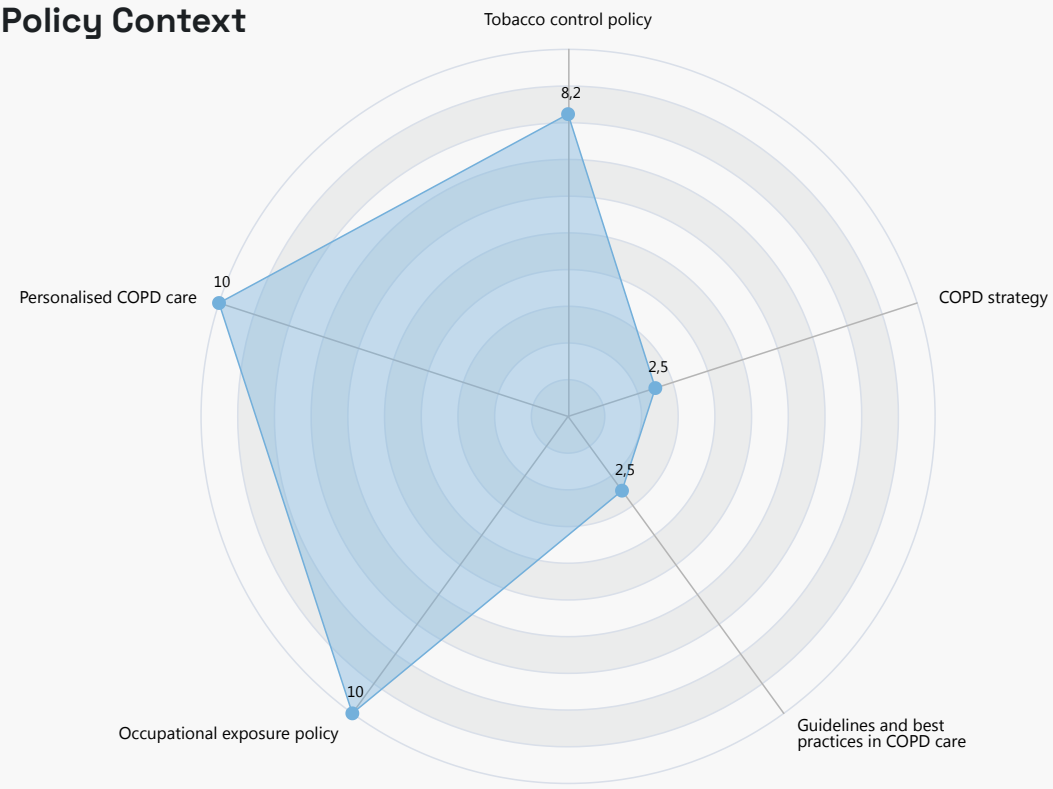
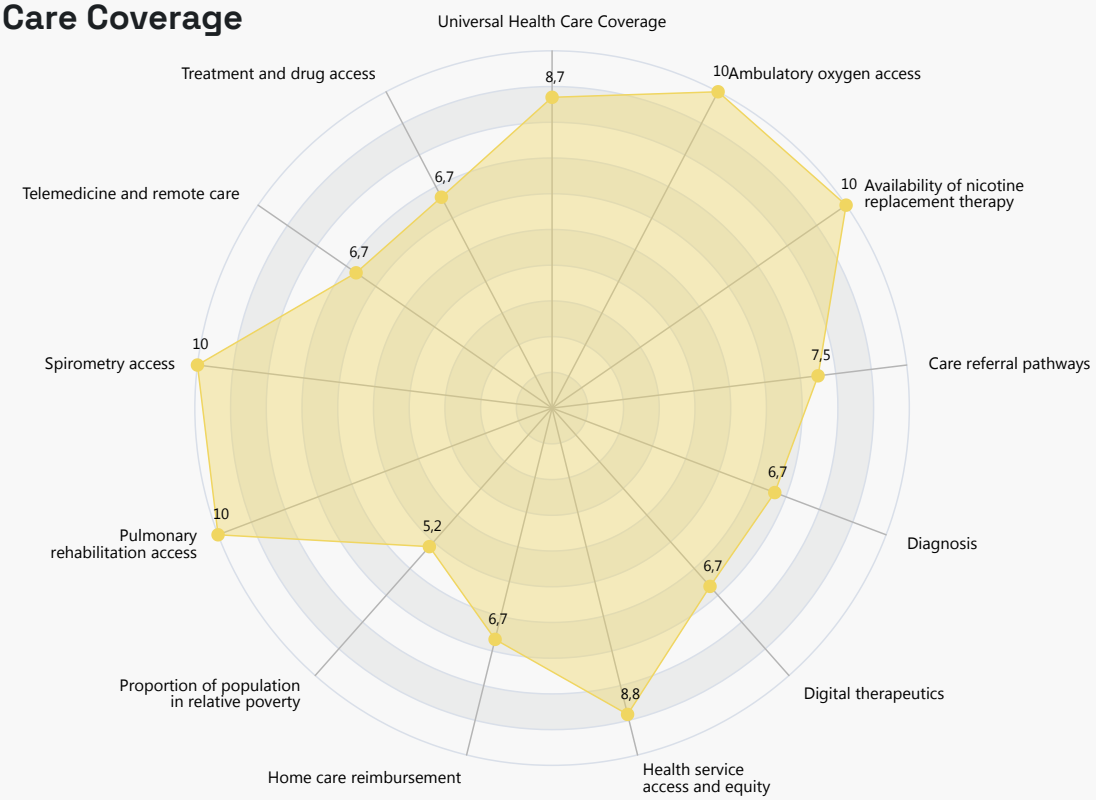
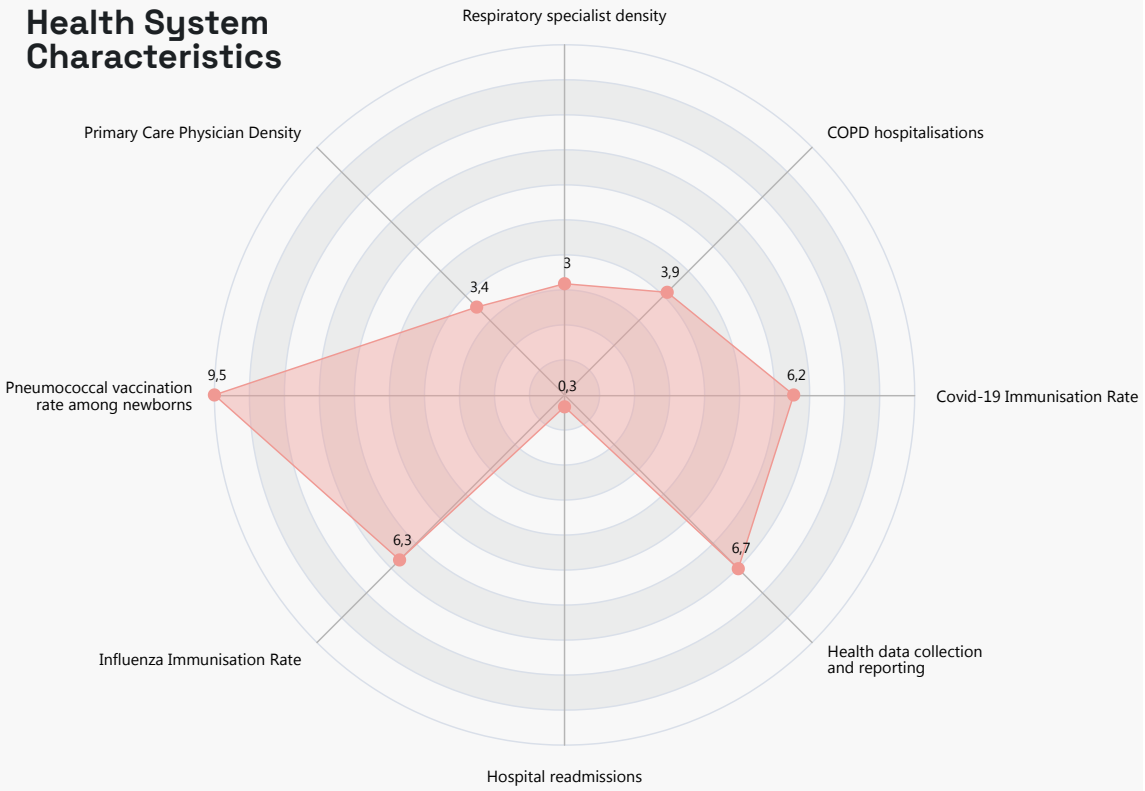
Policy Context



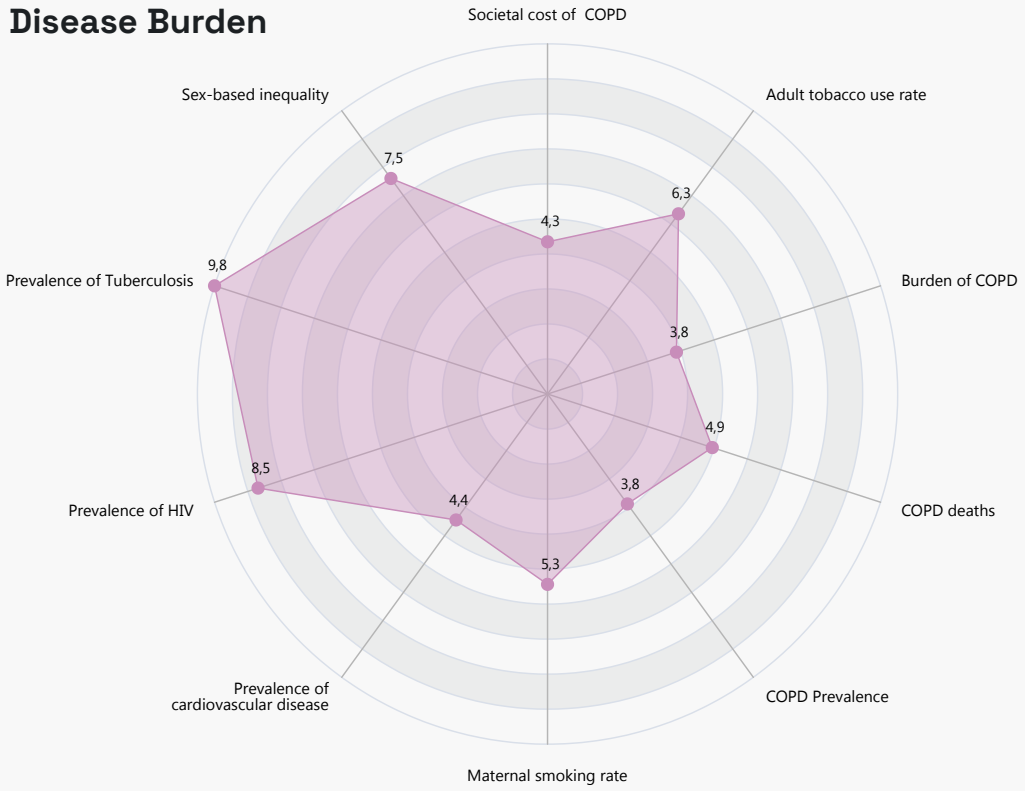
Access and Care Coverage

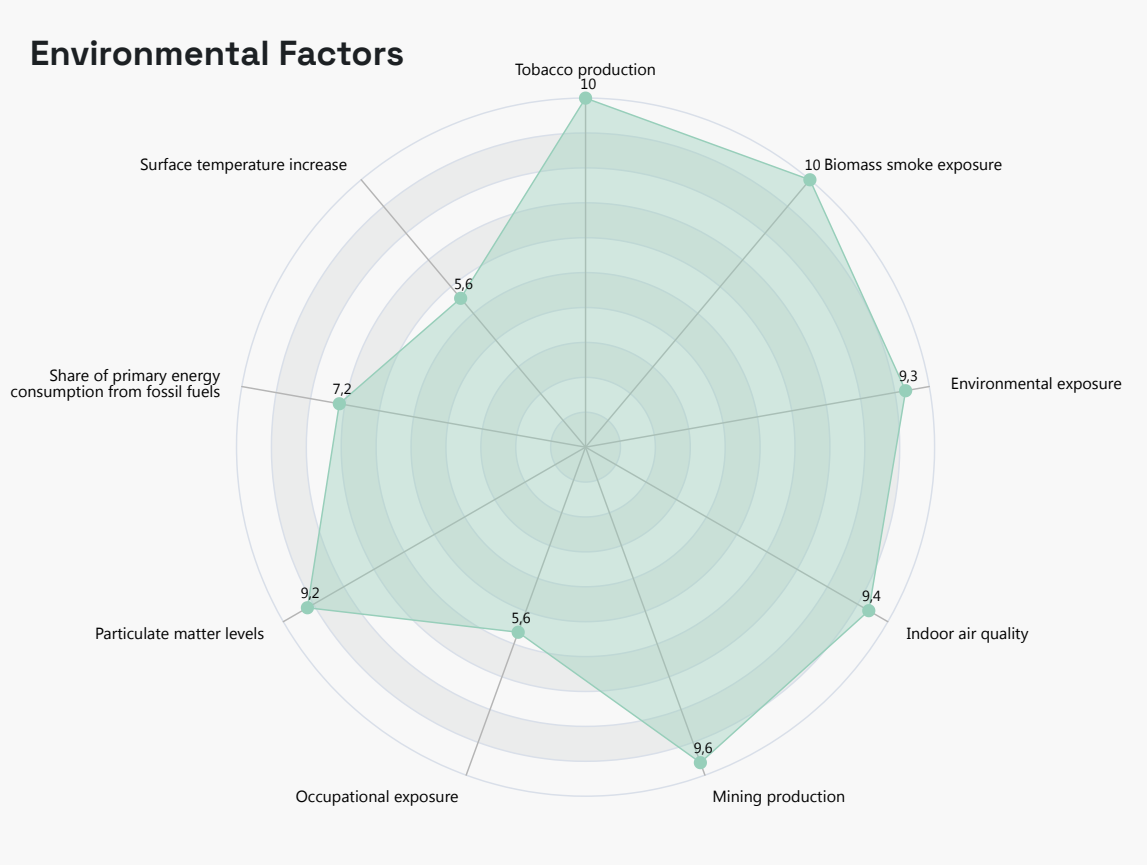


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
9,3
Environmental exposure
9,4
Indoor air quality
9,6
Mining production
5,6
Occupational exposure
9,2
Particulate matter levels
7,2
Share of primary energy consumption from fossil fuels
5,6
Surface temperature increase

Poland

Poland scores slightly above average in the Health System Characteristics category, primarily due to a low annual COPD hospitalisation rate, good conditions for health data collection and recording, and a high number of respiratory specialists. However, there is a low density of primary care physicians. In the Environmental Factors category, Poland scores slightly below average, with relatively high environmental exposure despite good indoor air quality. Conversely, Poland's score in the Disease Burden category is relatively high. Poland is the fourth-lowest scorer in the Policy Context category due to a lack of a national strategy for COPD, generally weak adherence to care guidelines, and comparatively less robust tobacco control policies. A similar score is seen in the Access and Care Coverage category, mainly due to high levels of unreported health needs, despite high universal health care service coverage and good conditions for diagnostic services.

Country Score
57.4

Rank
30

COPD Death Rate (% of all deaths)
1.8%

Smoking Rate (%)
24.0%

Estimated Societal Cost of COPD per capita (2017 INT$)
$745

KEY TAKEAWAYS

- Low annual COPD hospitalisation rate
- The development of a national COPD strategy and stronger adherence to care guidelines would significantly improve Poland's score
- High levels of reported unmet health care needs, despite high universal health care service coverage

Insights

Challenges

- Limited access to lung function measurement, which contributes to late diagnosis
- Low access to innovative treatments

Opportunities

- National smoking cessation program
- Coordinated care between GPs and specialists supported by the public payor

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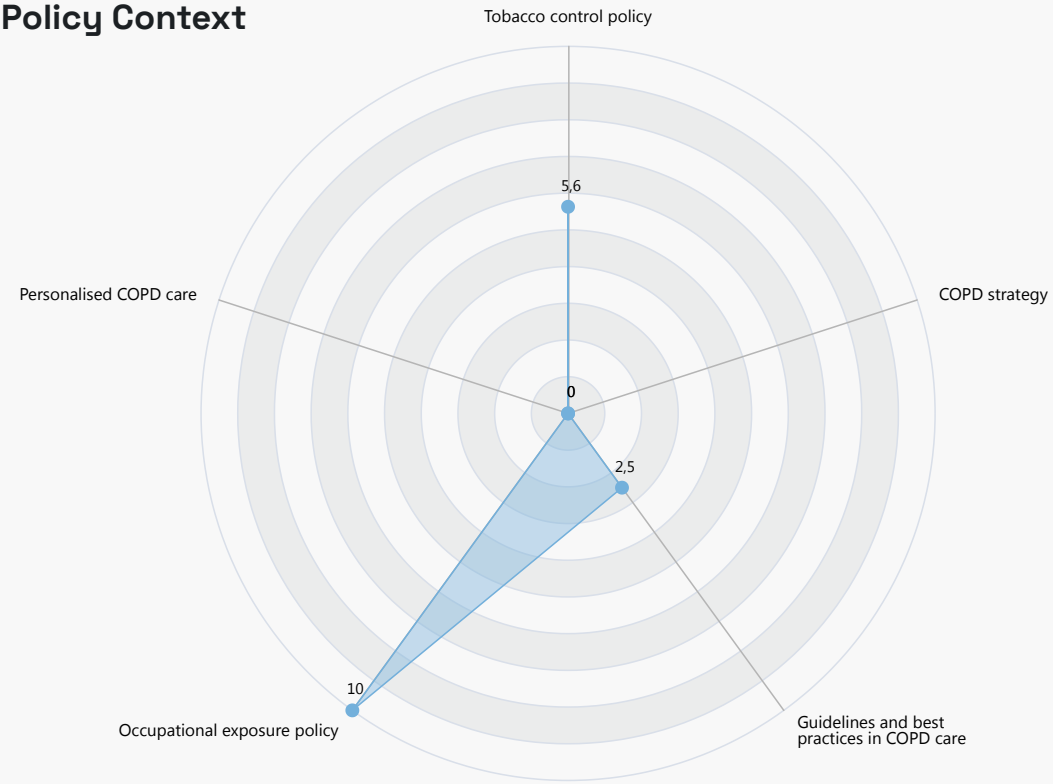
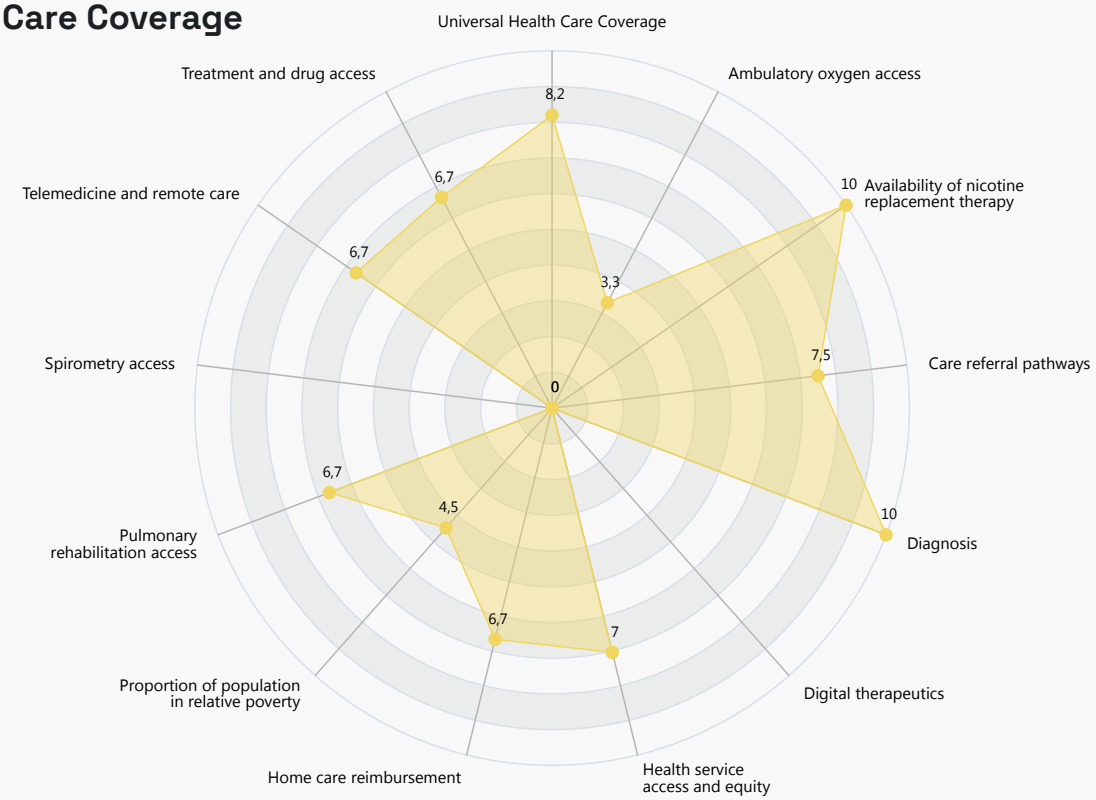
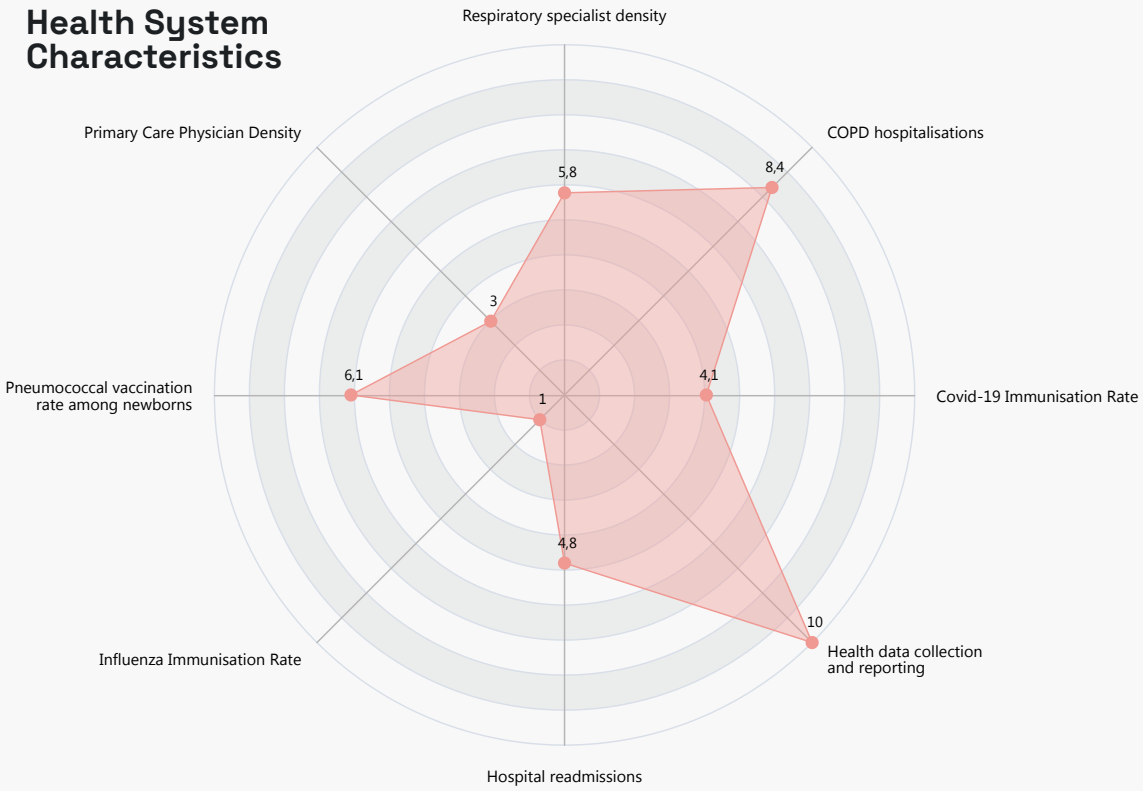
Policy Context



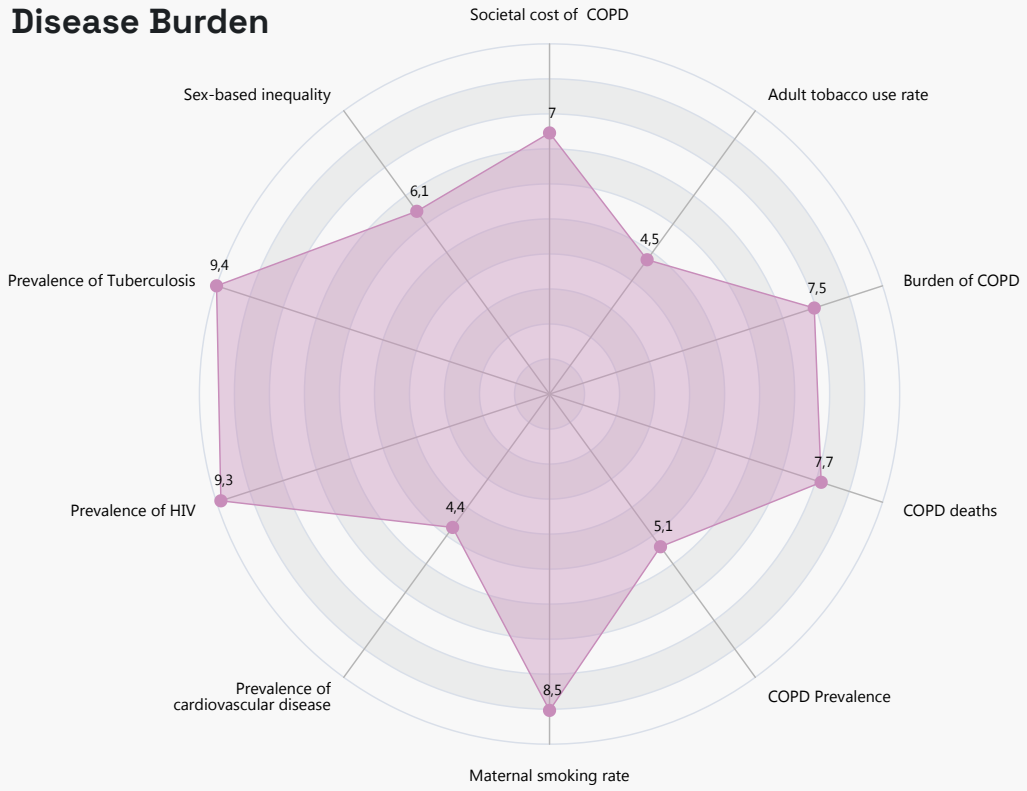
Access and Care Coverage

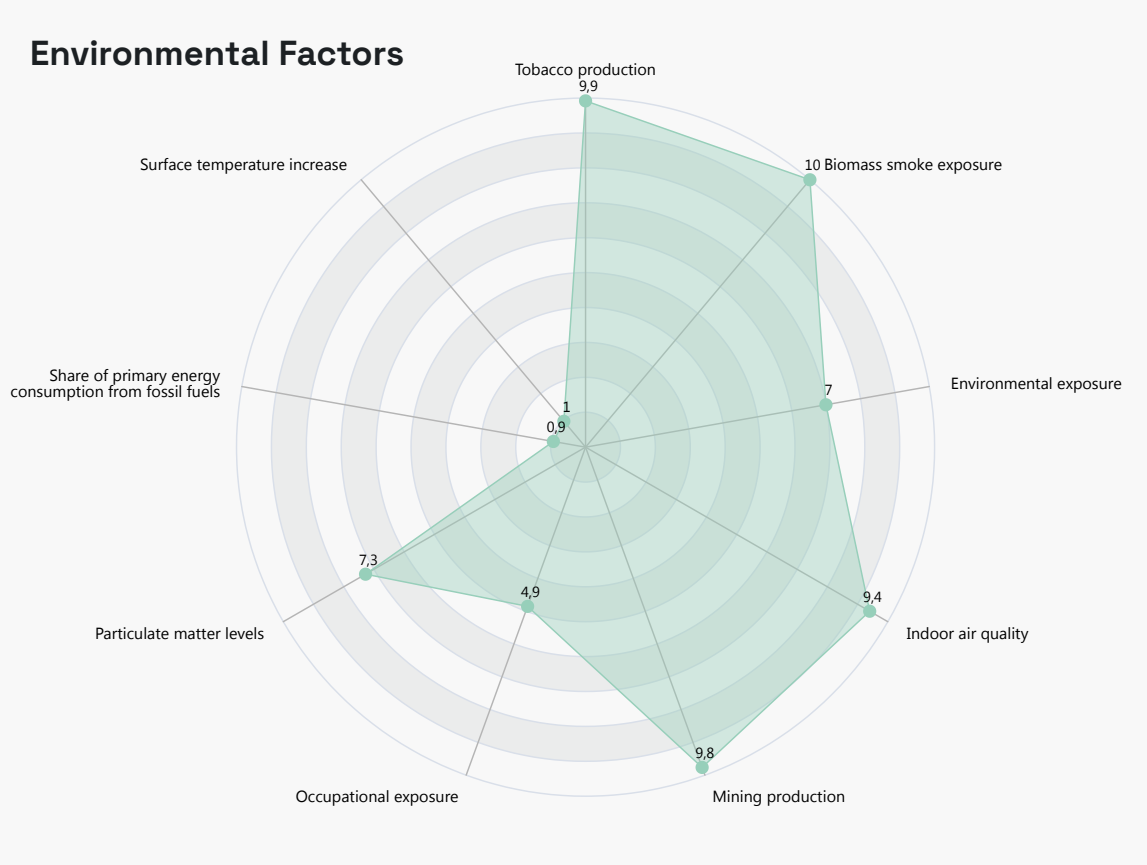


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
9,9
10 Biomass smoke exposure
Environmental exposure
9,4
Indoor air quality
9,8
Mining production
Occupational exposure
4,9
Particulate matter levels
7,3
Share of primary energy consumption from fossil fuels
0,9
Surface temperature increase
1
7

Portugal

Portugal has the highest Health System Characteristics score, primarily due to low annual COPD hospitalisations, good conditions for health data collection and reporting, and the highest primary care physician density. In the Access and Care Coverage category, Portugal has an above-average score with good access to treatment and drugs, relatively good conditions for diagnosis, and effective care referral pathways. However, Portugal has the highest level of reported unmet health care needs. Portugal's score in the Environmental Factors category is slightly above average, despite reporting significant issues with indoor air quality. Portugal has below-average score in the Disease Burden category, with relatively high rates of COPD prevalence and deaths. In the Policy Context category, Portugal scores low due to the lack of a COPD strategy and the low strength and scope of tobacco control policy, despite moderately good adherence to care guidelines.

Country Score
65.1

Rank
14

COPD Death Rate (% of all deaths)
4.6%

Smoking Rate (%)
25.4%

Estimated Societal Cost of COPD per capita (2017 INT$)
$373

KEY TAKEAWAYS

- Top performer in the Health System Characteristics category with low hospitalisation rate, good quality health data, highest primary care physician density
- Relatively good conditions for access to treatment and diagnostic services, but highest levels of unmet health needs
- Addressing the lack of a national COPD strategy and relatively weak tobacco control policy would strengthen the national approach towards targeting COPD

Insights

Challenges

- Uneven access to good quality spirometry
- Lack of knowledge about COPD among primary care doctors
- Lack of motivation from the primary care units to manage COPD patients

Opportunities

- There is space to create and improve national policies to stimulate primary care units to increase COPD diagnosis, as well as to improve COPD care
- Spirometry services are relatively easy to create and implement

Priorities

- Support the development of more knowledge and interest in COPD among primary care professionals

Best practices in COPD care

- Spirometry services are being created around the country
- Recent development of incentives for primary care professionals to work with COPD

Resources

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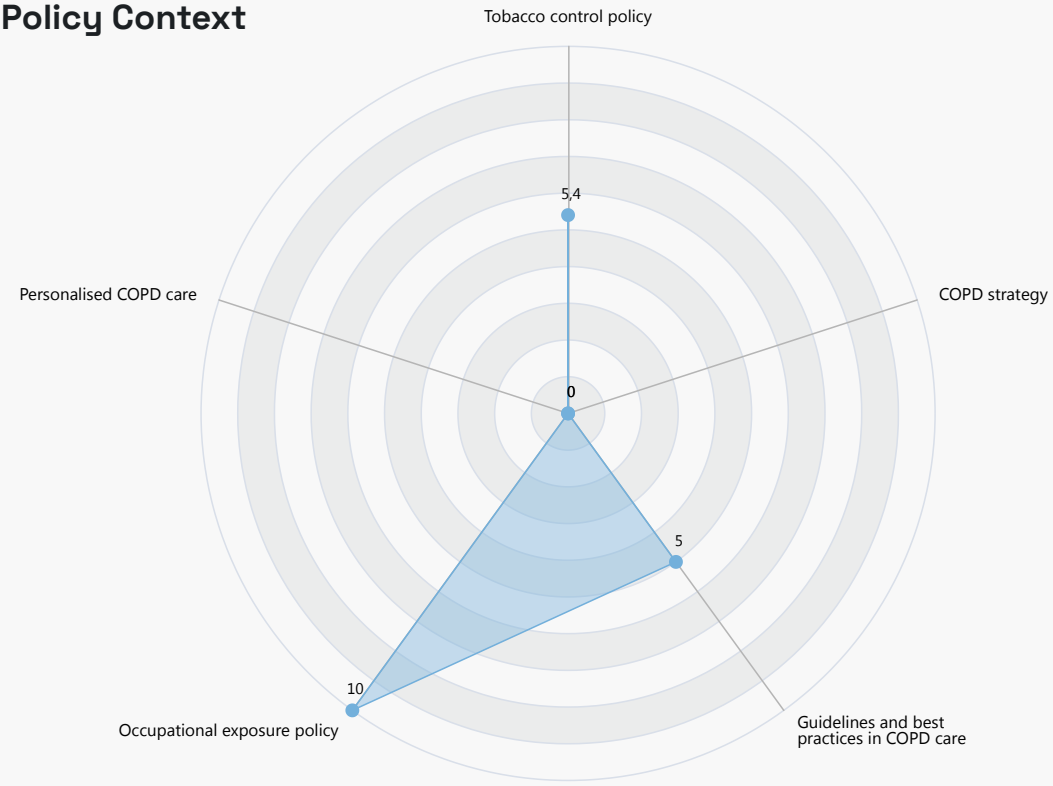
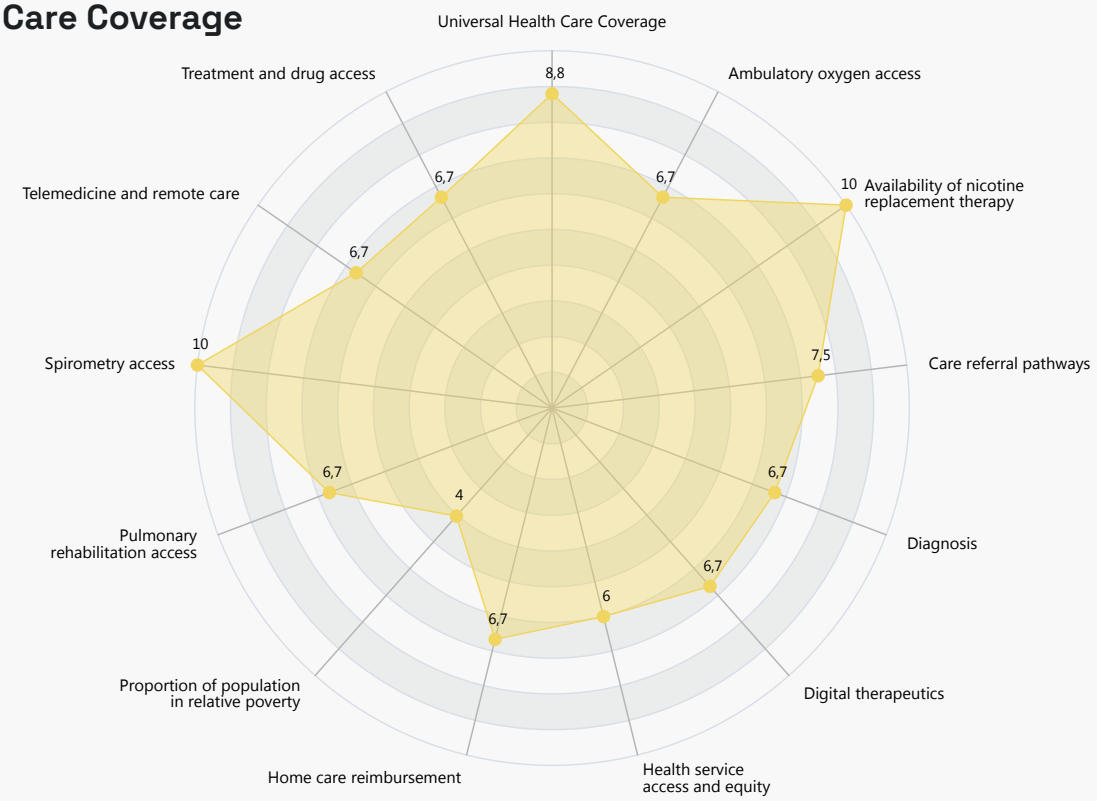
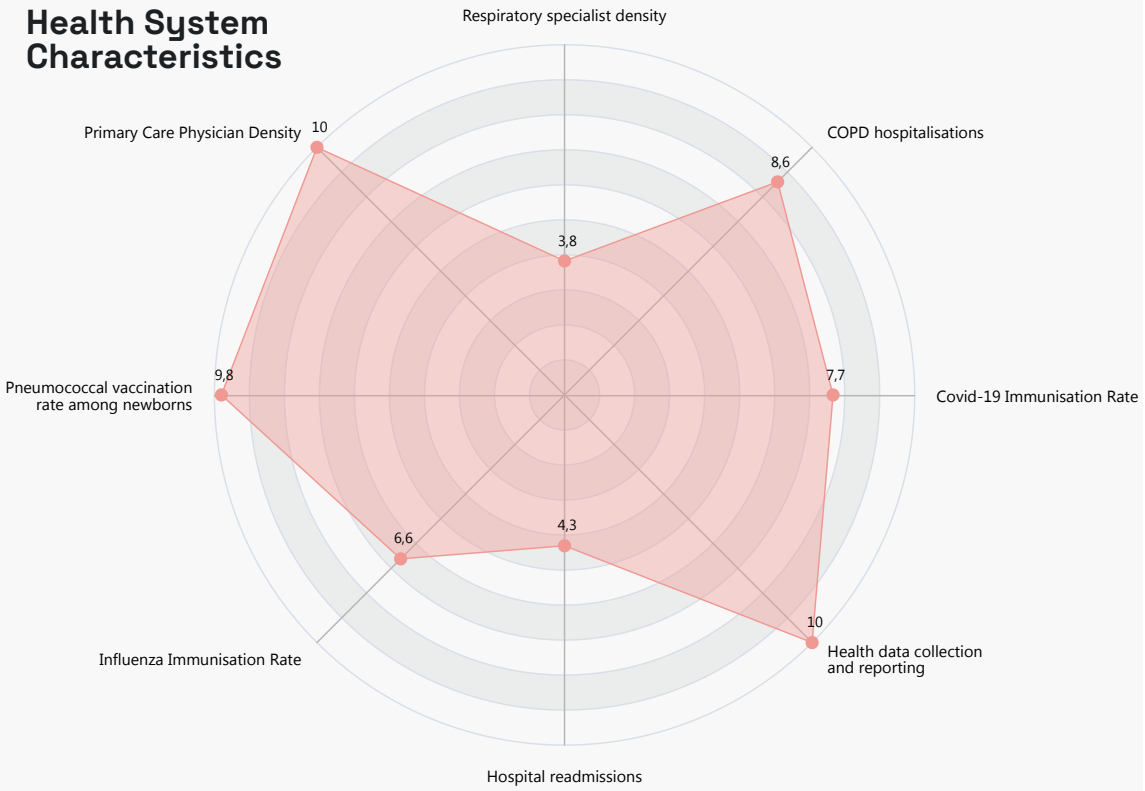
Policy Context



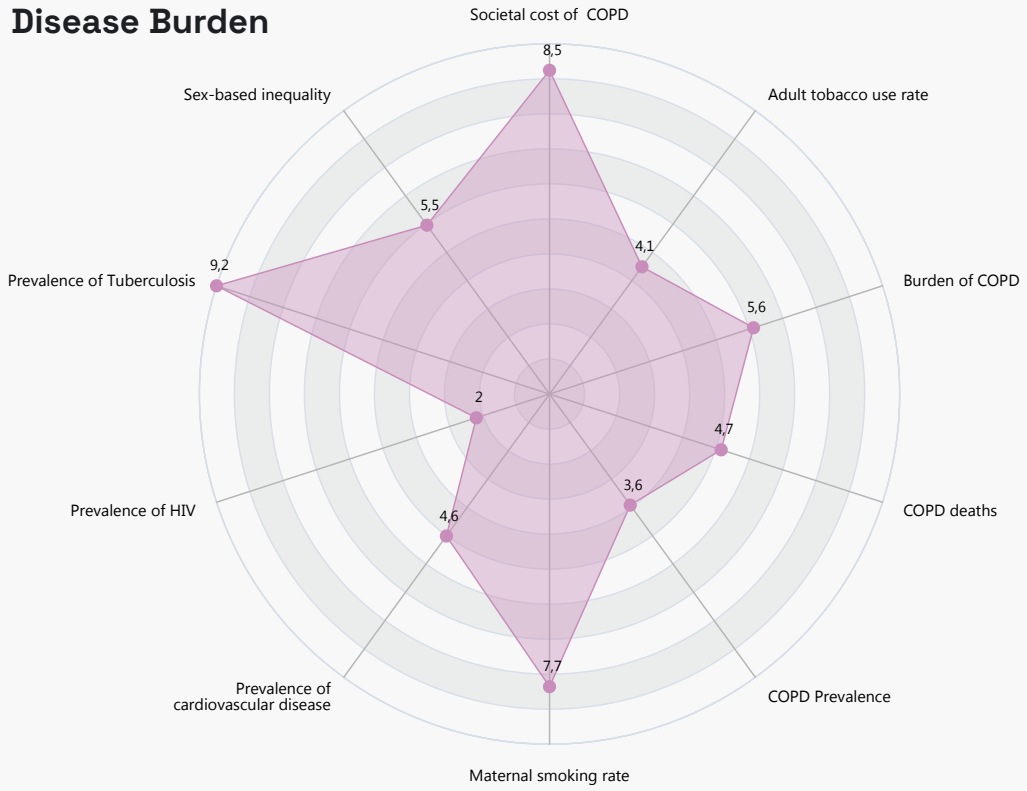
Access and Care Coverage

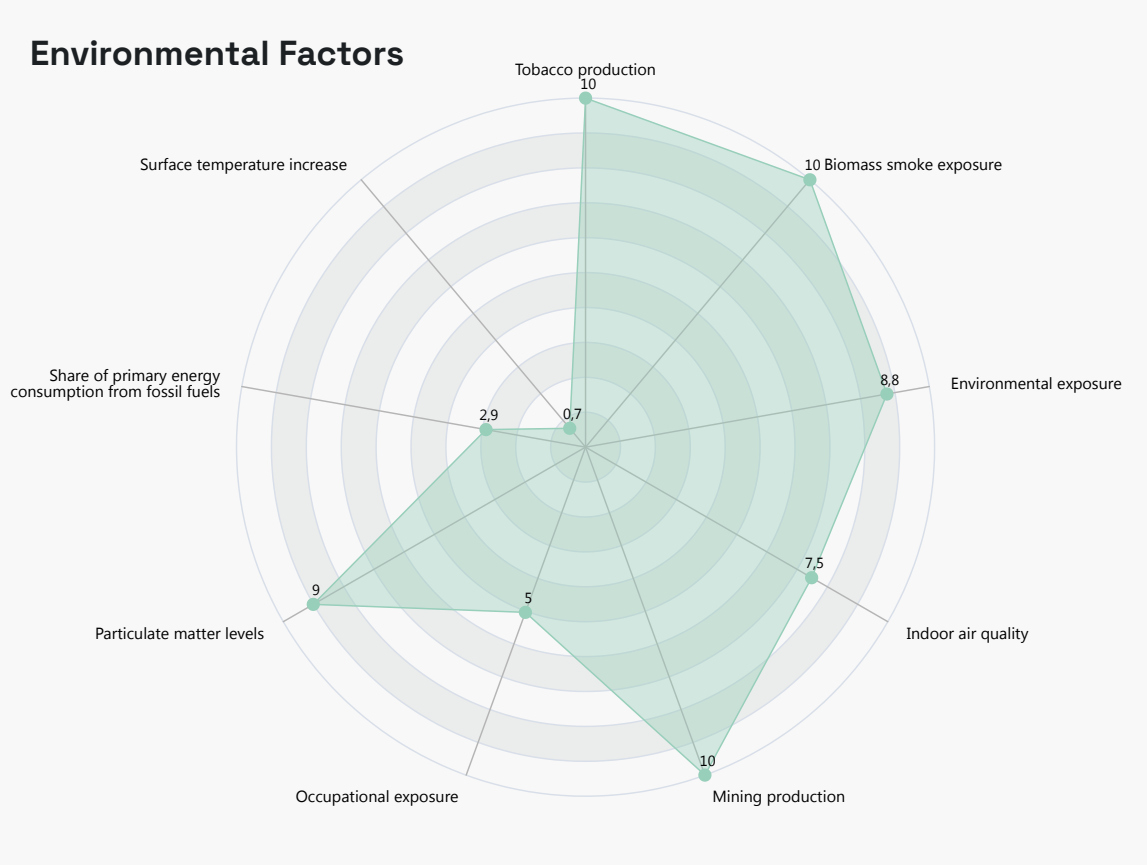


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
8,8
Environmental exposure
7,5
Indoor air quality
10
Mining production
Occupational exposure
5
9
Particulate matter levels
Share of primary energy consumption from fossil fuels
2,9
Surface temperature increase
0,7

Saudi Arabia

Saudi Arabia scores above average in the Policy Context category, with relatively good adherence to COPD care guidelines and tobacco control policies, despite the lack of a comprehensive COPD strategy. Saudi Arabia has an average Health System Characteristics category score due in part to a low number of primary care physicians. Saudi Arabia has the highest score in the Disease Burden category, due to a low estimated societal cost of COPD, a low rate of COPD-related disability-adjusted life years, low rate of COPD deaths, and low COPD prevalence. Saudi Arabia scores below average in the Access and Care Coverage category, with a need for stronger care referral pathways and universal health care service coverage, although it has relatively good conditions for diagnosis and treatment access. Saudi Arabia is the third-lowest scorer in the Environmental Factors category due to the highest levels of particulate matter and environmental exposure to COPD risk factors.

Country Score
65.1

Rank
13

COPD Death Rate (% of all deaths)
1.8%

Smoking Rate (%)
14.3%

Estimated Societal Cost of COPD per capita (2017 INT$)
$308

KEY TAKEAWAYS

- Lowest prevalence of COPD, highest performance in disease burden category
- Development of a national strategy for COPD would significantly improve Saudi Arabia's approach to COPD care and management
- Highest level of particulate matter exposure in the COPD Index

Insights

Challenges

- Lack of awareness of COPD among health practitioners and policymakers, leading to wrongful diagnosis
- Lack of adherence to national COPD guidelines
- Limited access to diagnosis (i.e. spirometry) and pulmonologists in general

Opportunities

- Implementation of smoking cessation programs, especially due to increased smoking rates over the past decade
- Care clinics with pulmonary function testing labs to diagnose COPD

Priorities

- Address the lack of registries in order to examine the current burden of COPD in Saudi Arabia
- Address the poor recognition of COPD in Primary Health Care and ER departments, as well as the lack of referral to appropriate pulmonary clinics

Best practices in COPD care

- Medication availability, including triple inhaler and biologics
- Excellent health care infrastructure in terms of health care access and availability of ER and pulmonary clinics

Resources

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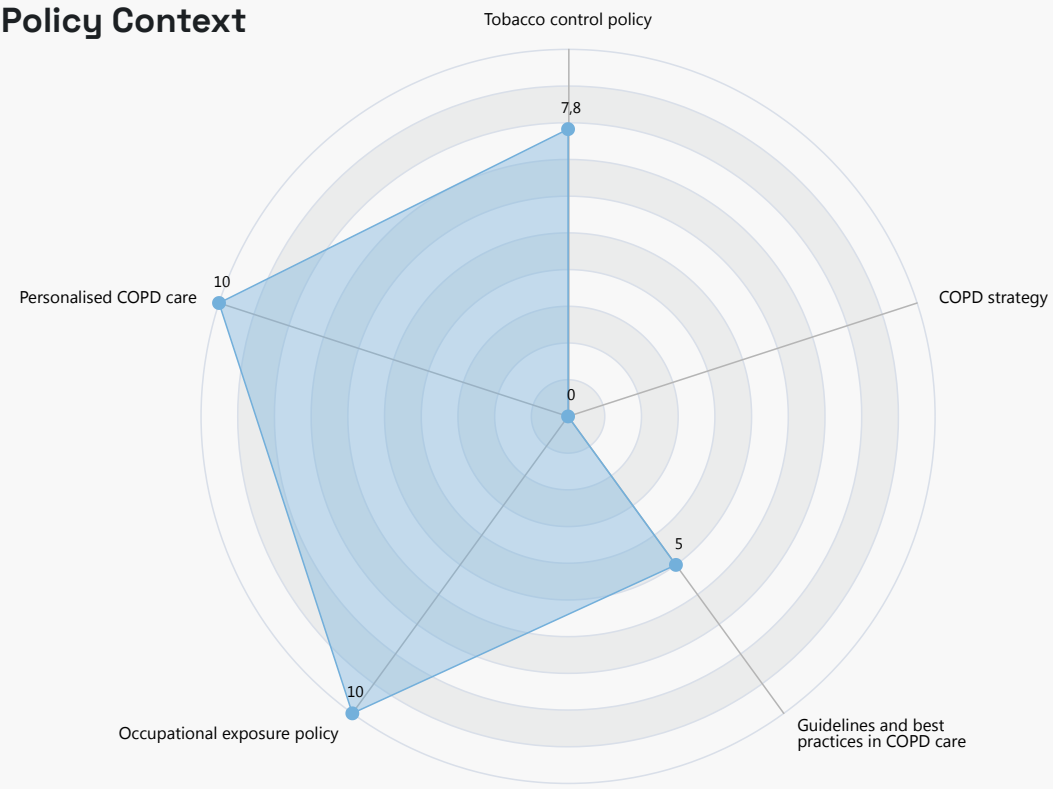
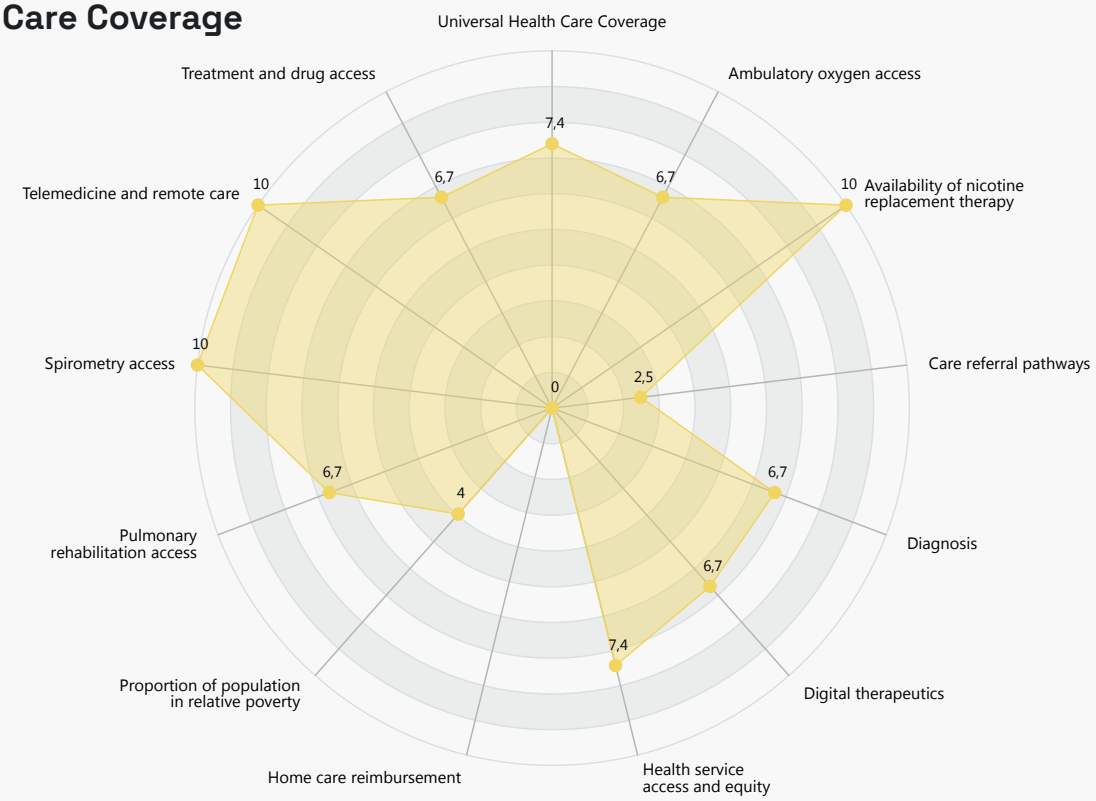
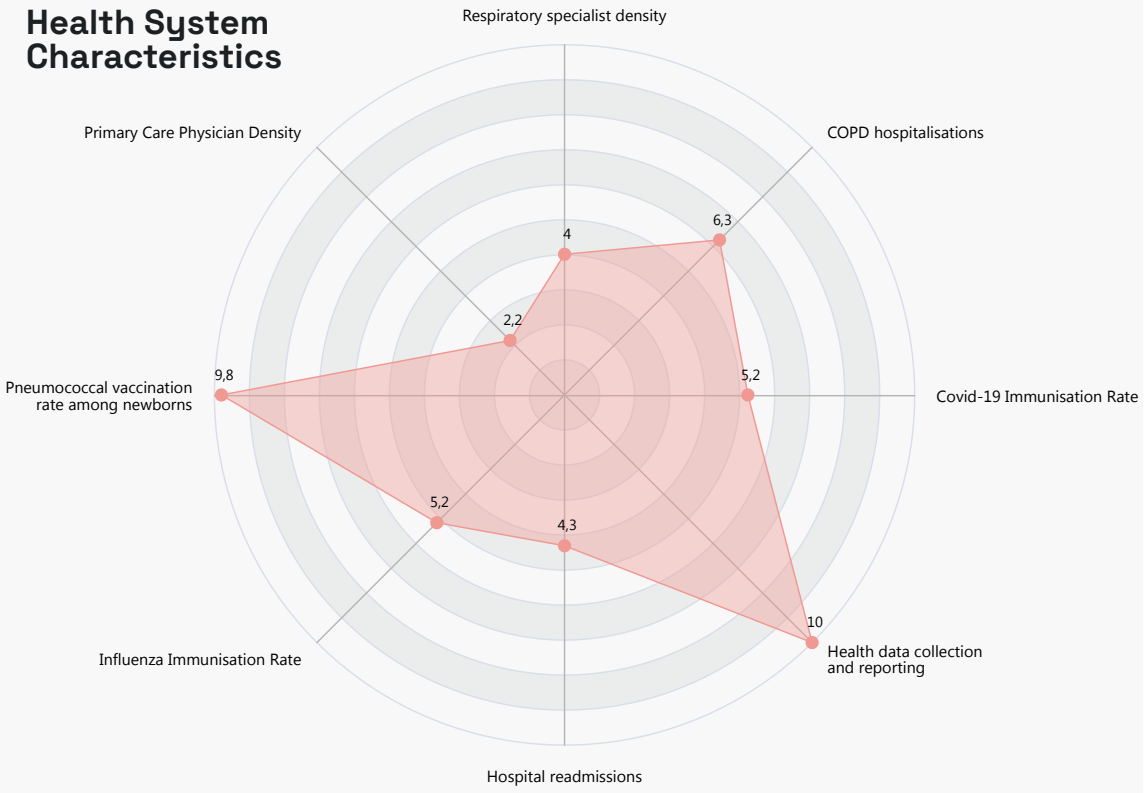
Policy Context



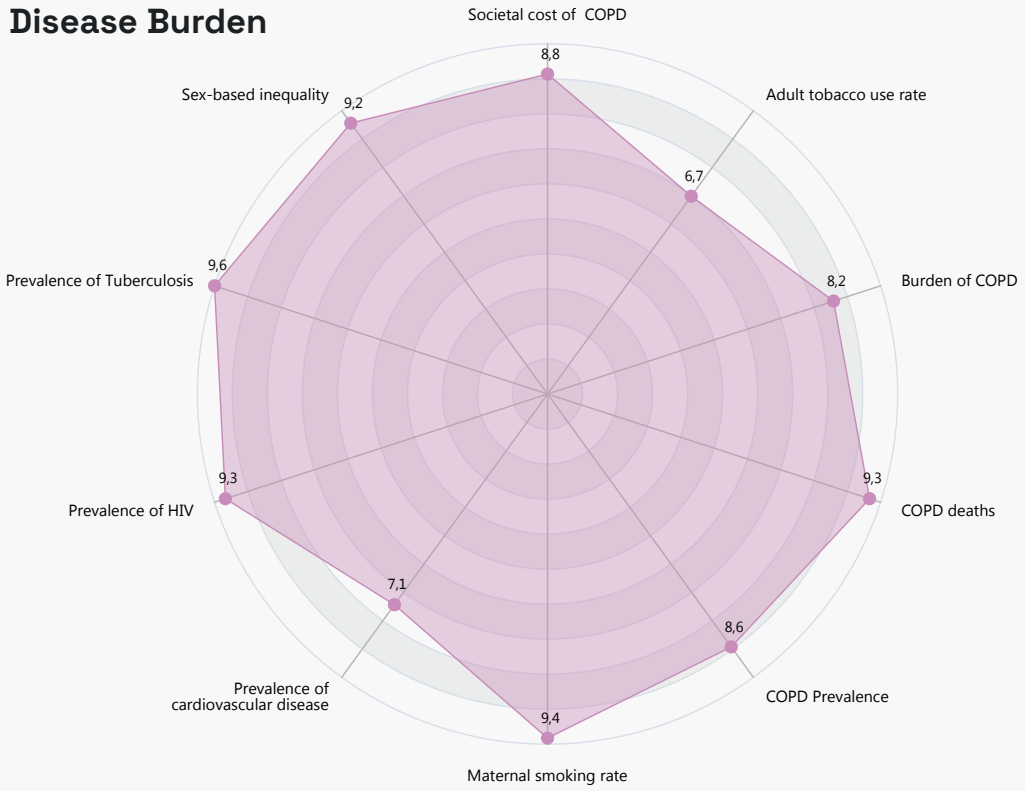
Access and Care Coverage

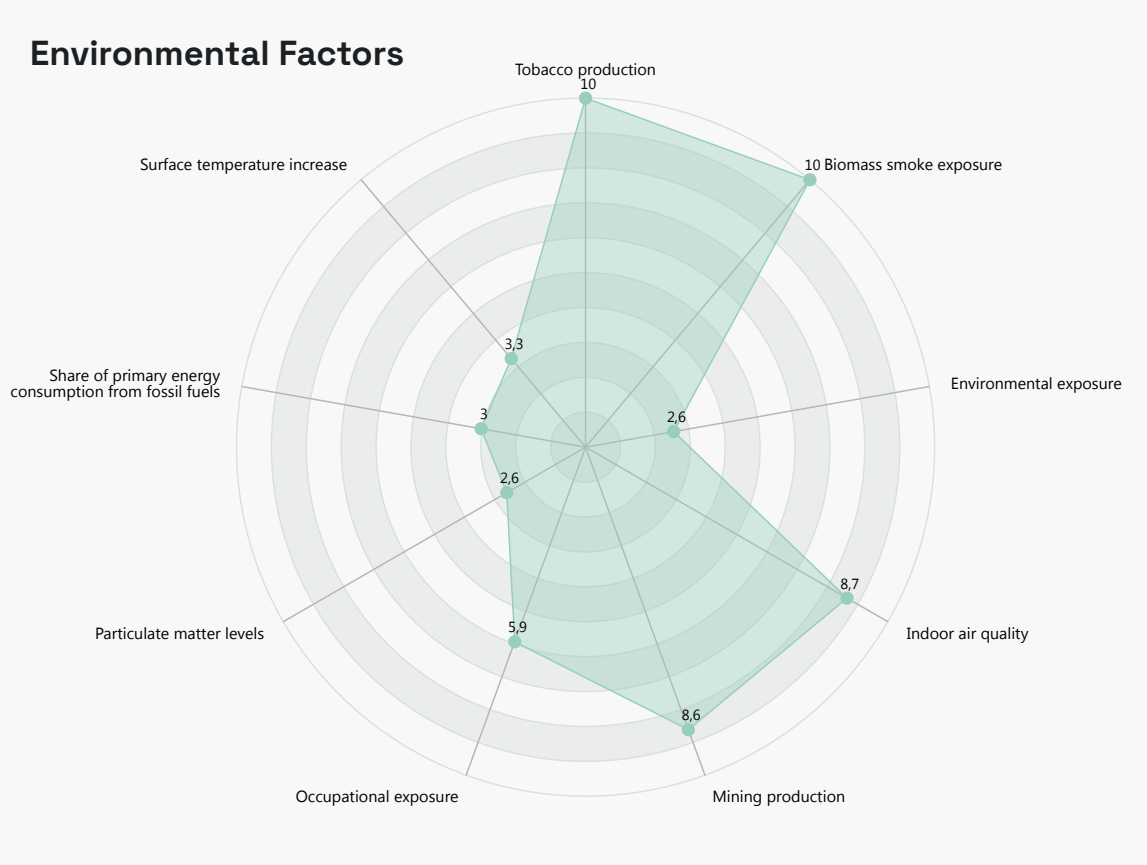


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
2,6
Indoor air quality
8,7
Mining production
8,6
Occupational exposure
5,9
Particulate matter levels
2,6
Share of primary energy consumption from fossil fuels
3
Surface temperature increase
3,3

Slovakia

Slovakia scores high in the Access and Care Coverage category, mainly due to high access to diagnostic and treatment services, and care referral pathways. Slovakia's score in the Health System Characteristics category is above average, with good conditions for health data recording and reporting, and a low number of annual COPD hospitalisations. Slovakia scores above average in the Policy Context category, with strong adherence to COPD care guidelines, but lacks a national COPD strategy. Slovakia's score in the Environmental Factors category is slightly above average, with good indoor air quality, but a significant level of environmental exposure to COPD risk factors. While Slovakia reports a high rate of tobacco use, it is among the top scorers in the Disease Burden category, due to a relatively low estimated societal cost of COPD and a low rate of disability-adjusted life years attributable to COPD.

Country Score
68.4

Rank
6

COPD Death Rate (% of all deaths)
1.8%

Smoking Rate (%)
31.5%

Estimated Societal Cost of COPD per capita (2017 INT$)
$700

KEY TAKEAWAYS

- Low rate of COPD-related hospitalisations
- Strong adherence to COPD guidelines, but lacks a national COPD strategy
- High smoking rate combined with significant level of environmental exposure to COPD risk factors

Insights

Challenges

- Lack of primary care strategy for early COPD diagnosis
- Prescription barriers to prescribe COPD medication in primary care

Opportunities

- Move the care from specialists to GPs, by providing incentives, training and guidelines for spirometry
- Remove barriers in prescribing COPD medication
- Reimburse smoking cessation help

Priorities

- Not enough involvement of GPs in COPD care, quality of care among pneumology specialists varies significantly and is often not aligned with GOLD standards

Best practices in COPD care

- COPD care led by specialists, lung disease ambulances

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "There is no strategy in primary care to diagnose COPD early ... GPs in Slovakia usually do not provide spirometry, all patients must be sent to pneumology specialists to be diagnosed. Upon diagnosis they are in care of pneumology specialist, as there are prescription barriers to prescribe COPD medication in GP practice. GPs can prescribe salbutamol and ipratropium bromide solely, no other medications."

> "Move the care from specialists into the competencies of GPs step by step – incentives for spirometry in GP practice, train GPs to diagnose and treat, produce guidelines and remove barriers in medication prescriptions. Smoking cessation help is not accessible for patients, GPs are not trained and not paid for doing so."

> "GPs are not involved at all, quality of care among pneumology specialists vary significantly and is often not aligned with GOLD standards"

Resources

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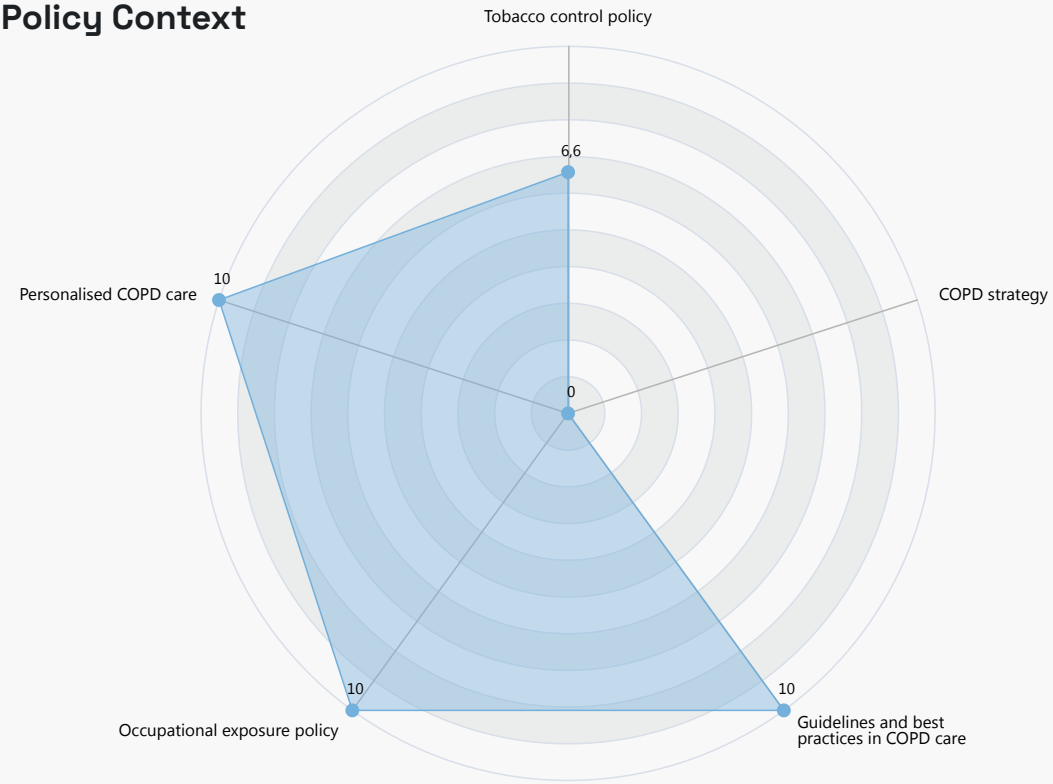
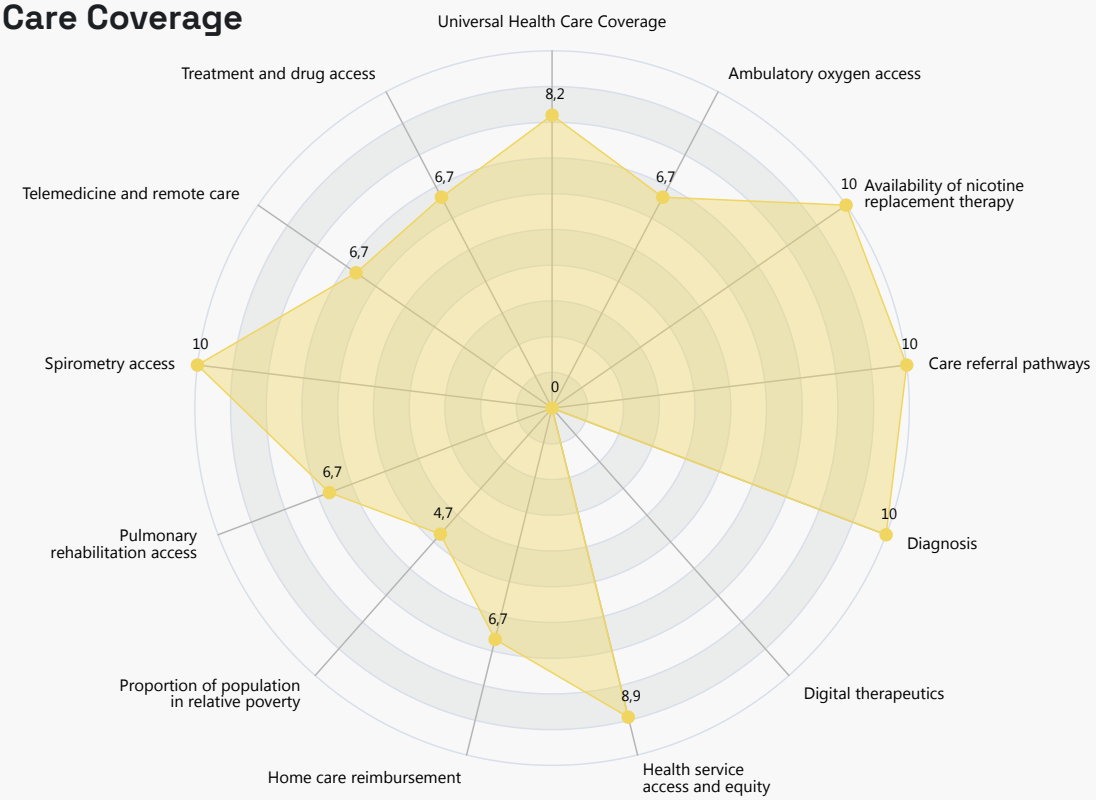
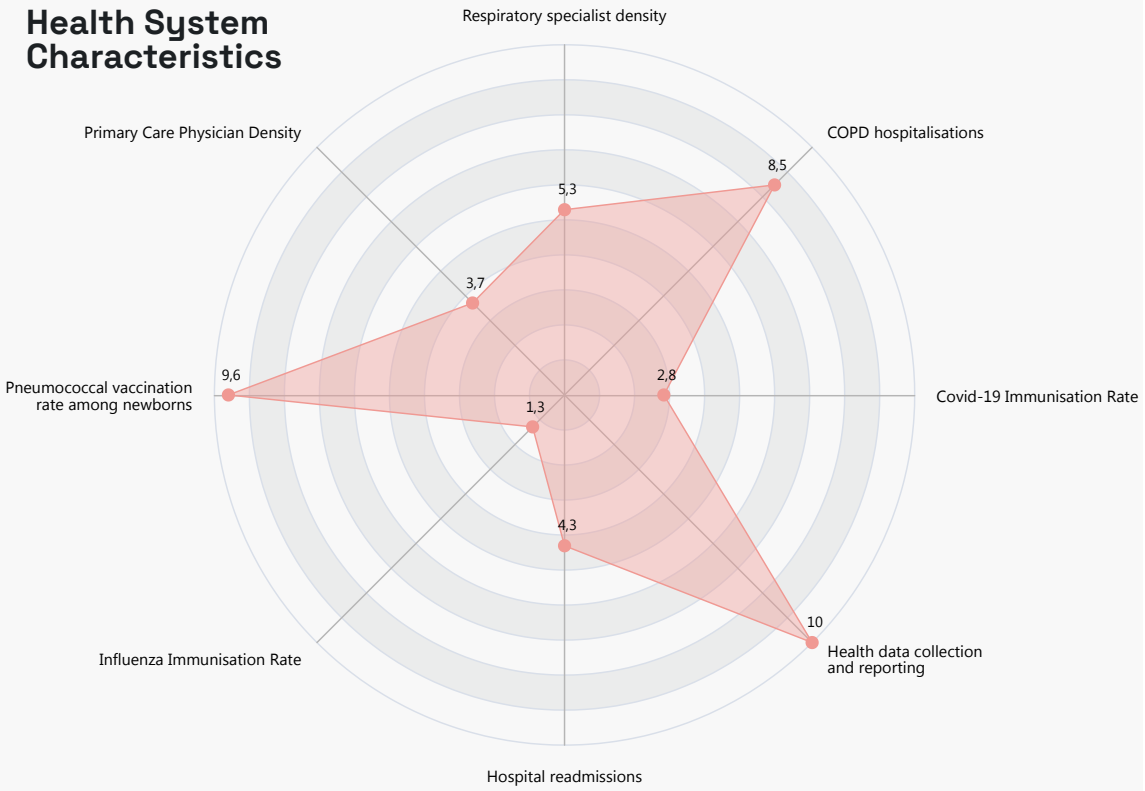
Policy Context



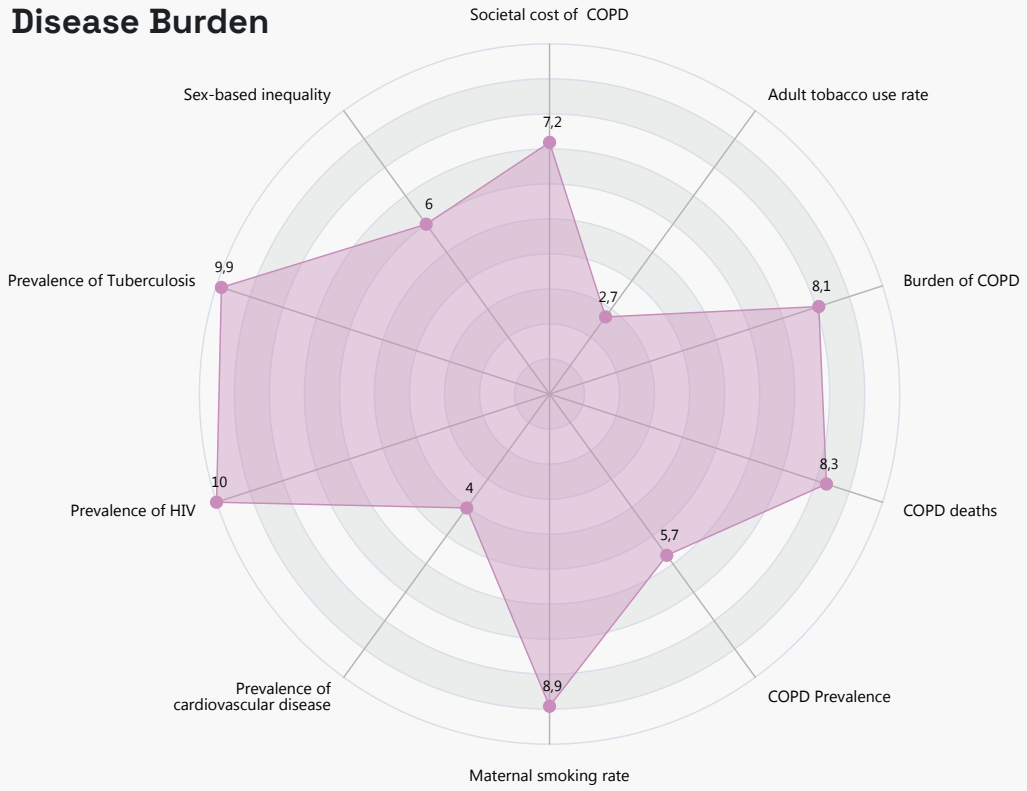
Access and Care Coverage

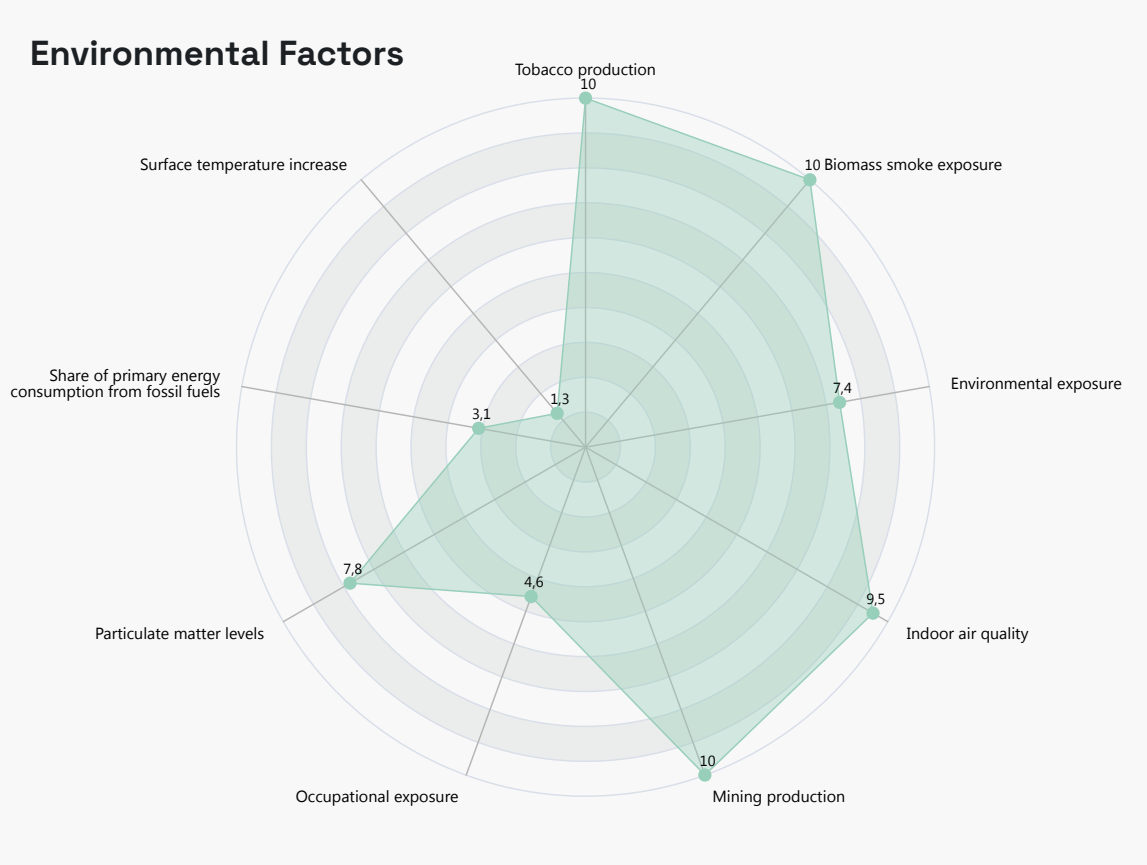


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
Indoor air quality
Mining production
Occupational exposure
Particulate matter levels
Share of primary energy consumption from fossil fuels
Surface temperature increase
1,3
7,4
9,5
10
4,6
7,8
3,1

Slovenia

Slovenia scores slightly above average in the Access and Care Coverage category, with relatively good access to treatment and drugs, good conditions for diagnosis, and robust universal health care service coverage. However, improvements in telemedicine access could boost Slovenia's score in this category. In the Environmental Factors category, the score is slightly above average, with low occupational exposure to COPD risk factors, despite reports of poor indoor air quality. Slovenia scores below average in the Health System Characteristics category, mainly due to a low number of primary care physicians, despite having a relatively low annual COPD hospitalisation rate and good conditions for health data recording and reporting. Slovenia has the fifth-highest score in the Disease Burden category due to a low estimated societal cost of COPD and a relatively low COPD death rate. In the Policy Context category, Slovenia has a low score, indicating the need for a national COPD strategy and stronger adherence to care guidelines, despite relatively robust tobacco control policies.

Country Score
60.7

Rank
27

COPD Death Rate (% of all deaths)
2.6%

Smoking Rate (%)
22.0%

Estimated Societal Cost of COPD per capita (2017 INT$)
$428

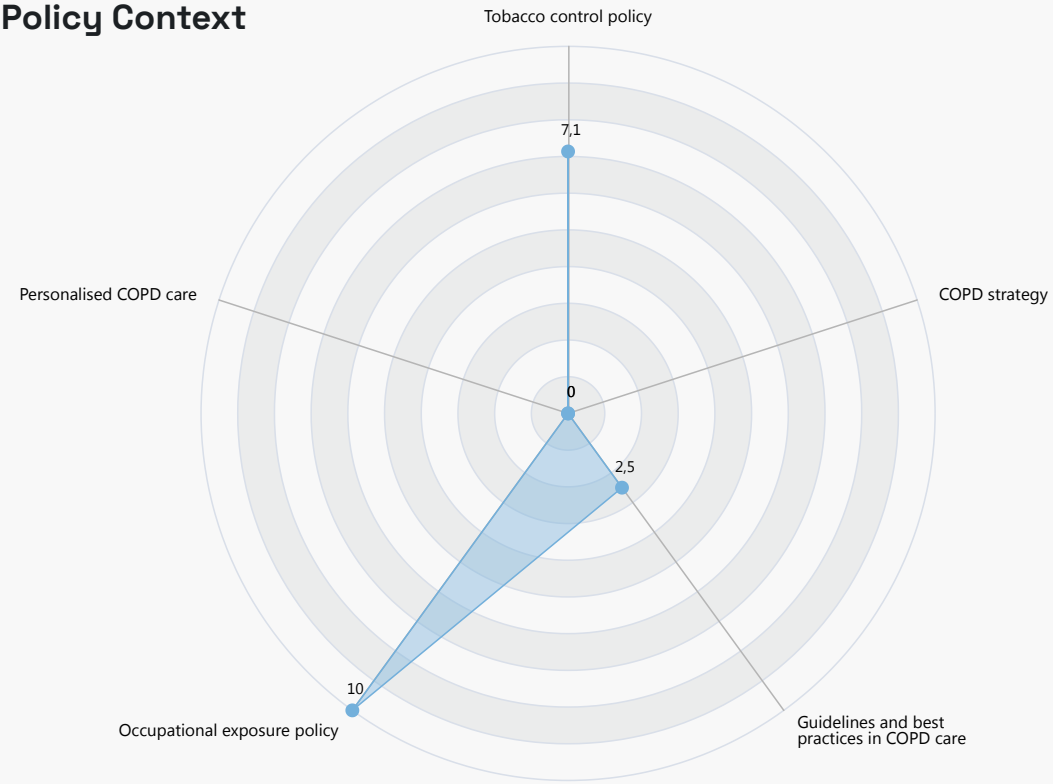
KEY TAKEAWAYS

- Low number of primary care physicians, but improvements in telemedicine would significantly improve the populations access to care
- Relatively good conditions for access to COPD care due to robust universal health care coverage
- Low estimated societal cost of COPD and a relatively low COPD death rate

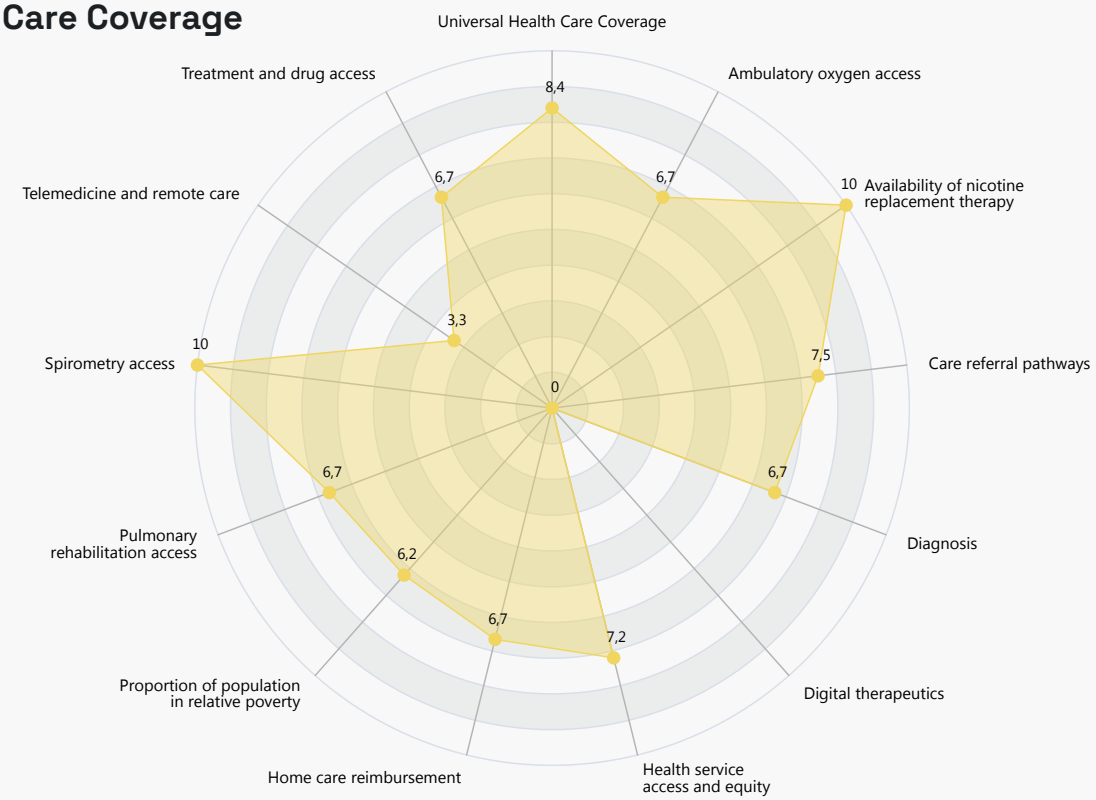
Resources

Please scan this QR code to view the sources.

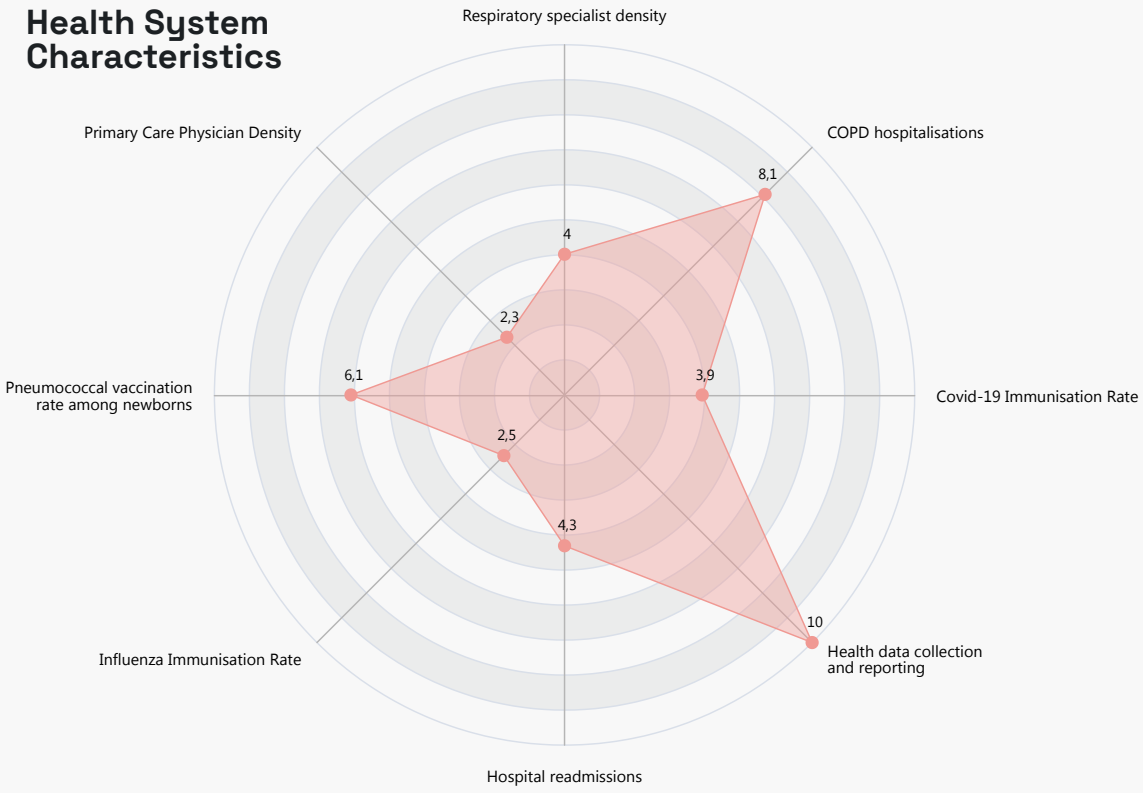
Policy Context



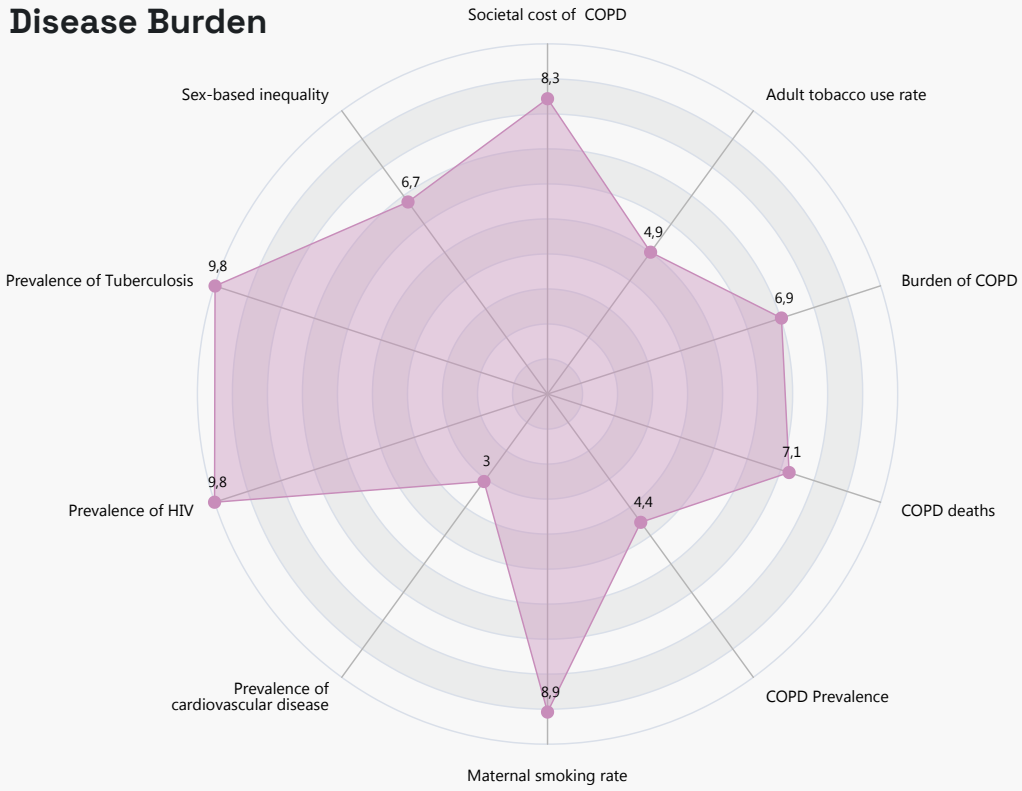
Access and Care Coverage

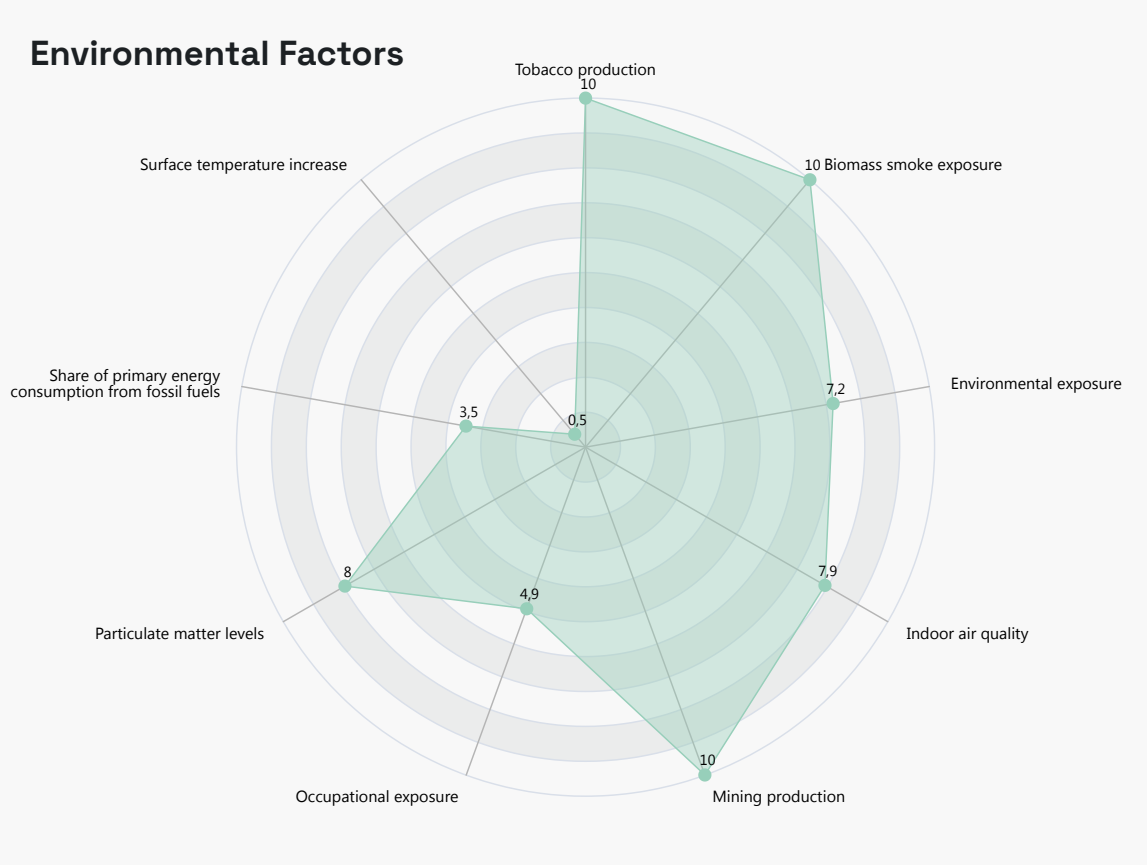


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
7,2
Indoor air quality
7,9
Mining production
10
Occupational exposure
4,9
Particulate matter levels
8
Share of primary energy consumption from fossil fuels
3,5
Surface temperature increase
0,5

South Korea
(Republic of Korea)

South Korea is among the highest scorers in the Health System Characteristics category, with a low number of annual COPD hospitalizations and good conditions for health data collection and recording. South Korea could improve its score in this category by addressing its relatively low primary physician density. In the Access and Care Coverage category South Korea scores below average, mainly due to a lack of access to telemedicine and a high level of relative poverty, despite good conditions for diagnosis and access to treatment and drugs. Similarly, South Korea scores below average in the Policy Context category. This score could be improved by a stronger implementation of the national COPD strategy and better adherence to care guidelines, as well as by improving the scope and implementation of tobacco control policies. South Korea scores below average in the Environmental Factors category, primarily due to relatively high air pollution. South Korea reports a relatively high score in the Disease Burden category, but the difference in disability-adjusted life years attributable to COPD among men and women is notable.

Country Score
63.8

Rank
=20

COPD Death Rate (% of all deaths)
3.3%

Smoking Rate (%)
20.8%

Estimated Societal Cost of COPD per capita (2017 INT$)
$913

KEY TAKEAWAYS

- Low number of annual COPD hospitalizations and good conditions for health data collection and recording
- High levels of environmental exposure to COPD risk factors, especially air pollution
- Notable difference in disability-adjusted life years attributable to COPD among men and women

Insights

Challenges

- Low awareness of COPD
- Low use of pulmonary function testing
- Low prescription rate of inhalers

Opportunities

- Ageing society
- National health insurance system
- Decrease smoking rates

Priorities

- Incentives for pulmonary function testing, incentives for inhaler prescription, incentives for pulmonary rehabilitation

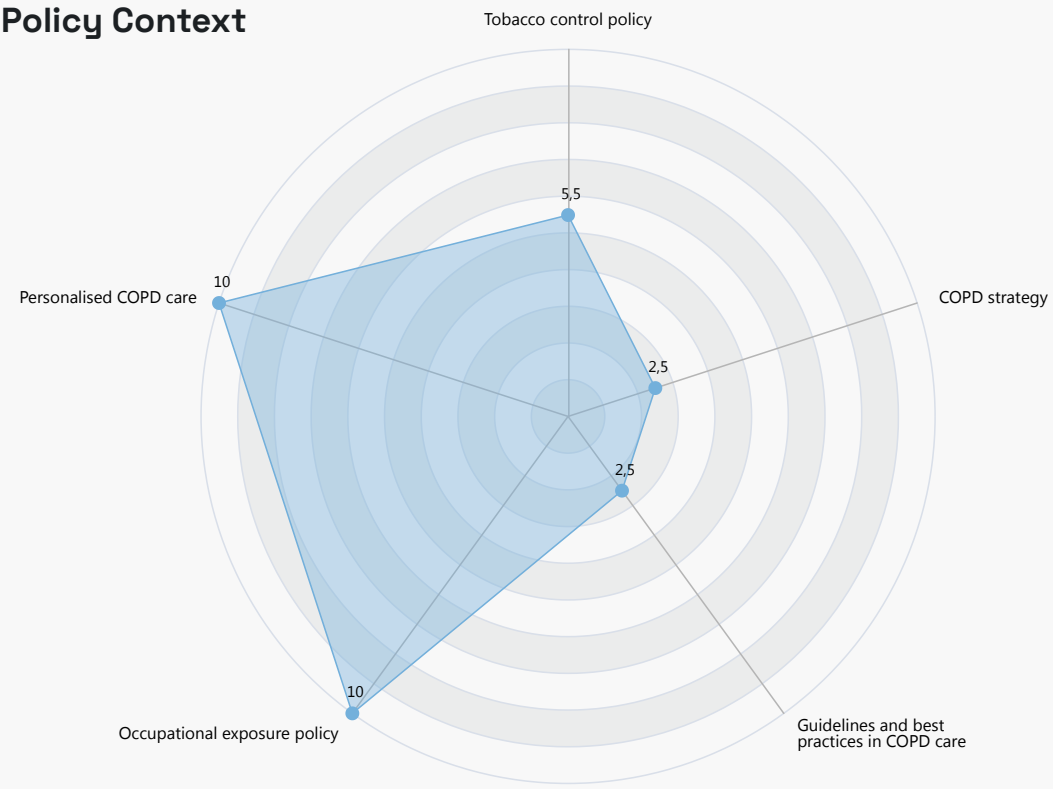
Best practices in COPD care

- Continue implementation of COPD guidelines
- Improve COPD education
- Increase insurance coverage for inhalers

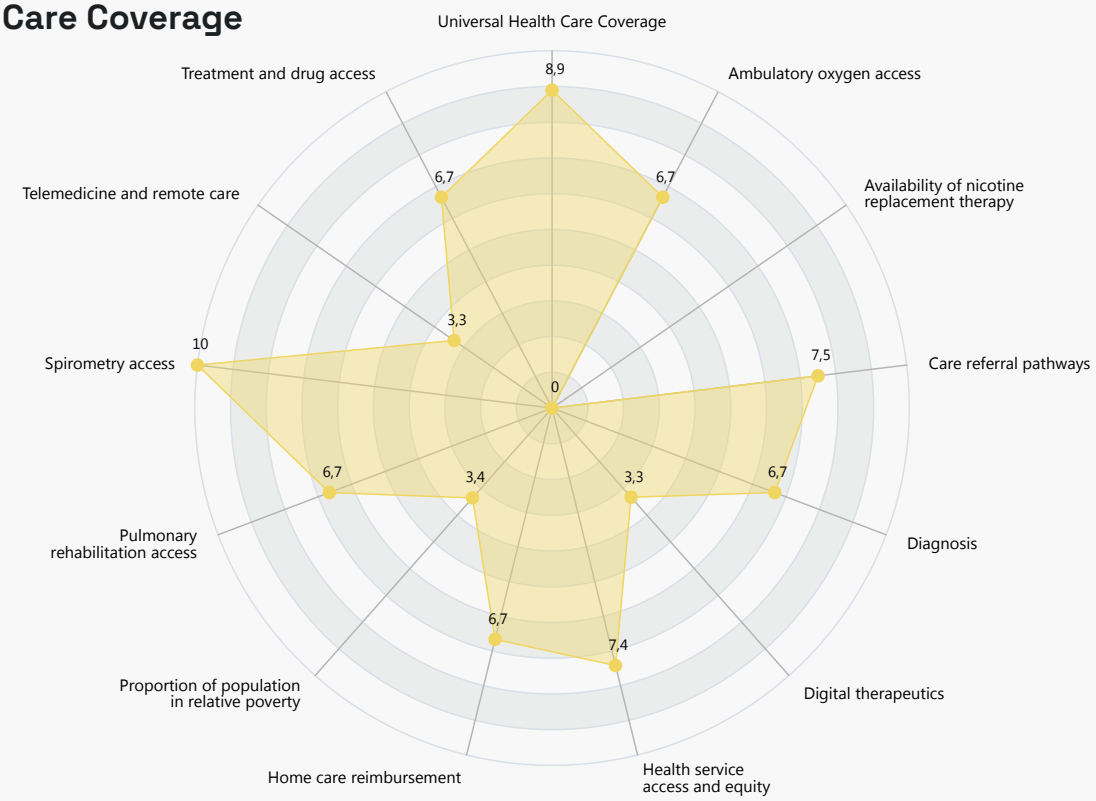
Resources

Please scan this QR code to view the sources.

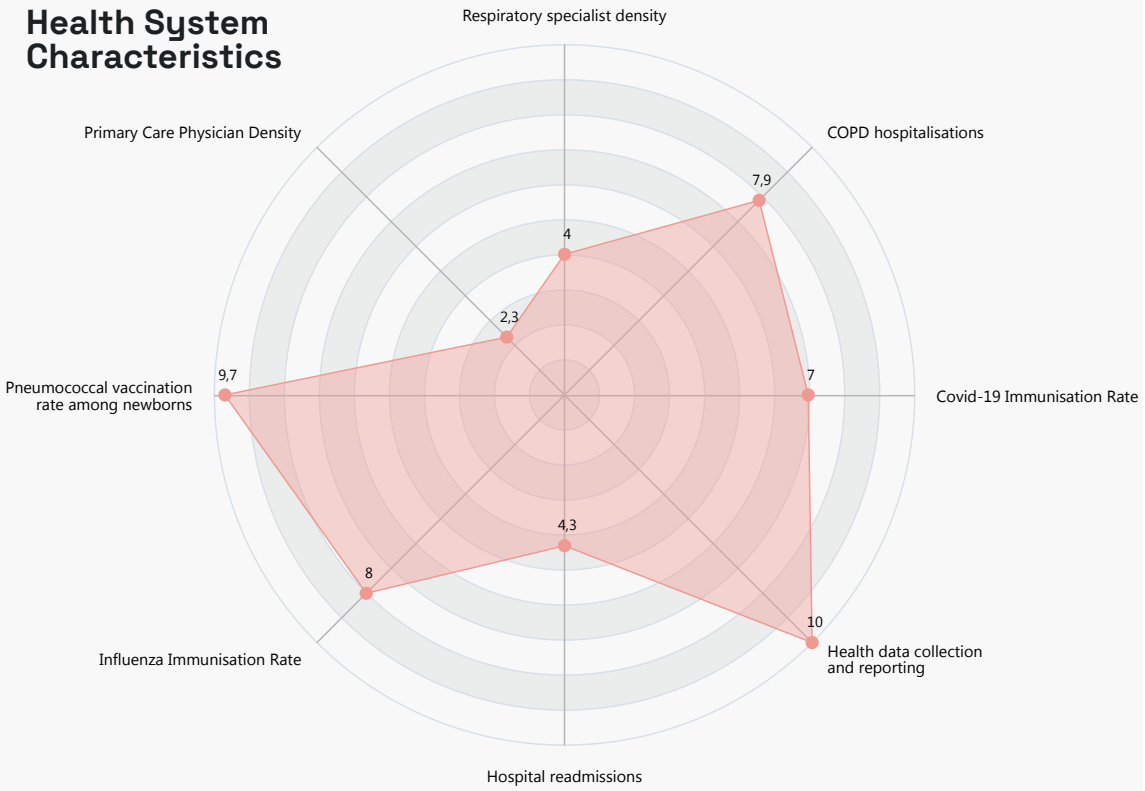
Policy Context



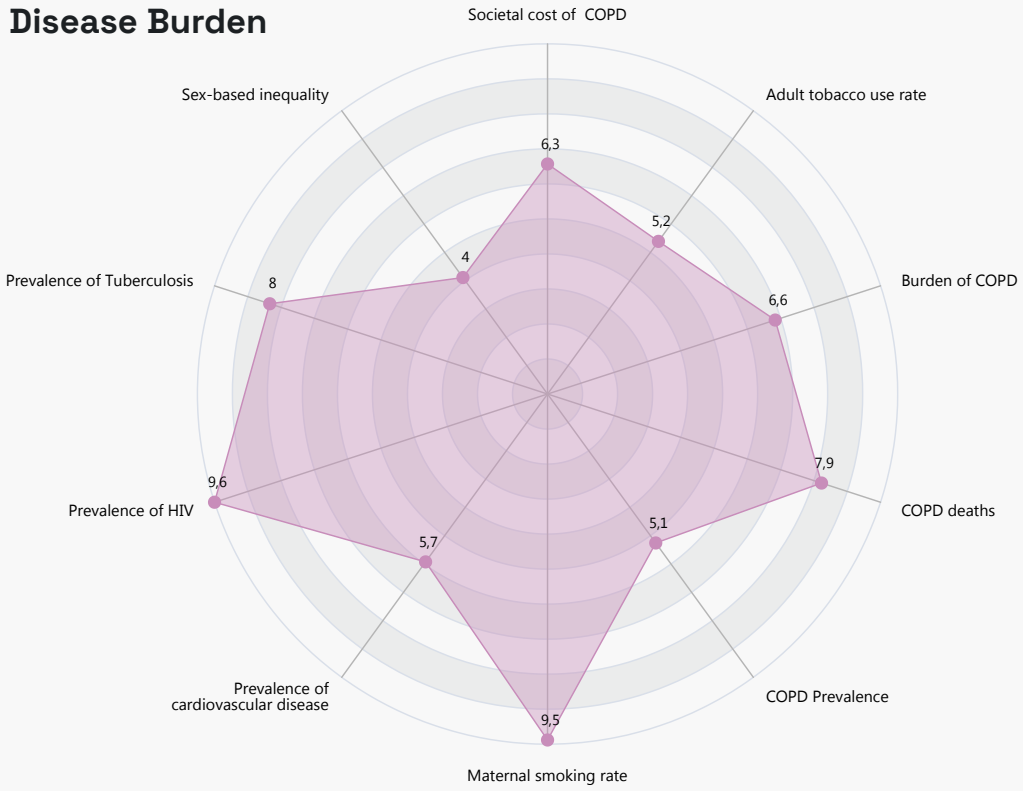
Access and Care Coverage

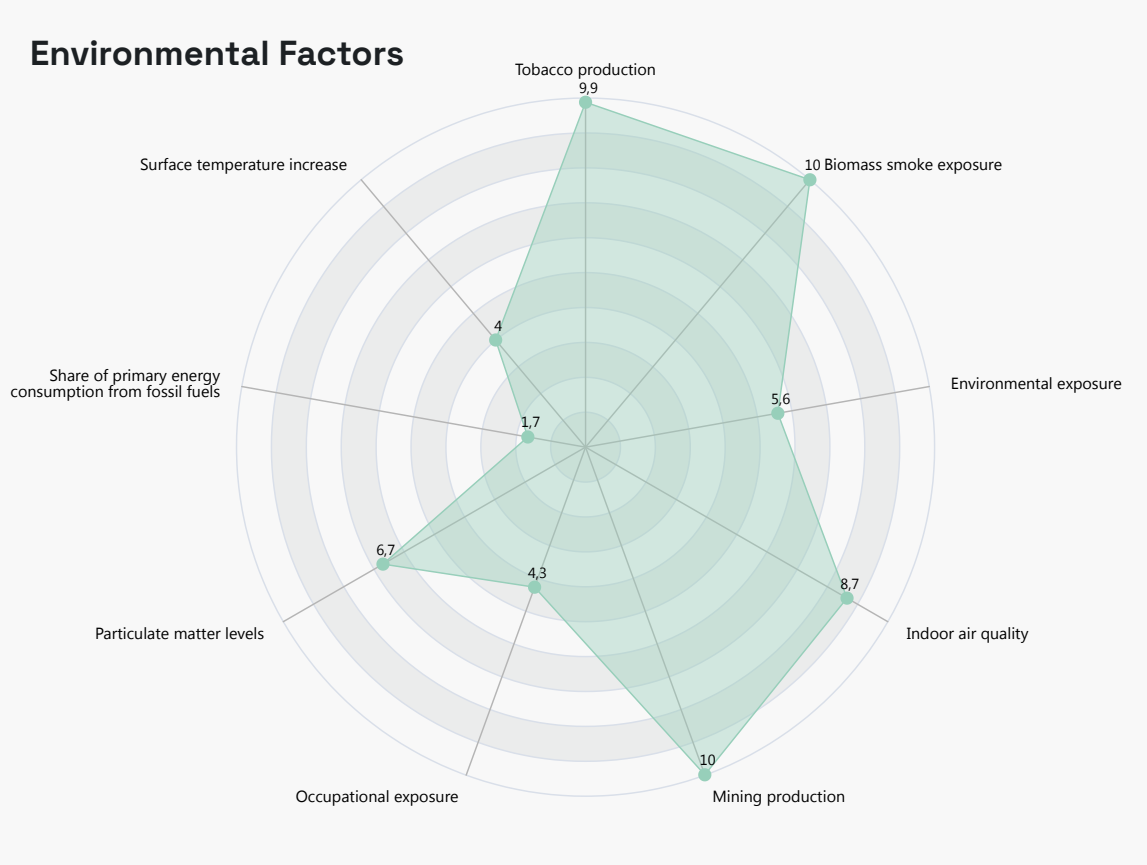


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
9,9
10 Biomass smoke exposure
Environmental exposure
5,6
Indoor air quality
8,7
Mining production
10
Occupational exposure
4,3
Particulate matter levels
6,7
Share of primary energy consumption from fossil fuels
1,7
Surface temperature increase
4

Spain

Spain is the third highest scorer in the Policy Context category, with strong care guidelines, a robust tobacco policy, and a national COPD strategy. Spain's score in the Health System Characteristics category is also high, primarily due to low annual hospitalisation and readmission rates for COPD and good conditions for health data recording and reporting. Primary care physician density could be increased to improve Spain's score in this category. Spain's score in the Access and Care Coverage category is above average, with excellent conditions for diagnosis and telemedicine, and good access to treatment and drugs, as well as universal health care service coverage, although the country faces somewhat high relative poverty. Similarly, the Environmental Factors category score is above average, with low particulate matter exposure levels and low occupational exposure to COPD risk factors. Spain has the third lowest score in the Disease Burden category, mainly due to the highest sex-based inequality in disability-adjusted life years attributable to COPD and a high COPD prevalence and death rate, despite a relatively low estimated societal cost of COPD.

Country Score
68.7

Rank
5

COPD Death Rate (% of all deaths)
6.6%

Smoking Rate (%)
27.7%

Estimated Societal Cost of COPD per capita (2017 INT$)
$680

KEY TAKEAWAYS

- Strong care guidelines, a robust tobacco policy, and a national COPD strategy
- Excellent conditions for diagnosis and telemedicine, and good access to treatment and drugs, as well as universal health care service coverage, despite high inequality
- Highest sex-based inequality in disability-adjusted life years attributable to COPD

Insights

Challenges

- Underdiagnosis of COPD
- Detection of patients at the highest risk for poor outcomes
- Treatment for patients who experience a high symptom burden and frequent exacerbations

Opportunities

- Early treatment according to risk stratification
- Precision medicine for COPD
- CT scans as biomarkers in COPD

Priorities

- Address the decrease in spirometry numbers in primary care following the COVID-19 pandemic
- Develop more referral units for severe COPD
- Address the lack of implementation of pulmonary rehabilitation centres for primary care

Best practices in COPD care

- Early recognition of patients at risk for hospital admission
- Management of comorbidities in COPD by primary care
- Multidimensional approach for patients with severe COPD and breathlessness

Resources

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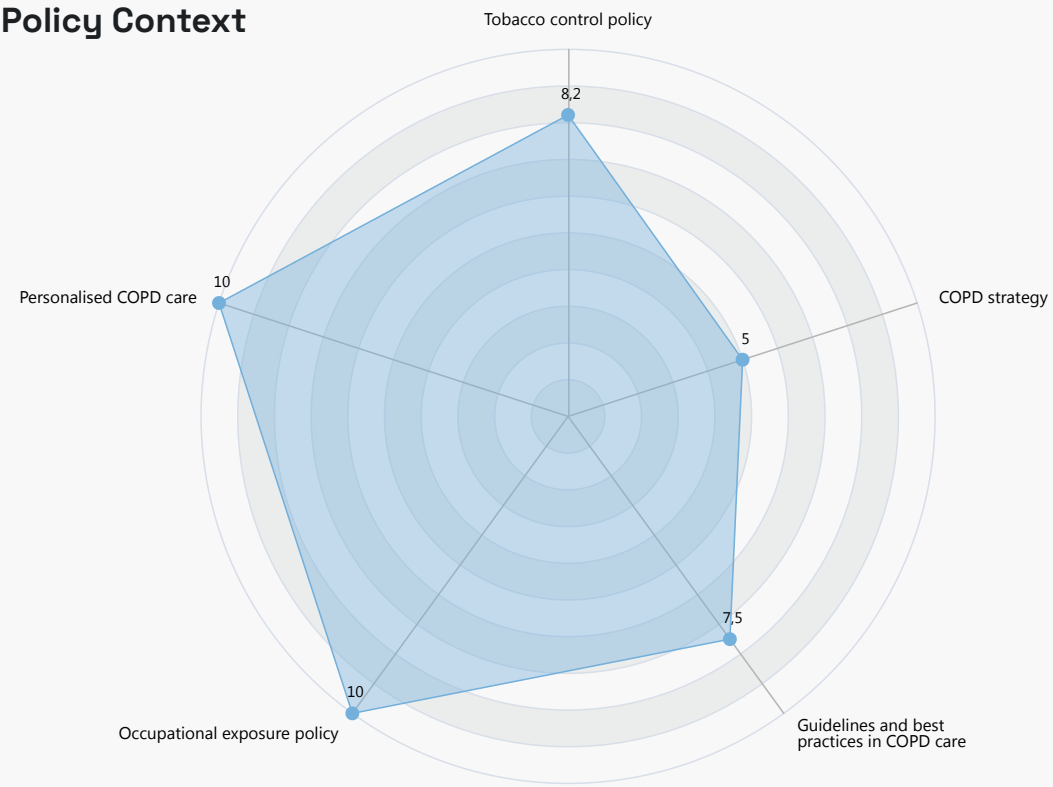
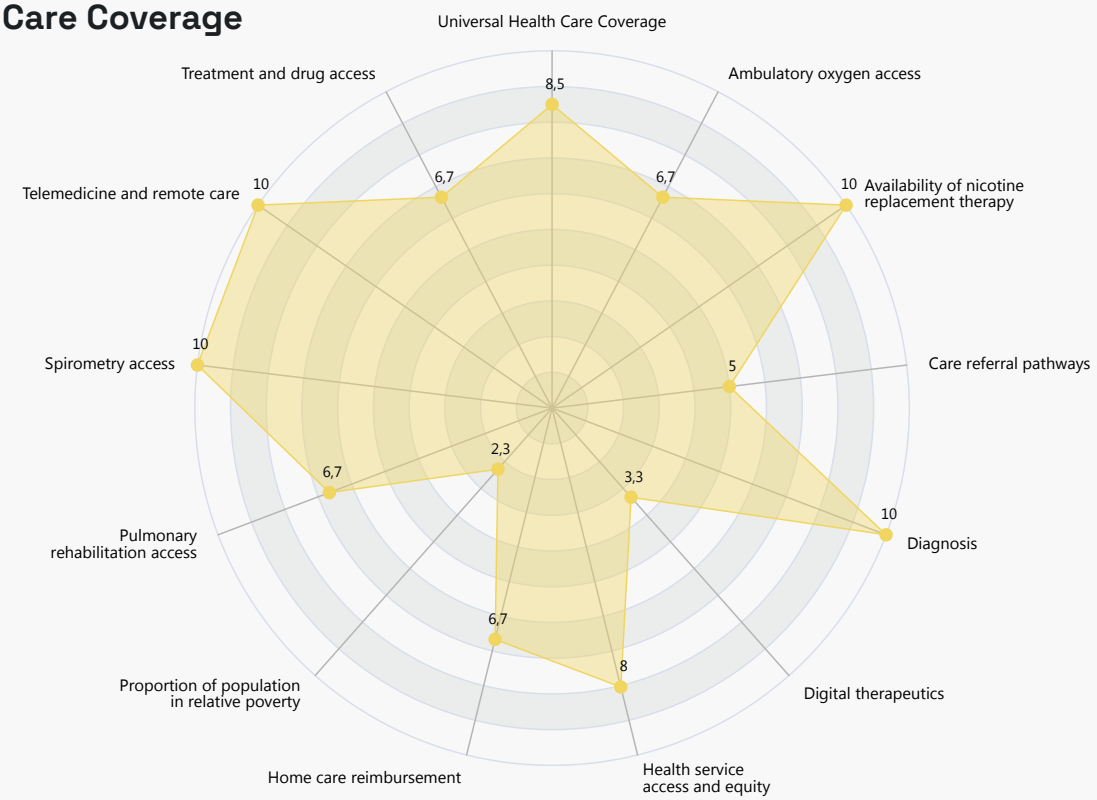
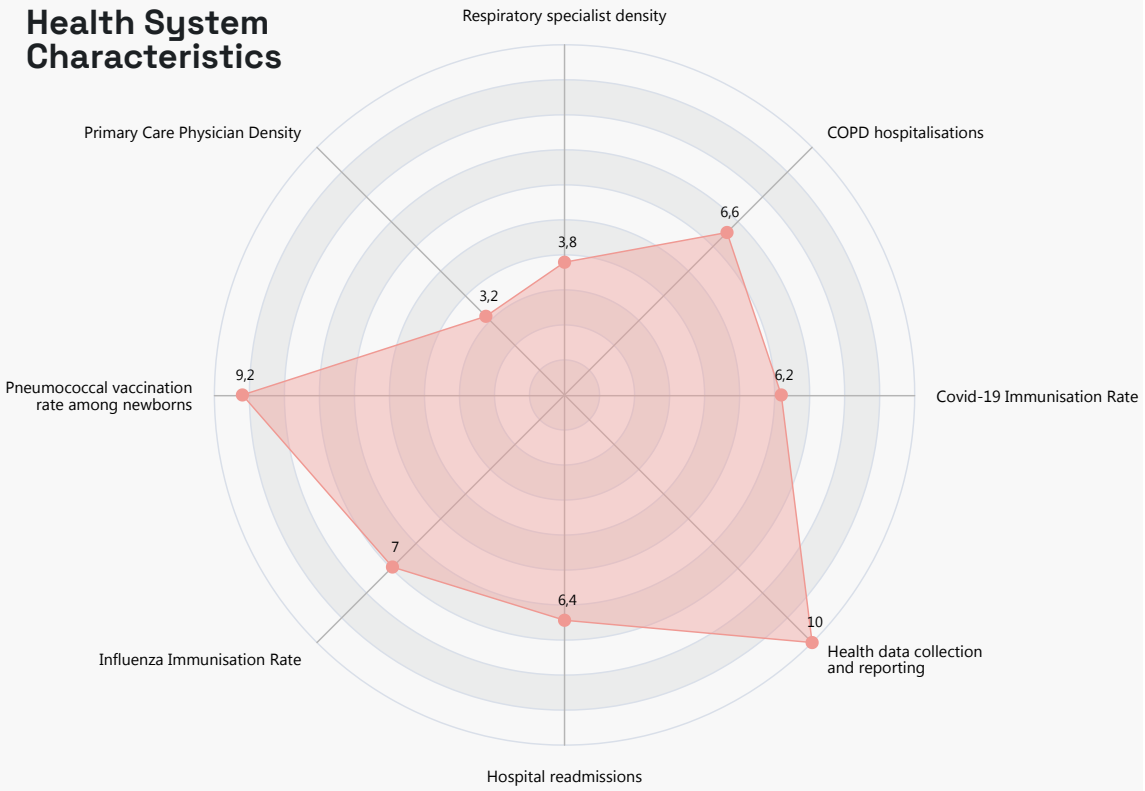
Policy Context



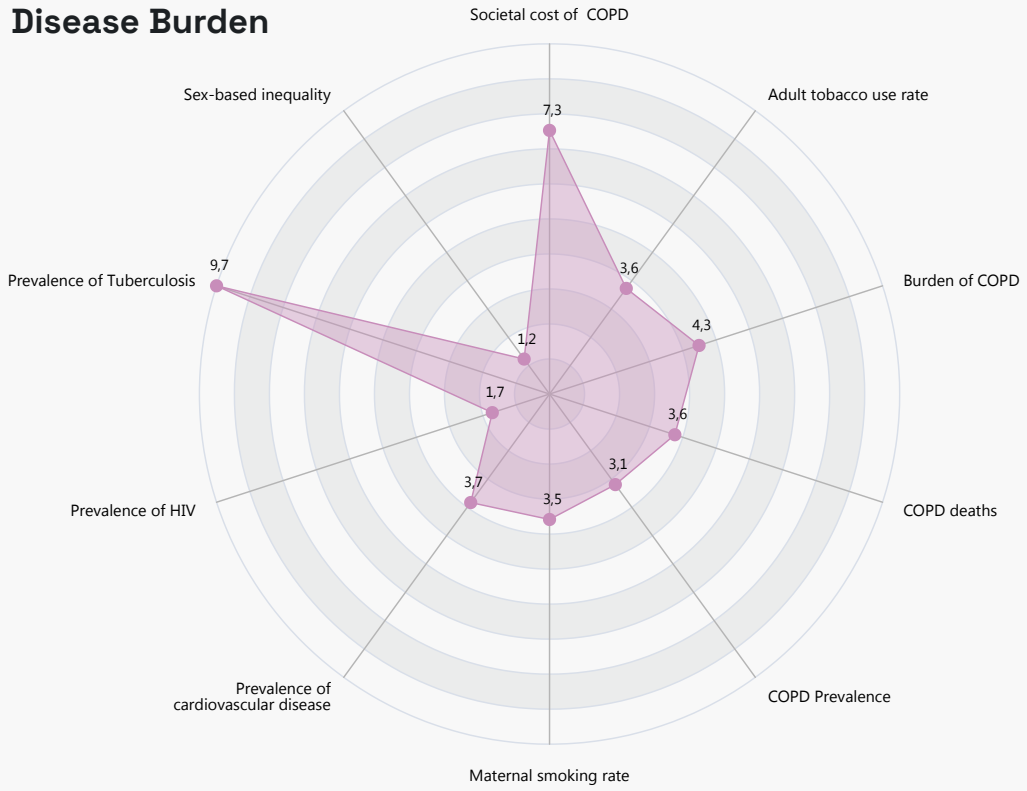
Access and Care Coverage

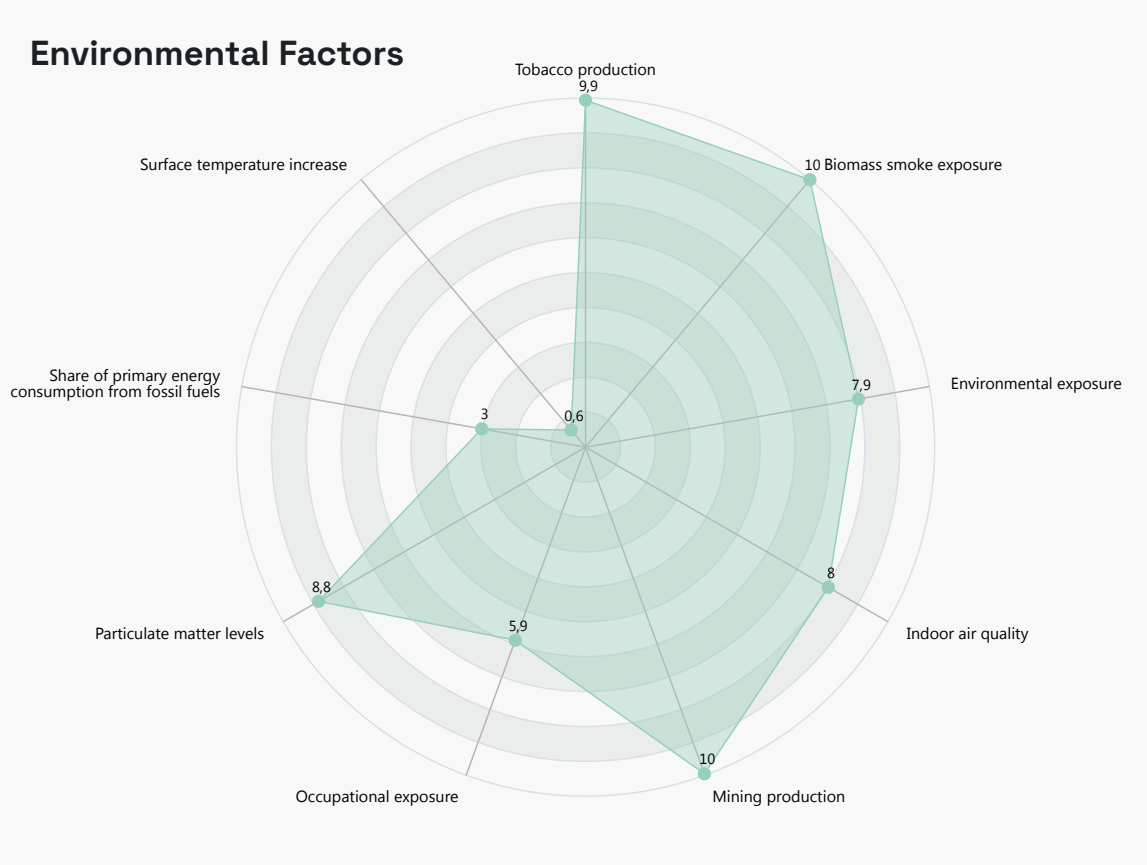


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
9,9
10 Biomass smoke exposure
Environmental exposure
7,9
Indoor air quality
8
Mining production
10
Occupational exposure
5,9
Particulate matter levels
8,8
Share of primary energy consumption from fossil fuels
3
Surface temperature increase
0,6

Sweden

Sweden presents the highest score in the Environmental Factors category and a strong Access and Care Coverage category, which contributes to Sweden's position as the tenth highest-performing country in the COPD Index. While Sweden has a national plan for COPD, adherence to care guidelines is generally low and their tobacco control policy is among the weakest in the Index, ahead of only Lithuania and Switzerland. Sweden presents good conditions for access to COPD diagnosis, as well as comparatively robust care pathways. However, a high percentage of people in Sweden report unmet health care needs due to distance to points of care, financial barriers, and waiting lists. Sweden reports a below-average rate of COPD-related hospitalisations, but an above-average 365-day readmission rate. To improve overall performance in the COPD Index, Sweden could strengthen its tobacco control policy, development, and implementation and, to a lesser degree, increase physician density.

Country Score
66.1

Rank
10

COPD Death Rate (% of all deaths)
3.9%

Smoking Rate (%)
24.0%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,107

KEY TAKEAWAYS

- Existence of a national COPD plan with a moderate level of implementation and adherence
- There is significant room for improvement in the Tobacco Control policy
- Top scorer in the Environmental Factors category, due to low levels of exposure to environmental risk factors and the lowest level of primary energy consumption from fossil fuels

Insights

Challenges

- Need to increase the use and interpretation of spirometry results in primary care

Opportunities

- Independent education and training of key professionals, e.g., physicians, nurses, and physiotherapists
- Increase support for digital and remote care options, especially in rural areas
- Improve phenotyping and precision medicine to help diagnosis and outcomes

Priorities

- Establish specialized care for severe COPD in tertiary care
- Improve awareness of COPD and training for physicians and nurses at all levels of care

Best practices in COPD care

- Existence of primary health care centres with asthma and COPD nurses

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[The challenge is that] ...the [Swedish] guidelines are adequate - it is the negligence (lack of compliance) that is problematic."

> "[In the future] we will have improved awareness of COPD...through the work by the World Health Organization (projecting COPD to become the...third leading cause of death."

Resources

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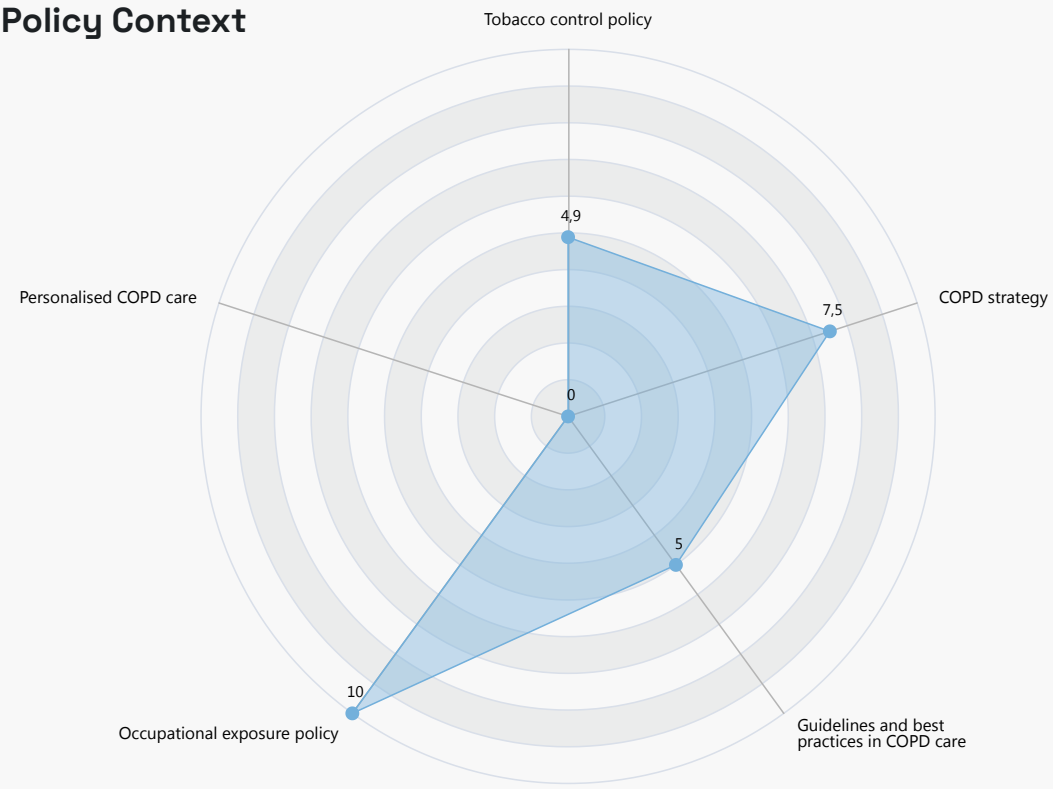
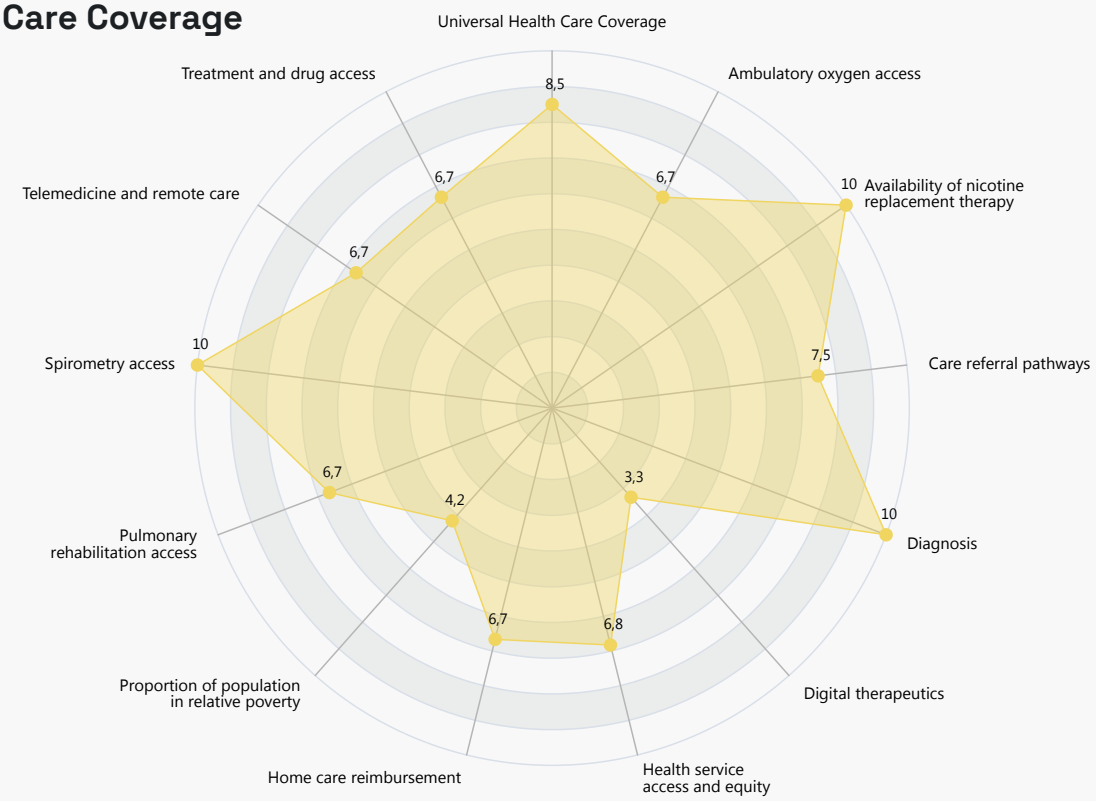
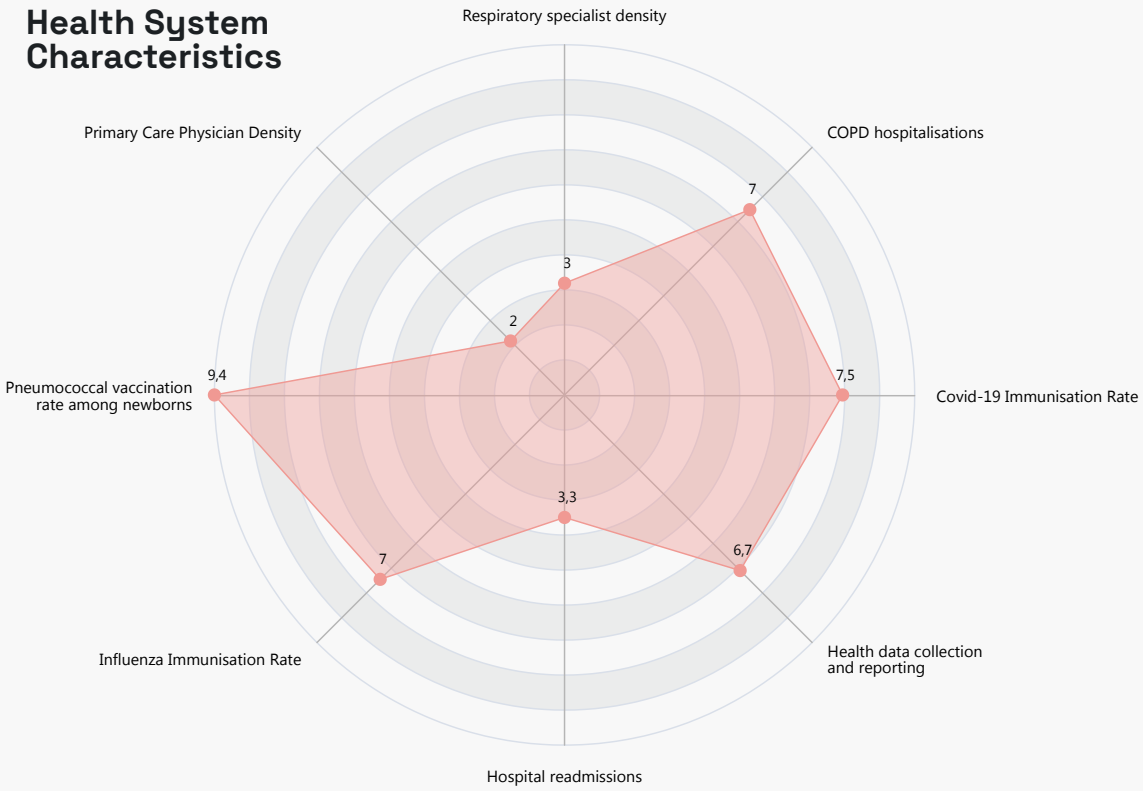
Policy Context



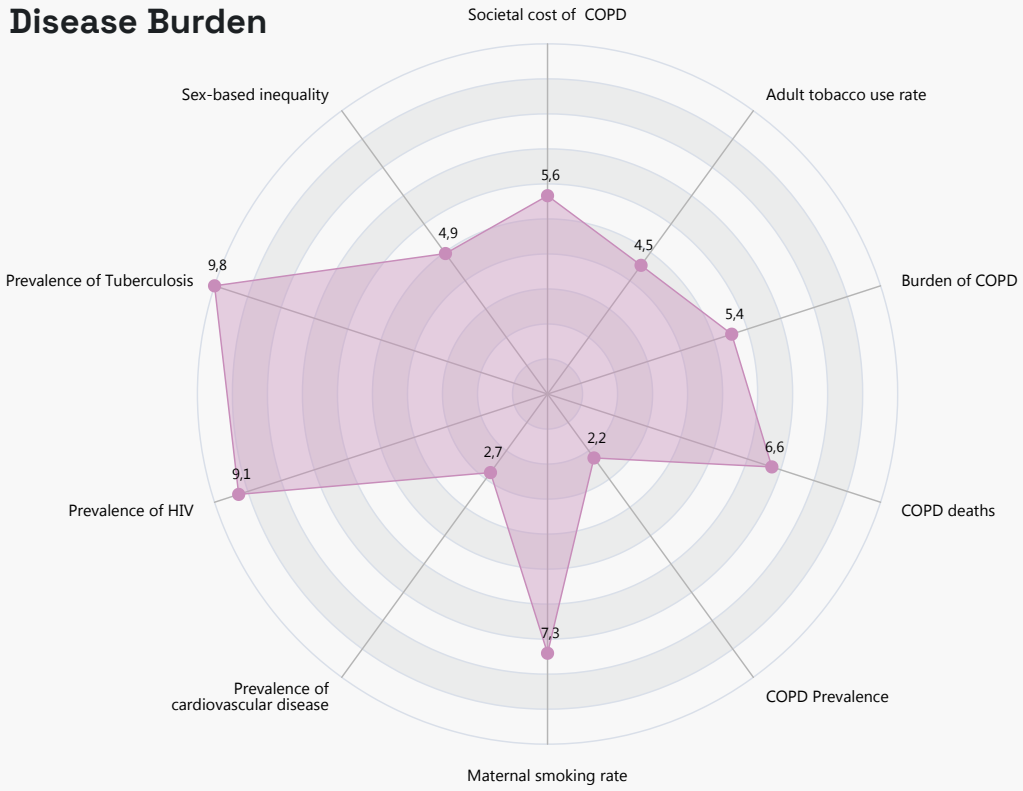
Access and Care Coverage

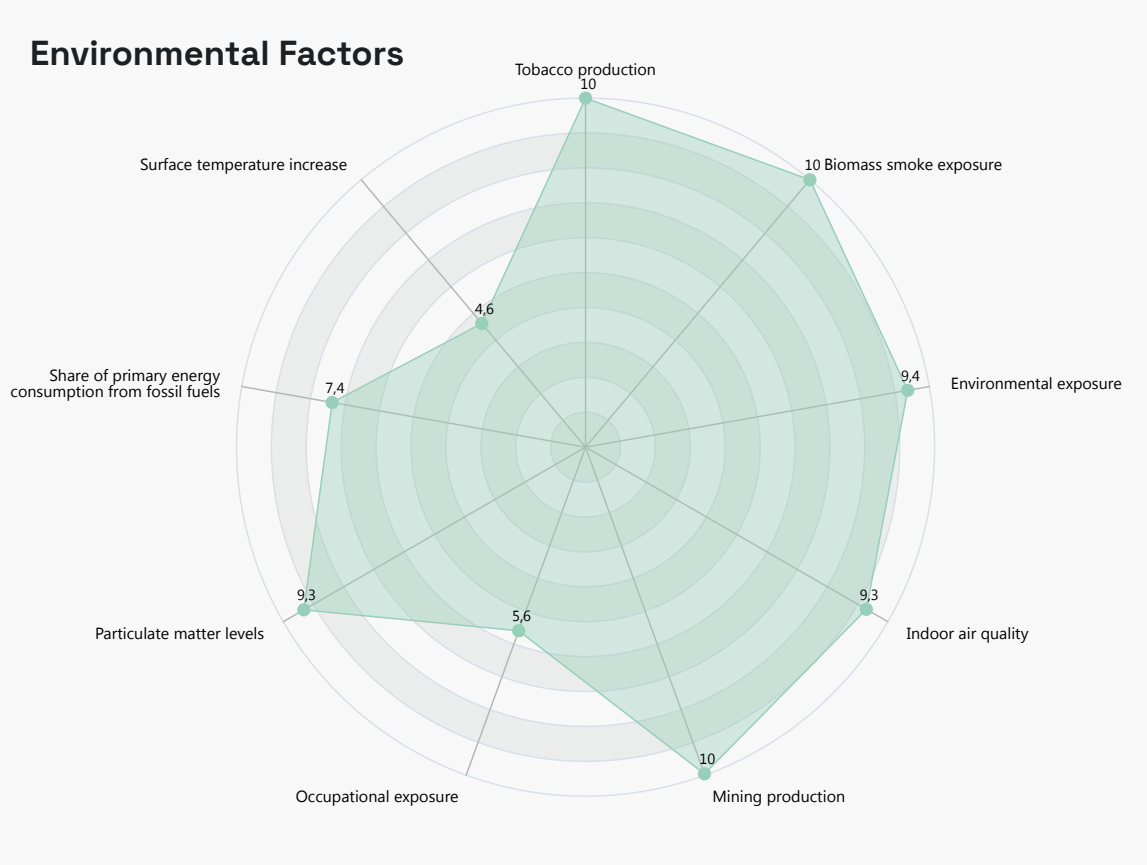


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
9,4
Environmental exposure
9,3
Indoor air quality
10
Mining production
5,6
Occupational exposure
9,3
Particulate matter levels
7,4
Share of primary energy consumption from fossil fuels
4,6
Surface temperature increase

Switzerland

Switzerland presents a slightly above-average score in the COPD Index, attributable to its high score in the Environmental Factors category and good performance in the Access and Care Coverage category. Switzerland scores well below average in the Policy Context category due to the lack of a national action plan for COPD and the lowest performance in the Tobacco Control Policy Indicator in the COPD Index. Switzerland has below-average levels of COPD hospitalisation, as well as below-average 365-day readmission rates. Despite the small scope and weak enforcement of tobacco control laws, the smoking rate in Switzerland is only marginally above the average of the COPD Index countries, while the maternal smoking rate is well below average.

Country Score
64.1

Rank
19

COPD Death Rate (% of all deaths)
3.6%

Smoking Rate (%)
25.5%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,428

KEY TAKEAWAYS

- Lack of a national action plan and lowest performance in Tobacco Control; would benefit from policy awareness
- Presents the 2nd smallest difference in the rate of disability adjusted life years between men and women in the COPD Index (low inequality between men and women).
- Has below-average reports of issues with indoor air quality

Insights

Challenges

- High continuous prevalence of smoking
- Smoking cessation could be more widely available
- Overuse of inhaled corticosteroids

Opportunities

- Increase the cost of tobacco products and offer more comprehensive smoking cessation programmes
- Increase spirometry among high-risk groups such as smokers to improve case finding

Best practices in COPD care

- Lung health organisations in Switzerland offer good programmes for raising awareness of COPD among patients and physicians and supporting disease management

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> **"[A strong practice is that] ... Multimorbidity is well managed in Switzerland. We have well trained GPs who act as gate keeper. Patients can see also their specialist if they wish."**

Resources

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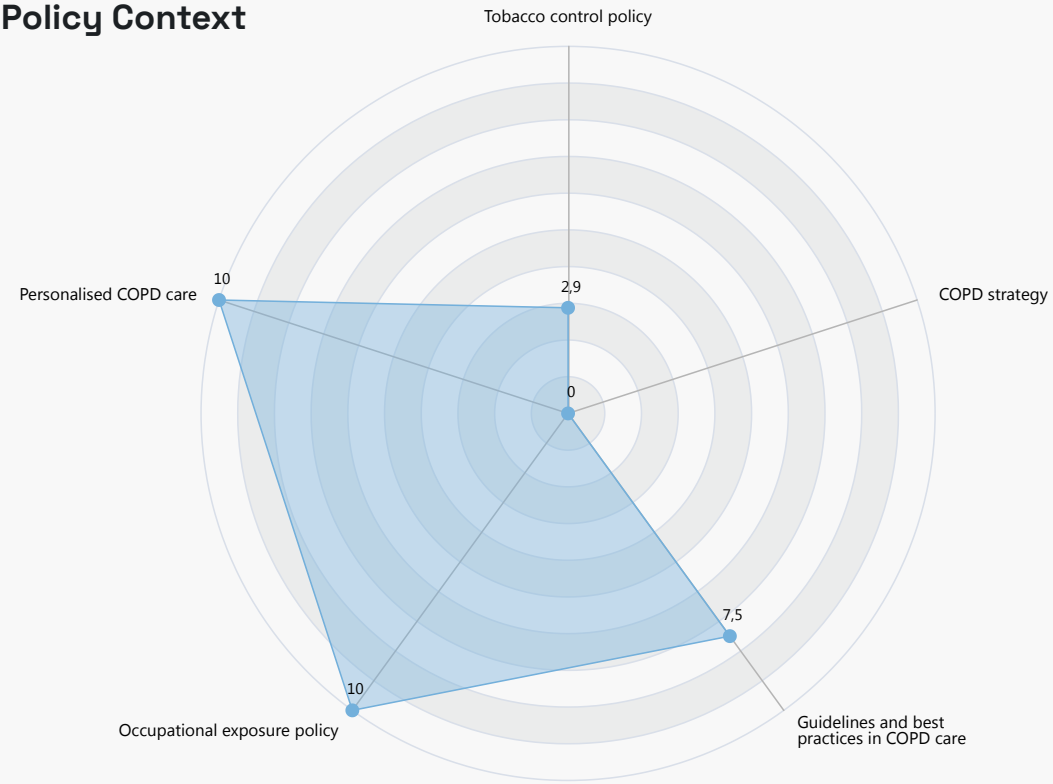
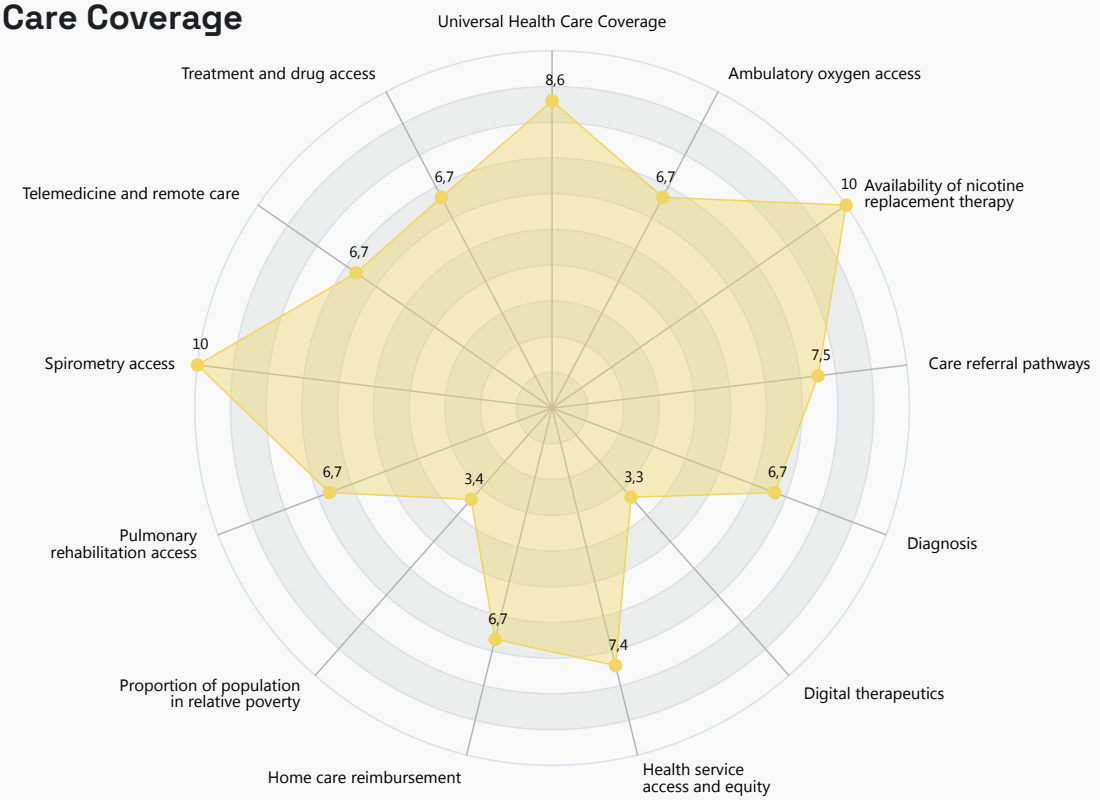
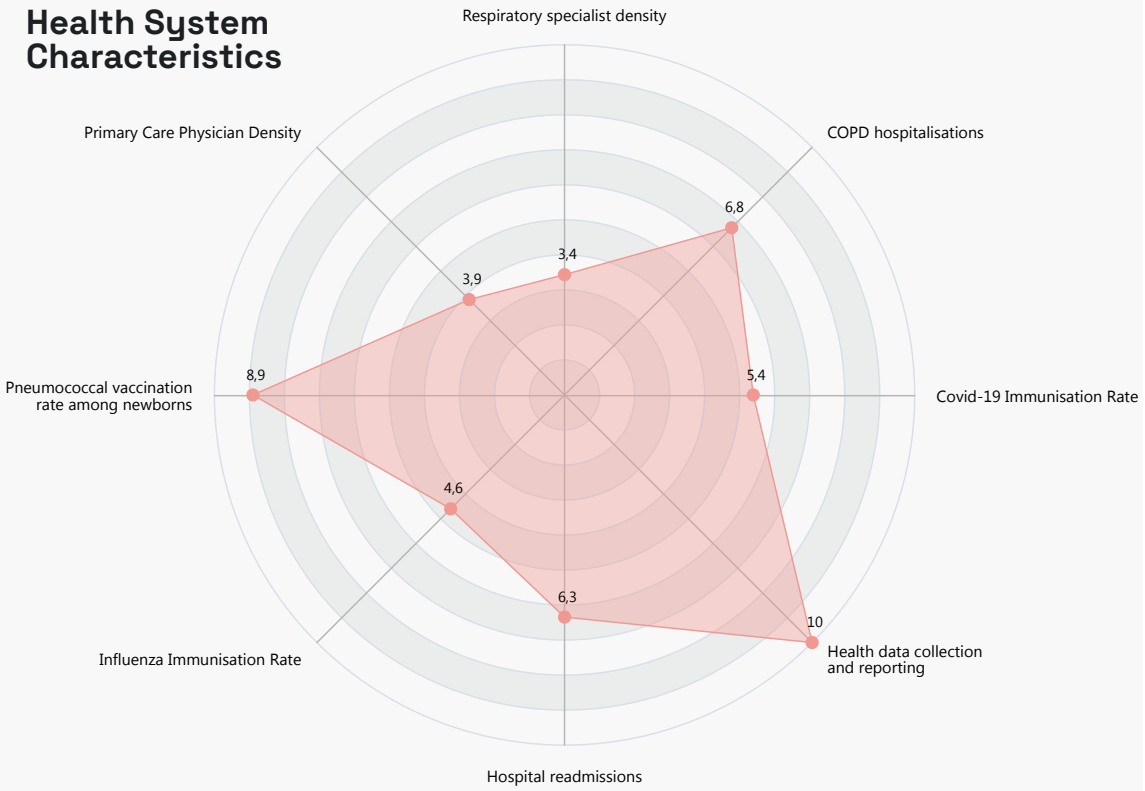
Policy Context



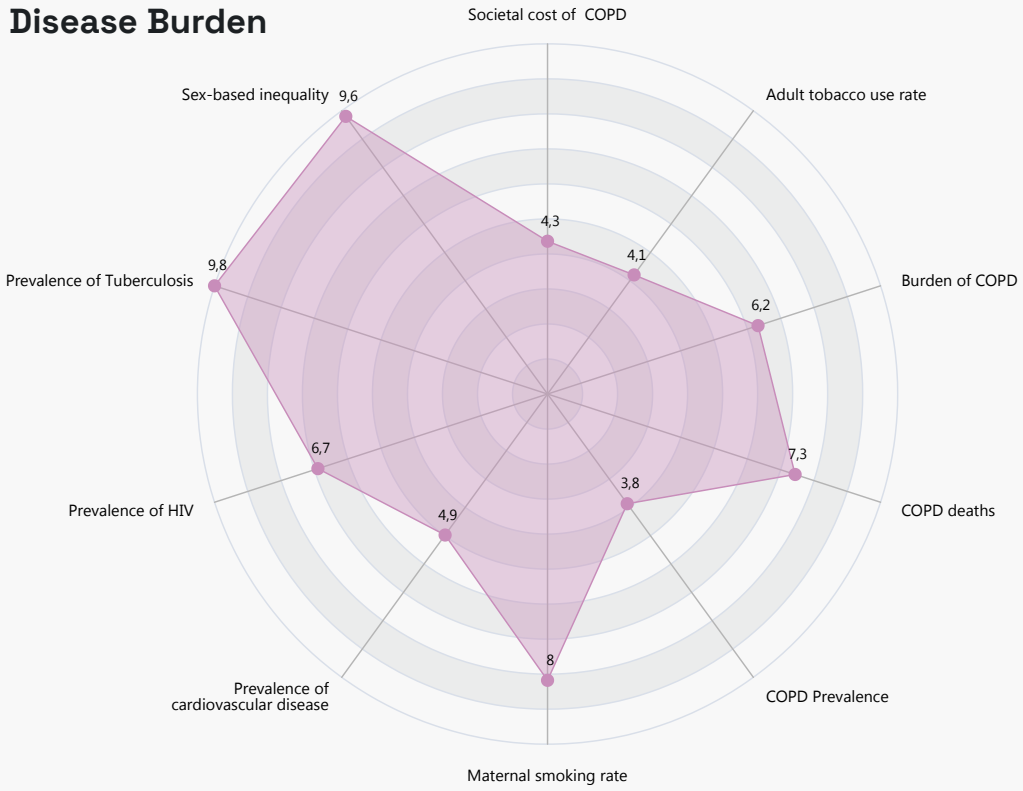
Access and Care Coverage

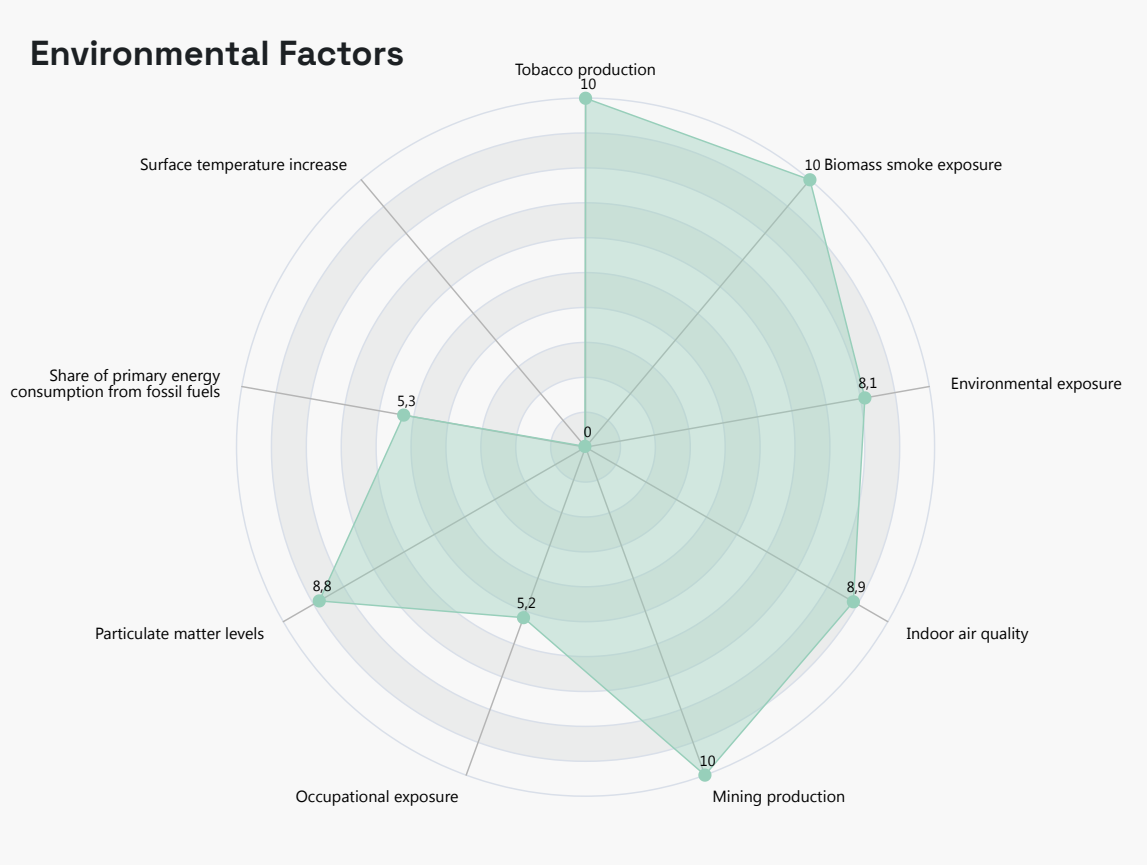


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
8,1
Indoor air quality
8,9
Mining production
10
Occupational exposure
5,2
Particulate matter levels
8,8
Share of primary energy consumption from fossil fuels
5,3
Surface temperature increase
0

United Arab Emirates

The United Arab Emirates (UAE) is among the lowest scorers in the COPD Index, primarily due to its low score in the Policy Context category. Development of a national strategy for COPD and COPD care guidelines would significantly improve the UAE's score. The UAE reports good access to telemedicine and remote care, as well as strong conditions for digital therapeutics, which boosts its score in the Access and Care Coverage category. The UAE also reports high levels of occupational and environmental exposure to risk factors for COPD. Addressing these factors stand to significantly increase the UAE's score in the COPD Index. It is important to note that the UAE has the least complete dataset in the COPD Index, which primarily impacts its score in the Access and Care Coverage and the Health System Characteristics categories.

Country Score
59.8

Rank
29

COPD Death Rate (% of all deaths)
2.1%

Smoking Rate (%)
23.9%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,212

KEY TAKEAWAYS

- High levels of occupational and environmental exposure to risk factors for COPD
- The UAE scores well in the Universal Health Care Service Coverage indicator despite only recent efforts to implement a universal health care mandate
- The UAE has one of the lowest recorded burdens of COPD, with comparatively low rates of DALYs and the lowest percentage of recorded deaths accountable to COPD

Insights

Challenges

- There are no designated clinics for COPD rehabilitation in the UAE
- Early stages of COPD are often not identified, leading to late diagnosis

Opportunities

- Favourable conditions to increase public awareness of COPD and its associated risk factors
- Support case finding through lung cancer screening

Best practices in COPD care

- Strong support for smoking cessation

Resources

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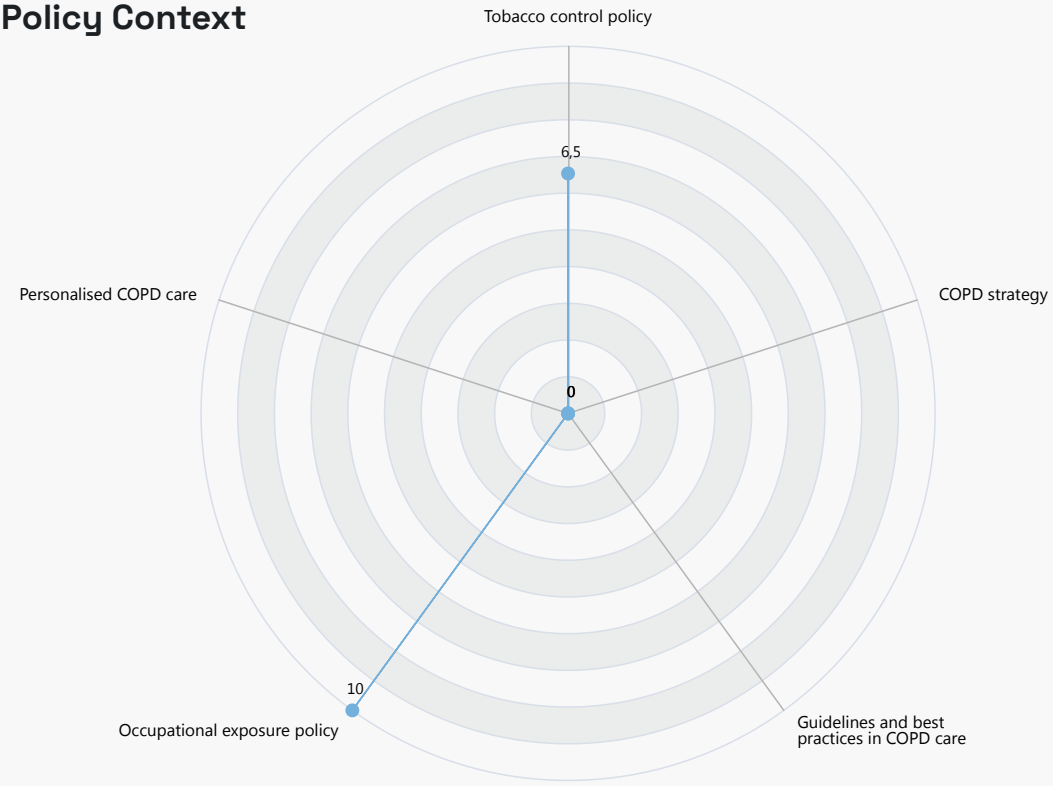
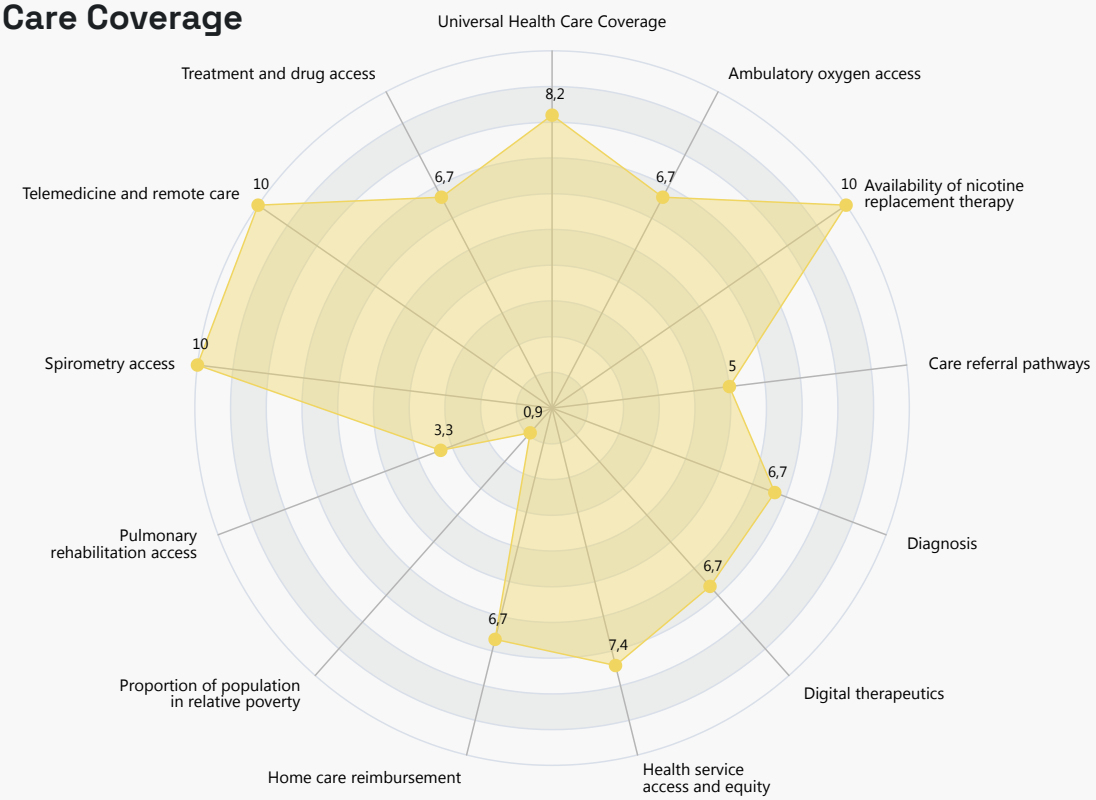
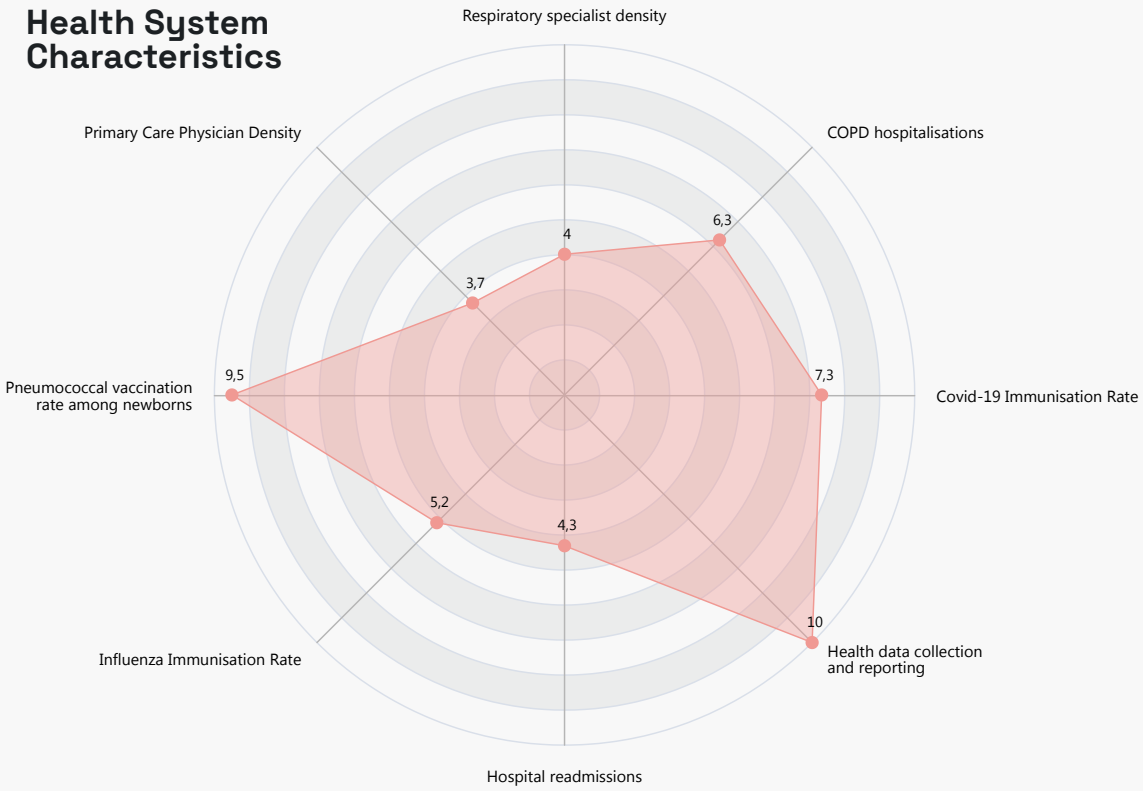
Policy Context



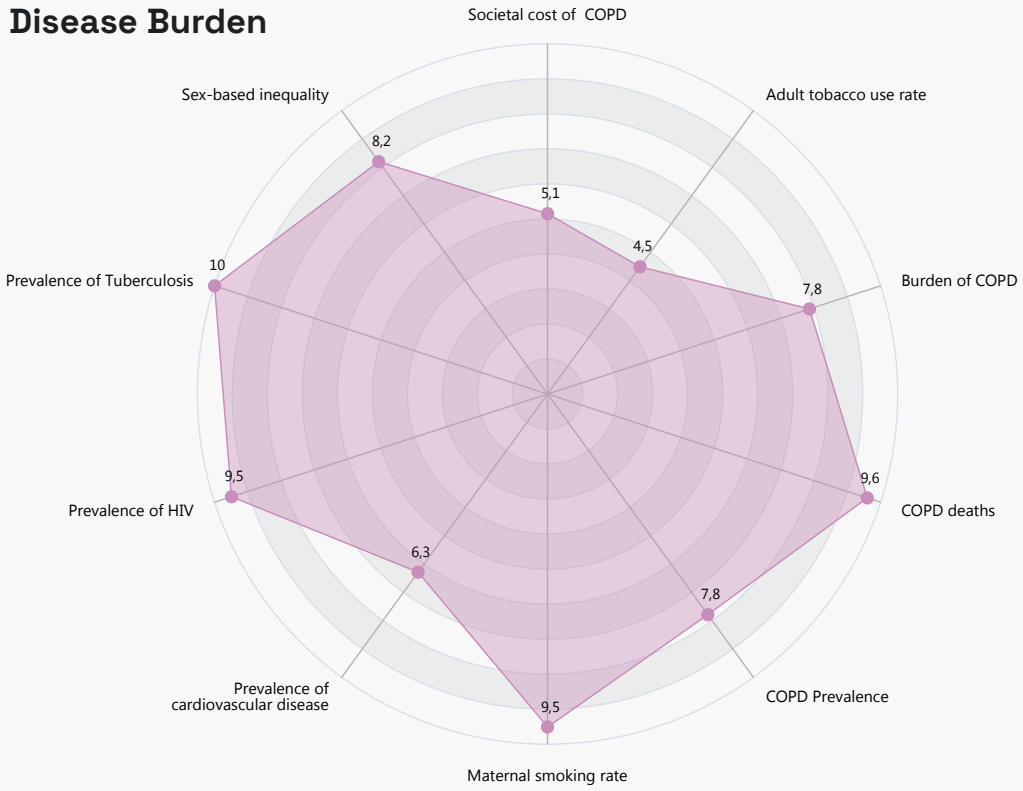
Access and Care Coverage

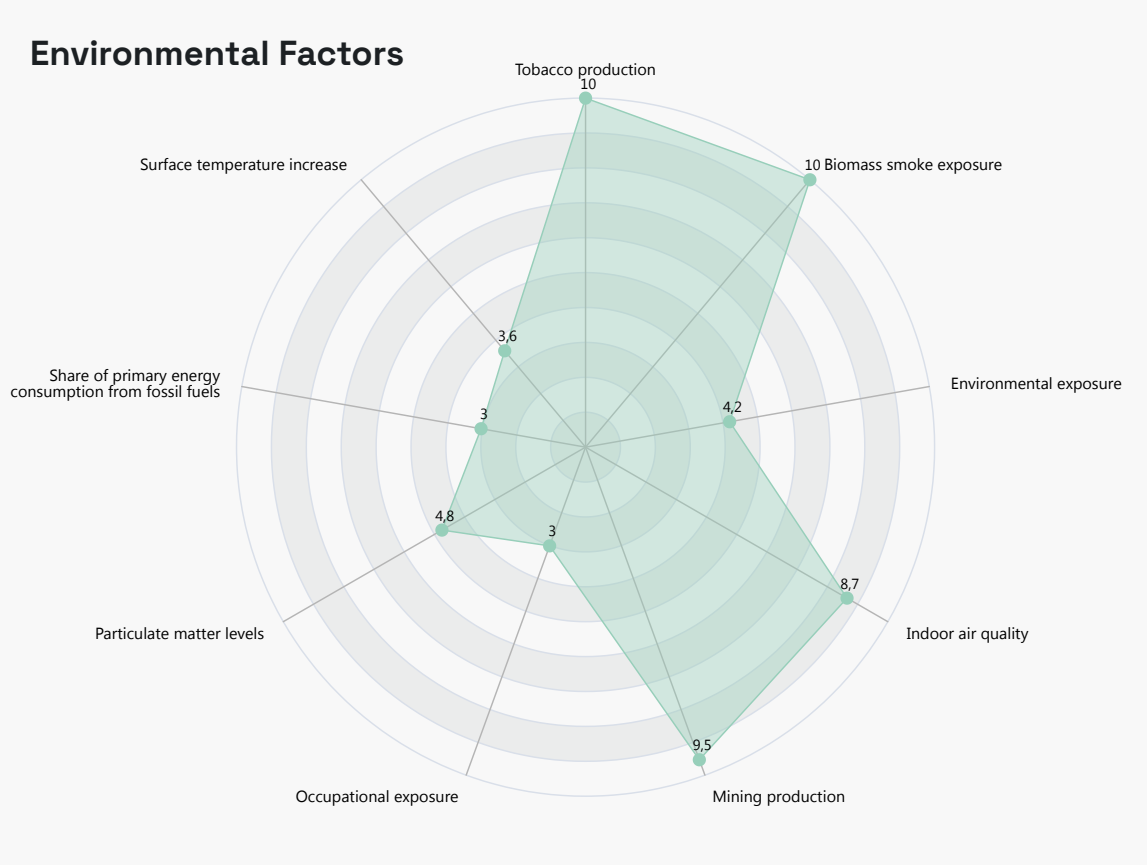


Health System Characteristics



Disease Burden




Environmental Factors
Tobacco production
10
10 Biomass smoke exposure
Environmental exposure
Indoor air quality
Mining production
Occupational exposure
Particulate matter levels
Share of primary energy consumption from fossil fuels
Surface temperature increase
3,6
4,2
3
4,8
3
8,7
9,5

United Kingdom

The United Kingdom (UK) is the second-highest scorer in the COPD Index, due in large part to its comprehensive implementation of strong tobacco control policies, a relatively robust strategy for COPD prevention and care, and comparatively strong access to care and diagnostic services. However, the UK is among the lowest scorers in the Health System Characteristics and Disease Burden categories, which can be attributed to the country's above-average hospitalisation rate, comparatively low density of specialists and general practitioners, a lack of federalised health data structure, a high percentage of DALYs attributable to COPD, and an above-average COPD death rate. While the UK is among the highest overall scorers, there is still ample room for improving COPD treatment and prevention.

Country Score
71.1

Rank
2

COPD Death Rate (% of all deaths)
5.7%

Smoking Rate (%)
15.4%

Estimated Societal Cost of COPD per capita (2017 INT$)
$1,087

KEY TAKEAWAYS

- Comparatively comprehensive COPD strategy and good general adherence to COPD care guidelines
- Strong Tobacco Control Policy indicator, ranking only marginally behind New Zealand
- 2nd lowest density of respiratory specialists among the Index countries

Insights

Challenges

- Reports indicate that low level of access to spirometry is a pressing issue
- Early stages of COPD are often not identified, leading to late diagnosis

Opportunities

- Effective approaches to smoking cessation are underway
- Support case finding through lung cancer screening

Priorities

- Improve access to biologics
- Risk stratification of patients in primary care
- Improve access to spirometry

Best practices in COPD care

- Chronic disease reviews are regularly completed at the primary care level
- Supporting role of specialist research nurses in general practice

Quotations

Responses from respiratory health specialists from the COPD Care Foresight Study

> "[The challenge is that] ... Primary care is very stretched and the use of pharmacists, paramedics and nurses to deliver care reduces quality."

> "Restoration of spirometry use to levels seen 10 years ago would help with accurate diagnosis."

Resources

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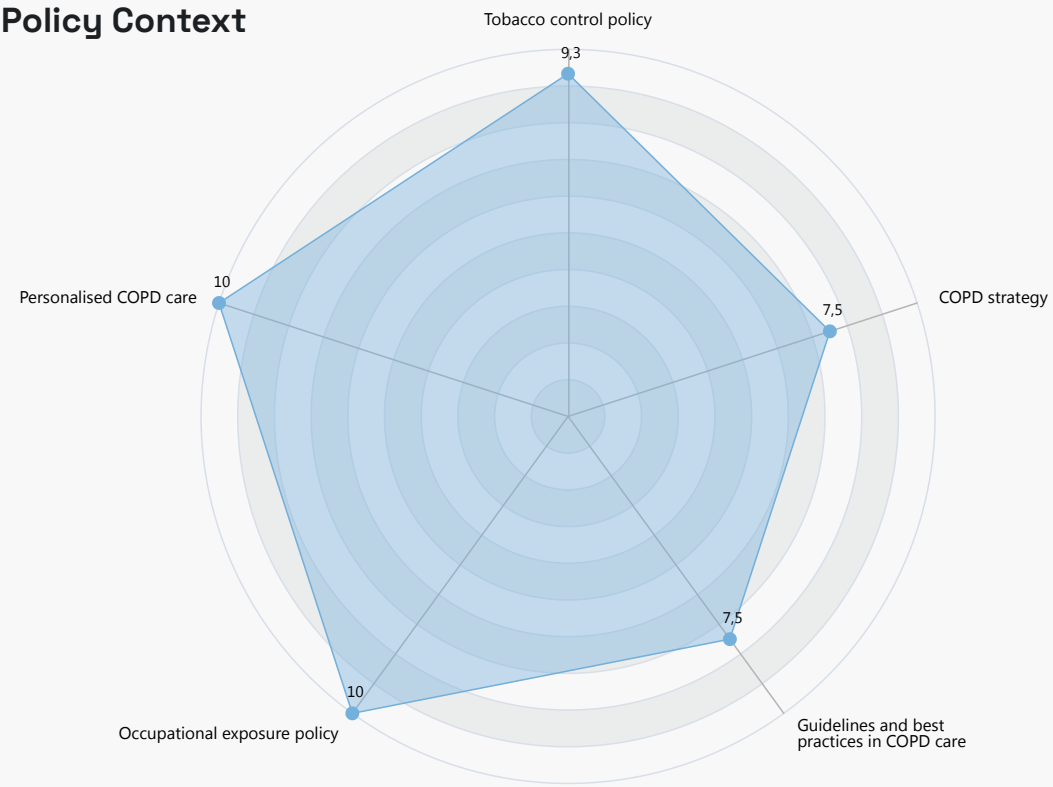
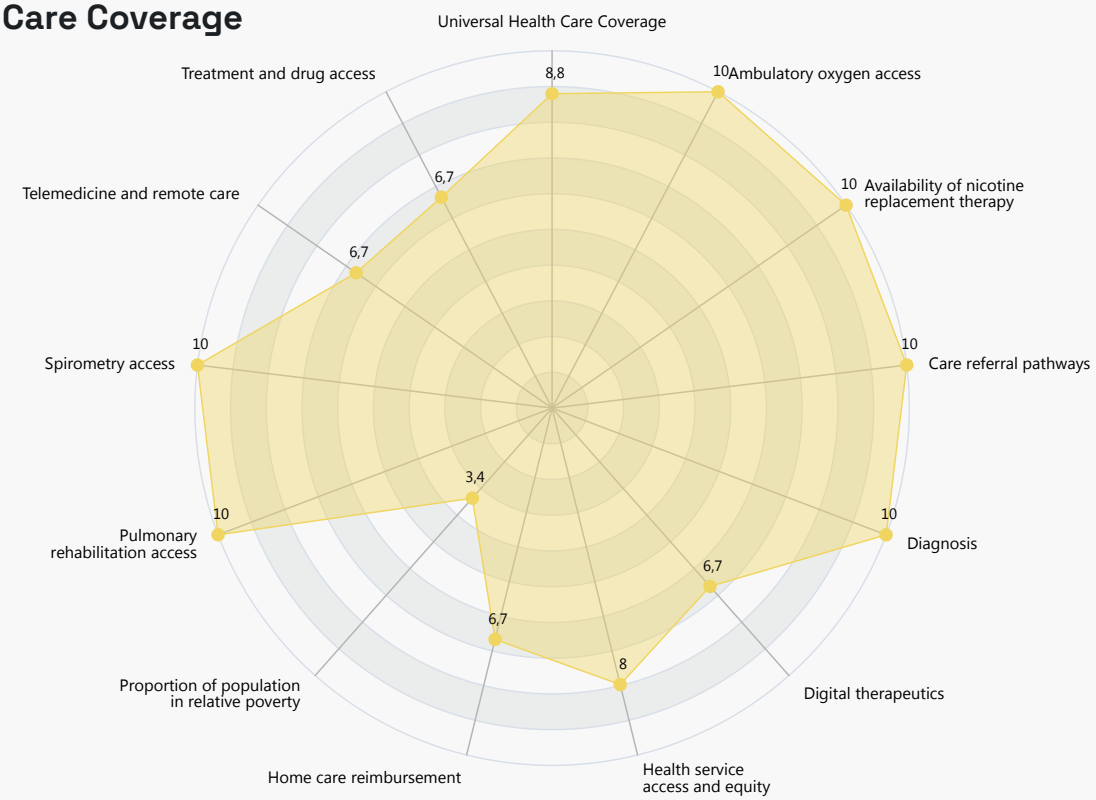
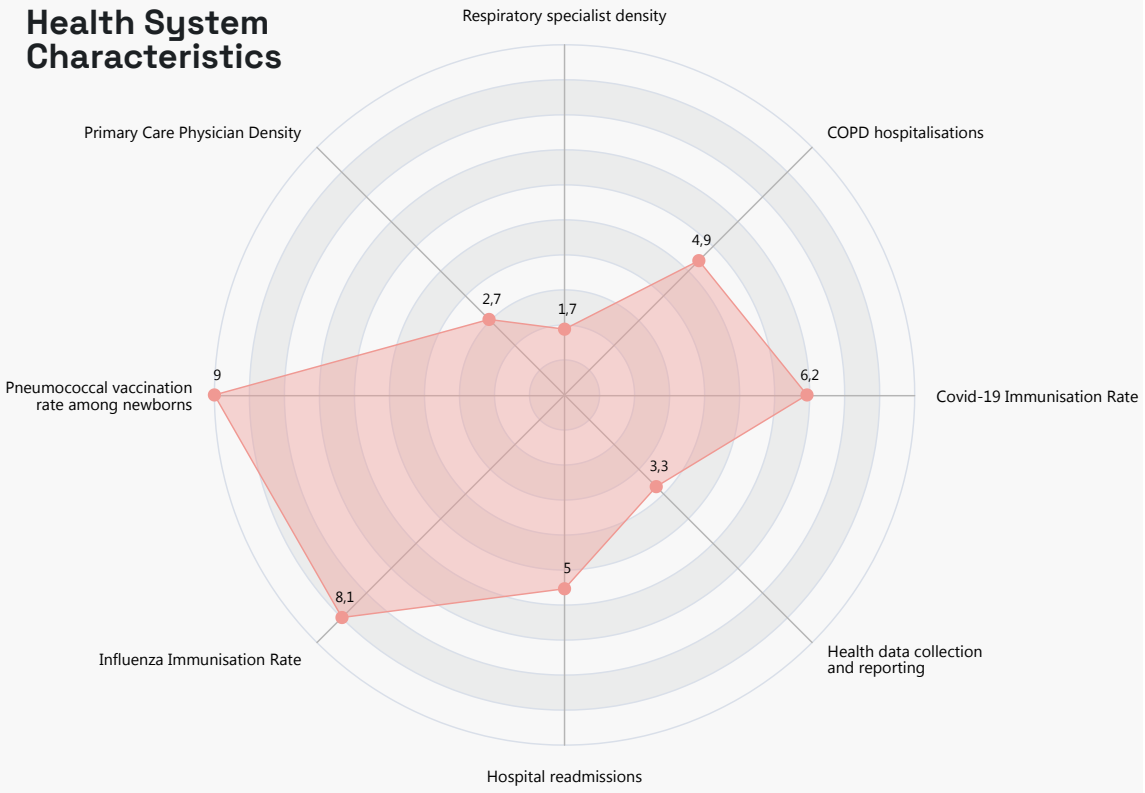
Policy Context



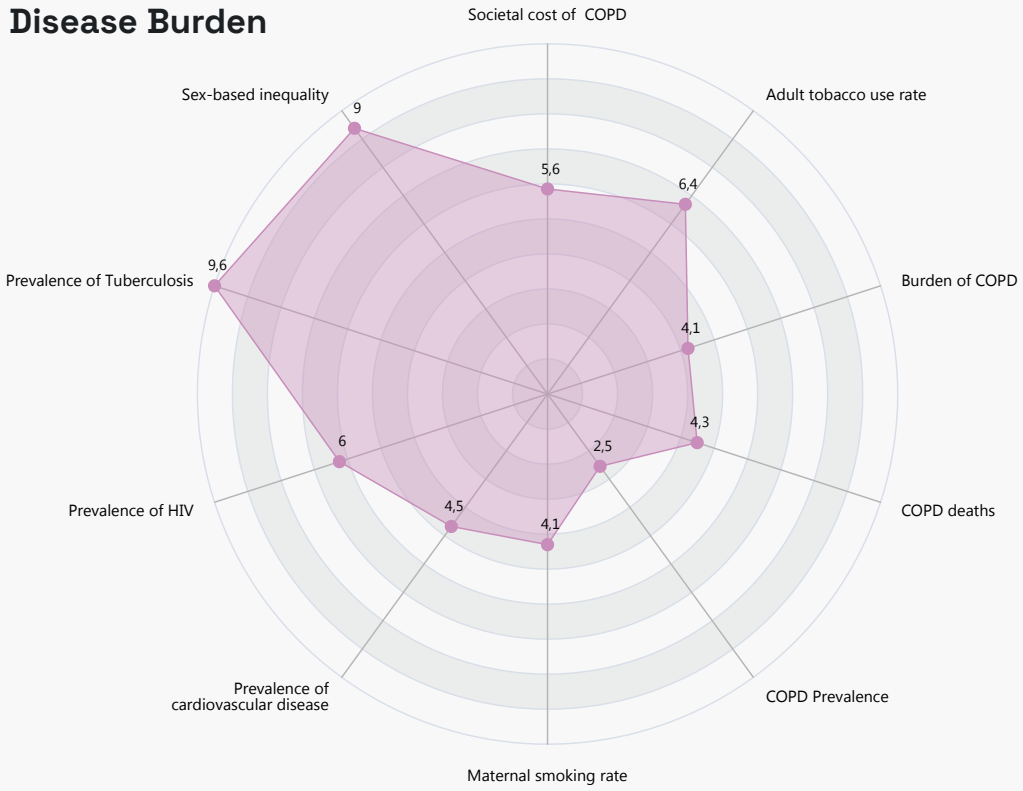
Access and Care Coverage

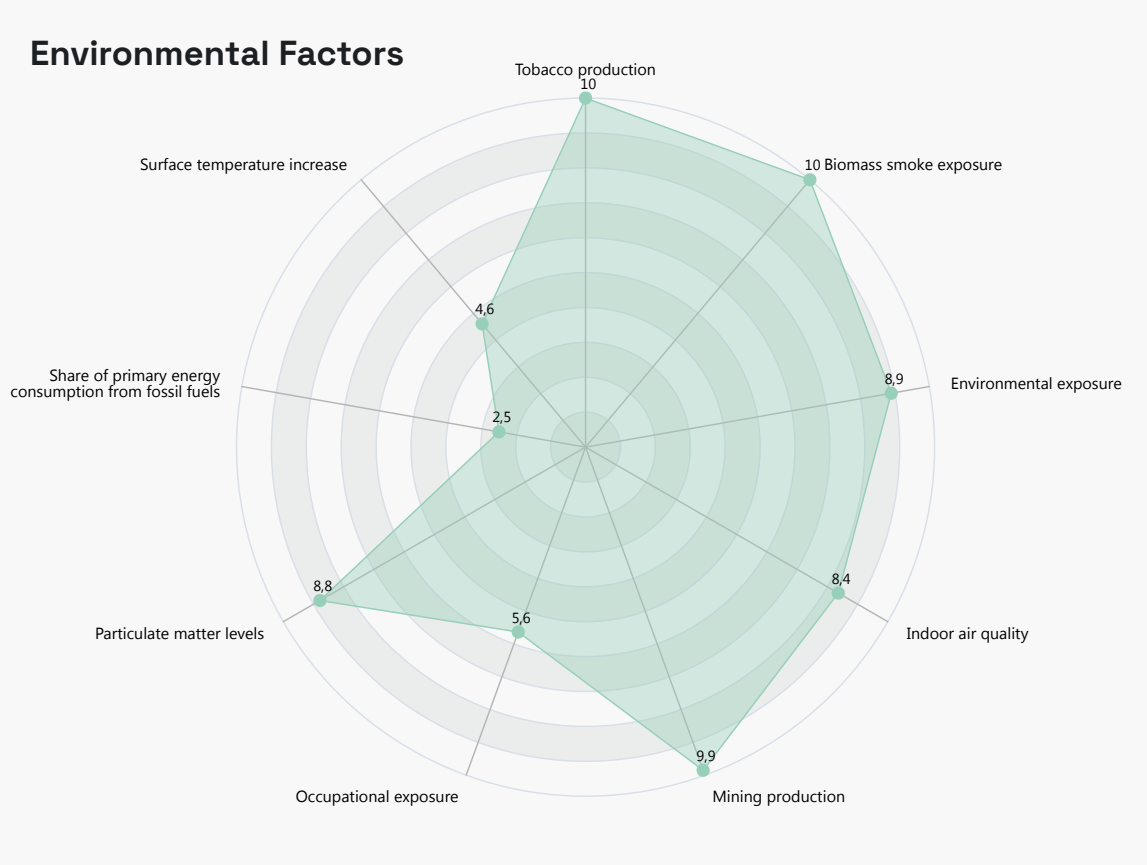


Health System Characteristics



Disease Burden




Environmental Factors
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10
10 Biomass smoke exposure
Environmental exposure
8,9
Indoor air quality
8,4
Mining production
9,9
Occupational exposure
5,6
Particulate matter levels
8,8
Share of primary energy consumption from fossil fuels
2,5
Surface temperature increase
4,6

Appendix II: Indicator list and weights

Category	Indicator	Indicator description	Indicator scoring	Minimum value	Maximum value	Weight
Policy Context (Weight: 21)	COPD strategy	Provides insight into national policy prioritisation of and engagement with COPD.	1=country has a COPD strategy; 2=low level of strategy implementation; 3=moderate level of strategy implementation; 4=high level of strategy implementation; 0=country has no COPD strategy	0	4	30
	Guidelines for COPD care	Assessment of whether a country has guidelines for COPD and the general level of adherence to the guidelines among healthcare practitioners.	1=country has guidelines; 2=there is a low level of adherence to the guidelines; 3=there is a moderate level of adherence to the guidelines; 4=there is a high level of adherence to the guidelines	0	4	20
	Occupational exposure policy	Assessment of chemical exposure regulations that may influence COPD risk factors and patient outcomes and their level of implementation.	1=country has chemical regulations; 2=there are variations in implementation of regulations in country; 3=there is uniform implementation of the regulations in the country	0	3	10
	Personalised COPD care	Whether a country encourages the use of individualised treatment plans for COPD patients	1=Yes; 0=No	0	1	10
	Tobacco control policy	Strength and scope of tobacco consumption and sale regulations	Normalised average of M, P, W, E, R elements of WHO's framework. ("O" element on smoking cessation is assessed as a separate indicator in the Access and Care Coverage category)	0	100	30
Access and Care Coverage (Weight: 20)	Treatment and drug access	Assessment of extent of public payor (insurance) coverage for a range of drugs and treatments for COPD	3=full payor coverage; 2=partial payor coverage; 1=drugs and treatments generally commercially approved but not covered; 0=drugs and treamtents generally not commercially available	0	3	15

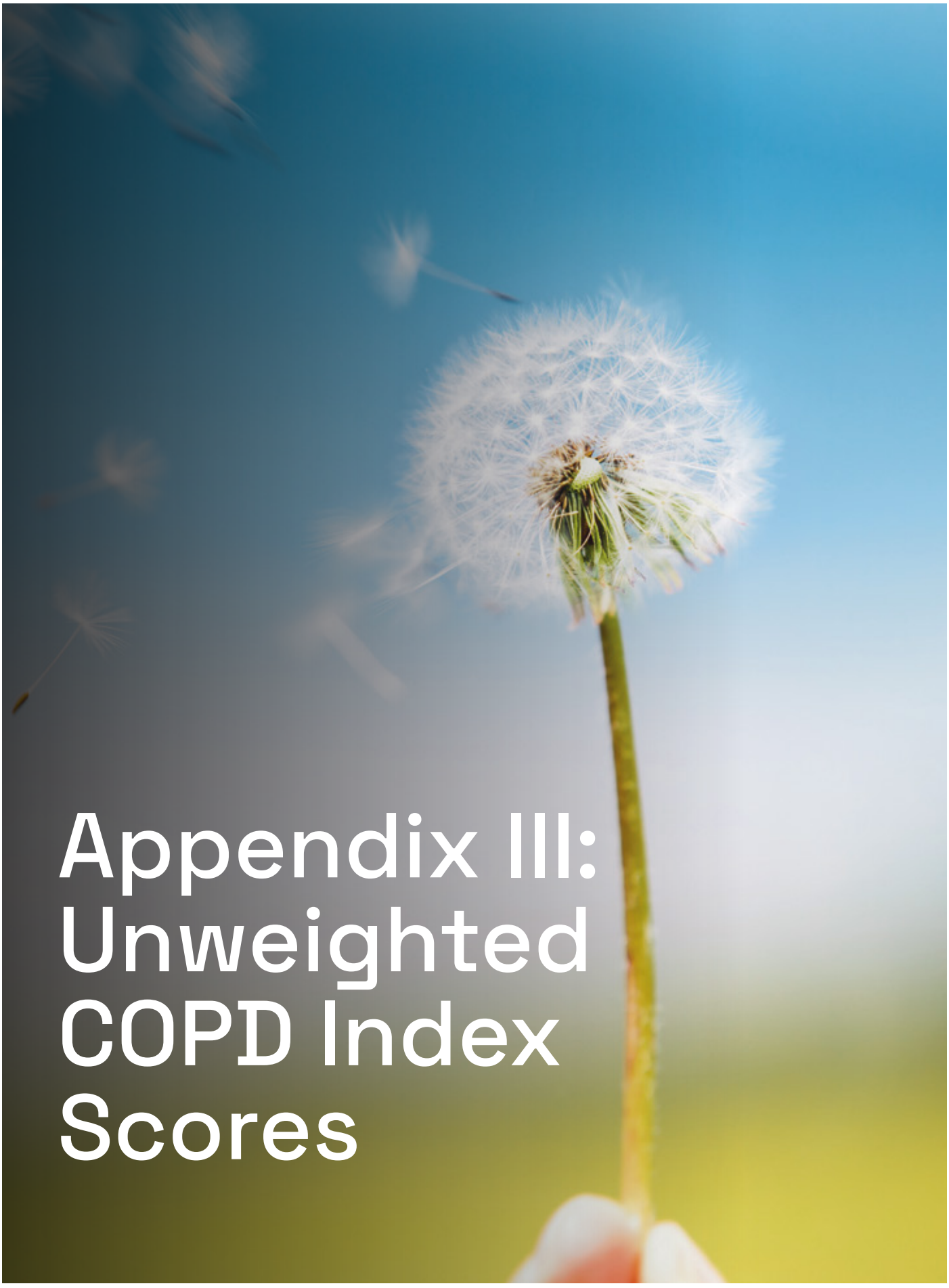
Access and Care Coverage (Weight: 20)	Diagnosis	Assessment of public payor (insurance) coverage for a range of diagnostic tools and methods for COPD screening, characterisation, evaluation of health status, and disease severity	1=diagnostics commercially available but not generally covered by public payor; 2=partial payor coverage; 3=full payor coverage; 0=diagnostics not commercially available	0	3	7.5
	Spirometry access	Assessment of the availability of spirometry at the primary care level for diagnosis of COPD	1=yes; 0=no OR no information	0	1	15
	Pulmonary rehabilitation access	Assessment of the availability of pulmonary rehabilitation for treatment of COPD	1=available to patients but no reimbursement information available/ no coverage provided; 2=partial payor coverage; 3=full payor coverage; 0=no coverage/not available	0	3	7.5
	Ambulatory oxygen access	Assessment of the availability of ambulatory oxygen for treatment of COPD	1=oxygen treatment commercially available but not generally covered by public payor; 2=partial payor coverage; 3=full payor coverage; 0=oxygen treatment not commercially available	0	3	5
	Home care reimbursement	Assessment of the availability of home care for treatment and management of COPD	1=home care services commercially available but not generally covered by public payor; 2=partial payor coverage; 3=full payor coverage; 0=home care services not commercially available	0	3	3.75
	Availability of nicotine replacement therapy	Assessment of availability of nicotine replacement therapy in the public healthcare system and of public payor coverage	1=yes; 0=no OR no information	0	1	5
	Care referral pathways	Assessment of specific specialist referral pathways for COPD patients, direct access to specialists, and extent of public payor (insurance) coverage for specialist care	1 point for existence of national care pathways for COPD 1 point for ability to access specialist care directly 1 point for partial payor coverage of specialist care OR 2 points for full payor coverage of specialist care	0	4	6.25

Access and Care Coverage (Weight: 20)	Telemedicine and remote care	Assessment of use of telemedicine and remote care in a country and extent of public payor (insurance) coverage for telemedicine and remote care consultations	1=telemedicine services commercially available but not generally covered by public payor; 2=partial payor coverage; 3=full payor coverage; 0=telemedicine services not commercially available	0	3	6.25
	Digital therapeutics	Assessment of access to digital therapeutics (e.g., approved condition management apps/monitoring tools) and extent of public payor (insurance) coverage for digital therapeutics	1=digital therapeutics commercially available but not generally covered by public payor; 2=partial payor coverage; 3=full payor coverage; 0=digital therapeutics not commercially available	0	3	3.75
	Health service access and equity	Percentage of the national population reporting unmet healthcare needs due to distance from points of care, financial barriers, and waiting lists	Percentage of national population reporting unmet healthcare needs due to distance from care, financial barriers, and waiting lists - NOTE: NEGATIVE DIRECTION INDICATOR	0	100	7.5
	Universal Health Care Coverage	Assessment of coverage of universal health care services for national population	Universal Health Care Service Coverage Index	0	100	10
	Proportion of population in relative poverty	Assessment of economic barriers to care	Percentage of population earning below 60% of median income NOTE: NEGATIVE DIRECTION INDICATOR	0	28.23	7.5
Health System Characteristics (Weight: 22.5)	COPD hospitalisations	Number of COPD-related hospitalisations per 100,000 population	Annual COPD Hospitalisations (per 100,000) NOTE: NEGATIVE DIRECTION INDICATOR	0	350	22.5
	Hospital readmissions	Percentage of patients readmitted for a COPD exacerbation within 365 days of a COPD exacerbation	Percentage of COPD patients readmitted to hospital within 365 days of previous admission due to an exacerbation NOTE: NEGATIVE DIRECTION INDICATOR	0	66.75	17.5
	Health data collection and reporting	Assessment of level of granularity and interoperability of COPD-relevant health and outcome data and to which kinds of registries these data are reported.	1=Recorded to regional database(s); 2=Recording to regional database(s) that are federated or connected at national level; 3=Recording to national database; 0=No recording or no data available	0	3	8.75

Health System Characteristics (Weight: 22.5)	Respiratory specialist density	Number of respiratory specialists per 100,000 population	Number of respiratory specialists per 100,000	0	15	10
	Primary Care Physician Density	Number of primary care doctors per 100,000 population	Number of primary care doctors per 100,000 population	0	277	15
	Influenza Immunisation Rate	Percentage of population over 65 years of age receiving the influenza vaccine	Influenza immunisation rate	0	100	8.75
	Covid-19 Immunisation Rate	Vaccination rate per 100 population	Covid-19 vaccination rate	0	360	8.75
	Pneumococcal vaccination rate among newborns	Pneumococcal conjugate vaccines (PCV3) immunization coverage among 1-year-olds (%)	Pneumococcal vaccination rate (among newborns only)	0	100	8.75
Disease Burden (Weight: 15.5)	Societal cost of COPD	Modeled per capita loss 2020-2050, 2017 INT$	Modeled per capita loss 2020-2050, 2017 INT$ NOTE: NEGATIVE DIRECTION INDICATOR	0	2500	13.75
	Burden of COPD	COPD disability-adjusted lifeyears (DALYs) as a percentage of all country DALYs	COPD disability-adjusted lifeyears (DALYs) as a percentage of all country DALYs NOTE: NEGATIVE DIRECTION INDICATOR	0	6.05	13.125
	COPD deaths	COPD deaths per 100,000 population	COPD deaths rate, total population NOTE: NEGATIVE DIRECTION INDICATOR	0	102.22	12.625
	COPD Prevalence	Percentage of population diagnosed with COPD	Percentage of population diagnosed with COPD NOTE: NEGATIVE DIRECTION INDICATOR	0	8.54	13.75
	Sex-based inequality	Absolute difference in DALYs accountable to COPD between men and women	Absolute difference in DALYs accountable to COPD between men and women NOTE: NEGATIVE DIRECTION INDICATOR	0	611.5	6.25
	Adult tobacco use rate	Rate of tobacco use among the adult population	Rate of tobacco use among the adult population NOTE: NEGATIVE DIRECTION INDICATOR	0	40	14.5
	Maternal smoking rate	Percentage of women smoking during pregnancy	Maternal smoking rate NOTE: NEGATIVE DIRECTION INDICATOR	0	40	10
	Prevalence of Tuberculosis	Cases of tuberculosis per 100,000 population	Prevalence of TB NOTE: NEGATIVE DIRECTION INDICATOR	0	200	5.625

Disease Burden (Weight: 15.5)	Prevalence of cardiovascular disease	Percentage of population diagnosed with cardiovascular disease	Prevalence of cardiovascular disease NOTE: NEGATIVE DIRECTION INDICATOR	0	20	7.75
	Prevalence of HIV	Percentage of population diagnosed with HIV	Prevalence of HIV NOTE: NEGATIVE DIRECTION INDICATOR	0	0.55	2.625
Environmental Factors (Weight: 21)	Indoor air quality	Assessment of issues with housing stock that may impact indoor air quality	Percentage of population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor NOTE: NEGATIVE DIRECTION INDICATOR	0	100	14
	Particulate matter levels	Average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter	Average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter NOTE: NEGATIVE DIRECTION INDICATOR	0	85	17.5
	Surface temperature increase	Mean surface temperature change during the period 1961-2023, using temperatures between 1951 and 1980 as a baseline.	Mean surface temperature change during the period 1961-2023, using temperatures between 1951 and 1980 as a baseline NOTE: NEGATIVE DIRECTION INDICATOR	0	2.75	3.5
	Biomass smoke exposure	Access to clean fuels and technologies for cooking	Proportion of total population primarily using clean cooking fuels and technologies for cooking	0	100	15
	Tobacco production	Hectares unprocessed tobacco harvested	Hectares unprocessed tobacco harvested NOTE: NEGATIVE DIRECTION INDICATOR	0	1,100,000	12.5
	Mining production	Production of minerals through mining by tonnage	Mining production NOTE: NEGATIVE DIRECTION INDICATOR	0	5,038, 785,218	15
	Share of primary energy consumption from fossil fuels	Percentage of energy consumption that is supported by fossil fuels	Percentage of total primary energy consumption from fossil fuels NOTE: NEGATIVE DIRECTION INDICATOR	0	100	5
	Occupational exposure	Percentage of COPD DALYs attributable to occupational exposure	Percentage of COPD DALYs attributable to occupational exposure - NOTE: NEGATIVE DIRECTION INDICATOR	0	20	12.5

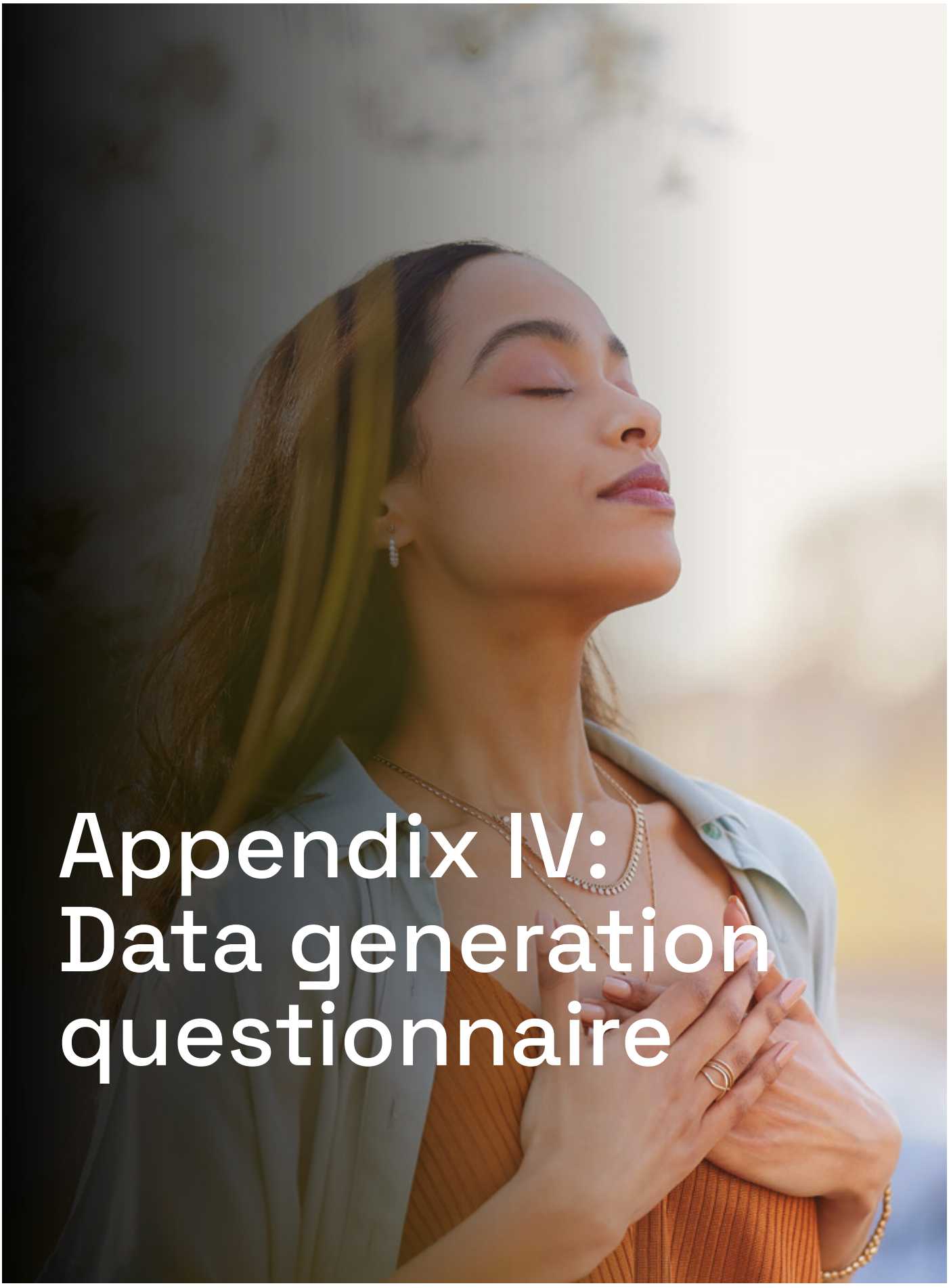
Environmental Factors (Weight: 21)	Environmental exposure	Percentage of COPD DALYs attributable to air pollution	Percentage of COPD DALYs attributable to air pollution - NOTE: NEGATIVE DIRECTION INDICATOR	0	70	5



Appendix III: Unweighted COPD Index Scores

COPD INDEX OVERALL PERFORMANCE

Country	Policy Context	Access and Care Coverage	Health System Characteris-tics	Disease Burden	Environmen-tal Factors	AGGREGATE SCORE (UNWEIGHTED)	RANK (UNWEIGHTED)
Australia	87	75	61	66	76	**73.1**	1
Austria	58	75	60	63	72	**65.6**	15
Belgium	34	59	62	56	73	**56.6**	31
Brazil	54	59	55	70	69	**61.5**	25
Canada	66	68	57	62	74	**65.2**	16
China	75	48	59	52	34	**53.5**	33
Czechia	59	77	44	58	69	**61.4**	26
Denmark	73	82	50	50	77	**66.4**	11
Estonia	78	67	58	63	72	**67.7**	5
Finland	81	73	60	63	80	**71.4**	2
France	51	75	63	56	74	**63.9**	20
Germany	59	73	55	53	71	**62.1**	24
Greece	66	68	69	62	73	**67.4**	7
Hungary	67	74	56	50	68	**63.2**	21
India	42	58	43	54	44	**48.3**	34
Ireland	66	81	49	61	77	**66.9**	9
Italy	57	69	68	57	69	**64.2**	19
Japan	68	65	58	66	71	**65.6**	14
Latvia	32	55	53	62	71	**54.7**	32
Lithuania	35	67	59	63	70	**58.8**	29
Netherlands	52	76	58	56	72	**62.9**	23
New Zealand	64	68	50	66	81	**65.8**	13
Norway	66	80	49	59	84	**67.6**	6
Poland	36	59	54	69	67	**57.1**	30
Portugal	41	72	76	56	71	**63.0**	22
Saudi Arabia	66	65	59	86	61	**67.3**	8
Slovakia	73	73	57	71	71	**68.9**	4
Slovenia	39	66	52	70	69	**59.1**	28
South Korea	61	59	66	68	68	**64.5**	18
Spain	81	72	65	42	71	**66.4**	10
Sweden	55	72	57	58	84	**65.2**	17
Switzerland	61	69	62	65	74	**66.0**	12
United Arab Emirates	33	68	63	78	63	**61.0**	27
United Kingdom	89	82	51	56	76	**70.9**	3
Average	**60**	**69**	**58**	**61**	**70**	**64**	



Appendix IV: Data generation questionnaire

Section 1 – Respondent information

Please provide the following information in the fields below.

- Title
- Name
- Organisational affiliation(s)
- Email address
- Country (please select the country on behalf of which you are responding to the survey questions)
- Stakeholder category (Please select which category best describes your role) o Policymaker
  - Civil servant/representative of a public institution or authority
  - Healthcare Professional (Respiratory specialist)
  - Healthcare Professional (Primary care)
  - Patient Advocacy Group Representative
  - Patient
  - Carer
  - Healthcare Researcher (please specify research area(s) below)
  - Other
- I am submitting a response to this survey with other members of my organization (Yes/no)
  - IF YES to above: Please specify the names of the respondents in the fields below.

Section 2 – Experiences with the Prevention, Diagnosis, and management of COPD

In this section you are asked to respond to a series of open questions. Please provide answers that are as comprehensive as possible.

1. What are the most important challenges related to COPD prevention, diagnosis, and management you see in your country today? Please provide up to three challenges. (Open-ended)

2. What are the greatest opportunities to improve COPD outcomes and approaches to how COPD is diagnosed, prevented, and managed in your country today? Please provide up to three opportunities. (Open-ended)

3. What are the strongest healthcare practices for COPD prevention, diagnosis, and management that are currently implemented in your country? (Open-ended)

4. Are there any major weaknesses in the prevention, diagnosis, and management of COPD in your country? (Open-ended)

Section 3 – Policy changes and priorities

In this section you are asked to respond to a series of open questions. Please provide answers that are as comprehensive as possible.

5. Which stakeholders are most influential in the development, implementation, and

execution of policies, strategies, and guidelines that impact COPD patient outcomes and COPD prevention, diagnosis, and management in your country? Examples could be patient associations, medical societies, industry actors, etc.) (Open-ended)

6. Are policies and initiatives to support COPD diagnosis, prevention, and management similar or the same throughout your country? (Yes, there are few or no differences/ No, there are several clear differences/No, there are many differences/I don't know)
   a. (Comment field to provide rationale on answer selection)

7. Are there any obvious activities or initiatives that decision makers in your country should engage in to improve COPD outcomes for patients and the burden of COPD on the health system? (Open-ended)

8. What health system-level changes are needed to improve COPD diagnosis and management in your country? (Open-ended)

9. Which three things should policymakers in your country prioritise over the next ten years to improve COPD patient outcomes and the country's approach to prevention, diagnosis, and management of COPD? (Open-ended)

Section 4 – Plans, strategies, and guidelines for COPD

In this section, you are asked to provide both knowledge related to plans, strategies, and guidelines related to COPD care as well as offer your expert perspective on their level of implementation and alignment. For questions related to your perspectives, please provide as much support as possible for your answer.

10. My country has a strategy or national plan that addresses the burden of non-communicable diseases (NCDs) (or a dedicated respiratory health strategy that explicitly and comprehensively addresses COPD). (Yes/No/I don't know)

    a. If possible, please provide a link to the policy or strategy. (Field to provide link)
    b. Is the strategy or plan linked to the United Nations' Sustainable Development Goals (SDGs)?
    c. Is COPD specifically addressed in the strategy?

11. I would characterise the level of implementation of the policy or strategy in the following way:
    a. There is a high level of implementation.
    b. There is a moderate level of implementation.
    c. There is a low level of implementation.
    d. There is no implementation.
    e. I don't know.
    i. (Comment field to provide rationale on answer selection)

ALTERNATIVE QUESTION 11 IF "NO" TO QUESTION 10: I believe COPD prevention, diagnosis, and management in my country would improve if my country had a plan or strategy for COPD. (Likert scale – Fully agree-Fully disagree / I don't know)

12. Which, if any, additional or alternative strategies or plans could make a positive difference for COPD prevention, diagnosis, and management in your country? (Open question)

13. My country has specific guidelines for COPD care and treatment. (Yes/No/I don't know)

    a. If possible, please provide a link to the guidelines. (Field to provide link)
    b. Were stakeholders working in primary care involved in the development of the guidelines?
    c. Which other types of stakeholders or organisations were involved in the creation of the guidelines? (Select radio buttons based on selections at beginning of survey + I don't know)
    d. Do the guidelines include elements related to treatment for tobacco dependence? (Yes/no/I don't know)

14. (IF YES TO QUESTION 13) I would characterise the guidelines' level of alignment with Global Initiative for Chronic Obstructive Lung Disease's (GOLD) guidelines in the following way:

    a. There is a high level of alignment.
    b. There is a moderate level of alignment.
    c. There is a low level of alignment.
    d. There is no alignment.
    e. I don't know.
    i. (Comment field to provide rationale on answer selection)

15. (IF YES TO QUESTION 13) I would characterise adherence to the care guidelines in healthcare settings in my country in the following way:

    a. There is a high level of adherence.
    b. There is a moderate level of adherence.
    c. There is a low level of adherence.
    d. There is no adherence.
    e. I don't know.
    i. (Comment field to provide rationale on answer selection)

16. In your view, what elements should a robust COPD guideline contain? (E.g., management of multimorbidity, focus on frailty, and preventive interventions) (Open, optional)

17. Please add any additional comments you have on guidelines for COPD diagnosis, prevention, and management in your country. (Open, optional)

Section 5 – Patients, access to care, and equity

In this section, you are asked to provide both knowledge related to patients' access to care and healthcare design as well as offer your expert perspective on your country's capacity to address patient care needs. For questions related to your perspectives, please provide as much support as possible for your answer.

18. It is a standard practice in my country healthcare system to develop personalised treatment and self-management plans for COPD patients. (Yes / No / I don't know)
    a. (Comment field to provide rationale on answer selection)

19. It is a standard practice in my country healthcare system to record COPD patient data.

a. Yes, it is recorded in a national database
b. Yes, it is recorded in a regional database
c. Yes, it is recorded into a database that is not accessible outside of an individual practice
d. No, it is not recorded
    i. (Comment field to provide rationale on answer selection)

20. (IF YES TO QUESTION 18): In general, I believe that the recording of data meets sufficiently high standards of accuracy and usability. (Likert scale Fully agree-Fully disagree / I don't know)

21. Patients generally adhere well to treatment plans. (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

22. Patients are generally given the educational and material support they need to manage their COPD after diagnosis. (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

23. Patients generally have significant barriers to accessing adequate COPD care (i.e. clinical interventions, hospital care, or seeing the doctor or getting home care) in my country. (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

24. Patients generally have significant barriers to accessing medication for COPD in my country. (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

25. The following factors are significant barriers to access to COPD care for patients in my country (select all that apply):
    a. Socioeconomic status
    b. Sex/gender
    c. Sexual orientation
    d. Ethnicity
    e. Religion
    f. Geography (distance)
    g. Lack of insurance coverage
    h. Lack of affordable care and treatment options
        i. (Comment field to provide rationale on answer selection)

26. Access to and quality of care is similar across the entirety of my country (i.e., there are no significant regional differences in access to and quality of care within the country). (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

27. Healthcare professionals in primary care settings generally have adequate resources to accurate and effectively diagnose and manage COPD in my country. (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

28. There are clear care pathways for COPD care and management in my country's health system. (Likert scale – Fully agree-Fully disagree / I don't know)
    a. (Comment field to provide rationale on answer selection)

29. Do patients have access to digital tools and/or platforms that aim to support improved management of COPD? (Yes/No/I don't know)
    a. IF YES – Please provide any additional information about the tools and resources here (Open-ended)
    b. IF YES – Are costs for these tools and resources covered or reimbursed by the public insurance scheme(s) in your country? (Yes, fully covered/Yes, partially covered/No, not covered/I don't know)

Section 6 – Future perspectives on COPD care

In this section, you are asked to provide your expert perspective on the future of COPD care in your country. Please indicate how likely you believe the outcomes in the following statements are. Note that you asked to provide responses based on what you believe to be most likely and not most preferable.

30. Guidelines on COPD prevention, diagnosis, and management will become more harmonised on an international level by 2035. (Likert scale – Very likely-Very unlikely / I don't know)
    a. (Comment field to provide rationale on answer selection)

31. The burden of COPD in my country will place significantly more strain on my country's healthcare system by 2035. (Likert scale – Very likely-Very unlikely / I don't know)
    a. (Comment field to provide rationale on answer selection)

32. There will be improved sharing of best practices and knowledge related to COPD diagnosis, care, and prevention between stakeholders in my country with those in other countries by 2035. (Likert scale – Very likely-Very unlikely / I don't know)
    a. (Comment field to provide rationale on answer selection)

33. Implementation and execution of plans and strategies to address COPD in my country will significantly improve by 2035. (Likert scale – Very likely-Very unlikely / I don't know)
    a. (Comment field to provide rationale on answer selection)

34. Stakeholders working to reduce the burden of COPD in my country will have compete more aggressively against stakeholders working with other disease areas in my country for attention and resources in 2035. (Likert scale – Very likely-Very unlikely / I don't know)
    a. (Comment field to provide rationale on answer selection)

Section 7 – Consent and release

35. I consent to having my responses published in an anonymised format in final reporting based on the data collected through this survey form. (Yes/no)

36. I consent to being contacted by the Copenhagen Institute for Futures Studies (CIFS) if CIFS would like to acquire additional permission to use my responses in other related outputs related to this study. (Yes/no)

37. I am interested in participating in an additional and separate global foresight study on the future of respiratory health conducted by the Copenhagen Institute for Futures Studies. (Yes/no)

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